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NOTICE TO SUBSCRIBERS.

The Thirteenth Volume of this Journal begins with the present number. Those of our readers whose term of subscription has expired, and who have been notified by our usual circular, will confer a favor by responding as promptly as possible, as all subscriptions terminating with the last volume will be discontinued if not renewed.

Oppressive Laws in the South.

IN many of the Southern states—in fact, in a majority of them—there exist special laws that impose discriminating burdens of taxation upon non-residents. They are particularly severe upon the representatives of northern merchants and manufacturers who send their travelers into those states to supply customers with goods. These burdens take the form of special license fees, and these are exacted in every county, town or city in which the traveler attempts to do business. In some cases these taxes amount to five or ten dollars a day; an item that aggregates an important sum in the expenses of the traveler. But beyond the mere item of money exaction, the injustice of such special taxation is felt to be an outrage, and engenders much ill-feeling. Merchants resident within these states are not required to pay this tax, hence, travelers and their employers feel that to exact it of them is in the nature of rank oppression. In the northern states no such discrimination is made between resident and non resident salesmen; on the contrary, every inducement is held out to promote inter-state commerce, and so important a factor are traveling salesmen regarded in promoting trade of all kinds, that special favors are extended to them in many instances. Hotels, for example, give them reduced rates while entertaining them as guests, and leave no effort unturned to secure their patronage. In many portions of the south the reverse is the rule. Not only is the traveling salesman charged a round sum for a license in each place he visits, but landlords apparently regard him as legitimate prey. It is a reproach to the government of these states that these objectionable laws are permitted to remain upon their statute books. The Supreme Court of the United States has declared all such state laws as impose a discriminating tax upon non-residents, exempting residents from their operation, to be unconstitutional and void. Yet they are still enforced in some of the southern states, and travelers far from home and among strangers, prefer to pay the unjust exaction to contesting the matter in the courts. It is a miserable paltry way of raising revenue. It is virtually saying that the south regards all non-residents as legitimate subjects to plunder, and that what can be filched from them shall go to lessen the taxation of her citizens.

The southern states have made wonderful progressive strides in commerce and manufactures during the past few years; they are now inviting northern capital to come and aid them in developing their immense resources, and urging manufacturers to make their homes within their borders. At the same time they leave these proscriptive laws unrepealed, a constant menace to free commercial intercourse, and a rankling thorn in the sides of all who are forced to submit to them. This policy of restricting inter-state commerce is unworthy of the south, and is operating greatly to her injury. Many merchants refuse to submit to the annoyance and expense imposed by these discriminating laws, and refuse to send their travelers into those states where they exist, and, consequently, southern merchants are deprived of many advantages they might otherwise enjoy. It certainly is a great advantage to merchants to have the products of the world—embracing all that is new and desirable in all classes of goods—brought to their doors, enabling them to select their stocks without neglecting their business, or incurring the expense of long journeys, in order to visit the different manufacturing centers. And this is precisely what the traveling salesmen do, selling their goods in the cities of the south as cheaply as they could be bought at the factory. Were these discriminating taxes removed, still greater advantages of trade would be given southern merchants than they now enjoy.

But this dog-in-the manger policy referred to, is bound to react upon the south eventually. A new impetus has lately been given to southern enterprise, and it will not be long before she will produce more of certain articles than she can consume, and will be soliciting commercial intercourse with the states of the north. So long as she keeps her own doors barred to inter-state commerce, she will find difficulty in securing a market for her own products. A reciprocity of interests is the only basis on which a lasting commercial intercourse can be maintained between nations or localities, and any restrictions placed upon such intercourse cannot but result disastrously to the one imposing them. Especially now, when the south is seeking to become more of a commercial and manufacturing section than heretofore, would it be a gracious act to repeal the obnoxious laws we have referred to. Not only are they unconstitutional, but they are unworthy the dignity of any state or any people. Southern merchants, who are so largely under obligations to commercial travelers, should hasten to secure the repeal of all laws that discriminate against them, or that deny to them the rights they enjoy in other states. We appeal to the jewelers of the southern states to take the initiative in this matter, and use their influence to secure legislative action that will remove these unjust laws from their statute books.

M. Saunier and the Little Clique.

THERE are few names better known to the students of horology or its practical exponents than that of Claudius Saunier, of Paris. As a practical horologist with an extended experience, as the author of numerous works upon the subject, and as the editor of the *Revue Chronométrique*, he has done as much as any other living man for the promulgation of horological truths, and for the elevation of the science. He found the watchmakers of Paris a down-trodden, ill-paid class, doing their work mechanically, and ranking among tradesmen little better than the street scavengers. He went among them doing missionary work, laboring equally to improve their physical condition and their scientific knowledge. He established a school for the education of apprentices, contributing liberally to its funds, inducing others to contribute, and establishing a library for the use of the school, to which he gave several hundred volumes of useful works. The school not only flourished, but led to the establishment of others, both in France and other European countries. It is largely through the influence of these schools, of which Mr. Saunier was the originator, that the watchmakers of France have been lifted out of their former degraded position, and now rank first among the tradesmen of that country. M. Saunier is now over eighty years of age, and his whole life has been devoted to the science of horology and to the elevation of the men engaged in watchmaking. Now, in his old age an attempt is being made to belittle him, and to cast a reproach upon him. It appears that a syndicate was formed some time since, for the purpose, as we understand it, of controlling the horological schools, and the *Revue* was selected as the organ of the syndicate. A small sum was paid to M. Saunier for the publication of the reports of the meetings of the syndicate, and its members were subscribers to the paper. The syndicate has fallen into the hands of a small clique that is inimical to M. Saunier, and they have notified him that they will no longer pay him for printing their procedings, or subscribe for his paper. This is an exhibition of petty malice too contemptible for serious consideration, and betrays the smallness of the calibre of the men who are guilty of it. The record of M. Saunier cannot be tarnished by the action of men who take this method to exhibit their jealousy of his superior attainments. His name will live so long as horology remains a science, and the elaborate works he has written upon the subject will be text books for beginners, long after the names of his persecutors have been forgotten. M. Saunier is entitled to the sympathy of the trade in all parts of the world, in his contest with a little clique that seeks to rob him of the credit due him for his life-long efforts in the interests of horology.

A Barefaced Attempt at Swindling.

AN attempted fraud of considerable importance has just been unearthed at Philadelphia. It appears that a person representing himself to be the manager of the Whiltman Manufacturing Company, having offices at 912 Arch street, has been ordering goods from abroad, forwarding in payment therefor, what purported to be a certificate of deposit in the National bank of Brazil. This certificate was clumsily forged, and, of course, the swindler had no funds on deposit. The letter-heads used by the swindler represented that the Whiltman Manufacturing Company had branches at Lima, Venezuela, Guatemala, San Salvador, Quito and Mexico, and goods were ordered to supply these establishments. A foreign manufacturer who had been solicited to send goods, caused an investigation to be made by the Post Office authorities of Philadelphia, when the fraud was discovered, but the perpetrator had escaped. Numerous letters of inquiry were also received by various respectable Philadelphia firms, and also by the commercial agencies, indicating that the swindler had sent his orders broadcast throughout the world, relying on the well-known credulity of manufacturers to fill them without investigation. It is not believed that he succeeded in securing many, if any goods, on his spurious certificates of deposit. The assumption of the name of Whiltman Manufacturing Company was intended to impress foreigners with the idea that the orders emanated from the well-known Waltham Company. When the detectives visited No. 912 Arch street, on the door of a small room was found the sign of the Whiltman Manufacturing Company, but the door was fastened with a padlock. The lock was forced and the room was entered. It was entirely destitute of furniture, and two heaps of paper were on the floor. The letter-box on the door was examined, and two dunning notes from Mr. Smith, for rent, were produced. Among the litter on the floor were several packages of letters in the French, Spanish and German languages, without address or signature, written on paper with the printed heading of the "Whiltman Manufacturing Company," which was embellished with a representation of a dozen prize medals, and a cut of a manufacturing establishment in full blast. A scrap of paper was found which appeared to be a fragment of a certificate of deposit in the "National Bank of Brazil" for $400, the words quoted showing on the "tint" of the bogus certificate.

The letters found were worded similarly, and conveyed the request that samples of watches, jewelry, etc., be sent to the "Whiltman" concern, which proposed to conduct an agency for the sale of goods on order. Mention was made that a certificate of deposit was inclosed as collateral for the safe return of the samples. The writer intimated that orders depended on reasonable prices and prompt delivery.

SUPERINTENDENT Byrnes, of the detective force of this city, has received from London a full description of the diamonds, diamond jewelry and precious stones recently stolen from the Hatton Garden Post Office, London. As it is believed that the thieves have escaped to this country, and will offer the goods for sale here, we give below the list. A reward of £1,200 is offered for the capture and conviction of the thieves, and a free pardon to any accomplice who was not actually concerned in the robbery. The following is the list of goods stolen:

1 diamond bracelet, 3 clusters; 1 diamond ear ring, daisy pattern; 15 coral lentils, and 24 rose brilliants; 1 gold bracelet, 5 pearls, star setting; 8 parcels of rough diamonds; 47 turquoises; 6,000 drilled sapphires; a quantity of small emeralds, 28¼ karats; 2,000 pairs garnet bores; 240 pairs sapphire bores; a quantity of sapphires, weight 695 karats; several rubies and sapphires, weight, 546 karats; a lady's carved half-loop brilliant and emerald ring; 1 diamond locket; 2 enamel watch dials; 2 gold pins; 2 pendants and bowls; 2 parts of movements, numbers 44,717 and 44,718; 1 gold neck chain; 1 double gold locket, fancy pattern, two boxes deficient; 1 silver Geneva watch, No. 15,093; a diamond half-loop bangle bracelet, 7 large stones, weighing over 12 karats, set in silver, remainder of bracelet bright gold, square wire, French style; plain gold ring, 15 karats, set with bloodstone, monogram "A. P." thereon; 2 lady's silver lever keyless watches, Nos. 16,019 and 16,021, J. Hancock; 6 fine silver watches, Nos 6,766 and 6,771; 1 silver Waltham lever watch, No. 1,464,392.

THERE is unquestionably a large amount of goods smuggled across the Canadian border, and offered for sale in the Canadian markets. This is an illegitimate trade that honest dealers cannot compete with. It is impossible for them to pay customs duties on goods, and then expect to sell in a market that is supplied with the same classes and quality of goods that have paid no customs tax. Manufacturers who cater to this smuggling traffic, are virtually cutting their own throats by crippling the regular dealers, to whom they look for custom, in their ability to pay. We see by a Canadian paper that $700 worth of goods were recently captured at Kingston, in the hands of retail dealers, who had bought them of a smuggler. A Boston dealer of questionable reputation, is alleged to have been the prime mover in several recent smuggling operations. The effect of this defiance of the laws of two countries, is severely felt by the retail dealers of Canada, and we hope to see active measures taken to prevent smuggling in future, and to punish all who may have participated in this nefarious traffic.

THE Fifth Annual Meeting of the Jewelers' League was held at Association Hall, in this city, on the evening of January 17. A full report of the proceedings will be found in other columns of this issue of THE CIRCULAR. There was a good representation of members present, and the reports of the various officers showed the affairs of the League to be in a highly prosperous condition. Mr. Gilbert T. Woglom, the efficient President, was unanimously re-elected amid a burst of enthusiasm that must have been pleasing to that gentleman. Mr. Woglom, in a few brief and happy remarks, thanked the members for the confidence reposed in him, and promised his best efforts to promote the success of the League. Mr. Wm. L. Sexton was also re-elected Secretary, a compliment richly deserved by that gentleman for his efficient and conscientious labors in behalf of the League. The Address of the President, the Report of the Executive Committee, and the Secretary and Treasurer's Report, will be read with interest by all persons identified with the jewelry trade. We would remind the trade that the limit of membership in the League is nearly reached, and those who have not yet forwarded their applications, should do so at once, before they find the doors closed against them. The membership is limited to 2,500, and when that limit is reached, all attempts to join will be unavailing, unless vacancies are caused by death. This is the only organization within the trade whose sole duty it is to look after the welfare of the widows and orphans of deceased members, and in this role it has already performed beneficent work that cannot be too highly extolled.

ONE of the most unpopular forms of taxes ever levied by the general government has been the stamp tax. The business community submitted to it patiently as a war measure, for the same reason that the income tax was tolerated, but within a few weeks past there has arisen a general demand among commercial and financial men to have the stamp tax abolished. Several commercial bodies have recently given formal expression to this demand, and yesterday the Chamber of Commerce, the most important of these organizations, added its voice by adopting unanimously, a resolution setting forth, that inasmuch as the revenue of the government derived from import duties and internal revenue taxes, is largely in excess of the amount required to provide for the interest on the public debt, and the ordinary expenses of the government, and the President, the Secretary of the Treasury, and the Commissioner of Internal Revenue having recommended the repeal of that portion of the internal revenue laws imposing stamp taxes, it was therefore resolved that the Chamber urgently recommend early legislation by Congress, which shall provide for the abolition of the stamp taxes, including bank checks, proprietary articles, matches, etc., and that the secretary send a copy of these resolutions to the chairman of the Committee of Ways and Means of the House of Representatives, and the chairman of the Finance Committee of the Senate.

IT IS reported that an attempt is being made to establish a Jewelers' League in Canada, on the same basis of the League in this country. It is scarcely possible for this movement to be a success. The number of jewelers in Canada is too limited, and they are too widely scattered over a large extent of territory to secure that active personal co-operation that is absolutely necessary to success. There does not seem to be a necessity for such an organization in Canada, for all jewelers doing business there, and coming within the requirements of the by-laws, are eligible to membership in the Jewelers' League of this country, and it will be far better for them to aid in strengthening an already established institution, financially strong, carefully managed, and embracing in its membership the most responsible and reputable men in the trade in this country. With scarcely one thousand jewelers in the whole of Canada, from which to draw their members, a Canadian League would find great difficulty in obtaining a sufficient number to perfect an organization, while if it should organize, the cost to each member would inevitably be very high, or the benefit so low as to scarcely be worth caring for. Our Canadian friends will consult their best interests by joining the League of this country, rather than attempt to organize one of their own, which cannot help being a weak, struggling affair, and of doubtful value.

Annual Meeting of the Jewelers' League.

The Jewelers' League held its Fifth Annual Meeting at Association Hall, corner Twenty-Third street and Fourth avenue, in the lecture room, on Tuesday evening, January 17. The room was well filled, there being about 200 members in attendance. Careful attention was paid to the proceedings by all present, and a large number of the members took active part in discussion of the various motions and resolutions offered, and other general business brought up.

At 8 o'clock promptly, Mr. Gilbert T. Woglom, of Woglom & Miller, the President of the League, rapped his gavel on the table, and the meeting came to order.

President Woglom announced that the following would be the order of business pursued during the course of the evening, there being no objection interposed thereto:

I. Call to Order.
II. Reading Minutes of the last Annual Meeting.
III. Introductory Remarks by the President.
IV. Reports—*a*. Examining Finance Committee; *b*. Secretary and Treasurer. *c*. Executive Committee.
V. Reading Communications.
VI. Miscellaneous Business.
VII. Election of Officers.
VIII. Unfinished Business.
IX. Appointment of Examining Finance Committee.
X. Adjournment.

Mr. William L. Sexton, of Sexton & Cole, the Secretary, read the minutes of the Fourth Annual Meeting, which were, on motion, adopted as read.

President Woglom then delivered the following introductory remarks, which were well received and frequently applauded.

PRESIDENT'S ADDRESS.

On the 26th day of May, 1877, the League was founded, and during the remainder of that year the nucleus was formed to the number of 132. At the close of 1878 we numbered 297, at the close of 1879 a membership of 563; 1880 a total of 1,040, and at the close of 1881, at this meeting, we number 1,654 members.

Gentlemen, it is this number of men, located in all parts of the country, in Canada, and even in France, whom you, as resident members, are expected to represent in your deliberations this evening.

The past year has been an important one in the history of associations similar in purpose to our own League It became evident prior to the last year that, although the laws of our State were ample for the incorporating of charitable and benevolent societies, still, after having been organized, there were no laws by which they could be protected as such from the onslaughts of those whose interest it was to have their beneficent work cease.

After having acted on the defensive as long as it was deemed politic to do so, the Union of the Mutual Benefit Associations of the State of New York (in which the League is represented), after having prepared the State Senate and Assembly for its favorable reception, in May last sent a delegation, accompanied by legal gentlemen, to Albany, and there and then was drafted a bill which, from the time of its writing until it received the Governor's signature and became a law, required but six days. Our own League has the honor of having been represented in that delegation. This law affords protection to all benevolent societies in that it requires all to make an annual exhibit of their methods of work. If properly conducted, and in the interests of the members, we have nothing to fear from its publication. If apparently mismanaged, or operated in the interest of office-holders, this law provides efficient means for determining whether it be for the public good that such societies should continue their work. This law at the same time throws around legitimate societies such safeguards as will prevent them from persecution or oppression by inimical interests. It is a good law as it stands, and faithful watch is being kept that it may not be amended by any succeeding Legislature, except with our approval.

Another event of the year has been the discovery of the existence of several thousand dollars in the jewelry trade, the balance of a fund raised in charity for the benefit of the sufferers by the Chicago fire of 1871, and every dollar of it just aching to be used in some other benevolent way.

In June last the President took the initial steps toward conveying that fund into the treasury of the League. A course of procedure was developed which, in all probability, will in time place the greater part of it where you all think it belongs.

Earnestly assisted by the most available members in each instance, they have up to the present time secured the gift to the League of their respective shares by the following named original subscribers :

Colby & Johnson, Cox & Sedgwick; Hayward & Briggs; Miller Bros.; Wheeler, Parsons & Co. (now Wheeler, Parsons & Hayes); Palmer & Capron; D Bruhl (now D. & M. Bruhl); Hodenpyl, Tunison & Shiebler (now Hodenpyl, Tunison & Co.); Brainerd, Goddard & Steele (now Brainerd & Steele); S. M. Lewis (now S. M. Lewis & Co.), J. W. Fooler & Co.; (Courvoisier, Wilcox & Co.), Henry Ginnel; Estate of Paul A. Brez.; J. D. Brez; Vulcanite Jewelry Co.; Brown, Cook & Co., and Maass, Groeschel & Co. (now Cook, Groeschel & Co.); L. Strasburger & Co.; Th. Bloch & Bros. (now Bloch Bros.); J. W. Johnson; J. M. Morrow; L. & M. Kahn; Brooklyn Watch Case Factory; Lincoln, Tifft & Co.; Joseph Fahys; T. B. Bynner & Co.; Julius Levin; F. F. Braillard; H. E. Droz; J. A.

Abry (now C. L. Abry); Fellows & Co.; Henle Bros.; F. Kroeber; Cooper, Fellows & Co.; A. Wallach & Co.; Geo. O. Street & Son; Hessels & Ludeke; Freund, Goldsmith & Co.; George W. Pratt & Co.; H. F. Barrows; Estates of L. Durr & Bro.; Smith & Hedges (now Wm. S. Hedges & Co., and Alfred H. Smith & Co.); D. H. Wickham; E. & D. H. Stites (now E. Stites, and D. H. Stites & Son); J. B. Matthewson & Co.; Samuel W. Chamberlain; Giles, Wales & Co.; William S. Hicks; John A. Riley & Co.; H. A. & G. M. Church; J. W. Richardson & Co.; Julien Gallet; Sillcocks & Cooley; Jacobs & Pratt; Victor Bishop (now Victor Bishop & Co.); M. Fox & Co.; I. Sturn & Co.; Chas. Rubens & Co.; E. C. Dunning & Co.; P. E. Robinson, Eisenmann Bros.; Geo. W. Platt (now James W. Todd); Sussfield, Lorsch & Co.; Earle & Franklin; John E. Hyde's Sons; E. Ira Richards & Co.; Bruno & Son (now C. Bruno & Son); E. Obermeyer & Bro. (now Henry Obermeyer); Saltzmann & Co.; Samuel Eichberg; A. Errico (now Errico Bros.); Ketcham Bros. & Co. (now Ketcham & McDougall); R. Kipling & Son, and J. T. Scott & Co.—a total of 75; that is, 62½ per centum of the available subscribers, and 53 93-100, practically 54, per centum of the whole present amount of the fund.

Several subscribers have stated that when a majority had donated they would follow. The present state of the case will admit of their fulfilling their promises, viz.: 62½ per centum of the subscribers, 54 per centum of the amount.

I desire to thus publicly express to those generous-minded gentlemen, and to the successors of those who are deceased, our profound gratitude for their gratuity, and I am sure that I express the sentiment of every member of the League both here and in every city and town in this broad land.

There are a few who prefer that their pittances may remain where they are rather than that they should in any manner benefit the widows and orphans of the members of the Jewelers' League.

We shall continue to hope, however, that their more generous natures may in time prevail, and that "the King may answer and say unto them: Verily, I say unto you, inasmuch as ye have done it unto one of the least of these my brethren, ye have done it unto Me."

Other subscribers are willing their shares should go in any other direction but the one we provide.

One would have his share to be a fund for the relief of aged indigent members of the trade; another would found a bed in some hospital for sick jewelers; another to relieve some class of sufferers outside of our trade—all works of merit, but not money enough. Let us have such distinctly to understand that if either of them will add sufficiently to their shares to actually accomplish their avowed wishes, and place the matter in the hands of the League, we will see that the work is done and their money properly applied in any practicable direction they may designate.

The objectors, however, are creditably few. Among those who have not as yet donated to the League are many who have omitted to do so merely because of the matter having been projected during a busy season, and many of these will, in the early future, give their interests to the League.

I would come short of my duty to you, gentlemen, did I not, as a matter of ordinary business foresight, desire to impress upon you the propriety of taking, at this meeting, proper action to inquire into the methods of business as conducted by organizations of like purpose to our own, both in this country and in Europe, and, by a study of their systems, learn whether or not it be advisable to engraft any of their methods upon our League.

In conclusion, I desire to express my hearty thanks to you all for the confidence bestowed in me by appointing me to the Presidency one year ago to-night, for the encouragement proffered during the year, and especially to the members of your Executive Committee, the Vice-Presidents, and your Secretary and Treasurer, for their unvarying sympathy, support and co-operation during the term just closing.

The report of the Examining Finance Committee being next in order, Mr. D. H. Hopkinson read as follows:

Mr. Wm. L. Sexton, the Secretary and Treasurer, submitted his report, which was, on motion, received and ordered on file.

ANNUAL REPORT OF THE TREASURER OF THE JEWELERS' LEAGUE OF THE CITY OF NEW YORK, JANUARY 17TH, 1882.

	General Fund.	Benefit Fund.
Amount on hand Jan. 18th, 1881	$1,621.17	$ 125.45
RECEIPTS.		
610 Members' Initiation Fees, at $3.00	1,830.00	
610 Members' First Assessments		1,220.00
Amount from Reinstatements during year	60.00	
Interest on Deposits at Union Trust Co.	64.84	
Coupons from 50 Gov't Bond	2.00	
Assessments from Death No. 6		1,962.00
" " " " 7		2,628.00
" " " " 8		2,808.00
" " " " 9		2,876.00
" for Death " 10 in Advance		3,034.00
Total Amounts to Credit of Treasury	$3,578.01	$14,653.45

DISBURSEMENTS.

Beneficiary of J. J. Acheson	$2,498.55	
" Geo. D. Stevens	2,684.70	
" Samuel Strauss	2,718 90	
" Andrew P. McGowan	2,882.30	
Commission of Secretary and Treasurer	726.40	$11,510.85
Amount in Benefit Fund		$3,142.60

MISCELLANEOUS.

Books and Stationery	$ 96.45		
Printing and Stationery	173.50		
Tin Case for Applications	8.25		
Postage and Postal Cards	158 00		
Rent of P. O. Box 4,001 and 3,444	16.00		
2,200 Blank Applications	42.00		
500 Constitution and By-Laws	33.00		
150 Blanks for Change of Beneficiary	4.50		
2,000 Annual Reports and Mailing same	169.00		
Mercantile Safe Deposit Co.	2.00		
Union of Mutual Benefit Societies	85.24		
Rent of Hall for Jan. 17, 1882	11.50		
Stenographer for Jan. 17, 1882	10.00		
Commissions of Secretary and Treasurer to date	129.50	938.94	
Amount in General Fund			$2,639.07
Total Amount in Treasury			$5,781.67

In trust for Executive Committee, $50 Gold Bond, 4 per cent.

WM. L. SEXTON, Secretary and Treasurer.

ANNUAL REPORT OF SECRETARY OF THE JEWELERS' LEAGUE OF THE CITY OF NEW YORK, JAN. 17th, 1882.

Membership of League, Jan. 18th, 1881			1,040
Applications Received during year		649	
Applications Rejected during year	31		
Applications Referred for Investigation, not yet Accepted	8	39	
Members Accepted this year		610	
Members Reinstated this year		8	
Increase of Membership this year			618
			1,658
Members Stricken from the Roll for non-payment of Assessments, *Not One.*			
Members Died during the year			4
Total Membership at date			1,654
Members Died since Organization, June, 1877		9	
Members expelled since " "		1	
Members dropped from Roll since Organization, June, 1877		5	15
Total Membership Number			1,669

WM. L. SEXTON, Secretary and Treasurer.

The chairman of the Executive Committee read the report of that body, which was adopted forthwith and ordered on file.

FIFTH ANNUAL REPORT OF THE EXECUTIVE COMMITTEE OF THE JEWELERS' LEAGUE, JAN. 17TH, 1882.

Mr. President and Brother Members of the Jewelers' League:

GENTLEMEN:—In presenting to you this, our Fifth Annual Report, we would most cordially congratulate you upon our continued prosperity.

During our existence of over four years, we have lost nine members, and have paid their beneficiaries $18,118.40, at a cost to them of only $95.00.

Your Committee have held during the past year, twelve regular and four special meetings, at all of which a quorum was present. We have examined 649 Applications; rejected 31, and reinstated 8, who had been dropped during the year 1880.

We cannot give you an idea of the amount of labor involved in the examination of 649 Applications, besides attending to all the other important matters that came before us. Some of our meetings have lasted five hours, and our Surgeon, Dr. Wilbur, has always been with us, and given us valuable advice.

We would again call the attention of the Members to the fact that more care in filling out applications would save your Committee valuable time and much trouble.

For instance, at one of our meetings we had 96 Applications to examine; 76 were accepted, 6 rejected, and 14 laid over because not properly filled out. All of these 14 requiring more or less correspondence, and a delay of one month.

It has been thought best by your Committee to provide a place of absolute safety for our applications, the loss of which would cause us much trouble and serious embarrassment. They are deposited with the Mercantile Safe Deposit Co., at a cost of $2 a year, and accessible at any time.

Your Committee have in contemplation the appointing of a Physician for the League, in certain large cities like Boston, Philadelphia and Chicago. By so doing we feel assured the interests of the League will be greatly benefitted.

The average age of the membership at our last meeting was 36.98; it is now 35.78.

We are *still* indebted to a small proportion of our members for the growth of the League, but we are glad to say that by their exertions, we are growing more rapidly than any other organization of the kind in the country, and our death losses are less than any other, in proportion to our membership.

We would tender our thanks to Mr. D. H. Hopkinson, for the able and liberal manner in which he has represented us through the columns of THE CIRCULAR.

We now surrender to you the trust committed to us, hoping that our labors will meet with your approval.

GILBERT T. WOGLOM, *Ex-Officio.*
ROBERT A. JOHNSON, W. C. KIMBALL, JOHN D. LYON,
GEO. W. SHEIBLER, STEPHEN P. COX, JAS. P. SNOW,
Chairman Ex. Com.

The Secretary read a communication from Mr. George A. Miller, Attorney for the League, who regretted his inability to attend the meeting.

Miscellaneous business being in order, Mr. Stedman H. Hale, of Chicago, requested the Secretary to read the following proposed alterations in the Constitution of the League, offered by him, and of which due notice had been submitted in writing, to the Executive Committee, thirty days previous to the meeting, and each member of the League having been notified by circular:

To Alter Section 3 of Article II, to read:

"Any man of good moral character and good general health, not over Forty nor under twenty-one years of age, who is now, or has been for one year immediately prior to the date of his application, engaged in the jewelry or kindred trades, is eligible to membership in this League."

To strike out Sections 1 and 2 of Article II., of the Constitution, namely:

SECTION 1. The membership of this League shall at no time exceed twenty-five hundred.
SECTION 2. When the limit of membership is reached, and a vacancy occurs by death or otherwise, it shall be filled in rotation from a list of applicants kept by the Secretary.

To make Sections 3, 4 and 5, of Article II., respectively Sections 1, 2 and 3.

Mr. Hale, in moving to adopt the change in Section 3, Article II., said that the alteration was simply to make the word *forty-five*, *forty*. This change, he argued, was recommended in the interest of this mutual benefit association to keep down the average age of the League, and maintain a healthy death rate. The whole system upon which the benevolent associations were founded, was one of economy in payments and small average age. It was possible, he thought, that the limit of forty-five years maximum age might be maintained five years longer without the average of age running beyond a safe basis. But because the League had experienced a healthy average age and mortality rate during the past five years, was no reason why the age in average might not run beyond the limits of safety, in the years to come, of forty-five.

The President stated that the motion was to strike out the word *forty-five*, and insert in lieu thereof, the word *forty*, in the section referred to, and announced the motion open for discussion.

A sharp and somewhat extended debate was then entered into, in which the expression of opinion was as varied as it was general.

Mr Charles Van de Sande thought the motion rather premature. He had heard of no objection to the present age limit previous to the motion, and did not think it would prove detrimental to the interests of the League to continue taking in members from forty to forty-five years. He thought tampering with the Constitution might induce other members in the future to attempt other changes, thus contributing to, and inviting dissensions, and the less cause for dissension and dispute, the better it would be for the prosperity of the association.

Mr. Hale did not believe in going along in the old rut, when there was good reason to make a change. He called attention to the old fogies in the jewelry trade, who, clinging to the ideas of years gone by, allowed young men of enterprising spirit to run ahead of them in the push for business. All institutions had to be tampered with. He cited other sister associations which had changed their constitutions when deemed expedient. The average age of membership reported at the Third Annual Meeting had been 37.95. The average age at the last meeting had been 36.98. During the past year it had been reduced to 35.78. If the maximum age be brought down to 40 years the average might be brought even lower, and it was on this that a healthy mortality rate depended.

Mr. Henry Hayes believed that the matter was one of too much importance to be decided without full consideration, and thought a committee should be appointed to consider the matter in the light of the experience of the life insurance companies.

Mr. Meyer Bauman favored Mr. Hale's amendment, and countenanced consultation with the insurance companies' statistics, as proposed by Mr. Hayes.

Mr. James D. Yerrington questioned whether the organization was for the purpose of benefitting the jewelers of the country or to keep a low death rate among a few. He was opposed to the change suggested.

Mr. Hale, in answer to a question from Mr. Hayes, stated that in his knowledge with a sister insurance association whose membership was three thousand, and maximum age forty years, instead of decreasing, the average age had increased during the last three years.

The question being called for, Mr. Hale's motion was put and declared lost by a vote of 101 to 61, a two-thirds vote being necessary to amend.

Mr. William C. Kimball thought that the alterations in the constitution, including that we just voted against, proposed by Mr. Hale, and read at the beginning of the discussion by the Secretary, were worthy of consideration by the League, and moved that the subject matter of these two proposed amendments, which were introduced by Mr. Hale, and all other matters needing change or revision, provisions touching a permanent fund, and any alteration deemed desirable for the welfare of the League, be referred to a committee of eighteen, to be appointed by the chair, and that the said committee, after giving the subjects careful consideration, should report by circular to all the members of the League, about the first of December next. Seconded.

Mr. Sexton moved that the motion be laid on the table, and it was so voted.

A motion was made by Mr. Hale, and seconded, that in lieu of proceeding to discuss the changes proposed in Sections 1 and 2 of Article II. of the Constitution, the subject matter be referred to a committee (it resting with the judgment of the chair as to its size and composition), which should be instructed to report at the next Annual Meeting.

The opinion seeming to prevail among many members that Mr. Kimball's motion covered the ground, Mr. Adolphus E. Karleson argued in support of a motion that Mr. Kimball's motion be taken from the table, and substituted for the motion made by Mr. Hale; question being put, it was so decided by the meeting.

Mr. Hale stated that, its legality being admitted, he was thoroughly in sympathy with the motion of Mr. Kimball. If the questions could not be settled by the League in annual session, then let them be settled by a committee.

Mr. Hayes offered an improvement, which was accepted by Mr. Kimball, that the word "November 1," be substituted for December 1.

Mr. Kimball's motion, as improved, was then put and carried.

The original motion of Mr. Hale was lost.

Recess being dispensed with, the meeting then proceeded to elect officers for the ensuing year.

Messrs. Henry J. King and Henry K. Dyer were appointed tellers. Pending the election for President, the chair was occupied by Vice-President Hayes.

On motion of Mr. Kimball the Secretary was instructed to cast one ballot for Mr. Gilbert T. Woglom, of Woglom & Miller, for President, and this being done, Mr. Woglom was declared elected.

President Woglom, upon assuming the chair, responded as follows: "Gentlemen, I will not consume any more of your time than is absolutely necessary to express to you my hearty thanks for this renewed assurance of your confidence in my administration. I heartily thank you. We will now proceed to the election of a third and fourth vice-president. By the constitution, at this meeting our present third and fourth vice-presidents are advanced to the position of first and second vice-president respectively, which leaves the offices of third and fourth vacant. We will proceed to fill these places."

The Secretary was instructed, on motion of Mr. Hale, to cast one ballot for Mr. James P. Snow, of G. & S. Owen & Co., for third vice-president. This was done, and Mr. Snow was declared elected.

Mr. Snow promised that he would try to perform the "arduous" duties of his office to the best of his ability.

Mr. Johnson moved, and it was so determined, that the Secretary be instructed to cast one ballot for Mr. Henry Hayes, of Wheeler, Parsons & Hayes, as fourth vice-president. Mr. Hayes was declared elected.

Mr. Hayes stated that he would make the same promise which his worthy friend, the third vice-president, had so æsthetically expressed.

For the office of Secretary and Treasurer, Mr. William L. Sexton, the present incumbent, was renominated.

Mr. Sexton modestly expostulated against a re-election, stating that he wished to step down and out, in order to let somebody else in. He was tired of lingering among the money bags.

Mr. Hale moved that the President cast one ballot for Mr. W. L. Sexton for Secretary and Treasurer, as the sense of the members that he should sit on the money bags for another year. The ballot was accordingly cast, and Mr. Sexton was declared duly elected Secretary and Treasurer.

Mr. Sexton heartily thanked the members of the League, stating that he accepted the position because he honored and felt proud of the League. He did not think there was an Association in existence that could show a better record than theirs. A whole year passing without one member dropping from the ranks, while 600 had been added, was something indeed to be proud of.

The meeting then proceeded to fill three vacancies in the Executive Committee, caused by the expiring terms of Messrs. Lyon, Snow and Cox.

The following gentlemen were nominated: Joseph P. Bowden, J. D. Yerrington, Stephen P. Cox and John D. Lyon.

It was voted that the ballot be for one member of the Executive Committee.

While this ballot was being taken, the President read a number of communications received by the Secretary during the year, illustrative of the many facetious epistles brought through the mails to him each day.

The tellers reported and the chair announced as the result of the ballot that Mr. Joseph B. Bowden had received 48 votes; Mr. J. D. Yerrington 32; Mr. John D. Lyon 22; and Mr. S. P. Cox 14.

Mr. Bowden was declared duly elected.

A long and wearying debate was then had as to the manner of voting for the other two members of the Executive Committee.

A motion was made that the Secretary be instructed to cast one ballot for the candidates who received the next two highest votes on the list just voted for.

A motion to amend was that the Secretary be instructed to cast one vote for Messrs. Cox and Lyon. This amendment, not being unanimously carried, was declared lost, and the same decision was made with reference to the original motion. By the authority of a unanimous vote, Mr. Lyon was at length elected by one ballot cast by the Secretary.

Then the interest concentrated upon Messrs. Yerrington and Cox, each of whom wished to withdraw in the other's favor. Finally, with these two gentlemen as candidates, a ballot was taken, resulting in the election of Mr. Yerrington.

The President appointed the following Examining Finance Committee for the ensuing year: Mr. Clement B. Bishop, Mr. James A. Bogart, and Mr. Henry C. Ostrander.

In pursuance of the purpose and by authority of the resolution adopted by the meeting, the President appointed as a Special Committee, for the purposes set forth in the resolution, the members of the present Executive Committee, the full board of officers, the ex-officers and ex-members of the Executive Committee.

On motion, the meeting then adjourned, at 10:40 o'clock.

Horology of Old.

BEFORE us lies an old French volume, without date (owing to mutilation); its running title calls it *Horlogerie*, and it appears to have been issued by Sieur Romilly, a very eminent Geneva watchmaker. It contains 63 folio pages of wood engravings of watches, clocks, and watchmakers' tools, and altogether permits a deep insight into the manners and tools with which Romilly, Berthoud, Bréguet, Kessels, Leroy, and so many other eminent horologists worked, and with which they achieved such wonderful results. In the few preliminary leaves Mr. Romilly gives an extract of a watch he made, as follows:

"Extract of the Registers of the Royal Academy of Sciences, of May 10, 1758.

"We, a committee named by the Academy, have examined a watch of Sieur Romilly, watchmaker, citizen of Geneva, constructed to go 378 days without winding.

"It is a seconds and repeating watch. The seconds are concentric. Its movement is composed like ordinary watches, with a barrel, five wheels, and four pinions. Its balance beats seconds. Its fuzee carries 8¾ turns of chain. The fuzee wheel has 96 teeth, which seize into a pinion of 8 leaves. The second wheel also has 96 teeth, which seize into a pinion of 6 leaves. The third wheel has 108 teeth seizing into a 6-leaf pinion. The fourth wheel has also 108 teeth, seizing into a like pinion. Finally the scape wheel has 30 teeth, each one of which causes two vibrations of the balance, which wheel thus makes one revolution per minute. It is easy to see that this watch must make 32,669,200 vibrations, each of one second, and that it consequently will go 378 days with the 8¾ turns which the fuzee wheel must make before it is necessary to wind it again.

"The spring of this watch is not much stronger than that of some watches which only go 30 hours. The watchmaker has been obliged to make the wheels very light, and to render all the pieces and depthings of its movement extremely regular, to control as much as possible the action of the motive force, which would soon be exhausted in a watch made with less care. It must be observed that this one, making in a given time five times less vibrations than the average of ordinary watches, it should only have necessary, other things being equal, a motive power five times smaller, and as the spring of its balance may be twenty-five times less stiff than that of ordinary balances of the same weight, it requires for its going twenty-five times less force than common watches.

"Although this watch is more susceptible than ordinary watches to inequalities caused by heat and cold, and may even be subject to stopping, it should not therefore be concluded from the above exposé, that the Sieur Romilly has neglected any precautionary means to make it go so long a time without winding, which will serve as evidence of his skill in the execution, and his ability in the theory of horology. (Signed), DE MONTIGNI, CAMUS.

"I certify that the above extract conforms to its original, and to the decree of the Academy, this 11th day of May, 1758. (Signed), GRANDJEAN DE FOUCHY, Perpetual Secretary of the Royal Academy of Sciences."

The Chicago Jewelers' Association—Fifth Annual Banquet.

THE prominent gentlemen connected with the jewelry trade of Chicago, comprising the Chicago Jewelers' Association, held their annual gathering at Leland's Hotel, in that city, on the evening of December 29, and partook of an elegant banquet, which is inseparable from such an event. The yearly banquet of the jewelers has come to be regarded as one of the most interesting social events that occurs in that city. Invitations are eagerly sought for, and those individuals outside of the trade who are so fortunate as to secure them, are regarded as unusually favored. The invitations were handsomely and appropriately engraved, forming a very desirable card for preservation as an art example. At the hour specified, 6½ o'clock in the evening, the guests began to assemble, and at 7 o'clock were ushered into the banqueting hall, where a number of tables, artistically decorated with table furniture, choice specimens of the culinary art, and rare flowers, elegant in color and exquisite in perfume. One floral piece that attracted especial attention and commendation, represented a large clock, the case, dial and hands of which were formed of flowers. Mr. H. F. Hahn, President of the Association, presided. The members and their guests, forming a numerous company, were speedily shown to their seats, each finding beside his plate a handsome buttonhole bouquet. Among those present were the following: Benj. Allen, Thomas Coggswell, O. W. Wallis, T. M. Avery, W. A. Giles, C. K. Giles, Peter Lapp, L. W. Flershem, N. Matson, Henry Oppenheimer, S. H. Hale, M. A. Mead, W. F. Thompkins, H. S. Peck, E. V. Wendell, Otto Young, J. Schnering, H. M. Carle, H. H. Butts, H. F. Hahn, L. W. Arnold, Charles Smorowski, Paul Jurgens, S. Anderson, Theo. Kearney, C. H. Knights, W. H. Gleason, N. E. Briggs.

Guests invited by members: B. F. Norris, Dr. Lyman Ware, Maurice Wendell, A. C. Felsenthal, C. S. Shepard, Sol. L. Kaiser, B. R. Chambers, Fred Blaner, F. E. Morse, H. Z. Culver, C. D. Peacock, W. M. Fisher, E. V. Roddin, F. A. Hardy, C. W. Troughton, M. Joseph, E. W. Trask, Maurice Berg.

Guests of the Association: Hon. Carter H. Harrison, Hon. F. W. Palmer, Hon. Wm. Bross, Judge Gardiner, Hon. Thos. Hoyne, Hon. Emery A. Storrs, Rev. E. Hirsch, D. D., Franc B. Wilkie, Herman Raster, Anson Gorton, W. W. Wilcox, J. W. Guest and W. S. Walker.

The menu was elegantly printed upon fringed satin of various shades, and was a very handsome affair. It read as follows:

MENU.

Huîtres en Coquille.
Terrapin, à la Baltimore.
Petites Bouchées, au Salpicon.
Saumon du Kennebec, Sauce Hollandaise.
Pommes Dauphine.
Filet de Bœuf, à la Renaissance.
Supreme de Perdreaux, à la Périgourdine.
Petits Pois.
Riz de veau piqué, aux Champignons.
Asperges.
PUNCH AU CHAMPAGNE.
Canards Canvasback.
Salade.
Charlotte Parisienne.
Jellie Macedoine.
Glace de Fantaise.
Café.
Pousse Café Glace.

The banquet was set forth in Leland's best style, was both abundant and toothsome, and was partaken of with evident satisfaction. When it had been disposed of and the cigars were introduced, President Hahn arose and spoke as follows:

THE PRESIDENT'S ADDRESS.

Fellow-Members of the Chicago Jewelers' Association, Gentlemen:

I have the honor and the pleasure of presenting to you, for the third time, the yearly address giving the status of the Chicago Jewelers' Association, and of welcoming to its fifth annual banquet, not only you who constitute its membership, but the distinguished guests who are here with us to-night for the purpose of sharing in the festivities, with which we close a year which has been free from disappointments and disasters. While I have taken no inventory of the results of our labors for the past twelve months, yet I feel that we have reason to be satisfied, and that you will unite with me in mutual congratulations upon having had a larger volume of trade in 1881 than in any preceding year. Nor is this our only cause for gratification. It cannot have escaped your notice that the Chicago jobber is becoming more and more closely identified and united with the contributory dealers, and that the members of our trade are recognized in the commercial world as active and intelligent workers, and as prompt and reliable merchants. We have added one to our membership during the past year, and twenty representative houses are now enrolled upon our books.

Our aims and purposes have remained unchanged, and we are still unitedly seeking to get more light regarding the commercial standing, the character, and the integrity and business responsibility of our customers. We are, in short, searching in the simplest and most direct form for facts and truth.

It is a noteworthy fact that a so-called "statement," giving the actual standing of a dealer in our special branch of trade, is rarely demanded; nor is it customary to give it; and yet it is generally understood that the legitimate dealer in every business, who makes his true condition known, profits thereby in times of depression, and loses nothing when the trade is prosperous. The estimate of one's strength and ability to meet obligations is often hypothetical, and the failure to perform a contract, no matter what the reason for it may be, creates doubt, and forces creditors to take measures which bring about the downfall of well-meaning and substantial dealers. It is therefore profitable to be candid with one another. Commercial integrity is not a trifle that can be easily played with. There is a written business record for nearly everyone, and it should be the aim to see that it is creditable, for we know full well that a clear record is the "soul" of the merchant.

The reason for seeking this information can be briefly stated. The credit system is one which at all times demands great watchfulness, and requires the exercise of profound discretion. It is, therefore, our constant aim and purpose to obtain special information, and we find the methods of the Chicago Jewelers' Association both consistent and effective, enabling us to place our credits with a feeling of security that we could not well have otherwise.

There stand at this time upon our records, the names of 6,700 dealers, regarding whom 3,521 special inquiries were made, in the course of the past year, while, during the same time, 2,691 letters of information were received. These special letters, together with the report of each member, appeared, as they were received day by day, upon our daily sheet, and were distributed to every member. These statistics illustrate the extent of our system, and the great and constant use made of its results.

And passing now from the graver themes, permit me, gentlemen of the Chicago Jewelers' Association, to call your attention to the fact that we have the pleasure of seeing here to-night, as our invited guests, besides many prominent representatives of other mercantile pursuits and other occupations, one gentleman who, since he last dined at our board, has been triumphantly re-elected to preside over the affairs of our city—Mayor Harrison. I warmly welcome you all, gentlemen, to our annual reunion, and only utter the sentiments of every member of the Association, when I say that I am glad to meet you here. Gentlemen, I thank you for your courtesy.

The address was frequently interrupted by applause.

THE PRESIDENT announced that he had received letters from a number of distinguished gentlemen, regretting their inability to attend the banquet, and tendering their best wishes for the welfare of the Association. He continued: I will now proceed to read the first toast of the evening:—Through all the clouds of darkness and sorrow through which our Nation has recently passed, there is a deep and abiding confidence and bright hope in our future. May I ask you all to fill your glasses and drink standing, to the honor, happiness, and long lite of our worthy President, Chester A. Arthur, President of the United States.

The toast was drunk in silence.

THE PRESIDENT then gave the following toast:

The City of Chicago, the Metropolis of the West; though but in its infancy, we believe its influence extends far beyond the bounds of the State and Nation.

I have the honor of asking the Honorable Mayor Harrison to respond.

REMARKS OF HON. CARTER H. HARRISON.

Mr. President and Gentlemen:

I am one of those men of whom an advantage always is taken. I was to have spoken second to-night, and my friend, Mr. Storrs, was to have spoken first of the United States; but in his extreme modesty—a modesty that is ungovernable, and that he could not overcome, he begged and pleaded with the President to put him a little after somebody else. The question was, who the President would get to speak first, and he concluded he would select the next most modest man in the room, and take me. Now, there is an eternal fitness in putting the City of Chicago first—because, if the City of Chicago is not a bigger thing than the United States, I am very much mistaken. The only mistake that was made was, that they did not put the Mayor ahead of the President of the United States. The thing that is most abused is generally the best thing, and I think the Mayor of Chicago has been more abused in the last few months, than even the President of the United States, and he has had a good deal of it.

Gentlemen, I am a reader of the Bible, and I am going to prove it. The Bible tells me that in the old times, when people were rebellious, the constitution enacted that when they took the name of the Lord in vain, something was done to them. In Egypt the plagues were sent abroad, and the first born were striken down; in Sodom a man's wife was turned to salt, and the result was whenever a man attempted to lick his wife, he got into a pickle after that. All through my Biblical reading I have found that whenever any people were rebellious, at once the Lord sent a plague upon them. Now we have had four months of steady rain, and the people of Chicago, and my friend Bross, and my friend Palmer, to my left, and my friend of the *Staats Zeitung*, have been throwing mud at the Mayor, and the result has been that the Mayor has been throwing mud back at them, and given them a great deal of mud, too. He claims the privilege of doing it. My friend just now said, "You are a first rate Mayor, but you will not give us clean streets." I said, "No, I will not do it; I do not intend to give you clean streets until you behave yourselves." Was I not right? Now I am asked to respond for the City of Chicago. The City of Chicago, with its Mayor, is a member of the Jewelers' Association. What do you gentlemen deal with, but with gems bright and serene, which are nothing hut mud after all. And if the City of Chicago is not decked with more jewels of that kind, pure and uncut, than anybody else, I do not know where you will find it.

The City of Chicago is prosperous, and intends to prosper. To understand what a thing will be, we have to look at it to-day and look at its past, and then by the rule of three to find out what it is going to be. Fifty odd years ago, when my friend Mr. Watson, was already a man doing business, Chicago was but a morass. Along here, where this hotel stands, was a low line of sand, piled up but a few feet higher than the lake, only about a hundred yards wide. To the east of it was the mighty lake, and to the west of it, as far as the eye could see, far on to the dessert plains, there was nothing but a morass—a swamp, growing nothing but wet grass and blue flag. Here, a little way from us to the north, was a fort, in which there was a company of soldiers, protecting a few traders, and around that fort there were a few Indians, who came here to swap off their furs for whiskey and powder. To the south, there was the Indian trail leading to where Michigan City now is, on into Indiana. To the south-west, far down beyond Ottawa, there was scarcely a settlement. To the north-west, clear to Alaska, there was not a white man. This was a wild country; and yet in fifty years what has Chicago become? The Metropolis of a great country, capable of feeding the world, and to feed the world she is determined to do. These states around here, Illinois, Indiana, Wisconsin, Minnesota, Iowa, and Nebraska, to-day have over nine millions of population. Fifty years ago, there was in the whole of that vast territory, not two hundred and fifty thousand people. The state of Illinois, 51 years ago, had but 140,000; to-day Illinois has over three millions of people.

The Mayor proceeded to speak of the growth of the west in general, and Chicago in particular, giving statistics of its production to show its influence upon the whole world, concluding with the prediction that in the year 1900, Chicago would have a million population, and be one of the greatest manufacturing cities of the world.

THE PRESIDENT.—I will now read the next toast of the evening:

"*Our Nation and its Government; if not the greatest, we believe the best in the world, depending upon the integrity, intelligence, and enterprise of its people.*

I have the pleasure of calling upon Emery A. Storrs to respond.

REMARKS OF MR. EMERY A. STORRS.

Mr. President and Gentlemen of the Chicago Jewelers' Association:

It can hardly be expected that in responding to the toast of our nation as a whole, I am to brag concerning it in proportion to that loftiness and effulgency of brag, which has been indulged in with reference to so small a part of it as the City of Chicago. The City of Chicago has become more famous for its brag than for the things it brags about; and it is consistent with the eternal fitness and propriety of things that a city so gifted in brag—which is the spirit of brag made manifest—should have selected for its typical representative, Carter H. Harrison, as its Mayor. I recognize the greatness of Chicago in matters much beyond those which our able and very popular Mayor has indicated. Our city is great, not merely on account of its steers, and its lard, and its lumber, and its Mayor, but also on account of the average of its men, and the magnificent and sterling spirit which inspires them. Our Nation is territorially big; our country is exceedingly vast; we are inclined to speak of it boastingly at times, as reaching from ocean to ocean, and characterizing it as an ocean bound republic. We boast of it because of the great rivers which flow in it and through it; of its mountains which lift themselves way above the clouds, and almost above the stars—of its thousands and its tens of thousands of leagues of prairie, of its meadows and hills; we boast of these things, and of its mines; of its infinite capacity for production; we boast absurdly and most foolishly of these things; these God made, and we, the citizens of Chicago, had no hand whatever in the matter. Greece was a great deal smaller than Illinois, and Athens was a great deal smaller than Chicago. But while Athens was so much smaller than Chicago, and so much less populous than Chicago, while it had fewer steers, and less lard, and less lumber, the name of Athens will live away down in all the centuries to come, long after the memory of Chicago has been obliterated from human records, unless we do something more hereafter than to boast of our physical and material achievements.

It is time that we talked the truth about each other. It is time that we understood ourselves. It is time that we quit pleading the baby act as an excuse for things which we have not accomplished. It is time for us to recognize the fact that this country is great, and that in the toast to which I have the honor to respond, it is not over-praised, because of the sterling quality of the people who inhabit and make it, because of the genius which is enshrined and sanctified within it. This country is great because the spirit of self government has crystalized about it all peoples and all tongues. It has called men here from old Germany, where love of country and personal liberty is a patriotic instinct; it has called men here from every quarter of the habitable globe; and on these great western plains, and in this valley of the Mississippi, where the heart of this great nation, if it is not to-day, soon will be, we have reared a mighty empire; we have brought men from the old Empire state, and from the shadows of the Old South Church, and from the blue grass regions of noble Kentucky, from which our Mayor comes—we have known no distinction of race, color, or previous condition of servitude. It is simply a question of what can a man do best, and, God bless him, let him do the best that he can at the thing he can do best, and build up this great, thriving, and glorious community of fifty millions of people, resolved upon it that there shall be no such thing as political inequality, but that every man shall be justified in the effort of carving out his own fortune, and that his fortune shall be secured under the law after he has achieved it. Without that, this Government is not worth bragging about. You might cover every foot of it down from the waters of the Mississippi, and let it be a nation of mere artificers, and it would die the death of a dog. I have this to say about the Jewelers' Association, and it is true of all classes here, that there is something about them more than their business; that they are citizens, and that they recognize the full right and the full measure of the duties of citizenship. Now, gentlemen, no praises too lofty can be bestowed upon this country of ours, and none too lofty have been bestowed upon it. It is made up, and is great, as I have already indicated to you, not merely in its territorial extent, but for the great things which it has achieved on behalf of civil rights and human liberty. This country is made up of the character of Washington, Jefferson, and Madison, of Monroe and Alexander Hamilton, of the supreme intellectuality of Daniel Webster; of the patient and long-suffering patriotism of Abraham Lincoln; of the stubborn self-reliance of Grant; of the splendid, broad, and comprehensive statesmanship of Garfield; the quiet self reliance of Chester A. Arthur—and the universal good sense of the great masses of our people, in the desire to observe the laws, and to execute the laws, each man the artificer of his own fortunes, each man knowing what is his own fortune, and each man resolving that these rights shall be vindicated. To tell you how great a nation it is, let me tell you just one more word. There never was a time in the height of the imperial greatness of old Rome, when its richest citizen could bring to the protection of his life or property, or his liberty, when either was challenged, one-half the power arrayed for their support, that the humblest artificer in this city, or anywhere within our boundaries, can command when either of them are assailed. It is to-day a nation without a single slave on its soil. This great people, through four years of war, lifted, by a supreme effort, four millions of human beings from the night and degradation of African chattel-hood, into the pure, clear, and bracing atmosphere of American citizenship, and to-day the scars of that bloody war are healed, and its horrors are relegated almost to the mists of antiquity—to-day, north, and south, and east, and west, there is a kinder feeling, and a more thorough brotherhood, and a loftier and more united patriotism than this country has known since the flag of the stripes and the stars waved above it. I conclude, therefore. God bless our Nation.

THE PRESIDENT.—Our fourth toast is:

" *The Judiciary; ever faithful to its trust, and a safeguard to all.*"

I have the pleasure of calling on our well-known citizen, Judge Gardiner, to respond.

REMARKS OF JUDGE GARDINER.

Mr. President and Gentlemen:

I am sure that I fully appreciate the honor of being called upon to respond to this toast, and I quite as fully appreciate that I am talking to gentlemen who will understand what I say, and if I say anything worthy of note, they will make a note of it. We have been told to-night of the greatness of Chicago; we have been told of the greatness of this great nation, of this great country of which we are all proud, and of which we hope to remain proud as long as we live. But we must not forget, gentlemen, that this greatness brings with it its responsibilities, and we must not forget that those who are put into a situation where they must administer the laws of the country, where they must see that it lives up to the great place where it is put, and does its duty, are thus responsible for not only the perpetuation of intelligence in this country, but also that its laws are executed promptly, rightly and efficiently. The body which I have the honor to represent, and of which I only represent the one-fourteenth part, is intrusted, so far as the city of Chicago and County of Cook is concerned with the administration of justice. Sometimes it is justice, and sometimes, I am afraid, it is not; but at all events, I have no doubt we all endeavor to use the best of our ability towards administering it. But, gentlemen, it rests with you whether these efforts shall be successful. You are also a part of the machinery which administers justice. It not unfrequently happens, gentlemen, that some of you are called upon to aid the courts in this great work, and it always invariably happens that you do not want to do it. Now I never could understand why. To be sure, my experience on the bench has not been very long, but my experience at the bar has been considerable, and I never yet have sat in a court, when an active, intelligent, wide awake business man—who is just the kind of a man we want to get on a jury—did not want to get off if he were called there. I do not suppose I could create any general public sentiment on this matter if I were to talk all night. I know that the claims of business are such that gentlemen will evade everything that will call them away from business; but I do know that many of the complaints that are attributed to the courts and justices, and perhaps justly so, are due to the men who evade helping the courts in the administration of justice. I have to sit in the criminal court; it is not a pleasant place to go for a judge, it is not a pleasant place to go for a jury; but there is no place on earth where good, straight, level headed men, determined to administer faithfully and justly the laws of the land, are more needed than right in the criminal court of the City of Chicago. In concluding, the Judge impressed upon his hearers the importance of all good citizens maintaining the supremacy of the law.

THE PRESIDENT.—Our next regular toast is:

" *The Bar: sometimes much abused, but always powerful advocates in assuring and defending our rights.*"

I have the pleasure of calling upon our well-known citizen and friend, Thomas Hoyne, Esq., to respond.

REMARKS OF HON. THOMAS HOYNE.

Mr. President and Gentlemen:

I find that there is one respectable organization in this community which sympathizes with the abuse which the bar receives. I wish all my friends of the profession were in here this evening. I think they would be somewhat reconciled to the abuse we sometimes receive, by this entertainment. This evening's assembly has presented to my mind a very different view from that which was presented to my friend the Mayor—the startling contrast between the year 1840 and the year that is just going out. Your craft to-day numbers, I suppose, hundreds, and probably thousands, in the city of Chicago. By turning over a directory of this city published in the year 1839, you will find 237 business names recorded, one-half of whom had their stores upon Lake street. There were a great many dry goods, provisions, and other things like country stores advertised in that directory. There were six churches, two newspapers and one jewelry store; and when I had the honor of selecting a partner for a wife and was compelled to find that symbol of unity, without which no marriage is complete, I had to seek a gentleman by the name of Isaac H. Sherwood, and it was with great difficulty, from the little stock that he possessed, that I could furnish the necessary bond, which has never since been broken between that partner and myself. Now, I look to this craft as a great agent in civilization. I know that some writers say that without iron there could be no civilization. It is true that iron turns out the plow, and it also turns out the sword, and while one produces the other destroys; but the craftsmen of jewelry promote the peace and take a position in the refinement and advancement of the race in that civilization with which we are blessed to-day. In all times and in all countries the jeweler is found to have some record in the advancement of civilization. Even in the book of Genesis you will find the Israelites borrowing their neighbors' jewels of silver and gold before leaving, and some aspiring artist among these poor people thought he would make a god, and he made a calf. Some Sunday school boy asked his teacher why they didn't make a bull instead of a calf, and the answer was that the stock of material probably run out. We next read of the silversmith Demetrius, in Paul's time, who thought he could make gods faster than Paul could preach up the great unknown God. He was making images of the great goddess Diana, and raised a great mob which compelled Paul to leave suddenly the city of Ephesus. But you come down to the Middle Ages, and you will find jewelers performing a prominent part in the civilization of the world. You will find them in Lombardy and London both, for Lombardy street is called after the Lombards. They invented that bill of exchange which is the great factor in the commerce of the world, and the exchange of money between the different countries led to the foundation of that commercial system which one of our profession, Lord Mansfield, established for the English people. I am glad to see that in the city of Chicago the jewelers of this day are not confined to one, or two, or three, and that it will not be difficult for wives and husbands to get that symbol of eternal unity, the marriage ring, when they need one for the purpose of consummating the marriage tie. Then again, "Things of beauty are joys forever." I have no doubt that the jeweler here, as elsewhere, will command our money and employment whenever it is needed.

THE PRESIDENT.—Gentlemen, our next regular toast of the evening is:

" *The West: the garden which feeds millions, rich alone in its agriculture, and has secured for it a world wide fame, and a home for all.*"

I have the honor to call upon the Hon. F. W. Palmer to respond to this toast.

REMARKS OF HON. F. W. PALMER.

Mr. President and Gentlemen of the Jewelers' Association:

I am hardly a fair witness on the subject of the West. I think I can say, perhaps, what the majority of this assembly here cannot say—that I was born in the West, and the majority of the years of my manhood, with its associations and its interests, have been here. Now, if we ask ourselves why we fall into the habit of boasting of the West, what will the answer be from any one of us? You may say that the West, or what we denominate the West here, is in the temperate zone; that the population was neither burnt up by summer heat nor paralyzed by winter's cold. You may say that the soil is rich as it is; that it was prepared by the Almighty for the hand of man in more magnificence than anywhere else upon the habitable globe. All that is true. You may say that land is cheap and that drags people here, and that is true. You may say that in the States we call the West, which means the States of Indiana, Michigan, Wisconsin, Minnesota, Illinois, Iowa, Nebraska, Colorado, Missouri and Kansas, the majority of all the cereals of the United States are produced; that more than one-half of the beef and pork and products of all kinds are produced—more than are produced in all the United States besides. But this does not make all that we regard as valuable in the West. What else is it? It is because the population of the West, like the population of the East and of the South, are equal, standing upon a political plain, all the equal of the others in rights and privileges. It is for this more than for all the other considerations that your people come from across the ocean to make their home here. It is because they separate the ties and associations of years and leave the graves of their kindred to come here and make their homes, because of the privileges that there are here to every man and every child to become the equal of every other child and every other man. It is because the laws do not put their hands heavily upon any one class, poor or rich, and keep them down; it is because we do not have to bow our heads and doff our caps to every snob of a lord or earl of any kind whatever, feeling that we are rather entitled to have the cap doffed to us than we are to have to doff it to them. This is the part of it which makes the great West of which we boast so much. The speaker enlarged to a considerable extent upon the freedom and equality of man, which, he claimed, was found nowhere so perfect as in the West. He was frequently interrupted by enthusiastic applause.

THE PRESIDENT.—Gentlemen, our next regular toast of the evening is:

" *The Press: its influence is the prime factor in the advanced civilization of the world.*"

I have the honor of calling upon ex-Gov. Bross to respond to this toast. [Applause.]

REMARKS OF HON. W. BROSS.

Mr President and Gentlemen of the Jewelers' Association:

I hardly need to speak for the press, but without your leave in the morning the press of Chicago will speak of you; and my friend the Mayor, and my friend Storrs, and my friend Raster, who is boiling over with a speech, would be very small men, limited to this room, if it were not for the press. Here is my friend Dr. Thomas, who is sitting at my left. He preaches to fifteen hundred or two thousand people, but the press gives him a hundred and fifty thousand as an audience, and there is where this factor of the civilization of the world comes in. It makes these great men, like my friend the Mayor; it shows the world how wonderful is their eloquence and how great is the city of Chicago, and how wonderful is this great Northwest, and how great is its product. The speaker referred to his early connection with the press of Chicago, and of the influence it wields at present wherever civilization exists.

THE PRESIDENT—Our next regular toast is:

" *Our Mining and Manufacturing Interests: their development the source of untold wealth and prosperity.*"

I have the pleasure of calling upon Mr. Hermann Raster, editor of the *Staats Zeitung*. [Applause.]

Mr. Raster responded to the toast briefly and appropriately, and was much applauded.

THE PRESIDENT—Our next toast of the evening is:

"*The Clergy: the great conservators of morals, and the exponents of all that is good and holy.*"

I have the pleasure of calling upon the Rev. Dr. Thomas to respond.

REMARKS OF THE REV. DR. THOMAS.

Mr. Chairman and Friends:

At this late hour I will not enter upon any extended remarks. Indeed, this being my first visit upon such an occasion, I did not begin to take in what it should be, and supposed that the little supper would be over against eight o'clock, and so made another engagement at nine; but I found that I was detained here, and I did not know even until I came to the room that I was expected to make a speech. And then I tried to trade off with Mayor Harrison. I wanted him to represent the pulpit and I would represent the city, but he declined to do it. [Laughter]. Then I tried to trade off with ex-Governor Bross, and I thought I would represent the press and he the pulpit, but he declined. [Laughter.] And so I am left here alone, at the last, to represent this great profession. I think it is fitting, because probably all the clergy in the city would endorse what I say. They all swear by me. [Laughter.] Hence I feel free to speak for them, and now I think that you are very wise in inviting one or two clergymen, because the churches have contributed very largely to the jewelers' prosperity. It is only fair to say that the church to which I used to belong—and belonged as long as they would let me [applause]—that church waged a long warfare against jewelry. I can remember the time when one could not go into a Methodist love feast with a little flower or a particle of gold upon them, but it is only just to history to state that you beat the church [laughter], and now they have come over to your side, and there is not a preacher in the country but carries a gold watch or a silver watch with a gold chain—if he can get it. [Laughter and applause.] Then the Methodists and their ladies represent you immensely on Sundays. The amount of jewelry carried into our churches is almost untold and uncalculated in wealth. [Applause.] It is fitting and proper that it should be so, for, gentlemen, you represent the idea of the æsthetic, the idea of the beautiful. You represent that advanced civilization where this ideal is translated into outward expressions. You represent that profession that has been called upon through all the long ages, as some speaker has said here, to express in these material ways our highest conceptions of the beautiful and even of the Eternal City. I have felt impressed here to-night, gentlemen, with this fact, that it takes a great many different callings and the various differentiations of labor to make up the world. I feel that I am surrounded with very strong men, representing the different professions and the different callings, and representing all different forms of life, and I am glad to be associated with men in the jewelry profession. I never had much to do with jewelry. I was not able to get my wife a gold ring until after we had been married ten years; then ten years afterwards I got her a diamond ring, and I carry a good gold watch to-day, that was given me. And now, gentlemen, I feel that after all these different expressions and speeches, representing the government, and the city, and the press, and representing all our institutions, law and industry, I feel that there is a little space for the clergy.

There is a call for religion in the world. It is a want of man's nature. It is not an invention of the clergy. You might take away all the churches, and all the bibles, and leave man as he is, with the cradle and the grave and the sky above him, and the infinite depths beckoning him on, a man will call for a religion; and I feel, gentlemen, that the great need of this country to-day is a pulpit in profound sympathy with its thought and in profound sympathy with its progress, [loud applause], in profound sympathy with the life of our age, and a pulpit so free that it can stand as a clear reflector of truth between God and man. [Applause.]

I greet you and hail you here to-night as citizens from different countries, representing different languages. I am glad to mingle in this hour, and whilst my friend the Judge of the Court has pleaded for the attendance of citizens upon the interests of the city, I feel like pleading for my fellow-clergymen, and for the great cause of God and humanity, that we all stand by the interests of the soul, that we all stand by the interests of right, that we help to lift our city above its groveling and vice, from beauty up to beauty, and up to adoration. [Applause.]

Gentlemen, I thank you for your attention to these few scattering remarks, and I hope we will come together in that city, the representations of whose glory are found in the most precious pearls and jewels that you handle. [Loud applause.]

THE PRESIDENT.—Our next toast is:

"*The Ladies: whose refined taste and just appreciation of the beautiful in art make them our most liberal patrons and our truest friends.*"

I have the pleasure of calling upon the Rev. Dr. E. Hirsch to respond.

As Dr. Hirsch arose he received a cordial greeting, after which he responded to the toast in a pleasant and humorous manner. He apologized for brevity by saying that he had not been informed till he entered the room that he was expected to speak.

THE PRESIDENT—Our regular toasts of the evening have all been happily responded to. Has any gentlemen anything further to offer to-night? If not, I declare the Fifth Annual Banquet of the Chicago Jewelers' Association closed; and I hope that the Chicago Jewelers' Association may live forever, and be as harmonious as it is to-night and as it has been from the time it started. [Applause.]

This terminated the proceedings, and the guests gradually dispersed, expressing their delight at the success which had attended the Fifth Annual Banquet of the Association.

Refining Gold.

THE method of refining gold in the dry way, or by cementing, has been known for a long time, although some secret-mongers attempt to guard it under an almost inviolate oath. Trials have been made lately to make gold chemically fine by cementing, but losses in gold have occurred, and it has been thought best to adhere to the old way of approximately purifying it.

The author, however, after repeated trials, has satisfied himself that it is actually possible to refine gold to such a percentage as it occurs in commerce, by way of cementing. But the success of the very simple operation depends: 1. From the choice of the requisite materials; 2. From the preparation of the composition; 3. From the degree of fineness of the alloy to be treated; 4. From the degree of heat to be applied.

1. *Cement Mixture.*—Many recipes for its preparation are in existence; for instance, for each part of gold to be refined take 6 parts brickdust, 2 sulphate of iron, ½ alum, 2 cooking salt, 1 nitre, ½ sal ammoniac; or, 12 parts brickdust, 6 cooking salt, 3 sulphate of zinc, ¾ nitre; or, 6 parts brickdust, 1½ sal ammoniac, ¾ cooking salt, ¼ rock salt.

All these recipes, however, give no satisfactory result; the first two, especially, cause a loss of gold (saltpeter and cooking salt must never be used together) and by the use of the latter the gold does not part from the silver.

The following mixture will be found to be the most simple as well as efficacious: 3 parts brickdust, 1 salt, 1 alum, 1 sulphate of iron.

2. *Preparing the Mixture.*—Salt, alum, and sulphate of iron are pulverized in as dry a condition as possible, mixed with the brickdust and well stirred together, until intimately commingled. This powder is next dampened with a little wine vinegar, until it forms a dough, pressed into a clay vessel or crucible, with the gold at the center; the gold, also, if consisting of pieces, may be put in in layers.

3. *The Requisite Fineness.*—Best of all gold is that of from 8 to 12 karats fine. Higher graded ones are not so easily permeated by the composition, not containing sufficient pores, wherefore an addition of copper should be made until reduced to the requisite grade. If less, the remaining gold has not sufficient adherence, and a loss is apt to result.

4. *Temperature.*—The crucible or vessel is put into charcoal, covered, and slowly heated, keeping it at a weak red heat for three or four hours. The length of time corresponds to the bulk of gold to be treated; easiest and best are thinly rolled plates. A weak red heat is unconditionally necessary; because, if raised too high, the decomposition would occur too quickly, and thus would not act sufficiently on the gold. When the vessel is cold, take out the baked cement, part it gently from the gold, and wash this in boiling water. It is now thoroughly porous, of purest gold color, and is to be melted with borax. The process of the operation appears to be that chlorine is developed from the salt under the influence of the sulphuric acid of the sulphate of iron, thus changing the metal under treatment into a metallic chlorate; the fine gold, however, is reduced to a metallic state in the heat; the other admixture remains dissolved in the cementing powder; the alum is intended to make a fusion more difficult, and the brickdust operates, by the partition, a gradual development of the chlorine.

AN ARTICLE recently appeared in the daily press, stating, upon the authority of the United States Commercial Agent at St. Gall, Switzerland, that the American watches fell behind at the recent exhibition of watchmakers' tools and machines, at Chaux-de-Fonds. As not a single American company exhibited either watches, tools or machinery at Chaux-de-Fonds, the maliciousness of the Commercial Agent's statement is apparent. We have seen his report as published by the State Department. It is a gross misrepresentation of the Chaux-de-Fonds exhibition, and its statements are entirely unwarranted by the facts. We respectfully submit to the Secretary of State, that it is not to the interests of American manufacturers or of the importers of foreign watches, to have the facts regarding that great industry so wilfully distorted by an agent of this Government.

Influence on Metals.

A THOROUGH knowledge of the peculiarities, properties, and adequate treatment of metals is of the greatest importance to the worker. It must be his constant aim to study the influence exercised by certain admixtures of bodies foreign to them, and what bearing they have, how they modify certain "angularities;" and should the metal-working craft ever succeed in registering and classifying such changes, a very large step will have been made in advance. What an immense benefit would accrue to it from such a reduction to natural laws, will readily be perceived, if we simply contemplate the va iations produced by a few known alloys.

The changes produced in the properties by such admixtures are mostly of a physical nature, and may, according to circumstances, influence all or singular the different properties, such as compactness, elasticity, brittleness, welding, malleability, etc., to a marked degree.

Best known, because of most importance for many trades, is the influence exerted by a greater or less quantity of carbnn upon the physical properties of iron. Cast iron, as it comes from the foundry, surcharged with carbon, possesses qualities entirely different from steel and wrought iron. Wherefore, on account of the three distinct percentages of carbon, iron presents three different, well-defined qualities. Each of these modifications is of much value to the trades. Cast iron, as well as steel, is not, whatever, suitable but for specific purposes, while wrought iron occupies the middle rank. Thus, while the presence of carbon in iron is the grand desideratum, a trifling quantity even of phosphorous, arsenic, or sulphur, often works decided mischief, making the metal brittle, friable, etc., and deteriorates it so much as to render it unfit for many purposes.

Mr. H. C. Roberts lately delivered an address before the Royal School of Mines, London, and stated several interesting facts, hitherto little known and recognized, showing the great influence which even apparently insignificant admixtures exert upon the properties and fitness of metals.

The presence of $\frac{1}{30000}$ pound of antimony in 1 pound of melting lead, has as consequence that this latter oxidizes with greater rapidity, or is burnt, in air, than the same quantity of lead, devoid of antimony. Lead, possessing more than .00007 of its bulk of copper, cannot be used for the production of the white lead.

Gold with admixture of $\frac{1}{2000}$ lead, or with the same quantity of certain other metals, is so brittle that a rod of one inch in diameter may be broken with a slight tap of the hammer. Copper with a half per cent. of iron simply retains 40 per cent. of the electric capacity of pure copper.

Until lately, nickel was considered a metal which could neither be rolled, nor hammered, nor welded, until Dr. Fleitmann found that by adding .001 part of magnesium, it was endowed with valuable qualities for the trades. A certain kind of cast steel which contains no magnesium, breaks by the first blow of the hammer, while it is made perfectly malleable by an addition of .0008 magnesium. Nickel with an addition of .003 phosphorus is also malleable.

At the exhibition of Paris, in 1878, a great variance of their resistances against fracture was observable among the exposed plates of Swedish puddle iron. The sole difference between them, which could be ascertained by a chemical analysis, was that the good plates contained $\frac{28}{100000}$, the faulty ones, $\frac{21}{100000}$ phosphorus.

Nyst, in Bruxelles, ascertained lately that common gold, by an addition of $\frac{15}{10000}$ silex, becomes so soft that a thin strip bends down by its own weight, similar to a strip of zinc exposed to a flame.

The limit between wrought iron and steel may, according to statements of many metallurgists, be fixed exactly in regard with its carbon, and a certain quality of the former will change into steel by an addition of $\frac{15}{10000}$ carbon. With a presence greater than 1½ per cent. of carbon, it ceases to be malleable, and is then called cast steel.

Not alone an admixture of solid elements, even the gaseous ones are capable of changing the physical properties of metals. This field, however, is still less explored than the preceding one, as the experimenter has to deal with invisible bodies. One well-known fact may be mentioned here, iron, when immersed into a diluted acid, does absorb a part of the hydrogen which has thus been set free, and becomes brittle. This is noticed with more or less effect by soldering steel or iron, for instance, by soldering telegraph wires, and occasions, at times, vexatious consequences.

Tables of Leaves and Pinions.

The following tables, calculated after the formula of Mr. Schouffelberger, and containing only the number of teeth and leaves most in use, have been calculated by Mr. Charles Junod, director of the School of Horology, Chaux-de-Fonds; Mr Rédier, of Paris, we believe, also lately published similar tables.

TABLE I.

To determine the pinion center, knowing that of the wheel.

The pinion diameter is found by multiplying the known wheel diameter by the figure contained in the table, and by dividing the sum by 1,000.

Wheel of 60 teeth,	pinion of 6 leaves	112
" " 60 "	" " 8 "	143
" " 64 "	" " 8 "	135
" " 70 "	" " 7 "	110
" " 75 "	" " 10 "	141
" " 80 "	" " 10 "	132
" " 80 "	" " 12 "	158
" " 96 "	" " 12 "	133

TABLE II.

To determine the diameter of the wheel, knowing that of the pinion.

The diameter of the wheel is found, knowing that of the pinion, by multiplying this latter by the figure contained in the table.

Wheel of 60 teeth,	pinion nf 6 leaves	8.9
" " 60 "	" " 8 "	7.–
" " 64 "	" " 8 "	7 4
" " 70 "	" " 7 "	9.1
" " 75 "	" " 10 "	7.1
" " 80 "	" " 10 "	7.5
" " 80 "	" " 12 "	6.3
" " 96 "	" " 12 "	7.5

TABLE III.

To determine the diameter of movable parts, knowing the distanee of centers.

Multiply the distance of centers by the figure contained in the table; the first result gives the wheel diameter, the second that of the pinion.

Wheel of 60 teeth,	pinion of 6 leaves	1.9	0.21
" " 60 "	" " 8 "	1.85	0.27
" " 64 "	" " 8 "	1.86	0.25
" " 70 "	" " 7 "	1.89	0.21
" " 75 "	" " 10 "	1.84	0.26
" " 80 "	" " 10 "	1.85	0.245
" " 80 "	" " 12 "	1.82	0.29
" " 96 "	" " 12 "	1.84	0.245

TABLE IV.

To determine the distance of centers, knowing the diameter of the movable parts.

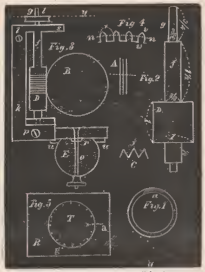
Multiply the sum of the diameters of the movable parts by the figure contained in the table, and divide the result by 1,000.

Wheel of 60 teeth,	pinion of 6 leaves	472
" " 60 "	" " 8 "	471
" " 64 "	" " 8 "	472
" " 70 "	" " 7 "	475
" " 75 "	" " 10 "	476
" " 70 "	" " 10 "	476
" " 80 "	" " 12 "	475
" " 96 "	" " 12 "	478

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

THE cutter for cutting the double compound dividing wheel should be cut up with the graver in lines running oblique to the radius, as shown at *a* Fig. 1, and then hardened as directed in a former number. In cutting the teeth, the cutter should be set a little oblique, as shown at *A;* the obliquity should correspond to the pitch of the endless screw working into it, so that the worm of the screw will lie as in the section of a nut, and hold the tooth firmly and securely. The reader will see that, as the compound wheel was turned on the arbor on which it is to be cut, that it must necessarily be true. It is, I suppose, useless to caution the reader about making all parts of the arbor so that it can be taken out and put back a great number of times, and be true in all instances, as there is no use building a thing on a perfect principle, unless the workmanship is also perfect. There is an adage in popular use that "a thing is all right in theory, but it will not work in practice;" now, this is a great mistake; if a thing is all right in theory, it *must* work in practice; the trouble is the theory is not all right, it is false. Make all your parts perfect (as you can), and the result will pay you; this applies especially to such parts as the screws which go into the lathe chuck; let these have full threads, yet work easily. The compound wheel *B*, Fig. 3, described in October number of '81, is $1\frac{9}{16}$ inches in diameter, or in decimals, 1.561 inches, and is supposed to have 96 teeth cut in it with the cutter of 60 degrees, and described in our last. The next part is an endless screw shown in Fig. 2; this is made of steel, and the sizes are given in the cut. The number of threads on the endless screw *D*, are 20 to the inch. The teeth in the wheel



B should not be cut quite to an edge; at *C* is shown a magnified view of about the right proportions. Such a screw can be had of only fine machinists. Goodnough & Wightman, Boston, or Brown & Sharp. The one I use was made by J. McHenry, 927 Filbert street, Philadelphia, and cost me $2.50, and is as good as need be made. The threads are 60 degrees angle, and come to an edge. The position in which this screw is placed, and the frame for holding it, is shown in Fig. 3; *m* is a bar across the bed (*E*) of the lathe to which it is attached by the screw *p;* the upright pin *k* is united by the screw *l* to the piece *s*. The pieces *u u* or *r*, are for restoring the piece *m* every time to exactly the same position on the lathe. After the teeth are cut in the compound wheel *B*, the screws which hold the wheel together (see October number) should be removed, and the two halves turned half way round, relative to each other, and if the divisions are correct, they will exactly match, forming perfect teeth, but if they do not perfectly match, the worm of the screw (*D*) will occupy the center and correct the error. At *t* is shown a grooved pulley; if you can contrive some way by which this can be made to revolve rapidly while the screw *D* is pressed into the teeth of *B*, it will wear the teeth into more and more perfect condition. There should be no lost motion between *B* and *D*, and the spindle and bearings of the screw *D* should be without side or end shake. Now for cutting a wheel of any number of teeth with this system of dividing. The simplest to cut would be multiples of 96, or such divisions as could be made by turning the screw *D* around a given number of times, twice producing 48 teeth, three times 32, etc. Or only half around, producing 192 teeth; but all such divisions will suggest themselves. By using small wheels on the spindle *g* (which is turned slightly taper), and these wheels divided into 21—which is 3 and 7 multiplied together, and another of 20, which is 4 and 5 multiplied together, also one of 22; you can obtain almost any division. These will give any number which can be divided by any of these numbers. Say you wish to cut a wheel with 56 teeth; this number is a multiple of 7; *i. e.*, $7 \times 8 = 56$. Take the 21-toothed wheel and use 36 teeth. The rule for this is: if you multiply the number of teeth in small wheel by 96, you get at the number of spaces at your command; that is, $96 \times 21 = 2{,}016$; or, use the 20-tooth wheel, and $96 \times 20 = 1{,}920$; $96 \times 22 = 2{,}112$. Now, to find out if you can cut a wheel of the required number of teeth, see if the number will divide either 1,920, 2,016, or 2,112, without a remainder; say it is a wheel of 44 teeth; will $2{,}112 \div 44 = 48$; take the 22 tooth wheel and use 48 teeth. If none of these divisions will cut the number you require, such as 71, 133, or any number as admit of no division, your way is to divide a wheel by spacing with dividers. One might, at first thought, fancy this was no very accurate way, but a little thought will convince you that it is quite accurate enough. We will suppose it is a 71-tooth wheel to be cut; we space our 71 spaces on a piece of sheet brass, zinc, or cardboard will do; now, each one of these spaces represent $(96 \times 71 = 6{,}816)$ of the circumference of the wheel, hence, if an error of $\frac{1}{10}$ of a space should occur (which would betray great carelessness) on a wheel of 2 inches in diameter, it would be less than $\frac{1}{10000}$ of an inch on the tooth cut. Whatever number you desire to cut, have that number on your spacing, and by using 96 of these teeth, you will obtain the divisions you desire on your cutting engine. The spindle of screw *D* is long enough so as not to interfere with the swinging piece which carries the cutter and thus admits of good sized spacing wheels for high numbers; you might for degrees want to cut 360, but seldom ever in clock wheels you will need run higher than 144. A segment rack can be constructed to work the wheels going on the spindle *g;* that is, if all the wheels are of the same pitch. By this is meant the teeth and spaces are of exactly the same extent, varying the diameter of the wheel to match. To illustrate; we will consider our wheels of 20, 21 and 22 teeth mentioned above. We will assume our pitch to be of $\frac{1}{10}$ of an inch; this is a very convenient number on the account of its being a decimal. We divide this into 10 parts, which are $\frac{1}{100}$ of an inch. The space from the face of one tooth to another (shown at the dotted line *x*, Fig. 4), measured on the pitch line *n n*, is exactly $\frac{1}{10}$ of an inch. The length of a tooth from *v* to *w*, $\frac{7}{100}$, 4 of which should be inside and 3 outside of the pitch line (*u*). The thickness of tooth, $\frac{46}{1000}$, the space $\frac{54}{1000}$. Now, to get at our diameter, take our first wheel, which is 20 teeth, or 200 hundredths in circumference on the pitch line; hence 20 divided by 3.1416 equals 6.36; that is, our wheel in pitch diameter is three-tenths and thirty-six one-thousandths of an inch in diameter, to which we must add three one-hundredths of an inch for the portion of the tooth which extends beyond the pitch line, and as the teeth extend on each side, we must double it, making six one-hundredths, consequently the entire diameter is $\frac{696}{1000}$ of an inch; the 21 tooth wheel $\frac{728}{1000}$; the 22 tooth wheel, $\frac{760}{1000}$. The rack for working these will be described in our next number. In making special divisions like 71, stiff card board can be used, sweeping a circle three or four inches in diameter, and dividing it into the required number of spaces. A small wheel (one of the brass wheels of 20 or 21 teeth) can be used to cement the cardboard to; gum (mucilage) will answer. At Fig. 5 is shown a table made of a piece of thin board (cigar box answers); this is attached to *s*, Fig. 3, by two **T** shaped pieces, screwed to *s*, the top of the **T** going under the piece of board. Fig. 5 is a top view looking down). *T* shows the card board divided into 71 spaces; this number of spaces are not shown, as they would be too small to print well. Now to get 96 spaces out of 71, you will have to revolve the wheel once, and add 25 teeth more; that is, suppose you have a fine-pointed needle thrust through one of the spaces in *T* at small *x;* count around 25 teeth, which we assume is at *g;* here make a mark as shown. If the needle at *x* is withdrawn enough so that it will be free from the table *R*, but still hold to carry the paper dial around, let the needle make a full revolution and pass to *g;* now withdraw the needle entirely, and put it back to opposite *a*. In this way you obtain 96 spaces, without the bother of counting or danger of making a mistake.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box* 3,444, *P. O., New York*, or the office of THE CIRCULAR.

The Annual Meeting of the League was held on Tuesday, 17th January, and will be found fully reported in another column.

The following applicants have been admitted to membership since the last report in the January number of THE CIRCULAR:

January 6th, 1882.

Thomas S. Steele, Hartford, Conn.; C. H. Stetson, Taunton, Mass.; Edw. W. Parker, Geo. F. Cheever, Plainville, Mass.; Chas. W. Durant, George G. Rogers, Lowell, Mass.; A. Judson Rand, Holyoke, Mass.; Benj. B. Savary, Medford, Mass.; Fred S. Gilbert, Horace E. Lincoln, Geo. J. Power, North Attleboro, Mass.; Alexander Henderson, Attleboro, Mass.; Stephen W. Knowles, Providence, R. I.; George S. Wickham, D. A. Skinnel, Berthold Block, Solomon Bass, James M. Morrow, S. H. Monell, Noah Mitchell, Sigmund Lorsch, Antonio Landolfi, Adolph J. Grinberg, Leopold Goodman, Chas. A. Gallagher New York City; Wm. A. Bedson, Frank N. Thorburn, John F. Luther, Wm. H. Einhaus, Brooklyn, N. Y.; Philip Roth, Richard H. Stevens, Syracuse, N. Y.; John T. McGinness, Buffalo, N. Y.; David F. Fero, Corning, N. Y.; George Peck, Naples, N. Y.; Chas. E. Hanson, James Harton, Wm. M. Post, Newark, N. J.; George F. Applegate, Trenton, N. J.; David J. Seifert, Phillipsburg, N. J.; Chas. W. Roberts, Steele F. Roberts, Israel DeRoy, Joseph DeRoy, Pittsburg, Penn.; Chas. B. Mindil, Philadelphia, Pa ; Emil Young, Johnstown, Penn.; T. Wilday Black, Huntington, Penn.; Samuel Carpenter, Mauch Chunk, Pa.; Robert W. Little, Cumberland, Md.; Frank R. Sadtler, Baltimore, Md.; Ralph A. Boyer, Cleveland, Ohio; George C. A. Gregor, Circleville, Ohio; Wm. S. Cornish, Hugh L. Given, Elgin, Ill.; Nils Noren, Chicago, Ill.; Philip Seewald, Hudson, Mich.; James Jones, Lexington, Ky.; T. J. Pottinger, Louisville, Ky.; Rudolph Klarenaar, Nashville, Tenn.; Jamison P. Rouse, Mt. Pleasant, Iowa; Olney R. Simenson, Clear Lake, Iowa; Fremont W. Hancock, Lansing, Iowa; Chas. Van Buren, Augustus H. Lewis, Bolivar, Mo.; Louis C. Bernays, Little Rock, Arkansas; David Goodwin, McKinney, Texas; David Miller, Cheyenne, Wyo. Territory.

Members admitted Jan. 12th, 1882: George W. Royce, Alonzo Hebbard, Jr., Jethro C. Cottle, Gilbert A. Burns, Wilber S. Benjamin, of New York City; John W. Senior, Henry A. N. Goll, Walter M. Elliott, of Brooklyn, N. Y.; Edwin N. Sanford, of Binghamton, N. Y.; Lemuel Fisher, of Flemington, N. J.; Adolph Ludwig, of Greenville, N. J.; John Ott, of Flemington, N. J.; Simon C. Levy, of Philadelphia, Penn.; Wm. H. Blaisdell, Roxbury, Mass.; Thomas Wilkinson, Chicago, Ill.; John W. Ridenour, Bidford, Penn.

Jos. R. Richards, of Chicago, commences the year by handing the Secretary seven new applications.

In consequence of alterations in the interior arrangements of the New York Post Office, the P. O. Box of the League will hereafter be 3,444. Members will do well to make note of the new number.

The special committee of 18 appointed by the President at the Annual Meeting, in conformity with the resolution passed, to consider matters of import to the League in its future welfare, has been convoked by the Secretary for its preliminary sitting and organization, on January 30th. We will report the proceedings in our next number.

Recipes for Galvano-Chromy.

THE most important point by galvano-plating lies in the right proportions of the bath; the following recipes, having been prepared after endless experimenting, should be strictly adhered to, coming to us from an eminent source, and vouched for as correct. The letter "g" stands for gram, and "l" for liter.

Gold bath, for galvanizing: 3½ g. gold dissolved in nitro-muriatic acid, diluted with 100 g. water, and neutralized with bicarbonate of soda until effervescence ceases, then diluted with ½ liter and poured into a solution of 70 g. of the purest cyanide of potash in 1½ l. distilled water.

Silver bath, for galvanizing: 20 g. chloride of silver, dissolved hot in 2 l. water, in which were dissolved from 50 to 70 g. cyanide of potash, and let it settle. The silvering is dead, and takes luster by proper manipulation.

Old or antique silver: As stated in the preceding recipe, the silvering is dead, and in this condition put the article into a solution of from 10 to 20 per cent. of sulphuret of potash, until it turns black in from 3 to 6 minutes; wash well, dry, and scratchbrush moderately, not to reduce the silver coating too much. This change into antique succeeds well only by good and strongly silvered articles; thin coatings would peel off.

Red gold: To the gold bath specified, add half the quantity of the fluid of cyanide of copper, and accompany the gold anode with one of copper of the same size.

Green gold: To the specified gold bath add 50 g. of the described silver bath; for anode use a strip of alloy consisting of 400 g. silver, and 600 g. gold.

The above-given recipes, deductions of a long experience, will serve for the manipulator who still works by "texts." I would make one cautionary remark, however, and say that it is useless to expect too much of a small battery and an insignificant bath. Where large effects are desired, the apparatus must be in proportion, and the workman will have his painstaking rewarded by beautiful products. And I would counsel him to study his work in hand, in order to produce combinations of colors and styles, from the most bizarre to the most elevated, in order to manifold enhance its beauty, and aid the designer. —*J. J. Hess, Vienna, in Centralz. f. Optik u. Mech.*

Emeralds from North Carolina.

MR. W. E. HIDDEN, whose important mineralogical labors in North Carolina have been previously mentioned in this Journal, has recently announced the discovery by him, of emeralds, sixteen miles north-west of Statesville, in Alexander County, North Carolina. The occurrence of beryls of unusual beauty and crystallographic interest was made known some years since by Mr. J. Adlai Stephenson. Mr. Hidden was led by this fact to make thorough and systematic search in the hope of finding them in place, and he has succeeded in finding, not only the ordinary beryls, but also true emeralds. The prevailing rock of the region is a feldspathic gneiss, with a strike N. N. W., and nearly vertical dip. The surface soil often contains crystals of quartz, rutile, tourmaline, spodumene, beryl, etc., and in cross-fractures in the rock beneath, the minerals have been found by Mr. Hidden in place; of these minerals, the emerald-green spodumene (*hiddenite*), and the true emeralds have been the special objects of search, because of their value as gems. The first pocket found has been worked to a depth of thirty-three feet, and has yielded largely of spodumene, but sparingly of the emeralds; twelve similar cavities have been found within an area of forty feet square, yielding emeralds, while still others have afforded quartz, rutile, monazite, mica and other species. So far as the explorations have been carried, the pockets have been in a crumbling condition, and the crystals have been found detached, lying in the bottom of the cavities. As the work is carried down deeper, it is to be expected that the rock will increase in firmness. The largest cavity yet discovered had a depth of sixteen feet, and was three feet wide and seven in length. The surface walls were thickly studded with large crystals of quartz, some of twenty-five pounds in weight, and with them nine fine emeralds. Their form was that of a twelve-sided prism (*I* and *i-2*), with basal planes, all well polished. The largest crystal had a length of eight and one half inches, and an average diameter of one inch. The others varied in length from two to six inches. Most of the crystals found are vertically deeply striated or ribbed, and are transparent, though not free from flaws. In some of the crystals the color near the surface is the deepest and the core is nearly colorless. The North Carolina emeralds do not quite equal in color those from Muso, New Granada, but are nevertheless very beautiful, and will bear comparison with those from other known localities.—*American Journal of Science.*

An Improved Pinion Measure.

EVERY professional man knows that by the construction of the present height guage it is impossible to truly measure the height of all bodies, and a study how to overcome this evil led me to the construction of a very simple contrivance, and one easily applied to many of the guages in use, by which all difficulties will be removed, as may be seen by the following figures and description:—

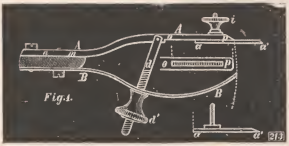


Fig. 1 represents a pinion guage with my appliance. Many of the guages in commerce cannot be provided with it, as they have both handles inelastic, and they must be altered correspondingly. Make face *n m* run truly parallel with *o p*. The small arm *a a'*, of steel, slides in groove *o p;* end *a* of the small slidable arm may, according to need, either be bent or straight, as in figure. Nut *i* serves to fasten both arms in the desired position; arm *B B* is, in common with the ordinary pinion guage, of elastic steel, and closed or opened by nut *d'* of screw *d;* both arms *A A* and *B B* are, at *n m*, connected by means of two screws, or rivets if preferred.

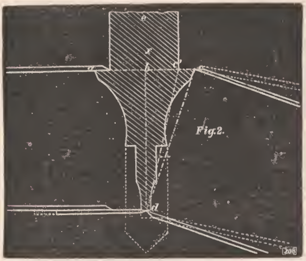


Fig. 2 shows the manner of measuring with the common as well as with my measure; the former upon the right, the latter upon the left of the fig.; *x* is a balance arbor, broken at *e*, to be replaced by a new one; owing to the construction of the watch it is necessary that the height, *b d*, the true distance of the shoulder from the pivot end, be transported exactly upon the new arbor.

As is indicated by the drawing, it is impossible, with the common guage, to obtain the true distance, *b d*. At best, the length, *c d*, or if one arm end is suitably bent, *c' d* may be guaged. Both lines, *c d*, *c' d*, however, are not like *b d*, but are hypothenuses of the same right-angled triangle, of which *b d* forms one of its sides, and, therefore, larger. If the balance or any other arbor is made of common steel, we run the great risk, when using the usual guage, as the dotted lines in fig. 2 show, of guaging, and, consequently, of turning the pivot too large, thereby fracturing it, when turning it out, and it is unnecessary to mention how disagreeable this is. By using my contrivance, however, the repairer runs no risk whatever of obtaining a false measurement.

An Old Clock with Torsion Pendulum.

[In our December number we described, with cut, a new pendulum, the torsion pendulum. One of the most eminent watchmakers of Germany, H. Sievert, however, declares the invention to be American. The principle is causing quite an excitement among European horologists, and we make room for the following remarks from the able pen of the gentleman mentioned:]

A newly patented clock is causing quite an excitement lately, called, for its inventor and time of activity without being wound, "Herder's Annual Clock." The novelty of this invention, as well known, consists of the application of the torsion pendulum, of which a late literary paper expressed the opinion that it would soon drive out of fashion all the antiquated pendulum constructions, together with their familiar old ticking. I am loth to echo the opinion, but will merely mention the fact that already, thirty years ago, America sent us such a clock, which, it appears, met with no great favor at that time; I have seen only one sample of it, which, at the time of writing these lines, stands before me upon the table. The clock is of so singular a construction that an elucidation would, perhaps, not prove unacceptable to our readers.

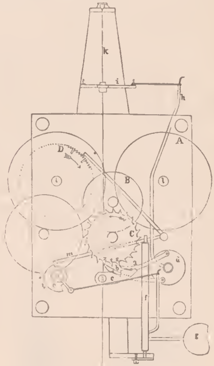


Fig. 1.

As will be seen, the 8-day motion train consists of only three wheels: the drum wheel, *A*, center wheel, *B*, and scape wheel, *C*. The latter resembles the common verge, but the other escapement parts are rather more peculiar. Piece *d* consists of two discs, fastened upon an arbor similar to the discs of a lantern pinion. Two arbors rest upon pivots between them, constituting the easily revolvable fulcrums for arms *a* and *b*. At the other end these arms are carried by two pins through brass piece *c*. Two small hollow planes of this piece are formed thus that the two arms alternately stand high and low, when the escapement piece *d* turns to and fro upon its axis. The arms do not operate as levers, but simply as pushing arms. The function of the escapement is easily understood. In the present position, tooth *z* pushes against arm *b* and turns the disc *d* to the left. Simultaneously, arm *a* passes forward under tooth *s*, until, gradually rising, it encounters tooth *t*. In consequence of a little excess of power, arm *a* at present recoils wheel *a* a trifle, by which arm *b* becomes disengaged, and falls with its pin upon piece *c*, only sufficiently deep to permit a free passage to tooth *z* by the occurring motion to the right of *d*. Slowly rising, arm *b* again encounters the next following tooth, recoils the wheel, and arm *a* again assumes the above sketched position. This movement goes, excepting the pivot holes, without oil, and the sliding friction is confined to the two pins borne by the arms, and is, in tenor with the slenderness of the latter, very small. The clock has no actual fork; the impulse is communicated by lever *h*, by means of a chain link upon lever *i*, fastened upon the very thin steel ribbon *k*. The rotating body suspended from this is composed of three balls, which, for compensation, are mounted upon steel and brass strips. These balls may, by screw worm and nut, be moved to any desired pla e from the center point of motion, whereby the regulating of the clock is effected.

The entire power consumption during a going of eight days is only 0.315 meterkilogram (0 9 kilog. weight by 0.35 meter height of fall). The clock, in common with all others of American make, is of crude construction: hollow pinions with thick pivots, etc.; the small diameter of weight drum *l* must especially be pointed out as very disproportionate; it is not much thicker than the winding-arbor pivots. In view of this defect, aforesaid consumption of power must be called very trifling, and this favorable result may partly be ascribed to the escapement, by which neither an after fall of the wheel nor a waste of power by side pivot-friction occurs, the power operating always in one direction. The chief advantage, however, lies in the long rotating period of the torsion pendulum (four per minute). After a continuous going of thirty years, not even the slightest wear of any part can be detected.

The described clock also contains a striking-train, which, owing to the small consumption of power, greatly differs from the customary arrangement. It consists of only two wheels and two pinions. On the arbor of the last pinion, upon a pivot protruding through the clock plate, sits a crank, which, by a connecting rod, sets the rather heavy hammer *g* into a horizontal to-and-fro motion. The truly vertically standing hammer arbor *f* is supported below by a pivot hole with counter plate. Stop *m*, at each stroke, is raised by the eccentric part of the disc *e*, until the former falls into a notch of the locking washer and deeper part of disc *e*. The motion of the locking washer has been arranged in a very simple and ingenious manner —a part which often causes great annoyance to the watchmaker, when it happens to be divided irregularly.

This locking washer, provided with ratchet wheel-teeth, is fastened with very slight friction upon weight drum *I*, but moves a little too fast in comparison with the proportion of wheel teeth and pinion leaves. In consequence of this, the washer is retarded a little by the stop, at each stroke, and it is thus corrected. A trifling inequality of the locking washer, therefore, cannot bring the striking part into disorder. The unlocking, which is left out of the sketch, in order not to overcrowd it, is similar to that in use.

Undoubtedly, by an exact execution, the present power consumption may still further be lessened, and in this manner an annual clock with weight propulsion (perhaps 4 kilog. by 1 to 1½ meter height of fall) appears to be very possible. Although not having any confidence in the torsion pendulum, I do not hesitate to say that such an arrangement would be quite effective for a show window.

H. Sievert.

[In order to answer the many inquiries made of the gentleman, he published the following complementary description:]

Inquiries have poured upon me from all sides concerning the annual clock spoken of in a previous number of this paper, especially by younger watchmakers, who are desirous of making one. I am really rejoiced to find so much alacrity on the part of these young men to do something, and I cheerfully will endeavor to answer all their questions. Since, however, it is impossible to do so by letter, I choose the vehicle of the horological press.

First, in answer to the inquiries of proportions of toothing. This, of course, is regulated by the height of fall, and, therefore, various proportions may be given. Each one undoubtedly desires to make a nice piece of work, and I would recommend to choose 12-leaf pinions, by taking them all of one size, the teeth may all be cut by one cutter. Under such circumstances, a suitable arrangement would be the following:—

Drum Wheel	120 teeth.	Diameter,	65.6 mm.
First Intermediate Wheel	96 "	"	52.8 "
Second " "	72 "	"	52.0 "
Center Wheel	60 "	"	33.6 "
Scape "	24 "		

Diameter of all pinions, 7.05 mm.; tooth thickness of all wheels, 0.8 mm.

The drum wheel will have to be made at least 3 mm. thick; and if any one thinks that the above-said tooth thickness for the drum wheel might not be sufficient for an annual clock, he may make the first wheel and pinion somewhat larger, retaining the given number of teeth. The height of weight fall, by a drum diameter of 35 mm. and a single cord roll, amounts to 1 meter by the specified arrangement.

If desired to suspend the steel ribbon above the clock train, as shown in above cut, of course the wheels must be arranged in such a manner that room is left for the vertically hanging ribbon. The scape wheel is best placed near the front plate, and piece *c* is screwed to this from within, without foot pins, for purposes of moving. Arms *a b* are only at their fore end a little broader, to better secure their catching. A trifling loss of power is connected with their alternate lifting, but which, if they are made slender, is of no moment, especially since this lifting only occurs four times per minute. The movement needs no oil, as already remarked. In the clock under description, the ribbon is 0.05 mm. thick, 1.3 mm. broad and 2.50 mm. long. While lever *i* describes nearly a half circle, the rotating body has revolved a litt'e more than three times around its axis, as the length of the steel ribbon above the pendulum is proportioned to its entire length as about 1:7. If the necessary room is at disposal, of course arm *h*, together with the entire suspension, may be removed to below. The pendulum suspension is provided with an edge at right angles to the breadth of ribbon, which edge enters into an incision, and a rotation is thus excluded there; the ribbon is thereby enabled to assume its vertical position. The connecting link between levers *h* and *i* must have fully wide and thin holes.

It is self apparent that the torsion pendulum actually is only a kind of balance, in which its spring, the steel ribbon, is applied in a manner empowering it to carry the weight of the balance, whereby its pivots are dispensed with. In this, as well as in the long vibration period, the reason may be found why the clock moves with so trifling a power.

The use of the spring makes a compensation necessary. The fastening of the rotating balls serving for this purpose appears not to have been fully understood by my former description, wherefore I subjoin one at length, with a half-size sketch; *a* is a round brass disc, to which brass strip *c* and steel strip *b* are fastened. Both converge below, and together carry a horizontal screw worm. This, at equal distances, is repeated three times, one for each ball. These are, by means of screw thread and nut, movable at option. No provision, however, has been made in this clock for regulating the compensation, which easily might be introduced by inserting a screw above through brass strip *c*, causing the steel strip *b* to approach or recede. If this is applied, the steel strip then must be loose. The operation is simple: by rising temperature the balls will approach the axis of revolution. The length of the steel ribbon has no noticeable influence upon the rotation period, but it increases the amplitude if the length above lever *i* remains the same.

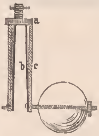


Fig. 2.

H. Sievert.

Patent Reports.

Pendulum Guard.—Henry Slusher, Indianapolis, Ind. Filed Oct. 6, 1881.

Claim.—1. The combination, with the pendulum rod of a clock, of the guard-rod *C*, which extends up in close proximity to the stud or pin *B*, substantially as described, and for the purpose specified.

2. The combination, with the pendulum rod of a clock, of a guard rod or bar and a stud or pin, said guard rod or bar having upturned ends, substantially as shown and described, and for the purpose specified.

Watch Case Center and Pendant.—Edwin H. Arms and Robert J. Quigley, Toronto, Ontario, Canada. Filed Aug. 17, 1881.

Claim.—1. In a watch case, and in combination with the center *A* and pendant *D* thereof, the spindle or sleeve *C*, secured to the center *A*, and forming a bearing upon which the pendant is pivotally held, substantially as specified.

2. In a watch case having its lids fastened to the center by the snap only, the combination of a pendant pivotally held in a bearing formed on a sleeve screwed into the center or a ring within the center, and provided with a cam or projection arranged for the purpose of opening the lids, substantially as specified.

3. In a watch case, the combination of a pendant pivotally held on a sleeve or spindle screwed into, or otherwise secured to the center without solder, and provided with a cam or projection arranged for the purpose of opening the lids, substantially as specified.

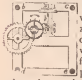
4. In a watch case in which the lids are fitted to the center without hinges, and held thereon by the snap only, the combination of a pendant pivotally held in a bearing formed on a sleeve secured to the center, and provided with a hub having a cam or projection on one side of it and fitting into a recess made in the center between the lids, substantially as and for the purpose specified.

Clock Movement.—Arthur E. Hotchkiss, Cheshire, Conn. Filed May 27, 1881.

Claim.—1. The combination of the front plate, middle plate, and back plate with the actuating mechanism, train of wheels, and verge, all arranged between the back plate and middle plate, the pendulum between the middle plate and front plate, and the dial mechanism on the front plate, substantially as set forth.

2. The pendulum and verge attached to the pivot rod or shaft, near the opposite ends thereof, and on opposite sides of the middle plate, in combination with the actuating mechanism and train of wheels, all on the rear side of the middle plate or between it and the back plate.

Clock Escapement.—Christian Reinhardt, New Haven, Conn. Filed Jan. 31, 1881.



Claim.—In a clock escapement, the combination, with an escape wheel, of a balance shaft placed horizontally with the escape wheel, and having three collets which directly engage the teeth of the escape wheel, said collets being constructed as follows: the first having a dead surface and an inclined or impulse service, the second having a dead surface only and a notch through which the teeth drop upon leaving it, and the third being provided with an inclined surface for receiving an impulse in an opposite direction to the first, as herein described.

Clock Movement.—Arthur E. Hotchkiss, Cheshire, Conn. Filed Jan. 22, 1881.

Claim.—1. A plate supporting the entire movement, and readily removable from the clock case, in combination with a train of wheels attached to its upper part, and a mainspring and main wheel on opposite sides of its lower part.

2. The combination of a winding arbor and a main wheel mounted thereon, with a mainspring and a back plate and bearing-bracket, said main wheel and mainspring being on opposite sides of the lower part of said back plate.

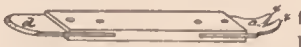
3. The combination of mainspring *E* and main wheel *F*, arranged on opposite sides of the lower part of the back plate, with said back plate and a triangular bracket, *H*, which aids in supporting, guiding, and protecting said spring, substantially as set forth.

Suspending Clock Pendulums.—Henry H. Ham, Jr., Portsmouth, N. H. Filed May 12, 1881.

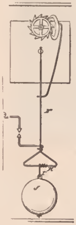
Claim.—1. In a clock movement adapted to adjust itself to operate in either an inclined or level position, the combination, with the e capement wheel and pallets vibrating on a fixed support, of a guide or lever connecting the pallets and pendulum, and having the center of the line of motion of its lower end opposite to and coincident with the axis of the balance lever shaft, substantially as shown and described.

2. In a clock movement, the combination, with the balance lever shaft, of an arm having a tapering pin, by which it is firmly secured in an aperture at the end of said shaft, and provided with a stud for the attachment and support of the pendulum, substantially as shown and described.

Watchmakers' Combination Tool.—Orvis W. Bullock, Springfield, Mass. Filed November 21, 1881.



Claim.—As a new article of manufacture, the within-described improved watchmaker's tool, consisting of the combination in one implement of the watch hand remover *a* and the watch case opener *d*, substantially as and for the purpose set forth.



Adjusting Pendulum.—John F. Lash, Hamilton, Ontario, Canada, assignor to W. Nicholas Miller. Filed Oct. 8, 1881.

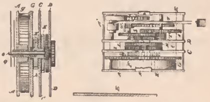
Claim.—1. The combination, with the pendulum *F*, having loop *C*, of the adjustable spring coil *H*, having hook *I*, carrying the ball or weight *J*, as described, for the purpose set forth.

2. In a clock, a pendulum formed of a single piece of wire with a loop at its lower end, and having a laterally-adjustable ball or weight, substantially as set forth.

3. The combination, in a clock, of a pendulum having a laterally-adjustable weight, and provided with a laterally-extending finger or index, and an index secured upon the inside of the clock case, as described, for the purpose set forth.

4. In a clock, a pendulum rod formed with an index finger and with a loop supporting a laterally-adjustable spring coil, having a hook for a detachable ball or weight, substantially as set forth.

Clock Movement.—William Edson Doolittle, West Haven, Conn. Filed June 3, 1881.



Claim.—1. A time-piece in which the mainspring is placed immediately in rear of the dial, and the time-train is journaled in rear of said mainspring, whereby each may occupy substantially the entire space laterally between the pillars or within the inclosing-frame and actuate the hands through the axis of said mainspring, substantially as and for the purpose specified.

2. A time-piece in which the mainspring and time train are separately, and, in the order named, placed between stationary plates directly in rear of the dial, and occupy each substantially the entire space laterally between the pillars or frame, and actuate the hands without the intervention of the usual central or minute arbor, substantially as and for the purpose shown.

3. In a time-piece substantially as described, the combination and relative arrangement shown of the mainspring, time-train, dial, and hands with the intermediate mechanism, whereby said hands are actuated without use of the ordinary central or minute arbor, substantially as and for the purpose set forth.

4. The frame composed of the plate *A*, provided with the pillars *A'*, and the plates *C*, *D*, and *E*, having peripheral engagement with said pillars, in combination with the operative parts of the movement, substantially as and for the purpose shown and described.

FINGER RING.—Adolphe Bonniol, New York, N. Y. Filed Sept. 10, 1881.

Claim.—1. An adjustable ring composed of a body, *a*, having serrated and lapping ends *a'*, a clamp or sleeve, *b*, a pinion, *d*, and means for rotating the same, the parts being arranged to operate substantially as and for the purpose set forth.

2. In an adjustable ring, the combination of a pinion, *d*, and means for rotating the same, by which the ring may be expanded or contracted in circumference, substantially as and for the purposes set forth and shown.

EAR RING.—Henry C. Russel, Mobile, Ala. Filed Sept. 27, 1881.

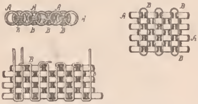
Claim.—In an ear ring, the combination of the lobe plate *A*, and the wire *B*, set at an acute angle thereto, with the swivel *C*, provided with spiral spring *c'* loop *l'*, and handle *l*, as shown and described, and for the purposes set forth.

WATCHMAKER'S AND JEWELER'S TOOL.—Orvis W. Bullock, Springfield, Mass. Filed Nov. 21, 1881.

Claim.—As a new article of manufacture, the within described improved watchmaker's and jeweler's tool, consisting of the combination in one implement of tweezers and the case-opener *c*, substantially as and for the purpose set forth.

CHAIN FOR WATCHES.—George W. Clampitt, Attleboro, assignor to Henry F. Barrows, North Attleboro, Mass. Filed Nov. 29, 1881.

Brief.—The ends of the locking wires are clinched over adjacent links.

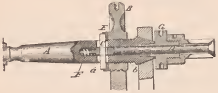


Claim.—1. In the manufacture of chains composed of a series of alternating interlocking wires or links united by wires passing through the links, the manner herein described of fastening the ends of these locking wires or devices, which consists in bending or clinching the same over adjacent links, substantially as explained.

2. In a chain, the combination of a series of interlocking rows of links or rings, with the connecting devices concealed within such links or rings, and secured therein by their points being clinched or bent, substantially as explained.

3. As a new article of manufacture, an ornamental chain composed of a series of rows of rings or links secured together by suitable fastening devices, the ends or points of which are secured by bending or clinching, in lieu of being soldered, substantially as explained.

WATCHMAKER'S LATHE.—Frederic Ecaubert, New York, N. Y. Filed June 4, 1880.



Claim.—1. The combination, with the draw-bar *D*, of the cross-key *C*, nut *B*, and spindle *A*, substantially as set forth.

2. The combination, with the spindle *A*, of the draw-bar *D*, key *C*, spring *F*, washer *E*, having a flange or rim to retain the key, and the nut *B* upon the screw-threaded spindle, substantially as set forth.

3. The combination, in a lathe, of the spindle *A*, chuck-base *G*, chuck, draw-bar *D*, key *C*, spring *F*, flanged washer *E*, and nut *B*, substantially as set forth.

4. The chuck-base *G*, having peripheral holes for the hold-fast *H*, in combination with the chuck and the spindle *A*, into which spindle the chuck-base is screwed, substantially as set forth.

STAFF AND JEWEL PROTECTOR FOR WATCHES.—Samuel F. Stover, Perkasic, Pa. Filed Oct. 7, 1881.

Claim.—1. A staff and jewel protector for watches, which consists of a strong open frame supported upon the watch frame, and extending above the staff and jewels to prevent the case being pressed in upon them, substantially as and for the purpose specified.

2. A staff and jewel protector for watches, which consists of a ring provided with means to support and secure it to the watch frame, said ring being adapted to encircle the staff and prevent any pressure upon the staff and jewels, due to the crushing in of the case, substantially as and for the purpose specified.

3. In a staff and jewel protector for watches, the disc *J*, supporting the ring *E* and having aperture *B*, in combination with a flange *K*, or its equivalent, part of said flange being cut away at *C* to allow the adjustment of the regulating lever, and the disc and flange being cut away at *D* for the admission of the bridge of the watch, substantially as and for the purpose specified.

BRACELET, &c.—James Stanley, Newark, N. J. Filed Sept. 8, 1881.

Claim.—1. The combination, with the sections *A B*, having cogged extremities, of a screw engaging with said extremities and adapted to cause said sections to open and close, substantially as and for the purposes herein set forth and shown.

2. The combination, in a bracelet, with sections *A B*, one or both of which have a cogged extremity, of means, substantially as described, having teeth engaging with said cogged extremity, adapted when operated upon to cause the opposite extremities of said sections to come together or separate, substantially as and for the purposes set forth and shown.

3. As a new article of manufacture, a bracelet composed of the pivoted sections *A B*, having cogged extremities which engage with the screw *c*, the whole being arranged and combined with the box *b* and operating substantially as and for the purposes set forth and shown.

WATCHMAKER'S TOOL.—George W. Johnson, Newton, Ill. Filed Dec. 3, 1881.

Claim.—The tool herein shown and described, consisting of the jaws *a* and *b*, the jaw *a* being flattened and divided to form the fingers or tines *c c*, the jaw *b* being formed with the recess *i*, substantially as and for the purposes set forth.

A Singular Hard Silver Alloy.

AMONG other silver ingots from South America, I some time ago received a bar which, from its color, appearance, etc., indicated to be very pure. When about to cut a piece from it, the ingot offered so much resistance that I was led to rate it only at 0.750 parts fine. The test, however, proclaimed it 0.994 fine, and an alloy of 0.006 sufficed to impart it an unwonted hardness, without, at the same time, interfering with its ductility. An analysis gave as composition of those six-thousandths parts of foreign mixture, 3½ thousandths iron, 2 cobalt, and ½ nickel. I have produced this alloy artificially, and find it to possess all the properties of the ingot. At one of the last tests I took the aforementioned ingredients in equal parts, and I believe that such an alloy would suit admirably for faucets of certain apparatus, medals whose relievos would be far more durable than usual, and for many other applications. I subsequently used it for knife blades, and found that they may be sharpened like steel.—[*Germain Barruel.*

Watch Industry in Russia.

THE *Deutsche Handels-Archiv* contains a report of the commerce and industry in the middle and eastern governments of Russia, especially Moscow, and gives the following about the watch industry:

"The endeavor to manufacture watches in Russia has met with no success. The factory established about two years ago in St. Petersburg has failed. The whole empire, consequently, has to look to foreign countries for its supply of watches. The most celebrated and widest extended German and Swiss houses, such as Moser & Co., Locle; Bovet & Fol, Geneva, etc., are represented by branches in Moscow. Beside these, there are a number of other dealers. Until now, the American product has not been able to obtain a footing in Russia. While watches come almost exclusively from Switzerland, Germany furnishes all kinds and manners of clocks; and Paris, the finer article. It is remarkable that stem winders find little sale, owing, undoubtedly, to the scarcity of watchmakers and repairers back of Moscow, who are able to cope with the complicated mechanism. A small amount only, of the imported goods, pay duties in Moscow. Messrs. Moser & Co., who undoubtedly do the largest business, pay duties upon their goods either on the line, at Reval, or at St. Petersburg. This article has, by the growing national wealth, an important future; because of the 60,000,000 to 70,000,000 inhabitants of the back country, only an insignificant fraction is provided with watches. Duty was paid in the Customs House at Moscow, on the following watches and parts:

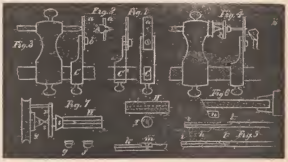
		Duty—Roubles
Movements	6,277	4,075
Gold or gilded watches	8,017	10,421
Silver " "	19,746	12,835
Wooden clocks with brass wheels	28,944	8,653
Steeple clock	1	16
	Pud.	
Parts of watches	513	1,642

"A not unimportant article of importation consists of the large orchestrions (Black Forest organs) by saloon keepers, for the entertainment of their customers; of which, according to the estimation of an expert, about 150 pieces, of a value of from 2,000 to 3,000 roubles, are annually imported from the Black Forest to St. Petersburg, Moscow and Odessa. These instruments, however, are at present also manufactured in Moscow."

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

I SHALL now describe how to turn a balance staff by the back rest system; the turning is done precisely as in the ordinary turns (bow lathe), except the motion is continuous. With nicely made centers, even though not jeweled, your work will be quite equal to most you will be called to repair; still, for greater accuracy, a modified form of back rest is used. The staff is first turned and polished with the double centers, leaving the pivots a trifle too large, so they can be reduced in the final operation. To do this a piece is provided with a conical shaped hole; this is used precisely as the back rest described in our last, except it has not the three adjustable slide pieces; this piece is shown in Fig. 1; *C* is a slide which goes on the lathe bar (like the back rest). At *A*, Figs. 1 and 2, is a small plate of (preferably) bell metal; or to be extra nice, jeweled. A conical lathe center can be passed through one of the heads as shown in Fig. 3; the screws *b* admits of adjustment to line. The piece *C* should be left in position, and the conical arbor replaced by one with the loose pulley, as it is essential that the face of *a* should be at right angles to the axis of the lathe; two or three sizes of holes can be in one plate by changing the position of the screw *b*. At Fig. 2 is shown an enlarged section of staff and plate. The idea is that the conical shoulder of the staff is used as a bearing for turning the pivots, and one error is used to a great extent to correct another. If an appreciable error should exist in a staff turned with two dead centers, *i. e.*, a staff as described above, with the pivots left a trifle too large, much of the error will be corrected if it is put into the arrangement as shown in Fig. 4, the shoulder of the staff running as shown in Fig. 2, and a graver used on the tool rest to turn and finish to the exact size. No distortion in the form of the pivot will occur, as the entire pivot and cone protrudes through the hole in *a*. For finishing and polishing the pivot, procure two ruby files from some material dealer, and mount them on steel wire to stiffen them. These files are generall slips of sapphire, though sometimes pale, imperfect rubies, and are fastened into a piece of brass with shellac. Heat the brass and pull out the slip. Take a piece of steel wire about $\frac{1}{16}$ of an inch in diameter and 2 inches long, and file one-half away from *l* to *i*, Fig. 5; the piece *i* is soft soldered on and undercut, to hold the ruby slip *h*. The ends of the ruby slip should be ground off slanting, as shown on a diamond lap, if you have one; if not, this piece (*i*) can rise over the slip, as shown at *m*. At *f g*, are shown enlarged cross sections of the ruby slip and the steel mounting. I spoke of two slips—both are mounted alike, except on one the edge is ground rounding, as shown at *g*, for conical pivots. Of course, a diamond lap is necessary to round the edge, but one slip, as shown at *f*, mounted as described, avoiding to go against the corner, answers very well. The conical part can be smoothed with a bell metal slip and oilstone dust, but avoid using the oilstone dust on the pivots proper. The slip of



ruby needs no oil or any preparation, except to wipe it with the end of the finger, to clean off the fine particles of steel which will accumulate on it. Such a slip is in fact an exquisitely fine file, which will comparatively never wear out. The writer has one which he has used daily for ten years, and it seems in no way to have deteriorated. If sharp gravers are used, such a ruby file removes all graver traces in a few seconds, and on the application of any polishing material to the pivot, it seems to flash almost instantly with perfect polish. A piece of polished agate about an inch long, $\frac{3}{16}$ wide, $\frac{1}{8}$ thick, set in a handle and shaped as shown in Fig. 6 (*n* is a cross section, the rounded edges for conical pivots), will polish perfectly without any polishing powder (rouge or diamantine). I remarked above that the staff should be polished and finished complete except the pivots, before the back rest was used. Most workmen can polish the round part of the staff all right, but the *flat* faces are a failure. A few essential points kept in mind, and all are easy enough: First, keep your graver sharp, and permit no grooves to appear when done with this tool; *always let the graver perfectly form the piece you are turning;* the grinding and polishing should in no way shape the piece. With the oilstone dust use a flat piece of bell metal shaped like the agate in Fig. 6. The flat faces are polished with a piece of bell metal of the size and shape shown at *H; I* is a cross section. These are also used to polish the ends of pinion leaves; they are round and have a hole drilled through in the direction of the axis; these pieces should have holes of different sizes, so as to nearly fit the staff, or the angle will not be perfect; you will need two sets of these, one for oilstone dust and oil, the other for rouge (steel rouge, not the kind used for gold polish), diamantine and oil will do, though not as well. After the graver, use the oilstone dust and facing tool *H*, until the face is flat; then, with some soft bread crumb (fresh, without crust, and worked into a mass like putty), press the job you are working on into it, and work it about, to remove the oilstone dust; then apply the polishing material with another piece of bell metal (*H*) until, as it revolves it whistles. If the work has been properly conducted on cleaning it it will be found perfectly flat, and of exquisite polish. The skilled workman never uses anything to flatten or square the ends of the pieces (*H*) except a fine file. In using these pieces, the staff or pinion is inserted into *H*, and the motion got by inserting the protruding end into the pit in the arbor with the loose pulley, the surface of the pinion or staff adjusting itself flat to *H*. These pieces (*H*) can be used with a drill bow, by putting a split collet on the staff or pinion you are finishing, and let one end rest in a pit; many workmen let one end rest against their bench vise, as if using a drill with a bow. The order of finishing is to first turn the staff (except the pivots) to exact sizes, allowing $\frac{1}{10000}$ of an inch for polishing. Then with oilstone dust and the bell metal slip, remove all graver marks; next, with *H* and oilstone dust, flatten all the faces; next, with bread crumb, clean the work; next, with steel rouge, polish the round parts of the staff. This course is best, as round surfaces look better with an imperfect polish than flat; lastly, with *H* and rouge, polish the flat faces. If you now put your staff in the arrangement shown in Fig. 4, and turn and polish your pivots; to try your work, you can grasp the pivot as it protrudes through *a*, with your michrometer calipers, and let your lathe turn slow; now, if your pivot was $\frac{1}{50000}$ of an inch out of true, you would see the hand on the calipers vacillate very distinctly. There has been a good deal of argument in regard to the accuracy of lathes, and also whether *all* of the error of the spindle was transmitted to the pivot; there can be no question but all the error is transmitted. The best answer to all such questions is to measure; your michrometer calipers will settle this question to your own and everybody else's satisfaction. I do not recommend you to make all your staffs in this way, especially if you use an American lathe; but if you have a special chuck which goes into the screw chuck you use for wax, which has a pin protruding like the loose pulley, and a nice lot of back centers, it is doubtful if, counting time of removing wax and all delays, the double center would not win. At Fig. 7 is shown the method of using *H*; *p* is the screw clamp described previously; *y* the loose pulley; *z* the end of the lathe arbor; *t* a staff, and it is supposed that the face between *a* and *H* is to be polished. No back center or rest is used; the top pivot is inserted into *z*, and the pulley *y* revolves the staff *t*; of course the end of *H* and face of *t* will come flat together; gently press *H*, and the work is soon done. By substituting a screw collet for the dog *p*, a drill bow can be used—let the pivot *s*, catch in any convenient pit to hold it steady.

Standard Time.

THE question of standard time has been, for perhaps forty years, growing in importance. From the period when chronometer makers were in the habit of taking their chronometers to the nearest observatory, to compare them with the standard clock of the institution, to the present time, when in all the large cities jewelers receive very accurate time signals by telegraph, automatically from the observatory clock, many plans have been proposed for increasing the usefulness and accuracy of the time thus disseminated. Of course, the first point of importance is to have the clock sending the signals accurately regulated. It is clear that on account of cloudy weather and irregularities in the running of timepieces, it is unwise to depend on the signals from any one observatory. This feeling is entertained by all astronomers. The only remedy for this difficulty is in the interchange of time signals between observatories separated by such distances, as will generally insure clear weather for observing the stars at at least one of the observing points. Heretofore this exchange of time has been deemed impracticable, on account of the great expense that would be incurred by the individual institutions.

There has been a feeling of late that all of the observatories now distributing time, ought to co-operate in this matter. Their joint endeavors will, however, need the assistance of some person or corporation controlling great telegraphic facilities. This assistance must be rendered disinterestedly, because the observatories will jealously guard their natural right to the perquisites derived from the sale of time signals, some of them depending on this alone for their entire support. The Army Signal Office has accordingly taken steps toward bringing about this union between the observatories, and they in turn have expressed a hearty willingness to make the facilities offered by the Chief Signal Officer their medium of exchange. It is evident that no better means can be had, as it is the policy of the Bureau to do all in its power to increase the accuracy and efficiency of any work that affects the results to be attained by the service. The Signal Service has the use of telegraph lines extending to all parts of the country, for the purpose of transmitting messages at stated times daily. It also holds most friendly relations with the different observatories, nearly all of them furnishing meteorological data for its use. This co-operation of the observatories would undoubtedly do more than any other step that could be taken toward effecting an agreement in regard to the introduction of a common standard of time. There are now in use by different railroad companies, at least seventy distinct standards of time. The work that is being done by the various scientific bodies, both at home and abroad, in relation to the establishment of a uniform system of time-reckoning, should meet with the encouragement of all who are in any way interested in the subject. A writer in a comparatively recent number of *The North American Review* ascribes to the late Professor Pierce the idea of establishing time meridians one hour apart, so that all timepieces would indicate the same number of minutes and seconds, differing only for the hours, in different longitudes. This division of time will undoubtedly be adopted.

A time signal of quite recent invention is the time ball, of which there are at present about a dozen in operation in this country, the most prominent being that at Boston. This is in the immediate charge of the Signal Service observer in that city. There is now in process of construction a ball of similar magnitude, to be placed in New York, and to be operated by the Signal Service officer at this station. This ball is to be dropped on Greenwich time, and will prove of great benefit to the mariner, as it will fall at the beginning of each hour for five or six consecutive hours daily, thus enabling him to rate his chronometer in a much shorter period of time than is ordinarjly required. A bill was recently introduced in Congress by Mr. King, of Louisiana, to appropriate the sum of $25,000, "to provide for the placing of time balls on the respective Custom Houses, or such other public buildings as are most suitable, at all ports of entry, and at all cities having a population of not less than fifteen thousand, and to provide for the expense of transmitting daily by telegraph, the meridian time of the Naval Observatory at Washington, District of Columbia, to said cities." This money is to be expended under the direction of the Secretary of the Navy. Undoubtedly time balls should be erected in as many cities as possible; but it does not seem advisable that they should be dropped by the signals from any one observatory, but from the combined signals of the different observatories.

Experience has shown that it requires a skilled man at the place of dropping the ball, in order to insure its perfect working. All of the larger cities have Signal Service observers, who occupy prominently exposed positions. These men are thoroughly trained in the use of scientific and mechanical apparatus, and it is evident that as only about half an hour a day is required of a man for the care of the ball, it would be impossible to find a better, cheaper, and more systematic way of managing the time signals, than by placing them in charge of these observers.

AT a late meeting, and upon the report of a special committee, the Société des Arts de Génève has elected several honorary members, among whom we notice the name of G. Rümker, director of the Imperial Marine Observatory, at Hamburg, and V. Kullberg, chronometer manufacturer in London.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Ninety-second Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

ABOUT REGULATORS—THE BEST VIBRATION ARC FOR A SECONDS PENDULUM—THE BEST ESCAPEMENT.

Secretary of Horological Club:

I would like to ask what is the best arc for a seconds pendulum? Most makers make the arc small, but my understanding is that the barometrical error is less where the arc is, say 5°. The great Westminster clock is said to be almost free from barometrical error, with (as I understand) an arc of 5° 30′—what is the objection to a larger arc, if any? Also, I would like to know what escapement can be made to keep the best time, the dead, or gravity? A discussion of the above would be of great interest to an old subscriber, whose name hereafter will be, HAWKEYE.

Mr. Regulator replied that our correspondent's questions covered a good deal of ground, and would require quite a treatise to fully answer. He would, however, endeavor to state the general facts as briefly as possible. In constructing a perfect regulator, every detail is carefully calculated beforehand, in order to secure a correct proportion between all the parts. The construction of the train, the weight, and its shape and position, the style of the escapement, and of the pendulum and its composition, must all be suited to each other, and to the use for which the clock is intended, down to the smallest minutiæ. Consequently there is a certain arc of vibration which the pendulum should have, because all the parts are proportioned with a view to giving it that arc, and the clock should not be run with any other arc than that for which it was intended. If it should be, then the conditions or data upon which the whole was based are departed from, and others substituted for which it was not intended, and may be wholly unfitted. Many watchmakers think it a small matter to make the weight or the pendulum heavier or lighter, to change the form of suspension of the pendulum, to remove one style of escapement and substitute another—but such changes are not allowable in a fine clock, unless on the idea that they are better qualified and better informed than the maker, and competent to improve upon his work. In the case of common or cheap regulators that may very well be so, and also making a new regulator, the question of the best arc, or the best escapement, may properly be discussed.

The object of making the arc small is to approximate as closely as possible to isochronal vibrations. The pendulum is, in nearly all cases, supported by a flexible suspension spring. This spring does not bend all at one point, as a string would do, but in such a manner that the center of oscillation of the pendulum does not move in a circular curve, but one that approximates a cycloid having the length of the pendulum as its radius of curvatare. As the pendulum deviates from the vertical position, this cycloidal curve or path deviates more from a circular arc; consequently, makers have sought to lessen this error by reducing the arc of vibration to the smallest practicable extent, because the variation is the more minute as the arc of vibration is kept nearer to the vertical, and very short arcs are practically isochronal.

But arcs which are extremely short have the objection that the construction of the escapement must be suitable, and it must be finished with the utmost accuracy, as any shade or wear in the fitting would infalliby cause stoppage. The finer the fitting of the clock, the shorter the vibration can safely be made. But as wear and other errors must be provided for, there is a medium taken between the errors of large arcs and the practical objections to very short ones, which each maker adopts to suit his own make of clocks. There is no question but that arcs of only 2° 30′ to 3°, (or 1° 30′ each side of the vertical,) with pendulums of enormous weight, are practically objectionable, although theoretically desirable, and the tendency is to an increase to 4° or 4° 30′, because a slight trembling of the clock's supports, or many other faults, could produce greater errors than a large vibration, and are far more important to be looked after. Even the arc of 5° 30′ used by Sir Edmund Beckett, for the great Westminster clock, is really a very small vibration.

But although, as before stated, the tendency is toward larger arcs, this change is to be understood as being made while planning the clock. After it is once finished, the arcs should not ordinarily be increased, at least not in a fine clock, unless the workman thoroughly comprehends the principles upon which it was based, and can make his changes understandingly. An enlargement of the vibration should usually be accompanied by proper changes in the escapement. Whether the increased arc be obtained by changing the weight of the pendulum, or of the driving weight, or the suspension spring, a corresponding change is required in the length of the escapement arm, and often in the length and shape of the pallet arms, in order to restore the co-relation of all the parts, upon which the quality of the clock as a time-piece depends. It is, of course, impossible to go into details on this point, as it would open up the whole theory and science of horology as applied to clock making. And this brings us to the second question.

Which is the best escapement is still a moot question, and has been as fiercely fought over, and as strenuously maintained, as any of the other disputed points of horology. The trouble is that a positive answer, which shall apply in all cases, is impossible, for what is best in one case would not be best under other and changed conditions. Some base their preference on positive experiment and practical trials, others on settled mechanical principles, but few stop to think that an escapement which is, theoretically, almost faultless, may be practically very inferior in the circumstances of actual use, or may even be impossible to carry out in material form at all. This remark is peculiarly applicable in discussing the merits of different escapements, for that construction which is theoretically the best possible one—an escapement which always gives to the pendulum precisely the same impulse, *i. e.*, a constant-force escapement, is practically impossible. We may approximate very closely to it, and some timepieces have attained to an accuracy which is little less than wonderful—but there is a limit which we cannot pass; when we reach that limit, we are met by a great number of practical difficulties, some of which we may succeed in removing temporarily, but not permanently, while others are entirely beyond our control, so that it appears useless to extend our refinements of execution any further in the former class, because, however successful we might be with them, any one of the others may cause errors which would entirely cover up and neutralize all of our laboriously attained excellences.

This is the reason why that form of escapement which is in theory the best—the gravity or remontoire, is in practice beaten by the dead-beat escapement. The former, while more perfect in principle, is also more sensitive to resistances and disturbing influences. It is also worthy of serious attention that the former has never given *better* results than could be obtained by expending an equal amount of care and labor upon the construction of the latter, and it could maintain that precision of performance *only for a short time*, while the latter would do it permanently. The latter admits of being oiled—indeed, it is desirable to oil the fork, in order to make the fitting as close as possible without danger of friction by too close metallic surfaces. But the gravity arms of the former must never be touched with oil or grease of any kind, but be left absolutely dry and clean, as even the slightest adhesion to the pendulum will be fatal to the going.

It is unnecessary to dwell upon the advantages conferred by the single fact of permitting the use of oil, as by it we avoid the danger of rust and tarnish, besides the lessening of the friction. But even if the surfaces could be permanently kept clean and without tarnish, it is known that adhesion occurs between clean and dry surfaces when brought in contact, and adhesion also occurs at a point where one such surface frequently strikes another. These, with the effects of capillarity, or the adhesion caused by the exclusion of air from between dry surfaces, of electrical actions, and other influences not known or understood, but distinctly perceptible by the production of errors in the running, all combine to oppose us when we seek to pass the limits of the practicable, and approach nearer to perfection. To the student of horology who has the knowledge, time, and means to experiment, the improvement of escapements designed to compensate for variations in the effective motive force of the train, and similar practical difficulties, offers an interesting subject for study and experiment. But for the practical watchmaker the dead-beat escapement would seem to be preferable, not only because it is capable of doing as good service as the former, but also because it may be used with ordinary care and intelligence, whereas the gravity escapement requires much greater skill and knowedge in the workman who sets it up or attends to it, in order to perform satisfactorily. But satisfaction cannot be expected even from the dead-beat escapement unless all the parts are correctly designed to suit the given pendulum, and as accurately executed. And inasmuch as the supplementary arc and the mode of flexure of the suspension spring are different in their actions with different arcs of the pendulum, that arc, in a good regulator, should be maintained which the maker intended it to have, whatever it may be.

In conclusion, Mr. Regulator hoped that his remarks would afford our correspondent the information he required, but if they did not, he should be happy to explain further. At the same time it should be remembered that the questions asked do not admit of positive and invariable answers, but depend on the circumstances of each case—and even then many points are matters of opinion, on which the best informed watchmakers may differ widely. Should he wish to study those subjects thoroughly, he should procure Saunier's Treatise on Modern Horology, with plates, price $13, or Dennison's Clocks, Watches, and Bells, published in London, at 4s, 6d. sterling.

NON-CORROSIVE SOLDERING FLUID.

Secretary of Horological Club:

I noticed in your December Proceedings "Subscriber" wanted a non-corrosive soldering fluid. I will give you my receipt, and you can publish for good of craft, if you choose. It works better than muriate of zinc, and has none of its bad effects on tools or clothing: Chloride of zinc, granular, cut with alcohol, so it is a perfect liquid. It can be used on the bench without any damage to tools. Can be had at any drug store. READER.

Mr. Electrode said that Reader was apparently not aware that "muriate of zinc" is precisely the same thing as "chloride of zinc," muriate being the term formerly given to compounds of muriatic or hydrochloric acid, which are now called "chloridio"—just as mercury is the correct chemical name for the metal popularly known as quicksilver. He thought if Reader would put some of his alcoholic fluid on steel, he would find that it would cause rust, although not so rapidly as the ordinary soldering fluid, which is a solution of chloride of zinc in water, instead of alcohol.

BLAISDELL'S SCREW-REMOVING PLIERS.

Mr. Isochronal then stated that he had been requested by "Excelsior," in a note just received from him, to exhibit this tool before the Club—a request which he gladly complied with, both to oblige the eminent author of Practical Hints on Watch Repairing, so well known to intelligent watchmakers everywhere, and also because he had himself used the tool with great satisfaction. It consists of a pair of pliers with two fine points facing each other, their extremities being made rough, so as to give a grip on the ends of the screw, which is grasped between them, whereby it is turned from both ends at the same time, without any pressure on the threads of the screw. If the screw is not flush with the plate, but broken off below the surface, the points are small enough to enter the hole and reach both ends. It is only necessary to apply the tool with one hand, as one would grasp a piece of metal with cutting pliers, and move the plate around with the other, and so remove the broken screw without injuring either the surface of the plate or the screw threads in the hole. By making one point in the shape of a screw driver, it becomes an excellent tool for removing screws from spectacles, eye-glasses, etc., when they have become rusted or seated so firmly that the ordinary screw driver will not start them. The beauty of this tool is that no pressure is exerted upon the thread, whereas the whole pressure put upon a screw driver comes upon the thread of the screw, and makes it still more difficult to start it on account of the friction. He believed these tools were for sale by dealers generally, or they could be obtained from the patentee, Mr. W H. Blaisdell, at 353 Washington street, Boston.

WATCHMAKERS' MEASURING TOOL.

Secretary of Horological Club:

In the September number of JEWELERS' CIRCULAR, on page 215, there is a new measuring tool illustrated; upon noting the above, I forwarded to you one of my guages, which is intended for same purpose, but with a self-measuring caliper, and which I have been manufacturing for the last three years. And in a letter, which I mailed two days previous to my sending the guage, I explained the full merits of my tool.

In No. 10, page 264, I find reference to the same by Mr. Clerkenwell, which reference, however, shows to me that my letter to you, explaining the merits of my tool, has either been lost or mislaid; as the letter was not returned to me, it must have certainly reached your office. Although a very useful tool, I found the sales thereof so limited as to make the manufacture unprofitable, and therefore discontinued making them. Yours, etc.,

Fort Madison, Iowa. THEO. ERNST.

Mr. Clerkenwell thought the fact that Mr. Ernst's letter was not returned to him through the mail, showed that it had not reached the New York Post Office, as it would have either been delivered to us or returned to him as per request on envelope. He regretted the loss, as the tool had been highly approved and commended by the Club, and we should have been glad to publish the maker's description of its uses and capabilities. As he has greater knowledge and experience with it, he will often note valuable points which others might overlook. He hoped that Mr. Ernst might yet find it profitable to manufacture the guages, for the use of good tools should be encouraged in every way—and one of the best ways to encourage their use is to encourage their manufacture. He therefore recommended that any readers who were interested in tools for measurement of the escapement, should refer to our Proceedings for November, 1881, and see whether it was something which they needed.

COLORING ELECTRO-PLATED ARTICLES.

Secretary of Horological Club:

Will you please inform me if it is possible to make an electro-gilding bath that will deposit anything less than pure, or 24-k. gold, or if a plate 14-k. or 18-k. can be deposited with a battery? If so, how are they prepared? If not, how are the different colors given to gilded or electro-plated articles? E. P.

Mr. Electrode replied that colored gilding is practicable in both ways. An alloy of gold and silver or, of gold and copper can be deposited on the article by the use of a battery, but the regulation of the electric current, and the management of the bath to preserve the proportions of the salts of the different metals, was only to be undertaken by the expert in electro-plating. Some metals deposit more readily or rapidly from a compound solution than others do, and differently upon different bases, so that success could not be expected by the amateur. But the coloring of gold deposited from a simple gold bath was within the skill of anyone with a reasonable amount of experience, and is the method usually followed. It would not be necessary to go into the details of the operations, as the back numbers of THE CIRCULAR contain numerous articles on the subject, with full instructions, formulas, etc. He recollected a very good article in THE CIRCULAR for last month. If Mr. P. desires to thoroughly study the art, he should obtain The Goldsmith's Handbook, by Gee, and Watt's Electro-Metallurgy, both of which treat the subject fully and practically. It should be remembered, however, that plating solutions quickly deteriorate by keeping, and unless one has frequent use for them, or is so situated as to be obliged to do such jobs for himself, it will be fully as cheap, and much less bother, to send his jobs to some professional plater, who is always prepared, and can be held responsible for the quality of the work done by him.

Mr. Clerkenwell remarked that he had given several good receipts for coloring both gold and gold-plated work, at the meeting of the Club for April of last year, and if Mr. P. would look at our Proceedings for that month, he would probably find the desired information there.

TO GIVE BRASS WIRE A SPRING TEMPER—HARD SOLDER PICKLE—BLACK LIST OF JEWELERS.

Secretary of Horological Club:

Please let me know how I can give brass wire a good spring temper? Also how to prepare the best hard solder pickle? Where can I obtain the black list of jewelers spoken of in THE CIRCULAR?

J. A. P.

Mr. Uhrmacher said that a spring temper could be given to brass wire by drawing it through a wire plate. A small piece can be tempered by burnishing it hard. Soft pin tongues are sometimes stiffened by *twisting* the wire, but if carried too far it will crack or injure it.

For pickle, a weak solution of sulphuric acid in water, is used, and is probably as reliable as anything for general use.

The Black List can be obtained by addressing the Secretaries of the various state societies of watchmakers.

NEW MODE OF PIERCING EARS.

Secretary of Horological Club:

Knowing, as I do, that the members of the Club are anxious to "catch on" to all the latest improvements, I hasten to inform them of a process of piercing ears, which has just been revealed to me, and which seems to possess some advantages over all ways hitherto known. By this new process it is entirely unnecessary to squander from 75 cts. to $2.50 for an ear piercer; all the necessary accessories consist of one file, one pair of pliers, one Dutchman, and two glasses of beer. The Dutchman is not absolutely necessary, but the beer is indispensable, and the thing does not work well with less than two glasses, and three is all the better. Everything supposed to be all ready, I will try and describe the *modus operandi* as briefly as possible. Seize the ear ring in the left hand, the file in the right, (if you are left-handed, it don't work that way, you have to turn around) and proceed to file the end of the ear wire to a sharp point; that completed, seize the ear wire with the pliers about ⅜ of an inch from the point, grip the subject's ear between the thumb and forefinger of the left hand, and by a skilful thrust with the right hand, force the wire through the ear. The job is done; it only remains to wipe off the blood and hook up the wire. Yours, as ever. FRIEND OF PROGRESS.

P. S. If any of your honorable body should be skeptical about the practibility of the above method, we would state that we know it will work, for it is successfully practiced by an enterprising Teutonic jeweler in this locality.

Mr. Ruby Pin suggested, as an improvement, to stick the tongue of the file through the ear, and so save the trouble of filing the ear wire to a point, and the danger of bending it.

The Action of Fork and Roller.

THE parts which transfer the motion created by the action of the wheel and pallet to the balance, have also been constructed in a variety of ways, and their action is commonly called the fork and roller action, because in almost all anchor escapements, the intervening lever is, at the extremity turned toward the balance, worked out into a notch, which gives it some resemblance to a fork. The roller in most of the anchor escapements, is a steel disc, carrying a pin to fit the notch in the fork. This pin is commonly made of a ruby, in order to diminish friction, and giving greater durability to the acting parts.

The fork and roller action can be divided into two distinct functions, in which the two parts act alternately, one upon the other. These functions are the *lifting* and the *unlocking*. In the lifting, the lever fork impels the ruby pin in the roller, being impelled itself by the lifting of the wheel tooth on the pallet, which latter is solidly joined to the lever, so as to form but one piece with it. This impulsion of the wheel on the pallet, which latter is solidly joined to the lever, so as to form but one piece with it. This impulsion of the wheel on the pallet, and the impulse of the fork on the roller arising from it, continues until the wheel tooth drops from the edge of the driving plane, which causes the corresponding tooth to fall against the locking face of the other pallet arm. The pallet and fork are kept in that position, while the balance makes its excursion to the same side. On its return, effectuated by the tension of the balance spring, the ruby pin has to perform the other function, in which it plays the active part, the function of unlocking. As soon as in this returning vibration the ruby pin touches the fork, this latter, (and also the pallet) follows the impulse a little way, thus withdrawing the locking face, against which the wheel tooth is resting. The tooth, immediately after having left the edge of the locking face, begins its lifting on the driving plane, which is transferred by the pallet and lever to the roller and balance; this lifting continues till the tooth has slided across the driving plane, and dropped from its edge, after which the corresponding tooth rests against the locking face of the opposite pallet arm. This plane of the escapement is constantly repeated, so that the ruby pin is *driving* a short way, and immediately afterward *driven*. It is a peculiar feature of this part of the escapement, that it is quite out of action during the greatest part of the vibration of the balance, and but a very little arc of the whole vibration keeps the roller in connection with the fork.

This circumstance on the one side continues the anchor escapement a detached one, and endows it with all the valuable qualities of such escapements. But on the other side, it produces a tendency to frequent disturbances in a portable timekeeper, which must be prevented by an arrangement of the parts, called the *safety action*.

It has already been mentioned in the description of the wheel and pallet action, that the locking faces of the pallet cannot be made circular, or at least not concentric circles to the center of the pallet, but must deviate from that circle so much as to produce a locking tendency, by which the pressure of the wheel tooth on the locking face draws the pallet farther into the wheel. But this alone would not be sufficient to prevent the pallet leaving its state of rest, in case of the watch being exposed to sudden external motions. The result of such uncontrolled motion of the pallet and lever would be, that the lever would not present its fork to the ruby pin of the balance roller when returning from its excursion, but the pin would fall against the outside of the fork, and the watch would stop immediately, requiring the aid of a watchmaker to put it right again. It is therefore of the greatest importance to secure continuous motion in watches with the anchor escapement, by a careful safety action.

There is still another function which the lever has to perform in all the usual constructions. It has already been observed that the deviation of the locking faces from the concentric circle, produces a tendency of the wheel to draw the pallet arm toward the center. This tendency would, of course, draw the pallet arm in, until arrested by the circular rim of the wheel between the teeth. But this excess of drawing motion would occasion a great loss of power in unlocking, or even cause a butting of the ruby pin against some part of the lever not prepared for its reception. For this reason it is indispensable to reduce the motion of the lever and pallet to the amount required for the safe escaping of the wheel. This limitation is technically called the *banking*.

This purpose can be attained in different ways. In many watches, especially in the English ones, there are two upright pins, planted into the plate at convenient distance, and at each side of the lever, near its fork end, called the *banking pins*.

In the greater part of the Swiss anchor watches, the lever and the wheel are sunk into the plate, and the fork end of the lever is banked against two projecting corners produced by the intersection of the sinks for the balance roller and for the lever. In some watches we also find the banking-pins near the other end of the lever.

The banking of the lever, though indispensable for the good performance of the escapement, is at the same time a source of very disagreeable irregularities. When by a sudden circular motion of the watch in the plane of the balance (a very frequent occurrence, when wearing a watch, or winding it in a careless way), the vibration increases beyond two fall turns, the impulse pin strikes against the outside of the fork, which cannot yield, because it is leaning against the banking pin or edge. By the violence of this percussion there is danger of injury, not only to the ruby pin, but also to the balance pivots, which are often bent or broken by the reaction. But more than that, all such cases are accompanied hy a considerable acceleration of the rate of the watch, producing, under unfavorable circumstances, great differences in its time keeping; such errors are called *banking errors.*

Of the three prescribed .methods, the banking between two pins is decidedly the best, provided the pins are not too thick, and are as near the fork end as possible, thereby avoiding any essential part of the shock being communicated to the pallet axis. The elasticity of thin and hard pins proves to be a tolerable safeguard against the danger of any injury to the ruby pin or balance pivots. But such pins are very easily bent when cleaning or repairing the watch, and then the banking will be too wide, or which is still worse, too narrow, producing a want of freedom in the action of fork and roller, or in the safety action, or not allowing the wheel teeth to drop freely from the driving planes.

The banking against solid corners of the sinks in the plate is not liable to such disturbances, and with such solid bankings the balance will not continue to strike against them so long as it does with the elastic banking-pins, but at the same time the danger of injury to the delicate parts of the escapement is greater. Beside, it is advisable to make these banking corners sharp, and not obtuse or flattened, as is often seen in such cases, where the banking was originally not wide enough. The consequence of such flattened corners is an adhesion between fork and corner, when the parts are not perfectly clean, and this adhesion is an increase to the unlocking resistance.

The worst system is that of banking the other extremity of the lever between two pins, or otherwise; because, by this arrangement, the lever transmits about double the banking shock to the pallet axis, and, indeed, if somebody wanted a machine for the express purpose of breaking the anchor pivots, he could not invent a better construction than this, with a pair of thick pins, and a strong inelastic lever.

By the preceding general remarks on the fork and roller action, it will be seen that an investigation into the different constructions of these parts of the anchor escapement, must include their four different functions, to wit, the lifting, unlocking, safety, and the banking action.

The Anchor Escapement.

BY M. GROSSMANN.

THE system of making the inclined planes only on the pallet arms, seems to be the oldest plan of lever escapement for watches. Mudge, who, according to our opinion, executed the first detached lever escapement, made his pallets in that way, and that system, with very trifling alterations, is still in use in our day in almost all English lever watches.

Mudge's pallet was made to embrace 5 teeth (of a wheel of 20 teeth) which number has been reduced to 3, with the view of having the pallet of as little weight as possible, and to reduce the friction of the acting parts to a smaller amount. The locking faces of Mudge's pallet were merely arcs of circles concentric to the pallet center, the "draw" being an improvement of later date.

The lever escapement with pointed or ratchet teeth, has the considerable advantage of going with the least possible amount of friction, the point of the tooth sliding along a polished surface, generally made of hard stone, to diminish friction and prevent wearing of the acting parts. Beside, it has not so much to suffer under the pernicious influence of the adhesion of thickening oil, which exemption permits it to keep a very steady rate.

Almost all English watches have ratchet wheels. Still it may be said against this system that there must be, necessarily, a certain quantity of drop, which, in the dead-beat escapement, is a complete loss of power. The very delicate points of the ratchet-wheel teeth are also very liable to being spoiled by unskilful hands.

The lever escapement with the lifting phases on the wheel teeth, is, from a theoretical point of view, a very perfect action, because its lifting and locking are performed exactly at the same center distance, and under the same angles.

This variety of the lever escapement has been adopted in a certain kind of German watches, and has been hitherto very little used and known.

The most simple form is one in which the pallet consists of two arms of brass, carrying each a very thin, hard-tempered steel pin, standing upright out of its proper surface. The pallet and lever are of one piece. The lifting faces on the wheel teeth are rounded, and must be carefully polished, as well as the locking faces of the teeth. The draw of this escapement is effected by a slight deviation of the locking faces (on the foresides of the wheel teeth) from the straight line toward the center of the wheel. Watches with this escapement perform very well.

There may be some objection to the acting parts not being jeweled, and consequently liable to wear by use, but it is a fact that such escapements, with a scape wheel of tempered steel, show no symptoms of deterioration of the pins after many years of service, and even if such a thing should happen, it is a very easy matter to insert new pins.

A lever of this kind can be executed in very delicate proportions and weighing less than any pallet and lever of another kind. This escapement ought to be more generally known, for it can be made so cheaply, and requiring no jewels, with the tools to be found in every watchmaker's workshop, that it might prove very useful, especially in such cases where cheapness is required.

Nevertheless, the wish to produce an escapement possessing the valuable theoretical advantages of this system, without being exposed to the acting parts wearing away, has originated some attempts to supply the pin anchor with jewels.

This has been done by taking the same lever and pallet piece, merely having a little larger holes to fix ruby pins into, in the shape of the locking stone in the detent spring of a chronometer. These pins can also be fastened by inserting them into a notch cut into the lever arm, and shutting the notch by a slight pressure, so as to hold the jewels in its place.

The lever escapements with the inclined planes partly on the anchor pallet and partly on the wheel teeth, is very much, and almost exclusively, in use in the Swiss watches. It has the advantage of admitting the closest scaping, and requiring the least possible amount of drop, because its teeth are hollowed out on their back part, in order to secure sufficient freedom for the delivery edge. The wheel of this escapement, with its little driving-planes on the end of its teeth (club teeth) is certainly much less exposed to injury, when falling into inexperienced hands, than the wheel with pointed teeth.

Most of the ordinary escapements of this kind are made with a circular pallet, that is, the pallet covers of equal length, and the driving planes at equal center distances. There are the same reasons for speaking against this construction, as already mentioned when treating of the escapement with the ratchet wheel. Still, the breadth of pallet arms being considerably smaller, compared to those of a ratchet-wheel escapement, the incorrectness of a circular pallet to a club-wheel escapement is comparatively less, and reduces itself in proportion to the part of the total lifting allotted to the wheel teeth.

The escapement with the club wheel, though superior in the economical use of the moving power, is still objectionable from another point of view. The inclined planes of the pallet arm and wheel tooth are so very little diverging, that with thickened and glutinous oil there is much adhesion between them, which may produce, under unfavorable circumstances, a very disadvantageous influence on the performance of the watch.

A Review of the Different Escapements.

[Translated and compiled from the French, for THE JEWELERS' CIRCULAR.]

These advantages are somewhat reduced by the repose friction, which is rather large, and cannot be diminished, because the cylinder must have certain proportions to contain the inclined plane of a tooth within its interior. But this friction is not without utility, regulating pretty nearly the inequalities of the motive power; wherefore cylinder movements are without fuzees, yet the difference in the rate between the extremes of wound and run down are so trifling as to be almost insensible. The effects of wearing might be feared, owing to which the watch would soon deteriorate, but experience proves that none such exists practically; cylinder escapements, having been carefully constructed and of good proportions, show no trace of wearing after a long-continued service; it is only necessary to renew the oil a little more frequently than with other escapements. Added to this is the great desideratum of a low price and a less costly repair.

Duplex Escapement, Fig. 31.—The duplex, thus named because at its origin the wheel was double, is attributed to P. Leroy (1750). Its performance is easily understood. The scape wheel *A* is provided with long, slender teeth standing far apart, *C, D, E*, which, at repose, rest by their points upon part *a* of the roller *B*, borne by the balance arbor. When this turns from *a* to *k*, notch *a* presents itself before the tooth upon repose *D*, entering into it with a small drop, but it is quickly brought again to its state of rest by the motion of the roller, which continues in the same direction. At the return of the balance, which then moves from *k* to *a*, the notch presents itself again; the tooth point engages anew, this time almost without drop, and escapes after having followed the roller in its motion. The following tooth *c* also makes repose at *a*, with a drop nearly equal to the interval of the teeth and thus the operation is repeated. A small lifting will be observed here already, contributing to sustain the balance motion, which would not be sufficient, however. For this purpose a large lifting is necessary, which we are about to describe.

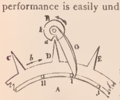


FIG. 31.

The scape wheel is provided with pins, *H, I, J*, set perpendicularly to its plane, in number equal to that of the teeth, and almost half ways between each tooth space. The balance arbor is furnished with a long lever, *G*, which enters into the interval of the pins, and receives the impulsion from one of them at each passage of the wheel teeth in the roller notch. This impulsion is communicated to the balance, by which it is enabled to make very extended vibrations. At the return the large lever passes before and between the pins without touching them; the engagement only takes place at the following vibration by means of the drop permitted by the notch; this drop causes the wheel to turn, brings the pin which is on the point to engage near to the line of centers, and establishes the depthing. The position represented in the figure is that in which the spring is at a repose. The notch is not ready to allow an escapement, and shows the large lever immediately after engaging. To obtain the small lifting, which precedes the larger, the notch must be turned a little to the right. By any style of arrangement the pins *H, I*, must always be placed at equal distance from the line of centers, or, what amounts to the same, at the same distance from the balance arbor, when the teeth are at repose.

The roller has been made one-third of the distance between two tooth-points; the small lifting is 20°; the drop, after the tooth has escaped from the notch, is 10° more; the large lifting measures 30°; the length of the large lever arm, measured from the balance center, is equal to $\frac{3}{8}$ or $\frac{3}{10}$ of the diameter of the scape-wheel, accordingly as the wheel carries 13 or 15 teeth. The circumference diameter, measured to the pins, is the $\frac{3}{4}$ or $\frac{3}{5}$ of that of the wheel.

After each two vibrations of the balance, a pause occurs, during which the wheel appears to be immovable, although it is actually a slight shock. The duplex escapement may give amplitudes of 1¾ turns.

It will be seen that this escapement presents great advantages; first, on account of the great liberty of its balance; and, secondly, by the energy of its action, resulting, on the one hand, from the reduction of the diameter of its impulse wheel, compared to that of the repose wheel; and, on the other, from the increase in length of the lever arm, as well as from the excellent mode of the transmission of force; third, by the reduction of the repose friction, taking place upon a roller of a very small diameter.

The Comma (Virgule) *Escapement*, Fig. 32.—This escapement, attributed by some to Lepaute (1753), is a combination of the cylinder and duplex escapements. The scape wheel is plane, but the tooth points carry raised demi-cylindric pins. The teeth bend forward, in the direction of the motion, in order to permit a greater amplitude in the balance vibrations. The comma is made of tempered steel, polished to the highest degree, and made of the same piece with the balance arbor of the shape *a b d*, shown in the figure; part *a b* does not differ from the analogous part of the cylinder in such an escapement; it possesses also a cylindrical surface *a b*, for the exterior reposes, a concentric surface, *a s*, for the interior reposes, and a small lifting *a*. Its dimensions alone are here reduced, because that part of the tooth which should be contained within the interior capacity of the comma, has dwindled down to a simple pin. The large lifting, *s d*, which here replaces the second lifting of the cylinder, is of a length equal to the space between two teeth, less a trifling shake. The rubbing parts are not straight; they are generally made of a cylindric curvature, of the same radius as the escapement wheel. On inspection it will be seen that the wheel impulsion is very energetic; the repose frictions are also much reduced, but the friction upon the large lifting is augmented, and it is rather difficult to sufficiently supply the oil, which is absolutely necessary. This latter is undoubtedly the reason why this escapement, although very easy of construction, has been abandoned; it is more irreproachable in theory than that of the cylinder.

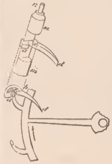


FIG. 32.

We have deemed it useless to give a description of the performance of the escapement, since, together with its dimensions and general shape, it is identical with that of the cylinder; the balance spring must also be at repose in the position given in the figure, when the tooth is on the point of engaging with one or the other lifting. The lifting arc is 10° for the small, and 30° for the large lifting. Care is taken to well round all the angles. The wheel, ordinarily of brass, would undoubtedly perform better services when made of steel. The balance arbor is composed of a steel cylinder *m m*, pierced in its center by a cylindrical hole equal in diameter to that of the pins, together with a small shake; and of two steel rods *n n*, inserted into the holes, to form the pivots. The cylindrical part is empty above and below the comma *a d*, for the unlocking of the wheel teeth; the part uniting the two cylinder parts is kept as small as possible, to permit the balance to swing as great arcs as possible. The tooth extremities pass through the center of the cylinder, and the reposes occur exactly at a tangent, a peculiarity not offered by the cylinder escapement.

FREE ESCAPEMENTS.

The discovery of the free escapements, attempted toward the middle of the last century by several celebrated horologers, has been well described by Mr. Berthoud in his history on the measurement of time, and we shall quote here the passage of that important work treating on the subject:

"Toward the year 1754, the escapements in use were of a precision adequate to the common wants of the age, but about this time the artisans commenced to engage in the task of constructing timepieces to ascertain longitudes at sea, and it became necessary to establish new data and principles, founded upon laws governing mechanics and motion, and to assign to each part of a timepiece those functions demanded of it by theory. Thus, after a profound study of the question, and a searching analysis of the functions of all parts composing a marine timepiece, the inventors finally began to recognize that the true rate of these mechanisms lay hidden solely in the balance and its spring, and that this was the only regulator establishing the isochronism of its vibrations, and that the functions of the escapement were simply to sustain the movement of this regulator, without interfering with isochronism. It was further recognized that if this regulator, having been divested of any friction hurtful to its isochronism, were applied to a watch, it would show very considerable variations when passing from a state of heat to one of cold, because the elasticity of the balance spring and the dimensions of the balance would change, by reason of these differences of temperature, and means of correction were sought after, proper to compensate these effects. Such are the first principles established by their authors, of the invention of longitudinal timepieces. The escapement was thenceforward considered in a new bearing.

"We must not forget to mention that this new theory of the isochronism of the balance vibrations by the balance spring, pertains entirely to French artists; this is so true, that Harrison, in his marine watch, has sought to obtain isochronism by means of the escapement, which shows how difficult it is to shake off the yoke of deeply-seated prejudices.

"The office of the escapement and the functions exacted of it, by this new theory, are, first, that the force of the motive power be transmitted without loss to the regulator, by means of the escapement, in other words, that the scape wheel communicate to the regulator, the force which it receives from the motor, with the least possible friction; second, that after the wheel has communicated the impulsion to the regulator, this latter accomplishes its vibration freely; third, that the escapement requires no oil, and that the frictions to which it is subject, be as small as possible, consequently, that the variations produced by these frictions, be never of a magnitude sufficient to affect the rate of the timepiece, or to alter the isochronism of its vibrations. Such are the duties I desired to obtain of an escapement, when I inquired into the theory governing a marine timepiece. These properties are happily united in the free escapement which we are about to describe.

"M. Pierre Leroy, a celebrated artist, to whom we owe the construction of an excellent marine watch, has also invented a free escapement, with perfect success. The invention of a free escapement appears to belong equally to several artists, who, without knowing that anyone else harbored the same ideas, have produced simultaneously the same object. These artisans are Messrs. Leroy, Thomas Mudge, an English artist, and Ferd. Berthoud. But the combinations they have employed are different enough one from the other, to distinctly show that each one is the veritable inventor of the mechanism he produced. The artists named are not the only ones who have thought of the subject, because a long time before them, J. B. Dutertre conceived the idea of such a mechanism. But this escapement is unknown to us, having never been published, and we cannot describe it."—(M. Berthoud.)

It is pretty well known at present that P. Leroy is the inventor of the free detent escapement, such as is employed almost exclusively at the present date in marine watches; if M. Berthoud does not pretend to aspire to this honor, he at least has the merit of having perfected the escapement, by studying it in all its phases, and has thus contributed on his part to endow horology with a mechanism to which are due, in great measure, all the unlooked for successes it obtained toward the end of the last century; the progress made since this epoch has facilitated, without doubt, the means conducting to perfection, by fixing calibers and reducing trials; but all our modern art has not been able to go beyond perfecting a few of the minor details.

Definition.—A free escapement is one which permits its balance to accomplish freely, that is, without contact with the train, or any other intermediate piece, the supplementary arc of its vibration; this contact being limited alone by the arc of lifting.

To reduce to some order the review of this numerous class of escapements, we will divide it into three groups. The first embraces the *anchor escapements*, in which the principal piece, so named by reason of its slight resemblance and functions, serves as intermediary to transmit the force of the train to the balance; second, the *mixed escapements*, in which the impulse is given the balance in part directly by the train, and in part indirectly by an anchor; and, third, the *detent escapements*, in which the impulse is always direct, even when the arrest operates by the intermediary of an anchor.

(To be continued.)

Tourbillon Escapement.

THIS escapement has the peculiarity that the different parts operate within a light, perforated drum, which revolves once every minute upon its axis, whereby the advantage is obtained that a not truly equipoised balance, or one which has been moved out of equipoise by compensation, does not exert a disturbing influence in a horizontal or vertical position upon the rate of the watch.

It is self-understood that the drum, made as light as possible, with all parts belonging to the escapement, must be equipoised as closely as possible. Its rotary motion is accomplished as follows: In the center of the drum's under face, outwardly, the fourth pinion is riveted, and its pivot serves on this side as revolving point; the counter pivot runs above the drum in a bridge, carrying the entire escapement frame. The third wheel seizes into the fourth pinion. The scape pinion, which is contained within the drum itself, and protrudes a little toward below, seizes into the fourth wheel, screwed upon the plate concentric with the drum, and sets the scape-wheel, and all the escapement parts generally, in motion. The balance arbor moves within the drum concentric with it, in fine capped jewel holes. Consequently, by unscrewing the upper bridge, the entire escapement, together with the escapement, may be taken down.

In spite of the specified advantages, this escapement labors under the disadvantage, that with every impulsion transmitted from the scape-wheel teeth, causing a vibration of the balance, the important inertia of the drum, together with the escapement parts, must be overcome, while by any other escapement, that of the scape wheel merely must be regulated —ALB. JOHANN.

Guide for Watchmakers' Apprentices.

BY HERMANN SIEVERT.

[*Continued from page* 325.]

The putting together of the frame is done in a very simple manner. The pillars which, between the plates, have a length of 37 mm. reach, with their shoulders firmly fitting into the holes, almost through the back plate, only so far, however, that they may be firmly screwed together by screws with sufficiently long heads. The other plate must be somewhat looser, without any wabbling, and set upon the pillar shoulders. This fore-plate is held by milled brass nuts. The pillar shoulders upon this side are elongated sufficiently to accommodate, upon other smaller shoulders, the dial plate, which may be fastened by small countersunk screws.

To accommodate the fork, the arbor is elongated beyond the plate, and a separate bridge is necessary, made of soft brass, and bent in the vise; hard brass would break in the operation. The bridge will partly receive a certain degree of hardness when hammering the corners in the vise; on the other hand, that part for the pivot holes may be hammered after bending. I would advise to make use of extra thick brass for the bridge, to enable you to suitably finish the corners with the file. It is retained by screws and foot pins.

In regard to making the wheels and pinions, I wish to remark that whenever a watchmaker makes a thing new, it always should be something excellent. This, however, is not possible by the time-consuming, and, at the same time, inexact making of pinions by hand labor, as I have described it, to assist you in case of necessity. If, therefore, your shop does not have the ready pinions on hand, it is better to obtain them from some dealer. The otherwise highly laudable pride, should not go so far as to attempt to make everything pertaining to a clock, with the contracted means of the shop, much of which can only be executed by help of machinery working mathematically true. There is plenty of work on a clock, even with the assistance of cut wheels and ready-made pinions. The wheels must not be riveted upon their collets, but fastened by three screws, also the anchor upon its arbor collet.

The pinions are cut upon the pinion-cutting tool, of the best cast steel. To give the piece the necessary solidity, only turn off upon both ends of the actual pinion, sufficient to permit the cutter to have a free motion. The disagreeable warping while hardening must be prevented. For this purpose inclose the pinion in a sheet iron box, filled with pulverized charcoal. After having heated the box sufficiently, open it, and empty its contents into water, if possible, that the pinions fall in vertically. The less they come in contact with the atmosphere, the cleaner and whiter they remain.

They may be ground and polished with the assistance of a little contrivance, quicker than by hand labor, by means of wood rollers. Fig. 10 represents such a contrivance, easily made, and adaptable for every larger turning tool. *A* is the bottom plate, upon which the pieces *B* are fastened as side pieces of a slide, in which piece *C* moves lengthways, by means of a screw. Two point bearers are screwed upon *C*; the points *d d* serve for receiving the pinion arbor. The whole moves like a joint in the fork piece *E*, up and down, which is inserted with its round handle in place of the T rest in the turning tool.

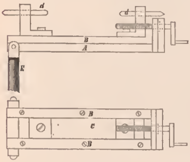


FIG. 10.

When the contrivance is to be used, put the T rest from behind into the turning lathe, and insert the former. There is a wooden plate upon an arbor running in the tool, above the pinion under treatment; if this contrivance, together with the pinion, is set somewhat obliquely, screwthreads, as it were, will be produced by the pressing of the pinion leaves upon the wooden roller, and the pinion turns continuously upon its axis. To prevent a grinding of hollows in the pinion, it must be kept rotating longitudinally, by turning the little crank, while pressing the contrivance with the left hand gently against the wooden roller; if you have no foot fly wheel, of course, somebody else will have to do the turning. The pinion will thus be handsomely polished in an incredibly short time. Use very finely grained wood for the wooden roller, such as mahogany or boxwood; not so much depends upon it, however, as upon good polishing powders—crocus or diamantine, and use the different numbers in succession, the rollers may, in accordance with the turning tool, have a diameter of from two to four cm., and a thickness of from six to seven mm.

Also the grinding and polishing of arbors, faces, and shoulders may be done quicker and better than by hand, by using discs and bells of composition. The whole arrangement for this consists simply in a large depthing tool provided with a contrivance for fastening it in the vise. The grinding disc is inserted upon an arbor, and, together with the article to be treated, placed into the depthing tool. Both parts are rotated in the same direction by using two drill bows, or better still, a fly wheel, in a manner that both the touching surfaces run against one another. The two points of the depthing tool between which the arbor with the disc revolves, must not be screwed tight, but be in a condition sufficiently loose to be moved to and fro, together with the disc. To do this well, both points are embraced by a half circular spring, going outside the tool, and pressing the points together. The disc is especially useful for the polishing of arbors, but for the grinding and polishing of surfaces and shoulders, the bell-shape, Fig. 11, is used to advantage, being easier sharpened. For grinding and polishing substances, use powdered oilstone, and different numbers of red and diamantine.

FIG. 11.

The Weight Drum.—I have only a few more remarks to make about the weight drum, which, together with the drum wheel, is given in Fig. 12, the former being shown in cross section; *a* is either turned out of one piece with the arbor, or, for easier construction, it is made of brass and hammered upon it. The two plates *b* and *c* are fastened to it with screws; *g* is a brass strip bent cylinder shape, its ends soldered together. This cylinder is provided with grooves for the reception of the weight cord. These grooves must be cut left so that the weight, when falling, may go from the pendulum. If the grooves are not entirely smooth, you may correct them in your lathe by holding a round file into them, and afterward grinding and polishing. Although the cylinder will of itself tighten upon the shoulder of disc *b*, it is beter to prevent all possible accidents of turning by drilling a hole and inserting a pin through *b*, between *b* and *g* (given in the figure from right to left). Disc *b* is turned out upon the side of the wheel, to make room for the clickwork, which in these clocks is hidden within the drum; *e* is the ratchet, *f* a space for the reception of click and click spring. It is the same whether the ratchet is fastened to the maintaining-power ratchet *d*, and the clickspring and click on plate *b*, or the reverse, only their direction must correspond to that of the teeth. The click need simply be retained by a pin, since it cannot slide out, and, moreover, braces against the fastened end of the clickspring. (Fig. 13.)

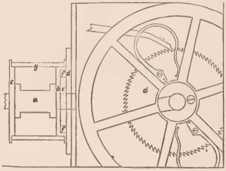


FIG. 12.

FIG. 13.

Making a Graham Anchor.—When examining the sketch of the Graham Anchor, heretofore given, you will have noticed that the exact determination of the pallets must be extremely difficult. I have, however, by drawing the lifting circle, given a hint to a valuable auxiliary, by the use of which the making of a new anchor is greatly facilitated. Beside this, the size proportions of an exactly correct anchor movement have been mathematically calculated, which enables us to determine exactly the size of anchor and lifting circles, the thickness of the pallets, and the depthing distance, and we are enabled to thus dispense with a drawing altogether. Those proportions, for a wheel of 30 teeth, if the anchor scapes over $6\frac{1}{2}$ teeth, are as follows:—

Wheel Diameter	=1.0000
Diameter of Inner Anchor Circle	=0.7706
" Outer "	=0.8490
Thickness of Pallets	=0.0392

Diameter of the Lifting Circle:—

For a Lifting of 1°	=0.1443
" " 1½°	=0.2109
" " 2°	=0.2741
Depthing Distance	0.6434

To find the actual sizes from these values we only need multiply the diameter of the wheel with them; in this case with 36.6 mm. Thus we receive as:—

Diameter of Inner Anchor Circle	mm.	28 20396
" Lifting Circle by Lifting of 1½°	"	7.71894
Thickness of Pallets	"	1 43472
Depthing Distance	"	23.54844

The first three quantities are enough for making a Graham Anchor with movable pallets and 1½° lifting. To enable us to work in accordance with them it becomes necessary to suitably reduce the ascertained quantities. Possessing a millimeter guage with nonius, we can determine 0.05, for which purpose we will reduce all quantities to 0 05, in such a manner that all those smaller than 0.025 are dropped, those between 0.025 and 0.075 will be called 0.05, and those exceeding this will be raised to 0.1. By this operation we have:—

Inner Anchor Circle	=28.20
Thickness of Pallets	= 1.43
Lifting Circle	= 7.70
Depthing Distance	=23.55

It is not advisable to exceed the measure of the pallet thickness, which must be regarded as the outer limit, the free passage of the wheel might be endangered thereby.

As auxiliaries for making an anchor, we use two discs of thin sheet brass, one of the exact size of the lifting circle, and the other one for the inner anchor circle. These discs are best made in the universal tool; in the center of each one we drill a hole, of the same diameter the hole in the anchor is intended to have. We next make a graver for the tool, for the purpose of turning in the pallets, whose cutting face corresponds exactly to the pallet thickness, consequently has a breadth of 1.43 mm. It will be necessary to make the graver a little tapering behind, that it may cut free. We next put a strong piece of sheet brass, at least as large as accompanying cut, fig. 14, into the lathe and turn in a center hole, also of the intended diameter of the anchor hole. We next fasten with a well-fitting turned pin the disc of the inner anchor circle upon the brass plate, that it may serve as correct guidance for the graver. It is advisable to make the turning in a little longer toward the outside, because the pallets, not made yet, have to be inserted. When the turning in is completed we take the piece out of the tool, and instead of the anchor circle we fasten the lifting circle upon it. We apply a ruler to this lifting circle and draw upon the brass plate two lines, at pleasure, with a very sharp point. These lines are the tangents of the lifting circle and determine the inclination of the lifting planes. After having sawn the piece of brass in corresponding directions, we file exactly by these lines two larger faces, which, by the production of the lifting planes, shall serve as guide to the file.

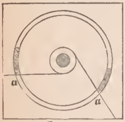


Fig. 14.

The pallets, in a finished condition, are about 3 mm. in breadth. They may be made of a piece of flat steel, bent correspondingly. It is better, however, to solder a sufficiently strong and broad steel ring with silver, fasten it with shellac or tin upon a brass plate, and make a ring of corresponding size and thickness in the universal tool. We first turn out its inner part until the anchor circle fits into it, then turn off so much from the outside that the ring fits exactly within the bezel of the brass piece. When the ring is completed so far, and also its front side turned smooth, we trim it to 3 mm. broad. Several pallets may be made of such a ring. Fig. 14 shows the pallets laid into the bezel for the purpose of filing on the lifting planes. We must suppose sides *a a* filed away down to the lines. After hardening the pallets, the lifting planes may very easily be ground and polished within the mentioned brass piece by permitting them to protrude by a trifle. Thus they will remain almost entirely plane. The grinding and polishing of the reposing planes may be done by hand by means of suitable composition files. It is performed more exact, however, by the assistance of a turned out ring for the outer, and a drum for the inner reposing plane; both are best of composition. The inner diameter of the ring, of course, must be equal to the outer anchor circle, and the drum must equally correspond to the inner anchor circle. The pallets, during grinding and polishing, must be pushed to and fro with gentle pressure, so as to produce no lines, while revolving the ring, or, rather, the drum in the tool. Use crocus for polishing, somewhat coarse at first, finishing with finer grades.

We now may satisfy ourselves with the decimal guage that the pallets possess the prescribed thickness. The anchor setting is made in the same manner by assistance of the disc of the anchor circle. The pallets are now ready, and we may proceed to fit them in nicely. The bezel is turned deep enough to let the pallets protrude a little and they will be retained by steel plates screwed upon them. Having finished the bezel we cut out the shape of the anchor setting with the saw. Its opening angle may be taken at 125°.

(*To be continued.*)

More About the Use of Diamantine.

MUCH has been disputed *pro* and *con* in the European horological press about the use of diamantine, and it may not be uninteresting to our readers to read, as it were, the final decision.

A subscriber to the *Revue Chronométrique* sent to Mr. Cl. Saunier the following communication: "Permit me to inform you of an observation I have made. Others may have made it as well as I, but since I find it nowhere recorded, I send it to you for verification. I have used diamantine altogether for some time to polish steel watch parts, but finally I noticed that when I had polished the lifting faces of a cylinder scape-wheel with it, the cylinder, after a short time, began to wear; the same thing resulted when I polished the cylinder lips with said diamantine. I have repeated the experiment several times, after fully satisfying myself of the good condition and hardness of the steel, and have arrived at the conclusion that diamantine is unfit for polishing rubbing surfaces. I have informed you of the result of my experiments, hoping you will elucidate the point. I have the honor, etc."

Mr. Saunier answered as follows to this communication: "We are unable to impart the desired knowledge sought by our correspondent, but will say that the results obtained by him exactly coincide with those made by ourselves, and we may establish the following premises: Either the cleaning of these parts has been imperfect, and some of the diamantine remained on the parts, or some parts have become imbedded, and thus have worn the parts affected. The latter supposition is perhaps the more correct one, since many can testify to the fact that steel parts cleaned with diamantine easily wear. If the above mentioned observations are borne out by later evidence, it is best to confine the polishing of steel parts with diamantine simply to those not exposed to friction, for instance, click parts, winding square, etc."

We cull the remarks of Mr. Saunier from an earlier copy of his *Revue*. The view of the present authorities appears to be that diamantine, after polishing, exerts no injurious effects whatever upon the steel parts; that it produces as high a polish as crocus, with the further advantage of producing it quicker, and to be recommended therefore; several practitioners, however, claim to have found that a polish of diamantine does not last as long as one obtained with crocus, similar to one obtained by the use of Vienna lime.

It stands to reason that brass holes should not be polished with diamantine; owing to the softness of the metal, the dust is apt to become imbedded. The experience has also been made lately that pivots and oil in aluminum bronze bushing do not last as well as in brass. This experience is, however, not yet well substantiated, and it would benefit the common interests if watchmakers would make careful observations on this subject and publish their experience.

Practical Treatise on the Adjustment of a Cylinder Watch.

[Translated for THE JEWELERS' CIRCULAR from the 2d-prize essay of Vincent Lauer.]

Continued from Page 329.

If the arbor square has not yet been perforated, do it now. When set in order, only the tempering and grinding of the stopwork remains, an operation with which every watchmaker is acquainted. I do not polish new stop-work, but simply clean it with fine emery, as is often seen in watches of fine grade. The screw also is hardened, annealed, and the head polished, the thread shortened sufficiently not to protrude within the cover. Now put the barrel into the plate to ascertain if perhaps its teeth rub on the case rim; should it take place, file out a little of the offending place. Close the dust cap, and should the square protrude, grind it down sufficiently, and polish.

We next bestow our attention on the inner barrel space; we imagine it divided into three parts. One part is occupied by the spring, the second part is intended for the core, and the third remains empty, to permit the winding of the spring.

The core must be measured to ascertain whether it occupies one-third of the barrel inside; if it be too large, turn off as much as necessary; but if too small nothing remains but to replace it. To ascertain the inner diameter of the barrel, measure with a guage the outer diameter, from this is deducted the two-fold thickness of the barrel walls; the remainder gives the inner diameter. The thickness of the rim may be measured with a decimal measure. A simpler method for measuring the inner diameter is to open the so-called dancing-master until it enters, and ascertaining its opening by measurement.

When, at the taking down of the movement, the spring should have been considered as not serviceable, we must choose a suitable one. To ascertain the breadth of a mainspring, we measure the height of barrel and cover, and deduct from this the thickness of the two side walls, also allow 0.05 for shake, and the remainder gives the breadth. As for thickness, it is sufficient for common watches, to measure with a pivot measure, taking the spring a few degrees weaker than the cover diameter indicates upon the scale of the pivot measure.

The thickness of the spring can also be easily calculated by dividing $\frac{1}{6}$ of the inner barrel diameter by the number of coils. The spring, in normal conditions, when it lies free within the barrel, has from 12 to 14 coils—let us take the average, 13. The given barrel has, for instance, 15 mm.; the number of coils, 13; we calculate: $\frac{15}{6} : 13 = 0.192$, that is, $\frac{1}{6}$ of the inner barrel diameter divided by the number of coils of the coiled spring gives its thickness. Here, therefore, the thickness of the spring amounts to 0.192 mm.; you will in this manner, by a correct size of the core, obtain from 5 to 5½ revolutions of the barrel. If desired to have the spring stronger or weaker, we divide in the first case with 12, in the second with 14; else with the values lying between these numbers—12½ or 13½.

CHAPTER VIII.

THE FOURTH WHEEL.

All watches to-day, small ladies' watches excepted, are provided with seconds hand, and I proceed from this supposition. It is easily explained why the fourth wheel cannot be moved, since thereby the seconds hand would no longer remain in the center of its circle, which must be the case, to go correct.

Put in the wheel to satisfy yourself that it stands truly straight, whether it has too much shake upward, or pinches, on account of the pinion being too high, if the wheel moves unhindered on all sides, rubs nowhere, etc. It is also necessary to put in the scape wheel, in order to try if the depthing is correct, or too deep, or too shallow, etc.

The dimension of the scape wheel is also to be considered at the same time, since it is not uncommon that the tooth heel scrapes on the fourth pinion. In this case, endeavor to move the fourth wheel a little farther, if it can be done without provoking any difficulties. The pinion stands sometimes a little upon one side, and it has to be moved to the center in such a case.

When all errors present have been found, take out the wheel and inspect the pinion, if it is suitable to give a good depthing. Should it have defects sufficient to make it useless, replace it by a new one. The fourth wheel is often left so thick that it has barely room to move free; also the inertia with such weighty wheels is so great that the transport of power is greatly damaged; it is therefore necessary to remove all superfluity. If the depthing in the scape pinion is too shallow, and the fourth wheel cannot be brought closer, and you do not wish to put in another one, hammer the thick wheel first a little, before filing it. Turn a groove around its riveting, if it not yet has one, place the half of the wheel into a cork, and, while holding it with the left hand and regularly moving it, remove the superfluous brass with a fine sharp file. Take care to leave it equally thick everywhere, and not to injure the pinion, especially the pivot shoulder. If the upper side of the wheel is not flat, or its polish bad, also remove the inequalities, and polish again afterward, (by gilt wheels, of course, this cannot be done).

Next try the pivots and polish them, if necessary Treat the bridge to the same course of proceedings as was recommended for the center and barrel bridges. The pinion thus is prepared, the bridge set in order, and the pivot holes now receive our attention for bushing.

If the wheel stands in its right place, and a removal is neither judicious nor admissible, broach the hole in the plate, set in a bushing, and perforate it in the center, by doing as follows: A brass wire is filed a little tapering, cut a thread upon it, also one within the hole in the plate. The protruding part is shortened in the screw-plate, filed flat, the wire is screwed out, and the center is sought with the centering tool, for drilling the hole; before marking the point, it is well to chamfer the end of the screw-thread a little, otherwise, the point will be inclined to this side. The bushing is now inserted into the plate screw-thread, from outside to inside, letting the end protrude a trifle. Next shorten the wire from outside, again permitting a trifle to protrude; divide the hole, and rivet the protruding ends; finish by suitably broaching the hole, paying attention to keep it straight.

The wheel is now put in, and see that it has its due quantity of shake; if it has not, the bushing must be turned off by so much—excepting, however, it is your intention to raise the wheel.

Before bushing the bridge hole, you first must ascertain whether the fourth wheel stands straight. To do this, put on the dial and head, and examine if the latter stands at all points and positions equidistant from the former. Should the wheel stand obliquely, broach the bridge hole, cut in a screw thread, insert a bushing, rivet it, and with an upright tool ascertain the center from the plate. Not to make the bushing unduly thick, and to get the hole as near its center as possible, you may open the bridge hole by broaching, then open it with a fine round file toward the side the pivot hole is destined to be.

When the bushing has been drilled, broach the hole for the pivot suitably, and insert the wheel, to regulate the end shake. If the pinion is too short, the bushing may protrude a little, but not much; if the up and down shake is too much, better turn in a new pinion. If the opposite is the case, that is, the pinion has no shake at all, carefully turn down the pivot shoulders, being very careful not to weaken the pivot itself, else all your previous work might be for nothing. Examine toward what side the wheel is to be moved, whether lower or higher, and by this choose the corresponding shoulder. After making it fit, of course, polish it again.

The wheel having been placed secure, examine it again that it stands straight, and proceed to make the oil sinks. The bushing is opened with a three-cornered chamferer, as far as deemed necessary, and finished with a roller chamferer.

Many watchmakers use raised bushing, which is simply a disadvantage for a watch, as the oil generally runs round the protruding part, while shortly afterward the pivot runs dry, when the little remaining oil has been expended. Raised bushings can only be made use of when too great a hole has been sunk at the factory, and the pivot simply rests upon an edge, the sink being at the same time too large to be filled with a bushing. In such a case we broach the hole and insert a suitably large bushing, after having smoothed the other part of the sink. The bushing must be turned in firm, and have a sufficient length for the secure working of the pivots.

Finally, chamfer the corners of both ends of the pivot hole with a pointed chamferer, and finish the inner face with a fine smoothing broach, which you may make yourself of a small piece of steel; file it in the shape of a broach, harden and grind it thin lengthways. This needle removes the roughness, left by every broach, at the same time increasing the hardness of the hole.

It only remains to examine that the wheel does not rub either with its under side nor with its teeth within its sink; should this be the case, or there be too little shake between wheel and plate, sink it by turning upon the universal tool. If the sink is to be deepened, do not turn it down to the pivot hole, but leave a shoulder in the center, else the pinion would receive too much shake, and also the wheel would rub again upon the bottom. When everything moves free and to satisfaction, we may deem this labor finished, and we turn our attention to the third wheel.

CHAPTER IX.

THE THIRD WHEEL.

By regulating this part, we encounter two depthings, that of the center wheel into the third pinion, and of the third wheel into the fourth pinion.

The bridge claims our first attention, and if necessary, any and all existing defects must be removed, in a manner heretofore described. Measure the pinion, if of suitable size, to give a good depthing; also pay attention to its height, to prevent the center wheel from passing above it; or if it contains any other defects. If the pinion is good, examine its pivots; should their polish or shape not be satisfactory, assist them.

Try the depthings, to see whether the wheel should remain in its place, or has to be removed. If the depthings are unsuitable to a small amount, bush the pivot holes concentric, as has been explained in the preceding chapter. If, however, it becomes necessary to change them, or that the wheel stands obliquely, we proceed in a different manner. The plate hole is broached, and a large bushing is inserted, which is well riveted in. We next place the first depthing, the center wheel and the third pinion, into the depthing tool, put one point of the tool truly into the center hole of the plate, and describe from here with the opening of both points, an arc, upon the inserted bushing, whereby care must be had to keep the tool vertical to the plate; if the center hole lies lower than the bushing, the corresponding point of the tool must be drawn out sufficiently.

The first depthing distance being thus indicated, we place the next depthing into the tool, and from the revolving point of the fourth wheel, we draw a second arc; the center point is at the intersection of the two arcs, in which the lower pivot of the third pinion is to stand, to enable both depthings to do good service. Mark the point of intersection by a pointed chamferer, and drill the pivot hole. For the further working of the bushing, as well as for that of the bridge, the straight position of the wheel, etc., our remarks of the preceding chapter will apply. The depthings are next inspected, and if one or the other stands too deep, or that teeth or leaves have not the requisite shape and thickness, we assist by cutting and rounding.

If any friction should have occurred by a removal of the wheel, remove them by turning out the plate—deeper, if the wheel rubs upon the bottom, larger, if the teeth rub against the sides of the sink. Be careful to examine that the wheel neither rubs against the lower foot side of its bridge, nor on that of the center wheel, and its teeth cannot interfere with the barrel; this will not occur often, and only in isolated cases; it is well, however, to bear it in mind. Again, an interference of the third-wheel arbor with the fourth-wheel teeth is to be avoided.

If the third pinion has too much end shake, so that the center wheel almost comes out, and it is not desirable to turn in a new pinion, permit the plate bushing to protrude, turn it off flat, and surround it with a facet.

Should the pinion stand well, but the wheel be too low, and frictions occur thereby, take down the wheel, turn off the riveting as much as necessary, and remount it. If, however, the wheel stands too high, and its depthing into the fourth pinion becomes too shallow, takee it down and turn off the riveting, next put the wheel upon a brass collet, as may be seen in many English watches, mount the wheel upon the pinion arbor, and make it round.

If in this manner all defects of the third wheel have been removed, put the dlfferent parts aside until further, and turn your attention to the scape wheel.

CHAPTER X.

THE SCAPE WHEEL.

This last wheel, especially the depthing into its pinion, requires the most exquisite attention, because the mainspring power has already been reduced to a fraction, and consequently, every occurring fault, such as, pinching of pivots, frictions of wheel or pinion, shock or undue engagement of depthing, etc., speaks in a loud voice, often producing the standing still of the watch.

The proportion of wheel and pinion is also here very thoroughly examined, the pivots are to be polished nicely, and its shake in the jewel hole is to be regulated thoroughly.

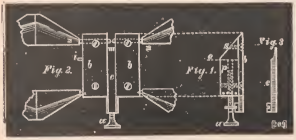
Having paid due attention to the bridge and screws, and rectified everything, we turn our chief attention to the examination of the jewels, and ascertain if the holes stand in right proportion to the movement, if they are highly polished, with corners rounded off, and if they sit firm and secure within their settings. Special care must be paid to their position—whether they stand straight or obliquely, as a jewel hole not set straight may occasion infinite damage to a watch, the pivot runs simply upon one corner, and consequently soon wears away. Jewels with such a defect must be taken out and reset. To find out whether the jewel sits firm within its setting, we insert a sharp-pointed pegwood into its hole, and observe with a strong magnifier if the jewel moves by turning the pegwood. Should it be the case, we fasten the jewel by rubbing its setting with a broach. It is best to perform this operation upon the universal tool, to preserve the setting neat, and it is only admissible in cheap watches to do this by hand. No jewel holes should be retained which have cracked into two or more pieces, even if they appear to be well held together by the setting; if a strong magnifier, even, shows no defects, the hole should be refused. nevertheless; it may contain some jagged corner to damage the pivot in a short time; the oil, also will escape through these flaws. If, therefore, the jewel is fractured, or possesses other defects, such as having a splintered, untrue, rough, or disproportionately deep hole, we insert another hole, because one with any of these enumerated defects only damages a watch. By setting a new hole, we first examine the pinion pivots, whether their dimensions stand in right proportion to the watch; if lengthways they are well cylindrical, possess a good polish, etc.; if any minor fault is discovered anywhere, we seek to correct it.

The polishing of the upper cylinder-wheel pivot often occasions difficulties, because in many cases it stands within the wheel-bottom sink. Many contrivances have been recommended, but I consider it best to take down the wheel, which is not connected with great difficulties, and the pivot is best polished thus. For taking down the wheel, use a fine hollow punch, within whose hole the upper short pinion arbor must fit; at the same time, the punch must, with its outer strength, fit well into the hole of the steel scape wheel. Put the latter upon a good flat riveting tool, choosing a hole in which the scape pinion fits easily, place the punch upon the pinion riveting, and beat it out. The punch is often placed upon the pivot shoulder, and it occurs frequently that the short arbor breaks.

[*To be continued.*]

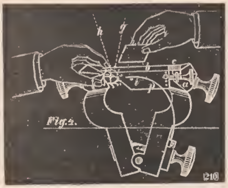
The Beveling-Plate for Correcting Faulty Anchor Scape Wheels.

SINCE several watch factories have so beautifully enriched us with bad anchor watches, the necessity for increased means of correction has arisen for the watchmaker, without which it is almost impossible to correct a faulty escapement.



Let us critically examine the scape wheel of such a watch and we will discover many glaring errors. It is either out of round, which generally originates in a badly-turned pinion, or the lifting faces are so rough as to show all the marks of the cutter and rounder. It sometimes stands too deep, and the harmony of the whole may only be established by decreasing the circumference of the wheel. We sometimes meet with defects in anchor movements of good quality, new as well as old; for instance, turned-down scape wheel, lifting planes either worn or having too little or too much inclination, etc.

As is well known, all these faults may be corrected upon the beveling tool, but its high price deters many a watchmaker from buying one, but the repairer, to-day, owing to the increased demands made of him, cannot get along without some tool serving for this purpose. I will describe a little contrivance in the accompanying cuts, which, owing to its simplicity, may simply be called "beveling-plate." It is quickly made, costs almost nothing, answers all the purposes of the costly machine, and is used in the depthing tool.



Any new depthing tool of average size may be used for the plate, as it is not injured in the least; if, however, you have an old one on hand, use it. If a serviceable tool has to be used, it is necessary, in order not to damage the original ones, to make four new points. Two dull points which carry the plates, and two points with holes for the protection of the scape wheel pivots. When using an old depthing tool, the existing points may be altered to suit.

A piece of brass plate, *p*, (fig. 1) after due smoothing 6½ mm. thick, receives the breadth of the space of two opposite point bearers of the depthing tool, or about 17 mm., and a length of 19 mm. In the middle through the length of this piece, *p*, is drilled an average hole, and a thread cut, wherein moves screw, *a*, (fig. 1). Two steel plates, *b b*, (fig. 2) are next fastened upon the brass plate by two screws, with heads countersunk in the plates. These two plates, standing in the middle 2.25 mm. apart, are filed below, to receive slide, *c*, which can be moved like a potance slide in the verge bridge by means of the screw, *a*. In front of this slide are made three incisions of different breadths, and the suitable one is found for the scape wheel needing correction. The slide must be cut on this place from below (fig. 3), to admit of a free wheel motion. The bevel, *s*, is then filed on the brass plate so that the angle left standing measures about 40°. Also a space for motion for the wheel in the plate is made with a square file, corresponding to the breadth of the slide and reaching up to the dotted line, *e*, (fig. 1).

To guard against the danger of overturning the plate accidentally, whereby the screw head, *a*, would strike against the wheel and break it, drill in the pin, *i*, and mount a spring upon it (fig. 4).

Finally, four sinks must be made on both sides of the plate, in which the points are inserted. These sinks must be measured with great exactness, since an inequality in their distance would produce a bad position of the plate. The upper sinks will come into use with a 14-line, and the lower ones with a 20-line watch.

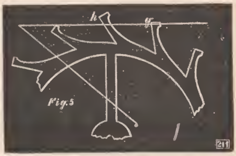
It only remains to harden both plates, *b b*, making them glass hard. The beveling-plate is now ready.

ITS MANIPULATION.

It will be seen by fig. 4 that, by opening and closing the depthing tool, the face of the beveling-plate receives an inclination more or less great, and the screw, *a*, makes it possible to bring the lifting plane of the scape wheel in one direction, or, if the lifting is incorrect, to place it in the desired direction, as shown in fig. 5 in an enlarged ratio. Attention must be paid, when putting in the wheel, that the place rests truly upon the points, *m*, *n*, (fig. 2) and not upon the wheel itself. This must remain free, as it has to support only the small pressure by grinding and polishing.

The teeth are ground with a small Mississippi stone, and the polishing with a small piece of composition metal.

Fig. 4 shows how the two hands of the repairer are occupied. With the index finger of the left hand he presses the beveling-plate against the two points, *m*, *n*, the thumb holds the wheel in one of the small incisions, and exerts the pressure in the direction of the arrow, while the third and fourth fingers firmly hold the depthing tool, the arm resting upon the work bench. The right hand conducts the stone, freely wetted with oil, to and fro over the plate, in order to remove anything protruding beyond it, of the tooth (figs. 4 and 5).



Care must be taken not to damage the succeeding tooth, which is prevented by having it in the form of a parallelogram.

The wheel thus is passed through tooth for tooth, and, when finished, it will be faultlessly true. Next clean the plate, without altering any of the screws, and polish with composition file and red.

I would finally remark that, perhaps, the matter may sound as very troublesome, but if the plate has been used once it is very simple.—[G. VOGEL, in *Journ. d' Uhrm.*

Workshop Notes.

Modelling Wax.—1 lb. white wax, ½ oz. turpentine, ½ oz. hog's lard, 1½ oz. zinnabar, ½ oz. white lead.

Influence of Air Pressure on Pendulums.—A Frenchman, Saint Loup, has noticed that a pendulum, by a fall of barometer of 10 mm., oscillates $\frac{1}{18}$ second per day less.

Uninflammable Tissue.—Steep the fabric to be rendered incombustible, muslin, calico, percale, or other, in an aqueous solution of phosphate of ammonia; subsequently dry it.

—A very tenacious and fireproof cement for metals is said to be made by mixing pulverized asbestos with waterglass, to be had in any drug store; it is said to be steam tight, and resist any temperature.

—Sulphur for sulphur casts is prepared by melting 4 parts sulphur and stir 1 part powdered zinnobar into it. Then pour this mixture into your form of well washed potter's clay, and you will have a sharp, well defined impression.

To Soften Steel.—Heat it brown-red, and plunge it in soft water; river water is best. Do not heat over brown-red, however, else it becomes hard when plunged. But if you plunge it as soon as it turns red, the steel will be soft enough to cut with ease.

—Diamantine consists of crystallized boron, the basis of borax. The *Techniker* says that by melting 100 parts boric acid and 80 parts aluminum, crystals are obtained, the so-called bort, which even attacks diamond. Diamantine bought in commerce is less hard.

Cement to Bind Metal.—Take pulverized plaster of Paris, and mix it to proper thickness by using water containing about one-fourth of gum arabic. This cement is excellent for metal exposed to contact with alcohol. It is far preferable to that prepared by the addition of joiner's glue to water.

—A handsome varnish for dials of clocks, watches, etc, may be prepared by dissolving *bleached* shellac in the purest and best alcohol. It offers the same resistance to atmospheric influence that common shellac does, when used as a coating on brass. The manner of applying it is easily learned.

Treatment of Brass.—To prevent brass from turning brown, coat it with the following varnish: 1 part white shellac and 5 alcohol; 1 shellac, 1 mastix, 7 alcohol; or 2 sandarac, 8 shellac, 1 Venetian turpentine, 50 alcohol; or, 12 parts sandarac, 6 mastix, 2 elemi, 1 Venetian turpentine, 64 alcohol. Clean the article well, do not handle any more with your hands, and warm to about 75° C.

—When repairing gold ornaments containing mosaic, be very careful, as it cannot withstand the least heat, the single pieces being held together with a very quickly fusible cement. As soon as the piece becomes warm, the pieces begin to rise, and, of course, the work is ruined. If you have to solder it, make a plate of sheet iron, give it the shape of your work, and tie it over the mosaic. You may safely thereupon solder with zinc, without fear of the little pieces rising.

Cleaning Mat Gold.—Take 80 gr. chloride of lime, 80 gr. bicarbonate of soda, and 20 gr. table salt; pour over this about 3 liters distilled water, and fill in bottles, to be kept well corked. For use, lay the dirty articles into a dish, pour over the well shaken fluid, let it submerge them, leave them in it for a short time, and in extra cases, when very dirty, warm them a little. Next wash the articles, rinse them in alcohol, dry them in sawdust, and they will appear like new. The fluid is of no further use.

Examining the Plate Form.—The pump is taken off, which is inclosed in a vise whose jaws are furnished with lead, letting it stand over sufficiently. Next, the plate form is passed contraways upon the so secured pump, and with two or three drill-bow motions, assure yourself, 1. That the plate form (its face) turns duly flat and straight; 2. That the point of its axis is immovable. Were this point to describe a little eccentric circle, it would be proof that the ideal and the real or material axes are not in accordance.

Plaster of Paris Casts.—The article is copied in soft, yellow wax. Then take gypsum flour, as much as you think it necessary, and stir it with water into soft batter. Take a fine camel's-hair brush, and cover the cast first with a thin layer of this batter, then fill the cast full with it and let it harden. If you do not take the precaution of thus lacquering your cast, you will never have a clean copy; it will always be full of air blisters and holes, originating from the confined air. Should the gypsum flour be old and refuse to set, add one or two drops sulphuric acid, and it will act as if fresh.

Gilding Steel.—Steel may be gilt by a solution of gold in ether. Dissolve pure gold in nitro-muriatic acid, and boil it until the latter is all driven off; then dissolve the residue anew in water, adding thereto a triple volume of sulphuric ether. Let the liquid stand in a well-corked bottle for twenty-four hours, and etherized solution will be seen floating on top. If polished steel is plunged therein, it will be immediately gilt, and if designs with any varnish whatever are drawn upon its surface, a handsome surface, both steeled and gilt, will be obtained.

For the other metals, use the galvanic process.

—Pearls which have lost their luster from perspiration or other causes, may be restored as follows: Dissolve potash in water, and scrape chalk into it until you have a thin batter. String the pearls on a thread, warm the potash water and suspend the former into it, and have them into it about ¼ or ½ hour, but pay particular attention that they never lie on the bottom of the vessel, they might become too hot and burn. If the potash should become too thick, add some water, you may also add a few drops of vitriol. When they are restored, rinse them in clean water and dry them in the sawdust; if not to your satisfaction, immerse them in the potash. This remedy is of effect only by pearls which were formerly handsome. No amount of treatment would improve indifferent ones.

White Shellac.—It happens most generally in common Swiss watches that the mounting of the lower cap jewels is entirely useless, and the jewels cannot be securely fastened. However, since between the cap and the jewel hole a small space must be left for oil sink, the repairer generally shellacs the cap in its place, and in order not to disfigure the work, many make use of white shellac. I hereby warn my fellow workmen against its use, as the oil dissolves it in very short time. I made use of the same remedy, and the owners of those watches complained soon afterward of a bad rate. On investigation I found that the balances in some merely "kicked," while others refused to go altogether; and I also found that the oil of the lower balance pivot had become a thick, white paste, while the cap was loose. Whether the common brown shellac possesses the same defect, I am unable to say,

Refining Gold by Precipitation.—The procedure of refining gold by the dry way, by the so-called precipitation process, has been known for a number of years, and treated as a secret, and only made use of by individual persons, to refine alloyed gold, and especially to remove those metals from it which make it hard and brittle. By repeated trials I have satisfied myself that it is possible to make the gold as fine as it occurs in trade, and even finer, by precipitation. The success of the very simple operation depends upon four conditions: 1. The choice of the necessary materials; 2. The preparation of the ingredients; 3. The fineness of the alloy to be treated; and, 4. The necessary temperature.

Many recipes are in use, and I have tried several, but all resulted in a loss of gold. My recipe is the following: To 1 part of gold to be refined, take 3 parts brick dust, 1 cooking salt, 1 alum, and 1 sulphate of iron.

Preparation.—Salt, alum, and sulphate of iron, in as dry a condition as possible, are pulverized, added to the brick dust, and thoroughly mixed. This powder is wetted with wine vinegar until it becomes a dough, kneaded into an earthen vessel or crucible, the gold to be operated upon in the center; it may also, if in pieces, be placed within the mass in layers.

Fineness.—Best suited for refining is the 8 to 12 karat gold; if of higher grade, add copper, to reduce. With gold of lower grade the difficulty arises that the remainder, after the operation, does not possess sufficient consistency to adhere and be taken out without loss.

Temperature and operation.—The crucible or the vessel is placed in charcoal fire, covered, and slowly heated, letting it remain for 3 or 4 hours at a feeble red heat. The length of time is in accordance with the thickness of the gold; easiest to be operated upon are thinly rolled plates. The feeble red heat is indispensable; if heat were given too quickly at the beginning, or raised too high during the operation, the decomposition of the ingredients would occur too quickly, and would not operate sufficiently upon the metal. When the mass is cold, the baked powder is carefully removed from the gold, and the latter, to thoroughly clean it, is washed in boiling water. It is now very porous, but of the purest gold color, and melted with borax.

The chemistry of the operation appears to be that the salt combines with the sulphuric acid of the sulphate of iron and forms chlorial, which changes the gold into a chloride; the fine gold becomes next reduced to a metallic state by the heat; the other base metals remain dissolved in the powder; the alum is intended to prevent a melting, and the brick dust works a gradual development of the chlorine.—[Dr. Philipp.]

Business Notes.

A. B. Jones, late of Fonda, has removed to Fultonville, N. Y.

The firm of Simons & Rogalsky has been dissolved. Mr. E. Simons will continue the business.

Mr. David Granberry, of Messrs. Hall, Nicol & Granbery, is now in Europe searching for novelties in fancy goods, etc.

M. D. Cohn has made a business engagement with Adolph Goldsmith, and will shortly make his maiden trip on the road.

Messrs. Freeman & Crankshaw are in town, purchasing their first stock of goods, with a view of opening a jewelry store in Atlanta, Ga.

W. H. Cohn, formerly with Gustav Ephraim, has entered the employ of Levy, Dreyfus & Co., and will represent that house in the south.

The firm of L. Baumann & Co., of St. Louis, have formed a joint stock company, and will hereafter be known as the L. Baumann Jewelry Co.

The Rhine-stone combs, buckles, pins, etc., introduced by Joseph F. Chatellier, have achieved a great success, and enjoy a deserved popularity.

J. P. Steinmann, of Newton, Pa., has recently built a new two-story brick store, with plate glass front, greatly increasing his business facilities.

Frank Carpenter has severed his connection with Alling & Co., and will be succeeded on the road by W. I. Block, formerly with Shaffer & Hahn.

C. A. Estberg, of Waukesha, Wis., has admitted to partnership his sons A. F. and E. W. Estberg, and the firm name will hereafter be Estberg & Sons.

Aiken, Lambert & Co. offer several new and attractive designs in pencil cases. This house is producing the most artistic effects in this line of goods.

The firm of Hodge, Goddard & Co., Pittsburgh, has dissolved, Mr. W. C. Hodge retiring. The new firm will hereafter be known as Goddard, Hill & Co.

E. Dreyfus, of the firm of Levy, Dreyfus & Co., will sail for Europe in a day or two for the purpose of making extensive purchases in their line for the spring trade.

Shaffer & Hahn, importers of precious stones, have dissolved partnership, Mr. Shaffer retiring from business. The firm will hereafter be known as Hahn & Co.

The firm of Garside & Berdan, of Patterson, N. J., expired by limitation on the 1st of January, and Mr. Garside retired. The business will be continued by William Berdan.

C. O. Boynton succeeds W. A. Bryant as western traveler for Bryant & Bentley. Mr. Boynton is well known in the west, and we commend him to the trade in general.

George B. Osborn, for many years with Hodenpyl, Tunison & Co., is now with Taylor & Brother, 676 Broadway, New York, and has already made his maiden trip east for them.

H. Myers & Co., of San Francisco, have closed their New York office, at 21 Maiden Lane, but their representative will hereafter be found at Julien Gallet, No. 1 Maiden Lane.

Edward F. Sanford, for some years in the employ of Alfred H. Smith & Co., diamond importers, has severed his connection with that firm, and engaged in the diamond business for himself.

Ludwig Lehman, manufacturer of jewelers' findings and fine paper boxes, is producing some very attractive goods in morocco and plush, artistically ornamented and finished in the neatest style.

The firm of Hosmer Bros., of Quincy, Ill., has been dissolved, and A. L. Hosmer will continue the retail business, while G. P. Hosmer, Jr., will carry on the jobbing business exclusively.

J. E. Simonson will succeed Mr. Conklin, as western traveler for Messrs. Shoemaker & Co. Mr. Simonson has been in the employ of the firm for a number of years, and now makes his maiden trip.

Mr. Charles A. Kneringer, salesman with the firm of Simpson, Hall, Miller & Co., was recently married to Miss K. Kosine, of Alpine, N. J. The happy couple have our best wishes for future happiness and prosperity.

A. B. Speir, an old and well known traveler, carries four lines of goods with him, and will present to dealers the stocks of Hodenpyl, Tunison & Co, Woglom & Miller, Sinnock & Sherril, and Saxton, Smith & Co. What with the attractions contained in the goods themselves, and the silvery tongue of Mr. Speir, he must be an exacting dealer who cannot be suited when visited by that gentleman.

S. Brunswick, manufacturing jeweler of this city, is about to retire from that business, for the purpose of engaging in the importation of diamonds. He is now in Europe, making selection of a choice stock of goods.

Theodore Evans, for many years with the firm of Wheeler, Parsons & Hayes, has gone into business on his own account, and will start out on the road at an early day with a stock of gold and plated jewelry, chains, etc.

J. J. Fisher, of 697 Broadway, has introduced a new support for French clock movements, its purpose being to hold the movement in position while being regulated. Its simplicity commends it to the consideration of the trade.

F. I. Marcy & Co., of Providence, have secured the services of W. D. Cable, an old and well known traveler. Mr. Cable's friends will be glad to learn of his association with an enterprising and honorable firm like F. I. Marcy & Co.

W. & S. Blackinton, of Attleboro, whose factory was slightly injured by fire a few weeks since, have repaired damages, and are now prepared to fill all orders promptly. We are happy to state that the fire was not so disastrous as at first reported.

Joseph Seymour, Sons & Co., manufacturing silversmiths, of Syracuse, are said to be negotiating with D. Valentine, for the purchase of his entire stock, business, etc., in which case Mr. Valentine will enjoy in his retirement the well earned honors of a busy life.

S. Perry, for many years with the firm of N. Matson & Co, of Chicago, has withdrawn from that firm, and formed a co-partnership with his brothers, for the purpose of carrying on a jobbing jewelry business. They have located at the corner of State and Monroe streets, and will do business under the firm name of Perry Bros.

E. Aug. Neresheimer, diamond importer, announces that he has associated with him in business, Wm. M. Weil and Louis Neresheimer, and that the name of the firm will hereafter be E. Aug. Neresheimer & Co. The new partners have long been in the employ of Mr. Neresheimer, and their advancement is a deserved recognition of their services and business capacity.

Geo. W. DuBois has associated with him, F. N. Nauman, who has been in his employ for the past ten years, and the firm will hereafter be known as Geo. W. DuBois & Co. The business of the firm of Francis DuBois & Co. will hereafter be conducted by Geo. W. DuBois & Co., Mr. Francis DuBois having died. The new firm will carry on the optical business and the importation of watches.

On Wednesday, Jan. 18, in Syracuse, N. Y., Mr. Kossuth Marx, of Kossuth Marx & Co., was united in marriage to Miss Minnie Kraft, of Syracuse. Among the guests present were Messrs. Jacob Marx, Monroe Marx, Samuel Eichberg, Wm. Weil, Joseph Muhr, and many others. The presents were numerous and elegant. The happy pair have gone upon an extended bridal tour through the south.

Mr. Henry Veith, of the firm of Oppenheimer Bros. & Veith, recently entertained the employes of the firm in commemoration of his recent marriage, a little affair that made him one of the happiest of men. The wedding occurred during the height of the busy season, when the boys were on the road, and Mr. Veith embraced the first opportunity when they were all home to give them an elegant dinner. The affair was a most enjoyable one in every respect.

A. Bernhard & Co. have prepared an attractive example of hair work, consisting of a portrait of the late President Garfield. The photograph is handsomely mounted, surrounded by a wreath of leaves and flowers, all hairwork, and the whole enclosed in a neat ebonized frame, handsomely ornamented. It is not only attractive for the portrait of Mr. Garfield, but is a unique example of hairwork, and forms an elegant ornament for a store window. This specimen is presented by the firm to their customers.

An announcement is made by the old and well known firm of Sussfeld, Lorsch & Co., that from and after January 9, the firm will be known as Sussfeld, Lorsch & Nordlinger. Mr. Nordlinger has been a member of the firm from its organization, but his extreme modesty has heretofore impelled him to conceal his identity under the anonymous designation of "Co." He now very properly comes to the front in bold relief, and will continue to take an active and responsible part in the management of the business. In this connection we note, also, that the firm has made a change in the designation of the precious stone department of its business, and this will hereafter be conducted under the firm name of Lorsch, Dreyfus & Co. Mr. Dreyfus, who has been with them for several years, being admitted to partnership. This is simply a branch of the house of Sussfeld, Lorsch & Nordlinger, with Mr. Dreyfus admitted to partnership in this special branch.

Trade Gossip.

A tiny silver teapot is the new watch charm.

Diamonds are set in a row around the finger in guard rings.

An interrogation point in diamonds is a new Parisian brooch.

One of the latest horological novelties is a musical alarm cornet clock.

A gold sunflower is the æsthetic design for breastpins and finger rings.

A silver tankard made by Paul Revere has just been discovered in a store in Waterville, Me.

American pearls of abnormal shape are mounted in grotesque devices for gentlemen's scarf pins.

A lace pin of hammered gold, with the wearer's monogram in the center, is one of the newest styles.

An investigation is now being made in Canada into the recent wholesale jewelry smuggling at Montreal.

A promising diamond bed has been discovered, it is reported, on the Resecca estate, near Uberaba, Minas Geraes, in Brazil.

Limoges enamel is much used, and with good results, on medallions and lace pins for ladies, and on scarf pins for gentlemen.

The firm of Fowler Bros. & Co., of Providence, has dissolved. C. A. & J. D. Fowler will continue the business under the firm name of Fowler Bros.

The daughter of a St. Louis jeweler is said to have slept continuously for four months. Probably there is nothing in that town worth waking up to see.

The fashionable engagement ring of the season is a sapphire stone set in diamonds. It is more elegant than the large solitaires which preceded it in favor.

Frank Carpenter, for many years with Alling Bros., has entered into a business engagement with Taylor & Bro., importers of fancy goods, diamonds, etc.

Some doubt is expressed as to whether a bankruptcy bill will be prepared. If one is not, there will be great disappointment in business circles in this country.

The residence of J. W. Webb, a well known jeweler of Dallas, Texas, was destroyed by fire on January 2. He lost all his furniture, and was only partly covered by insurance.

Albert Burch, the Pullman car conductor, who was caught smuggling watches and jewelry into Canada, has admitted his guilt, and was sentenced to eight days imprisonment and $100 fine.

Daniel Webster's watch, the one he gave Dr. John Jeffries the day he died, is on exhibition at a Boston jewelry store. It is a heavy gold, open-faced Swiss watch, made in the early part of the century.

New sleeve links and studs for gentlemen's wear consist of tiny dogs' and cats' heads of enamel set in gold under crystal. Each sleeve link has a dog's head and a cat's head alternately, and the studs are made to correspond.

Benjamin Spier, of Harris, Spier & Co., was married Sunday, Jan. 15, to Miss Lucy Wolff, at the residence of the bride's parents, in Brooklyn. The happy pair are now enjoying the sweets of the honeymoon in an extended bridal trip.

James Hildebrand, of Mercer, Pa., disappeared from his home several days ago, taking about $1,000 worth of goods, and leaving a number of firms in Chicago, Buffalo, New York, and Pittsburgh in the lurch to the extent of $15,000.

A sweet girl graduate in New Hampshire is learning the watch cleaning trade. Just as we expected. One of those tender, sentimental young things cleaned us out of a watch once, and now the art is to be more thoroughly developed.

Ruby and sapphire stones are exceedingly popular at this time, and a favorite combination for rings consists of the ruby and sapphire with diamonds. The flexible bracelet, with fancy ends, has replaced the less graceful broad bands, chains and bangle bracelets.

It is all very well to admire a pretty girl in a sealskin sacque, but when one of these charmingly attired and attractive appearing demoiselles is heard to blurt out, as was heard in Tiffany's the other day, "Oh, ma! ain't them terra firma ornaments just lovely," our faith is shattered.

Marcus Nusbaum, said to be a commercial traveler, is serving a three years' term of imprisonment at the Jefferson City, Mo., penitentiary, for obtaining some $300 worth of jewelry from Mermod Jaccard & Co. The prisoner is said to belong to a respectable family in this city, whose real name he has successfully concealed.

Sesser Friedburg, one of the most notorious pawnbrokers of Chicago, whose name figures in several dark transactions, the last being the murder of policeman Rae, was sent to Joliet penitentiary recently, after having baffled justice over three years, and having spent $20,000 to secure immunity for his crimes.

An Oriental taste finds expression in the slender bangle bracelets and ear rings, and in the settings of lace pins with rubies, emeralds, and colored pearls; while the golden serpent with jeweled eyes, apparently enjoys the same favor to-day that it did with the dames of Egypt and Cyprus three thousand years ago.

A large box containing a quantity of diamonds, watches, rings, and a general assortment of jewelry, was recently seized by Custom House Officers, on board the steamer France. The trunk was taken to the Custom House. It is thought that the owner was a resident of Philadelphia who has a branch jewelry store in Brooklyn.

The new reform Mayor of Brooklyn has very wisely appointed Mr. Wheeler, of Wheeler, Parsons & Hayes, one of the new Board of School Commissioners. Mr. Wheeler is a gentleman possessed of high business integrity, of excellent executive ability, and enjoys the respect and confidence of the community in which he lives. It is to be hoped that all the Mayor's appointments will be as judicious as this.

A large number of western buyers are in town, making their purchases for the spring trade. The instant they make their appearance in the Lane, they are set upon by a score or more of Providence drummers, who fill up the doors and stairways of the stores of resident dealers. Some of the more respectable Providence manufacturers, becoming thoroughly disgusted with such indecent importunity, have determined to seek interviews by appointments only.

The old trick of substituting bogus diamonds for genuine stones has been revived. It has been successfully played on several jewelers in Maiden Lane and Broadway. It is usually played by a well dressed young man asking to look at some diamond rings; watching his opportunity, he abstracts one and substitutes a bogus one; he finally leaves without purchasing. The number of rings being correct, the swindle is not discovered until the thief is well out of sight.

The Manhattan Railway Co., of New York, that has 64 miles of track on the Elevated Roads, and about 200 stations, have contracted with the E. Howard Watch and Clock Co., of Boston, to furnish them a clock for every station, and put up in the Superintendent's office one of their fine regulators, with a contact that will synchronize the clocks in every station twice each twenty-four hours, so that the clocks will have uniform time. The regulator to have a rate not exceeding one second per week.

J. Alex. Hardy, of Pittsburgh, Pa., was presented with a handsome gold Patek, Philippe & Co. watch, by his employer, Mr. W. W. Wattles. The outside of the case is ornamented with an artistic monogram, "J. A. H." Inside the cap is engraved, "J. Alex. Hardy, from W. W. Wattles, on his twenty-first birthday, in appreciation of his strict integrity and faithful services. Pittsburgh, Jan. 18, '82." It is a very elegant present, of which any young man might be proud, and this recognition of his faithful services is as deserving as his employer's gift is generous.

When the auctioneers mounted their Paris pulpit a few weeks ago, in order to sell the Mme. Blanc jewels—otherwise known as the Monaco Crown jewels—they were arrayed in fine linen and evening coats; honors which, as a London paper notes, are not conferred upon an author's books, however noble the collection be. Then the auctioneer appears in a shooting jacket. The following were some of the prices of the Blanc sale: A necklace, of 313 pearls, with clasp in brilliants, £12,500; two rows of pearls, 100 to each string, £4,600; a diadem of diamonds, £8,600. Three days' sale produced 1,094,000f., or about $220,000.

A guileless youth recently played a sharp trick on the ticket agent at the Grand Central Depot. He purchased a ticket for Boston, paid $3, and offered as security, a gold ring which he represented as worth $12, for the balance. The ticket agent, overcome with the tearful appeals of the guileless youth, yielded to the swindler's importunities. Shortly after the train had left, the agent discovered that the ring was brass and worth about five cents, and that the guileless youth aforesaid had worked all the passengers and railroad employes for all they were worth. The swindler recently made his appearance at the depot, and was immediately arrested. He had in his possession at the time twenty-five bogus rings, all marked inside "Henry P. Studley, 18 karat." The prisoner was committed in $500 bail to answer at General Sessions. It would be interesting to know the name of the manufacturers who are aiding and abetting this swindle.

THE

Jewelers' Circular and Horological Review.

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

The recognized organ of the Trade, and the official representative of the Jewelers' League.

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Commercial Integrity.

WE frequently hear it stated that commercial honor is rapidly becoming obsolete, or that, in fact, it is a thing of the past. Is this true, or is it a slander upon the business men of to-day? We are not among those who feign to believe that the human family is degenerating; on the contrary, we are confident that there prevail to-day, to a greater extent than ever before, a finer sense of honor, more genuine kindly feeling, more liberal ideas of what is due between man and man, greater charity and more true hearted benevolence, more general and widespread than since the world began. We believe in the progress of the human race, its elevation as civilization advances. We have an abiding faith in the God-like attributes of man, and scout the idea that he is daily and hourly falling away from grace. It is true that there is a vast amount of rascality abroad, and sometimes the depravity displayed by a presidential assassin, or the stupendous embezzlement of a Newark bank cashier, staggers our faith for a time, but then will come an uprising of the people in behalf of some desolated district, and as thousands upon thousands of dollars are spontaneously poured in upon the sufferers by fire in Michigan, or by disasters elsewhere, our faith in the human family is restored, and we are again prepared to assert that the present generation of men is better and purer, as it is wiser and more civilized than any that has preceded it.

Nevertheless we are willing to admit that there is far more rascality abroad than is either necessary or good for us. It pervades all classes of society, and is found in every branch of industry. If we were to draw our conclusions from the record as presented in the daily papers, we would be obliged to admit that crime was in the ascendency, but, while the busy reporters of the press drag to light every transaction that smacks of irregularity, benevolence and charity modestly shrink from publicity, and their deeds of mercy are "unheralded and unsung." Crime owes its greater prominence to-day to the fact that the daily press, with its unequalled facilities, hunts it out and pillories it in blazing print, that all may read and shun the perpetrators. Crime increases more or less with the increase of population, and, as our population was never so great as now, there is, logically, more crime. But crime has not increased so fast as Christianity has spread, and there is still maintained a preponderance of good. Still, we could wish there was less of crime, and especially of that phase of it that intrudes upon commercial transactions, inducing some of our merchants and business men to take unfair advantages of their unsuspecting customers. In other words, we wish there was less of that which is denominated "sharp" practice, whereby a "shrewd" operator contrives to work off merchandise or stock of little value, at exhorbitant prices. Our great railroad magnates showed the public how to amass colossal fortunes by that magical process known as "watering stock," and while it is not possible for every unscrupulous person to dilute railroad stock, it is within the power of many to adulterate and degrade the quality of the merchandise they have to sell, and to make unholy profit thereby. They have even laid adulterous hands upon the food we eat, and the law has been obliged to step in and prescribe penalties for poisoning the nutriment of our bodies by the introduction of foreign substances. Our sugar is largely made up of sand and glucose, our coffee is mixed with chicory, oleomargerine is sold for butter, stones and scrap iron give weight to cotton bales, shoddy struts about in the plumes of broadcloth, and fire gilt parades in the guise of gold, while paste shines in the place of diamonds, and of sausages and hash no man knoweth the component parts.

But greed of gain has characterized the human race ever since Cain envied Abel the uprising of the smoke of his sacrifice, and many of the family have put aside their conscience, as did Cain, in their efforts to obtain that for which they lust. Still, there are hosts of Abels in the land, pure of heart and noble in all their actions. As business men, their transactions are characterized by the strictest integrity, and the commercial honor of many a house is a noble legacy, handed down from father to son though many generations. In fact, the strictest honor characterizes every business house that holds a permanent place in the great commercial transactions of the age, carrying on their enterprises year after year, conducting transactions involving millions of dollars, with never a taint or a suspicion attaching to their integrity. Their commercial paper passes current in the street, and every obligation is promply met at maturity. The word of such men is as dear to them as the apples of their eyes, and what they say, they do. The speculators, sharpers, and swindlers, of whom we hear so much, are but the hangers on to the skirts of commercial operations; they are the perishable fungii that attach themselves to the noble oak, and, being nearest the surface, attract the most attention. The jewelry trade is noted for the numbers of both classes we have referred to which it contains. No calling embraces more solid, substantial houses, whose commercial honor is above suspicion, than does the jewelry trade. Their capital is embarked in a legitimate business, and it has been their ambition to elevate their calling, and to make it honored of all men. To their enterprise and laudable ambition, combined with their tried integrity, the country is indebted for the pre-eminence the watch and jewelry industries of the United States have attained among their competitors of the old world. These men have raised the traffic in jewelry from a position of huckstering, to a foremost place among the arts, and the products of their genius and skill are the envy of the world.

Nothing but the highest sense of commercial honor could have sustained these grand old houses through the troublesome times of war and panic, and enabled them to overcome the many obstacles they had to encounter. Among them are men whose names will go down to posterity side by side with the names of many others who have trod the paths of commerce, and to whose integrity of character, and steadfast loyalty, the country is largely indebted for its greatness, its power, and its prosperity. Prowling in the shadow of these noble houses, there are many unscrupulous sharpers, as there are in every other calling, who are willing to sell their manhood for money, and who believe that any trick or device is pardonable provided it satisfies their greed of gain. They belong to that adulterous generation that poisons our food, and spend their time and ingenuity in devising means whereby they can adulterate pure gold to a point where gold ceases and grand larceny begins. They have no scruples about selling gilt for gold, or paste for pure gems. They are simply swindlers and robbers, whose acts are criminal, and should be punished as such. But because a few such swindlers make a great show in the trade, and flood the country with their bogus goods, it is no more just to condemn the entire trade as unscrupulous, than it would be to denounce all banking institutions because a Baldwin robbed a single one. Baldwin, the embezzler, created more of a sensation, and was more talked about than all the hard-working, plodding bank cashiers in the country, whose private integrity and commercial honor induced them to handle millions of trust funds without losing a dollar. Modest merit performs its duty quietly and unostentatiously, while swindlers and sharpers flaunt their rascally schemes in the eyes of the public, the better to advertise their swindling enterprises. The highest forms of commercial honor exist to-day to a greater extent than ever before, but so much greater publicity is given to crime, that one must look below the surface to find that commercial integrity and personal honor that are the characteristics of our business men. Nevertheless, they are the potential agent in all the great enterprises of the century, and the keystone of the arch on which rests the nation's prosperity.

Debased Rolled-Plate Goods.

WE have received many communications from the trade upon the subject of the degraded quality of rolled plate with which the market is flooded at present, and regret that we have not room to print them all. We give, however, two of these communications—one from a retail dealer and one from a manufacturer—which show the general tenor of all we have received. The retail dealer condemns the manufacturers for making these cheap goods and supplying outsiders with them, while the manufacturer alleges that the fact that the public wants and buys these goods is sufficient warrant for their manufacture. He also alleges against the retail dealers, a lack of enterprise, averring that they are content to sit in their stores maintaining the dignity of their calling, while "outsiders" catch the trade. He suggests that they should carry lines of all qualities of goods—from 7-karat rolled plate to 18-karat gold—sell them for what they are, and so compete with the outsiders. There is some logic in the communication of Manufacturer, and some plain truth that may not prove palatable to dealers. There is no doubt but retail dealers are too frequently inclined to stand upon the dignity of their calling to an extent that is not contemplated with satisfaction by their neighbors. We often hear travelers complain of dealers who do not get to their stores till long after other business men have entered upon the duties of the day, and are too dignified—or indolent—to put forth any exertion to bring their goods to the attention of the public. Many of them unquestionably are lacking in that spirit of enterprise that characterizes the successful man. There is sense, too, in the statement that people naturally go to a jewelry store for jewelry, but if they do not find the kind they want, they will patronize those outsiders who do keep it. It will be a matter of reproach to the trade if dealers in legitimate jewelry are forced to carry lines of cheap, debased goods, but if the manufacturers continue to supply such goods to outsiders, the dealers may be forced, as a means of self-protection, to include these debased goods in their stocks. If they did carry lines of all qualities of goods, they would certainly be in a position to compete with outsiders on equal terms. But we take exception to the general tenor of Manufacturer's communication. We believe it to be the duty of every person connected with the trade to strive to elevate the art standard in jewelry, and to educate the public to a just appreciation of the best work of our designers and artisans. It is the greed of gain that induces manufacturers to pander to depraved tastes, and to cater to a demand for cheap goods. To do this, quality, style, workmanship, art, must be sacrificed. This is to degrade the art of the goldsmith to a level with the makers of patent medicines, who sell bread pills as a cure for all the ills that flesh is heir to. To get money without giving an honest equivalent, is the incentive alike to the manufacturer of degraded jewelry and the maker of bread pills. The one degrades the noblest of all professions, and the other the most skilled and artistic of all the trades. While there may be present money in the manufacture of degraded goods, the final outcome cannot fail of being injurious to the manufacturer, for as our correspondent remarks, these degraded goods tend to destroy confidence in the better qualities. It seems to us a short-sighted policy that induces manufacturers to make goods that the legitimate dealers cannot conscientiously handle, and for the sale of which they are obliged to rely upon furnishing goods dealers, hardware merchants, etc. Retail dealers are the medium through which manufacturers must expect to reach the great bulk of consumers of their products, and anything that tends to weaken the dealers must eventually react upon the manufacturers. The communications we give elsewhere will be read with interest and profit, no doubt, by all identified with the jewelry trade.

Something Novel in Clocks.

THE manufacturers of clocks have not only kept pace with the improvements of the age, but have led and directed public taste to a great extent in matters of art. The mechanical accuracy achieved in the construction of clock movements leaves little to be desired in this respect, while the many combinations made by which calendars, weekly and monthly, are united with the movement, are as ingenious as they are practical. Movements of all sizes are turned out in perfection, from vest pocket sizes to the elaborate counting-house clocks that mark the seconds, minutes, hours, days, weeks and months of the year. But it is in the casing of the movements that our manufacturers show rare artistic taste with a high order of mechanical ingenuity. They have kept fully abreast with the improved taste for decorative art, and have given us elaborate cases to correspond with the requirements of interior decorations. No matter what style one may adopt for the interior finish of his house, whether of the Queen Anne, Egyptian, Japanese, or the American, he can find clocks cased to harmonize perfectly with the effects he has sought to produce. If his furniture is of the Eastlake style, he can readily find a clock to harmonize with it; if he has sought architectural effects in his rooms, and has introduced niches of peculiar shapes, or columns of various styles, he can find a clock to correspond and give practical effect to his conception. The ambition of the makers has been to combine artistic effects, by the use of various woods and metals, with superior workmanship, producing a result that gives us the practical perfect clock movement in forms and under conditions that shall satisfy good taste and please the eye of the most critical observer. In this regard, the clock makers have kept abreast with the improvements made of late years in watches and jewelry, and fully sustained the high reputation the trade has attained for its rapid progress in the science of horology.

Among the latest novelties produced in clock cases is one known as "The Pike's Peak," constructed by C. W. Little, of Denver, Colorado. The case is made of samples of the ore of precious metals and stones found in the immediate vicinity of Pike's Peak. The ores and mineral curiosities are arranged in the form of a rock pyramid, supporting a tower, the clock movement occupying a grotto in the rock work. In the example we have seen of this work, there are thirty-five specimens of mineral ore and precious stones, each one of which is marked with a number, corresponding to a number on a card explaining each specimen. Among these are several samples of gold ore from different mines, silver, copper and lead ore, moss agate, quartz crystal, cornelian, petrified woods of different varieties, rose quartz, iron pyrites, jasper, etc., etc. These specimens are artistically arranged, make a unique pyramid of rock work, which is not only valuable as a work of art, but possesses considerable intrinsic worth. Mr. Little has made a business of mounting clock movements in this unique manner, and is prepared to supply the trade with them. Nothing could be more ornamental for a mantel clock, at the same time that it furnishes valuable and attractive specimens of the mineral curiosities of Colorado, which state is recognized as a marvel in the richness of its mineral products.

IN THE February number of *The Horological Journal*, of London —which paper claims to be "published for the British Horological Institute"—appears an article over the signature of D. Glasgow, entitled "An American Watch." The writer claims to have recently dissected, or vivisected, an American Watch, and proceeds to show that it is defective in all its parts, coarsely made, and wholly untrust worthy as a timepiece. We do not know who Mr. Glasgow is, his name not having yet been included in the list of famous watchmakers, but it is apparent that his recent literary effort is written from a prejudiced standpoint, and intended to destroy public confidence in all American watches. It is possible that he may have found such a watch as he describes, for, upon the heels of respectable and responsible American watchmakers, who have so largely introduced their products to the British people, makers of cheap-grade watches have followed with goods of inferior make, that do not pretend to be of the best quality, and certainly are not. It is probable that Mr. Glasgow has obtained possession of one of these, and either ignorantly or maliciously assumes it to be a fair sample of American watches. The characteristics of the watch he describes are certainly not to be found in those manufactured by reputable American watch manufacturers. The writer referred to gives evidence of his prejudice and cowardice by omitting to give the name of the maker of the watch he pretends to describe, thus leaving his readers to infer that it is a fair example of all American watches. But if it was cowardly in him to write such an article, it was more cowardly and contemptible for the editors of *The Horological Journal*—pulished for the British Horological Institute—to admit to their columns an article which they knew to be false and intentionally misleading. But how prejudiced the British Horological Institute is against American watches, may be inferred from the fact that it formed a topic for animated discussion, as to whether or not the American manufacturers should be permitted to advertise in *The Journal.* American watches have earned and maintained a reputation for superiority, and their merits as timekeepers have commended them in all quarters of the globe. The manufacturers of American watches have built up a large trade in foreign countries, competing successfully with British manufacturers upon British soil, and it is not to be wondered at that they meet with opposition. Our manufacturers, however, are justly indignant at this dastardly attempt to excite a prejudice against all American watches, because some self-constituted judge has dissected an inferior watch of allegedAmerican production, and found it defective. We trust that the editors of *The Journal* will recognize their error, and that their sense of justice will impel them to make a speedy atonement for the injustice they have done to American manufacturers of established reputations.

THE cruel and barbarous treatment to which the Jews have recently been subjected, is naturally exciting the indignant protests of the civilized world. That men, women and children should be beaten, and even murdered, their property destroyed, and they forced to flee into exile, forsaking their homes and the accumulations of years of honest industry, simply because of their religious belief, fills with horror the breast of every true man in this free country, and invokes upon the head of tyrannical Russia, the contempt of every civilized nation. The newspapers teem daily with the horrible details of the outrages perpetrated by the ignorant and brutal Russians, many of the murderous scenes being enacted under the eyes of the government troops sent to prevent disorders. Evidently these troops fully understand the temper of the Russian government, and only see disorders where some of the denounced race seek to defend themselves. So long as the Jew is the victim, all is peace and quiet, but when he turns upon his persecutors, then the officials see riot and treasonable demonstrations, and the poor Jews are promptly arrested and banished the country. While such barbarous outrages are permitted, Russia cannot be classed as a civilized nation.

But it is good to observe how repugnant these things are to the enlightened people of other nations. In all the principal cities of Europe and America there have been meetings of the people to denounce and protest against this persecution of the Jews by Russians, and these meetings were attended and endorsed by the leaders of society in intelligence, Christianity, wealth and social position. Many of the exiled Jews are seeking a home in this country, where they will be sure of such welcome as they individually merit. The question of creed, fortunately, does not enter into consideration in judging of the merits of a man in this country, but each is esteemed according to his individual merits. The Jews who seek a refuge here, come among us upon precisely the same footing as other immigrants, and while we extend to them our sympathy for the persecutions they have undergone, they will, nevertheless, have to win their way by their good conduct. They will find no persecution, however, based upon religious prejudices. The barbarous atrocities which Russia permits to be executed upon the Jews, is a reproach to the civilization of this enlightened age, and the time is not far off when the advanced nations will demand that they shall cease.

THE following circular, relative to the purchase of mutilated silver coins at the mints, has been issued by the Director of the Mint: "The Superintendents of the United States Mints at Philadelphia, San Francisco, Carson, and New Orleans, have been authorized to purchase mutilated and uncurrent United States silver coin of standard fineness at the rate of $1 per ounce, Troy weight, when presented in sums of $3 and upward. Coins can be forwarded to those mints by registered mail or by express, charges prepaid, and the value will be returned at the seller's risk and expense by express, registered mail, check or draft. Persons sending full weight United States subsidary silver coins would receive, at the rate authorized, 80 cents per dollar of their face value, but, for mutilated coins, a less amount, proportioned to the deficiency in legal weight. At the rates paid, mutilated silver coins will be worth at the mints: Per ounce Troy, $1; per ounce avordupois, (about,) 91 cents; per dollar, face value, (approximately,) 70 to 76 cents."

IN withdrawing the twenty-cent pieces from circulation, because of their unpopularity, the Canadian Government has shown a desire to accommodate the people. The Deputy Receiver-General of Toronto recently collected fifty-thousand of them and sent them to the capital. In this country the twenty-cent piece is also a nuisance. There is no important function fulfilled by it which cannot be served by the dimes and half dimes. Not only two ten-cent pieces, or four fives, or a ten and two fives, will make up the required amount, but there are many combinations of the small coins with the one-cent pieces which will effect it. On the other hand, the frequent mistake, in haste, of receiving a twenty-cent piece as a quarter dollar, is enough to condemn this superfluous coin.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

The first meeting of the Executive Committee since the annual meeting of the League, was held on February 3d; it was organized by the election to the chairmanship of William C. Kimball, of H. F. Barrows & Co. Mr. Kimball was certainly entitled to this honor, having been a faithful and energetic member of the Committee since the League was founded.

President Woglom and Robert A. Johnson were appointed delegates to the Union of Mutual Benefit Societies of the State of New York.

The report, in pamphlet form, of the proceedings at the annual meeting, was ordered to be printed, and is now in press, and will be forwarded to the members as soon as they are ready.

The deaths of John H. Willemin, late with J. P. Capelle, of St. Louis, and of Edwin C. Taylor, late with Tiffany & Co., have been announced. When their proofs of death are presented and passed upon, the members will be duly notified of the assessment.

The following named members were admitted at the last session of the Committee:

Andrew J. Barrett, Olof Bjorkwall, Albert Freund, Henry Goodman, George R. Halm, Theo. Heinroth, Fredk. W. Hoyt, Wm. R. Jackson, Edward H. Kent, Moses J. Lichenburg, Jos. Odenheimer, Herman Oppenheimer, Jr., Jos. Sherman, Jr., Sigmund Stern, all of New York City; George S. Collum, Edward R. Glover, Peter J. McGurk, Arthur Rifenberg, Irving L. Russell, Francis S. Sherry, William E. Taylor, all of Brooklyn, N. Y.; John A. Seely, Ogdensburg, N. Y.; Chas. E. Kirtland, Utica, N. Y.; Chas. A. Boynton, Binghamton, N. Y.; Wm. W. Pierce, Erie, Pa.; Simon Muhr, Philadelphia, Pa.; C. C. Mussina, Williamsport, Pa.; Edward J. Bubb, Allegheny City, Pa; Nathan F. Swift, Plainville, Mass.; Arthur C. Lord, Jamaica Plains, Mass.; Albert M. Litchfield, N. Attleboro, Mass.; Howard G. Lane, Gloucester, Mass.; Henry M. Lane, Bridgewater Mass.; Fredk. E. Fisk and M. O. Elsbree, of Taunton, Mass.; James L. Clark, Springfield, Mass.; Solon Abbott, Winchendon, Mass.; Isaac M. Miller, East Orange, N. J.; Alfred W. Lawton, Elizabeth, N. J.; T. J. Haring, Norwood, N. J.; Harry A. Bliss, Wm. A. Durand, Wm. H. Lyle, Chas. C. Wientge, Jas. D. Smith, John E. Simonson, of Newark, N. J.; Alfred M. Weinhardt, Edward A. Ware, Fredk. M. Solomon, John W. Sercomb, Albert L. Sercomb, Geo. W. Payson, Robert Morris, John A. Hallstrom, Jacob Hahn, Egbert H Griffin, Simon Glickauf, Edwin A. Giles, of Chicago, Ill.; James B. Curr and B. H. Stief, Nashville, Tenn.; Chas. Kasten, Milwaukee, Wis.; Geo. H. Dustin, Beloit, Wis.; Wm. Hurtig, Cincinnati, O.; L. H. Brunner, Cleveland, O.; F. L. Zimmerman, Troy, Ala.; Jacob M. Visanski, Laurens C. H., S. C.; John Thiem, Baltimore, Md.; H. T. Silverthorn, Lynchburg, Va.; Ralph S. Hamilton, Providence, R. I.; Emil C. Mutrux, St. Louis, Mo.; Arthur O. Norton and Ernest Norton, of Coaticooke, Canada; Stephen Spitzler and Geo. J. Ringwald, Helena, Montana, a total of 74.

One application was rejected, and seven were laid over for further inquiry.

We have received several letters from the trade in Canada, approving of the article in the February issue of THE JEWELERS' CIRCULAR, wherein we deprecated the attempt to establish an Association like the League, among the jewelers of Canada.

Attempts have been made to either amend or repeal the act of 1881, for the protection of charitable and benevolent societies in this state, but they will in all probability fail, when brought face to face with the well organized force at the command of the Union of Mutual Benefit Associations of the State of New York.

The special committee of 18 appointed by the President at the Annual Meeting, in conformity with the resolution passed, to consider matters of import to the League in its future welfare, convoked by the Secretary for its preliminary sitting and organization, on January 30th, has held one session, electing as its chairman, Henry Hayes, of Wheeler, Parsons & Hayes, and as its Secretary, Wm. L. Sexton, the Secretary of the League. Several sub-committees of three each were appointed to consider the important matters which have from time to time been presented to the League for its consideration, with instructions to report to the special committee at its next sitting on April 28th, thus giving ample time for a thorough study of the respective matters intrusted to them for investigation.

In consequence of the details necessarily accompanying the annual meeting, we are unable to give a complete list in this number of THE CIRCULAR, of those firms who have so kindly given their interest in the Chicago fire fund to the League. Several firms have declared their purpose to do so since we gave the list of names in the address of the President at the annual meeting. We expect to give in the next issue the whole number of those who, up to that time, will have done so.

The President reports that he is often sought by young men who are out of positions as salesmen, local as well as traveling, in order that they may avail themselves of the fraternal element in the League, and which could well be used in their behalf, in securing them other positions, if employers would advise the President of their requirements; they could thus be put in correspondence with a class of young men whose membership in the League, with its accompanying proofs of foresight, prudence, frugality and good bodily health, are strong presumptive evidence of other good qualities which employers could avail themselves of for their mutual interest.

The Wisconsin Retail Jewelers' Association.

A MEETING of the above-named Association was held at Janesville, on the 8th of February, about twenty-five members being present, and W. H. Thorp presiding. Reports of the Secretary and Executive Committee were read and approved. The annual dues were increased to $2, fifty cents of which is to be paid to the National Association. C. B. Morse, of Evansville, Theodore Schelle, of Milwaukee, and W. H. Thorp, of Beaver Dam, were chosen as delegates to the National Association. J. Taylor Smith tendered his resignation as President of the Association, which was accepted with many expressions of regret. Mr. Hall, of the firm of Webb & Hall, of Janesville, was elected to fill the vacancy, but declined on account of the illness of his partner. Thereupon Mr. W. A. Manning was elected President and duly installed. A communication from Mr. W. N. Boynton, President of the Guild, was read, which stated in substance that the Guild Stamp designed by himself had been approved by the Executive Committe, and a satisfactory arrangement had been made with the Racine Silver-plate Company, to make a line of flat ware, and that bonds had been executed by the Racine Company to insure faithful performance of its part of the contract. The contract stated that the goods should have ten per cent. more silver upon them than the best triple plate goods now in the market, and that they would be sold only to members of the Association. The Racine Company had placed one hundred and fifty dollars to the credit of the Guild for the purpose of advertising and introducing the Guild stamped goods. The contract with the Guild is that the Company shall make one style only of flat ware, extra plate, bearing the stamp of the Guild, such goods to be sold only to members of the State Associations, whose names are to be furnished to the company.

On motion the stamp recommended by Mr. Boynton was adopted, with the proviso that other electo-plate manufacturers be permitted to use it on the same terms and with the same benefits as the Racine Company.

At the evening session addresses were made by various members on matters of interest to the trade. It was voted to hold the annual meeting in July, at Waukesha, and to have a two days' session. The best of feeling pervaded the meeting, and the informal discussion of trade topics was interesting and instructive.

A Stroll through the Horological School at Glasshütte.

IMPELLED by curiosity, and time hanging heavily on my hands, I concluded to pay a short visit to the Horological School at Glasshütte; having seen it formerly in a picture, I had formed an indistinct idea of its natural beauties, position, facility, etc., but I must say that the reality agreeably excelled any preconceived ideas. The building is separated from the main street by a handsome fence, with a large gate, through which I entered, mounted the wide doorsteps, and entered through the open hall. I do not know why, but a cold shudder stole over me when I made the first step over the threshold of this edifice erected to art and science. The hall is handsomely painted. Four large pillars carry a cross vaulting; a glass wall separates the hall from the inner staircase.

The janitor appeared, summoned by my ringing, and upon request, conducted me to the director of the school, Dr. Lindemann. I expressed my desire to examine the school, and the gentleman very kindly permitted me to be present at the theoretical instruction, the same forenoon. I listened to the lectures of Mr. Strasser, in the theoretical branches of arithmetic, geometry, and book-keeping, and was really struck at the high degree of excellence attained by the pupils.

I returned in the afternoon at 1½ o'clock, to hear the lectures delivered by Messrs. Hesse and Bergter, both eminently practical teachers. Mr. Hesse was calling the roll, done morning and evening. I intended to at once examine the tools, but found that the discipline of the school demands every scholar to clean up his bench, and carefully pack away his tools into a box under the bench. On consideration, I found it to be a laudable rule, because the scholars might suddenly be prevented from visiting the school next day, and by their being laid away and locked up, they are prevented from getting dusty, and being used by his co-apprentices; beside, it teaches the young men order. Every watchmaker knows that the use of many tools is sometimes necessary during the day, and if heaped upon the bench, a long search is often necessary to find it. "A place for everything and everything in its place."

Leisurely I could witness the several works in progress. The school counts over forty scholars, divided into three large rooms, and each scholar was occupied with that work best suited his capacity. But the imprint of the school was plainly visible upon everything.

Two more hours of instruction were given in the evening, from 5 to 7 o'clock, bearing on theoretical horology and French, under tuition of Director Lindemann, and I, an old watchmaker, must confess that I was perfectly charmed with the amount of instruction imparted in the former.

Desiring to see the tools, etc., and a week day offering very little opportunity for such inspection, I solicited the Director for permission to call to-morrow (Sunday), which he kindly granted me, and next day he exhibited to me all the constructions, contrivances, tools, and utensils in use; everything I saw was thoroughly practical and adapted to its purpose.

During instruction and school hours, the rooms within are locked, and no one can enter or depart without the intervention of the janitor.

The ground floor to the right contains the theoretical schoolroom, with five benches and an experimenting table; on the wall in front of the benches is suspended a large blackboard. Close to this schoolroom is the library, being also the conference room of the Directors. The kitchen, also, is located on the ground floor, as well as the janitor's rooms.

Descending to the basement, the first thing that strikes our attention is a pump by which good drinking water is forced up under the roof, where it empties into a reservoir. From there it is distributed over the building. An electric apparatus indicates when the reservoir is nearly empty or full.

The basement also contains the battery room, containing a large number of elements, for the propulsion of the different electric clocks and bells of the building. The most interesting, however, is the so-called pendulum room, with double walls, doors, vaulting, and floor; everything is laid in cement. The room is intended to retain even temperature, and as soon as it is thoroughly dry, will receive an electric seconds pendulum, which at present oscillates in the Director's room.

Four very practically constructed working rooms are situated in the first story, and are very amply provided with light and air; in the middle room is the Director's room, whence doors and windows lead to the right and left. The working henches are of beech, and built very substantially. Every scholar has one meter length of bench, a large tool box, and a seat suitable for him, to enable him to sit straight while at work. Eight places are separated for scholars who desire to work standing. The Director told me that they are always taken up. Every room contains all the latest and improved machinery, universal lathes, cutters and rounders, drilling machines, etc., and the requisite foot fly wheels for their propulsion, as also those for smaller turning tools, are all fastened to the ceiling, and thus they do not occupy valuable floor space. Electrical index clocks are distributed through the entire building, and a bell, which, of course, rings for the beginning and end of the school hours.

The Director's room contains two standard clocks, also the aforementioned pendulum. A telephone connects the school with the house of the Superintendent, Mr. Moritz Grossmann.

The garret contains the dwellings of Messrs, Lindemann and Hesse, also several rooms for scholars. The aforesaid water reservoir is situated immediately under the roof, as well as three electric fire alarms, and the room for a large public electric index work, not yet located for want of funds.

Expressing my thanks to the Director and teachers for their exceeding affability, I left this institution of learning, the German Horological School, with feelings akin to regret, silently hoping that horologists would issue thence, who, with the profundity of their thoughts, would be a credit to the establishment and an honor to the craft, and soon afterward bade adieu to the charming little mountain town of Glasshütte.[—Z., in *Allg. Journ d. Uhrm.*

A Condensed History of French Goldsmithing.

[We translate from a volume *l'Orfèvre complet*, issued during the French Revolution, the following account on goldsmithing, which we have condensed into a convenient article for the acceptation of our readers. If we contemplate the so-called good old times, with their extremely rigorous laws, and their many fences, bounds, and confines to keep man in the right path by force, and should he, nevertheless, impelled by *inward cussedness* deviate from this carefully hedged-in path, then punish him with all the refined cruelty of the savage, we are led to believe that, old fogyism notwithstanding, we have fallen upon better times, when man's word of honor limits his action and prevents his straying from the paths of rectitude. But it is not the duty of the translator to *do the heavy*.]

The art of the goldsmith ascends to the most remote times of antiquity ; the Chaldeans and Hebrews already had acquired great celebrity in their work, and the ancient monuments of Egypt give testimony, that goldsmithing and bijoutry had attained a certain degree of perfection, which grew prodigiously among the Greeks. From the time that these two arts commenced to spread over Europe, up to our day, we may say that they have not alone assumed gigantic, but also magic proportions, and works which issue at present from the ateliers of our artists, are most admirable in all their details. The word *orfèvre* (goldsmith) appears to be a composition of *auri faber ;* this etymology is at least given in the *Encyclopédie*.

Goldsmithing was constituted a body by Philipp VI., surnamed of Valois, in the year 1330. He invested it with its first statute in the month of August, 1345, and honored it with a coat-of-arms, consisting of a scolloped gold cross in a field of gules, accompanied by two crowns and two cups, also gold, surmounted by the French banner. No one was eligible to the mastership who had not served an apprenticeship of eight years, served by masters two more years as journeyman, made his masterpiece, and given bail in the sum of 1,000 livres.

Every year, in the month of June, after the translation of St. Elias, the patron of the goldsmith's art, an election was held for three guards, one old and two young ones, and made by plurality of votes, in an assembly presided over by the lieutenant-general of police and the *procureur du roi du Chatelet*. No merchant of the body of goldsmiths could be elected grand guard, unless more than ten years had elapsed since he had last served; and no one could take the charge of young guard who had not at least been a master for ten years.

King John I. permitted the body to build a temple under the name and invocation of St. Elias, and he caused reliquies to be given them of this saint by Pope Innocent VI., who occupied at that time the Holy See at Avigron. In this chapel, one of the most magnificent of Paris, and vulgarily styled by the irreverent the Goldsmiths' Chapel, holy service was performed during the whole year.

RECEPTION OF A MASTER GOLDSMITH.

The artisan was obliged to present himself before the *procureur* of the King, at the Chatelet at Paris, and take an oath of his veracity in business; he was next examined at the *Court of moneys*, on the different calculations of alloy for gold and silver. If found sufficiently instructed, the court admitted him at once to take an oath of religiously observing the ordinances of the King, and the arrests of the court, and the *procureur general* then received him as master. A deposit of 1,000 livres was required of him, to serve both for the king and the public, in case of fraud or deception practiced by him.

In 1776, the gold beaters and drawers were admitted into the Goldsmiths' Guild, and later, in March, 1781, also the lapidaries were consolidated with them.

The number of goldsmith merchants of Paris was fixed at 300 guild masters; after this consolidation, it was increased to 500.

Independent of these masters, other goldsmiths existed in Paris with an equal right to work and sell. Some had acquired their mastership by the privilege accorded to the Hotel des Gobelins, others by that of the Hotel de la Trinité. The number of masters of the former privilege had no limit; they were required to have worked for six years in the hotel, and upon the certificate of its inspector and of the King's director of buildings, the aspirant was received as master without any other fees than those of the Court of Moneys.

The privileged masters of the Hospital de la Trinité were only two, and nominated by the *procureur general* of the Parliament; they must have worked eight years in the establishment. They possessed the advantage over those of des Gobelins, in that they obtained a master stamp upon beginning. But they were obliged to take charge of an infant from the hospital; to board, wash, and instruct it for eight years in all the branches of the art. Besides this there were a few other privileged masters of the Provost's Hotel, 4, and 2 others appointed by the Prince of Orleans, as the prince of the blood; they had nothing to do with instructing apprentices.

OBLIGATIONS AND PRIVILEGES OF MASTER GOLDSMITHS.

Each goldsmith was required to have a proprietary stamp, called master stamp, bearing the initials of his name, a device of his choice, a crowned *fleur de lys*, and two little oblongs standing parallel with each other, to continually remind him that he had but two grains of margin in the use of metals. At the same time these stamps had to be engraven upon two sheets of copper, of which one was deposited in the Court of Moneys, the other one in the clerk's office of goldsmiths, for reference. He was also required to apply his stamp upon all works at commencement, in such a manner that they could not be effaced during working. When these works were simply hammered out he had to carry them to the clerk's office, enter them on the register of the king's fees; he then received a certificate and the article was counterstamped. He then was required to deposit it in the office of the goldsmiths guards, to be assayed, who affixed his stamp of approval: This was, up to 1784, a crowned letter of the alphabet, changing each month of July, upon the election of the new guards, and which indicated the delinquents in case of fraud.

The King, in 1784, made several changes in marking and standard.

Goldsmith's widows could keep open shop and manufacture, but their works had to be stamped by some other master.

Goldsmiths could not buy, smelt, or deform any piece of gold or silver of the kingdom, before having given public notice. They could not manufacture works composed of gold or silver partly, and in connection with gilt or silverplated baser metal, nor of silver and gold together in such a manner that it could not be weighed separately. They were forbidden from purchasing plate of gold or silver above the standard of money. They must sell the contents of their work separately, in tenor with the metals employed, according to the certificate. They could buy no plate except from well known persons. A goldsmith who suspended manufacture temporarily must bring his stamps to the bureau, where they were sealed up and laid away until such times that he should commence again.

Proposed Uniform Time Service.

THE Signal Service authorities have planned an extension of time service, in this and other Atlantic ports, which promises to have some far reaching results. Nearly all the vessels engaged in the Atlantic trade regulate their time by the Greenwich standard, which from the vast predominance of the British marine is becoming the conventional standard the world over. To facilitate the testing and regulation of ships' chronometers in our port it is now proposed to set up a time-ball on the high building of the Equitable Insurance Company, to be dropped hourly by Greenwich time. It is also in contemplation to establish a system of standard meridians at even-hour distances from Greenwich, and the distribution of standard time based thereon in all our principal cities.

The meridian five hours (or 75°) from Greenwich passes near Philadelphia. The proposition is (by disregarding the odd minutes) to make Philadelphia time officially five hours later than Greenwich time, and the standard for the Eastern and Middle States. It is reasonably held that to the 12,000,000 people within twelve minutes of the Philadelphia meridian the practical convenience of uniform time will vastly outweigh the theoretical inconvenience of having their time uniformly a few minutes too fast or too slow. The next standard hour line would fall near the meridian of St. Louis, Memphis, and New Orleans, making the time of the Mississippi Valley exactly one hour later than that of the East. Two other hour lines would cross the country near Denver, Colorado, and near San Francisco, California. This would give four standards for the whole country, instead of the forty now existing.

Strength of Materials.

AT THE late fair of the Massachusetts Charitable Mechanic Association at Boston, examples were shown of tests of materials made by the machine lately erected in the United States Government Arsenal, at Watertown, for the proving of structures of full working dimensions. A steel wire cable, 1¾ inches diameter, was shown, which had withstood a pull of 75 tons, when the fastenings by which it was held gave way, although the cable itself remained sound. A hammered iron bar, 5 inches in diameter, was shown to have concealed a crystalline formation of the fibers, and it consequently parted with a loud report under a strain of nearly 723,000 pounds, or 36,900 pounds to the square inch. A smaller wrought iron bar drew down and broke with a fibrous structure under a pull of 51,340 pounds per square inch. Some pinewood columns were also shown which had been tested by compression. The first of these, originally 12 feet long, yielded at a pressure much below its estimated strength, in consequence of a large knot in the side, which acted as a comparatively incompressible wedge. Another column was a spar 12 feet long, 7¾ inch butt, and 6½ inch top. This stick was a perfect sample, and gave way by splintering at its smaller end. A seasoned hard pine girder, 11 inches square and 10 feet long, bore a load of 751,000 pounds.

Guide for Watchmakers' Apprentices.

BY HERMANN SIEVERT.

[*Continued from page 26.*]

WATCHES.

Introduction.—The pendulum, which renders such excellent services in the measurement of time, can only be used for firm and vertically-standing clocks, consequently a substitute must be found adaptable for portable movements. The regulating part of a watch must, in its motions, be independent from the earth's attraction, and it therefore must have no point of gravity. This condition is best complied with by a balance wheel, that is, a wheel whose greatest weight lies in its periphery, and while resting upon two pivots, remains in perfect equipoise in whatever position.

As you know, the pendulum oscillation is the effect of two causes—the attraction of the earth, and the inertia of bodies. The former is entirely excluded by the circular shape of the balance, and is replaced by an extremely fine spring, wound spiral-form, and called the balance spring. If the balance wheel, like the pendulum, is moved from its place of rest, the elasticity of the spring drives it back, until the spring occupies its previous place. The balance cannot stop its own motion, but progresses on its way until the reoccurring tension of the spring has overcome such motion, again draws back the balance, and the same performance is repeated continuously. You will see that the balance vibration is exactly identical to the pendulum oscillation, with this difference, that in the former the earth's attraction is replaced by the elasticity of a spring.

That extraneous motions do not unduly influence the vibrations of the balance, it must have a far greater vibration circle than the pendulum, and, in fact, the balance motion in a cylinder watch amounts to about three-fourths, that of a good anchor watch as much as six-fourths of its circumference. For this reason the escapement of a watch requires a proportionately far greater power, in order to sustain these extended vibrations. Again, the entire weight of the balance rests upon its arbor pivots, and if even these are made as thin as is possibly consistent with their durability, they nevertheless cause an unduly greater friction than takes place by the pendulum motion in its suspension. And for this reason, a watch requires proportionately a far greater degree of power, and as a sequence, in proportion to the dimensions of its parts, a greater and quicker wear takes place, wherefore a watch requires repairs far oftener than a clock. Its duration depends entirely from the style of its execution, and it is not said wrongfully "that not the wearer, but the watchmaker ruins a watch." From its condition we judge of its capability, and the skill of him who repaired it.

The watch is undoubtedly the smallest of all automatic machines, and its production and repairs demand an extraordinary degree of skill and care. No artisan is required to spend more time and diligence for learning his trade than the watchmaker, who is supposed to be not alone skilled in the making of the several parts, but also to control its functions and performances, as it were. The capable watchmaker is required to understand how to replace every part in even the smallest watch, which has become unfit, and in such a manner that no layman can be able to detect it. Of course, we are able to purchase many parts in market, still, a great deal of knowledge and capability are necessary to put the watch into a faultless condition.

For such exact work, extremely exact and minute tools and utensils are requisite. Especially a good turning lathe will assist our endeavors to a high degree. The repairer who tries to get along with a bad, faulty contrivance, can certainly have no adequate conception of the importance of such a tool.

Taking down a watch.—When taking down a watch, the greatest caution is necessary for the preservation of its good appearance, and not to mar it by scratches. As much as the gilding of the movement contributes to the handsome appearance, as sensitive is it to all careless and inattentive injury by slipping of tools, cleaning with chalk, etc. Be very careful therefore, not to damage a watch in such a manner, since an injured gilding cannot be restored in any other way than by regilding the entire movement, and the watch generally has to bear such disfigurement to its end. None the less guard against disfiguring the screw-heads; always keep your screw drivers in the best possible order, as shown in Fig. 51. A screw driver must neither be too large nor too small for the screw-head; in the one case, it ruins the screw-head; in the other, the surrounding parts, if the head, as is generally the case, is countersunk. It therefore is necessary to have a whole collection of good screw drivers of different breadths on hand.

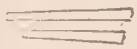
Fig. 51.

The taking down of a watch commences with the escapement, after hands and dial plate have carefully been removed; the mainspring, however, must first be let down. Let the spring for this purpose slowly run down by the key, in case it is wound, by lifting out the click or click spring with a suitable pegwood. If you cannot get at the click, put a very thin pegwood between the wheels until you have removed the entire escapement, with the wheel. The running down of the train with the scape wheel in place, sometimes causes a fracture of the latter's pivots. Now, when the mainspring has run down and the escapement removed, you may take out all the bridge screws. These screws must be kept in strictly the same order which they occupied in the watch, upon a little table devoted to the purpose, and furnished with holes. The lifting off of the bridge must not be done with a sharp-cornered hard instrument; best suited for the purpose are little tongs, with extremities shaped like screw drivers, and given in Fig. 52. They are made of hammered German silver. To remove the canon pinion from the center staff, take the watch-plate loosely within your hand, and with a very small hammer strike against the staff. Then, after having taken down the bridge, together with the center wheel, place the thin end of the arbor staff upon a brass plate, and while seizing hold at the wheel, turn the arbor with a key. It thus will easily come out under a gentle pressure upon the bridge. In this manner neither the pivots of the center wheel nor the dust cap upon the center staff will be injured.

Fig. 52.

The escapement parts, owing to the delicacy of their pivots, demand a very careful treatment, and the balance spring, moreover, must in no manner be bent or damaged. The stud is cautiously taken out of the bridge by means of small tongs, one part of which, somewhat larger, as seen in Fig. 53, is provided with a small pin, screwed in. The collet may be carefully removed with a knife. The unscrewing of the cap jewels together with index and plate, are very necessary for the proper cleaning of the pivot holes of the escapement. The taking out of the mainspring, as well as the taking apart of the clickwork for purposes of cleaning, is self-apparent.

Fig. 53.



Cleaning.—In order to renovate the polish of the blackened wheels and balance, take a fine leather huffstick, free of dust, with oil and very little crocus, and give those parts a few slight strokes, laying the wheel under treatment upon a clean cork. Be careful, however, not to take too much crocus, you would ruin the polish and produce streaks and grooves. Finally, a fresh dry leather buffstick produces a high polish. Also brush the teeth with a worn, short-haired brush. Then with a pegwood remove all the dirt out of the pinions, etc., any occurring rust spot, with oil and crocus. Also all blackened holes and sinks clean with pegwood, crocus and oil, but do not touch the gilding surrounding the sinks, they might turn white.

Now put all the parts, except screws, intp *clean* benzine; this removes all greasy or other loose dirt, except resin and strongly adhering perspiration. If, therefore, you should have damp fingers, be careful not to touch the steel parts with them. If it could not be prevented, be sure to brush the parts affected with alcohol and chalk. Otherwise, the steel parts would rust even after the benzine bath.

. This must not be dirty, and it is advisable to first rinse all strongly fatty or crocus-covered parts in dirty benzine, in order not to ruin the clean. For drying, take a clean, anfibrous cotton or linen cloth; any adhering benzine, however, evaporates quickly. It finally remains to go over the different parts with an entirely clean soft brush, to revive the polish, and to clean the holes anew. If spots should show themselves upon the gilding which cannot be removed by the brush, breathe upon them, then brush, and your attempt will, in all possibility, be crowned with success.

The mounting of the watch must proceed with the same care as taking down. Do not fasten a bridge screw until you are satisfied that the corresponding pivot is in its hole. Lubricate all the pivots, the spring, the ratchet, escape-wheel teeth, the cylinder on its inner upper corner, whereby the place of friction is constantly lubricated, also the center hole, to prevent a pinching of the center staff, and minute-wheel pin; the latter is oiled more for the purpose of preventing a rusting than to assist the gentle friction. Care must be had at the same time not to lubricate such parts, where the application of oil would most decidedly produce mischief, such as the balance spring, curb pins, balance, wheel teeth, and arms of scape wheel, etc. Fasten the cannon pinion by fitting it into a suitable hollow brass punch, a steel one might occasion damage, to afterward fasten the hour pinion.

[*To be continued.*]

Patent Reports.

Clock Movement.—Arthur E. Hotchkiss, Cheshire, Conn. Filed May 27, 1881.

Claim.—1. A clock movement having a front plate, back plate, and intermediate half-plate, and a wheel arranged substantially in the same vertical transverse plane with said half-plate, the latter aiding to support the mainspring and main wheel, substantially as set forth.

2. A clock-movement having three plates, the actuating mechanism being supported by the intermediate and back plates, and the portion of the train between the center wheel and escapement being supported by bearings in the front and rear plates, as described.

Ear Ring.—Herbert G. Mackinney, Providence, R. I. Filed Oct. 17, 1881.

Claim.—1. The bow of an ear ring provided with the hook *h*, hinged to one arm of the bow, and arranged to turn in a segment of a circle between stops located as described, said hook being adapted to engage the opposite arm of the bow, substantially as described, and for the purposes specified.

2. In combination with the hook *h* of an ear ring, the disc *d*, with the lips *l l*, or equivalent flange *f*, all substantially as described, and for the purpose specified.

3. The hook *h* of an ear ring, provided with the lips *l l*, in combination with the disk *d*, substantially as specified.

Pin-Jewel Holder.—Ferdinand Gundorph, Portland, Oregon. Filed Nov. 23, 1881.

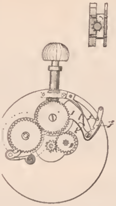
Brief.—The balance-disk is laid on *k*, its shaft passing down into slot *f*, and the hole in the disk is placed loosely over the ruby pin, which is clamped between *b* and *e e*. Shellac is placed on the pin and heat applied to the whole until the proper degree is indicated by the spring thermometer *g*.

Claim.—A pin-jewel holder consisting of the parts *a b c d e f g h i j* as a whole and in combination, as described, and for the purpose set forth.

Clock Movement.—Arthur E. Hotchkiss, Cheshire, Conn. Filed Jan. 22, 1881.

Claim.—In combination with a supporting-plate for a clock movement, a stud projecting from said plate, a hollow arbor sleeved thereon, and a mainspring and main wheel mounted on said arbor and arranged on the same side of the said plate.

Stem-Winding Watch.—Chas. W. Grosche, New York, N. Y. Filed Aug. 23, 1881.



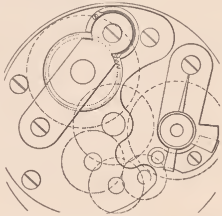
Claim.—1. The combination, with the minute wheel, the barrel-arbor wheel, the first winding wheel, the second winding wheel, and its carrying lever, of the locking lever adapted to engage with a stationary catch for holding the wheel carrying lever in either position to which it may be adjusted, substantially as and for the purpose specified.

2. The combination, with the wheel carrying lever and its second wheel, the barrel-arbor wheel, and the minute wheel, of the notched locking lever and a spring adapted to move said locking lever into engagement with its catch, and to move said wheel carrying lever to bring its wheel into engagement with the wheel on the barrel arbor, substantially as specified.

3. The combination, with lever *I*, of the locking lever *J*, pivoted to said lever, adapted to engage with a stationary catch, and having an arm *k*, and the spring *l*, bearing on said arm, substantially as and for the purpose specified.

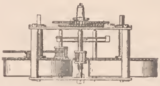
4. The combination, in a watch, with the dial plate, the back plate, and the first winding wheel or stem wheel, of a block fitting and clamped between said plates, steadypins for holding it against lateral movement, and a bearing for said wheel, formed partly in said dial plate and partly in said block, substantially as and for the purpose specified.

Click Spring for Watches.—Antoine L. G. Buys, Geneva, Switzerland. Filed Sept. 12, 1881.



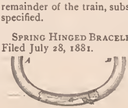
Claim.—The click and curved spring made in one piece, in combination with the segmental bearing around which the curved spring passes, substantially as specified.

Clock Movement.—Benjamin B. Lewis, Bristol, Conn. Filed Oct. 24, 1881.



Claim.—The time train herein described, in which the two driving wheels mesh into and are connected by the intermediate pinion, mounted on the shaft which drives the dial wheels, while one of said driving wheels meshes into the next pinion in and drives the remainder of the train, substantially as described, and for the purpose specified.

Spring Hinged Bracelet.—Abraham H. Engel, New York, N. Y. Filed July 28, 1881.



Claim.—In a spring hinged bracelet, the combination, with the parts *A B* and spring G, of the beveled lug *F*, substantially as herein shown and described, whereby the parts of the bracelet will be held in position, both when opened and when closed, by the tension of the said spring, as set forth.

BRACELET AND CLASP.—William C. Edge, Newark, N. J. Filed Nov. 19, 1881.

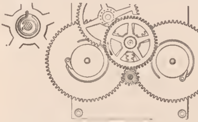
Brief.—The parts of the bracelet are swiveled. A stop at the joint limits the movement. A spring holds the bracelet in a closed position.

Claim.—1. In a bracelet, the combination of its rigid portions *A B* with the spring *i*, and with the stops *e* and *h*, all arranged so that the parts *A B* are swiveled together, and have an opening movement that is arrested by said stops, substantially as specified.

2. In a bracelet, the combination of the swiveled parts *A B*, with the spring *i* and stops *e h* and *f g*, for operation substantially as herein shown and described.

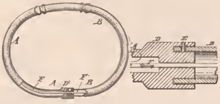
3. In a bracelet, the combination of the swiveled parts *A B* with the shoulder *b*, having stops *g* and *h*, with the tube *C*, carrying stops *f* and *e*, and with the spring *i*, substantially as specified.

CLOCK MOVEMENT.—Benjamin B. Lewis, Bristol, Conn. Filed Oct. 24, 1881.



Claim.—The combination of the center pinion with the double wheel and spring for acting upon one part of said wheel, substantially as described, and for the purpose specified.

BRACELET.—John V. Diefenthaler, Newark, N. J. Filed Nov. 18, 1881.



Claim.—1. In a bracelet, the combination, with the part *A*, provided with the coupling *D*, the tubular part *B*, provided with the coupling *D*, of the part *B*, provided with the semi-annular groove *a*, and the pin *E*, substantially as and for the purpose set forth.

2. In a bracelet, the combination, with the tubular part *A*, provided with the semi-annular groove *a*, and the pin *E*, of the spring *F*, having its ends resting against the outer ends of the bracelet, substantially as and for the purpose set forth.

ORNAMENTAL CHAIN.—Salomon Davidson, New York, N. Y. Filed Nov. 28, 1881.

Brief.—A cap is applied to the end of the link, and retained in place by a shoulder on the cap.

Claim.—1. In ornamental chains, the caps or bands *d*, formed with internal shoulders, combined with the end rings, *a a'*, and connecting loop or rings *b* of the links, substantially as shown and described.

2. The combination of the shouldered cap or band *d* with the link *a a' b* and sleeve *c*, substantially as shown and described.

FINGER AND SCARF RING.—Robt. J. La Grange, Philadelphia, Pa. Filed Nov. 30, 1881.

Brief.—The ring is expanded or contracted by means of the pivoted and sliding segments.

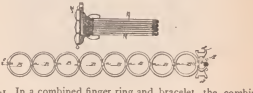
Claim.—1. The ring having a head with grooved or hollow segments hinged or pivoted thereto, and an expansible and contractile segment fitted into the former segments, substantially as and for the purpose fet forth.

2. The ring having hinged segments, an expansible and contractile segment, and spring fastening-plate *C* therefor, substantially as and for the purpose set forth.

WATCH.—Albert Heberle, Ueberlingen, Baden, Germany. Filed June 23, 1881. Patented in Germany July 27, 1880.

Claim.—In a watch movement, the combination, with the barrel *a*, of the wheels *c e*, of the same size, and the pinions *b d f*, and the escapement wheel *g*, receiving motion from such train of wheels, arranged as specified, and the pinion *x* and connections to the hands, that are separate from the train of gearing to the escapement, substantially as specified.

COMBINED FINGER RING AND BRACELET.—Siegmund Brunswick and Johannes Engel, New York, N. Y.; said Engel assignor to said Brunswick. Filed Sept. 24, 1881.



Claim.—1. In a combined finger ring and bracelet, the combination, with the ornamented hollow head *A*, of the series of hinged rings *B*, hinged to the said head, and the outer rings of the series provided with a spring catch adapted to enter the hollow head, substantially as and for the purpose set forth.

2. In a combined finger ring and bracelet, the combination, with the head *A* and the series of hinged rings *B*, of the recessed wings *d*, hinged to the opposite sides of the said head, substantially as and for the purpose set forth.

ORNAMENTAL CHAIN.—Andrew J. Harris, Providence, R. I. Filed Jan. 31, 1881.

Claim.—As a new and improved article of manufacture, the ornamental chain herein described, consisting of major links *B*, made of wood and finished in enamel, and having eyes *a a*, connected by one or more minor links, *C*, of gold or other suitable metal.

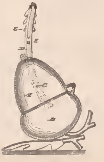
EAR WIRE LOCK.—P. K. De Mur, New York, N. Y., assignor to Van Houten, Sayre & Co., Newark, N. J. Filed Aug. 3, 1881.

Claim.—1. The combination, in an ear ring, of a revolving lock, *d*, with a ring secured to said ear ring, having an opening therein, said parts being arranged to operate substantially as and for the purposes set forth and shown.

2. In an ear ring, a locking device adapted to receive and hold the ear wire, composed of a ring, *c*, having an opening therein, and a revolving piece, *d*, having a notch therein adapted to coincide with said opening, substantially as and for the purposes set forth and shown.

3. In an ear ring, a revolving piece, *d*, having an annular groove therein, working within a ring, *c*, secured upon a wire, *a*, and adapted to receive the ear wire, substantially as and for the purposes set forth and shown.

JEWEL BOX.—George Gough, Brooklyn, assignor to Elizur G. Webster and Adelbert A. Webster, both of New York, N. Y. Filed Nov. 25, 1881.



Claim.—1. The combination with a box and its hinged lid or cover, of a bail pivoted to the box, and of studs or pins projecting from the sides of the hinged lid or cover, substantially as herein shown and described, and for the purpose set forth.

2. The combination, with the box *B* and the hinged lid *A*, of the longitudinally-slotted bail *E*, pivoted to the box *B*, and of the studs or pins *C*, projecting from the lid *A* through the slots of the bail *E*, substantially as herein shown and described, and for the purpose set forth.

3. The combination, with a box and its hinged lid or cover, of a bail pivoted to the box, of lateral studs or pins on the lid or cover, and of a checking device on the bail, against which checking device the pins are to

strike to prevent the cover from being opened too far, substantially as herein shown and described, and for the purpose set forth.

4. The combination, with the box *B* and its hinged lid or cover *A*, of the bail *E*, pivoted to the box, the studs *C* on the lid *A*, and the check button or knob *F* on the bail *E*, substantially as herein shown and described, and for the purpose set forth.

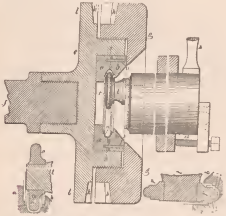
STOP-WATCH.—Charles H. Audemars, Brassus, Switzerland. Filed June 23, 1881.

Claim.—1. In a stop-watch, the combination, with the arbor *p*, which carries a fixed pinion, *r*, and a spring-supported loose pinion, *q*, of the two springs *r' s'*, of unequal power, and arranged to bear upon opposite ends of said arbor, whereby the pinions are forced out of connection by a strong spring and into connection by a weak spring, for the purpose specified.

2. The loose pin *t*, bevel-ended and protruding through plate *C*, the lever *u*, pressed by a spring *t'*, and the ratchet wheel *l'*, movable by a stem, *m*², in combination with the spring *r'*, arbor *p*, and spring *s*, the spring *s* being weaker than the spring *r'*, whereby the weak spring *s* is allowed to raise the arbor *p* and wheel *r*, as described.

3. In stop watches, the combination, with the pinion *k* on arbor *a* and the second-hand pinion on arbor *o'*, of the loose pinion *q* and fast pinion *r* on the same vertically-movable arbor *p*, the former gearing with pinion *o* and the latter with pinion *k*, said pinions *r q* having respectively pin and teeth on their opposite faces, as and for the purpose specified.

DEVICE FOR MAKING WATCH CASE CENTERS.—Frederic Ecaubert, New York, N. Y. Filed June 21, 1880.



Claim.—1. In a two-part die having offsets, annular flanges, and knurled surface for watch-case centers, a circular recess in one ring-die and a corresponding circular projection on the other ring-die, to prevent lateral movement of one die or the other, in combination with pins on one ring-die and holes in the other ring-die, as and for the purposes set forth.

2. In combination with the rings *a b*, forming a hollow die corresponding to the exterior of the watch case center, the chuck *e*, having a recess for the rings *a b*, and the ring *g*, screwed upon the outside of the chuck and clamping the rings *a b* together, as set forth.

3. The chuck *e*, having teeth *k* and dies *a b* jointly with toothed ring *g*, screwed upon said chuck and pinion *m*, substantially as described.

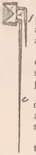
4. The method herein specified of manufacturing watch-case centers, consisting in clamping a hollow sheet-metal ring between two ring-shaped dies, rolling the metal out into the knurled portion of the die to form the largest portion of the watch-case center first, then spreading the metal outwardly by a second roller to form the annular offsets or shoulders for the lids, substantially as set forth.

5. The method herein specified of manufacturing watch-case centers, consisting in clamping a hollow sheet-metal ring between two ring-formed dies, rolling the metal outwardly into the die by one roller, to form the largest or knurled portion of the watch case center, then spreading the metal outwardly by a second roller to form the offsets or shoulders for the lids of the case, and then spreading the metal outwardly by a third roller to form the annular offsets or shoulders for inner lid and ring of the glass, substantially as set forth.

6. In the manufacture of watch-case centers, the comhination, with the hollow die that corresponds to the exterior surface of the center, of a roller corresponding to the interior surface of the watch-case center, and having a groove at 10 to form the rib upon which the plate of the watch work rests, substantially as speciefid.

7. The combination, with the die *a b*, and its clamping and revolving mechanism, of the cylindrical stock *w*, having an eccentric arbor at one end for the rollers *o p* or *r*, and the lever *z*, for giving to such stock a partial rotation for the purposes and as set forth.

JEWELRY.—John B. Van Houten, Newark, N. J. Filed Oct. 11, 1881.



Claim.—1 The combination, with the crown piece composed of the back plate, *d*, and cramps, *b*, of the cylinder and stone held in combination by said cramps, substantially as and for the purposes set forth and shown.

2. The combination of the back plate, *d*, having a pin and cramps thereon, of a tubular portion, *c*, and stone held in said combination by said cramps, substantially as and for the purpose set forth.

3. In a scarf pin, the combination, with the back plate, *d*, of the crown piece, of the pin *e* and supplementary pin, *f*, arranged and operating substantially as and for the purposes set forth and shown.

4. As a new article of manufacture, the scarf pin having therein the crown piece *A*, tubular bearing *c*, stone pin *e*, and supplemental pin *f*, the whole being arranged and operating substantially as and for the purpose set forth.

BRACELET.—Adolph Vester, Providence, R. I. Filed Oct. 15, 1881.

Brief.—The box contains a clasp having plates provided with teeth, which lock into the hollow ends of the bracelet by catching over lips thereon.

Claim.—1. A bracelet with its two ends clasped into a box, and adjustably held therein by means of a spring-clasp located in said box, and interlocking with the ends of the bracelet at different fixed points, enabling the bracelet to be adjusted to different sizes, substantially as herein described.

2. A bracelet with its two ends fitting into a box, and adjustably held there at certain points by a spring clasp interlocking with the ends of the bracelet, as herein described, and with posts connected and arranged, as herein described, to govern the action of said spring clasp, substantially as and for the purposes herein described.

3. A bracelet clasp consisting of a box containing a spring, *H*, plates *A*, teeth *B*, posts *E*, and rod *K*, arranged to adjustably connect with and hold the ends of the bracelet, substantially as herein set forth.

RUBBER WATCH CASE.—Gustav Speckhart, Nuremberg, Germany. Filed Nov. 12, 1881.

Claim—1. A protecting case for watches, made, substantially as herein shown and described, of soft rubber, and with an aperture, *B*, for the pendant and an opening, *E*, for the dial, as set forth.

2. The combination, with the soft rubber watch protecting case *A*, provided with a pendant aperture, *B*, and a dial opening, *E*, of the beads *D* and *F*, surrounding these openings or apertures, respectively, substantially as herein shown and described, and for the purpose set forth.

3. The combination, with the soft rubber watch protecting case *A*, of the circumferential rib G, substantially as herein shown and described, and for the purpose set forth.

BRACELET.—Adolph Vester, Providence, R. I. Fi'ed Nov. 21, 1881.

Claim.—A bracelet having a band, *A*, composed of a single piece of metal having its edges turned over and rolled into a cylindrical form, as described, and bent into an elliptical shape without hinge or joint, in combination with a continuous interior torsional spring, *B*, the whole constructed, arranged, and operating in the manner substantially as specified.

CLOCK PENDULUM.—Aithur E. Hotchkiss, Cheshire, Conn. Filed Oct. 8, 1881.

Claim.—1. In combination with a verge, a pendulum rod having its end bent at right angles to its length, and inserted in a recess or perforation of the verge, substantially as and foi the purpose set forth.

2. A pendulum ball consisting of a perforated scalp or shell, and a filling attached thereto by a part of its material extending into the peiforation or perforations of said scalp or shell.

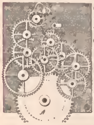
3. The collet on the verge shaft carrying the pallets of the escapement, and supporting the pendulums, as set forth.

4. Shell *G*, provided with an annular side wall, in combination with pendulum rod *D*, which has a flattened or angular part, D^3, that passes through said side wall from top to bottom, to prevent the pendulum ball from turning.

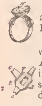
5. A pendulum rod which is all in one piece, in combination with a shell oi scalp, *G*, through the side walls of which it passes, said rod and the perforations in said scalp being of such shape as to prevent said shell from turning on said rod.

6. In combination with scalp *G*, the filling or body, *F* having pins *f f*, which extend into holes *g g* of said scalp, said parts composing a pendulum ball, substantially as described.

CLOCK.—Almeron M. Lane, West Winsted, Conn. Filed Oct. 11, 1881.



Claim.—1. The combination of two main or driving wheels upon the same shaft, concentric with each other, a mainspring arranged between the said wheels, so that one end engages with one wheel and the other with the othei wheel, whereby one of the said wheels is caused to revolve in one direction, and the other in the opposite direction, a train of gearing leading from one of said driving wheels to impart rotation to the escapement wheel shaft and to the hour and minute pointers, with a second train of wheels leading from the other driving wheel to a shaft from which an arm projects outward, and so as to engage the teeth of a wheel on the escapement shaft, and from which teeth it escapes by the rotation of the escapement shaft produced by the first train, and by such escapement of the said arm, an intermittent movement is given to the said second train and communicated through said second train to an independent second pointer on the central shaft, substantially as described.



FINGER RING.—James H. Sprague, Providence, R. I., assignor to Edward A. & William H. Luther, same place. Filed Nov. 9, 1881.

Claim.—The band *A*, with its lips *B B*, in combination with the slotted ornamental piece *C* and the slotting-setting *E*, the whole firmly united without the aid of solder, by passing said lips through the slots in the ornamental piece, and setting and turning down the protruding ends thereof, as described.

SETTING PEARLS ON FINGER RINGS, ETC.—Julius Bergfels, Newark, N. J. Filed Dec. 14, 1881.

Brief.—The cavity in the gem is larger at the bottom than at its mouth, to receive the end of the shank having the wedge, which is forced into the cavity, causing the shank to spread and fill the cavity.

Claim.—1. The combination, in jewelry, with the body *b*, of the gem having the cavity *d*, therein, the hollow shank, and wedge, all airanged and operating substantially as and for the purposes set forth and shown.

2. The combination, in jewelry, of the shank carried by the body *b*, adapted to be spread, the stone having a cavity therein enlarged at its bottom, and the wedge, all arranged and operating substantially as and for the purposes herein set forth and shown.

ORNAMENTAL CHAIN LINK.—Salomon Davidson, New York, N. Y. Filed Dec. 7, 1881.

Brief.—The link has recesses formed at its ends. Collars embrace the link and fit into recesses. An ornamental plate may be secured to the link by said collars.

Claim.—1. In a chain link, the tube having recesses *a* at its ends, with one or more collars embracing the tube and fitting in said recesses, substantially as described.

2. The combination, in a chain link, of the tube *A*, having at its ends the collars *b*, fitted into recesses in the tube, and an ornamental plate arranged upon the exterior of the tube, and engaging at its ends with the said collars, substantially as described.

LOCKET.—William H. Blaney, Attleboro, Mass., assignor of one-half to Sturdy Biothers & Co., same place. Filed Dec. 16, 1881.

Brief.—A spring forces the picture-holding slides through a slot in the side of the locket-case. Spring catches hold such slides normally retracted within the case when desired.

Claim.—1. A locket or analogous article of jewelry, consisting of a slotted case, a slide adapted to be contained therein, a spiing for forcing the slide out of the case, and a spring-actuated catch adapted for use in holding the slide retracted, and also for releasing it when desired, substantially as hereinbefore specified.

2. The combination, with the case of a locker or analogous article of jewelry, of the notched picture-holding slide, adapted to work in and out through a slot in the side thereof, a spring arranged between the inner sides of the case and slide, the spring-actuated catch, beveled as described, to adapt it for being raised automatically when the slide is forced in, and for engagement therewith and disengagement therefrom, substantially as shown and described.

3. The combination, with the locket-case having one side slotted, as specified, of the notched slide, the spring for forcing out the latter, and the spring-actuated sliding bar, which projects from the case, and has a beveled notch formed on uppei end, to operate as and for the purpose shown and described.

4. The combination, with the locket case provided with a lateral slot, of a slide having ears for engagement with portions of the case when forced out, and a spring, all arranged as shown and described, to operate as specified.

5. The combination, with the locket case, having a lateral slot, a notched picture-holding slide having ears on its outer side, as shown, a spring arranged within the case, and a spring locking-catch, all as shown and described, whereby the said slide is held steady in place within the case, as specified.

PROCESS OF COATING REAL AND IMITATION PRECIOUS STONES.—Francis Ed. Meyer, New York, N. Y. Filed Jan. 20, 1882. Original No. 236,604, dated Jan. 11, 1881.

Brief.—Improvement on Letters Patent Nos. 223,237, and 229,328, and 233,364.

Claim.—1. The process herein described of applying a reflective coating, *B*, to the rear face or collet of a real or imitation precious stone or gem, composition of glass or paste, *A*, by first coating the said stone *A* entirely with the reflective material *B*, and then removing by any suitable means the reflective coating from the front face or crown of the said stone or gem.

2. The process of protecting the outside of the reflective coating on the collet side of the stone by means of an electroplating or a metallic shield, substantially as described.

3. The electroplated covering or cap for the reflective substance, applied to and combined with the reflective cap *B*, substantially as described.

4. The application by electricity of a solid metallic coating or cap on the back or collet of a real or imitation precious stone, paste, or gem on the outside of a reflective substance, *B*, which has been previously placed on the said collet side of the stone.

PROCESS OF MANUFACTURING GEM SETTINGS.—James R. Feeley, Providence, R. I. Filed Sept. 29, 1881.

Claim.—The improved method of constructing gem settings herein ,described, consisting in cutting a series of blank prongs, *A*, shouldered and recessed, as shown, and then in assembling and temporarily binding said blanks *A* upon a grooved hub, *B*, and then soldering the ring *C* within the series of blanks *A*, and finally cutting said blanks to form gem settings, substantially as specified.

BRACELET.—Willet A. Johnson, Phenix, assignor to himself and P. & A. Linton, Providence, R. I. Filed Dec. 31, 1881.

Brief.—The hinge is soldered to the outer side of the back plates and located at one side of the joint. To one of the plates is secured a flat catch-stud having a notch on its inner edge, and on its outer edge a spring. The notch receives the catch on the opposite plate.

Claim.—1. In a bracelet, the combination of the back and front plate with a separately-formed hinge joint placed to one side of the joint between the two arms of the bracelet, and concealed from view within the inner and outer plates and edges of the bracelet, substantially as described

2. In a bracelet, the combination of the flat catch-stud *D*, provided at its edges with a notch, *d*, and spring *E*, attached to one arm of the bracelet, with the catch *e*, attached to the end of the opposite arm, to be operated by the edgewise movement of the arms, substantially as described.

Compensation of Balances.

THE trials made to correct the effects of changes of temperature upon watches, almost date from the time that the first compensated pendulums were constructed; from their origin, pendulums attained a high state of perfection, but success was far from favorable for watches. Harrison, Mudge, Leroy, Berthoud and others, were all nearly at once engaged with the task of devising compensation, hut without producing any disposition worthy of being preserved. It will suffice to state in a few words the ends sought to be attained by these inventors, for the solution of their task.

The compensation may be borne, 1. By and upon the balance; 2. By the spring; 3. By both the balance and spring At the beginning, when research was directed to the latter two conditions, a system of blades of steel and brass, acting upon a short lever arm was contrived, and produced upon the regulator a motion, combined in such a manner as to elongate or shorten the length of the spring, precisely by the quantity necessary to augment or diminish the power, and thus control the smaller or greater balance power. Sometimes, as in Berthoud's marine watches, the balance was also compensated. The metallic blades, beside, acted upon the spring, to fully obtain compensation. This system to-day is abandoned, at least for timekeepers; the correct rates of these mechanisms, for the greater part, is inherent in the length and force of the spring, and when isochronism is obtained, it must in no degree be interfered with. The watchmaker must abstain from meddling with an isochronous spring, in order to obtain compensation, even to regulate the rate of the watch. The last two means of compensation mentioned previously, are no longer in use, at least not for watches of which great precision is expected.

Chronometers are all compensated exclusively by the mass itself of the balance, which assumes other forms by the changing of temperature, in such a way that while one part of its pieces elongates to the outside through the effects of dilatation, another part approaches nearer to the center of motion, and thus maintains the same power in the whole. It is true that the action of the spring is comprised in this compensation, because no experiments can be made upon the balance deprived of its spring; wherefore, it is actually never the balance alone, but the balance and spring which are thus compensated. Moreover, it is a well recognized fact that if the spring is well-conditioned, the isochronism obtained for a given temperature also maintains itself in all others, when the balance is compensated; tests made upon the balance provided with its spring, may therefore be considered as if it had taken place without the spring, and it even offers this advantage that all the small variations of other parts of the same watch, due to temperature, are comprised within this compensation, and the final result is therefore more exact.

Changes of temperature produce effects upon watches, which vary with the escapements. In those of recoil or repose, these effects can hardly be noticed, because if, on the one hand, the heat diminishes the power of both balance and spring, on the other, it increases the fluidity of the oil, and, as a sequence, the easy transmission of the motive force to the balance, which is constantly in contact with the train, and it establishes between these two effects a sort of compensation. Eminent artists, also, have thought that it is entirely superfluous to complicate the mechanism of an ordinary watch with the addition of pieces constituting compensation. It even occurs sometimes that ordinary watches with compensated balances withstand the changes of temperature less easily than good ordinary cylinder watches.

Lastly, let us suppose a watch newly cleaned and going well in all temperatures, by means of a compensating apparatus. At the end of a few months the condition of the oil will have changed, and since the train acts without intermediary upon the balance, this latter will feel the effects of the thickening oil, and the watch will go slower generally. But as the degree of fluidity of the oil constituted one of the elements of compensation, this degree now having changed, if the watch was at first regulated, it will be so no longer. It will be less so at the end of six months, a year, etc. The compensation, consequently, will be of effect only for a time, and the advantage will be far from counterbalancing the cost.

In the free escapements, on the contrary, and especially in chronometers, the compensating apparatus becomes indispensable. Of three perturbing causes, which we have pointed out, two always exist and exert their influence in the same direction; the third, due to the oil thickening, which formed a sort of compensation, does no longer exist; because the balance makes, or, at least, should make, vibrations exactly in the same time, whatever the state of the oil. Beside, these kinds of escapements are only employed in high-priced watches, where the precision of rate is almost the chief quality sought, and the regulating apparatus therefore, will be the necessary adjunct to the mechanism of such kinds of watches. We have not yet taken account of the thickening of the oil at the balance pivots; this effect does exist, however, but only in a feeble degree, to correct which, the compensation is regulated in a manner to embrace and correct this small cause of error.

To sum up, the causes of variations which are expected to be corrected by compensation are the following:

1. Decrease of rate, from the effect of heat upon the balance mass which, thus finding itself further removed trom the center, acts as if it had become heavier.

2. Decrease from the effect of elongation of the spring, caused by heat, and which for this reason is weaker.

3. Decrease by the effect of heat upon the substance of the spring itself, it becoming less rigid and more flexible.

4. Acceleration by the effect of heat upon the oil at the train and balance pivots in ordinary watches, and of the balance alone in chronometers.

And the regulator watchmaker must seek to correct these causes when engaged with compensation.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

DEBASED ROLLED-PLATE GOODS.

To the Editor of the Jewelers' Circular:

I have read with much interest the articles in recent numbers of THE CIRCULAR in reference to the degraded quality of the rolled-plate goods now in the market. It seems to me that the manufacturers of these goods are killing the goose that lays the golden egg, for they have so degraded their products that the public has lost confidence in all rolled-plate goods. I am often shown articles of this cheap quality that have served to disgust the persons who bought them with all imitation goods. The quality is so wretched that the goods will neither stand usage nor exposure. A gentleman came to me with a scarf pin last summer that he had only worn two hours, and it was as black as an old shoe. Perspiration had so discolored it, that it no longer bore the slightest resemblance to gold. Yet that pin was bought at a gent's furnishing store, and was represented to be the best rolled plate. Of course, the gentleman was disgusted, and denounced the "swindling manufacturers" in round terms. To be sure, he had paid but a small price for it, but he had none the less been robbed of what he did pay. He would have preferred to have paid a little more and got a good article. As it was, he would have nothing more to do with imitation gold goods, and I sold him a cheap stone pin. This is the way the manufacturers are injuring their own business, destroying public confidence in rolled plate goods. For the sake of supplying the furnishing goods trade, the dollar stores, and the twenty-five-cent counters, thay have prostituted their art, and become panderers to the illegitimate trade. We regular dealers cannot compete with these cheap goods made for the outside trade, for we cannot offer standard rolled-plate goods at the prices these "Cheap John" goods can be sold for, and as the public cannot discriminate between gilt and gold, we stand a poor chance of working off our better quality of goods. These debased goods are made in such excellent imitation of the better classes, that it is almost impossible for an expert to distinguish the difference, and, consequently, the public think one is as good as the other. It is only after they have bought the cheap stuff and found that it turns black in a short time, that they discover the swindle, and are then too disgusted to trust any other kind. There is more swindling in this class of goods than in any other in our trade. I have had rolled-plate goods that were represented to be 14-karat plate that would not wear any length of time, and that I know did not have 7 karats of gold in them. I paid a 14-karat price for them, but the furnishing stores in my vicinity were selling the same goods for half the price I could afford to sell them for. I made up my mind that the manufacturers had a price for the retailers, who are supposed to do a legitimate business, and another price for the outsiders, who have no reputation at stake and can handle any kind of goods. By filling up outsiders with this cheap class of jewelry, the manufacturers have largely reduced the demand for standard rolled-plate goods, and it is with difficulty we can dispose of them. Honest retailers connot afford to jeopardize their reputations by handling this inferior quality of goods, and so have an up-hill job in trying to sell standard quality goods in competition with them. There are, I know, some manufacturers who make as good rolled plate now as they ever did, but the number is small compared to the number of those engaged in making the bogus stuff. I hope you will continue showing up these tricks of the trade, and to advocate a more exalted standard of commercial honesty among manufacturers, and among that portion of the retail trade that lends itself to selling the debased goods of dishonest manufacturers. J. M. C.

ARE MANUFACTURERS RESPONSIBLE.

To the Editor of the Jewelers' Circular:

You have published several articles lately denouncing the manufacturers of rolled-plate goods, for having degraded the quality of their goods in late years. It is undoubtedly true that the majority of goods of this class will not assay as high as the rolled-plate goods formerly made, but who is responsible for this? Your correspondents seem to think the manufacturers are, while I think it is the retailers themselves. It is the business of the manufacturers to supply the demands of the trade; we would not rank very high as business men if we made up a lot of goods that would not sell, and refused to make such as there is a demand for. That there is a demand for the inferior grades of rolled-plate goods, is fully shown by the quantity made and sold each year. If the public want this class of goods, why should not the retail dealers supply the demand? Why is it any more derogatory to their dignity to carry two or three qualities of rolled-plate goods than several qualities of what are called standard gold goods? Yet they do carry in stock 18, 14, 12, and even 10-karat goods, that sell as pure gold. There is a difference in price, of course, and so there is a difference between 14 and 6-karat rolled-plate goods. Why should not the retail dealer carry a line of each quality, and give his customers their choice? If he deals honestly by them there is no danger of their being swindled, for we sell to them for what the goods are worth. The only swindle perpetrated on the public by cheap goods, is when the dealers palm them off for better grades. It is the price that tells the value, and if retail dealers insist upon paying low prices, they will certainly get low-priced goods. It is useless for them to decry cheap goods, for, if the public wants them the public will have them, and if the retail jewelers will not keep them, then the dealers in furnishing goods, hardware, and pills and pellets will do so. If the retail dealers will carry lines of all qualities of jewelry, they will be in a position to compete with all outsiders. It is natural for persons desiring jewelry to go to a jewelry store for it, but if the dealer does not keep what is wanted, and the hardware dealer does, then the hardware dealer will get the patronage, while the jeweler is left to mourn over lost opportunities. The fact is, the retail jewelers are inclined to be old fogyish; to stand upon their dignity; they lack enterprise and push. The business man of to-day must be full of energy and enterprise, up early in the morning and keep open late; and, above all, he must sell what the public wants. If he does not, he must expect to fall behind. If, instead of growling about outsiders being supplied with goods by the manufacturers, the retailers would keep these same goods, and enter vigorously upon a campaign to command the patronage they think belongs to them, they would make more money, and, at the same time, enhance their reputations as active, enterprising citizens, just the kind every community likes to have. It makes me sick to see these dealers sitting back in their stores, talking about the dignity of their profession, and the necessity for maintaining the "legitimate" in art, instead of stirring about and capturing the trade they see passing their doors and falling into the clutches of the barbarian outsiders. Their twaddle is like that of the dramatic critics, who condemn all plays as "illegitimate" that were not written by Shakespeare, while the amusement-seeking public turns its back on Shakespeare, and patronizes the modern drama. Theatrical managers cater to the taste of the public, and make their fortunes doing so. Retail jewelers might take a hint from them, and, by dealing in what the public wants, command its patronage. The "legitimate" in art is all well enough when people will pay for it, but when the public wants 7-karat rolled-plate goods, I am going to make and sell all I can of them, notwithstanding the growls and kicks of a few disgruntled retail dealers. And, what is more, I am going to sell to any customer that wants to buy, be he furnishing goods dealer, hardware merchant, druggist, barber, "butcher, baker or candlestick maker." If the retail dealers want the trade, they must wake up and catch it.

MANUFACTURER.

HOW RETAILERS ARE DECEIVED.

To the Editor of the Jewelers' Circular:

Your strictures upon the manufacture of cheap jewelry—or rather upon the practice of selling cheap jewelry upon false representations of its character—are timely and truthful. But you can have but a faint conception as to how we retail dealers suffer by the operation. As an illustration let me give you a leaf from my own experience. Mr. A. is a traveler for an eastern firm, and in making his rounds calls on me and shows his goods. He has many novelties, attractive in appearance and apparently of excellent quality. He represents them to be 14-karat rolled-plate goods, and, as my stock needs livening up with fresh goods, I give him quite a respectable order. Anxious to display my new purchases to the best advantage, I place some of them in my show window, where they attract considerable attention. Presently I sell some of these goods, and among them a chain to a young lawyer. In the course of a week or so, my customers come back with the complaint that the goods turn black, and as I have already observed that the sun had given those in my window a dingy appearance, I cannot blame the customers for growling. There is nothing for me to do but to refund them their money, and they depart half convinced that I am a swindler. Soon, along comes B, a traveler for another eastern house, who also shows me some goods that appear to be very desirable. I tell him my experience with A, whereupon he shrugs his shoulders, and informs me that the house A represents is noted for its "snide" goods, but if I buy of him I am sure to be satisfied. I finally give him an order, and feel that now I am safe. But a few weeks convince me that the second lot was no better than the first, and are soon thrown back upon my hands by the persons to whom I had sold them. But the most indignant of my customers is that young sprig of a lawyer, to whom I sold the chain. He has not yet asked me to take it back, but he shows it to my customers, says the chain is a "fraud" and leaves the impression that I am also. Indeed, he has stated that he had a mind to prosecute me for selling goods under false pretenses. As he hasn't much practice, I am apprehensive lest he does prosecute me, or prevail on some customer to do so. While I am in a state of mind over these goods, along comes C, traveler for a Providence house. He commiserates me on my misfortune in having been taken in by "those notorious swindlers, A and B;" says they never carry anything but four-karat goods, and ought to be criminally prosecuted for swindling, a statement with which I most heartily concur. C shows me his goods, and, while they are attractive and seemingly desirable, I cannot for the life of me see the difference between them and those sold me by A and B. But C assures me that these are 14-karat goods, and upon the truthfulness of his statements, he pledges his honor and that of his firm. My doubts as to the genuineness of the goods are somewhat dissipated by the fact that he charges 25 per cent. more for them than the other fellows did for theirs. Finally I am persuaded to buy a bill of them, and flatter myself that I am all right. But the result proves that C was a more accomplished rascal than the other two, for his goods are not only of precisely the same quality, but he has made me pay a higher price for them. Several of my best customers were deceived into purchasing them, and no explanation I can give will satisfy them that I was not a party to the swindle. My rival in business heard some of the complaints made against my goods, and contributed all he could to excite prejudice against me. I was accused of dealing in bogus jewelry, and so much was said about it that the pastor of the church of which I am a member, came to interview me on the subjeet. He said such conduct as mine was most reprehensible, and likely to breed a scandal in the church. In short, I came near being driven out of business. I am still "under a cloud," but hope to live it down. One thing I have resolved upon, and that is only to buy goods of old and established houses, whose reputation is something of a guarantee that I will be honestly dealt with. But what can we country dealers do? The bogus jewelry is so close an imitation of the genuine, that I defy anyone not an expert in jewelry to tell the difference. When we are swindled in this way we have no redress, for if we complain to those of whom we purchased, they say, "You should have known by the price that they were not fine goods." If I had stopped to assay each article, perhaps I would have known, but I supposed they were light plate. So they were, not only light plate but bogus gold. Now, in the transactions I have referred to, I not only lost my money, but my reputation as an honest merchant, was threatened with a criminal prosecution, scandalized the church of which I am a member, and gave my competitor an opportunity to make a point against me. This is no exaggeration so far as the material points of the narrative are concerned, for I have been deceived in just the manner related, but at considerable intervals between the events I know of no way in which we can guard against these frauds perpetrated by the manufacturers, except to demand legislation by Congress, as you suggest, fixing the standard of gold goods, and providing penalties for its violation. It ought to be a state prison offence for a manufacturer to make goods more than one-half alloy. When they get below that they cease to be valuable as gold, and should be sold for base metal alloyed with gold. At present we country dealers are buying goods blindfolded, without any knowledge of their quality, and only the assurance of prevaricating drummers to rely upon.

A SWINDLED VICTIM.

To Separate the Gilding from Base Metals.

IT IS necessary, for this operation, to first granulate, or in some other way, reduce the metal mixture to a somewhat firm state. When done, take for each 500 grams, 80 grams saltpeter, 40 potash, and 20 powdered white glass; first mix these ingredients by themselves, then stir them carefully with the granulated mass, put the mixture into a new Hessian crucible, leaving about three centimeters space at top. Next reverse a somewhat smaller crucible over it, and fasten it with cement in such a manner that the smaller crucible enters a trifle with its outer rim into the lower one. Previously, perforate the bottom of the upper one with a hole of about the size of a goosequill. When all this has been done, expose it at first to a gentle heat, which increase gradually, until the crucible glows with a weak red glow. Maintain it at this point for about 1 to 1½ hours. You soon will hear how the mass works in the crucible, and a flame will issue out of the upper hole burning like a candle. As long as this continues, the crucible must be kept at the temperature. When it has ceased, increase the fire, in order to melt the matter in the crucible, and retain it about ¼ hour in flux; then let the fire cool down until everything is cold. Lift out the crucible, break it, and you will find three layers, one over the other. The upper consists of the flux, the second is metal slag; the third is that of the noble metal, either fine gold or fine silver, alone, or if both were contained in the mass, then both together. The upper two layers are separated as closely as possible from the lower with a hammer, and this is remelted in another crucible. When in flux, add (if the mass amounted to 500 grams) little by little, 40 grams saltpeter, and 20 grams purified potash, well mixed previously. When well molten, pour, and the noble metals will be found in a perfectly pure state.—[P. Hiehle, *Journ. d. Goldschm.*

TO OBTAIN THE GOLD FROM EXHAUSTED COLOR BATHS.

By gold coloring bath is understood a fluid saturated with cooking-salt, saltpeter and alum, and used by goldsmiths to enhance the appearance of their productions, by dissolving the copper in alloy with the gold, whereby a thin layer of pure gold is left on the surface. It occupies the same position of the pickle with silver.

Since, however, this caustic fluid will attack not alone the copper, but must of necessity also dissolve more or less of the gold, it is to be recommended not by any means to consider it as useless and exhausted and to throw it away, but the gold must be parted from it, which is done in the following manner: First saturate the color with nitro-muriatic acid, in order to dissolve any free gold, and set it aside to operate for some time. Next dilute the mixture with a quantity of distilled water, and filter in a glass funnel and blotting paper, having previously stirred it well. The residue left in the funnel throw into the sweepings, and from the clear fluid part the gold as follows: Throw into a wineglass of distilled water, as much sulphate of iron (iron vitriol) as the water will dissolve; when the solution is saturated, slowly drop a few drops of it into the fluid, and the gold will at once precipitate in a brown metallic powder.

After having carefully decanted the fluid from the sediment, this is first washed with hot, and afterward with cold water, to "sweeten" it, and to remove all salty adhesions therefrom, then dried, and next melted with a flux, such as potash and a little borax.

The gold may also be thrown down by sulphate of copper or copper clippings, but the preceding method is the most rational and sure.—[*Journ. d. Goldschm.*

A Review of the Different Escapements.

[Translated and compiled from the French, for The Jewelers' Circular.]

FREE ANCHOR ESCAPEMENTS.

A Simple Anchor Escapement, Fig. 1.—Scape wheel *i a b* is separated from balance *d* by the anchor *a c b*, which does not differ from an ordinary pendulum anchor. It is movable, and in an exact equilibrium upon a center *c* with pivots, and carries a fork *f h* fixed upon the same arbor, whose extremity *f f'* embraces the detent finger, which is part of a disc *d*, adjusted upon the balance axis. The following is the performance of the escapement:

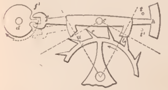


Fig. 1.

The balance turning in the direction indicated by the arrow, fork end *f* is lowered, and tooth *b*, at present at repose, becomes free; this tooth acts upon pallet *b*, and pushes the anchor and at the same time the fork in the direction of its movement, but with more rapidity, thus that the fork which at first was under the impulse of the detent finger, now presses it; the balance, from an active turns to the passive state, and at this moment the force necessary to sustain its action, is imparted to it. The balance continues to turn in the marked direction, and the finger escapes from prong *f'*, which now becomes inactive; the anchor now would not assume its wonted direction, if, on the one hand, tooth *e* falling upon repose *a*, a little inclined to the backward, would not produce a small draw, sufficient to cause the anchor to still further advance; and if on the other hand, pin *t*, opposing this motion, would not cause an immediate stoppage. The anchor consequently is retained firm between these two contrary pressures, until the unlocking caused by the balance at its return.

But this is not all; prong *f'* has passed below roller *d*, enabled by the notch with which it is provided; from the time that this notch is no longer opposite the prong end, and that the roller prevents its convexity, all motion backward becomes impossible; the anchor, therefore, is doubly prevented from a tendency to return; first, by the pressure and the draw of tooth *e* at repose, and next, by the roundness of roller *d*, against which the prong *f* butts, if by accident the first preventive should not suffice. It should be remarked that the prong never touches the roller, in order not to interfere with the balance motion; there is only little interval, but sufficient for the action.

At the return vibration, the unlocking finger presents itself in the notch between the prongs, and draws after it the anchor by pushing prong *f'*. Tooth *e*, until now at repose, escapes and raises up the fork, which, advancing before the balance motion, presses it in its turn by prong *f*, and thus *ad infinitum*. Banking pin *t'* again limits the anchor in this direction.

The impulse planes *a* and *b* are traced in accordance with the ordinary rules, at a tangent, as is indicated by lines *i a* and *a c*, *i b* and *b c*, which cross each other at right angles. We have already stated that the reposes are not concentric to anchor center *c*, but inclined backward by 5°, in order to give a little draw to the unlocking, thus increasing the surety of effects.

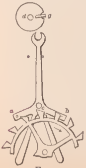


Fig. 2.

The action of all anchor escapements is similar to the one described, thus rendering a future description unnecessary. The only difference existing between them is in some of their pieces.

Sylvain Mairet's anchor escapement, Fig. 2.—This escapement only differs in three points from the preceding: its anchor pallets are simple pins; its impulse planes are placed entirely upon the wheel teeth; and, lastly, the banking pins are situated between the balance and wheel, by which a trembling of the anchor rod is entirely prevented.

Guard Pin Anchor Escapement, Fig. 3.—Its impulse planes are situated partly upon the anchor and partly upon the scape teeth. Its general form differs little from those already described, except a new preventive, introduced to guard against accidental jolts of the anchor. For this purpose, the balance carries a piece *d d*, driven with friction upon its arbor. The fork is retained in its place by the position assigned to it; *d'* is a disc in which the unlocking finger *g*, an oval ruby pin, is inserted and shellaced; above is the small cylinder *d*, notched in to permit the passage of the guard pin. The roundness of the cylinder stop a return motion, serving at the same time as banking for the prongs. We have seen in the preceding escapements that these prongs oppose a fork recoil; here their destination is inverse—they limit its course forward. A contact never must occur between the pieces in their motions and arrests, if it be not for the unlocking and the lifting; but the shake must be as small as possible; and effects thus are completely guarded against all accidents, without in the least interfering with the rate.

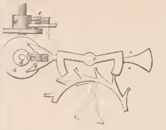


Fig. 3.

It will be seen by the side view of the figure that the finger and prongs are on one plane; the notched roller and the guard pin are on another plane above the former, without any contact between the two.

In this escapement, both anchor and fork are of one piece, wherefore they may be made as slender as possible.

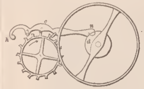


Fig. 4.

Another Anchor Escapement, Fig. 4.—Its levers are of jewels, and the wheel of brass; else the anchor is of one piece of steel, also the wheel. Pin *n* and roller *d* guard against an accidental return of the anchor. Part *h* has no other purpose than to establish an exact counterpoise of the anchor upon its center *c*.

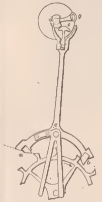


Fig. 5.

Perfected Genevan Anchor Escapement, Fig. 5.—The characteristics which distinguish this escapement from the preceding are: The shape of the guard pin, here called *dart*, on account of its shape; the greater surface given to the impulse planes of the teeth, and the disposition of the reposes. The anchor staffs alternately rest against the scape arbor, which, being constantly in motion, ever present different faces of contact. It is believed that in such a disposition all irregularities of friction by adhesion will be overcome.

MacDonald's Pin Escapement, Fig. 6.—This escapement only differs from the others in its manner of arrest of the scape wheel; and by the manner in which it communicates the impulse to the anchor. The scape wheel, as usual, is toothed, and drives a pinion generally of 6 leaves. This pinion, with center at *i*, carries a roller *i s*, with a protruding pin *s*. This pin, in the position represented in the figure, is at repose upon arc *s*, of the cut-out piece *b c*, which forms one of the anchor arms with its motion center at *c*. From the time that the balance has accomplished an unlocking, the pin falls upon plane *b*, which it presses in gliding along its length, first from *s* toward *b*, and then from *b* to *s*, continually pushing the anchor to the left in this motion, which is prolonged for half a revolution. After having escaped, the pin rests in waiting upon arc *v*, until the balance disengages it again. The anchor arm now finds itself entirely to the left. At the return vibration, an unlocking takes place; the pin, during a half revolution, presses the other flanc *v*, by conducting the anchor to the right; it next escapes, and falls

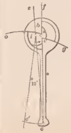


Fig. 6.

upon repose in the position indicated in the figure, and so onward. It will be seen that the pinion must make an entire turn, while the balance makes one going and one returning vibration. Both the reposes and impulsions occur under very favorable conditions for the surety and power of effects; but the addition of the pinion and the causes of irregularity connected with the extreme rapidity of this piece, will be an obstacle to the success of this kind of escapements.

Radius *i s* of the circle described by the pin, determines the angular quantity *i c s* of the anchor motion; or, this quantity *i c s* being given, radius *i s* of the circle is deducted therefrom. The repose arcs *s o*, *v g*, might be described from the center, if it were desired that the repose should be absolute; but as a certain draw is always necessary for the surety of the action, these arcs must necessarily be inclined at a certain angle, for instance, of 12°; the arc of the circle *c c'*, of 12°, will therefore be described from center *i*, and center *c* is transported to point *c'* determined by the angle of draw; next from this center *c'*, the arcs of repose, *s o*, *v g*, must be described. The interval between the arcs is equal to the diameter of the pin, plus a little shake necessary for surety.

The pin can go without oil; it is generally made of gold.

Tavan's Anchor Escapement, Fig. 7.—The wheel of this escapement bears, in place of teeth, half-cylinder shaped pins, raised beyond the plane, thus permitting the two anchor arms to alternately receive the impulsion from the same tooth, with a very small drop. Anchor center *c* is on the line which joins the tooth in action to the balance center. The form of the ruby pin and of the guard pin is somewhat different, but the action of these pieces is absolutely the same as in other anchor escapements, and the same explanations will serve for them; the cut will sufficiently explain effects.

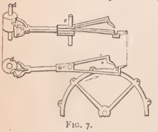


Fig. 7.

FREE DETENT ESCAPEMENTS.

The Robin Escapement, Perfected by Rochat, Fig. 9.—Center *c* of the anchor motion is here on the side of the scape wheel, opposite to balance *d*. The unlocking finger is formed by a ruby pin fixed upon a plate, as per dotted figure, carried by the balance axis. The pressure pallet *t*, also of ruby, takes the place of the detent circle; the fork ends by jaws, which prevent a cramping, in the usual manner. Lastly, the dotted disc is notched out in front of finger *g*, to permit the passage of the guard pin *n*, upon the anchor arm, after the passage of the staff from one side to the other of the balance. In all other positions, this pin prevents the anchor from retrograding, by reason of the plate whose edge almost touches it, only leaving sufficient shake between them for unconfined motion.

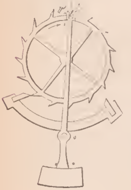


Fig. 9.

It will be seen by the above that the anchor simply performs the function of a stop or detent. The chief defect of this escapement is, in common with the Robin, the occurring friction of the unlocking finger upon the angle of the fork, as well at exit as at entrance. A strong draw upon the stop pallets by the pressure of the teeth alone might lessen this inconvenience, if not prevent it altogether.

Tavan's Crabfoot Escapement, Fig. 10.—Anchor center *c* here is placed beyond that of the tooth impulsion, an arrangement which permits balance arbor *d* to be placed near the wheel. The unlocking finger and guard pin present nothing particular, but the arbor simply performs the office of a detent; its two necks alternately stop the scape teeth. The impulsion is given by another tooth *a* upon an arm or lifting *g*, fixed to the balance arbor. The two necks sit upon the balance axis *c*, and are fastened by screw *u*, allowing a little shake. Lever *g* is turned down, as shown in the side view in the cut, and fulfills a double function; part *m* unlocks the anchor, by playing between the two prongs, and part *g*, which is upon another plane below, receives the impulse direct from the wheel; disc *m* is fitted tight upon the balance arbor, also disc *n*, which is made of another piece.

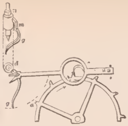


Fig. 10.

Tavan's Surprise Escapement, Fig. 11.—The disposition of this escapement is the same as that of the preceding, except the *surprise*, to be explained. Neck *s* is fixed alone upon the anchor, whose motion center is at *c*; it is of the same form and fulfils the same functions as in the preceding escapement; the other neck *s'* is fixed upon a particular arbor *c'*, and is put into motion by anchor arm *r*. The balance turning in the direction of the arrow, its finger unlocks the anchor, and the tooth in action *b* escapes from neck *s*. At this moment tooth *a* encounters arm *g*, and gives the impulsion to the balance. During the lifting, the anchor continues to move under pressure of the finger; its stem *r*, next touches the pin on the stem of the second neck *s'*, and thus compels this neck to present itself before tooth *d*, which there makes repose, from the time that tooth *a* has terminated its lifting. At the return of the balance, the unlocking of the anchor brings neck *s* under the tooth, and the motion continuing, neck *s'* is pushed to one side by the effect of the pin fixed upon its stem; the wheel does not change position, but it is ready now to escape. It will be seen that there is no drop apparent anywhere; the tooth on repose glides from one neck upon the other, and the seizing is reduced to a quantity strictly necessary to secure the reposes. However, it is well to introduce a little drop and a little shake to prevent the tooth in arrest upon neck *s'* from retrograding, by coming back upon neck *s*. This escapement was used by Tavan for a chronometer, which received the prize in 1819.

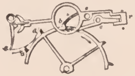


Fig. 11.

Gontard's Free Escapement, Fig. 12.—Anchor *a c b*, whose motion center is at *c*, carries a fixed arm *c e*, Roller *g d*, adjusted upon the balance arbor, carries a ruby pin *g*, suited to receive the impulsion of the scape wheel, which impulse; another smaller piece *t d*, below the former, is provided with an unlocking finger *t*, standing in connection with anchor arm *e*. From this disposition results that the balance turning in the direction of the arrow, the finger pushes the anchor, and unlocks tooth *a*; tooth *i* then falls upon the lifting, and gives an impulse to the balance. From the time that this tooth has escaped, tooth *f*, which finds itself in seizing upon pallet *b*, pushes this lever, escapes in its turn, and the wheel only stops by the drop of a new tooth repose upon pallet *a*; at the return of the balance, finger *t* necessarily meets the anchor arm, and it is at this point that the escapement we are describing differs; the anchor gives way, and pallet *a* enters into the space of the wheel teeth; but from the time that the impulse has ceased, the anchor raises again and reassumes its position of repose by the pressure of tooth *a*, due to the particular shape of the pallet. This shape is more apparent in *a' s*, of the side view of the figure, upon an extended scale; it will be seen that the force of the train takes the place of spring.

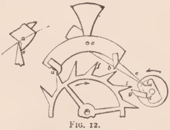


Fig. 12.

The return vibration of the balance therefore is accomplished without any unlocking; no other force is lost beside that of causing the anchor to turn, barely sufficient to permit the unlocking finger to pass. The wheel is of brass; all the liftings are of jewels.

(*To be continued.*)

A Wonderful Clock.

A MECHANICAL marvel, the product of nine years' patient toil on the part of an unlettered miner, who made it in his "spare hours" in the Hallenbeck Colliery of Wilkesbarre, 200 feet below the surface of the earth, has just been completed in the shape of a clock by James McGlynn. It is built on the plan of the "astronomical clock" recently exhibited in this country, but is much more complicated in most of its parts, and derives an added interest from the manner of its construction.

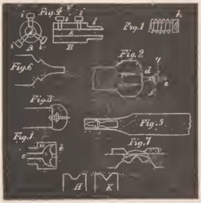
The front of the clock shows three balconies, rising above a massive and elegantly carved pedestal, and upon these the moving figures appear. The lower balcony shows a procession of Continental soldiers, headed by a mounted general, and marching past, while the old liberty bell proclaims its welcome notes of freedom. A sentinel salutes the Continentals as they pass, and just at the moment a door is opened from an upper balcony and reveals Molly Pitcher, with her cannon, which she fires with startling and realistic effect.

To show how well the maker of the clock has considered the details of his handiwork, he has placed a small revolving fan in the clock, to be actuated after the firing of Molly's cannon, for the purpose of clearing out the powder smoke. Simultaneously with this, the portraits of twenty Presidents of the United States pass in panoramic review, on a balcony just above the patriotic tableau of which Molly Pitcher is the central figure, and Thomas Jefferson holds up the Declaration of Independence. The apostolic procession is similar to those hitherto seen in such clocks. The Twelve Apostles file past, Satan appears and the cock crows in warning to Peter. A figure of Justice raises her scales as the form of Christ appears, and during the scene a large representation of Death tolls off the minutes upon a bell. When one sees the clock, the tools with which it was made, and hears the miner's story of how he bought the wood for it, bit by bit, as he could afford from his spare change, he is sensibly impressed with human possibilities.—*Philadelphia Times.*

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

A MODIFIED form of the pinion face polisher shown in the last number (Feb., 1882) is shown at Fig. 1. It is made of brass wire, (large bushing wire answers well) and the cut shows it in longitudinal section; the part *b* is a ruby hole jewel; the jewel is ground flat on a coarse diamond lap, and left with the outer surface rough. The method of using is the same as for the bell metal pieces, and they can be used either with some abrasive material like oilstone dust, or the rough surface of the jewel, like the ruby file, will cut slowly, but produce a perfectly flat face, entirely destitute of scratches, and comes up to polish almost instantly. The polish is produced with the bell metal piece and diamantine or rouge. Such jeweled facing pieces have almost unlimited wear when made even of garnet or chrysolite jewels. I will now give detail description of the method of producing a staff rapidly and well, by either an American or any wax chuck lathe. The idea which some workmen have, that a piece (staff or pinion) if turned in a wax chuck must be true, is erroneous. Many precautions must be used to ensure even tolerable accuracy. The best manner of making a new staff is to use steel wire, a little larger than the largest part of the staff; a piece of wire is selected and cut to about 5/8 of an inch in length, and if an American lathe is used, the piece as it is cut from the wire, and while yet soft, is turned as shown at Fig. 2; a general form is produced, but left larger; now harden by heating red hot, and immersing in olive oil. If the piece is dipped endwise it prevents springing to a great extent, but it is not essential to be very particular, as the final turning determines the accuracy. After hardening, the piece will have to be tempered, or run down; this is best done with a strip of copper about 1/2 inch wide and 2 inches long—break off the enamel from an old watch dial, and cut it into a strip, bend up at one end into a half circle; lay the rough staff into this as shown at Fig. 5, put a lump of beeswax as large as a small pea; apply the lamp and let the wax catch fire and *burn off*. The rough staff will now be found of an exquisite spring temper, and its strength and toughness can be inferred from its producing the best temper for watch case springs. The piece (rough staff) can now be restored to the lathe, and the lower part turned to size and finished to the dotted line *f* Fig. 2. The flat face at dotted line *g*, is finished by a bell metal piece or a jewel roughened as above. The polishing piece *h*, Fig. 6, is quite short, and provided with aspiral spring, as shown; this is done to have the face of *h* pressed flat. The polishing is done with a similar piece and rouge or diamantine. The part of the staff where the roller goes is turned to size, taking the size with the michrometer callipers from the old staff. The pivot sizes should be got by the jewel guage, and allow $\frac{2}{10000}$ side shake for oil space, if the watch is a fine one; if a common, coarse thing, allow twice this amount. It is dangerous to have the pivot fit too close, as it requires an appreciable space for the globular particles of oil to penetrate, and it is quite possible to make a joint oil tight. It frequently happens—it would be nearer the truth to say in most cases the holes in the jewels of cheap watches are not pierced straight, or at right angles to the plane of the jewel. This can be remedied by enlarging the hole with a diamond broach and polishing the hole again; but in the majority of cases it is best to accept the situation, and make the pivot as large as is safe. After the part to the right of the line *f* is finished, the places where the balance and



hair spring collet goes, as well as the upper pivot, are turned to approximate sizes. The staff is now cut off a trifle in excess of the proper length. As the ordinary wax chuck lathe of the Bottun type, has no conveniences for holding a piece of wire, as shown in Fig. 2. A hollow brass chuck as shown in Fig. 4, is a vertical, longitudinal section of such a chuck, and *A* a cross section. The brass wire for such a chuck should be about 3/8 of an inch in diameter, and the interior hole about 1/8 of an inch. The size of the hole *k* will depend on circumstances; if the part *l*, Fig. 4, is large enough, the hole can be continued through as shown; this is the case in lathes known as the combination, *i. e.*, lathes with a universal head and another spindle for screw chucks. In this case the screw hole in the spindle can be drilled back for 2 or 3 inches, so as to admit pieces of wire 3 or 4 inches long. Of course, in drilling one must avoid injuring the threads of the screw in the spindle. But for the case in hand, it is only a short piece of wire we are using, but it is very convenient to have a piece of wire long enough to cut several staffs from. The chuck we are describing has six screws arranged as shown; this will enable you to grasp any wire smaller than the hole, and perfectly center it. After the staff is broken off as described above, it is ready for the wax chuck, and even if using an American lathe, it is better to finish the top in a wax chuck. In this case we will suppose it to be a Swiss watch we are making a staff for; after removing the cap jewels (end stones), see that the balance bridge lays flat and has not been tilted up or bent down; in fact, restore the bridge as near to the position it occupied when made as possible. Then with the ordinary bow callipers, get at the extreme length of staff; this is simple enough if the watch is a fine one; the rule is, (as the convex side of the jewel is a trifle below the surface of the plate or bridge), a magnified illustration is shown in Fig. 7; the idea is the cap jewel should be set so that the flat face is exactly flush with the surface of the setting; the line *o* shows the bottom surface of the cap jewel, the space between the cap and hole jewel, a diameter of the pivot, end shake a diameter of the pivot; consequently, the end of the upper pivot, if the watch was lying dial down, would be exactly flush with the upper surface of the top hole jewel. The cylindrical portion of the pivot before the cone commences should be 2½ or 3 diameters. The interior surface of the jewel hole, *i. e.*, the cylindrical part, should be about ⅜ of the pivot's diameter, and the hole in the upper convex surface slightly capped or countersunk; say to ⅜ of the pivot's diameter. The proportions above given gives a range of pivot wear on its cylindrical surface, of over one and one-half diameters, by change of position, thereby ensuring maximum durability with maximum friction. Of course, my readers will understand that these rules are not arbitrary, but in conformity with those adopted by the best makers. There are several ways of getting the heights when the old staff is destroyed; or very likely an error may have existed in the watch originally. In our next will be given an improved instrument for such measurements, as the description is too lengthy for the space in present number. The height of the balance is the principal point to be considered, as the roller can be staked on at such a height as shall conform to the fork. The position of the balance can be determined by removing the upper cap jewel, and letting the taper tongue of the jewel protrude through, until it defines the position of the shoulder of the staff where the balance sets. After the staff is turned and broken off as mentioned above, comes the finishing in the wax chuck. This is a matter requiring more care than most workmen bestow. Two essential points need to be carefully observed; first, the accuracy of the hollow cone in the wax chuck, which secures one end of the staff; this needs to be carefully turned to a perfect hollow cone, without a reversed positive cone protruding at the bottom; at *H* and *K* are shown vertical sections of such chuck, *K* being the correct form. Some care will be necessary to get perfect cones by the graver, a steel joint formed of steel wire, and turned to a perfect cone with an angle of 70 degrees; this should be hardened and polished. Turn the hollow cone as near as you can judge to 60 degrees, and with the back center, press the steel cone into the hollow cone pit until a perfect hollow cone is formed. Next comes inserting in the wax; nothing is simpler than this, yet many persons make a great deal of trouble and bother about it—nothing equals the nail of the forefinger, and the touch should be light and constant. The wax should cover the staff nearly to the end, and be cut away as the work progresses. If the wax is irregular in form, it will, as it cools, draw the work to one side; for that reason it is better to put on a little more than is needed, and turn off the wax until the form is regular, then warm it up again, truing as before; the wax for this needs only to be softened a little. The idea is, keep the wax true, or unequal contraction will throw your work out of true.

The Corvin Niello.

[German patent 6,993.]

THE idea for this invention, namely, to sketch the decoration upon a plane metallic surface, then paste the carefully cut and perfectly prepared and finished pieces upon the drawing; next to dust the reverse side of the entire ornamentation with graphite, and finally to deposit metal upon the prepared surface, was so simple that experts, when they heard it, smote their heads and exclaimed, "The egg of Columbus!" Although the first limited trials proved the conception to be executable, yet many difficulties and obstacles presented themselves, and years passed by until the inventor could practically execute his idea, with the assistance of the proprietor of one of the largest electro-galvanizing establishments in Germany.

The Corvin niello, as manufactured at present, is exceedingly handsome; the metallic surface is embellished with harmonious designs, which no longer appear to have been inserted, but glitter with the richness of color of the pearl, the wing of the butterfly and the humming bird, appearing as if painted upon the metal itself, or melted in. Most eminent masters in the art of design lent their aid, and with a true artist's hand, embodied designs for the ornamentation of the surface, of ravishing beauty, and thus the iris shell, in combination with the black tortoise, glitters with all the hues of the rainbow, and the object, ornamented with designs of the highest possible degree of the decorative art, becomes veritable *chef-d'œuvre.*—[Extract letter in *Journ. d. Goldschm.*

Ceramoid.

DR. R. MARTIN, of Sonneberg, in Thuringia, has invented a substance which is said to resemble matt porcelain biscuit and faience, and has the ring of ceramic products. The process employed by him consists in mixing the clay with water glass so that it hardens without the necessity of burning. The objects made of it, especially doll heads, key escutcheons, vases, etc., are made of clay, mixed with infusorial earth, cellulose, or fibrous substance, and either pressed in plaster moulds or made by pouring the thick paste into moulds, and then, after they are taken out of the mould, they are dipped in a solution of water glass. Owing to the capillarity of the substance mixed with the clay the water glass solution is rapidly absorbed by the substance and soon penetrates the entire mass, and when it hardens the mass resembles stone.

To color the article at the same time the paste is colored and poured or pressed into the form, and then the ground mass poured in as in making terra-cotta, where the finer parts are first filled up with prepared clay, which can be colored at will, and then filled out with ordinary clay that has not been elutriated.

It is well known that silicate of alumina, and also clay, when mixed with water glass solution, hardens and does not readily get soft in water. The strength and durability and power of resisting water is not, of course, equal to that which can be attained by burning.

Effect of Compression on Solids.

A GERMAN chemist has recently published an interesting memoir, giving the results of a series of of experiments as to the effect of powerful compression on various bodies. The substances experimented with were taken in fine powder, and submitted, in a steel mould, to pressures varying from 2,000 to 7,000 atmospheres, or about 7,000 kilograms per square centimeter. Lead filings, at a pressure of 2,000 atmospheres, were transformed into a solid block, which no longer showed the least grain under the microscope, and the density of which was 11.5, while that of ordinary lead is 11.3 only. At 5,000 atmospheres the lead became fluid and ran out through all the interstices in the apparatus. The powders of zinc and bismuth, at 5,000 to 6,000 atmospheres, gave solid block having a crystalline fracture. Toward 6,000 atmospheres, zinc and tin appeared to liquefy. Powder of prismatic sulphur was transformed into a solid block of octahedric sulphur. Soft sulphur and octahedric sulphur led to the same result as prismatic. Red pnosphorous appeared also to pass into the denser state of black phosphorous. A certain number of pulverized salts solidify through pressure, and become transparent, thus proving the union of the molecules. At high pressures the hydrated salts, such as sulphate of soda, can be completely liquefied. Various organic substances, such as fatty acids, damp cotton and starch, change their appearance, lose their texture, and consequently undergo considerable molecular change.

Obituary.

Charles Oakford Klett, traveler for the Middletown Plate Co., died suddenly at the Rankin House, Columbus, Ga., recently, of appoplexy. Mr. Klett was well known in the trade, and highly respected by all with whom he came in contact. He was about 55 years of age, and leaves two sisters, who reside in Philadelphia. Those who knew him most intimately speak in the highest terms of his manly character, his strict integrity, and his many social characteristics which endeared him warmly to his associates.

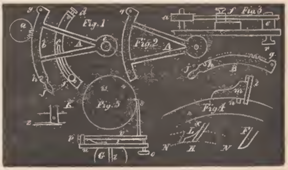
Mr. E. Stites, a well-known jeweler of this city, died recently after a lengthy illness. Mr. Stites was born at Westfield, N. J., in 1814, and learned the jewelry business of W. D. Saulsbury. In 1841 he started in business with Mr. Bogert, under the firm name of Stites & Bogert. He was subsequently in business with J. H. Laffen, with whom he continued until the death of Mr. Laffen, when the firm became E. & D. H. Stites, continuing as such until 1877, when Mr. E. Stites assumed entire control of the business. He was well known and highly respected in the trade, and his death is sincerely mcurned by a large circle of personal friends, who were deeply attached to him.

The many friends of Mr. Joseph Fahys will be grieved to learn of the sad bereavement that has befallen him in the death of his youngest child, Edith, aged about ten years. She was a lovely and most interesting child, a great favorite, not only with the other members of the family, but of their neighbors and acquaintances. Her sad death, from spinal meningitis, caused her much suffering, which she bore with the greatest patience and fortitude. A dark cloud has in consequence settled upon this household which has been so suddenly bereft, and changed from one of gayety and happiness to one of mourning. Mr. Fahys has a most interesting family, and he is a kind and indulgent father, making his home attractive, not only to the members of his family, but to a large circle of their friends and acquaintances. The untimely death of little Edith has left a vacancy in the family circle, and a void in the hearts of those who knew and loved her that never can be filled.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

THE rack for working the 20 and 21 toothed wheel mentioned in my last, is shown in Figs. 1, 2 and 3. Fig. 1 shows a plan as if seen from above; *a* represents say the 21-toothed wheel. Fig. 2 shows the quadrant which carries the rack; this quadrant turns on a stud shown at *c*; a curved piece shown at *c* controls the arc through which the quadrant *A* swings; *d* is a stud and screw, and *f* a movable stud with set screw working in the slot in *c*. At *B*, is shown the circular rack which works the wheel *a*, this also turns on a joint shown at *g*. If the quadrant is constructed on a radius of 3 inches, the rack *B* can have 45 teeth, which will compel two full turns of any of the wheels *a*, or by setting the screws *f* to shorten the arc, move the wheel *a*, one tooth at a time. To illustrate, we will suppose we wish to cut a wheel of 56 teeth; we set the screw *f*, so that 36 teeth of the rack will oscillate back and forth, the exact amount of swing being determined by the screw *d*; the handle *j* of the segment *b*, is swung in the direction of the dotted line *i*, until the teeth of the rack are disengaged from the wheel *a*; the quadrant *A* is now swung back as far as *d* will permit; *f* is now returned, and the rack *b* (if the screw *d* is set right) will fall perfectly into the teeth of the wheel *a*. Now turn or swing the quadrant *A* as far as it will turn, and you cause *a* to revolve 36 teeth. Repeat this 56 times and the wheel is cut, if the formerly described appliances are in place. The rack *B* can be cut and rounded by hand well enough, as it has been explained that slight inaccuracies are almost lost in this system. At Fig. 4 is shown a method of cutting such a rack, *k* represents the curve of the rack; *l* shows in cross-section a thick saw ($\frac{8}{100}$ of an inch), *m* a gauge similar to one described in a former article for producing saw teeth. The exact pitch can be got at by a few trials on short segments, or arcs of the same curvature. In this case one segment *b*, does for all the pinions or small wheels as I have called them. As the wheels *a* vary slightly in diameter, the stud *c* is made to move by shifting the screw *x*. There has been described now, a complete wheel cutting engine, which is capable of producing almost absolutely perfect work. Although such a cutting apparatus is very desirable, still one on the same general principle, but much more quickly made and at less expense, will do almost any job which a workman is called upon to do. The arrangements for holding the revolving cutter cannot be much simplified. By making the cutter arbor to revolve by power—the foot wheel for instance—single tooth cutters can be used, but only for brass wheels to advantage, as single tooth cutters do not cut steel wheels well; neither do they cut single brass wheels as well as the cutters described; and these are so simple and expeditiously made as to leave but little to be desired. The simple form of dividing engine hinted at in former articles, is made by using such wheels for dividing wheels as come conveniently, like old Yankee clock wheels, such divisions as 84, 80, 78, 72, 70, 64 and 60 being common; these are capable of divisions, and produce any number of leaves for pinions, etc. A wheel of any number of teeth of such size as is required can be got cut at small expense. Suppose you wish a division of 19, for stem-wind purposes; get a wheel cut of 76 teeth; you can cut 38 and 99 from this division—for 17 get 68 giving this number and 34; for 15 use 60; for 13 get 52. Make all these wheels to fit your arbor as described for the 96-toothed wheel, and use one



pawl, but this adjustable with a screw; such an arrangement is shown in Fig. 5, where *G* represents the lathe bed, *t* the holding screw, *u* a piece of brass or iron with a lug forming a joint at *p*, with the piece *u*; this piece extends back so that a spring *Y* will keep *v* pressed down on the adjusting screw *o*. The pawl *s* is pressed toward the wheel *w* by the spring *z*. At *K* is shown the shape and action of the joint and spring; this is enlarged to make the action better seen. It will be seen that the screw *o* moves the pawl *s*, and enables the workman to adjust the wheel *w*, so that work which might accidentally be taken from the lathe imperfect, can be restored and perfected. In this arrangement the wheel *w* has to be shifted by hand, counting off the teeth necessary to produce the divisions desired. A rubber band as directed in former article will keep the teeth of *w* pressed against the pawl *s*. In cutting steel wheels the cutter must be kept well oiled, and the engine should be run around twice, the last time without any feed, just to remove any burr. If the cutters are cut fine and the lines brought to an edge, the teeth will be found very smooth; and a piece of engraver's boxwood, cut into a strip with the edge brought to the shape of the tooth, this presents the end of the grain of the wood to the work, with oilstone dust or fine emery and oil, will soon efface all cutter marks. After the teeth are freed from cutter marks, Vienna lime and alcohol, with a similar boxwood slip, will produce a fine polish; but before the lime is applied the oilstone dust or emery should be washed off. The cutters for cutting scape wheels to chronometers are of two forms: The first cutter is concave on the edge, as shown at *H;* it will be seen that this shape conforms to the curve of the wheel as shown by the dotted line *N*. The surface of the cutter shown at *x*, should stand at 28 degrees to a radial line and the concave edge as described. The curve of the back of the tooth *t* should correspond to the curve of the impulse roller, only slightly in excess. At *F* is shown the edge view of the cutter for forming the back of the tooth. These cutters need no roughing, except on the concave and convex surfaces. The cutter shown at *L*, with the concave edge, is used first, producing an incision with parallel sides, and after this the convex edge cutter is used to produce the back of the tooth. In such cases as this, the adjusting screw *o*, Fig. 5, comes into play, enabling one to bring the point of a tooth to almost a perfect point. The tooth should not, even in the subsequent polishing, be brought to a perfect point But the extreme point should show, even when highly magnified, a trace of the original curve of the blank wheel. After the wheel is cut, (oil should be used in cutting, the same as for the steel wheels) the teeth should be polished; this is best done by hand. The wheel is left in the engine and the whole arrangement for holding the cutters removed, and a guide put into the tool post which serves to steady an arrangement for polishing the teeth with bell metal polishers, using first rotten stone and oil, and finally diamantine and oil, or preferably, charcoal dust and oil; the latter leaves no grit, but it does not produce as high a polish. Cuts showing how these guides are arranged will be given in our next. The arms and inside of the wheel are finished after the teeth are polished. The scape wheels of chronometers are usually turned down thinner to the base of the concave side of the teeth; also leaving a hub of the same thickness as the points of the teeth; to finish this sunk part is not difficult to the practical escapement maker, but to the novice it presents difficul'ies which require patience. As a well made chronometer escapement combines to form the most perfect escapement known, I shall speak at length on the manner of making a scape wheel as well as grinding a detent, in my next article.

Chloride of Gold.

THE mode of procedure is to dissolve the gold, throw it down to obtain pure gold, wash the precipitate, and redissolve. A solution of the salt is then obtained.

To dissolve the gold, a mixture of pure nitric and hydrochloric acids in the proportion of one to three is used. The usual manufacturers use an ounce of gold to four ounces of the mixture, though in our own practice we usually find double that quantity needed, as a considerable loss of chlorine takes place during the prolonged digestion. A porcelain or glass vessel should be employed, on account of the value of the contents. The kind we have found most useful is one that can be obtained from any dealer in chemical apparatus; in shape it may be likened to an egg with one end widened out. A useful glass vessel is made specially for such purposes, though we prefer the porcelain, particularly when the operations may not all be carried on by a principal himself.

This glass vessel is a bulb blown at the end of a long tube, and is so constructed with the object of avoiding waste through splashing. We place the gold in the porcelain vessel, pour over it the mixed acid, and put the whole in a sand bath ; a tin canister almost filled with sand will answer all purposes. The whole is then put in a place where the fumes will not do any harm. The hob of an open fireplace is very good for the purpose, as the draught from the fire takes up the fumes, and the heat facilitates the dissolution of the metal. If such a place be chosen, care must be taken that no officious housemaid knocks the vessel and its valuable contents over.

In a few hours the gold will be dissolved. Should it not be, however, the liquid must be poured off and a fresh supply of acid put upon it, and a gentle heat again applied. When all is dissolved the liquid is next to be transferred to an evaporating dish, which should again be placed upon a sand bath and heated till the bulk of the liquid is driven away. It must not be made *dry*, or there will be a loss of gold by the production of an insoluble salt; and further, for the after operations it is desirable to have some quantity of acid present.

The solution being thus brought to a small bulk it must be transferred to a precipitating glass, water added to reduce its strength, and a filtered solution of sulphate of iron poured in. For safety two ounces of sulphate may be added for each sovereign piece. A deep brown precipitate, sometimes appearing green when looking through the vessel, is then produced; it is pure metallic silver. This must be allowed to settle till the supernatant liquid is quite clear, and when this happens it may be poured or siphoned off, fresh pure water added, the precipitate stirred and allowed to settle, the fluid again poured off and water added, etc., till all the iron is washed away. The precipitate then may be transferred to the porcelain holder again, and either heated to drive off the water or allowed to stand till the precipitate occupies a small space, when almost all the water may be removed.

All that is now required is to redissolve this precipitate in the smallest possible quantity of acid and slightly to evaporate, when a solution of acid terchloride of gold, or chloride of gold and hydrogen, is at hand, and it may be kept, with a little water added, with far more convenience than if it were in the solid state.—*British Journal of Photography.*

African Diamond Digging.

Fancy, if you can, a pit half a mile long and say one-third of that space wide. The walls of this chasm are of blue slate, the bottom, where the men are at work, is a mass of concrete gravel and cement. It is in fact a crater or the mouth of an extinct volcano from the bowels of the earth. In this oval shaped pit, which is now excavated to a depth of perhaps five hundred feet from the margin, from eight to ten thousand people are at work digging and delving into the gravelly *debris* at the bottom. The claims include a space within this pit of diamonds thirty-two feet six inches in surface measurement. These claims are in some cases owned by individuals and in others by companies who have bought up a group of claims and work them under the direction of overseers. The digging is done by natives, mostly Kaffirs, who work half naked in the concrete *debris*. To every group of diggers there are usually four white watchmen, who sit and watch when a native discovers a diamond, and over these four watchmen an overseer, who makes a record of every "find" by a digger. A premium of one penny to the pound sterling in value is offered in addition to the regular daily wages for every diamond found. When a native finds a stone he cries out and passes the brilliant to the watcher, and it is handed by him to the overseer, who in turn sends it to the office of the company. Each of these men—the finder, the watchman and the overseer—receives a price or premium on the discovery made, and this acts as a check upon fraud, each man claiming a premium upon every stone found. From every claim in this pit a double wire cable runs to the level ground at the surface, and upon this aerial railway little cars run up and down. The diamond dirt, when it reaches the surface, is taken out into a field and scattered and there left exposed to the sun and atmosphere, which pulverizes the cement like dirt. After two or three days' exposure the natives throw water upon the dirt, and then commence the second search for gems. They are picked up by natives almost naked and handed to overseers, who take them to the general office. This dirt is afterward sifted and again sorted, and after a second overhauling is carted away and a new crop laid out for inspection. Notwithstanding the closest vigilance, diamond stealing is carried on very profitably. The half naked Kaffir sometimes succeeds in placing his naked foot upon a diamond and works it up between his toes and so carries it off; or he will stoop down, pick up a precious stone and put it into his mouth; or, pretending to scratch his ankle, slip a gem into his fingers and thence into his ear. The most common mode of diamond stealing is to rub small sized stones into the dense mass of wool which crowns the head of the native African. Some blacks have been caught with as much as $6,000 worth of diamonds in their hair. It is a common expression among the watchers that "we can always tell when a stone has been discovered—the African always trembles."

Proceedings of the Horological Club.

A Distinguished Body of Watch and Clock Makers.

Ninety-third Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the Circular for the next month.

HOW WATCHES ARE MADE TO RUN TO A SECOND.

Secretary of Horological Club:

I am a good workman, have worked 35 years, and learned my trade with one of the best workmen in our state. But in the last ten years or so, the kind of work we get to do is very different from the way it used to be. People carry finer watches, and are more particular. They growl when their watches get a few seconds out of the way, more than they would for so many minutes, years ago. I think I am careful, and thorough, and skilful, but this running by the seconds is too much for me. Is there any book or books that will help me? I mean books that tell how watches are "adjusted" and regulated down to the last second. If you would kindly inform me, I would consider it a favor. Old Timer.

Mr. Isochronal said that the secret of perfect time keeping was firstly, in making the action of the whole train as perfect as possible, and, secondly, in certain manipulations of the hair spring and the balance, which are called "adjustments," as, the adjustment for isochronism, for rate, for positions, and for heat and cold. Our correspondent doubtless knew that ordinary watches ran differently in summer and in winter. This is caused by the changed temperature, which affected the action of the hair spring and the balance. This change was so great that no one could help but notice the difference of time between warm and cold weather, but the effect was the same between warm days and cool nights, or the warm pocket and when taken out of the pocket. These latter changes caused the watch to vary only a few seconds per day, perhaps, but the errors became too large to be ignored after a time. The adjustment for heat and cold is designed to prevent this error, and make the watch keep nearly uniform time without regard to changes of temperature. It is this adjustment which is generally meant by the word "adjusted," applied to the finer grades of watches, in price lists and in advertisements, but a more correct term would be "compensated" for heat and cold. The term "adjusted" cannot, with strict propriety, be applied to movements unless they have received all the adjustments before mentioned. The adjustment for positions is to secure the same time in the different positions of the watch, as, hanging up or lying down, either edge up, dial up or down. The adjustment for isochronism is to secure the same time whether the balance has a large or small motion, as when first wound up or nearly run down, clean or dirty, the oil liquid, or thick with cold, etc. The adjustment for rate is usually considered to be the same as regulating, but is more properly applied to the rating of chronometers, to ascertain whether they run with perfect uniformity for a considerable length of time, and just what this regular error is, *i. e.*, it runs exactly so much fast or slow every day, and that amount is called the daily rate, and is allowed for in all calculations afterwards made on the time of the instrument.

These manipulations were formerly kept secret, and only understood by a special class of highly skilled workmen known as adjusters.

When our correspondent learned his trade there were probably not a half dozen men in this country who could adjust a watch, and nine-tenths of the workmen had never seen an adjusted watch or knew what the word meant. But now, as he says, such watches are comparatively frequent, and every watchmaker who pretends to call himself a workman must understand these things, or his ignorance may be detected any day. Our friend will find several good articles on these subjects in the last volume of The Circular. If he wants a book that goes into the whole matter and gives a complete course of instructions, he should get Saunier's Treatise on Modern Horology, price $15, or Excelsior's Practical Treatise on the Balance Spring and the different Adjustments of Watches and Chronometers, price $3.50. Saunier's work is by all odds the best one that is accessible to the trade, and should be possessed by every workman who wishes to thoroughly understand the theory as well as the practice of his business. It requires considerable education and intellect to fully comprehend and appreciate it, but it is worthy of all the study that it requires. Excelsior's book treats on the making and fitting of hair springs and balances, and the various adjustments spoken of. It is thoroughly practical, giving plain instructions, that can be understood and followed by anyone of ordinary intelligence—at the same time explaining the reasons of the different operations, and the objects which it is desirable to accomplish. In short, it is just the work for the practical workman at the bench, and the low price leaves no excuse for any watchmaker to remain in ignorance about the first and most important branches of his trade. Everyone should have both, if he can possibly afford it, but he should in any event have this one. Both can be ordered from the publisher of The Circular, and Mr. "Old Timer" will then have the opportunity to inform himself of the modern improvements, and bring himself up to the front with the "Present Timers."

CHARCOAL FOR SOLDERING, ETC.

Secretary of Horological Club:

For benefit of J. S. in Dec. No., I would say that basswood charcoal will not snap or crack, and will not hold fire, *i. e.*, will go out as soon as you stop blowing flame on it It is very compact and firm, holding a steady pin or clamp well. By fitting two pieces together, (whittle off smooth, then rub the two faces together until you have a perfect "joint") with chamber or any shape to suit work then on hand, cut in one piece, and the two pieces bound together, it makes a splendid ingot for small quantities of gold or silver. I have used basswood coal for 20 years, and find it the best of any. Bert.

Mr. Rolliver endorsed this statement, and said that charcoal made from whitewood, soft pine, and any soft close-grained wood was good.

BUSH'S PATENT RUBY PIN SETTER.

Mr. McFuzee acknowledged receipt of a sample of this tool from the maker, with thanks, and said it was a substantial, simple, and effective tool for the purpose, held the ruby pin firmly, and admitted of heating the roller enough to melt the cement, without injury to the spring in the tool. He thought it would prove a very handy tool for repairers.

POLISHING WATCH CASES—GROWTH OF MOSS AGATES.

Secretary of Horological Club:

Please inform me through the columns of The Circular how to polish an old watch case? I have a small polishing lathe, but am not able to do a nice job of polishing. Let me know what kind of wheels or buffs are needed for the work, what kind of polishing compounds, and which kind to use first, and how to apply the powders to the wheels or buffs.

A customer asked me to-day if the moss in moss agate stones, continued growing after the stone is cut and polished. It is a subject that I had never thought of. If you could give me any information on the subject it will be thankfully received. L. R.

Mr. Ruby Pin responded that a good fine polish can only be got after the case is smoothed, and the scratches and marks scoured out. This may be done with a bristle brush and tripoli Oil stone dust, or even emery dust may be used if the cases are very rough and marred up. If rough powder is used, the case should be washed thoroughly clean with soap and warm water before using the tripoli, and also after using tripoli, and before using rouge, which gives the final polishing. The object of this is to prevent any of the coarser powder remaining in the case to mix with the finer powders used next. Each kind must also be kept covered, so that dust and dirt cannot mix in it and impair or destroy its usefulness. The polishing brushes must be each in its separate box, and covered when not in use, as a single grain of grit on the finishing buff would render it worthless—scratching the case instead of polishing it. The powders are mixed with oil into a thick creamy mass, and are applied to the buffs in any convenient way. Most workmen take a little on the finger and apply to the buff while revolving. After the surface is well smoothed with the tripoli, the case is thoroughly washed and rinsed, and then polished with jewelers' rouge on a very soft buff, and run very fast, turning the case constantly, but with only a slight pressure on the buff. If properly prepared by the tripoli, a fine polish is soon obtained with the rouge. The buffs, powder, brushes, etc., can be bought of all material dealers, and practice will supply the rest, but cleanliness as described is indispensable.

As regards the moss agate, it will depend on circumstances. Many stones are artificially colored by means of chemical solutions, heat, and otherwise, and moss agates can also be changed in appearance by heat. If the iron or other matter in the crevices of the stone, and to which the color is due, should be in a state susceptible to the action of light, the foliated appearance, or "moss" would doubtless be affected more or less during use. But he thought that seldom occurred except by heating or similar treatment. As regards the idea of "growth," there was no such thing, neither after the stone was cut nor before, any more than the spots and discolorations in glass are caused by growth. The appearance was caused simply by dark colored matter settling in minute crevices or fissures of the stone. Many persons considered that they were a sort of photographic impression of natural objects, but such notions were entirely unfounded. The forms occasionally resembled *something*, as is very natural to be the case—but even these resemblances generally exist principally in the imaginations of the owners, rather than in the stone.

PROTECTING STONE SETS IN RINGS WHEN HARD SOLDERING.

Secretary of Horological Club:

Will you please let me know how to protect the set or sets in a ring, when hard soldering? I have a brass plate, which I bought for that purpose, but I find it almost useless, unless in soldering a very light ring. I tried to solder a heavy cameo ring, and the water, of course, protected the set, but I could not get the ring hot enough for the solder to flow. V.

Mr. Rolliver replied, we usually take a small crucible and fill it with sand. When you wish to solder a ring, *wet the sand*, put the head of the ring in the sand, cut a piece of charcoal that will fit inside of the ring, coming close to the place to be soldered. Let the coal project about half an inch each side of the ring. Put your borax and solder on where you wish it to flow, and blow the blaze sharp and quick. It needs practice and common sense to be successful.

GUNDORPH'S GLASS WATCH OILER.

Secretary of Horological Club:

After the suggestion of Mr. Gross, I send you inclosed little instrument, which I have got up and used with satisfaction for more than a year. I wish you would kindly give it your consideration, and mention it in your Proceedings. I have never had a tool for giving oil to watches, which was so clean and convenient, and, so to say, labor-saving, as I have no oil cup to uncover and keep clean; no motion with the arm each time I have to dip, as is the case when using a piece of wire to oil with. The first thing, several watchmakers would exclaim, "It is of no use; it is too easily broken"—the very same men would not be without it now. I thought so myself when I had made the first one, but I was surprised to see how elastic and tough the point is. I have used one for six months, and they only break by carelessness—not being replaced in the box, and then a file or hammer will be thrown on it. I wish you would let some member of the Horological Club give their opinion about it.

In a short time I will send you another little invention for which patent has been allowed me. Hoping that this will be kindly accepted, I remain, Yours respectfully, F. GUNDORPH.

Portland, Oregon, Jan. 12, 1882.

Mr. Uhrmacher expressed himself as much pleased with this tool, which was very neat and clean, as well as quite tasty in appearance. It consists of a small glass tube, having a removable stopper at one end, while the other is drawn to small size for about three-quarters of an inch, forming a fine capillary or hair-like tube to the extreme end. A drop of oil, more or less, is first drawn up into the handle part, where it serves as a reservoir of oil, from which the small tube is constantly kept full by what is known as capillary attraction. It is only necessary to touch the point to any object, and the oil will be forthcoming, as long as any remains in the instrument. He observed that oil was supplied most plentifully when the point was touched vertically to the object, and this might be availed of to regulate the amount of oil, by inclining the point more or less in relation to the surface to be oiled. Of course, when the tube was held parallel with the surface, and only its outside touched it, no oil would be furnished. The price, twenty-five cents, was certainly cheap enough to enable everyone to try it for himself. He would suggest to Mr. G. to provide a more substantial box for it, as the one sent was badly wrecked in the mail, and many workmen would prefer to pay a little more for it. Those who would not, could, of course, buy at twenty-five cents, and fit up a box to suit themselves. We shall be pleased to receive and consider any further inventions of Mr. G., and we would suggest to others who have improved tools, attachments, ways of working, and labor-saving contrivances of any kind, that they should make them known for the benefit of the trade as well as themselves. We make no charge for the description in our Proceedings, believing that the advantage to the trade more than counterbalances the free advertising conferred upon the inventor, and our trouble in the matter is rather a pleasure, in being able to furnish interesting and useful information to the craft. Let us hear from those who think they have "the best"—and the more of them the better.

REMOVING SOFT SOLDER FROM JEWELRY.

Secretary of Horological Club:

I would like to ask one question: Where gold or silver has been mended with soft solder, is there any way of removing the same, without scraping or filing it off, which is very difficult sometimes? W. E. B.

Mr. Rolliver advised Mr. B. to remove all you can with a scraper, then, if the article is good gold, say 14-k., you can lay it in nitric acid for a short time. The acid will eat the lead away. If the article is of silver, and there is not much soft solder on it, muriatic acid can be used the same as nitric for gold. But in all cases you must be very careful. The following process had been recommended, but he had never used it himself, viz.: Proto-sulphate of iron (green copperas) 2 oz.; nitrate of potassa (saltpeter) 1 oz.; water, 10 oz. Reduce the two salts each to a fine powder, add them to the water, and boil in a cast-iron pan for some time, then set aside to cool. Take the crystals, by pouring off the liquid, and dissolve one ounce of them in 8 oz. muriatic acid, or in that proportion. To use, take 1 oz. of this solution, and add to it 4 oz. of boiling water in a glass or porcelain dish, and boil the articles in it. In a short time, it is said, the worst cases of soft solder will be entirely freed from the article, without changing the color of the work. This process is recommended for all qualities of gold work, and also for silver goods. If any of our correspondents try this method, we should like to hear their experience with it.

MAINTAINING SPRINGS IN WATCHES AND CLOCKS—SOLDERING FLUID WITHOUT ACID.

Secretary of Horological Club:

Will you please inform me, only an apprentice, through THE CIRCULAR, if the maintaining power spring in a fuzee watch or in a clock, gives additional power to the spring or weight? For example, you have a clock run with a ten-pound weight, the maintaining power spring is equal to one pound, is there ten or eleven pounds pulling? In other words, does the maintaining power spring act at the same time as the weight, or only while being wound, or weight power taken off?

In the December No., "Subscriber" wanted a soldering fluid made without acid. You answer that there was no soldering fluid made without acid. Please allow me to differ. There is a soldering fluid made without acid; steel may be covered with this fluid without injury, and it will work in all respects as fluid made with acid. Dealers in watch and jewelry repairers' supplies sell fluids, but they are all made with acid. Why would not a fluid without acid sell well, and also be a benefit to repairers? I see no objections. I do not think that the fluid would cost as much as a bottle, cork, and label. I have just counted my cash on hand; it amounts to 87 cents; no expectations. If I had enough to buy a few dozen bottles, and enough to pay for an advertisement, I would start in business, if it would be only a benefit to jewelers. I think it would be worth while trying, and if you think so, please say so through THE CIRCULAR, and I will send my address. Yours, etc., SOLDERING FLUID.

Mr. Clerkenwell replied that the maintaining spring adds nothing to the power of the weight or mainspring. The latter simply bends the maintaining spring on its way to the main wheel, which it then drives with the same power as if there was no maintaining spring or similar connection between them. The maintaining click prevents the maintaining spring from straightening out again when the pressure of the weight on the mainspring is removed, as during the winding process. The maintaining spring then presses at one end against the unyielding click, and at the other against the main wheel, which it drives with the same force as the weight, *minus* the friction of the maintaining works, until the spring gradually loses its strength by the main wheel moving on and allowing it to straighten. This is the explanation of the clock or watch continuing to run for a short time after the weight or mainspring is entirely removed.

As regards the soldering fluid made without acid, it is possible that our young friend may have fallen into the same error as a correspondent whose letter was considered at our meeting for February, viz: Supposing that chloride of zinc contains no acid. Chloride or muriate of zinc is formed by the chemical combination of hydrochloric or muriatic acid with zinc, and the resulting compound or salt is composed partly of the acid and partly of the zinc. Our friend admits that there is no soldering fluid without acid *sold* by dealers, which shows the correctness of our reply, for if any such fluid was known and really worthy of general use, it would be on sale. But it is not impossible that such a fluid may be discovered, and if so, it will pay to make and sell it. But before going to any expense, or even raising any expectations, our young friend had better have his fluid thoroughly tested by some experienced workman. When he is fully satisfied that it is all he expects, we shall be pleased to try it and give him a notice "without money and without price," to start him off with.

STRIPPING AND REPLATING STEEL KNIVES.

Secretary of Horological Club:

Having experienced difficulty in removing silver from articles to be plated, will the Club please give the process by which articles for replating may be stripped of the silver remaining on the article? Also the process of preparing steel knives, forks, etc., for receiving a silver plate? I value your publication very highly, and would not be willing to do without it. Every month I find some article worth a whole year's subscription. You may count me a life subscriber.

Yours very Respectfully, W. P. K.

Mr. Rolliver replied that the best way to take silver off is to reverse the battery, and that will take all the silver off into the solution. Then polish the articles all smooth, before replating. They need no other preparation.

REMOVING PALLET JEWELS.

Secretary of Horological Club:

I should be very much instructed to be made acquainted with some process by which the jewels of lever watches can be removed from the levers, when they are injured and need repair. A. M. O.

Mr. Uhrmacher replied that they are merely constructed with shellac or other fusible cement, and can be removed by warming the pallets a little. Mr. O. will find it much harder, however, to get them in proper position again.

HOW TO ENGRAVE.

Secretary of Horological Club:

Can any member of your Club give me any information on engraving, how to sharpen the gravers for different kinds of work, etc.? Also if there is any good book published on the subject?

A. W. J.

Mr. Expert replied that there was, so far as he knew, no work on engraving which would be of any use to Mr. J. He had published in THE CIRCULAR, some four years ago, an illustrated series of articles on this art, to which he must refer Mr. J. for complete information. It would be impossible at this time to do more than outline the operations. In engraving on metal, the angle of the cutting point should be about sixty degrees, the same as the angles of a three-square file, that is, the graver should be ground off so that the back edge and its flat ground surface, meet at the point with the same inclination to each other as the two sides of the file do. The grinding is, of course, done on a wet grindstone. The graver is then sharpened on an Arkansas oil stone, say two by five inches, and of good thickness. Its surface must be kept smooth, free from scratches and grooves, and as nearly flat as possible. Hold the graver much as you would a pen, with the cutting edge from you, and the ground surface flat on the stone, which must be plentifully oiled, and the graver must then be rubbed back and forth over the stone, holding it all the time *perfectly flat*, so that the edges will not dig into the stone, as that would of course take off the cutting edge entirely. If any feather-edge is produced by this process, the graver is too soft, and must be rejected or hardened. If the latter, it is tempered, or the hardness reduced by holding carefully over the lamp and bringing them down to a dark straw color.

Gravers can be bought of all shapes, and by proper selection and grinding, can be made to give any desired form of cut. If ground "square-across," the cut will incline the same on both sides, and the width of the graver will determine the greater or less width which the cut will have for a given depth. If ground angling, instead of square-across, the graver will be right or left-hand cut, *i. e.*, the cut may be nearly vertical on one side, while the other may be very much inclined, making a broad shape on that side. This is the way that watch cases and like objects are engraved, and give the appearance of a very deep cutting, while really it is very shallow. For engraving the insides of rings, the main strokes are done with the ordinary gravers, but the ends and final curves of the letters are all with bent gravers. These have been bent while soft, to give them a bow or loop which will clear the ring when turned sideways, but the point is brought back into line with the main body of the tool, which is then hardened, tempered, and sharpened as usual. Many varieties and shapes of bent gravers are used, and the workman can make such as he thinks will be most useful to him. Then there are flat-bottom gravers, which produce a cut with a flat bottom, of any desired breadth, and many other styles, which cannot be here described.

In order to make a very smooth and polished cut, the graver is first made perfectly sharp, (which is generally tested on the thumb nail, by resting the cutting edge on it and trying if it will slip with a light pressure,) and is then polished perfectly. The more perfect the polish of the graver, the more polished the cut will be. To give the polish, glue a piece of firm, rather hard leather to a flat board or strip, rub on it some Vienna lime, or diamantine and alcohol. Place the flat surfaces of the graver *perfectly flat* on the leather, (otherwise you will take the cutting edge off,) and draw the graver *toward* you, being careful not to raise the handle while in motion, but keep the surface flat down on the leather as long as any pressure is on it. Such gravers are used to turn off the taps and inside of jewel settings, as seen in the end stones of American watches, and for many other purposes. They must be very carefully used and guarded from injury, as it does not take much to ruin so fine an edge. In engraving they must also be cautiously guarded, as they are more liable to "slip" than an edge from the oil stone.

Having the tools, you now want to practice, much and often. A flat piece of sheet zinc, cut of any convenient size, is cheap, and answers all purposes. The surface is to be rubbed smooth with fine emery paper, and the pattern, or "design" marked with a lead pencil. The zinc is, of course, fastened in some sort of holder, of which there are many in the market, or you can make one for yourself. As to what you shall cut, that is a matter of small consequence at first, as the principal object is to get so you can use your graver handily, cut smoothly and rapidly, and make a cut of any shape you wish without having the graver dig in, or slip out and jump the track entirely. First try to cut a long line perfectly straight, and of exactly the same depth and width from one end to the other. Cut a series of such lines, exactly parallel with each other, and all exactly alike.

You may think that is a very simple thing to do, but you will find your mistake after you have worked at it a few weeks.

Next mark off curves of different kinds, some circular and some oval, and practice turning the work while you are cutting, without making elbows or knots in the curve. Don't trouble yourself about shading your lines, for you can shade with your eyes shut, almost, after you can cut a plain line properly. When you can make a curved line perfectly smooth all around, and of uniform width and depth, reverse your curves, like a letter S, till you can cut easily, rapidly and without slipping, and you have then mastered the most difficult parts of engraving. The artistic part, giving graceful and harmonious curves to the letters, with proper proportions, etc., is much a matter of natural taste and artistic feeling, but you will find plenty of models to imitate, as well as many to avoid, by noticing specimens of good work that pass under your observation, and making copies of such as strike you as particularly neat and happy in design or execution. This part is something that cannot be taught without illustrations, and long descriptions and directions, but if you have the true spirit and a real desire to excel, you will have no trouble in getting along, even without instructions. But you will often meet men who can help you, if you are willing to learn of them.

Practical Treatise on the Adjustment of a Cylinder Watch.

[Translated for THE JEWELERS' CIRCULAR from the 2d-prize essay of Vincent Lauer.]

Continued from Page 28.

For choosing a suitable jewel hole, as well as to test the shake of a pivot in one already located, it is well to turn a number of pivots of all regular-sized holes, and to preserve them in a little box, to serve as patterns; a little tag or label is appended near or to each one, definitely stating its size in degrees, measured by the pinion measure.

If now it is necessary to choose a jewel hole to a pivot, we first of all ascertain its size proportions by the pinion measure; we next take from the pattern box a pinion of a few degrees larger than necessary, and with this we choose a jewel hole, fitting upon our pattern without shake; the right pivot, of course, will have so much shake as it is weaker in degrees. Again, if we wish to ascertain if a pivot has sufficient shake for free motion, we find a pattern exactly fitting into the jewel hole, then we measure the original pivot, and the remainder will tell the tale. A cylinder escapement requires rather more shake for its pivots, and we make them two or three degrees weaker than is actually required by the proportions of the holes. If the pivots have too little shake, a retarding of the watch will be the result as soon as the oil begins to thicken.

If you do not wish to do as mentioned, put every pivot into its jewel hole, having first well cleaned them both, and observe how much the pinion falls from one side to the other, also, if its inclination to the plate or bridge is the same in every direction. At the same time pay special attention if the jewel hole is long or short, its walls straight or arched, if the pivot is exactly cylindrical, or somewhat conical, because the falling to and fro of the pinion will be very much influenced by these conditions, and it is well, finally, to put in the scape wheel and examine the shake with a strong glass.

Examine next that the lower corners of the scape teeth do not rub on the setting of the jewel holes, by putting in the lower pivot; for this purpose put in the latter when you can see whether there be sufficient room. Also notice at the same time if the wheel does not rub in the sink plate, if it does, assist by turning out the offending place. If the wheel stands too deep below, a new pinion will have to be turned in, except it should be necessary to replace the lower jewel, in which case, if there is sufficient room, it may be countersunk, whereby the wheel will be raised higher.

The upper pivot shoulder must in this case be turned back by the quantity the lower jewel has been raised, if there was not previously too much end or height shake.

Next take the bridge in hand; put the upper scapewheel pivot in the jewel hole, in order to examine that neither the pinion riveting, nor the bottom, nor the wheel teeth scrape. Should the riveting rub on the outside of the setting, assist by turning; if the wheel bottom lies upon the bridge, the latter is filed down sufficiently and finished with the slate stone. In the latter case, when the teeth are not able to pass, turn the bridge sink deeper, remembering always to preserve the stiffness of the latter as much as necessary.

If rubbings occur by reason of the wheel hanging too far above, and the escapement as well as the fourth wheel may be placed lower, the wheel is taken down, the pinion shoulder turned off, and the former is mounted again.

By the specification and detail of these works, I presume that the pinion at the time of taking down, or by separate measurement at the commencement of the work, was found to be suitable, as well with regard to its size as to its height, else the time and trouble expended on correcting it would be wasted uselessly. If the pinion is unsuitable, do not waste further pains or labor upon it, but at once turn a new one; in which case see if the wheel hangs at its proper height; that it passes free in the cylinder, on the bridge, and over the fourth wheel; should it possess such defects, you must seek to remedy them with the new pinion.

The wheel is now mounted and submitted to a careful scrutiny, whether it rubs, or its pivots cramp, and whether its position to the plate is horizontal. If it is inclined to one side, first seek to move the bridge by means of the foot pins, if it be too much, it is better to reset the jewel, of which more anon. Next put in the fourth wheel, to investigate the depthing; if this is too deep, cut and round the wheel a little smaller; if too shallow, it is best to insert a larger wheel. The stretching of wheels is most generally defective, and should be used only in cases of utter necessity.

If the watch has no seconds hand, the wheel may be removed, as was explained in its time with the third wheel, if the scape wheel or balance is not approached too closely, so as to create scrapings. It will be well in such a case to correct the last depthing, before the third wheel is displaced by crossing the depthings, to move the fourth wheel closer to the scape wheel, and correct the two former depthings in manner mentioned, the position of the third wheel being best suited to the purpose.

If the depthing cannot be well inspected, or is entirely invisible, set a depthing tool well in accordance to the distance of both pivot revolving-points, and correct it in accordance with it; this is the more suitable if the pinion openings are not sufficiently deep, and it may happen that the wheel teeth rub upon its bottom. The repairer will often believe when passing through a depthing clogged with such a defect, that it is a recoil, but upon closer inspection, he will discover the above-mentioned defect. To correct this evil, let the wheel revolve between centers in the turning tool, and with a fine file or stone remove sufficiently from the tooth points.

Remember well how the depthing, after having been corrected in the tool, felt to the touch by passing through, and finally make another test when mounted in its place in the movement, if it shows the same peculiarities. If a watch is not constructed extraordinarily flat, the depthings may be ocularly inspected in their places. When the depthing has been thoroughly connected in this manner, this part of the watch will have been set in order, and its train is completed. We have to do next with the expending part of the power, the correct transmission of which is thus insured, and to do this we must turn our attention to the escapement; we will dilate upon this subject in the next chapter.

CHAPTER XI.

THE ESCAPEMENT.

This mechanism has for its functions the division of the motion of the train into small fractions, permitting the scape wheel to pass tooth by tooth, whereby the balance receives the impulse necessary for its motion. By this periodical interruption, the train which, owing to the power operating upon it, would move with quick motion, is forced to use a longer time for its revolutions, to serve the purpose of timekeeper.

The cylinder movement belongs to the so-called reposing escapements, because the scape wheel only moves for a small part of the motion of the cylinder and balance, in the remaining time the tooth slides upon the repose planes of the cylinder without moving forward. This peculiarity imparts to the escapements its eminent conditions, because by the small arcs of lifting and for greater arcs of completion, the balance spring is enabled to better develop its regulating activity than was the case formerly, with the old vertical escapement.

The fuzee, also, can be dispensed with in the cylinder escapement. Every watchmaker will have noticed that by an escapement with correct proportions, the balance vibrations do not increase or decrease sensibly, if the mainspring is wound fully or only partly; although by the greater pressure of the spring the balance undoubtedly receives a stronger impulse, yet the friction increases in the same proportion, which the balance during its arc of completion has to conquer, and the scape wheel, in this case, also rests with an increased pressure upon the reposing plane.

The cylinder escapement, complicated though it be in its exact execution, of all escapements, bears with the greatest number of defects without standing still. He who has to handle watches day after day, will have satisfied himself of the truth of the remarks, because the watchmaker often receives watches for repair, which seem almost impossible that they ever did go, considering their condition, and still the owner of said watch will declare with all sobriety, that said watch has rendered good services for a long time. Of course, it also will be found that such owners made no great demands on their timepieces, because if a correct rate is expected of a cylinder watch, it should have no great errors. Escapements of new watches sent to the watchmakers for adjustment often contain multitudinous and important defects, and a long and intimate practice is necessary to eliminate them everywhere with security and speed.

I will not be so presumptuous as to write an instructive treatise on the cylinder escapement: the watchmaker at present has books and journals at his disposal, in which are recorded opinions of eminent men, in comparison with whom I am not able to produce anything as good, let alone better. I will therefore commence to point out the oftenest occurring defects and indicate their remedies.

Above all, examine the escapement well, especially if you discover defects subsequent to the taking down of the movement, by putting the wheel and cylinder together, in order to see how one part stands to the other, and to enable you to know with certainty what to improve or replace. Pay attention to see if the escapement stands too high or too shallow, if the cylinder stands at right height to enable the scape wheel to pass freely through the notch, etc., and consider in what manner this or that fault is remedied easiest and best. After having thus well tested the location and proportions of the parts, take them out again to proceed with the practical work. This, as usual, begins with the bridge, the lower one. Take it off, and you will satisfy yourself if the screws draw; if not, replace them by others.

Should the bridge already have received maltreatment, an occurrence not by any means belonging to the region of improbabilities, endeavor to improve it to the best of your ken. To obtain room for a high cylinder, you will often find the bridge hammered and defaced; remove this with a fine file, and if the cylinder pivots cannot be shortened or turned down as much as is necessary for its free motion, drill a few holes on the inside of the bridge, and insert protruding pins in them, in the manner indicated when treating of the barrel. The cap jewel plate is removed and its screw tested; if it be not good, put a new one in its place at once. If the upper cap jewel plate has a dirty appearance, file it off a trifle, and with a fine emery buffstick give it a sharp grinding.

If you have found on investigation that the escapement must be moved, now is the time to displace the bridge a little; if the escapement is too deep, it must be moved from the scape wheel; in a reverse case, when the teeth seize too shallow, move the bridge closer. This may be done in a handsome manner by chamfering the foot-pin holes with a pointed chamferer, to bend the foot pins by one stroke in the room obtained between bridge and plate. The jewel hole is to be inspected next, that it has no fissures, and its hole be neither too wide nor too small, for which investigation insert the pivots and examine their shake; if they are of correct dimension and proportioned to the movement, but you find either that they have too much shake, or else are cramped in their holes, replace these latter by new ones. This is also necessary if you ascertain that the stone is cracked, or the hole has no good polish, or is too long, etc. The latter defect, viz , too long a hole, must well be taken note of, as often its inner faces are parallel and not olive shaped, thereby occasioning the watch to lose when in vertical position, because friction being greater in this than in a horizontal one.

A suitable jewel hole for the balance pivots must have a sufficiently large oil sink, whereby it is shortened and corresponds to the hole diameter, *i. e.*, becomes equal. If the hole under inspection is suitable in this respect, examine if it sits firm and straight in its setting. Should the stone stand too deep, and too great a distance exist between it and the jewel hole, turn the sink for the cap (or the cap jewel plate) deeper, so as to place it nearer to the jewel hole; there must always be a small space between both. Also file off the cap, in case it should stand back. Next put the cap plate on again, and should the screw serving for fastening protrude, shorten and round it, and put the bridge in its place.

Next is to be investigated if the cylinder stands straight, for which purpose test it, put the upper bridge upon it, and examine if the balance moves in plane parallel to the plate. Should the cylinder and balance stand obliquely, straighten them by suitably bending the bridge foot pins. Where the difference is great, this method cannot be used, and another one will have to be adopted.

If the regulator has not been located well, and consequently does not move concentric to the jewel hole, it is possible in odd cases, when a displacement of the jewel is necessary, to straighten the cylinder in the way indicated, and at the same time bring the jewel hole more to the center of the regulator.

If the regulator sits well, a displacement of the jewel cannot be recommended, because giving rise to difficulties with the balance spring. In such a case, remove both foot pins from the bridge, file its foot flat, and put in the cylinder in order to move the bridge in such a manner that the cylinder stands straight. Next drill a hole from the lower side for a new foot pin, in another place than the one previously occupied by the old one. Do not entirely drill through the upper bridge, in order not to disfigure it. Now take the bridge down again, cut a thread in its drilled hole, and insert a foot pin, (according to the English pattern), shorten it and round its end. The hole in the lower bridge next is to be sufficiently broached until the foot pin enters easily, but without shake; the cylinder again is put in its place and the bridge with the one pin is brought in its correct position, when the hole for the second foot pin is drilled, and this is inserted in like manner. The new foot pins will occupy positions one to each side of the old ones.

Should the case screw not permit the removing of the bridge, file its head smaller and widen its bridge hole toward the corresponding side.

When the foot pins have been located, secure the bridge in its place with shellac, fasten the plate in the clamp head of the universal tool, centering according to the thread in the lower bridge, and open the countersinking of the screwhead until the graver touches on every place; finally, a new screw with larger head is to be inserted. Pins are inserted into the old holes of the lower bridge, they having become useless; they are rounded off below, and filed flat above, to correspond with the bridge.

The necessity for such a work will not occur often, but it will be well enough to be prepared at all times, if it is not desired to bend the foot pins in such a manner as to leave almost no security for the firm position of the bridge, and at the same time they leave the imprint of a botch.

After having placed the bridge firmly, bestow your care upon the upper jewel hole. This is to he investigated in the same manner as already described; especially examine the size of the two jewel holes, as different sized holes also require different sized pivots, which gives rise to great difficulties in regulating the watch.

If the jewel hole stands too far backward from the upper surface of the bridge, or does not stand straight, the jewel must be taken out and the setting turned. If by very common watches the cylinder is too short, and the jewel does not sit sufficiently deep, countersink it a little, so that the cap jewel approaches closer to the jewel hole.

Inspect the regulator next; and it will be found to be capable of many improvements. First clean it of all filth and roughness, to prevent the scraping of the finger upon the bridge face. Locate it in place, and examine, while so doing, whether its screws draw well, and whether the finger moves with gentle friction, when the plate has been screwed down; should the finger move too hard, grind down its little plate on on the level somewhat upon the turning arbor; if too easy. grind down the little plate on its lower side.

Should both parts be badly executed, whereby the finger moves hard and easy by turns, it is best to open the regulator to let it assume an elastic property; for this, a place is chosen at the forepart, near the short arm; if it were split on the opposite side, the regulator would move easy to one side, hard to the other. For this purpose, it is opened at the corresponding place one-half, with the screwhead file; it is next laid upon a flat metallic face, a small chisel is set upon the incision, and the rim is opened by slight hammer taps. Nobody will call it botchwork, because even in the finest watches the regulators are thus split. Should the screws not draw, insert new ones; it may become necessary at this operation to anneal the little plate, in order to cut in a thread, they being ordinarily provided with very indifferent ones; the plate is retempered and polished anew.

If the under side of the bridge has a bad appearance by being filed off coarsely, or has rough edges, file and grind the offending places, until clean and smooth. If necessary, also retouch and polish its screwheads, to make its polished ends to correspond with the plate face.

(*To be continued.*)

Costly Clocks.

THE Philadelphia *Record* publishes an interesting article on the subject of quaint clocks, and how Mr. G. W. Childs, the distinguished philanthrophist, takes notes of time to the value of some $30,000. The writer says that when General Grant returned to Philadelphia after his great tour around the world, he brought to his friend, Mr. George W. Childs, a large hall clock, which he designed as a companion piece to two remarkable timekeepers then in Mr. Childs' possession—one had ticked for more than two centuries in an Austrian cloister, and had rung out the signal which daily roused the monks to their devotions; the other is the most complex and the most complete piece of time-measuring machinery that can be found in America. To look at these curiosities a reporter visited the private office of the *Ledger* publisher, on Sixth street, below Chestnut. The apartment is patterned somewhat after a room in Coombe Abbey, Warwickshire, which one of its lords had fitted up for the reception of Queen Elizabeth. The quaint open fireplace, high wainscoting, the plaster pendants of the ceiling, the Flemished stamped leather for wall papering, and the tile flooring are in perfect accord with the style and traditions of these massive timepieces.

Meantime a glance around the room revealed clocks in every place where such heavy articles could be put. On Mr. Childs' writing desk were three odd looking timepieces. On the top was a clock made with lapis lazuli case, one foot high and ten inches broad. Stone as it is, the clock case is worth more than its weight in solid gold, and is the highest priced article in the room.

Immediately below is an odd looking ornament, consisting of two uprights supporting wha· at first glance appears to be a ball, but which is a Japanese clock, the dial completely covering the front half of the sphere, and curious hands pointing out Japanese scrawls to denote the hours. The works inside rock like a cradle. There is a third clock on Mr. Childs' desk, an ornamental steeple clock, which is set in a stand, that indicates the day and date of the month.

Over the old-fashioned fireplace, where the grate is suspended by heavy iron crane, there is a basso-relievo, wherein a winged Cupid is depicted bearing an hour-glass, to typify the flight of time, while on the mantel immediately overhead is a bronze and marble French clock of beautiful design and exquisite finish, and of such fine workmanship that it does not vary hardly more than a minute in a year. It has a perpetual calendar attachment, and cost over $800.

On either side of the mantel, under life-size pictures of Messrs. Childs and Drexel, are clocks marking two periods in French history. One has a case of tortoise shell inlaid with bronze scroll work, such as was fashionable in the time of Louis XIV.; the other is in the Rococo style, which was popular during the time of Henry IV. The bronze case, nearly three feet high, is profuse in decoration of a debased style that succeeded the first revival of Italian architecture.

Above a huge ebony cabinet filled with curios of every variety, stands an antique English clock, with square ebony case It is very plain and very old, the seconds being measured by a verge escapement, which was supplanted more than 200 years ago by the pendulum.

Another expensive clock on the walls has a case of malachite ornamented with bronze. This is Russian work. The clock stands on a neat bracket of malachite and bronze, that was made in this country to Mr. Childs' order, at a cost of $250.

The glance around the room from desk, and mantel, and bracket, and cabinet, now strikes three hall clocks—the dearest treasures of the collector. The "convent" clock, which came from an Austrian cloister, is over 200 years old, is roughly made, and is exceedingly crude in its mechanism.

General Grant's present, sometimes known as the Grant clock, and often named the Klingenburg clock (after its maker, John Klingenburg, of Amsterdam), is of great value. But, precious as are these two timekeepers, they are commonplace as compared with the Rittenhouse clock, which occupied an honored corner in the magnificent office. For ingenuity, and accuracy, and beauty of workmanship, it is believed to exceed any clock in America. David Rittenhouse, a famous Philadelphian, after whom Rittenhouse square was named, made the clock in 1767, for Joseph Potts, who paid $640 to Rittenhouse. This timepiece was much sought after in the early days of the republic, 125 guineas having been offered for it by Lord Howe, when he was holding Philadelphia under occupation. Later on, the Spanish Minister to the United States wanted to make a substantial present to his sovereign, and offered $800 for this clock. It, however, fell into the possession of the Barton family, who retained it until it was bought by Mr. Childs in October, 1879. The intricacy of its mechanism is wonderful. It contains seventy-two wheels, with 5,685 teeth. It is operated by three weights, aggregating 100 pounds in weight. In addition to the timepiece it has a musical attachment, and a limited planetarium in miniature. On its face are six dials. The main dial in the center has four hands, indicating seconds, minutes, hours and days, the last being so set as to run perpetually, with due provision for leap year and all the other vagaries of the calendar. The phases of the moon are also shown. The second dial accurately represents the movements of Venus, Jupiter, Mars, Mercury and the earth around the sun, each of the planets being represented by a small gold ball that makes its orbital revolution around the central sun with wonderful precision. Thus far the gold ball marked Jupiter, has made only nine and a half revolutions since the clock was made—114 years ago. The rim of the dial is marked with the signs of the zodiac, thus showing the location of each planet.

Equally curious is the dial in the upper left-hand corner, which describes the moon's phases in its course around the earth. The moon is portrayed by a ball, half white and half black, which slowly traverses around another ball representing the earth, the moon being made to revolve on a pinion in such a manner as to give the correct view of it when in its various stages of reflection. The lower left-hand corner dial shows Saturn slowly crawling along its twenty-nine-year course around the sun. Another astronomical feature of the clock is its sun-dial, which shows sun time, fast or slow, in comparison with mean meridian time. The movement necessary for this dial is exceedingly intricate and rare. The sixth dial reveals a combination of chimes, which play at every quarter, half and full hour. A hand is turned to one or ten numbers, and when the quarter point is reached a peal of choral music is heard, lasting for a minute. A gentle push on a little knob on the dial brings a repetition, and the twenty tiny bells gush out their sweet melodies.

It was while the scribe was glancing at this astronomical wonder that the State House bell tolled out its heavy midday clang, and almost at the same instant a flood of music deluged Mr. Child's office. Each of the seven clocks, excepting the antique "English," struck the hour—the astronomical clock in deep, rich tones; the convent clock with a high tingling sound; the mantel clock with a softness that is characteristic of French timepieces; the Louis XIV. clock on a highly toned bell; the Rococo clock with a healthy, loud sound, and the lapis lazuli with a pleasing jingle. Then the chimes struck up, and for another minute sweet concord pervaded the room. The effect was thrilling. The products of two continents were brought into an array that pictured distinct successive periods of progress in handicraft and scientific attainment. It was a blending of times and peoples, of history and art.

These clocks in Mr. Childs' office could not be bought for any money. They cost over $10,000, while $30,000 will hardly cover the cost of all his clocks, numbering fifty, the others being divided among his summer house at Wootten, his Long Branch residence, and his mansion at Twenty-second and Walnut streets. Every room in each of these domiciles has its clock, and each clock has its peculiar merit. In the library at the corner of Twenty-second and Walnut streets is a heavy clock, rich in design and finish, that was once owned by Prince Napoleon; while in the parlor, between the two front windows, stands what is perhaps the most costly parlor clock to be found in the world. It weighs two tons, and stands nine feet high, onyx and verde antique forming a base two feet square and four feet high. On this pedestal poses a life-size figure in silver of a woman, her raised arm poising a circular pendulum which operates the machinery in the base. The clock has quite a history. It won universal admiration, as well as the grand prize, at the Paris exhibition of 1867, when Le Grand Lockwood bought it, after a sharp bidding with the Emperor of Russia, and placed it in his palatial home in Norwalk, Conn., where it remained until Lockwood's riches had been squandered, and the auctioneer mounted the block to sell off the effects for what they would bring. Mr. Childs had visited the place eleven years ago, when studying designs for his Walnut street house, and upon the announcement of the auction sale, the *Ledger* publisher went to Norwalk, and there encountered A. T. Stewart's agent in competition. The price was started by Mr. Childs at $1,000. Mr. Stewart's man bid $2,000, and Mr. Childs bid $3,000. Tapping the *Ledger* publisher on the shoulder, the representative of Stewart said, with surprised tone:

"Mr. Childs, I am bidding for Mr. Stewart."

"I can't help it," said Mr. Childs, "I want that clock."

"Four thousand dollars," exclaimed the agent, turning to the auctioneer.

"Six thousand dollars," said Mr. Childs, and to him the clock was sold.

Fire Gilding.

[*Concluded from No.* 11, *vol. XII.*]

MAT GILDING.

To obtain this color, take sulphate of iron, 2 parts; sal ammoniac, 20 parts; sulphate of copper, 1 part; saltpeter, 2 parts; verdigris, (cryst.) 2 parts, and triturate the different ingredients in a braying vessel, by damping it with a little good wine vinegar until it is a thick paste, which is put into a small vessel and diluted with nitric acid. This latter is applied upon the places of the gilding to be matted, and the article is laid upon a quiet coal fire, until it turns brown, but not black. When it has arrived at this stage, remove it from the fire, and anneal the piece in vinegar. A very handsome mat is obtained in this manner.

When these four colors have been given to the piece, it must be brushed well with a stiff and very clean bristle brush, using beer or vinegar, then rinsed and dried. We next come to the

WHITE COLOR,

which is easiest of all, because places intended to be white are scratched deep enough to remove the gold coating, letting the silver reappear. Next put the article upon the pitch-ball, and chase it with the matting punch, in a manner well known to every goldsmith. The green, red and yellow colors are only thus fully and most handsomely developed, when gone over with the matting punch. No further additions must be made to the matting, else it will lose its beauty, and places intended to be burnished with the steel, must, as a matter of course, not be touched with the punch. An article ornamentally gilt in the above manner has a very attractive appearance, to be seen in many pieces of Renaissance work.

A little advantage in fire gilding.—Every silver article before being gilt is glow-heated, boiled in pickle, and scratch-brushed, by which the article receives a very handsome, white, and neat lustrous appearance; but it is owing to this bright, lustrous surface that it requires more gold than a brass or pinchbeck surface of the same extent, the luster always shining through in the silver surface, while the other ones already contain a red or yellow tone. To remove this obstacle as much as possible, the gilder should seek to also give a dark tone to the silver, one easier to be covered by the gold. Proceed as follows: When the article has been ground ready for use, boil it in pickle, and scratch-brush, as usual, to make it very clean. Next dry well, and glow-heat again pretty strongly, to make it black; then quicken, as stated previously, and gild; you will find out that a great deal of gold can thus be saved. The common quickening water may show no disposition to adhere upon the black ground, wherefore I publish a separate recipe to prepare a

SPECIAL QUICKENING WATER,

to be used in connection with this work. Take about 40 grams of chemically pure nitric acid, pour it into an alembic, and add 20 grams chemically pure mercury; expose it to a moderate heat, blood-heat at most, and the solution will proceed well. When all the mercury has been dissolved, add about 10 grams distilled water, and scrape in about 1 gram of red chalk, which also add to the solution.

This quickening water will be found to take hold at once. After use, store the remainder in an even-tempered place.

I spoke at the beginning of my article of dipping brass and bronze objects; the operation may not be known to everyone, and at the conclusion I wish to say a few words about it. The pickle or fluid used for dipping, either consists of concentrated nitric acid alone, or what is better, of nitric acid mixed with from 10 to 20 per cent. sulphuric acid. The articles are dipped into this pickle, until they become bright, which change of color indicates that the oxide layer has been removed. When this brightening is observed, take out the article, and expose it to the air for a few moments, to let the acid operate a little longer; then rinse, best done by drawing the article to and fro in a vessel filled with water; it is next put into another vessel with water until it is to be quickened.

I believe I have described the method at length, to the understanding of everyone, and it will be easy for him to work by these instructions, and if he adheres to them he will not be wanting of success.—[P. H., in *Journ. d. Goldschm.*

Foreign Gossip.

Abolishment of Taxes.—A body of gold and silversmiths of London have handed a petition to Parliament for the total abolition of tax on gold and silver ware.

—German gold coins are all alloyed equally, containing 21 karats, 7.2 grains=.900; the alloy consists of copper alone. Some are colored, others are not. Of one pound fine are made 139½ 10-mark pieces. or 69¾ 20-mark pieces.

Time Ball at Antwerp.—Electricity is at present used to regulate marine chronometers. The hanseatic tower of Antwerp has been raised sufficiently to be seen in port, and connected by wire with the Brussels Observatory. From here, at true meridian, a current is sent, causing a time ball on the Antwerp tower to drop.

English Swindle.—Gold and silversmiths of London are cautioned against a plausible, good-looking fellow who goes around purchasing diamond and other rings, paying for them in gold necklaces and some cash. They are only partly of 15-karat gold, but chiefly of iron. "It was the good-looking young man who stole the spoons."

—Trade marks are as old as commerce. The ancient Babylonians already had symbols of proprietorship, and the Chinese pretend to have had them a thousand years before the Christian era. Guttenberg, the inventor of printing, had a trade mark process pending in court at the time of his invention. The English Parliament authorized them in 1300.

Thefts.—The *Schw. Uhmr. Ztg.* publishes a long list of watches stolen from time to time, amounting in all to about 300 or 400 francs—nickel cases, verge and cylinder escapements, etc. Alas, Mr. *Uhrmacher Ztg.*, the gentlemen burglars of this country would scorn to go gunning for anything less than $10,000 of tickers, and only then, if in 18-karat gold cases, regulated to the positions, etc.

—Professor Cohn, of Breslau, denies the assertion that the electric light is hurtful to the eyes; he maintains that it is beneficial, rather, to them. From experiments tried on color blind, it was ascertained that it assisted them to readily distinguish colors. In comparison with daylight, electric light increases the discernment of green and blue by double, the red by six times, and the yellow by sixty times.

—We see by the *Journ. Suisse d' Horlog.*, that the jury of the horological section of the Exposition of Zurich, Switzerland, will be composed of Messrs. Jurgensen, Locle; Piguet, Vallie de Joux; Francillon, St. Imier, and Favre-Perret, Locle. The *Journ. de Génève* contains a letter from the Secretary of the Exposition, stating that the absence of Genevan watchmakers in the list was caused by their tardiness in replying, whether they would accept or refuse the nomination.

Well-deserved Honor.—One of the most intelligent horologers of France, Aug. Leroy, has been named director of the Chronometrical Observatory of Caens; this institution was lately founded for the accommodation of ship captains, for the growing maritime interests of that city, who, during their stay in port, take their chronometers to this establishment, where they are observed meanwhile, gratuitously. We believe the gentleman is a son of that famous French watchmaker, Pierre Leroy, who was one of the brightest ornaments of the craft, contained in the same setting with Bréguet.

From 24 Florins to 101,000 Frs.—At a late art collection auction of the effects of Leopold Doublé, was sold a marble clock made by Falconet, at the sum of 101,000 frs. It was once bought by a renowned painter from a second-hand junk shop for 24 florins, cleaned up, and it ornamented for many years the *salon* of Mr. Manhaym. How this beautiful production ever found its way into a junk shop of Frankfort, would be interesting to know. Falconet (1716-1791) was one of the foremost art producers in France, and worked for some time for Empress Catharine of Russia. The clock is of white marble, and known under the name of La Pendule des trois Graces.

School of Horology at Geneva.—The Superintendent reports that during the scholastic year 1880-1881, at the 1st of July, there were in attendance 58 active sholars, of which 25 were Genevans, 13 Swiss from other cantons, 10 French, 3 Germans, 2 Spaniards, 2 Italians, 1 English, 1 American and 1 Belgian.

The school is to-day completely installed in its new building; and the Administrative Council have high hopes of its success. The latter have re-elected the original Committee of Supervision, for the term of two years, except our esteemed fellow citizen, Mr. A. H. Potter, who declined the honor, fearing that he might not be able to be present at its sittings; however, he promises the school his full moral support. He was replaced by Mr. Louis Martin.

—When we find anything particularly interesting in our European horological exchanges, we have to be very careful that it has not been culled from our columns without rendering credit, and translated. Several European exchanges thus increase their amount of reading matter, *ditto, ditto, several home journals.* Friends of The Circular have time and again sent us articles which they saw in Paris, or Berlin, or London jewelry journals, and were highly astonished when we turned up a Circular of a prior date containing the same article pilfered without due acknowledgement. The Circular, however, can afford to be magnanimous.

—We perceive from our St. Petersburg (Russia) exchanges, that the Empire has confiscated several invoices of Swiss gold watch cases. Russian laws, governing the standards, called *Solotnisk*, demand that 18-karat gold shall be stamped with 72, and 14-karat, with 56; silver, 875 parts fine, with 84; no margin is allowed to either one, arising from error of alloying, and the people had become so accustomed to these figures that they purchased the articles without further questions. The Swiss, relying on this confidence, debased the standard gradually down to the numbers of 50, 45—even down to 40, for gold, in a few instances still lower.

Tricky.—We read in a German paper, whether true or not, on the authority of an English horological journal, that the truck system has assumed such a magnitude as to leave the workman entirely demoralized thereby; it lowers the standard of honor of the trade, and leaves no profit whatever to the honorable manufacturer. We lately learned of a case where a manufacturer paid his workman with cloth, in place of money; but as the man did not know what to do with it, he offered it back to his employer at a lower price; the latter, however, was only willing to accept it at half price. The workman was satisfied, but—did not receive his share in money, but in shirts! When will our honorable manufacturers join together to find ways and means of suppressing such iniquity?

A Marvel of Art.—What a degree of perfection may be attained by patience, in horology, will be seen by the following description of a watch made by one Rébillier. It is entirely transparent; the case, the bridge, wheels, in fact, every part of the watch is of rock crystal, which, as is well known, ranks immediately after the main precious stones in hardness. The difficulty of working it will also be duly appreciated; and it almost surpasses understanding in what manner he wrought a ladies' watch so small as to serve for a necklace locket, or how he worked in the screw taps. The watch in question is a testimony of unremitting patience, and cannot be estimated in dollars and cents. M. Rébillier assures that it goes as correctly as a chronometer, but the present possessor does not desire to submit it to any violent tests, for fear of injury. The patient artisan intends to make a chain, key and seal to it, of a single piece of rock crystal.

—M. Pierret offers a first prize of 500 francs, to be competed for at the end of September, 1882, to any French watchmaker who shall have up to that date produced either a watch or a mantel clock. A prize of 300 frs. is equally offered for the second best production. These productions must either be distinguished by a new invention, or at least by a handsome and good execution. Watchmakers who desire to enter the competetive lists, will address him by the 15th of September, 1882, at Neuilly, Seine, 6 rue Ancelee. They are solicited not to give their names; the package must contain a number of four figures and four letters, and if necessary, contain an explanatory letter. On the 25th September, 1882, there will be inserted in the Petit Journal the numbers which have obtained the prizes; the parties interested will make themselves known to the editor of the *Revue Chronométrique*, 154 rue Saint Honoré, who will make a report, and publish at the same time the names of the two watchmakers.

Still they Come.—A Mr. Loessl, of Vienna, has patented a clock invented by him, by the name of "Autodynamic clock," (not to be mixed with the "perpetual" of A. V. Loehr, also of Vienna); this new mechanism needs no winding, and has no special motive arrangement. The motor is contained within, and is acted upon by the change of atmospheric pressure, which progresses at all times, and therefore the clock never can run down. Neither mercury nor fluids are contained within the movement, it consisting simply of solids throughout. In spite of the apparent irregularity of the propelling power, it is said that the clock is distinguished by a remarkable exactness of rate. The hour work is immediately driven by a heavy hanging weight within a pulley, and the functions of the chief motor power are solely directed to continuously sustain this weight at a proper fall height. The cord, on which is suspended the weight pulley, seizes upon one side into the hour work, upon the other into this automatic winding apparatus, which is always closed, and is an endless chain, moving in a circle. The regularity of rate is further assisted by a closely adjusted compensated pendulum.

Workshop Notes.

Hardening Drills.—Drills for goldsmith's use are best hardened in oil or sealing-wax, when strongly heated red hot.

Silver Solder.—Melt 4¾ parts fine silver, ¼ part copper, and 2½ parts brass under powdered charcoal.

Bending Glass Tubes.—Fill the tube with finely sifted sand, close both ends, and heat it over the flame of a Bunsen burner. It may thus easily be bent, without losing its roundness at the elbow.

—Turquoises which have become green, can in no manner be restored again to their original color. Books and periodicals sometimes contain recipes, such as boiling in wine, milk, etc., but it is all to no purpose.

Verdigris.—Copper, or its alloys, may be cleared of its oxydized spots by the application of spirits of sal ammoniac, wiping with silk paper. If the offensive places do not become cleansed at once, a second application will surely effect it.

Silver Wash.—To quickly silver wash articles of copper or brass, mix 3 parts of chloride of silver, with 20 of cream of tartar, in very fine powder, and 15 of pulverized table salt. Add sufficient water, and bray the mixture until it becomes a paste, which rub with a piece of blotting.

To Clean Rusted Steel.—The *Chemiker Ztg.* says that rusted steel can be perfectly cleaned by hard brushing with 30 gr. cyanide of potash, 30 gr. castile soap, 60 gr. pulverized and washed chalk, and water sufficient to make a dough; care, however, should be used in its application.

Cleaning Silver.—The simplest and quickest agent for cleaning silverware is the hyposulphate of soda. It operates rapidly, is cheap, and has not yet been proposed for this purpose. A rag or brush moistened with a saturated solution of this salt, quickly cleans heavily oxydized silver surfaces in a few minutes.

Transparent Signs.—To heighten the effect of the sign of a firm, a sign maker in Hamburg places colored or white glass splinters between two glass plates covered from within with a covered coating, except the necessary letters and figures, and the penetrating rays of light shine through the splinters and break in all the prismatic hues.

—To stain horn black, immerse it in a cold prepared solution of 120 parts mercury, 120 parts nitric acid, and 500 parts water, rinse it well after 12 hours, and put it for an hour or two into a solution of 15 parts sulphuret of potash and 500 parts water; next rinse. The color is unalterable, although simply upon the surface. To give horn a dark color, polish it with tin ashes and oil.

Gold Color.—1. Water, 150 parts; muriatic acid, of 22°, 10 parts; merchantable sulphuric acid, 4 parts; crystalized boracic acid, 2 parts.

2. Water, 150 parts; fluid muriate of alumina, 13 parts; crystalized sulphate of soda, 4 parts; crystalized boracic acid, 3 parts. To either of these mixtures 20 grains neutral muriate of gold in solution must be added.

Arguzoid.—This is the name of a new alloy coming from Glasgow. It is said to be far whiter than nickel plating, and can hardly be distinguished by the color from silver. Although 50 per cent. dearer than brass, articles made of it are cheaper than those plated or galvanized with nickel. The resistance to pressure of this alloy ranks immediately after silver, resisting 16 tons, while brass bears 10, and phosphor bronze about 14 tons. It stands equal to brass in ductility. The virtues of its resistance to temperature are at present under trial.

Galvanic Gilding.—Phosphate of soda, 60 parts; bi-sulphate of soda, 10, cyanide of potash, 1; chloride of gold, 2.5; distilled water, 1,000. The water must be divided into three parts: 1st part, 700 parts, in which the phosphate of soda is dissolved; 2d part, 150 parts, for dissolving the chloride of gold; 3d part, 150 parts, for dissolving the bi-sulphate of soda and cyanide of potash. The first two solutions are little by little mixed together, and the last is then added. For this gilding, to be heated to 40 to 55° R., use a platinum anode. and add fresh portions of the salts of gold when the solution is exhausted.

Influence of Curbpins.—A correspondent in the *Deutsche Uhm. Ztg.*, wishes to be informed of the reason of a watch gaining with the last few coils of the spring, and Mr. H. Sievert responds as follows: While taking the expression of "perfectly free of defects" with all due allowance, I am free to suggest to my worthy colleague that the arc of vibration immediately after a full winding is greater than with the last few coils; without the establishment of these premises, it is hard to decide what ails the watch. And I would seek the cause in the defective position of the balance spring between the curbpins of the regulator. If the balance does not find itself perfectly equidistant from both pins, while at repose, or, worse yet, touches one of the pins, it will, with smaller vibrations, be more subject to these curbpins, consequently will make quicker vibrations. It often, by a certain extension of the vibrations, leaves one of the pins, and for a certain time swings free of all impediment, therefore with less power. If this explanation is true, even only in part, the mentioned defect can be explained in a simple manner.

Solders.—Fine gold, 8 parts; fine silver, 10½; copper, 5½; or 13½ karat gold, 10 parts; fine silver, 5; zinc, 1; it is necessary, however, to say that the latter solder cannot be used for articles to be colored, and it is well to remember that any solder containing zinc cannot be used for coloring, as it turns black.

A silver solder not very hard of fusion consists of 1 part silver, and 1 finest alloy brass, or, 20 parts 12-part silver, 3 zinc; fine silver, 5 parts; fine alloy brass, 6; zinc, 2; this composition is very quick of fusion, but less malleable than those commonly employed, owing to its great percentage of zinc (20%).

Protecting Silverware.—Table ware and other articles of silver, solid as well as plated, invariably become tarnished if not used for some time, especially if stone coal is burned in the house or neighborhood, owing to the sulphur it contains. Such tarnishing, however, may completely be prevented by first heating the ware and afterward anointing it with a coating of collodion thinly diluted with alcohol, laid on with a camel's hair brush. This coating dries at once and forms a very thin, transparent film, which completely protects the silver, and which, if necessary, is quickly removed by hot water. The method is much used in English silverware stores, to protect the ware against tarnishing.

Mosaic Gold.—One pound pure tin is melted. ½ pound mercury which first has been heated in an iron spoon until it commences to smoke is poured into the molten metal, and stirred with an iron rod, when cold, a lump is found, which must be rubbed, and when reduced to powder, ½ pound purified sal ammonia, and ½ pound flour of sulphur is incorporated with it. The powder is then put into a glass alembic, this set into a glass capel, and fired little by little, until the sand is at a glow heat. After the cooling, the alembic is broken, and its upper layer within will be sal ammoniac, below zinnabar, and lastly the mosaic gold, in shape of a gold-colored glittering mass, weighing about $\frac{1}{12}$ more than the tin supplied.

To Produce a Greenish Blue Patina.—To produce a greenish blue partina upon copper, brass, bronce, and other copper alloys, Mr. E. Puscher, in *Kunst und Gewerbe* recommends to coat the article, brightened by pickle with a brush, with a solution of 1 part sal ammoniac and 3 parts carbonate of ammonia dissolved in 24 parts cold water. Heavier coats of patina are formed if instead of the water, tragacanth slime is employed for the solution of the ammoniacal salts. The patina already begins to form in ¼ hour, and is perfected in from 6 to 8 hours. A repetition of the coating makes the patina heavier, and handsomer of color, and a thin varnish of turpentine and copal lac contributes materially.

To Impart a Finely Ground Surface to a Glass Plate.—For this purpose, use a very fine sand, river, or what is still better, the sediment from a grindstone. Stir either of these in a vessel filled with water; after a few minutes, the upper half of the fluid will begin to clear up, and this part, containing all the finer parts of the agent employed, is dipped off with a watch glass. The glass plate to be treated is laid upon a damp cloth spread upon a table, and of the aforesaid fluid a sufficient quantity is put upon the plate, and the watch glass is used for rubbing, its convexity offering a firm hold to the fingers. In about ¼ hour a very nice satin-like polish is obtained; by rinsing with water you will satisfy yourself that the grinding has been uniform.

Improvement in Silvering Mirrors.—The old method of "silvering" mirror plates by covering them with an amalgam of tin and mercury, has been to a great extent superseded by the process of depositing a coating of real silver upon the glass, the metal being thrown down in a smooth film by adding oil of cloves or other organic substances to a solution of ammonia-nitrate of silver, retained upon the surface of the plate by a raised rim of wax or similar material. These silvered plates, although cheaper than those made by the old process, are inferior in luster, the latter having the "black" color which silversmiths regard as indicating perfection of polish, while the others are yellowish in cast, and a process has long been sought by which the brilliancy of the mercurial coating could be imparted to the cheap and durable silver film. This has at last been accomplished by chemical reaction. After the silver plating is complete, the film is flooded with a weak aqueous solution of the double cyanide of mercury and potash; slow decomposition takes place, and mercury is precipitated, which immediately amalgamates with the silver film. The result is said to be very satisfactory, the amalgam of silver being quite as brilliant as that of tin, and less subject to change; while the new process has the advantage of being readily applicable to the largest plates, which, by the ancient method of manipulation, could be treated only with great difficulty, if at all.

—The *Deutsche Uhrm. Ztg.* contains a short recipe for small watchmakers, who only at odd times are called upon to do gilding, watch-parts or other small articles, and by which the use of a battery is entirely dispensed with. It says, when wheels or other parts of a watch are disfigured by hard usage or hotch repairing, and the watch otherwise is in fair order, but would look better by being regilt, clean the parts thoroughly, grind and scratch brush them; next procure from a drug store or photograph material store, one part chloride of gold, and four parts cyanide of potash, dissolve the two together in boiling water, and the gold bath is ready; into this suspend the articles to be gilt by a thin copper wire, which is hung on a clean scraped strip of zinc, and leave it immersed for a few minutes, when the articles will be handsomely gilt in a simple manner.

ALUMINUM COATING.—An article may be coated with aluminum in the following manner: To a saturated solution of alum in water, add a saturated sal ammoniac in water, or spirits of sal ammoniac in small quantities, whereby a filling of alumina is produced. The precipitation is put upon a filter, and washed, next dissolved in a neutral solution of cream of tartar and potash, and the solution dissolved, the residue is re-dissolved in sulphuric acid, and put into a cool place where the solution crystallizes; these crystals are dissolved in water, and the fluid for galvanizing is ready. Cyanide of potash is not used. Any battery may be used for galvanizing, and either a rolled aluminum plate or a linen bag filled with alumina is used as an anode. The articles are cleansed in a very much diluted solution of potash or soda—a strong solution attacks and consumes the metal.

TO OBTAIN THE SILVER FROM PHOTOGRAPHIC WASTE PAPER.—Photographers simply endeavor to obtain the silver from the baths; the paper, also, may be made to restitute its percentage of silver. Take a Hessian crucible of a good size, fill it with the cuttings, and set it in a moderate coal fire so that it takes some time until it comes into glow heat, and when the paper contained in it is burned, throw in the remainder. When everything is consumed and the ashes almost burned white, add a few spoonfuls of anhydrated soda, and let the mass boil for about ½ hour by an increased fire. Remove the crucible and pour its contents in an iron pan, and when cold, empty it in a glass or porcelain vessel, and soften the composition with rain water, and rinse the undissolved silver well; next dissolve it in pretty strong nitric acid. The further treatment is that of nitrate of silver, in general.—[JEAN PFAFFRATH.

ANNEALING STEEL PARTS.—A communication to the *Deutsch. Industriel.*, contains the following paragraph, signed O. K. L. I experimented with steel, and wished to obtain on it a light blue. Pure lead melts at 315° C., and the same degree of temperature is necessary to anneal steel to light blue. I melted the lead, raising the heat a few degrees beyond fusion, and having ground the steel white, immersed it in the lead, and after having immersed the steel in it for a few moments, withdrew it and had a handsome light blue color. To keep the lead from oxydizing, fuse it under cover of powdered charcoal and soda or potash.

A similar method can be applied for annealing steel yellow, (at 230° C.) by substituting zinc for lead. It must be remarked, however, that the flame must be extinguished as soon as the metal has fused, a continued exposure to the heat would raise the temperature.

SUDDEN CHANGE OF RATE.—An interrogator wishes to know the cause for the sudden change of rate of a watch, and Mr. Sievert opines: Excluding the scraping of a balance, or the change of rate occasioned by the sudden bending of the pivots, whereby the escapement has become too shallow, the cause for the defect must either be sought for in too great an arc of vibration (occasional forcible banking produced by wearing, and by defects in the depthing), or in the change of the balance spring. It often happens that the latter glues together, by oil or filth, without at once detecting the occurrence, the jolt to a watch when opening it is often sufficient to disconnect the coils again. Also an adherence to the curbpins may occasion an accelerated rate. Springs with many coils favor such a condition very much, also the weak ones in ladies' watches. Perfectly pure benzine and a faultless condition of the regulator contrivance, as well as a position of the balance spring, as free from impediments as possible, will afford the desired redress. Of course, crampings of pivots and other constitutional defects must not be present.

ADJUSTMENT.—How may I know from the outside whether a watch has been adjusted or not?—CORRESPONDENT.

What a singular idea! As if it were necessary that each watch shall have been adjusted, before passing into the possession of the layman. Why, there are watches executed with such exceeding nicety and skill that one would be tempted to exclaim: "It were a pity if taken down, because watches of such quality which, of course, only emanate from the hands of an artist, when taken down, are exposed to the probable danger of not being put together again correctly by hands less skillful. Even a watch of lesser grade cannot be judged whether it has been adjusted, if it be clean in all its parts, except it contain a protruding bushing, to tell the tale that subsequent work has been done upon it—but how?—ALBERT JOHANN.

TO PRODUCE SPONGE GOLD.—Gold may be produced in a spongy state from alloys as well as ores, and the method is far cheaper than the usual one. After having separated gold and silver in the ordinary way by the application of nitro-muriatic acid, the solution, which may still contain copper, is driven off until the excess of nitric acid has disappeared. Now add a little oxalic acid and sufficient carbonate of potash to nearly dissolve all the gold as an oxide of gold with potash. Add plenty of oxalic acid, to over-saturate the mass, and put it into a quick boiling. The gold will deposit at once as a handsome yellow sponge, while the copper remains in solution. This sponge is next washed in hot water, and dried upon filtering paper. It may be gathered in the shape of rolls, rods and leaves, since it adheres easily under a moderate pressure. It may be used in this form by dentists for filling teeth, as a solder for platinum, and for the precipitation of amalgams.

DURABLE BRONCE COATING.—*Bottcher's Polyt. Journ.* contains an excellent recipe for providing wood, metal, glass, etc., with a very tenacious bronce coating. The procedure is as follows: coat the article to be bronced with a concentrated solution of silicate of potash, water glass of 30° B. When the article has been uniformly coated with the solution, with a camel's hair brush, powder it with very fine bronce powder, using a finely perforated box (like a pepper box) to apply it, and let it dry at a common degree of heat. The layer of bronce becomes so solid and adhesive that a subsequent washing with alcohol, ether, or water will not remove it, and this method is excellent for revamping mirror or picture frames which have become marred or tarnished by time or ill-usage, and also is susceptible of taking polish with a stone or steel. Glass, porcelain, wood and metals of all kinds may thus be quickly and handsomely embellished with a very durable coating.

DIFFERENT RECIPES FOR TEMPERING STEEL AND IRON.—Prussiate of potash, 1 part; carbonate of ammonia, 1; lard, 3; fish oil, 1.

$\frac{1}{20}$ part muriatic acid in a quantity of water gives an excellent temper.

For a good cementation: mutton tallow, 10 parts; olive oil, 35; resin, 5; sal ammonia, 2.

J. J. Perret advises, in his treatise published in Paris in 1778, the presence of mercury and nitric acid in all mixtures prepared for tempering.

To regenerate steel. Perret says that all animal substances are suitable, also many vegetable ones. A good mixture for the same purpose is, mutton, rape seed, and lamp black. Tallow and burnt leather are also very good.

Seltzer water gives a good temper for drills.

For surface tempering, either cutters, crown wheels, or other steel articles, two parts water and one oil. It prevents warping.

ANOTHER GOLD COLOR.—Take ½ pound alum, ½ pound dry cooking salt, and 1 pound saltpeter, which ingredients reduce to a fine state. The well united mixture is divided into four parts, each of which is boiled in half a pint of water. As soon as it begins to boil, 2 ducats (1 ducat—2¼ dwt., with 22 karat fineness) are placed red hot into the first part, and the boiling is continued until the mixture turns lemon color. Cool it with water, and take out the gold. In the same way, and with the same gold, treat the other parts, heating the gold each time; when done, mix all four together, let it stand for 24 hours, and the color is ready for use; the sediment, however, is useless.

To use it, red-heat the article, boil it in starch water, and rinse. The color is boiled in a stone vessel, and the article, tied to a thread, is suspended therein for several minutes. If the color is desired to be paler, scratch brush the article, and re-immerse; then take out, boil in clean water, and dry.

Business Notes.

L. Sauter, manufacturer of hair jewelry, has removed to No. 1 Maiden Lane.

G. E. Cloyes, formerly of Mantorville, has opened a jewelry store in Kasson, Minn.

L. Russell, of Bowling Green, Mo., will move about April 1st to Pittsfield, Ill., where he will open a jewelry store.

Keller & Untermeyer have commenced proceedings against a watch case manufacturer in this city, for an alleged infringement of patent.

W. H. Jones, formerly entry clerk for Aikin, Lambert & Co., has entered into a business engagement with H. Elcox & Co., as city salesman.

L. Borneman, manufacturer of diamond jewelry, will remove on April 1, from 169 Broadway to more commodious quarters at No. 19 John street.

Max Kuner, of Denver, Colorado, succeeds Kuner & Hauck, and will continue in the jewelry business at the store formerly occupied by the late firm.

Newell S. Lord, formerly of Kalamazoo, Mich., has entered into a business engagement with Messrs. Giles Bros. & Co., of Chicago, to represent them on the road.

William H. Ball and family, who have been sojourning in Florida for some time, have returned. Mr. Ball is much improved in health, and will return to business with his old energy.

Frederick Lauckhardt and Henry L. Romer, lately with P. Hartmann, have entered into partnership for the purpose of manufacturing and importing gold and silver filigree jewelry. They are located at 75 and 77 Nassau street.

E. W. Reed, of Fort Collins, Col., owns a very attractive store, and has as clean a stock of jewelry as can be found in that state. He is a pushing, enterprising, business man, and enjoys the confidence of the community in which he lives.

Waterman & Lehmann announce that they have formed a copartnership for the purpose of conducting a manufacturing jewelry business and the importation of diamonds. Both the gentlemen were formerly in the employ of Messrs. A. Bernhard & Co.

The E. Howard Watch and Clock Co. have leased the ground floor of the store under Randel, Baremore & Co., Maiden Lane and Nassau street. It will be fitted up in a substantial and attractive manner, and will be ready for occupancy in the early part of May.

F. A. Kennedy, for several years in the city department of Aikin, Lambert & Co., of this city, has bought out the jewelry department of James E. Spencer & Co., at No. 13 Maiden Lane. Mr. Kennedy will occupy a portion of the store, and keep a full line of attractive and desirable goods.

Albert Friedenthal, manufacturing jeweler, and Salomon Kohn, manufacturer of morocco cases, have combined their business interests. The jewelry branch will hereafter be conducted under the firm name of A. Friedenthal & Co., at No. 43 Maiden Lane, and the case manufactory under the name of S. Kohn & Co., at No. 15 John street.

Messrs. Simons, Bro. & Co., of Philadelphia, in consequence of the growing importance of their diamond trade, have sent Mr. John F. Simons and Ernest Kritzmar, the well known diamond expert, to Europe, in search of novelties to supply orders from customers. This firm has a branch establishment in San Francisco, and have recently despatched an agent to the Sandwich Islands with samples of their goods. Energy and enterprise are characteristics of this firm.

The firm of Hale & Mulford has been dissolved by mutual consent, Mr. L. J. Mulford retiring on account of ill health. Mr. Mulford has long been identified with the jewelry trade, has always been a hard worker, and will now take a much needed rest. Mr. S. W. Hale has admitted to partnership in the old business, William A. Lee and Willis H. Howes, and the firm will hereafter be known as S. W. Hale & Co. The new firm will liquidate the business of Hale & Mulford.

The firm of Dinkelspeil & Nordman, of San Francisco, Cal., is dissolved by mutual consent. Phelps & Miller will collect all outstanding credits and pay all debts of the late firm. Joseph Nordman, of the late firm, has associated with him his two brothers Isidor and Leon Nordman, who will continue in the same business under the firm name of Nordman Brothers, and occupy the old room of the late firm, while Mr. Dinkelspeil will open a similar establishment in room 23, same building.

Trade Gossip.

Sapphires are fashionable for engagement rings.

Serpent bracelets in silver and silver gilt are very fashionable.

Small screw earrings remain the favorites for very young ladies.

American pearls are cut in grotesque designs for gentlemen's scarf pins.

Necklaces, when worn at all, must be high and close around the throat.

Bangle bracelets large enough to slip over the hand are no longer in vogue.

Yellow diamonds are again sought after and are growing in public favor.

Diamond flowers and stars on quivering stems shine in full dress coiffures.

An odd but attractive brooch is a cock's head in pink and white diamonds.

The sunflower, with a heart of very dark topaz, is one of the latest novelties in jewelry.

Snake bracelets are still popular; many beautiful specimens are offered by the manufacturers.

The boys on the road say that it takes a great deal of small talk to sell a large bill of goods.

J. Cleft's jewelry store, at Lynchburg, Va., was recently destroyed by fire. Loss said to be covered by insurance.

The sunflower and the tiger lily are the favorite floral ornaments for the lately introduced straw fans from London.

Mr. C. Billings, of Messrs. Randel, Baremore & Co., diamond importers, sailed for Europe in the *Servia*, which left this port March 1st.

Mr. James Hedges, of Messrs. Wm. S. Hedges & Co., diamond importers, sailed March 1, in the *Servia*, on his semi-annual visit to Europe.

Geo. F. Jones, an apprentice in the employ of B. J. Price, of Shamokin, Pa., has been arrested for making too free with his employer's cash.

Sinnock & Sherrill have taken the store on the second floor of No. 3 Maiden Lane, now occupied by Fritz Mathez, and will occupy the same about May 1st.

Charles Bichman, a well-known jeweler of Pomeroy, Ohio, died of small pox recently. His daughter, the wife of Mr. Loepfert, with Duhme & Co., died of the same disease.

A somewhat pretty and well-dressed young woman has visited several of our diamond houses, under circumstances calculated to excite suspicion as to her real motives.

N. M. Weiss, of the firm of Marx & Weiss, was married February 14, at Chicago, to Miss Henrietta Oppenheimer, daughter of Henry Oppenheimer, a well-known jeweler of that city.

The most decorative stone, as well as the most fashionable, is the ruby. Colored pearls are in great demand, and green, black and bronze ones are used with diamonds in artistic jewelry.

Mr. D. Valentine, of Syracuse, N. Y., has disposed of his business to Messrs. Joseph Seymour, Sons & Co., and on the evening of February 11th gave a farewell dinner to his late employés, at the Globe Hotel.

At a recent meeting of the New York Jewelers' Club, the committee on by-laws submitted their report, recommending their complete revision. The report was accepted and the new by-laws ordered to be printed at once.

W. E. White & Co., manufacturers of fine rolled-plate goods, have introduced a new line of bracelets mounted in garnet, turquoise, and white stones. These goods are exquisite in their ornamentation, while their chasing is unexcelled.

Messrs. L. & A. Mathey and F. L. Mathez have joined forces by entering into a co-partnership, to take effect April 1st, 1882, for the importation of Swiss watches. We wish these gentlemen continued prosperity in their new business relations.

James H. Hildebran, of Mercer, Pa., recently fled from that city, and his stock of goods was sold by the sheriff, in the interests of creditors. Mr. Hildebran had purchased goods to a considerable amount, of New York, Philadelphia, and Pittsburg merchants, with the evident intention of defrauding them. After his flight a portion of the goods was found in a corn crib, and part in boxes in his father's barn. The present whereabouts of Mr. Hildebran are unknown.

Wide bands of black velvet are worn close around the throat. One of the mode pins for bands of this kind is a sunflower studded with diamonds, which surrounds a black pearl, an exquisite little ornament, worn directly beneath the chin.

An investigation of the recent failure of L. Ollendorff, of this city, by D. L. Safford, shows the following: Liabilities, $11,795.21; assets, nominal, $11,843.60; real value of assets estimated at $6,179.07. An offer of forty cents has been submitted to the creditors and its acceptance recommended by Mr. Safford.

Peter B. Simons has retired from the firm of Simons, Bro. & Co., the well-known jewelers of Philadelphia, and has purchased their branch establishment in San Francisco, which will hereafter be conducted under the firm name of Peter B. Simons & Co. The firm name of Simons, Bro. & Co., of Philadelphia, will remain unchanged.

Mr. Samuel F. Myers, of S. F. Myers & Co., will, in the latter part of March, lead to the hymenial altar, Miss Bertha Adler, daughter of Mr. Leopold Adler and neice of Louis Strasburger, Esq., all of this city. The many friends of the young people will unite in expressions of good will and hope for their future happiness and prosperity.

During the past few years there has been a demand for jewelry appropriate especially for Easter. Messrs. Aikin, Lambert & Co. have introduced a watch charm in the form of an extension pencil, issuing from the top and bottom of an ornamental egg. This idea is not new; its application to a variety of designs, highly ornamental, will render it popular as an Easter offering.

The Mackinnon Pen Company recently commenced proceedings against John Foley, the well-known gold pen manufacturer, for an alleged infringement of patent. The case was brought to trial, when a decision was rendered in favor of Mr. Foley, he having submitted evidence to show that he had introduced valuable improvements in the pen and reduced the cost about one-half.

Many new freaks in jewelry were devised during the great time of present giving. A note of interrogation in diamonds is a winning brooch for the "layde fayre," who may well ask "What next?" Such an idea once started, we shall expect to see commas, semi-colons and periods following in the rear; asterisks we have already, and why should not the curly bracket be copied in gold for a shawl pins?

In fancy jewelry, black velvet dog collars are worn, dotted with pearls, diamonds, and fine flowers in colored stones. Young ladies also have these necklaces ornamented with antique coins. Dead gold ornaments are used on different parts of the toilet. Parures are thus made of detached flowers, mounted to form bouquets and garlands, to be placed on the shoulders and different parts of the dress.

Three men recently entered the jewelry store of Ralph Davis, Albany, N. Y., ostensibly to purchase silverware. While Mr. Davis was exhibiting his goods in the rear of the store, one of the three men slipped behind the counter, and decamped through the doorway with a tray of diamonds, valued at over $5,000. His confederates escaped through a rear door. Three professional sneak thieves, well known in the west, have been arrested by the police in this city. They have been identified by Mr. Davis, and were taken to Albany for examination.

The show window of Thos. Leggin's jewelry store, No. 1209 North 11th street, Philadelphia, was smashed in on the evening of the 3d ult., and some $4,000 worth of diamond goods and other jewelry stolen therefrom. One of the thieves held the store door while the other reached through the aperture in the glass and made off with the goods. A day or two afterwards, Perry Burns, alias McCoy, and Alexander Harrison or Henderson, alias Snatcher, were arrested and held in $2,500 bail to answer. Snatcher, it will be remembered, was sent to Joliet prison by the Jewelers' Protective Union, for complicity in the Max Freund & Co. trunk robbery.

Myer Rubenstein, a Paterson (N. J.) jeweler, has worn a three-hundred-and-fifty-dollar diamond pin for the last 32 years. On Sunday last he lost it, as he supposed, while in the cellar, but the closest search failed to disclose its whereabouts, although everything in the cellar was thoroughly overhauled, and several barrels of onions were emptied and each onion examined. Yesterday morning, Mrs. Rubenstein, while sitting in a chair in the store, fell asleep. In her dreams a young girl, somewhat resembling her own daughter, appeared to her and seemed to say, "You'll find pa's pin in the second barrel of onions." Mrs. Rubenstein awoke and immediately went down in the cellar, and from a barrel of onions which she overturned, there rolled out some decayed onions, in one of which lay the diamond pin, firmly imbedded in the soft mass. They now believe in the efficacy of dreams in the Rubenstein family.

Professor Waldo, who has charge of the Yale Horological Bureau, has just returned from Europe, where he has for the past year and a half, been having a $10,000 heliometer constructed. It will be the only one in this country. It has a telescope about eight feet long, and is expected here in March. In December it will be used to observe the transit of Venus. The heliometer was invented in the last century. Eight years ago it was used with excellent results in the observations of the transit of Venus.

J. Freulich, of Chicago, is said to have confessed judgment to a number of relatives, to the extent of $15,640.33, on the 20th of February, and is reported to have died on the morning of the 21st. The names of his preferred creditors are Simon Glickauf, $1,737.43; Sarah Freulich, the deceased's wife, $4,471.99; Mrs. J. Glickauf, $5,250, and L. Glickauf, $1,030.91. The judgment notes are dated February 20th, the day of confession of judgment, and are said to have been entered up late on the afternoon of that day. The majority of his creditors are reported to be eastern houses. The amount of the deceased's liabilities has not been made public.

The lily is reproduced in silver, with a pearl to represent the tear drop of an æsthete, or, if you like better, a dew drop. Flowers made of precious metals and stones are becoming fashionable on account of their warmth of color. They are actually diminishing the fancy for diamonds, because the latter are too cold in appearance when contrasted with the ruby's glow, the emerald's depth, or the intensity of the yellow topaz. A popular flower in jewels now is a corn flower in blue enamel with a heart of sapphire. Emeralds set in the fashion of a cross show well against a delicate hand, and rubies add to the whiteness of a wrist by contrast. A novelty in jewelry now is the wishbone of childhood, carved in silver and gold, and heavily inlaid with precious stones.

Marine tendencies crop up here and there in the silver oyster shell purse, dangling from the plush waist belt, and the wee plaice and mackerel which do duty for brooches, every line and tinge of their phosphorescent skin being cunningly imitated in the metal; almost true to life, though so tiny, one might say—but stay, here is something more realistic still—miniature lobster claws in coral, mounted as earrings. Oh, the quaint conceit of an unbridled fancy! The animal world is just as conspicuous, though perhaps not so vulgarly large as in former seasons; a mouse perches on a pole, but it is a pretty little mite in pebble, and it chases a diamond; fighting frogs appear on a brooch, but the pair of them might lie on a ten-cent piece, and their irridescent coloring makes one quite pardon their clumsy forms.

A very skilful and successful robbery was perpetrated on the evening of the 8th ult., at the jewelry store of B. H. King, Buffalo, N. Y. A man entered the store, and handing Mr. King, who was alone in the store, an old-fashioned English gold watch, asked him to examine it with a view to determining what repairs were required. Soon after, two more men entered, who conversed in a friendly manner with the first one for a few moments and then went away. The other one said he would leave his watch and return in the course of twenty minutes, after which he took his departure. Soon after, Mr. King's son came in and discovered that a tray, containing twelve gentlemen's gold watches and one lady's chatelaine chain, valued at $1,500, which was in a show case near the door, was gone. The method of the robbery was easily disclosed. While Mr. King was examining the watch at the work bench, and one of the three men was talking to him, another opened a little gate leading behind a counter on the other side of the store, slyly opened the show case, and, removing the tray, passed it to the third confederate. No arrests have been made.

Mr. Bryce Wright, a well-known London diamond expert has lately received a very remarkable historical stone. Previous to the fall of Delhi, at the time of the Indian mutiny and the looting which subsequently took place, this ring was kept in the treasury of the Mogul emperors of Hindoostan, where it had been preserved for many years. The ring itself, and the back of the oval, shield-shaped table which is affixed to it, is most beautifully enameled with a floriated pattern in red, green, blue and yellow, on a white ground, the whole set in an Indian gold framework. The face or upper surface of the table is composed of a floral or foliated design in green and blue enamel, having for its central ornament an engraved diamond, surrounded by twelve others varying in size. The interest of the whole work centers upon this stone, it being one of the very few known diamonds that are cut or engraved. Indeed, only about five are in existence, and of these it should be said that the European ones are more properly ground by the wheel than engraved by purely manual labor. The stone is the work of a Persian artist, and bears a monogram composed of two Arabic words interlocked together, making up the invocation, "O Ali!"

THE

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THE

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The Æsthetic Craze.

THE Oscar Wildes and Bunthornes who have inaugurated in England an idiotic craze for what they term "the æsthetic in art," and whose followers worship sunflowers and apostrophize the virtues of the lily, have much to answer for in the future. Without any reason to guide them, they have, to a considerable extent, diverted attention from art works of real intrinsic value, and concentrated it upon cheap and tawdry works that have nothing to recommend them but their ugliness and alleged antiquity. This craze has been developed to a considerable extent in this country, though, to the credit of the good sense of our countrymen and countrywomen, they have refused to fall down and worship the Wildes and Bunthornes in their knee-breeched and long-haired persons, or to pour their gold into the pockets of these æsthetic imbeciles. There has grown up through this craze a demand for old and ugly plaques, for ancient and dilapidated china, for hideous vases, for ornamentation that is only remarkable for the awkward and repulsive forms it assumes. *Lady Jane*, in "Patience," with her dress decorated with storks, lizards, frogs, sunflowers and lilies, scarcely exaggerates the absurdities in dress and ornamentation that are assumed by the genuine worshippers at the shrine of æsthetical idiocy. Of course, this craze has some effect upon the jewelry trade, for manufacturers have the good business sense to supply whatever there is a demand for, and, consequently, we have had sunflower and lily jewelry, lizards and frogs have appeared upon a background of gold, while many retail stores have fairly blossomed with hideous vases and cracked pottery. To goods of this character there is little intrinsic value, but the fictitious prices put upon them have left an extraordinary margin of profit to manufacturers and dealers in them. But the trade in such goods is precarious, and even the temptation of large profits should not induce dealers to go into it extensively. The æsthetic craze is bound to be short-lived; there is too much good sense in the community to allow of its becoming far extended. It is an epidemic that can be taken by those especially exposed to it, but one that runs its course in a very brief period. It may be classed among the "isms" that spring up frequently, have their day, and then disappear, leaving to shame and sorrow those who were their zealous advocates. Already the æsthetic idiocy is on the wane in England, and some who were most pronounced in its advocacy are now "unloading" their accumulations of æsthetical art works upon new and verdant converts. It is merely a question of time when it will die out in this country, and those who have loaded themselves down with æsthetical trash will be glad to get it out of their sight, by consigning it to the rubbish heap or the ash barrel.

Goods recognized as "purely æsthetical" are not to be confounded with such as come under the generic head of bric-a-brac. This latter head embraces small articles beautiful and artistic in form, design or workmanship, or possessing some special historical interest. They have intrinsic value, and there is always a market and a demand for them. This demand increases in a community corresponding to its accumulations of wealth and its education in matters pertaining to true art. As refinement and culture are developed in the human mind, the eye delights in works of art and vertu, and the purse is opened to supply its requirements. The traffic in genuine art works is bound to increase from year to year, and there is here offered an abundant field for jewelers to harvest. This is their legitimate vocation, from which they should not be diverted by the ephemeral crazes that spring up occasionally in their line. Æsthetical broken china and outlandishly decorated vases have no place among true art works, and should be avoided, or, if handled by the trade, done so sparingly and with caution, above all, they should not be allowed to crowd out goods of intrinsic value. Overstocking with such trash is one of the worst things that could occur to a dealer. Panics come upon the country with periodic regularity. Suppose a panic to come and find a dealer largely stocked with æsthetical stuff, what would be his outlook when his stock came to be measured by the standard of value created by a forced sale? Handled with extreme caution, a precarious profit may, for a short time, be made upon goods of this character, but the stock on hand should be exceedingly limited at all times. The æsthetical craze is a frenzy of the moment, and will soon disappear before the inherent common sense of our people as biliousness is dissipated by a dose of calomel.

Congress and Commercial Travelers.

A BILL which was introduced in the House a day or two ago by Representative Brewer, and is now before the Judiciary Committee for consideration, is of great interest to all wholesale merchants, manufacturers and others, who employ commercial travelers to sell goods by sample. The bill is simple in its provisions, but at the same time far reaching in what it seeks to accomplish. The bill is one which prohibits any State or municipal corporation from interfering in any way with any commercial traveler, selling goods by sample, wares and merchandise of any kind, who may be traveling in a State other than the one in which the merchant or manufacturer does business for which said traveler is acting, and providing that any officer who shall thus interfere shall be deemed guilty of a misdemeanor, and be liable to indictment before the United States Grand Jury in the district in which the interference occurs; and if convicted shall be liable to pay a fine not to exceed $100, or three months' imprisonment in jail, or both. Should this bill become a law, as we hope it will, it at once puts an end to all special taxation in the form of licenses or otherwise, now imposed by several States upon commercial travelers who sell goods by sample. THE CIRCULAR has frequently called attention to the obnoxious features of these State laws, imposing upon commercial travelers what is popularly known as the "drummer's tax." We have pointed out that it was not only a hardship upon our merchants, but upon those for whose protection the laws are supposed to have been enacted, inasmuch as it deprived them of the privilege of buying some of the most desirable goods by sample, and imposed extra cost upon those they did buy. Most of these obnoxious laws are found in the Southern States, and quite a number of our Northern manufacturers have refused to send their salesmen into those States because they would not submit to the outrageous impositions of these laws. Those travelers who did submit to such special taxation always added it to the price of their goods, so that, in reality, the burden of this "tax upon drummers" fell upon the local merchants after all. Nevertheless, it was obnoxious to Northern merchants, subjecting their travelers to innumerable delays and annoyances. A national law prohibiting this form of State taxation will be a boon to the commercial community. We do not know that such a law is really required to prevent the enforcement of State taxation as referred to, for the Supreme Court held recently that such State laws were unconstitutional. It is not probable, however, that every cross-roads justice of the peace, and every town constable, is familiar with that decision, and they would go on levying the tax upon travelers and enforcing fines for its non-payment in spite of the Supreme Court. An enactment by Congress will serve, no doubt, to enlighten them as to their duties, and compel them to keep hands off

Should Congress pass the bill referred to, that fact will have a more important bearing than is apparent upon the surface. It will be a declaration on the part of that body that it is less subservient to the State rights doctrine than heretofore, and more inclined to extend its protection to inter-State commerce. If it does so in one instance, it can do so in others. If Congress holds that inter-State commerce is a proper subject for legislation, then it can legislate for the preservation of the integrity of that commerce. It can assume to say that plaster of Paris is not flour, or that white metal is not gold, and it may prohibit manufacturers of fraudulent and bogus goods shipping them from one State to another. It may go further, and prescribe a standard for gold goods, and declare that goods that will not assay twelve karats are not gold, but base metal, and that their sale as gold goods is a fraud, punishable by fine and imprisonment. All this is possible to Congress if inter-State commerce is deemed worthy of national legislation. We have maintained in these columns, in discussing the power of Congress to establish a standard for wrought gold, that the constitution conferred upon that body the authority to so legislate in that clause which gives to Congress the authority to "regulate commerce between the States." In the famous case of Paul *vs.* The State of Virginia, the court maintained the right of the State to regulate its internal affairs, and this has been construed as prohibiting Congress from legislating relative to inter-State commerce. But in the more recent decision by the same court, in a case against the State of Virginia, it was decided that no State had a right to impose a tax upon manufacturers, residents of other States, that was not shared equally by home manufacturers. This has been construed as showing more advanced ideas on the subject of commercial intercourse between the States, and as indicating that the court would uphold any reasonable legislation to secure to merchants and manufacturers equal rights in all the States. If, therefore, Congress assumes in one instance to "regulate commerce," by prohibiting special State taxation of commercial enterprise, it may yet assume to legislate for the preservation of the integrity of all factors that go to make up commerce, and to prevent the degradation of their quality.

The Proposed Bankrupt Law.

THE bill to establish a uniform system of bankruptcy throughout the United States, agreed upon by the Senate Judiciary Committee and reported to the Senate, will, in its present form, hardly come up to the standard required by the advocates of a National Bankrupt Law. Besides being apparently drawn rather in favor of the debtor than of his creditors, it leaves to the Supreme Court the duty of fixing all fees and costs for services. In this respect the bill is really incomplete.

The clause providing that the bankrupt may retain such portion of his estate as is exempt from execution under and by the laws ot the state where he resides, is in direct conflict with the title of the bill, which proposes to establish a "uniform" system of bankruptcy, etc.

We are aware of the fact that the question of exemption is a very delicate one, but we believe that in so far as the trader is concerned, a uniform exemption, irrespective of state laws, is an imperative necessity. This exemption can as reasonably be made uniform as a standard of value is uniform throughout the country. The Senate, in its discretion, and with a proper consideration of the subject in all its bearings, will most likely make the exemption uniform, putting it as high or as low as justice demands. But, high or low, it should, when applied to insolvent tradesmen, be "uniform" throughout the country; otherwise gross inequity and unjust discrimination will be shown to insolvent debtors, varying according to locality.

The new bankrupt law should be inexpensive, and the expenses attached to the proceedings should be clearly defined and form a part and parcel of the bill, and be fixed by Congress—not by the Supreme Court. The services of the receivers, clerks and deputy clerks should be paid for in fixed salaries—fees should be abolished. The simplification of legal proceedings should, if properly defined and enforced, reduce the expense of bankrupt proceedings very generally. The new bill, as it comes from the Judiciary Committee, obviously opens the door to possible fraud. Fraudulent debtors will take dishonest advantage of its provisions, unless safeguards are set up against such an abuse. We know very well that all the legislation in the world cannot transform a knave into an honest man; but, happily, it can do something by appropriate penalties to circumscribe the operations of the knave, and to extend to the creditor a protection which it is idle to look for from conflicting and loosely drawn state laws, even when these are administered without local partiality or prejudice.

It is to be hoped, therefore, that the Senate will address itself to the duty of framing from the present bill such an "uniform" act as will remedy, as far as possible, the defects of the statute repealed some three or four years ago, and place the relations of creditor and debtor upon such a basis as will relieve the former from the disadvantages of his position as it stands to-day. We know of no higher duty devolving upon the Senate than that it should at once vigorously address itself to this task, and discharge this duty to the best of its ability.

The Guild Stamp.

SOME two years ago the United States Guild of Retail Jewelers and Watchmakers resolved to adopt a stamp of value, to be impressed upon goods manufactured especially for the use of members of the Guild or of State Associations of retail dealers. This was to be a stamp of value, corresponding to the Hall-mark in England, and to be recognized as a certificate of quality. At the time, we favored the adoption of such a stamp as being, in the absence of a national stamp of value, the nearest approach to a responsible certificate that could be obtained. Manufacturers of all kinds of goods handled by the trade have been invited to negotiate with the Guild, relative to adopting this stamp, and supplying the Associations with goods guaranteed to be of a standard quality and bearing the stamp. A silver-plated ware manufacturing company at Racine, Wisconsin, seems to be the only manufacturing concern to respond to this invitation, and they have made a contract to manufacture certain lines of flat goods upon which this stamp is to be impressed; the goods are to be of a quality equal to the best "triple" plate in the market; they are to be sold to none but members of some State Association in good standing; and the company puts up $1,000 as a forfeit in case the terms of the contract are not complied with upon their part. It is to be regretted that it was left to a small and comparatively obscure company to make this experiment with a stamp certifying to quality, under the auspices of a National Association. Some of our well-known manufacturers of the east, whose reputations are already established, and who have no occasion to use the organizations of retail dealers as advertising mediums, should have fallen in with the idea at once, and made a thorough test of its utility. With their facilities they could have soon demonstrated satisfactorily whether or not the proposed plan is likely to benefit the trade in general, while a company that doles out its goods in driblets can scarcely be relied upon for a satisfactory trial of the experiment. However, the opportunity is still presented for other manufacturers to make similar arrangements with the Guild for the production of other lines of goods, which will then be offered for sale throughout the west, with the endorsement of the various Jewelers' Associations, as well as of the United States Guild.

We apprehend that the members of the trade in the east do not appreciate the importance of the western State Associations of retail dealers. No such organizations are to be found east of the great lakes, but in eight or ten of the western states they exist and flourish, embracing in their membership large numbers of dealers of those states. These associations were called into being to combat certain abuses that had crept into the trade, such as flooding the country with price lists and catalogues, and selling goods to persons outside the trade at wholesale prices, thus robbing the dealer of the advantages that dealers in other sections enjoyed. By the united action of these State Associations, these abuses have in a measure been broken up, and now they are devoting their attention to those still greater evils, the debasing of goods and misrepresentations as to their quality. As a step in this direction, they have adopted the Guild stamp, and every dealer who handles goods so stamped will not hesitate to warrant them as being of the exact quality represented. Members in good standing of State Associations are the only ones who can purchase these goods, and they will not fail to let the public know that they are endorsed by the Guild and several State Associations. This cannot fail to give them an advantage over their competitors who are not members, and whose stock is not so stamped. As yet this stamp has only been applied to certain lines of flat silver plated goods. It would be a stroke of enterprise for some eastern manufacturers to make arrangements to supply the western associatiations with other lines of goods so stamped, and, by this means, give the new experiment a thorough and practical trial.

But the Guild, backed as it is by a number of State Associations, has it in its power to perform a still more important service to the trade than any it has yet done, and that is by demanding Congressional legislation that shall prevent the manufacture and sale of bogus goods. The honorable members of the trade in the east will unite in this effort, and the United States Guild, with the influence it now possesses, is in a position to demand of Congress the needed legislation. What is required is a law declaring that pure gold shall be recognized as twenty-four karats fine; that goods less than twelve karats fine shall be made and sold as base metal only; that any misrepresentation as to quality shall work a forfeiture of the goods, and subject the person so misrepresenting them, to fine and imprisonment, that every bill of goods shall specify the quality of each article in karats, such bill to be regarded as a warranty of the goods, and accepted as *prima facie* evidence of fraud when the goods named are of an inferior quality to that mentioned in the bill. With such a law to regulate the quality of wrought gold goods, there would at once be an end put to the numerous frauds now perpetrated by unscrupulous manufacturers and dealers. The Guild, and the various State Associations can devote themselves to no more important work in the future than to securing the passage by Congress of such a law, regulating the quality of wrought gold goods.

The Trade in Precious Stones.

IN THE year 1871, precious stones to the value of $2,346,732 were imported into the United States, of which $2,283,350 were received in this city. In 1880, the value of these imports was $6,698,488, New York taking $6,294,392. Last year, gems to the value of $8,332,511 passed through the Custom House, $7,884,739 being for the New York market. It is the general opinion of the trade that the importation of precious stones will be steadily on the increase. Even now the New York market is one of the greatest in the world, and the very large increase in the importations is due to this one fact: the masses purchase all kinds of precious stones, and in no other country but America do working people own such valuable gems. The country was never in a more prosperous state than at present. One of the proofs of this is the increased demand for valuable jewels. Diamonds, rubies, cat's-eyes, sapphires, opals, onyxs, carbuncles and other valuable stones are now being sold at the rate of six to one as compared to the year 1871. In America, a retail customer can purchase gems much cheaper than in any European City. This is due to competition. The masses here purchase the jewels, whereas abroad, the trade is confined to the wealthy and aristocratic.

Mr. Schultz, a Cape diamond merchant, staying temporarily in New York, who comes over twice or three times a year, says he considers America the leading market of the world. "It is true," he said, "that there is a duty of ten per cent. on all cut precious stones; but diamonds are now being largely imported in the rough." Skilful workmen are employed here who can cut and polish stones equal to the Amsterdam cutters. Other gems are cut and polished in New York and Boston, in a most skilful manner, and this industry is quite rapidly growing in importance. It is a well-known fact that retail purchasers of all kinds of precious stones can buy cheaper in New York than they can in any city in Europe. Those not acquainted with the diamond market abroad cannot comprehend the difficulties and perplexities that harass a diamond buyer. He has to be constantly on the alert for sharp practices, for the persons holding the stocks of diamonds in Europe are among the shrewdest merchants to be found anywhere, and they not only work in collusion, but play one customer against another to obtain higher prices. They are wonderfully given to romancing, and their statements, like their goods, are only to be taken after investigation. The diamond merchants abroad do not grade their goods, but when a purchaser comes along he is shown a parcel comprising good, bad and indifferent stones, and he must bid for the whole parcel. The grading, pairing, and selecting is done for this market after the diamonds have reached our shore. By this means a purchaser is compelled to buy many goods that he would not do were he allowed the privilege of selection. Some diamonds thus purchased are actually sold here at less than their cost abroad. It is a conceded fact that the American consumers of precious stones are the most critical of any that merchants have to cater to, and European holders of diamonds appreciate this fact. In this country but three grades of diamonds are really marketable, the first being rare and exceptional gems, the second first water goods, and the third must be above the average in quality. The cheaper grades of stones generally go to eastern countries, where the fashion is to wear great quantities of precious stones, without special regard to their quality. A few colored stones are sold in this country, but they must have specially good features to compensate for their want of color. At present the preference is given for blue stones, but how long this particular fancy will last it is impossible to say. Not long ago a blue stone was regarded as being as far off color as a yellow one. The art of developing diamonds has made such progress of late years as to greatly enhance their value, and those who have not kept pace with this progress can no longer be regarded as experts, nor can their judgment be relied upon. The expert of ten years ago would be sadly puzzled to-day to make a selection of first-class diamonds for this market. Fashion, also, has something to do in enhancing the value of diamonds, by proclaiming one day in favor of one particular style of cutting or of color, and again changing and setting in the post of honor those which had been previously rejected. Taken all in all, the diamond trade is a most difficult one to cater to, full of annoyances and hazards, and requiring special training and unflagging vigilance.

Fobs, Seals, Pins, and Rings.

THE fashion of fobs and seals worn by men creates a desire for curios and copies of the antique in gems, gold, and coins. Among these is a terrier's head of massive gold, exquisitely modeled, cast, and chased. It has eyes of rubies and holds a diamond in its mouth. A large cockatoo upon the same plan of workmanship, with half raised crest, has a diamond circlet about its neck and diamond eyes. A superb pendant of square shape is set with a carving in intaglio on sardonyx of Hector and Achilles; another of similar shape and mounting, also very finely carved in intaglio, shows the labors of Hercules. Seals are revived in close imitation of those worn nearly a century ago, and are set with blood-stones, sardonyx, onyx and chrysophore. Upon some of these are delicately carved in intaglio beads of classical and mythological studies. The massive gold of the seal is done in elaborate repousse, and the slides are delicately engraved. An antique Greek coin fob pendant shows upon its surface Diana driving a chariot and four horses abreast. The flexible gold chain attached represents a twisted rope. There are some scarf pins of mediæval fashion in platina and gold of beak-shaped visors. Shrimps, wolf heads, bees, spiders, and other quaint conceits in platina and gold, colored by alloys, are also seen.

Among some superb wedding gifts in preparation for Easter holidays, are lace pins and rings set with diamonds and semi-precious stones. A ring is set with a center brilliant green tourmaline and two large diamonds; others have a single large stone, as a pink tourmaline of excessive luster, or a gleaming cat's-eye. Others show, placed together in a wild carnival of coloring, a hyacinth, peridot, ruby and a colored pearl, perhaps a superb diamond. The blue topaz of the diamond fields of Africa and the flame-colored topaz of Switzerland are taking a prominent place in artistic work and æsthetic revivals, for a Greek poet says of the topaz: "Adorned with it man may gain the heart of every woman, and woman the heart of every man." Some small chatelaine watches of oxidized silver are carved in boldest relief. Pan, exquisitely engraved, peeps from a thicket of frieze; on another is a fine specimen of artistic work in a Renaissance mask; surmounting a chatelaine are a rampant unicorn and lion in combat. Another not less carefully worked out with a minute fidelity to nature, is a turtle wrought through the repousse process and oxidized, forming the top of the chatelaine. Silver takes a prominent part in dress accessories. The scarf-pins for men are the most elegant of the silver jewelry. A large spider, tinted by fire-finish in dull gray-green and dull red, stands with outspread legs as the head of a scarf-pin; dog's heads are tinted in a similar manner; oxidized silver owls stand on a branch; there are other unpleasant gray spiders, and some fine and rare specimens of Roman coins. Nothing can surpass the exquisite beauty of the lace pins of filigree, so fine as nearly to escape the sight. Some of these are fern-like frost tracings, forget-me-nots and lilies; a rose, buds and leaves tied with a ribbon; a mandolin; a row of little Marguerites with golden hearts; a horse shoe of silver finished in gold, the center filled in with open work designs and the word "Salve." A charming design in frosty filigree is a row of little shells, each containing a pearl, made of satin finished silver. Some glove bracelets, with necklaces to correspond, closely imitate pearls in their moon-like luster. Others have brilliant faceted balls, and this style is also seen forming the tops of the three-teethed comb of shell. Cigar scissors, hammered copper match boxes, solid silver shoe horns, elegantly engraved with flowers, are some of the gifts offered for festal occasions.

AT THE Annual Meeting of the Union of Mutual Benefit Associations, held February 8, Superintendent of Insurance Charles D. Fairman, was present, and submitted a bill for the regulation of Mutual Benefit Societies, which he proposed to present to the Legislature for adoption. The bill was read to the meeting and supported by the Superintendent. Its general purport is to give the Superintendent absolute power over the benefit societies, authorizing him to refuse them permission to do business unless he is satisfied with their organization, and to examine them, at their expense, whenever he shall deem it necessary to do so. On motion, the bill was referred to Abel Crook, Esq., for his opinion. On February 17 Mr. Crook submitted his opinion to the Executive Committee, then in session, when it was ordered that copies of the present law, the proposed law, and the counsel's opinion be printed for general circulation. The opinion of the counsel is opposed to the bill proposed by the Superintendent of Insurance. The following resolutions were adopted by the Executive Committee:

Resolved, That the provisions of Chap. 256 of the Laws of 1881, appear to be satisfactory to the Mutual Benefit Societies of the State of New York, and should have further trial.

Resolved, That the members of each society of this Union be requested to urge their several representatives in the State Legislature to oppose any amendment, repeal or legislation affecting in anywise Chapter 256, of the Laws of 1881.

The objections of counsel are lengthy, but their general tenor can be inferred from the following extract. He says: "In my opinion, no single individual can be trusted with such arbitrary, autocratic control of the hundreds of thousands of members of these societies conducting their affairs within this state," as is conferred upon the Superintendent by the proposed bill. The Union of Mutual Benefit Societies will, therefore, resist all attempts to amend or change the existing laws affecting them.

THE Third Annual Meeting of the Jewelers' Union was held on the afternoon of March 5, in the Park Bank Building, Mr. Safford having kindly tendered the use of the room. Between thirty-five and forty members were present, and evinced great interest in the workings of the organization. In a few happy remarks made by the President, Wm. R. Alling, as to the nature and character of the association, he explained the valuable services it had rendered to the trade since its organization. He stated that while the recovery of stolen property was always desirable, the prosecution and conviction of the thieves was of paramount interest, and to this purpose the efforts of the Union were especially directed. A number of jewelry thieves are now in state prison who regret the day they found the Union engaged in their prosecution. While it is not always possible to obtain legal evidence of the complicity of a thief in a robbery with which it is known he was identified, the Union never loses sight of any person of whose guilt they are convinced, but sieze upon the first opportunity of giving him his deserts.

The former officers of the Union and the Executive Committee were unanimously re-elected. The financial affairs of the Union are in a highly satisfactory condition, and its membership steadily increasing. For prudential reasons, no extended report of the proceedings is deemed desirable.

THE American Express Company have introduced a feature that will no doubt be appreciated by the public, that of inaugurating a cheap money order system, especially for the transmission of small sums of money: Heretofore the express companies have sent money by packages from place to place at a minimum cost of fifteen cents for sums of twenty dollars and under. The charges under the new system are five cents for amounts of five dollars and under, down to one dollar, the smallest limit, and eight cents for sums more than five dollars and no more than ten dollars. This highest rate is two cents less than the Post Office charges for sums of ten dollars and less. The time during which payment of the orders on presentation will be made is limited to three months from their date of issue, but if for some reason the holder of the order fails to present it in time there will be no difficulty in obtaining the money afterward. In case the orders are lost or have been mislaid, the Company has made provision for refunding the amount.

Charles Oakford Klett.

A MEETING of the jewelers of New Orleans and representatives of New York houses was held at the store of Mr. Edward Lilienthal, February 17th, for the purpose of expressing regret at the sudden death of their friend, Mr. C. Oakford Klett, whose sudden death at Columbus, Ga., was announced in the March number of THE CIRCULAR.

Mr. J. W. Steele was elected Chairman, and Mr. Chas. E. Moody Secretary. After stating the object of the meeting by the Chairman, Mr. A. B. Speir moved that the Chair appoint a Committee of six to draft resolutions of respect and sympathy. The Chair appointed Messrs. Ginder, Buckley, Lilienthal, Speir, Vande Sande and Marx. They reported the following preamble and resolutions, which were unanimously adopted and signed by those present.

On motion of Mr. Snow, the Secretary was instructed to send a copy of these resolutions to THE JEWELERS' CIRCULAR.

On motion of Mr. Buckley the Secretary was instructed to send a copy to *The Watchmaker and Metalworker*, Chicago, Ill.

On motion of Mr. Lilienthal the Committee on Resolutions were instructed to have a copy engrossed and framed, and sent to Mr. Klett's sisters.

On motion the meeting adjourned. CHAS. E. MOODY, Secretary.

NEW ORLEANS, Feb. 17th, 1882.

WHEREAS, an All-Wise Providence has seen fit to remove from among us, our friend, Charles Oakford Klett, be it

RESOLVED, *First*, That in his death the trade has suffered the loss of one remarkable for honesty, reliability and conscientious dealing;

Second, That we personally mourn his death as that of a good friend and universally popular gentleman;

Third, That our grief is tempered by the conviction that what is our loss is his eternal gain;

Fourth, That we deeply sympathize with his sisters and other relatives in their great loss, and, in testimony thereof, we send them a copy of these resolutions.

A. B. Griswold & Co., H. P. Buckley, Edward Lilienthal, Joseph Sterne, A. M. Hill, M. Scooler, Aug. Bauman, John Lazarus, B. Simon, Frantz & Opitz, Saml. Cohen, E. Offner, John G. Meyer, M. L. Navra, John Henry, Jules Meteye, New Orleans; George Wolf, Louisville, Ky.; W. W. Hayden, L. E. Tay, A. Barker Snow, P. S. Wier, Chas. Vande Sande, M. Isenberg. B. H. Davis, H. C. Rosswog, Ernest Emmel, W. L. Pollock, J. H. Astruax, R. H. Kronse, A. B. Speir, J. C. Andress, J. W. Steele, Kossuth Marx, Samuel H. Levy, Chas. E. Moody, S. E. Theus, J. T. Crane, H. A. Bliss, Adolph Lilienthal, Wm. Bardel, C. L. White, New York; Josh Lipman, New Orleans.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

The Executive Committee have printed and forwarded to each member a copy of the proceedings at the Fifth Annual Meeting, accompanied by a circular showing the distribution of the membership throughout the country and abroad. Every state in the Union is represented in the list, the District of Columbia, three Territories, Canada, England and France, the Committee adding with sly humor the name of Alaska, followed by "o" members. Alaska is an inviting location for the manufacture and sale of certain classes of "jewelry" of which the solder might be seriously affected in a climate less frigid, and the committee evidently expect in time to substiute for the "o" some considerable number of members from the manufacturing jewelers of Alaska. Look sharp, O Attleboros! with thy long lead of over fifty members.

We note also an invitation to the members to send to the Special Committee of Eighteen, through the Secretary, any suggestions as to measures that may operate for the welfare of the League.

At the regular meeting of the Executive Committee, held on Friday, March 3d, the following named candidates were admitted to membership:

William H. Wilford, Gustav Berkmans, August J. Christian, Oscar Dietz, Henry Hanover, Stephen Jenkins, James Pott, Jr., Edwin Beckwith, Louis H. Todd, William T. Blessing, Albert G. Cook, Clarence E. Fenniman, Jules H. Lacroix, Sylvanus Hoyt, of New York City; Samuel W. Percy, Ogdensburg, N. Y.; Casper A. Kuster, Buffalo, N. Y.; Edwin T. James, Sing Sing, N. Y.; Augustus L. Hoffman, Newark, N. J.; Henry Greenman, Richfield Springs, N. Y.; Edgar Gray, Port Jervis, N. Y.; Julius Becher, F. T. Forsberg, Henry A. Pierce, Albert Shuette, Leopold Sonnencheir, Sigmund Stein, Frank E. Stevens, of Chicago, Ill.; Frank N. Wills, Springfield, Ill.; Albert S. Bixby, Danville, Ill.; Clement Weaver, Frederic Shaw, H. L. Roberts, Frederic A. Davis, Wm. G. Butler, Joseph H. Brazier, David S. Barry, of Philadelphia; Jno. S. Crawford, Allegheny City, Pa.; Chas. H. Ways, Cornellsville, Pa.; Florian Wehrle, Lancaster, Pa.; Walter Baker, Stephen Burrows, David Johnson, Philip Lane, Wm. E. Trinkham, Taunton, Mass.; Owen B. Bestor, North Attleboro, Mass.; Wm. T. Carter, Louis Bruemmer, Newark, N. J.; Andrew H. Briggs, Jersey City, N. J.; E. F. Randolph, Elizabeth, N. J.; Wm. E. Hart, Englewood, N. J ; R. H. Galbreath, F. Jacobs, Jr., Andrew G. Schwab, John J. Norre, Cincinnati, O.; L. C. Eisenschmidt, Newport, Ky.; Joseph Jonas, Covington, Ky.; Leonard Huber, Louisville, Ky ; Edwin Wood, Bay City, Mich.; W. W. Vosburgh, Allegan, Mich.; Wm. H. Squier, Big Rapids, Mich.; George S. Smith, Marshall, Mich.; Levant Bedell, Romeo, Mich.; H. H. Clark, St. Louis, Mo.; Wm. G. Hadrill, Omaha, Neb.; Henry Ringwald, Helena, Montana Ter.; S. S. Wheeler, Hallowell, Maine; Philip Blum, Baltimore, Md.; Ernst Schall, Hartford, Conn., a total of 68 accepted; 4 were rejected and 11 tabled for further consideration. The League now numbers 1,794.

In our March issue we referred to several attempts being made in the state Legislature to either amend or repeal Chapter 256 of the Laws of 1881, for the protection of charitable and benevolent societies. In addition thereto, Hon. Charles G. Fairman, Superintendent of the Insurance Department of the State of New York, who was present by invitation at the Annual Meeting of the Union of Mutual Benevolent Associations of the State of New York, (February 8), presented for the consideration of the Union, a proposed new bill for the government of such associations in this state. The Union promptly referred it to its counsel, who in reply, after carefully traversing the paper, stated fully the scope of it with his objections thereto. The Union, after deliberation, ordered to be printed the law of 1881, the proposed law of Supt. Fairman, the opinion of the Counsel, and the objections of the Union, all in one document, which was sent to every member of the state Legislature; the officers of the Union have been assured by members of the Legislature, that no bill can be passed which the societies may strongly oppose.

The officers of the League are in receipt of frequent complimentary letters, of which we instance one from Vermont, contrasting the speculative insurance machines of his state with the League, speaking in strong terms of approval of its prosperity, and sending for a blank for membership; also one from two brothers in Mississippi, stating: "We are so highly pleased with the Jewelers' League that we want to put in our application for membership." These are proofs of the careful reading of the columns of THE JEWELERS' CIRCULAR by the trade, and especially of this column, wherein we record what is of interest to the trade at large, as well as to the members of the League, of the progress of an organization of which the trade may well feel proud.

The pride taken in the good work of the League is shown by the fact that so many of the old houses in the trade have become patrons of it, by giving their interest in the Chicago Fire Fund. The following is a complete list of the donors thus far:

J. A. Abry, (now C. L. Abry); H. F. Barrows; Victor Bishop, (now Victor Bishop & Co.); Erhard Bissinger; Th. Bloch & Bros., (now Bloch Bros.); F. F. Braillard; Brainerd, Goddard & Steele, (now Brainerd & Steele); Estate of Paul A. Brez; John D. Brez; Brooklyn Watch Case Factory; Brown, Cook & Co., and Maass, Groeschel & Co., (now Cook, Groeschel & Co.); D. Bruhl, (now D. & M. Bruhl); Bruno & Son, (now C. Bruno & Son); T. B. Bynner & Co.; Samuel W. Chamberlain; H. A. & G. M. Church; William Cohen, (now Cohen & Co.); Colby & Johnson; Cooper, Fellows & Co.; Cox & Sedgwick; H. E. Droz; E C. Dunning & Co.; Estates of L Durr & Bro.; Earle & Franklin; Samuel Eichberg; Eisenmann Bros.; A. Errico, (now Errico Bros.); Joseph Fahys; Fellows & Co.; M. Fox & Co.; Freund, Goldsmith & Co., (now Max Freund & Co.); Julien Gallet; Giles, Wales & Co.; Henry Ginnel; Hayward & Briggs; Henle Bros.; Hessels & Ludeke; Wm. S. Hicks; Hodenpyl, Tunison & Shiebler, (now Hodenpyl, Tunison & Co.); John E. Hyde's Sons.; Jacobs & Pratt; J. W. Johnson; L. & M. Kahn; Ketcham Bros. & Co., (now Ketcham & McDougall); R. Kipling & Son.; F. Kroeber; Julius Levin; S. M. Lewis, (now S. M. Lewis & Co.); Lincoln, Tifft & Co.; J. B. Matthewson & Co.; Miller Bros.; J. M. Morrow; E. Obermeyer & Bro., (now H. Obermeyer); Palmer & Capron; Geo. W. Platt, (now Jas. W. Todd); J. W. Pooler & Co.; (Courvoisier, Wilcox & Co.); Geo. W. Pratt & Co.; J. W. Richardson & Co.; Stephen Richardson & Co.; E. Ira Richards & Co.; John A. Riley & Co.; P. E. Robinson; Chas. Rubens & Co.; Saltzmann & Co ; J. T. Scott & Co.; Sillcocks & Cooley; Smith & Hedges, (now Wm. S. Hedges & Co., and Alfred H. Smith & Co.); Herman Sonntag; E. & D. H. Stites, (now E. Stites' Sons, and D. H. Stites & Son); L. Strasburger & Co.; Geo. O. Street & Son; I. Sturn & Co.; Sussfeld, Lorsch & Nordlinger; Vulcanite Jewelry Co.; A. Wallach & Co.; Wheeler, Parsons & Co., (now Wheeler, Parsons & Hayes), and D. H. Wickham, making a total of 78 out of 120 subscribers; these 78 donors or patrons of the League represent $55\frac{6}{10}$ per centum of the aggregate amount originally subscribed; it is now hoped (the majority both in amount and numbers having signified their wish in proper legal form), that those who have been in doubt as to the propriety of giving their proportions to the League, may fall in with the majority, or they may fall so many laps behind, as not to be entitled to any of the "gate money."

Be it said to the credit of the jewelry and kindred trades, that but 5 out of 120 have refused, and of that 5 a portion have conditionally "withheld consent."

This fund, which the President is, with the assistance of New York members and the subscribers, seeking to convey into the Treasury of the League, it is well known now, is the unused balance of moneys subscribed for the sufferers by the Chicago fire in 1871, and was returned to New York to the subscribers, who refused to receive it back, but voted it into the custody of three trustees, one of whom now holds it.

In 1881 the Banks of New York City subscribed a sum of money for the same purpose; a portion of it was unused, and was returned to the board of managers of the New York Clearing House Association as Trustees for the donors. The said Trustees, with commendable appreciation of the good to be done by their special channel for the application of charitable funds, turned the fund over *in toto* to the Bank Clerk's Association; their action was approved by the donors, and the money has been doing good since that time. The jewelry trade, however, is so much more exact in the transaction of business, that its representative men require the utmost nicety of legal process before its representative benevolent society may become possessed of *its* charitable fund; conservative, you know; "all the same" the Jewelers' League will get it in due time, and it deserves it for the labor already expended in its acquirement.

At the last meeting of the Executive Committee the proofs of the deaths of John H. Willemin, late with J. P. Capelle, of St. Louis, and of Edwin C. Taylor, late with Tiffany & Co., were properly presented and an assessment of four dollars upon each member was ordered, notice of which has since been sent out.

On Monday, March 9th, the beneficiary of John H. Willemin was paid, $3,142.60.

Preservation of Health and Eyesight of Workmen.

SOME of the following directions may, perhaps, be considered to be over minute and too restrictive, but they are not so. Good habits contracted in youth are easily maintained, and, when the watchmaker has tried them long enough to convince him of their influence on his health, he will experience no difficulty in keeping them up.

The working at any small mechanism, such as a watch, it is necessary to use the glass, but this is apt to produce inflammation of the conjunction or cornea, and a weakening of the eyesight; a too frequent and prolonged use of the glass will have the same effect as using spectacles that are too strong. In order to preserve the eyesight a watchmaker should take the following precautions:—

He should not retain the glass at his eye by a contraction of the muscles for more than a brief interval of time. The glass holder, which can be at once set in any desired position, has therefore much to recommend it.

Drill a few holes in the frame of the glass to avoid or at least diminish the inconvenience that arises from the heating of the inclosed air, as well as from the deposition of moisture on the surface of the glass.

Do not use glasses of too great magnifying power; they needlessly fatigue the eye. Use only glasses that are truly achromatic. If compelled to use the ordinary simple glass, place a ring of dead black paper inside the frame and against the lens, which, by diminishing the field of view, will reduce the inconvenience due to spherical aberration. It is hardly necessary to advocate the use of a green cardboard shade to the lamp, as they are so generally used by watchmakers. It should be so arranged as to protect the head and eyes from radiation, and cardboard is preferable to metal, since it radiates less.

Working at night and by artificial light, more especially by the dazzling light of gas, fatigues the eyes much more than with ordinary daylight; and the workman will find it a relief, if obliged to work by artificial light on very minute objects, to rest his eyes frequently on large stationary bodies. If he can do so, it is a great relief to bathe the eyes in cold water.

It is a good practice to habituate oneself to the use of either eye with the glass.

By adopting these simple precautions, how many of our fellow-workers who are now only able to see objects indistinctly, and suffer from incipient blindness, would have preserved their sight uninjured. And there is yet another precaution that has been pointed out by Dr. Haltenhoff, of Geneva He has shown that by avoiding an excessive indulgence in alcoholic drinks or tobacco many old watchmakers have succeeded in preserving their sight unimpaired, and it is impossible to doubt the truth or overestimate the importance of this fact.

The same authority draws attention to the necessity of taking care that, before adopting watchmaking as a trade, youths should ascertain that they do not suffer from progressive near-sightedness, which is often hereditary, as, in such a case, they would most certainly be compelled to abandon it in after life. Boys should not be set to work on such small objects as the details of a watch too early in life, before the membranes of the eye have assumed a certain degree of rigidity.

Mr. Brudenell Carter, a well-known ophthalmist, is of opinion that the hab'tual use of the glass by watchmakers has the effect of actually developing and preserving the power of the eye.

It is often found that an old or middle-aged workman is irritable, often tired and soured. This arises not so often from an over-excited uneasiness in regard to his trade, an explanation that is usually urged, as from derangement of his digestive organs, brought on by the habits of life he is compelled to adopt.

Prolonged working on minute horological mechanism is, perhaps, more wearying to both mind and body than any other trade or occupation.

To avoid its ill effects the watchmaker should adopt the following precautions as far as possible:—

Do not use a stool with stuffed seat, but prefer one of cane or wood. Take care that the relative heights of the bench and stool are such that an excessive compression of the muscles of the chest, etc, is avoided during any long operation that renders it necessary to maintain the body in a constrained position. A stool with adjusting screw similar to a music stool is convenient from this point of view. Change the position as much and as often as possible, especially when working with the file or graver. With this object in view many workmen have a second bench of such a height that they can work standing. When using the lamp let it always be provided with a cardboard shade, as already recommended. A screen to protect the head from the direct heat of the flame is often found advantageous; in fact the watchmaker should adopt the advice of Boerhaave: "Keep the head cool and the feet warm."

Let him always remember that nothing does more harm than sitting to the bench immediately after a meal. He should allow an interval of at least half an hour to elapse, and with some temperaments an hour is not enough; during this period he should only do work in which it is possible to stand. A little exercise, such as a walk that is not hurried, will be still better, it will stimulate the circulation and stretch the muscles that have been maintained in a constrained position for a long time through the prolonged attention and slight motion that his labors involve.—[*Saunier's Watchmaker's Hand Book.*

How Watch Crystals are Made.

MANY of our respected readers, although daily handling this unpretentious component of a watch—its crystal, will only be tempted when reading the above head-lines into making the inquiry: How are watch crystals made? We will endeavor to elucidate this subject to the best of our ability, and will invite them to accompany us in a visit in imagination to such a factory.

The work of the celebrated chemist, Piligot, *Glass, its History and Production*, will help us to elucidate the methods and manners of fabrication.

Watch crystals formerly were simple spherical segments, and were separated from small glass spheres by means of iron rings red heated in fire. These *calottes* (segments) must necessarily be very arched, to permit sufficient play to the hands. An irregular fracture occurred hereby, and the subsequent attempt of correcting it with imperfect tools often entailed the total loss of the crystal. The rim was then finished upon a disc or grinding wheel.

The invention of the cylinder watch permitted the use of a much flatter crystal, and the defects of the highly arched glass were still more keenly felt. Several Parisian watchmakers manufactured concave glasses for these watches, pressing them of a square piece of flat glass and rounding the rims, which method was imitated in Geneva.

This kind was at first made of a round glass or crystal disc, giving it the necessary height for the motion of the hands; the rim was next corrected, and finally they were cut to correspond to the bezel of the lid. This method of hand production being very expensive, the crystals were very dear; the watchmakers sold them from three to five francs per piece.

Toward the year 1830, concave crystals called Chevé crystals, were manufactured at Götzenbrück in a greatly simplified manner, by blowing glass balloons in shape of a bottle with flat bottom, and the latter, when separated, furnished the desired crystal. These bottles were blown by skilled workmen without the use of a model, and only a scale showed them the diameter of the piece.

These crystals were also manufactured in like manner in Bohemia. The bottom of the flask was separated while in a hot condition, and received a somewhat heightened rim, which was cut level-shaped to fit it to the case bezel. The making of each crystal requiring a separate flask, the price remained pretty high, in spite of the great speed obtained in their manufacture; they commanded from fifty to sixty francs per gross.

Shortly afterward, the same factory manufactured thicker, so-called double Chevé crystals, which commanded a price of sixty francs per gross, at present only ten to twelve francs. A great improvement in their manufacture has since occurred. Instead of a small flask for each separate glass, with a diamond fastened to a sort of a compass, a number of calottes were cut from a balloon of about fifteen centimeters diameter. The diamond formed the movable shank of the circle; the other shank was replaced by a piece of leather or chamois skin, laid upon the glass ball. The shank carrying the diamond could be lengthened or shortened to suit the diameter of the crystal to be furnished. By this fabrication, of 100 blown glass balls, on an average only fifteen could be used for watch crystals; the balance found its way into the wastage.

This method has been very materially improved by the superintendents of said factory, Messrs. A. & T. Dalter, to both of whom the watch crystal manufacture owes its greatest advancements. The small spherical callottes are at present cut of large balloons, of from 75 to 80 cm. in diameter. From a single one of these spheres, as many as four gross crystals are cut, not to take into account several hundreds of small crystals for Nurnbergian toy watches. About one-half of the spheres may be used at present, instead of 15 of 100, as heretofore.

The progress, together with other further perfectionments made in cutting and polishing the crystals, have gradually lowered their price; ordinary Chevé crystals come into commerce at from seven to eight francs per gross; crystals of third choice, intended for export, are sold as low as two francs, fifty cent.; heavy ones cost from ten to twelve francs.

The large spheres, of which we spoke, and which sometimes possess a diameter of one meter, must be blown very thin, since they cannot be thicker than a watch glass, that is from 1 to 1½ mm., either as single or double. The blower's breath is not sufficiently strong to inflate a sphere of such a magnitude, because the glass, in proportion with its expansion and consequent attenuation, also becomes cold, and very rapidly offers great resistance to further expansion; it must be the main object, therefore, to blow the sphere as quickly as possible, while the glass is still hot and yielding.

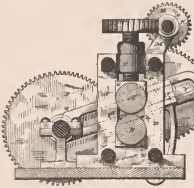
The following method is pursued at Götzenbrück: The blower collects six or eight kilog. glass with a pipe of corresponding large dimensions; he then rounds his glass upon a block of soft wood, with assistance of a wooden mallet; at the same time he first blows very gently, and, when the ball appears at the end of the pipe, somewhat stronger, turning the entire mass, that a lengthy glass balloon, in shape of a pear, is produced, and with his tools he gives it the shape of a distended bladder.

This blowing is repeated in the furnace; the workman blows again to increase the circumference; he next makes use of a blowing contrivance propelled by a small machine of three-horse power. The finished sphere is loosened from the pipe, and placed upon a frame. The glass is so thin that it is not necessary to bring it into a cooling furnace in order to cut it.

Patent Reports.

Machine for Rolling Blanks for Clock Springs.—Wallace Barnes, Bristol, Conn. Filed July 2, 1881.

Claim.—1. In a machine for making clock-spring blanks, the combination, with two rolls, one of which is arranged to recede from the other by the gradual withdrawal of screws which impinge upon its journal-bearings, of a train of gearing adapted to actuate said screws, the driving and driven gears of said train being changeable, the intermediate gear being provided with a vertically and laterally adjustable bearing adapting it to be meshed with changeable driving and driven gear-wheels, substantially as set forth.



2. The combination, with a stationary and a receding roll, the recession of the latter being effected by the gradual withdrawal of screws from its journal-bearings, of a train of gearing to actuate the screws, the intermediate gear of said train being provided with a vertically and laterally adjustable bearing, consisting of a two-armed plate, the upper end of which is provided with an elongated slot in which the stud upon which the gear is mounted is adjusted, the lower arm of the bearing being provided with an arc-shaped slot which receives a stud adapted to be secured in any part of it, substantially as set forth.

Watch Train-Plate.—James H. Gerry, Newark, N. J. Filed Oct. 28, 1880.

Claim.—1. The combination, with the front train-plate *B*, of the back train-plate *A*, post *c* having the shoulder *d* thereon, and fastened to said plate *B*, as shown, the bridge or cock *e*, and screw *f*, all arranged and operating substantially as and for the purpose set forth.

2. The combination of the front train-plate *B*, having the undercut shoulder *b*, the back train-plate *A*, having a returned portion or flange *a*, sprung into engagement with the shoulder *b* of plate *B*, post *c* having the shoulder *d* thereon, and fastened to plate *B* as shown, the bridge or cock *e*, and the screw *f*, all constructed substantially as and for the purpose set forth.

Mechanism for Rolling Finger Rings.—Chas. R. Smith, Providence, R. I. Filed Oct. 29, 1881.

Claim.—1. The combination, with the adjustable arbor a^4 and roll *C*, of the interchangeable spools *a*, substantially as shown and described.

2. The combination of the holder *B*, having the collared arbor a^4, adjustably connected thereto, with the spool *a* and roll *C*, substantially as shown and described.

3. In a machine for embossing, engraving and finishing rings, a metallic spool loosely fitted to a rigidly-supported arbor, and adapted to guide the rings when in contact with the figured roll, substantially as shown and described.

Ornamental Chain.—Robert Barker, East Attleborough, Mass. Filed Nov. 25, 1881.

Brief.—The central blank is of cheap metal. A band of gold covers the sides of the blank, and side pieces of gold cover its edges.

Claim.—1. An ornamental chain-link or other equivalent article of jewelry, composed of a blank of cheap metal, a band of gold or gold plate covering the edges of the blank, and plates of gold covering the sides of the plate, as set forth.

2. An ornamental chain-link or other equivalent article of jewelry composed of a blank of cheap metal, a band of gold plate covering the edges of the blank, and plates of gold covering the sides of the plate and the edges of the band, as set forth.

3. An ornamental chain composed of a series of links or bars, each composed of a blank of cheap metal, a band of gold plate covering the edges of the blank, and provided with rigidly-attached eyes, gold plates covering the sides of the blank and the edges of the band, and ordinary links connecting the links or bars, substantially as shown and described.

Clock Movement.—Arthur E. Hotchkiss, Cheshire, Conn. Filed July 19, 1881. Original No. 221,310, dated Nov. 4, 1879. Re-issue No. 9,656.

Claim.—1. In a clock movement having a frame consisting of three plates suitably connected together, a train which is divided into two parts, a front part and a back part, the front part arranged between the front and middle plates of the frame, and the back part arranged between the middle and back plates of the frame, the point of division being between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute hand, as set forth.

2. In a clock movement having a frame consisting of three plates suitably connected together, the middle plate of the frame, the said middle plate dividing the train into two parts between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute hand, as set forth.

3. In a clock movement, a frame consisting of three plates suitably connected together, the middle plate of which divides the train into two parts between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute hand, and the frame having the parts of the divided train arranged between its three plates, as set forth.

4. In a clock movement having a frame consisting of three plates suitably connected together, a center arbor carrying the minute hand, and provided with a center wheel and center pinion, the wheel arranged between the front and middle plates of the frame, and the pinion arranged between the middle and back plates of the frame, as set forth.

5. The improvement in a clock train, consisting of three wheels suitably fastened on arbors carrying pinions, and arranged between the escape wheel and its arbor carrying a pinion, and the center arbor carrying the center wheel and center pinion, as set forth.

6. The improvement in a clock train, consisting of three wheels having the same number of teeth and the same diameters, suitably fastened on arbors, the pivots of which are arranged in the circumferences of circles concentric with the center arbor, the several arbors carrying pinions having the same number of leaves and the same diameters, all the said parts arranged between the escape wheel and its arbor carrying a pinion, and the center arbor carrying the center wheel and center pinion, as set forth.

7. The improvement in a clock train, consisting in the arrangement of the pivots of the escape wheel arbor, and of the pivots of the three arbors carrying the three wheels and the three pinions between the escape wheel arbor and the center arbor carrying the center wheel and center pinion in a semi-circle, as set forth.

8. In a clock movement, the combination, with a train divided into two parts, a front part and a back part, by the middle plate of a frame having three plates, the division being made between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute hand, the escape wheel being arranged in the front part of the train and near the top of the frame, and the pivots of the front part of the train being arranged within a semi-circle, of a pendulum attached to an arbor near the top of the frame and vibrating in a plane passing between the front and middle plates of the frame, as set forth.

9. In a clock movement provided with a circular rack, the circular disc *F*, rotated by the mainspring and carrying the planet-wheel *E* only, which connects the rack with the center pinion, as set forth.

10. In combination with the pendulum rod provided with the plate *S*, fastened to the rod, a spring arranged on the rod to hold the pendulum ball against the adjusting nut, as set forth.

ALARM WATCH.—Joseph Bachner, New York, N. Y. Filed Aug. 1, 1881.

Claim.—1. The combination, substantially as hereinbefore set forth, of the anvil on the rim of the watch case for the reception of a percussion cap, the hammer hung by an interior pivot to the case rim, and having its outer end adapted to strike the anvil, the hammer spring on the interior of the case rim, the index wheel on the arbor of the hour hand carrying a trip pin, and the hammer-lock mechanism adapted to be actuated by the trip pin for releasing the hammer.

2. The combination, substantially as hereinbefore set forth, of the anvil on the rim of a watch case for the reception of a percussion cap, the hammer hung by an interior pivot to the case rim, and having its outer end adapted to strike the anvil, the hammer spring on the interior of the case rim, the dog engaging the hammer, the trigger engaging the dog, and the index wheel on the arbor of the hour hand carrying a trip pin adapted to actuate the trigger.

MODE OF MAKING INLAID JEWELRY, ETC.—Chas. P. Fest, Philadelphia, Pa., assignor to George P. Farmer, Montclair, N. J., and Wilson Pratt, Philadelphia, Pa. Filed Jan. 3, 1882.

Brief.—The body piece and the inlaid piece, being fastened together by cement, are cut at one operation. The inlay is inserted into the body and the surfaces made flush.

Claim.—The mode herein described of inlaying pearl, ivory, shell, and similar substances, with substances of another shade or color, by first cutting out the two pieces in the desired outline at one and the same operation, leaving a tapering opening in the piece to form the body, and inserting the cut-out portion of the other piece into this opening, and finally making the surfaces of the two substances flush by grinding or otherwise, all substantially as set forth.

Guide for Watchmakers' Apprentices.

BY HERMANN SIEVERT.

[*Continued from page* 40.]

THE ANCHOR ESCAPEMENT.

The Examination of the Escapement.—First examine the effect of the wheel upon the anchor, placing it into the watch, and removing the balance. For this purpose wedge the fork loosely with a piece of paper, and move the former until a tooth drops on either side. Note the quantity of the drop, the repose, and the appropriate banking of the fork against the pins. The drop, in common with that of the cylinder escapement, is often unequal. If the outer drop is too great, the anchor is too small, and *vice versa.* Too great a drop upon both sides is caused by the lifting planes being too short. By an unequal drop, observe the reposes, and remember that by too deep a motion the inner drop is significantly increased. The drawing angle generally, in such an escapement is somewhat stronger, and must amount to that much more as the wheel is recoiled by the unlocking.

It is injurious, however, if the tooth either falls insufficiently or too deep upon repose; the regularity of the rate is jeopardized in either case. Especially is it a great impediment if the balance has to surmount too long a repose, its arc of vibration is seriously contracted thereby. If the repose is unequal, the cause lies in a false and unequal form of the lifting faces. Grinding them on a diamond disc will often be followed by the desired correction, but the greatest caution must be observed, and the quantity necessary to be removed ascertained in each case, else other and graver defects will be produced thereby.

By the correction of the motion, the repose must always be brought to the due quantity, without regard to the extension of the fork's motion.

There is only one thorough means for placing the anchor deeper or shallower—closing the holes, and relocating the escapement in the depthing tool. It is commendable, also, when it becomes necessary to replace a false by a new anchor, and the depthing distance does not correspond. The depthing tool, as a matter of course, must be very good, and the work executed with extreme exactness. If it is only a trifle by which the anchor has to be removed, the hole in the anchor may be opened to the corresponding side by stretching a wire in the drill bow; the foot-pins, in such a case, must be replaced by soft ones, and their holes countersunk a little inside. But the execution of such a work must be of a nature not to disturb the intimate relation of the anchor and fork. The least displacement in their mutual position is productive of the gravest errors.

The drop upon repose can also be unequal by being caused by an untrue wheel. This defect is only removed by replacing either wheel or pinion; it will be found that the inequality is caused more generally by the latter having an untruly turned shoulder.

You are acquainted with the right shape of the anchor. Although being of great importance, with regard to the notch and position of the guard pin, many grave errors are committed, nevertheless. First of all, the faces of the notch must be highly polished, to obviate a friction as much as possible. A fork either too short or having rounded corners causes the ruby pin to operate against said corner or rounding, followed by an unlocking rendered thereby extraordinarily difficult. For further investigation put the balance without its spring into the watch, and cramp it with a piece of paper, after having loosened the fork, you may ascertain in this position of rest whether the ruby pin has too much or too little shake in the slot. Too much shake occasions a great loss of power; the force is uselessly wasted by the unduly large recoil of the fork after unlocking, and a part of the anchor lifting is rendered ineffective for the propulsion, because a knock is no propulsion. This defect, however, occurs chiefly only in cheap or ruined watches, and can, if it is not convenient to put in a new fork, be remedied by bending the horns. Unscrew the fork (it is fastened by a screw thread to the arbor, the anchor has a smooth hole), seize it with tongs, and heat the outer end dark red. With another tongs, or by beating, seek to close the slot a little. Then file it parallel, to fit exactly, and shape it in such a manner that the guard pin remains truly in the center. Put the escapement parts together again, and should the ruby pin not pass at the slot corners, *provided* the banking pins stand in right position, carefully correct the horns, pausing to examine your work repeatedly.

The examination of the fork and its correct length can be done in the following manner: Detain the fork by paper and cautiously turn the balance. You will thus feel in an increased measure the resistance offered to the unlocking either of an incorrect shape, or rounded corners, or insufficient fork length. In order to be entirely secure, loosen the fork, and conduct the balance to the drop of a tooth; you may satisfy yourself how much shake there is between the ruby pin and slot corner of the outwardly lying fork horn. In case of doubt, take the depthing tool to your aid, set it to the given distance of centers, and insert both fork and balance. You are then able to examine the co-operation of fork and ruby pin from the other side, and satisfy yourself of the correct or incorrect length of the former, and also, whether the ruby pin does not scrape upon the slot bottom. In any case, you can only after thoroughly understanding the nature of a defect, proceed to its correction. Should the fork be too short in its slot, stretching the horns by a punch, after softening them, is sometimes effective. I presuppose a good, workmanlike execution of the work, and a repair of the fork which does not offend the eye.

If, however, the guard pin is too short at the same time, lengthen the fork in its middle in a similar manner, of course, after having removed the anchor. The position of the guard pin to the staff roller is of the greatest importance, and the prompt performance of the lifting angle stands in close relation thereto. To test the operation of both these parts, put in the entire escapement, without the balance spring, however, and mount the mainspring by a few turns. As previously mentioned, the point of the guard pin, by the drop of tooth, must have arrived already at the circumference of the staff roller, and the fork progress a trifle further, until it arrives at the banking pin, as well for the security of the drop as for the necessary shake between the guard pin and roller. If you drive the balance forward, take notice that the shake is uniform and sufficient, but not too large. If you press the fork against the staff roller, it must not be retained by it, but be drawn back by the power of its lifting angle. Another important defect is if the wheel does not attract the anchor, and must be corrected, either by correcting the lifting angles, (grinding upon the diamond disc), or throwing the anchor aside for a new one. I desire to mention, in this connection, that ignorant workmen, in order to facilitate the unlocking, sometimes round off the corners of the scape teeth. If the defect is due to such a ruination of the wheel, no other course remains but to replace it, before a further correction of the anchor motion can be attempted.

The lifting angle having been remedied, it may happen, nevertheless, by an over great shake between guard pin and roller, that, by pressing on the fork, it still adheres to the latter, because it permits a motion of the fork as far as the unlocking. The guard pin is clearly too short, in such a case especially if the shake toward both sides is more than sufficient. If only one side, and the guard pin is not filed obliquely toward the slot, the position of the balance center to the fork is probably not correct, that is, the fork must, from the drop of one tooth to that of the other, and back, move farther to one side of the pivot hole than to the other, or, in other words, the balance axis not located upon the center line of the fork. This can be corrected by turning the fork and anchor in their mutual connection to each other, replacing the hard pins by well fitting soft ones, and countersinking the holes from within. In place of this remedy, which easily provokes an insecurity in the correction of these two parts, I would propose a better way to correct such an entirely false anchor.

First arrange carefully the limit of the fork motion by drilled-in banking pins in the vicinity of the anchor. It is defective when the fork places itself with its horns against the wall; the points of contact become unduly large thereby, and the least collection of dirt is sufficient to seriously interfere with the shake of the guard pin, or to produce a great loss of power by the glueing of the guard pin to the offending point. It is better therefore, to file out the plate, and in order to exactly determine the necessary quantity to be removed, cramp the fork, and drive two vertical banking pins into the plate. The fork's motion having been regulated in this manner, unscrew and bend it toward the corresponding direction. For this purpose, seize the fork with a tongs at each end, heat it at the suitable spot, and bend it by exerting a gentle pressure toward the corresponding side. In this manner, and by a little practice, you will be able to correct the fork's motion in its relation to the staff roller.

If only the guard pin is too short, and the fork otherwise in order, it is sometimes possible after having filed away the corner of the former, to insert a vertical pin of sufficient length into the fork, in place of this corner, you may also do the same with an obliquely filed guard pin. The latter will generally show a false position of the balance axis to the fork motion, in consequence of which some ignoramous has filed it in the indicated manner.

The motion of an anchor watch with a good mainspring cannot be stopped. If it can, the defect may be caused by a bad polish of the wheel teeth, lifting planes, or fork slot. Also too great a lifting of the balance prevents the watch from starting of its own accord. Although this lifting may amount to a little more than 40°, but you will see that by an increasing quantity the position of the fork becomes more inclined, therefore such a position is unfavorable, and the starting of the watch finally becomes impossible.

Further rate disturbances can be caused by the staff roller being badly polished on its circumference or having become rough by adhering filth. Especially if the knife is fully short, or the roller is proportionally too large, and by an accidental shock the guard pin is brought into contact with the roller, it is apt to adhere, and the fork passes through, often bending or fracturing a pivot. Both guard pin and roller, consequently, must always be kept smooth and thoroughly clean. Although an utter absence of oil at the places of contact of fork and ruby pin cannot be recommended, yet the least moistening is sufficient, and the injurious spreading of the oil upon the guard pin and places of contact are obviated thereby.

Again, all scrapings of the motion parts must be prevented. The anchor may touch the sink, or the scape teeth can come so near to the inner face of the anchor, that some of the oil necessary for the lifting faces is deposited, and forms contact places. Also that part of the fork intended to establish an equipoise should not move so scant within its sinks that the least amount of dust impedes the fork's motion.

It happens sometimes that the balance scrapes upon the fork, when this is pressed upon it, especially when much shake is present. The latter may also cause the wheel to pass by the pallets and reposes, and touch the steel parts instead.

Too long a ruby pin may also scrape upon the bottom of the sink, or upon the end of the small screw which secures the plate. It is apparent that the co-operation of ruby pin and fork must be secured in such a manner that an overshort ruby pin does not permit the fork to slip by below. Finally, loose or obliquely lacked ruby pins are found, which, of course, make a good rate impossible. To lock a ruby pin, clean the corresponding parts in benzine of all oil and filth. Shellac dissolved in alcohol is best suited for fastening, but it must be thickish fluid. Fill the hole with it, push the jewel through, and heat it upon a perforated spring barrel, without coloring the steel, bowever.

An untrue roller gives too much shake to the guard pin in some places, not enough in others; this fault is generally owing to an untruly turned balance axis, if no bent pivots are present.

Too much pivot shake of anchor and balance pivots in their holes is a great defect, and the correct co-operation of the parts much contracted, and not seldom entirely prevented thereby.

I have mentioned already that anchor and fork must be in equipoise upon their arbors. Although it need not be so literally understood as with a wheel, which must remain in every position. Owing to its lengthened shape, a fork will always assume a horzointal position, when equipoise, and this is sufficient. A fork, however, too heavy at one end, is easily unlocked prematurely by a knock. The equipoise often is with difficulty established and it becomes necessary sometimes to remove all superfluous metal; but it is unconditionally necessary to establish it. The fork must not be freighted at the other end, because the heavier a fork is, the more loss of power there is.

Although the array of ailments occurring in an anchor movement is by no means exhausted in the above list, it will nevertheless be found to throw light on several knotty points, in case you bestow an unremitting attention and diligence upon your work. You will perceive how manifold the errors of this escapement can be, and that one error generally has another as sequence; it is necessary, therefore, to study the bearings and relations to each other, and to establish your diagnosis of the case before attempting the correction of any part.

[*To be continued.*]

Antique Plate.

THERE happens to be one department of *vertu* in which collectors have been lately somewhat reluctant to invest, owing to certain embarrassing revelations made public through the vigilance of the officials of the Goldsmiths' Company of London. That department is old plate. An enthusiastic amateur of this very fascinating ware had "plunged" so deeply in purchasing antique silver that for a time the demand exceeded the supply, and, there being a deficiency of Charles II. and Queen Anne *vaisselle*, it occurred to certain unscrupulous dealers to foist on the market a quantity of so-called old plate, the hall-marks on which had been impudently forged.

Then came the notable case of the ingenious silversmith who employed a workman to cut genuine hall-marks out of small pieces, such as salt cellars and cream jugs, and insert the cuttings in large pieces of plate. The career of the shopkeeper who had promoted this clever system of manipulation, laudible for its adroitness, but scarcely defensible on ethical grounds, was cut short by an interview with a judge and jury, with the result of a term of imprisonment of no slight duration; and, for a considerable period following the ingenious shopkeeper's conviction, collectors of ancient plate were rather chary of resorting to any but long-established dealers of reputation wholly above suspicion, or of purchasing at auctions any plate that did not possess a positively unimpeachable pedigree. To judge, however, from the prices realized at a sale of old family silver and silver-gilt plate, which recently took place at Messrs. Debenham & Storr's, the antique silver market has recovered its tone, the unpleasant escapades of the past have been forgotten, confidence has been restored, and lovers of old plate are once more enabled to follow, undismayed, their beloved pursuit of collecting. The competition at Messrs. Debenham's was, it is stated, most active, and the sums at which the various lots were adjudged to the highest bidders afford matter for much curious reflection. For example a "fine old two-handled stirrup cup and cover," weighing a little less than 66 ounces, went for £124 17s. 6d., being at the rate of 38s. an ounce. The intrinsic value of this stirrup-cup is £16 10s., but the "fashion" is doubtless very fine; or perhaps the rare old tankard has a history of its own, and may have belonged to some personage famous in English history.

An antique silver waiter of George I., weighing 24 ounces, fetched £29; and a silver waiter of William III., dated 1698, weighing less than 10 ounces, was adjudicated at £15 3s. 6d. It should be worth every penny of the money which it brought, and more. Just as we owe the excellence of our Charles II. silver to the close intercourse of England with France during the reign of the Merry Monarch—an intercourse which enabled the English goldsmiths to study the works of the famous Jean Berain, the "orfèvre" in ordinary to Louis XIV.—so should William III.'s silverware be extremely precious to English collectors from the fact that the Protestant champion brought with him from Holland a certain Huguenot artificer by the name of Marot. This excellent designer, whose works have been described as "an inexhaustible treasury of models for gold and silver" had been originally the architect of William of Orange, and his early architectural pursuits probably led to his designing those candlesticks in the form of Corinthian columns to which the name of "Queen Anne's" are popularly given. Marot died in 1702, but he was undeniably the exemplar of the splendid silversmiths of the Queen Anne period. The silversmiths of that Augustan age were likewise materially aided in their advances toward excellence by the number of celebrated French engravers who came over to England to execute the plates for the great National work illustrative of "the Wars of Marlborough"; an artistic enterprise projected, oddly enough, by the Frenchman Dubosc. Nearly all these engravers were likewise designers for gold and silversmiths, and many had been, like William Hogarth, engravers of silver plate, and even chasers thereof. No Queen Anne's ware seems to have been brought forward at this notable sale in Covent Garden; but a George III. "small antique coffee urn," weighing a little over forty ounces, was sold for £43. An Elizabethan chalice and cover, dated and hall-marked 1573, weighing less than nine ounces, sold for within a shilling of 18 guineas, say 40s. an ounce, a very reasonable price, as were, indeed, most of the prices realized. Genuine antique plate is an exceedingly scarce and precious commodity, and must be paid for in proportion to its beauty and rarity.

The Sympathetic Action of Clocks.

HUYGHENS was the first to observe that two clocks placed upon the same board, influence each other reciprocally. This sympathetic action has frequently been observed since. Ellicot, a celebrated English watchmaker, found that two clocks, placed upon the same support, and having kept the same time for several days, showed variations of 1 minute 36 seconds, when separated. Each clock had therefore exerted an influence of 48 seconds.

Th. Reid cites a case of two seconds clocks, placed at the distance of 60 centimeters one from the other, upon two pine planks, of 1.80 meters in length, 15 centimeters wide and 4 thick, substantially fixed against the wall. These clocks kept a uniform rate for over a year; when a period of great cold occurred, they showed a slight deviation for a few days, finally to agree again. One of the clocks having been replaced by another one different by a trifle, it was impossible to make them go together, and none of them could be regulated. If one of the original clocks was stopped, it put itself into motion in a short time; its oscillations occurred in an inverse direction to those of the other one, that is, the bobs approached or repelled each other. The influence ceased when the supporting plank was sawed across between the two, and it is natural to suppose that the motion was communicated from one clock to the other by the planks, which vibrated in unison. It is an effect of the same kind when a pane of glass resounds under the influence of the human voice or a musical instrument, the air in this case, however, acts as intermediary, and conducts the sound wave.

The conclusion to be drawn from these curious phenomena is that a clock, of which great precision is expected, must never in any way stand in communication with another one, and if it be not possible to remove them far apart, all intermediate connections must be severed, especially a body susceptible of vibration. The observation is general, and is as true for watches as for clocks.

Another conclusion may be drawn from the above: to put as great a distance as possible between the weights and bobs. If too close together, a sympathetic action will be established between them, the weights entering into vibration with the pendulum, which at times attains such proportions as to injure and arrest the motion altogether. Even it be but insensible, there nevertheless exists a certain influence of one upon the other, of sufficient moment to injuriously affect the rate, when the weight arrives at the same height with the bob.

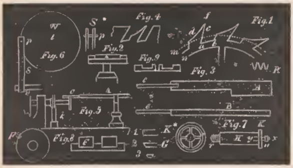
A number of suppositions to explain this cause were made, until F. Berthoud conclusively shows that the effect is entirely due to the air, which, being displaced by the bob, in its turn acts upon the weight, and communicates the impulse. It is sufficient to enlarge the clock case, and the reaction will have disappeared.

The precautions necessary to prevent this cause of irregularity therefore consist of: 1. To horizontally remove the weight from the bob; 2. To use large cases; 3. To put a great distance between the pendulum suspension and the cord drum.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

IN MY last I promised to give the details of finishing a chronometer scape wheel and detent. After the teeth are cut, a piece of bell metal or soft grey cast iron, shaped like the cutter, or perhaps it would be better to say, of the same curve on the edge as the cutter, for it is the hollow at the back of the tooth, which should be finished first. At Fig. 1 is shown an enlarged plan of a portion of a chronometer scape wheel, and the part to be first finished is shown at *d*. A piece of bell metal about 1¼ inches long, and presenting a convex surface to match *d*, is attached to a brass holder shaped as shown at Fig. 3, in which *A* is as if seen from above; it should be about 3 inches long, ½ inch wide at the widest part, and fully ⅛ of an inch thick. *B* shows the same piece seen horizontally. In making the bell metal slips, care must be used to shape them like the cutters used to cut the teeth in the first place; a good way to arrive at this is to cut into a soft piece of steel with the cutters, as shown in Fig. 4; this can be hardened and used as a guide, and if the flat side is ground so as to present a sharp angle, it can actually be used as a scraper to shape the bell metal slips; but this is not desirable, as the inclination necessary to make it cut changes the curve. In grinding the concave *d*, the tool should not be permitted to touch the face *c* of the tooth back of it. At Fig. 2 is shown a **T** shaped piece, which goes into the tool rest holder; by moving it up or down it can be brought in line, and by means of the spacing apparatus already described, it can be brought to conform to curve of the tooth. In this, as in all other matters, good judgment and good sense are the great guides. In setting the bell metal slips in *A*, care must be used to make them perfectly in line. Fig. 5 shows a front view of the lathe and the grinder *A c*, in place, also the plan and position of the **T** shaped piece. The idea is the small end of bell metal, which is to do the work, is kept from tilting and turning by the **T** shaped piece. In using, the end *c* rests lightly on the work, while *A* rests on *i*, Fig. 2, between the two guides *h h*, and is carefully rubbed back and forth in the direction of the axis of the lathe. Oil stone dust and oil is about as good an abrasive material as can be used. To repeat a word of advice given in last number, if the cutters are accurately and carefully made and used with oil, but very little grinding will be necessary. Of course the reader will understand that each tooth must be ground separately, shifting the spacing apparatus as in cutting. The convex surface of the wheel from *a* to *b*, as well as the face of the tooth *c*, is to be ground with a slip which will just fit the cut *g*, Fig. 4; of course this grinding is only a repeat of the first except that care must be taken to remove just as little from the point *f* as possible. Of all things do not let your finishing destroy your accuracy. After the grinding is complete, the work should be cleaned with bread crumb, also the bell metal

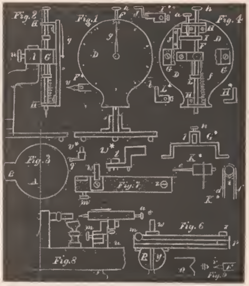


slips and then the polish can be given by diamantine and oil; grinding the diamantine and oil on a hard steel lap with the blade of a pocket knife. In grinding and polishing the points of the teeth (*f*) should not come to a perfect edge, if seen with a high magnifier, but present a small cylindrical surface, say three or four minutes of a degree; and it is a pretty good test of the accuracy of your work if all these spheres are of exactly the same size. If the novice should hesitate about using diamantine to polish with, on account of its leaving grit in the brass, he can substitute charcoal dust and oil; this substance does not produce a high polish, but it leaves a surface as fine as could be desired, and free from grit, and as fine a polish as you please can be given to the rest of the wheel. To enable those who do not wish to go to the trouble and expense of the double dividing wheel and endless screw described, I will give now details for making a dividing wheel for cutting scape wheels, which, if carried out carefully, will produce a scape wheel almost absolutely perfect. Most chronometer scape wheels have 15 teeth (if another number is required, all the change necessary will suggest itself to the reader). Take a 60-tooth wheel from some old Yankee clock, and mount it as directed for the 96 tooth wheel. Make a double wheel of No. 14 brass, 1½ inches in diameter, and after turning it off carefully cut sixty teeth in it with a V shaped cutter, with an angle of about 30 degrees; let the teeth be shaped as shown at *R* in Fig. 6. After the teeth are cut shift the wheels half way round, as described in previous number, screwing them together. The pawl which works into these spaces is of peculiar shape and shown at *s*, Fig. 6. The end which works into the wheel *W*, is double, with a round wire to go into the teeth. It is essential that the center of the lathe *l*, the wire *p*, and joint *v*, should form a right angle. Such a spacing wheel, if anything like carefully made, will not give an error of one minute of a degree. The arbor on which a scape wheel is cut should not be less than the diameter of the wheel at the base of the teeth, so that neither the cutters nor the polishing tools will touch it; about the best rule is to let it be of the size of the inside of the rim of the scape wheel shown at *n*, Fig. 1. It is not to be supposed that these introductions are for manufacturing purposes, but merely the details of a method by which we can produce an occasional wheel of first-class finish and accuracy. The manner of making an arbor for holding a scape wheel to be cut is shown at Fig. 7; *H* represents a piece of large brass wire (about the size of the arch *n*, Fig. 1), *r*, the screw which goes into the lathe, *y* the pin on which the scape wheel blank goes; this is best made of steel and inserted; the end of this is cut with screw thread, and the nut *x* holds the scape wheel blank in place; *u* represents the scape wheel. A very good way is to dispense with the steel pin, and turn down the end of *H* small enough to go into the hole in the center of the scape wheel. The pin on *H* should not reach quite through the scape wheel blank. If now one side of the blank is tinned with soft solder, and the same thing done to the end of *H*, where the wheel goes, taking care to brush off all excess of solder, the blank can be soldered to *H*. The only care being to have the face of *K*, (which represents the scape wheel blank) and the shoulder of *H* come perfectly in contact, letting the solder just hold them together, not fill any spaces, and when in the lathe, a slim, sharp pointed tool is applied, as shown at the arrow *z*, Fig. 7; it will cut a small groove, as shown by the inner circle at *K**; this will be your guide in forming the circle *n*, Fig. 1, which is where the arms connect with the rim of the wheel as shown at *K***. And when your wheel is complete except the arms, and unsoldered from *H*, two or three rubs on a fine file will remove all the solder and leave the groove distinct, and then lay out your arms, and cut a line on each side with a fine groove to work to. After your arms are cut, the groove should be polished out. But before the wheel is removed from *H*, and after the teeth are cut and polished, they (the teeth) should be protected by shellac. Take thick shellac, dissolved—so thick that it is like molasses—and paint over the teeth, burning off the alcohol with the lamp; a good heavy coat should be applied, and to do this it will take two or three burnings. The shellac should be hard and firm; the use of it is to prevent burr. Now, with a sharp tool turn out the face of the wheel until shaped as shown in section at Fig. 9, in which *j j*, represents the sunk portion, and the dotted lines correspond to the dotted line *m*, Fig. 1. At *G** is shown the shape of the tool used; 1 is a plan looking down, 2, an edge view, 3, an end view. In turning, the tool must be very sharp and the work go slow. At Fig. 8 is shown a bell metal disc, which is used to grind with oil stone dust the recess just turned. Clean with bread crumb, and polish with diamantine and oil. If the turning is carefully done, the shellac will prevent any burr but what will polish off. If you are very particular, the center can be turned out with a slim tool, destroying the pin on *H*. In this way any little error which might exist is corrected, as it is evident that as the wheel was turned in the lathe, and the teeth cut in the lathe, now with the center turned out it must be very near true. After *j*, Fig. 9, is recessed and polished, the wheel should be unsoldered, and after shellacing the recess, cut out the arms. The object in shellacing the recess is to avoid the file used in cutting the arms from raising as much of a burr as would be the case if unprotected. The inside of the arms can be ground and polished by hand, only taking care to make the work as true and square as possible. Shellac again on the arms, and grind off the back and polish with a tin or zinc lap with diamantine and oil. The face is only a repeat of the back. A little trouble may be experienced to get a perfect polish to the faces, but if they do not come perfect you have left some grit somewhere; this can be avoided by taking the faces direct from the fine file to the tin lap and diamantine.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

AN *erratum* should be made in the last article; in line 29, page 50, between the words "jewel," "protrude," insert "guage." The instruments for getting heights spoken of in our last is shown in front elevation at Fig. 1, and side elevation at Fig. 2. Fig. 3 shows a plan of the bed; this should be of thick brass (No. 8 or 9), and the round part (*A*) three inches in diameter, and the extended part one inch, and shaped as shown. The top of this bed should be finished flat and true. The upright piece *C*, is also of thick brass, and shaped as shown; it is fastened to the bed by screws and steady pins, and two bent angular pieces of brass as shown in Figs. 1 and 2. The dial *D*, Fig. 1, is of No. 16 hard brass and two inches in diameter, with a drop of one-half an inch. This dial is divided into 500 spaces by the same method as was given for the micrometer calliper dial; indeed, the same spacing will do, only halve them. A piece of steel wire about $\frac{1}{10}$ of an inch in diameter and three inches long is shown at *F*. (Fig. 4 shows an enlarged rear view of the dial to which all the movable parts used in measuring are attached). The piece of steel wire *F*, moves up and down half an inch, and by means of a hand it works, shows $\frac{1}{1000}$ of an inch on the dial. Measurements



of height need not be near as accurate as those of pivot and wheel diameters, consequently, $\frac{1}{1000}$ is quite close enough. The bar *F*, is drilled at the lower end to admit of a point being screwed in, an enlarged view of which is shown at *F**; these pieces shown at *v*, are hardened to a spring temper, and turned by putting *F* into a back rest as described in former number. There should be two or three sizes of *v*, as it is intended that the point should go entirely through the lower hole jewel, so, of course, the points of *v* should vary; this however, will be mentioned farther along. The bar *F* works through two bridges bent at right angles, as shown at *H H*, and also separately at *H**; these serve as guides. There are two loose pieces which go on *F*, and are held in place with small set screws; the upper one shown at *I*, Fig. 4, serves a double purpose: it first prevents the turning of *F*, and next, by means of the stop screw *a*, regulates the up and down motion of *F*. At *I** is shown a view separate, as if seen from above, and how it engages *J*, and prevents *F* turning. At *L* is shown another piece, which goes on *F*; this is also shown separate at *L**. The positions are indicated in Fig. 4. The use of this piece *L* is to attach a short piece of fuzee chain to. At *K** is shown a small steel arbor; this arbor by the pivot *c* carries the hand *g*, Fig. 1; this arbor should be scant $\frac{1}{32}$ of an inch in diameter. At K^2 is shown a transverse section of the arbor *K*, and *i* represents a stud, into which two short pieces of very small fuzee chain are attached, as shown at *c d*; one of these chains fasten to the piece *L*, and the other to a weak spiral spring shown at *f*. The reader will see that the spiral spring will cause *K* to revolve and pull up *L* until *I* strikes the screw *a*, Fig. 4. We will suppose, to illustrate, that the button *h* on the bar *F* is pressed, and that the point of *v* strikes the bed plate *A*; the piece of fuzee chain *d*, has been drawn down, and *c* been carried up; if the pressure is removed from *h*, the bar *F* will run until *I* strikes *a*, which should make a full revolution of the hand on the dial. Now to use our instrument; suppose we wish to get the measurement for an ordinary anchor lever balance staff, we remove the upper bridge and select (by measurement) a point *v*, which is small enough to go easily through the lower jewel hole; we leave the lower cap (end stone) on, and lay the lower plate of the watch on the bed plate *A*, with lower hole jewel of the staff immediately under *F*; we now press on the button *h* until *v* passes down through the lower hole jewel, and strikes the cap or end stone; the hand *g*, on the dial *D*, moves on the pivot *c* with only a slight friction (enough to make it secure, however); it—the hand *g*—can now be set (while *v* rests on the lower cap jewel) to 500, or we may say 0, as it is as well the commencement as the end of the divisions; now let *h* (or *F*) rise, and by means of the screw *a*, bring the point of *v* so it just clears the lever fork; this is the height of the roller, then by the center wheel get your balance height—of course, you have to keep retracting the screw *a*. Next remove the plate of your watch, and screw on the upper bridge (cock), first removing the cap jewel; *v* should now just touch the upper surface of the upper hole jewel, allowing what the jewel is sunk for end shake. At *G** is shown the edge view (looking down) of the piece which fastens the dial and its parts to the upright piece *C*; *l* is a socket, *n* a set screw; this socket goes down to a shoulder on *C*, so as to ensure its going to place. The dial and socket (*l*), now can be removed, and take its measurements to the lathe. This is accomplished by having a piece which swings, and crosses the dial around out of the way, and also permits of its being swung back and measured instantly; indeed, quicker than a pair of callipers can be picked from the bench and used. At Fig. 6, is shown an elevation of the parts which attach the measuring apparatus to the lathe; these consist of two bars of brass or iron about five inches long, one inch wide, and ¼ thick to ensure steadiness. These bars lie horizontally and at right angles to the lathe bed. The lower one (*r*) fastens to the lathe bed by a screw shown at *y*, Fig. 6, and extends back to where it terminates in a raised piece *p*; the upper bar *s* swings on the screw *z*. At *u*, the lower bar (*r*) has a lug projecting upward, against which the screw *m* strikes; and between *s* and *r*, at *u*, is a block of the same thickness as *p*. At *w** is shown a piece seen in the direction of the arrow, Fig. 6; this piece fastens to *s* with the screw *t*, and has also two steady pins; the socket *l* shown at *G**, goes on to *w*, the same as on the upright piece *C*, and fastens with the screw *n*. To use our new attachment we first get our measurements as above described; then fasten the bar *r* to the lathe with the screw *y*. At Fig. 9 is shown, at *Q*, the wax chuck, and *v* in the position it should occupy; if we push *h*, the point *v* goes down to the bottom of the cone, and we set the hand on the dial at 0, or bring it to 0 by the screw *m*. The reader will see that the measuring apparatus can be swung away by turning on the screw *z*, so as to put it out of the way in the rear of the lathe, while the bar *r*, and screw *y* will not interfere with the tool rest *P*. And at any time measurements are to be taken, *s* can be swung around into place, and must come every time alike by means of the stop screw *m*. The piece shown at *w** turns on the screw *t* a little, but no side shape should exist except to the steady pins, which have holes oval; the use of this will be understood by inspection of Fig. 9; it is intended that *v* can swing off to one side, as shown at the dotted lines, to enable us to measure to shoulders, as, for instance, where the balance goes. There should be pieces fastened to *r*, so that it can be taken off or put on instantly, and line up with the centers, except the swing shown at Fig. 9. At *v** is shown a point which goes into F for inside measurements, such as pinion lengths, etc.; of course the reader will understand that the length of the part q will have to be added to the length shown on the dial, but as this is a constant size, it will be no trouble to add it. This piece (v^*) can also be used to determine the height of cylinder in reference to a scape wheel pinion; the height taken to the bottom of the cylinder throat, with allowance for end shake, shows the bottom of the scape wheel; the difference between the throat and scape wheel jewel tells the length of the pinion. Practical illustration of how to use this instrument will be given in our next.

Superstition Attached to Gems.

THE belief in the magical powers of the jewels is perhaps the most poetic of all superstitions created by human phantasy. If the ardent youth imagined himself protected against the wiles and craft of his enemies, by a talisman in the shape of hair, or picture, or ring, etc., of the goddess of his heart, it was, without doubt, a purer and more æsthetic belief than other contemporaneous ones; it was a matter pertaining to the purer sentiments of the heart.

How charming is the belief in the supernatural powers of the fiery-red ruby, the delicately-blue sapphire, the bright green emerald, that they could ease the love-stricken breast, when compared with the horrible powers ascribed by superstition to objects once owned by suicides, executed criminals, etc., that the future possessor could continue to rob and murder without fear of detection! The majority of these myths, of course, originated during the ages of antiquity, the time when "poetry's enchanting fold enveloped still the truth;" and, strange to say, the diamond, although the chief of jewels, from his cold glitter, never conjured up poetic veneration, but simply awe and wonder. From the first, it was merely held the representative of so many dollars and cents.

Amber was one of the most valuable jewels of antiquity. Many fables covering it exist, of its properties, origin, and manner of obtaining. According to the mythology of the Greeks, the tears of the sisters of Phaeton, which they shed upon his grave after his fatal sun drive, turned into amber. A Roman author declares them to be the perspiration of the sun, which run into the ocean, there harden, and land on the coast of the Allemani (Germans). Plinius and Tacitus, however, already hold that amber is the hardened sap of a tree, and the latter bases his argument upon the fact that insects, bugs, and parts of plants, are sometimes found in it enclosed, while Pliny even mentions lizards! Until now, 1,041 different kinds of animals have been counted, enveloped in amber. Since such pieces, although not very rare, are in great demand, much fraud was committed by producing them artificially; bugs, little fishes, etc., were inserted from the earliest times, and the lizard of Pliny undoubtedly belongs to the same category. Although the resinous nature of amber being plainly visible, yet there were not wanting disbelievers in the last centuries. George Agricola, in 1546, ridicules the idea; "How can amber emanate from trees, and be thrown out by the ocean, when the sea does not contain any?" and declares it to be sulphur or bitumen.

As for the amber tree itself, the most widely different beliefs existed. Pliny classifies it to the firs; Aristoteles says it is a poplar; Mithridates, a cedar. Finally, the tree mentioned in Genesis as the "Tree of Life," was held to produce the amber, and Paradise was therefore located near the German ocean.

Homer understood the virtues of amber, viz., to become electric upon rubbing, and consequently called it electron. He thus describes a necklace in the Odyssey:

"Golden, electron ornated, to helion refulgent comparable,"

and the word "electricity" originates from this peculiarity, which was the first property of amber that attracted man's attention. The ancient, of course, could not understand the mystery, and the celebrated Greek philosopher, Thales of Milet, 640 B. C., maintained that amber is possessed with a soul.

Its source as well as the way thither was invested with the most terrific and horrible of fables by the Phenicians, by whom the sale of amber was one of their chief staple branches. The sea thither was as thick as jelly; the ship could barely make its way through the slimy water, covered with rushes; terrible sea monsters lurked within them, everywhere threatening death and destruction. At the place where found, the noise made by the rising of the sun, was plainly discernible, also the forms of the gods, and the halos surrounding their heads.

The inhabitants on the shores of the German Ocean, who at first were unacquainted with the value of amber, and used it for feeding their fires, soon became alive to its importance, and a brisk trade ensued, at first for bronce articles, which, after the lapse of 2,000 years, are frequently found in the soil of those regions at the present day.

A Roman knight, sent by Nero to those regions to collect amber, returned to Rome with 6,500 kilos, and a few days afterward everyone appeared adorned with amber in the circus; Nero, also, possessed a table, the plate of which was composed of it.

Amber was endowed with manifold sympathetic effects; it was a talisman against rheumatism, neck and tooth aches, its special curative powers, however, were confined to diseases of the eye. The Turks believe to be fully insured against the injurious effects of nicotine by an amber mouthpiece of their pipes. The Estians were rendered weapon-proof by an amulet in the shape of a wild boar.

New Books.

WE HAVE received from the publisher, A. Fischer, London, a copy of a work entitled "Modern Alphabets." It consists of a series of ornamental letters, in one or more colors, from original designs by Martin Gerlach, one of the most celebrated designers of Europe in this line of work. Each letter is a study in itself, elaborate and elegant in all details. These letters are especially intended for the use of engravers, and will be found of great value to those who use them. Electros of any of the series will be furnished on application to H. Horend, of this city, who is the agent for the work in this country.

One of the most important works on Monograms has recently been published by A. Fischer, of London, the designs being by Martin Gerlach. It is in convenient sheets for the portfolio, and its production has, doubtless, entailed great expense upon both the designer and publisher, for it is one of the most elaborate works in this line ever published. It embraces every style of lettering, combining the various letters of the alphabet in the highest forms of artistic ornamentation, many of the monograms being especial studies in themselves. Among the monograms contained in this work are the crests of many noble families in Europe, and some even that are used by royalty itself. The greatest variety of combinations of letters are presented in this work in a manner that reflects great credit upon the artist, and cannot fail to be of immense value to the trade. There are also included in the work many beautiful devices designed for special trades or callings, the symbols of such occupations being gracefully blended to form a unique and tasteful trade mark, or design for letter heads. The crowns and coronets of ancient and modern kings and rulers are likewise accurately illustrated, the whole forming a work of 110 illustrated pages, unique in its character, and interesting and valuable to all art workers. This work is for sale by H. Horend, of this city.

We have received from the author, Mr. F. J. Britton, editor of the *British Horological Journal*, a book entitled "The Watch and Clock Maker's Hand Book." This book is already favorably known, the edition now presented being its fourth, it having been so well received as to demand republication. The author is a scientific and practical watchmaker, and has a happy faculty of imparting to others, in plain, terse language, the information he has obtained. The work treats at length upon numberless topics identified with the art of horology, and in fact presents a great variety of valuable information upon points that arise daily in the experience of every watchmaker. Mr. Britton is well known as a writer upon horological subjects, and the "Watch and Clock Maker's Hand Book" is an important contribution to the literature of that science.

A Review of the Different Escapements.

(*Concluded.*)

[Translated and compiled from the French, for THE JEWELERS' CIRCULAR.]

Other Free Escapement of Gontard, Fig. 13.—This escapement differs from the preceding in that its arm *c* is movable upon the anchor staff. A balance spring whose stud is upon the anchor at *r*, holds this arm in repose upon pin *k;* the anchor itself is in banking upon screw *l*, against which the pressure of tooth *a* constantly holds it banked;. the action is the same on the vibration of going, but upon return, the anchor does not stir; the unlocking finger passes by, causing the arm to give way, which thereupon returns to its position by the force of the spring. The needle is of gold; it goes without oil.

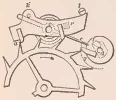


FIG. 13.

Arnold's Free Escapement, Fig. 14.—The scape teeth have their extremities raised up, as will be seen in the side view, intended for a double duty; the unlocking occurs by the motion of detent *e k* toward the center of the wheel, which enables this piece, which is very loose, to form the reposes by a draw in the direction of length, the resistance here being greatest; again, the impulse is given by large surfaces, which is another point of advantage.

The principal piece of the escapement is the detent spring, *e k*, secured by its foot to the plate, by means of a footpin and screw, with flexion center at *k;* the head of this spring braces with a slight pressure upon screw point *f;* this screw itself is secured against any

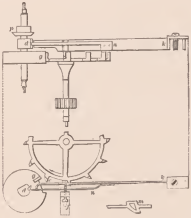


FIG. 14.

accidental displacement by a counterscrew, seen in the drawing. The face against which the tooth point braces is somewhat inclined to create a draw, a disposition to prevent the trembling of the spring; the detent carries a jewel *m* for the reposes; the unlocking finger *d*, does not act directly upon the detent, but rather upon a small spring, with crow's foot, *d u*, very loose, which, in one direction, when the balance is inactive, offers almost no resistance to the passage of the finger; but which, in the other direction, bracing against the head of the detent, transmits to it any impulse it receives from the unlocking finger; the balance, consequently, vibrates with full liberty in two directions, except at the times of unlocking and lifting; the small disc *d*, firmly driven upon the balance axis, is cut, as will be seen in the drawing, in order to be seized more easily with pincers, when it becomes necessary to put the escapement in place; disc *p* is the balance shoulder.

Earnshaw Escapement, Fig. 15.—It has its scape wheel flat, which renders the making easier. The unlocking of the detent takes place from within to without, a disposition demanding the modification of the small spring and stops. The performance of the escapement in

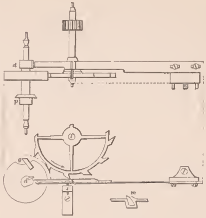


FIG. 15.

all other points is the same. It will be seen that the two holes through which the screws pass, fixing the detent foot, are oval, to permit a little motion, in order to put the escapement into order.

Robinson's Free Escapement, Fig. 16.—This escapement does not differ from Arnold's, except in the form of its wheel, which is analogous to that of a duplex; the long slender teeth are intended for reposes; impulses are given by raised pins upon the limb.

FIG. 16.

U. Jurgensen, Sr., a celebrated Danish horologist, has made great use of this sort of escapement, and the marine timekeepers which he produced, have recorded very good rates. Particularly to be cited is No. 73, of L. W. Jurgensen, a son of the former, whose daily rate for two years, while it was on a voyage, on sea as well as land, has constantly kept within +0.51 s. and —1.57 s. This piece was constructed on the same principles.

Roberts' Free Pivoted Escapement, Figs. 17 and 18.—The brass scape wheel is level, but the limb is hollowed out below, thus the teeth are thicker than the wheel. They are pointed, a little rounded at the end, and their anterior face inclined 30° backward; disc *g* and impulse finger *d* present nothing

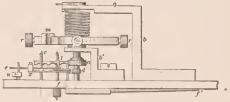


FIG. 17.

in particular; steel piece *e l*, forming detent, is movable upon axis *c;* a balance spring not shown in the figure holds its arm *l* on repose, against a pin on screwhead *u*, outside of the center; by turning this screw more or less, the pin advances or recoils by a small quantity, and the action of the escapement may also be thus regulated. This arm must be sufficiently heavy to retain the detent in equilibrium upon its axis. The other arm *c t*, of the detent, carries at *t* a ruby pin *t*, half-cylinder shaped, upon which the wheel makes repose. The detent arm is prolonged beyond, near to the unlocking finger, and its arm is bent back at right angles, as will be seen in the side-view figure, for the butting of the crow's-foot spring; this spring is of gold; the acting part, extremely flexible, does not differ in form from those already described; the foot alone has a peculiarity worthy of notice; it is flattened and bent at right angles, to put on flat from above the detent at x, where it is held by a screw. This part is not alone pierced, but also rounded, in order to remove the spring at pleasure, without entirely removing the screw.

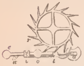


FIG. 18.

Horologists are not at all of accord whether preference is due to pivoted or to spring detent; each one of the systems has its partisans, and each one has given most excellent results, when they have received fair treatment at the hands of artisans.

The four kinds of escapements above described are almost exclusively used in marine timepieces, and are all directly derived from the free escapement of Pierre Leroy; the names by which it is convenient to designate them, are those of the artists who have either perfected single parts of them, or who have succeeded in adopting a different and peculiar arrangement, which have been named by their names. All the figures have been traced with great care, to enable watchmakers to take up any one of the escapements to serve as models for execution.

RULES FOR THE CONSTRUCTION OF FREE DETENT ESCAPEMENTS.

The scape wheel is either of pure brass, or of brass alloy, or gold, silver or a gold alloy. It is deepened either on one side or on both sides, the teeth thus presenting a greater thickness than the body of the wheel; beside this, the latter is kept as slight as possible.

The rubbing tooth surface must have sufficient dimensions.

Their acting faces must present an inclination of 30° with the radius.

The diameter of the lifting roller is equal to double the interval between the points of two consecutive teeth.

The flat jewel faces upon which are made the wheel reposes, must be inclined in a manner to produce a draw of 5°.

In the Arnold escapement, the ruby forming the lifting must point to the balance axis; in all others, the lifting must be at an angle of 30° with the radius.

When the wheel is at repose, the two teeth which embrace the lifting roller must be at an equal distance therefrom, and have very little shake.

A very slight amount of tooth drop is necessary upon the lifting at the moment of unlocking. This quantity is increased a trifle in pocket chronometers.

The unlocking finger must abandon the small spring when the tooth has passed through half its course.

The lifting must be 40°.

The reposes of the detent-spring must be placed at nearly three-quarters of its length, starting from the foot, or, to be more exact, at the point where the drop upon the repose is most free from trembling.

The spring detent must be very small and flexible, but yet have enough strength to promptly return to its repose after an unlocking. The smallest portion must be near the foot.

The spring detent must be of steel; the crow's foot must be either of pure or alloyed gold.

It is useless to put jewel holes in pivot detents.

The unlocking finger, lifting, and repose of the scape wheel must be of jewel.

FINAL OBSERVATION ON ESCAPEMENTS.

It is well known that free escapements in watches give the highest possible degree of exactness in their rate; but the same principle does not apply in clocks; certain horologists go so far as to proscribe entirely this escapement, as mediocre and complicated; others persist in supporting that, if well executed, it may sustain a favorable comparison with other escapements, and this opinion is upheld by that eminent English horologist, Th. Reid. Be it as it is, the question is still an open one for clocks.

The repose escapements, either anchor or pin, are almost exclusively used for astronomical regulators, and experience has shown that they can go for many years without an apparent wearing, due, undoubtedly, to the lubrication with oil, and that the arcs of amplitude vary very little, due to the effect of the reposes, where the pressure diminishes unceasingly, owing to the weakening of the train force; thus that, if the necessary proportions have been observed, and if the escapement is in good order, the clock gains by this as much as it loses by the defect of the impulse. This is the secret of the superiority of the repose escapements, especially for long rates.

No trials have yet been made to make repose escapements go without oil.

The escapements most employed for watches for common use are the following, and they are classed ordinarily in the following order, commencing with those of the best rate: 1. Anchor; 2. Duplex; 3. Cylinder; 4. Verge.

REMONTOIRS OF CONSTANT FORCE.

To complete the preceding remarks, we will describe the more or less ingenious designs called by the name of equalizing escapements, or constant force remontoirs, destined to replace the force of the train, necessarily variable, by an impulsion supposed to be constant, since it occurs at short intervals, and always in the same manner. We will, however, abstain from going into explanations, as it is well known to-day that this idea, although seductive in theory, cannot be applied in practice, and simply will lead to deceptions. No remontoir is worth a good escapement.

As far as clocks are concerned, certain artists admit that the remontoir may with advantage be used in certain cases; for instance, house clocks with ressort (spring) escapement, traveling timepieces, clocks of a large volume, where the motion of the hands occasions considerable friction, etc.

"No first-class artist," says Mr. Robert, "has made use of it in fine horology; not on account of ignorance, but because he saw the different defects. These defects are: 1. The increase in the work of the timepiece; 2. The greater force of the motor; 3. The increase in the points of contact, productive of variable results; 4. The inequality of tension produced by the same spring, in accordance with being wound with more or less force by the train."

To conclude, we will quote the opinion of one of the greatest watchmakers of the last century—F. Berthoud, who expresses himself as follows in one of his works:

"If it had been desired to give to clock No. 2 all the perfection which it was capable of receiving, a beginning should have been made by entirely removing the remontoir, because it is defective, useless and hurtful, for the following reasons: 1. If the auxiliary spring is not wound up each time exactly at the same minute, it will have less force; now, the fly which regulates the speed of the winding, turns more or less slow in proportion to the inequalities of the mainspring fuzee, by the friction of the mainspring, the unequal tenacity of the oil, and the inequalities of the depthings, 2. The experiments of which I have spoken above prove the uselessness of the mechanism; 3. The remontoir may be hurtful, because the effects of its detents are less sure than those of the train alone. The mechanism, beside, causes an augmentation of work, and much difficulty in the execution."

[THE END].

Coloring Metals.

METALLIC objects may be colored by immersing them in a bath formed of 640 grains of lead acetate, dissolved in 3,450 grains of water, and warmed to from 38° to 90° Fahr. This mixture gives a precipitate of lead in black flakes, and when the object is plunged into the bath the precipitate deposits on it. The color given depends on the thickness of the skin, and care should be taken to treat the object gradually, so as to get a uniform tint. Iron treated thus acquires a bluish aspect like steel; zinc, on the other hand, becomes brown. On using an equal quantity of sulphuric acid instead of lead acetate, and warming a little more than in the first case, common bronze may be colored red or green with a very durable skin. Imitations of marble are obtained by covering bronze objects warmed to 100° Fahr., with a solution of lead thickened with gum tragacanth, and afterward submitting them to the action of the above-mentioned precipitate of lead.

The Pendulum, Methods of Suspension, Etc.

THE first conception of the application of the pendulum to clocks must be credited to Gallileo, but to Huyghens is due the honor of being the first one who practically applied it. Thenceforward dates the marvelous success in the precision of clocks, and their being adapted for astronomical purposes. The progress of modern art has not been able to add anything to the contrivance beyond a few trifling modifications.

Shape.—Two important points must be kept in view for giving the pendulum a suitable shape, viz., that it shall overcome the resistance of the air, and, to produce the greatest regulating power with a given weight.

These two conditions are complied with by making the rod as light as is consistent with resistance against bending, and the bob of a heavy weight, compacted in as small a volume as possible. It may be flattened like the rod, in the direction with its motion, or cylindric. The best form for the bob to cut through the air, is that of two segments of a sphere united by their bases, thus as to present an equal thickness for two-thirds of its diameter.

Weight.—The pendulum will discharge its functions of moderating and mastering the variations of the train force, in correspondence with the weight it possesses. The only inconvenience connected with its ponderosity is an alteration produced in the suspension, or a disformation, or sinking, of the pieces.

The pendulums of regulators formerly weighed 40, 50, and as much as 60 kilog. We have returned from these exaggerations to-day, and confine the weight of the bob to from 4 to 6 kilog.; some artists even content themselves with 2 kilog.

Length.—Clement, an English horologist, was the first one to investigate the rate of clocks by applying long pendulums. In fact, their regulating force may be sensibly augmented by lengthening, while its shape and weight remain unchanged; and these means *may be used*, whenever other governing conditions offer no obstacles. In general, pendulums of less than 25 centimeters should not be made use of. The dimensions of the cases of some clocks for common use exact their being shortened to a length of even 10 centimeters, yet it is defective and injurious to the rate of the clock.

It is as yet an undecided question, whether their length may indefinitely be prolonged without injurious consequences. French artists hold that the seconds pendulum is the outside limit of length; beyond and below, there is loss. English artists, on the contrary, much exceed this limit, instances being quoted in which pendulums were made 16 meters long, with very satisfactory results. We are inclined to think that if the difficulty of compensation can be overcome, long pendulums decidedly offer many advantages, and their length should only be affected by the length of the case.

Amplitude of Oscillation.—In ordinary clocks, the extent of pendulum oscillations is generally confined between 4° and 8°, according to the height of the case, which does not at all times permit a longer one to be used. In clocks of precision, these amplitudes were formerly reduced to ¼ of a degree to each side of the vertical, in order to diminish any variations resulting from the changes in the motive power exerted upon the pendulum, changes which necessarily affect the extent of its arc, consequently, its duration of oscillations; but the least disturbance occasioned the stoppage of the timepiece. At present, seconds pendulums describe arcs of 1½° to 2° on each side of the vertical. The supplementary arc is about one-half of the lifting; thus, for an amplitude of 2° on each side, each supplementary arc will be ¼° (or more), or, 2¼° on each side, or 4½° in all will therefore be the extreme limit of amplitude.

PENDULUM SUSPENSION.

Three dispositions are in vogue to suspend the pendulum in clocks, and we will examine them in succession:

Knife-edge.—This manner of suspension allows most liberty of motion; F. Berthoud experimented with pendulums suspended in this manner, with a bob of 10 kilog., which oscillated for 30 hours by their own inertia, after having been diverted 10° from the vertical.

This disposition, however, is attended by the grave defect of occasioning variations of rate, because the knife, whose edge rests upon the plane of a groove, is prone to imbed itself, as well as to wear; and, again, its position in the groove is not absolutely stable, whereby the points of contact vary; wherefore the knife suspension to-day has been abandoned.

Silk Suspension, Figs. 16 and 20.—This method of suspension is in extensive use in horology, because of its simplicity; it complies well with all its functions. The cylindrical piece *a*, adjusted upon the plate, is pierced with two holes, through which the ends of the suspension thread are passed; it is always of silk; one end is

Fig. 16.

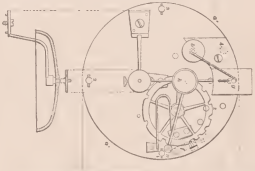
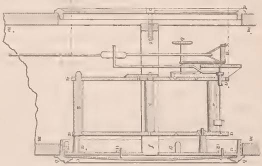


Fig. 20.



stationary, the other is wound around the button *b*, turned by the hand to lengthen or shorten the suspension. The axial end of this button is fixed within a collet fastened to the plate by a bearing piece, which produces the necessary friction.

By another arrangement, the stem of the button passes through the plates, and ends with a winding square through the dial, which permits the suspension to be regulated from the front. This disposition is the most commodious.

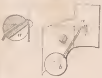


Fig. 13.

Fig. 13 represents a silk suspension contrived by Mr. H. Robert, one which fulfils a condition generally neglected in common pendulums, by placing the flexing point of the thread upon a prolongation of the anchor axis. Part of cylinder *a* is removed, and it is upon the anchor of this face, placed exactly into proportion with the fork's axis, that the movement of oscillation occurs.

Spring Suspension.—This method of suspension was first employed by Clement, an English horologist, who made use of a single blade. Two are employed to-day, kept a little apart, in order to prevent any tendency of the pendulum to twisting. Spring suspension is exclusively employed in costly clocks; it is connected with some difficulty of constructing, and does not permit the pendulum as great a liberty, but these slight inconveniences are amply counterbalanced by the fixity and justness of the mechanism.

Brocot's Spring Suspension, Fig. 21.—*l l'* are two very thin and flexible spring blades, firmly enclosed by their two ends between two little brass plates *m m'*, which hold them securely. The two upper plates *m* are traversed by a pin, forming the *point d'appui* of the suspension; this pin plays freely in grooves worked into mountings *b*, fixed to the plate; the pendulum thus assumes its *aplomb* of itself. The two inferior plates carry another pin, to which is hooked the end of the pendulum rod. Piece *a*, called pinch-blades, embraces the two springs with gentle friction, and moves vertically by means of a long screw whose head carries a toothed wheel *d*, engaged by another wheel *e*, the axis of which ends by a square through the dial. This disposition permits the raising or lowering of the pinch-blades, and consequently the point from which flexion takes place. The pinch-blades glide between the two mountings supporting the suspension. In the side view, at *a*, will be seen how effects are obtained in a manner both simple and exact, by means of slots opened into this piece. Blades cc', by virtue of their elasticity, lay themselves closely against the faces of the mountings, and suppress all manner of shake, even if the faces should not be rigorously parallel. The center slot gives passage to the suspension blades. At *a* will be seen that the screw box is slotted horizontally. This is for the purpose of preventing the dead motion (*temps perdu*) of the screw, and to correct wear; it is sufficient, in effect, to open or close the slot to fasten the screw threads against those of the screw box. At a'' will be seen another method to obtain this effect, but it is less sure.

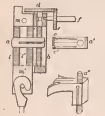


FIG. 21.

Screw *d* turns upon itself, without displacement, by means of a bolt pin not shown in the cut, its end penetrating into the neck contrived into the staff below the wheel.

The single objection which might be raised against this contrivance is the variation of the point of suspension, which here is movable with the pinch-blades. This inconvenience does not exist in the two dispositions we are about to describe.

Robert's Spring Suspension, Fig. 15.—Pinch-blade *a* is firm; it is formed of two small plates reaching to the bottom of a square frame, and joined by two bolts. The regulating screw passes between the two superior plates *m*, and is kept in place by means of two pins cc'. It will be seen that this mechanism permits the modification of the length of that part upon the blades, without altering the point of flexion, which is always below the pinch-blades. It may be remarked that the downward pressure occasioned by the weight of the bob, is here counterbalanced by the repose of the screwhead itself upon the mountings, an arrangement which offers more security than the simple suspension pin of Brocot.

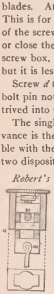


FIG. 15.

Vallet's Spring Suspension, Fig. 18.—Pinch-blade *a* is fixed, and its lower face always upon the axial prolongation of the escapement piece—a condition indispensable to a good suspension. The upper jaw receives the motion of a screw with long rod, which passes through its center, and which is kept in place by two bolts, to be seen at *c*. The lower end of the screw bears, for greater security, upon the fixed pinch-blades. The parallelism of the motion is regulated by the two steady-pins fixed to the upper jaw, and slide in grooves hollowed out in the pinch-blades, and next, by the screw itself, which must perform in a very exact manner.

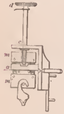


FIG. 18.

By an ingenious arrangement, the superior end of the screw staff carries a hand *d*, movable upon a dial, and outside the case, by which the clock may be regulated with facility from the outside. The dial indicates the quantity regulated for each minute advance or retard.

Suspension of Astronomical Pendulums.—When it is required to obtain the highest possible degree of precision, the use of the pinch-blades must be discarded, on account of the flexibility of the plates and the possible shake offered by them. A system of fixed plates is therefore made use of, like $m\ m'$, Fig. 15, and care must even be taken to line the brass plates *m* with others of tempered steel. A strong pin passing through the superior plates serves to suspend the entire contrivance, by permitting it to exactly assume its aplomb.

In the very careful suspensions, the blades are not secured to the plates by pins, but by screws, one at each end; the suspension charged with its pendulum is mounted in its place, which it shall occupy, and when the blades have assumed their position by the draft, the screws definitely fixing the entire arrangement are put into place. Such pendulums are always regulated from below. Each of the two blades has a breadth of from 5 to 8 mm., and an interval is left between the two of from 5 to 35 mm. The length of the free part of the springs must not pass beyond 6 or 7 mm. By English mercury pendulums, of which we will give detailed descriptions further on, breadth of the blades is 4.3 mm.; their thickness 0.18 mm.; interval 5.00 mm.; free length 16.00 mm.

In the suspensions of M. Winnerl, the blades have 3 mm. in length, 5 in width and 0.15 in thickness.

Conditions.—The blades of tempered steel must be uniformly strong and flexible; they must draw equally and be *aplomb*. Their adjustment must be such that in the oscillation motion they do not deflect. The point of flexion must occur rigorously upon the axis of the escapement piece.

A Romance of the Camera.

AN INTERESTING tale, with a variety of the most pointed morals, is told of a Brooklyn belle and her faithful admirer, a young gentleman well known in the jewelry trade in this city.

Last year the young lady in question and her mother were among the boarders at one of the large hotels at Asbury Park, and among the regular "Saturday-nighters" was a friend of the family—and especially of its younger female member—about whose punctual habits and rapt devotion no doubt was permitted to exist. Never a Sunday passed that was not spent in the young lady's company and a pair of uncomfortably tight patent-leather boots upon the sloping sands of the beach; while as the sun retired behind the western hills the young people would sit beneath the scrawny branches of a dyspepsia seaside cedar to watch the play of the rippling waves or the sails of the seaward-going ships. On such occasions, too, it may be imagined, words of love were whispered to the accompaniment of the mosquito's musical hum. Thus the summer passed away till the season closed, and the young lady returned to her residence on "the Hill," where her admirer could enjoy the rapturous charms of her society much more frequently and at a much smaller expense. Of this advantage he did not fail to avail himself, and all went merrily until recently the young man was informed that a photographer at Philadelphia possessed, and, indeed, had put on exhibition, an interesting photograph of himself (the Y. M.) and the lady, sitting on the sad sea-sands, backed by a halo of Japanese umbrella. This information being also conveyed to the young lady, she was greatly concerned, as she too had a vivid remembrance of the photographer's green van. Acting as her guardian or brother would have done under the circumstances, the young man induced the Philadelphian artist—through the use of a good deal of "laughter"—to destroy the negative and send him the pictures. With the precious pictures in his possession he hastened to the young lady's residence, and on being ushered into her presence announced his success by waving the package aloft and crying, "Eureka!" or words to that effect. After congratulations had been exchanged between them, the gas was turned up and the package was opened, the young lady being anxious to see that the photographer had kept faith with them. The young man took out the pictures—

There was a hoarse and utterly irrelevant remark, a shrill scream, the crunch of crumpling tin, and the slam of a vestibule door.

It was the young lady's picture, but the arm laid trustfully about her canvas belt was not his arm.

The picture had been taken on a week day.

Removals.

Victor Bishop & Co. will remove May 1st, from No. 47 Nassau street to No. 33 Maiden Lane.

L. Bornemann removed April 1st from 169 Broadway to 19 John street.

S. F. Myers & Co. will remove May 1 from 304 to 179 Broadway.

Fry & Schieber removed April 1 from 176 to 201 Broadway.

Van Moppes & Marx will remove May 1st from 9 Maiden Lane to 82 Nassau street.

E. Stites Sons will remove May 1st from No. 12 Maiden Lane to No. 14 John street.

Aug. Saltzman removed March 15th from No. 15 Maiden Lane to 69 Nassau street.

C. F. Terhune & Co. will remove May 1st from 16 Maiden Lane to 194 Broadway.

Saxton, Smith & Co. will remove May 1st from No. 15 Maiden Lane to No. 14 John street.

Alfred H. Smith & Co., diamond importers, will remove May 1st from No. 14 John street to No. 182 Broadway, corner John street.

Hagstoz & Thorpe will remove May 1st from No. 13 to No. 14 John street, (branch office).

The Sand Blast.

MANY are the wonderful and useful inventions of the present day, and not the least of them is the common sand blast. Let us suppose a piece of marble is to be lettered. Cover the stone with a sheet of wax no thicker than a wafer, cut out the letters, figures, or other ornament, leaving the marble exposed. Next pass it under the blast. The wax will remain uninjured, but the sand will have cut the letters, etc., deep into the stone.

If you desire to have raised letters, cut away the surroundings of the letters down to the stone, and by applying the blast, the sand will cut these surroundings away, leaving the wax-protected letters unscathed.

Take a piece of French plate glass, of convenient size, and cover it with fine lace, and expose it to the action of the blast sand. Not a fiber of the lace will be injured, but the glass will be worn away wherever it was unprotected by the lace, and its beautiful and intricate pattern will be found engraven upon it, upon removal of the lace.

Beautiful figures and devices of all kinds may thus be engraven upon glass at a comparatively small expense. Even while the sand is wearing away the hardest material, the workman may hold his hands into it with impunity; his hand, yes, but not his nails, else he would have none in a very short time. Even the protection of steel thimbles will do no good, they will be worn away very quickly, but a wrapping of soft cotton will protect them completely. The sand wears away any hard substances, steel, iron, even diamond, but leaves unharmed soft substances, the human hand, wax, cotton, or any other soft article.

The First Hour Glass.

A CENTURY after the final overthrow of the Roman Empire, the habit of reckoning by hours and minutes had completely disappeared from western Europe. One by one every vestige of art and science disappeared, and, had it not been for the kingdoms of the east, which kept the flame of science just flickering while the west was in darkness, our present system of horology would have fallen in complete abeyance. It was the famous Caliph of Bagdad, Haroun-al-Raschid, who restored the old water clock to Europe. In the year 807 he sent a magnificent clepsydra as a token of friendship to Charlemagne; but it seems that present was looked upon as a thing to be rather admired than copied, for we find no mention of any water clocks of French make until the reign of Philip, contemporary of William the Conquerer. Perhaps the reason of this is that the sand glass (sablier) had been invented in France shortly before the accession of Charlemagne, and that this last contrivance was judged more handy and simple than the other. The first sablier was made by the same man who re-invented the blowing of glass, after the secret had been lost for some centuries. He was a monk of Chartres, named Luitfrand, and the sand glass he made was the exact prototype of all those that have been manufactured since. It consisted of two receptacles of pear-like shape, joined by their slender ends. When the sand had all run out from one into the other, the lower glass was turned uppermost, and kept in that position till empty. Shortly after he had received the gift of Haroun-al-Raschid, Charlemagne caused a monster sablier to be made, with the horal divisions marked on the outside by thin lines of red paint. This was the first hour glass. It required to be turned over only once in twenty-four hours, and, if it was blown with anything like the care which modern hour glasses are, it must have kept time with as much precision as the best of lever clocks. Indeed, it is not rare to hear people declare, even nowadays, that the hour glass is the best timepiece that was ever invented.

Test for Gold.

THERE is a simple method for the detection of gold in quartz, pyrite, etc., which is not generally described in the mineralogical text books. It is an adaptation of the well known amalgamation process, and serves to detect very minute traces of gold.

Place the finely powdered and roasted mineral in a test tube, add water and a single drop of mercury; close the test tube with the thumb, and shake thoroughly and for some time. Decant the water, add more and decant repeatedly, thus washing the drop of mercury until it is perfectly clean. The drop of mercury contains any gold that may have been present. It is therefore placed in a small porcelain capsule, and heated until the mercury is volatilized, and the residue of gold is left in the bottom of the capsule. This residue may be tested either by dissolving in aqua regia and obtaining the purple of Cassius with protochloride of tin, or by taking up with a fragment of moist filter paper, and then fusing to a globule on charcoal in the blowpipe flame.

It is being shown that gold is much more universally distributed than was formerly supposed. It has recently been found in Fulton and Saratoga counties, New York, where it occurs in pyrites. It has also been discovered in the gravel of Chester Creek, at Lenni, Delaware county, Pa. In one of the Virginia gold mines wonderful richness is reported, $160,000 worth of pure gold having been taken from a space of three square feet.

Antique Gems.

IN THE search for antique gems, though there are many blanks, there are pretty sure to be a few prizes now and then, possibly in the shape of Greek work of the finest period, the age of Phidias and Praxiteles. It will be well, however, to explain to the reader what we mean by "antique gems." These are not to be found, perhaps, in a lady's treasury-casket of glittering brilliants or gleaming sapphires, which she takes out, together with her Venetian point lace, to grace ball room or drawing room. Some of them, perhaps, may be of equal intrinsic value, and, as works of art, incomparably more priceless than machine-cut stones, whose glitter, after all, is excelled by the dewdrop of the grass. Engraved gems, then, are the signet rings of antiquity—the seals wherewith the men of old time, whether of Egypt, Assyria, Greece, or Rome, sealed their documents and protected their goods.

The portable goods of a man were, no doubt, at first secured by a seal of clay from the banks of the Nile or Tigris, stamped with a bit of worm-eaten reed rolled over it, which reed the owner retained in his possession. The marks of his little cylinder of reed, and the corresponding marks on the clay seal, would always assure him that his property had not been tampered with. What more natural than that a cylinder of stone, engraved with various devices, should take the place of the reed? This, in fact, was the first step in gem engraving. And the little cylinder of serpentine, agate, or lapis-lazuli, engraved with those archaic figures with which Mr. Layard has made us familiar, hung suspended from the wrist of the curled Assyrians, exquisite by a golden thread, long before Jonah came to Nineveh. This was, in fact, the signet with which he sealed his possessions and documents. And in that great treasure-house of antiquities, the British Museum, may at this day be seen, by those who care to search for them, the cylinder signets of King Davins, and of Sennacherib, the Assyrian.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

To the Editor of the Jewelers' Circular:

The discussion of debased rolled-plate goods waxes interesting. There are two sides to the question, as everyone very well knows, one of which is shown by "Manufacturer," in the March number of your journal, and the other by "J. M. C." and "A Swindled Victim."

Manufacturer says the public demands cheap goods, and it is the retailer's place to keep goods that are in demand, and if they do not, the more enterprising outsider will, thus getting the trade. He claims that if we retailers would keep all grades of goods, we would be in position to compete with all outsiders, but a little reflection on his part would convince him to the contrary. It is a well-established fact that if a regular jeweler wishes to hold his own, he must represent his goods just as they are, or his customers will soon lose confidence in him, consequently, if he keeps both good and cheap goods, his cheap stuff will remain on his hands, for customers will refuse to buy cheap goods when they are informed of the fact; still, they often decline to buy the better grades, because they think they cannot afford it, but they go to an outsider that keeps nothing but the cheap goods, and the outsider, having no reputation at stake, represents that the cheap goods are identically the same as the good goods kept by the jeweler and are so much lower in price, and the customer takes it all in and of course is taken in. If manufacturers were required to stamp their goods as a guarantee of their quality, there might be a show for the public, but so long as they can make cheap goods, so long will the public be swindled, for, as J. M. C. says, the cheap stuff can be finished to look as well as the better grades, and the public, not being judges, believe the outside dealer, when informed that his goods are as good as any in the market, and buy them because they are so much cheaper than the regular jeweler charges for his goods.

Manufacturer says if the public wants seven-karat rolled-plate goods, he is going to make and sell them. The fact is, the public does not want such goods, and will not buy them when represented as such, and the regular dealer that lays in a stock of such goods, and represents them as such, will get badly left; and if he represents them as 14-karat, then in a short time his customers will leave him, for they will soon learn that he misrepresents his wares, and customers will not trade with a dishonest jeweler. Outsiders can keep such goods, and by representing them as being just the same as the jeweler sells at much higher prices, secures the trade and rakes in the cash.

The public will in time get tired of such treatment, but it takes time to do it; but when it learns that it is swindled every time it buys such goods, the outsiders will be left with quite a stock of worthless goods on their hands.

Manufacturer says also that he is going to sell his goods to anyone that will buy them, whether regular jewelers or outsiders. If he will give his name, it is safe to premise that he will have to look to outsiders for his trade in future. Yours truly. W. H. T.

TORSION PENDULUM CLOCK.

To the Editor of the Jewelers' Circular:

I read with considerable satisfaction the article on Torsion Pendulum Clocks, by Mr. H. Sievert, in the last issue of THE CIRCULAR. Allow me to state that annual clocks with torsion pendulums are not new in this country. I have one similar to that described by Mr Sievert that was made in America. The case is 11½×7¼ inches by 22½ inches high. The time part has only three wheels and two pinions, with fuzee and catgut line. The scape wheel has 60 teeth and 8-leaf pinion, makes one turn every hours and carries the minute hand; the next has 96 teeth and 8-leaf pinion; the main wheel has 112 teeth.

In the striking part, the two largest wheels are exactly the same as in the time part; the third one is a crown wheel with 52 teeth and 8-leaf pinion; this drives an 8-leaf pinion which also carries the rotating hammer. The whole consists of less pieces than any common 30-hour clock. The following printed description is pasted inside the case:

Crane's Patent Twelve-Month Clock, Manufactured by J. R. Mills & Co., Belleville, N. J. Warranted Superior Timekeeper.

After the directions for starting, winding, regulating, etc., it says:

THE DESCRIPTION OF THE IMPROVEMENT IN THIS CLOCK.

The great improvement in the time part consists principally in the escapement, which may be called a frictionless escapement; and in the regulating motion, which may be called a rotary or torsion pendulum. The ball is hollow, and suspended by a steel spring; near the upper end of this spring is an arm in the form of a crank; the revolving of the ball twists the spring and causes the arm to perform an arch, acting upon and receiving the impulse from the swing wheel, by means of a lever connected with the arm and the pallets or escapement. The impulse is carried through the spring to the ball and keeps it in motion. The spring in a quiescent state is longest; by its being twisted either way from that state is shortened and the ball made to rise; returning by the reaction of the spring, and the force of gravity receiving the impulse from the maintaining power at each return. Any difference of friction or maintaining power in this clock, will not affect the time given by this pendulum; its revolutions or vibrations are rendered perfectly isochronal by the influence that the torsion of the spring has in its reaction upon the force of gravity of the ball. The different degrees of temperature do not affect the time given by this pendulum. The time it would lose by the expansion of the spring in length, is accurately counteracted by the time it gains by its expansion in width and thickness; and the time it would lose by the expansion of the ball outward from its axis of motion, is accurately counteracted and compensated for by an adjustment inside the ball. The improvement in the striking part consists principally in the application of a rotary hammer. Each part of this clock is driven by a spring equal to seven pounds of weight, for about fifty-four weeks with once winding up.

The advantages of this clock are:

1st. That very little care is required in setting up the clock, in consequence of its not being liable to be put out of beat.

2d. It requires no oil on the pallets or teeth of the spring wheel, there being no friction between them, and the number of the revolutions of the swing wheel are sixty times less, or, in other words, is sixty years in making as many revolutions as the thirty-nine inch or seconds pendulum clock does in one year, and it requires more than fifty times less maintaining power; consequently a very large amount less of friction and wear than in other clocks, therefore a more regular motion is given.

3d. It will run one year with once winding up, is silent, save its striking the hour. It is simple, easily adjusted and regulated, and not subject to derangement by difference of temperature, density of air, or by an increase of friction, as it performs its movements always in the same or equal time. T. E.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Ninety-fourth Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

TO FIND PROPER NUMBER OF TEETH AND LEAVES FOR MISSING WHEEL AND PINION.

Secretary of Horological Club:

I have an old "Bull's-eye" watch, verge escapement, that formerly had a calendar attachment; now, the pinion that the calendar hand went on is missing, also the wheel that moved it. Can you inform me as to the number of teeth there should be on the pinion, also number of teeth on wheel—in fact, give me any information you can in regard to it, so I can make it all right again. Also, can you give any rule for making a train to get a required number of revolutions? J.

Mr. Uhrmacher said that there were so many different kinds of calendar trains that it would probably be impossible to answer without examining the movement and calculating it out. Mr. J. will find full instructions for calculating teeth and leaves for all sorts of trains in Excelsior's Practical Hints on Watch Repairing, published in THE CIRCULAR in 1879. He did not know of any other work which went into the subject so fully and thoroughly—and few do more than give a vague idea of the principle—if they do that. If Mr. J. can obtain the back numbers of THE CIRCULAR for September, October and December, 1879, and January, 1880, he will have precisely what he needs—but he will be well repaid if he buys all numbers that he can get containing Excelsior's articles, as they are conceded by all to be the best practical articles ever written on our trade.

WHAT IS IT THERE FOR?

Secretary of Horological Club:

Please state of what use a pin is, situated near the foot jewel, between lever and barrel, which I found thus situated in an English watch, made by G. Blackhurst, Warrington. I have asked several gentlemen of my profession, but without receiving any satisfactory explanation. This pin, as it seems, was placed there when the watch was made; nevertheless, I can find no earthly use as to place it occupies. By answering you will greatly oblige, W. S.

Mr. Horologer thought from the description that it was probably the "safety pin," designed to stop the chain when the mainspring breaks, and prevent it flying against the balance staff and breaking off a pivot.

EXPOSED PALLETS *vs.* COVERED PALLETS.

Secretary of Horological Club:

I am at a loss to know the advantages possessed by the pallet jewels of a watch being exposed. For my part, I think the more and better the pallets are protected, the better they are for the work required of them, in "every sense of the word." Imagine for a moment a dealer saying to his customer: "Now, here is a watch with exposed ruby pallets, held at one end by a little cement, and liable to become loose, thereby giving a watchmaker a job to reset them. They also chip very easily by slipping off the tweezers, etc. Then the watchmaker will put in a new one. He may not have one just the same shape, but he will find something that will do. Now I will sell you this watch for only $5 more than one with the old-fashioned pallets, which are protected as much as is possible, not liable to become loose or chipped, and will in all probability be good when the watch is worn out." Imagine again how wide the eyes of the customer will open on receiving such information. Now sir, in all seriousness, I think we are going to have lots of trouble with these same exposed pallets, and I think it would be doing good service were your distinguished body to address the manufacturers, and endeavor to get them to use in future the *protected* instead of exposed pallets. Please bring the subject up for discussion at your next meeting. C. W. C.

Mr. McFuzee thought that there need not be any greater risk of the exposed pallets coming loose than the covered ones, if properly inserted. They may have more surface held by cement than the covered ones do, and they need not project so far outside of the steel as is often seen. That is a fault of the maker, but not of the plan itself. Any pallet will come loose if cleaned with alcohol, as that dissolves the cement. Loose covered pallets are very often found, caused by the use of alcohol. Besides the handsome looks of the exposed pallets, they have a facility of alteration not possessed by covered pallets. A workman who understands how an escapement should be, often discovers an error in the depthing or pitching of the escape wheel on the pallets, which he can easily correct with the exposed jewels, as the slots in which they fit are intended to be so cut as to admit of moving them slightly, endwise, without appreciably varying the correctness of their general direction and position. But this would be difficult to do with covered pallets If they are moved towards the wheel, there is no guide except the workman's eye; while, if they are moved back, the steel must be ground off to correspond, at imminent risk of ruining the stone. Moving the pallets bodily on their arbor or staff, is an operation which cannot be regarded as really workmanlike, although it is often unavoidable. Even when the pallets are correct, the wheel will run on the steel instead of the stone, if the end shakes are defective—which cannot occur with the exposed pallets. In short, there is much to be said in favor of them besides their appearance, and the troubles anticipated by Mr. J. do not necessarily arise from the method of inserting the stones, but from an injudicious application of it in practice—which is of course liable to happen everywhere, no matter how perfect or desirable the plan itself may be.

BEST MODE OF SUSPENSION FOR PENDULUMS—SPRINGS *vs.* KNIFE EDGES.

Secretary of Horological Club:

Will some member of the Club be so obliging as to state the objections there may be to hanging a pendulum on a knife edge instead of a spring, when the force is constant and the oscillations equal, as in the case of a well constructed gravity escapement? A. P. A.

Mr. Regulator replied that the knife edge and the slit will wear after a time, no matter how hard they may be. If they are not fitted closely, the point of suspension is liable to be changed more or less, by jars, etc. Dirt, hairs, and fuzziness will collect in the slit, and finally fill it up. If the clock is moved, the knife edge is entirely loose, and may get out of its place altogether. These and other objections have led to the rejection of knife edges, and the use of suspension springs for supporting the pendulum. There is inevitably some slight friction at the knife edge, but a spring moves without friction—unless we apply that term to the molecular motion of its particles which is known as "elasticity," and even that does not damage its usefulness as a suspension for the pendulum.

BRITTLE GOLD.

Secretary of Horological Club:

Will some one of the members please inform me how to soften gold so that it can be forged out thin without cracking and breaking? Some gold can be forged out easily, while other is very hard and brittle, and can you tell me the reason? E. B. B.

Mr. Rolliver said that impurities or alloys, such as a little lead or zinc, would make the gold brittle. Melting it over a stone coal fire would do the same. Gold should be melted over charcoal or coke, and, if of low grade, should not be exposed to the heat too long. If it has no "grain," melt again. If it does not take grain then, melt again and add a little saltpeter, and, a little later, some borax. For ordinary meltings, fuse with borax, stir well, and add a little sal ammoniac just before pouring it out. In forging gold it must be annealed as often as it begins to get hard and brittle. Low grade gold needs annealing oftener than finer gold. Heat red hot, and let cool without tempering.

TURNING A BALANCE STAFF ON THE BOW LATHE.

Secretary of Horological Club:

Will some of your honorable body please tell me just how to go about making a balance staff with conical pivots on a verge bow lathe and Jacot pivoting lathe? I have one of each, but don't know just how to go about making a staff on them. I can make a very good staff on an American lathe, but it seems to me that if I could make one on a bow lathe I would like it better. My boss uses an American lathe, and either don't know how to use the bow lathe or don't want me to, I don't know which; I suspect the former. I can do all the turning very well until it comes to the pivots, then I get "stuck." Also, should the blank you start with be longer than the staff when finished? If so, how much? By giving me full instructions you will confer a great favor on me, and doubtless on hundreds of other young men just in my situation. It will not do to refer me to the back numbers of THE CIRCULAR, as I have only been taking them a short while, and cannot get back numbers. I will take them from this on, though, "you bet." APPRENTICE.

Mr. Horologer thought it quite likely that the "Boss" did not understand the use of the bow lathe, and it was no special discredit to him if he did not, any more than not understanding how to make and repair the verge escapement, or any other antiquated contrivance that has been superseded by something better, and gone out of common use. The bow lathe has been very useful in its day, and is capable of doing good work. But the live spindle lathes are equally capable, are more convenient and rapid, and will do many things that the bow lathe cannot—and things that are absolutely indispensable in these days, such as turning off jewel settings, and many other jobs which every workman *must* be able to do. If our friend has plenty of spare time, as seems to be the case, he may profitably employ it in learning everything he can, and among the rest how to use the bow lathe. As he says he can turn a good staff on the American lathe, the principal thing to be learned seems to be, how to make the pivots.

The blank must of course be longer than the finished staff, because the ends of it set into the lathe centers while working, and are then inaccessible to the graver. After the pivot is turned down enough, these knobs are turned or cut off. The staff is then very little longer than it is to be when finished, in order to allow for the final fitting, dressing off the ends of the pivots, etc. During the turning be careful to have the *smallest* and weakest part next to the knob, so that if the graver catches or anything happens, only the knob will break off, thus leaving the pivot sound. The conical shoulders are turned the same as done on the American lathe. The polishing of the pivots and shoulders is also done in the same way, although many workmen use pivot-polishing files, with the corners rounded off for the conical shoulders. These, with pivot-burnishing files, admit of using more pressure in the Jacot lathe than in the other, while finishing the pivots, and give a somewhat harder surface to them, which is the only advantage than can be really claimed for the bow lathe. Even that can be done on the American lathe, by using a suitable rest in the back center, and turning the staff by a pin or dog on the spindle working into a collet fixed on the staff—and this is often done. But if properly hardened steel is used for the staff, this advantage is hardly worth considering. A good deal of pressure can safely be put on a pivot in an American lathe, if it is run rapidly, as it should be while polishing The greater the speed, the more pressure it will bear. But heavy pressure gives a burnished surface—light pressure a highly polished one.

The difficulty with the learner on the bow lathe is to make a long, steady (not jerking) draw with the bow, causing almost the whole of the hair to pass over the collet at every stroke, yet holding it so lightly that the least catching of the graver will pull the bow out of the fingers and prevent accidents. The graver must be lifted from the work just at the end of the down stroke, and replaced exactly at the proper point as the next down stroke begins. This requires more dexterity and labor than the corresponding work on the American lathe, because, on the latter, a good deal of work is done after the graver is adjusted to its proper position and the best angle for cutting, but on the bow lathe this adjustment must be made at every stroke of the bow. Evidently the same amount of time, study and practice will secure a much greater useful result, if it is expended on the live spindle than on the bow lathe. Furthermore, Apprentice should remember that skill does not consist in knowing how to do a thing in many different ways, but in doing it quickly, surely, and perfectly, even if he knows but one way of doing it, out of the many possible ways in which it can be done. Hence, he should early settle upon some particular way of working, which is best for him in his circumstances, and then endeavor to become perfect in that. As few men ever do become perfect, in even one method of working, it is foolish for anyone to fritter away his efforts in trying to become master of many different ways.

ABOUT ADJUSTING FINE WATCHES.

Secretary of Horological Club:

I have a fine English lever, ¾ plate, nearly new, and found that it was not rated or adjusted, as it lost four seconds in the first twelve hours, and gained thirteen seconds in the last twelve hours. To remedy this I got a fine tempered hairspring, and fitted it in precisely as Excelsior orders. I trued it perfectly, as to flatness, and as to roundness, (if we may so call it). I then regulated my watch by taking out two screws. After having regulated it pretty well, I took off my hairspring and *poised my balance* very closely, put in my hairspring as carefully and as correctly as possible, and now find that my watch does not perform any better than originally. Why is this thus? Please throw a little light on, Yours truly, C. K.

Mr. Isochronal said that our correspondent had omitted to state whether the watch was run in *the same position* during the last twelve hours as in the first. If it was laid down at one time and hung up at another, the difference of position might account for the error. This would be corrected by the "adjustment for positions." Or the watch might be hung up in a warm room during the day—perhaps near the stove, or even in the sun, and kept in a cool safe during the night. This would cause an error due to difference of temperature, and could only be corrected by the "adjustment for heat and cold." There are also the adjustment for rate, and the adjustment for isochronism. Mr. K will therefore see that there are many points to be looked after, besides the shape and pinning of the hairspring. The term "adjusted" should include all of the adjustments named, but, as generally used by manufacturers, it means the same as "compensated" for heat and cold—which is only one of the adjustments needed by a really fine movement. And before any adjustment at all is attempted, there are numerous mechanical points to be attended to, in order to get the movement in fit condition to adjust. It would be useless to spend time in adjusting a cheap movement, or one much out of order, as the mechanical imperfections would do more to disturb its running than the adjustment could do to perfect it.

The whole subject of adjustments is intricate, and becomes more and more difficult as we seek greater perfection. Few watchmakers really understand it fully, and a large share do not even know what it means. Yet in these days, when good watches are to be found everywhere, any workman is liable to be called upon to repair or examine one, and if he does not know at least a little something about such things, he will cut a rather sorry figure in the customer's eyes. He may even do the watch many dollars of damage without knowing it, simply from not understanding how an extra fine watch should be treated. Every watchmaker should inform himself at least enough to avoid any danger of such an occurrence, both for his own credit, and to save himself from possible prosecutions by the owners of the injured watches. There are only two really thorough books on these subjects obtainable by workmen, in English. Saunier's Modern Horology treats very fully of the theory of the art, price $15. Excelsior's Practical Treatise treats them in a thoroughly practical way, price $3.50. Every student of horology who desires to learn all he can of our art, should own and study both of these books, which can be ordered from the office of THE JEWELERS' CIRCULAR. If he has not the education or means to do that, he should at least possess the latter, where he will find full practical information, such as he needs at the work bench. As Excelsior says: "Even if the workman does not intend to undertake the isochronal adjustment, it is important that he should know how to discover whether the watches he buys and pays an extra price for as isochronized, are so or not, for there is as much swindling of ignorant dealers on 'isochronal hairsprings' as on 'compensation balances adjusted for heat and cold,' of which not one out of a hundred so called are adjusted at all."

Perhaps no better answer to Mr. K.'s inquiry can be given than by quoting from page 55 of Excelsior's work, the *Requirements of Isochronism:* "Besides observing the instructions already given for the correct forming and fitting of the spring itself, the balance and the lever must be perfectly poised; the balance, spring, and all other parts in the watch, even the springs in the case, must be free from magnetism; the movement must be in good condition to transmit the motive force uniformly to the balance; the escapement particularly must be as perfect as it can be made; the end shake of the balance, lever and escape wheel no greater than is necessary to give freedom of motion, so that there can be no material change in their relative positions; the pivots of the lever and balance staffs well fitted to their jewel holes; the lever pivots well polished and free from any "binding in any position of the movement; the balance pivots straight, hard and round, well polished, as small as is consistent with strength, their shoulders well clear of the jewels, and the balance not running too near the plate, bridge, or any other part; the hole jewels thin and the holes round and finely polished; the holes not perfectly cylindrical, but a little rounded out or enlarged towards each end, to diminish the extent of surface in contact with the pivots, and prevent any possible binding by either the jewel or pivot not being set perfectly true, as well as to lessen the adhesion of the oil to the pivot; and in lever watches the ruby pin must be perfectly firm in its place and vertical, or parallel to the balance axis, and the slot in the end of the lever polished and well fitted to the ruby pin."

If the movement is correct in these respects, the isochronism of the hairspring may be tested in several ways, described by him, which it would take too long to quote. But if the balance of Mr. K.'s watch has *the same extent* of vibration through the twenty-four hours, then the cause of the error is not in the isochronal adjustment of the hairspring, but may be any one of the numerous faults specified in this book, with directions for making trials and finding which it is. And on page 137, Mr. K. will find hints about the distinction between the timing or "quarter screws" and the compensating screws, in the balance rim, which may have some application to his movement.

As nearly as can be judged from the sketch of his hairspring, Mr. K. has so pinned it as to have an extra half-coil, instead of the even coils which are the rule. This rule is not invariable, however, but the nature of the hairspring itself must govern. On page 72, Excelsior gives instructions for testing the spring, to find whether the correct time point and the isochronal point of the spring coincide or not, and, if not, where each one is. By carefully examining these references, Mr. K. can soon ascertain where the trouble lies in his movement, and how to correct it.

IMPROVED METHODS OF PIERCING LADIES' EARS.

Secretary of Horological Club:

In THE JEWELERS' CIRCULAR of February, Mr. Ruby Pin is reported as having offered suggestions, improvements, in his opinion, evidently, over Mr. Friend of Progress' theory or practice, (whichever he calls it), of ear piercing. To such an one, and all others of a like stamp, butchers, beer lovers, torturers—devoid of all feeling, without sentiment, unmoved in the presence of human suffering, unmindful of allaying pain, being ungrateful for the sacrifices the "fair sex" are continually making for our profit and pleasure. To such monsters, dead to refinement and virtue, I would further suggest the mainspring punch for their remorseless hands to wield; be sure to spit upon the tool before using it; it is an excellent and cheap way of imparting lubricity, (and be assured, tobacco is very healing). Should the ear bleed, to your annoyance, a little nitric acid from your test bottle will certainly coagulate the albumen in the blood, "you know." If it should make the ear sore, all the better for the patient's eyes; if the blood will flow in spite of all, it is evidently from undue excitement of the arterial system, (women are such frail and nervous creatures)—you must resort to your bandana—but it is, remember, only common politeness to apologize for its condition, in some way; for instance, in a complaining tone state the many things a "watchmaker and jeweler" is compelled to do in order to earn an honest living. No wonder we are called "blacksmiths" and the like. Thank goodness my name is not Smith, and my mode of ear piercing is quite different. It is the one part of the business I never tire of. Will give the process if needed. JONES.

Mr. Ruby Pin said that the method described by Mr. Jones unquestionably took the rag completely off Mr. Smith's way, but he had, after long and serious cogitation, and a considerable expenditure for spiritual stimulus, discovered a new way, far ahead of Mr. Jones' method, and he thought it would make Mr. Jones' eyes fairly stick out with wonder and admiration. It was certainly the easiest, simplest, and surest way of making a hole through the ear which he had ever heard, read, or thought of. Furthermore and moreover, it was entirely original. Get the lady to step out into the back yard, and have her friends hold the ear stretched out flat, then take good aim with a revolver and "shoot the hole." Sure thing, every time. Warrant a hole, or no pay. And so perfectly easy! You only have to touch the trigger, and there is your hole. He had not tried it yet, but he felt sure it would work—*must* work, "you know." But after all, he did not think he would be able to recommend it so strongly as Mr. Jones did his method. If Mr. J. really had a way of piercing ears, which one would "never tire of." practising, he had something worth telling of. We shall be very glad to know how it is done, and if it "works" according to the recommend, Mr. Jones may consider that it is "our treat," and his bill will be duly paid by calling upon the Secretary the next time he visits the city.

The Spence Metal.

WE extract from the *Oesterr. Zeitschr. f. Berg. and Huttenw*, the following data about Spence metal. He says, "It shows an extreme resistance to all acids and mixtures; is of a grey, fine-grained mass, with intermixed small, glittering nuclei, perhaps slags, which, owing to the quicker cooling of the casting surface, appear to be crystalline. It possesses about the hardness of cast zinc. Melted Spence metal becomes torpid between 101° and 102° C., the solid becomes semi-fluid by heating above 120° C., and is thin-fluid by 160° to 170°, toughening again, however, at a higher temperature. An analysis rendered the following composition: Silicious gangue and silicic acid, 5.84 per cent.; bi-sulphate of iron, 57.38 per cent.; sulphate of zinc, 3 93 per cent.; sulphate of copper, traces; free sulphur, 32.44 per cent.

The circumstance that no trace of lead could be found is worthy of notice; and the suspicion that the analysis might contain graphite, appears to be well founded, since at the analysis of the mass in sulphuric acid, a grey residue remained, similar to graphite.

The analysis further attested that the metal is no chemical combination, but simply a mixture of the sulphates of iron zinc, and free sulphur. The percentage of silicates originates from the gangue for the production of the composition. Copper must not be used in it.

It further established that the metal is produced by immersing pyrites of iron, (FeS_2), zincblende (sulphuret of zinc), and sulphuret of lead in melted sulphur.

According to the analysis and behavior when brought to test with reagents, it is peculiarly suited for castings and articles not exposed to a temperature higher than 120° C., clock cases, in lieu of marble, etc, but it cannot be used for lead-lining in acid factories, since a mixture of sulphuric and nitric acids, especially at higher temperature, pretty strongly attacks it.

The metal is very slightly or not, whatever, attacked in cold state by muriatic, nitric, sulphuric, nitro-muriatic, and nitro-sulphuric acids, by nitro-muriatic acid, even by boiling, only very slightly, by sulphuric acid to a great, more especially by nitro-sulphuric acid in a still greater degree.

Nature's Gifts to Art.

THE arrangement of specimens to display their economic uses in our museums, is an innovation that dates back only a few years. In the State museum we find a collection of building stones representing the quarries of the world. In the museum at Central Park a similar collection is seen, with an additional display of all the woods that are of use to man in decorative building. In the Smithsonian Institution the leading economic collection relates to the fish and fisheries of the world. Here are seen all the game and edible fish known, the different sexes, young at various sizes, models of the different appliances that are used in their capture, and, finally, the products of the various parts of the fish used in the arts and sciences, and, in fact, showing at a glance the benefits accrued from marine animals. This includes the fur-bearing animals and many birds, and an examination of the collection is an interesting and valuable study to the public or private economist. Especially interesting are the articles of jewelry and ornamentation obtained from animate nature. Hardly an animal in the multitudes known but what is of some use to man. Commencing at the extreme lowest forms, we find in the National Museum a block of polished, cream-colored stone—much in demand. Its surface takes a rich polish and is covered with a multitude of stars in a darker shade. The radiations of the star being filled with white crystals. The stone is a fossil *coral*, and at Tiffany's can be seen studs, buttons, and various articles made from the work of the little zoophytes that labored instinctively to this end tens of thousands of years ago. The corals are also much in demand as paper-weights and other articles of use. Another species, the Halycites, or chain coral, is much in demand among designers, and many of the rich chains of gold and silver are modeled after this primeval type. The polyps seem to form in continuous chains, the intervening spaces being filled up with the jelly-like mass or sarcode of the animal proper, which, when alive, is a rich olive green or brown.

The skins of certain sharks are used in jewelry for sleeve buttons and the like, and when dried and cured take a polish almost equal to that of stone, and greatly resemble the fossil coral *porites*. The vertebræ of the shark is always in demand for canes. The opening filled with marrow during life is now fitted with a steel or iron rod. The side openings are filled with mother of pearl, and when polished the cane is decidedly ornamental. In India, in 1880, $300,000 worth of shark fins were shipped to China for food. In the islands of the Pacific the fish is in great demand for its teeth, which are manufactured into weapons of various kinds, ranging from spears to swords and daggers. The teeth are all serrated or saw-edged, and make terrible wounds. The base of the tooth is bored with some small instrument, and forty or fifty of them are tied or lashed to a hardwood sword, forming the edge. The hilt is often protected by cross pieces armed in the same way. So effective are these weapons that the natives of these islands wear an armor made of rope, especially to protect themselves from the shark's teeth.

The most profitable products of animals are pearls. The largest come from the oyster known to science as the *Meleagrina margaritifera*, and some remarkably fine ones have been taken from the fresh-water shell *Unio*. The pearl is simply the result of the animal's attempts at defending itself from the attacks of parasites or other bodies. A microscopic bit of sharp sand comes in contact with the delicate folds of the oyster, and would seriously interfere with it, but the animal throws around the sand a coating of pearly nacre, rounding off the sharp edges, and giving it the appearance of the shell itself, additional coats are continually made, and thus the pearl grows, as can be shown by making a section of one, where the edges of the layers can be counted. The imperfect pearls are attached to the interior of the shell, and are produced by the continued efforts of the oyster to escape from some parasite that is boring through the shell. When it reaches the oyster, the latter throws a covering of pearly nacre over the opening or tunnel, covering the parasite; but the latter continues to press on, and the oyster to pile up the nacre, until the result is a pearl of irregular shape fastened to the well. Until within a few years these formations have been practically valueless, but now they are purchased by jewelers and worked into pins and rings, representing animals—the shape of the pearl determining the animal. In the National Museum, and the one in Central Park are collections showing the economic value of the oyster. The pearls are seen in all shapes—some attached to the shell, while in some shells are curious images that have been placed in them by the Chinese, who, discovering the secret of the oyster, now purposely salt the beds with round bits of stone, and in a year or so after the oyster has covered them reap the harvest. The little images are gods that are in this way embellished by nature. Some of the finest pearls have been taken from the fresh water streams of this country. St. Clair County, Ill., and Rutherford County, Tenn., are famous places for fresh water pearls, and every season thousands of them are found and sent to the large cities for sale. A very large one was found some years ago near Salem, N. J. It was over an inch across, and brought in Paris over $2,000 to the fortunate finder, a poor boy, it is said. In Scotland, a few years ago, the fresh water pearl fishery was a very important industry, especially along the rivers Tay, Isla, and Doon. Over $50,000 worth of jewels have been sold in Edinburgh alone in one season. On our western coast fine pearls are often found by the Mexican divers. One of the finest was found in the Bay of Mueldge. The man who opened the oyster containing it made an attempt to conceal the brilliant prize, but was betrayed by his own evident confusion and excitement. It consisted of six pearls clustered together in a very curious and beautiful manner. Two large jargonels of purest water were joined to each other at right angles, the neck being encircled by a collar of four smaller pearls. It was sent to Europe. Though this is the case with many or most of the best finds, some magnificent gems still remain in Mexico in the hands of the old territorial aristocracy. A lady in Sonora has a set of pearls valued at $111,000—a fortune in itself. Five hundred thousand dollars was the state price for the pearl "farms' of the Persian Gulf in 1804. In 1707, the divers of this region realized $720,000 for one season's work, and in 1798 over a million. In 1802 the farms realized hardly $600,000, and at the present day probably $100,000 will cover the profits that accrue to the Government directly or indirectly. One season in the Indian Archipelago has been made to pay, together with that of the Bay of Bengal, over $5,000,000. A pearl was taken from these waters during the reign of Charles V. and sold for $560,000, probably the most expensive pearl of modern times. Pliny says that the widow of Caligula had pearls valued at $3,000,000. The beautiful Servilia received from Julius Cæsar, a pearl worth $250,000, accompanied by an apology for the poverty of the gift.

Black pearls are a latter day novelty, and so indeed are the so-called red pearls. These are taken from the conch, the great *Strombus*, so common in our southern waters, and such a demand is there for them that last year over 50,000 were taken directly to the port of Liverpool alone and sold. The shells, when young, are useless, but the adults have a thick lip, colored upon the interior with a rich pink. The north-west portion of Key West, Southern Florida, is known as Conchtown, from the belief, which is quite general, that the inhabitants of the quarter eat the meat of the bulky conch. The shells are collected for bait, being much prized by the *Grouper*, a gamy fish of the Gulf stream, and that the rich white meat of the great mollusk is sometimes eaten is probably true. The writer has seen it eaten by a number of "conchs," and made a desperate attempt to devour his portion of "conch stew" that, as some old writer described the dodo, was "more pleasing to the eye than the stomach," being in appearance rich and white like turkey meat, but utterly devoid of taste, and as tough as leather. The red pearls are probably produced by the conch as a protective measure, the animal throwing out the pink secretion to cover the intruder. The shell is now quite valuable as jewelry, and sets of rare tints often bring $300 or

$400, although it was the writer's experience in opening hundreds of them, that the beautiful tints invariably faded. They are caught on the reef by poling the boat along and diving for them, the great shell, moving along by curious leaps, being easily seen. It is tossed into the "dingy" by the skilful diver, and held in the left hand, while a sharp blow knocks off the end of the cone, and the animal is twisted out of the back door thus formed, and cut up into eight or ten grouper baits, as the case may be. Sometimes a queen conch is found. They are higher and more rounded, looking like a helmet, while the inside is a rich purple and dark red. They are valuable to the medallion cutter, and many of the rich, delicate cameos on the market are cut from these very shells; a fine shell can be seen in the Museum of Natural History, Central Park; and on one side is cut a fine head, after the style of the best cameos. The same has been done with the common Strombus gigas, but the work is not as successful, one of the objections being that the material of the shell is too soft. Here is also a shell from the hawksbill turtle, polished richly, representing a valuable article of commerce. In the days of old Rome this shell was used to inlay doors of palaces, and the same decoration has been used in one of the rooms of the Vanderbilt mansion. In New Bedford a large factory is devoted to the manufacture of jewelry and articles of personal adornment from the shells that are taken from the back of the animal while alive.

Tigers' claws are greatly in demand for decorative purposes, and the real article is hardly to be had, while the economic value of birds can hardly be estimated. There is a continual and increasing demand for feathers, and the skill of the dyer is taxed to produce from the domestic crower the gorgeous plumes of a tropic bird. The northern birds, as some of the auks, are in great demand, and as in some only the feathers of the breast can be used, a garment represents a considerable sum of money. The resources of the fur trade are shown at the National Museum by a fine collection of fur-bearing animals. The fur seal is the most valuable, the soft pelt being an inside covering or protection to the animal, growing closely to the skin. To obtain it, the skins are scraped from the inside, the coarse hair falling off, leaving the fine fur, so valuable and ornamental. Lizards are worn in the south, and even snakes have figured in personal adornment, and it would be hard to find an animal that in some way was not valuable to man.

Another Method for Preparing Chloride of Gold.

TAKE 8 gr. fine gold, roll it into thin plates, glow heat it, to burn any adhering filth; next cut it into small pieces. Procure an olive-oil bottle, and cleanse it well with a saturated and heated solution of soda in water. This bottle is filled one-half with water, and placed upon a heated sand bath, to be kept hot until the water begins to boil, whereby the bottle becomes ready for use. The water is poured out and the bottle well dried, the finely cut pieces of gold are put in and submerged with a mixture of two parts muriatic acid and one part nitric acid; the bottle is next placed upon a lightly heated sand bath, and the mouth loosely closed with a paper cork; the acid will at once begin to effervesce and dissolve the gold; it is advisable to set the bottle in an inclined position, to enable the liquid to run back. When the solution has ceased to boil, and still contains undissolved gold, add another quantity of acid, and thus continue until every particle is dissolved.

Then remove the bottle from the sand bath and let it cool; if a little fine white powder, like snow, has settled in the bottom, it has been formed by the silver contained in the gold, and has been changed into chloride of silver by the muriatic acid. The solution is carefully decanted from the precipitation, the latter washed several times with warm water and added to the gold solution. The silver deposit is then removed from the bottle, the gold solution poured back, an equal quantity of water added, placed again upon the sand bath and boiled until one-half evaporized, the solution is then poured into a porcelain dish and the bottle well rinsed with water, which is added thereto.

Now prepare a filter in a glass funnel, and filter the solution back into the bottle, and shortly before it is finished, several small portions of water are added to remove all solution from the filter, until increased by one-third; it is next put again upon the sand bath, and reduced again to one-half. The solution is poured again into the porcelain dish, the bottle rinsed, the water added to the solution, and for each gram gold used in the solution, add 1 gram 50 centigrams (1½) dried and pulverized table salt, put back upon the sand bath and constantly stirred with a glass rod, until the mass has been reduced to a dry powder, which is put aside to cool; it next is ready for filling into bottles. The 8 grams will make 24 gram bottles of chloride of gold, and a solution prepared according to these directions will be found to be far more acceptable than that purchased in commerce. This chloride of gold is much used in photography and galvanic gilding, and for the latter purpose one gram and three or four grams of cyanide of potash are dissolved in a quantity of hot distilled water, set away to cool, and filtered; a gilding fluid is thus obtained, of which excellent results may reasonably be expected, either by the use of a zinc strip for contact gilding, or with a battery in galvanic gilding.

The Treatment of the Mainspring.

THE observant horologist will concur with me in saying that there is no one part of a watch not requiring as much care and attention as another. Yet watchmakers may be found by the dozen who regard certain parts of the movement as something inferior, something secondary in importance; and in first line, the mainspring may be classed in that category; they maltreat it until one thinks he has to do with a layman who plays with it for the sake of entertainment. The mainspring, at all odds, demands the same care in its arrangement and treatment as the balance spring, if it is intended to fully and completely discharge its functions, and these are at least tantamount to those of the balance spring. By an execution, no matter how careful, the watch will only render indifferent services, if its motor power, the mainspring, has been neglected. I do not claim these preceding remarks as new or my property, but facts compelled me to reiterate them before proceeding with the statement of my few observations and researches in the premises. The breaking of the spring also is the consequence of such bad treatment.

The causes which favor the breaking of the spring have been treated heretofore in this journal, (*Allg. Journ.*), and it is unnecessary to reproduce them. I suppose them to be universally known. Many will have experienced that soon after having cleaned a watch, the spring will suddenly snap, although having done services for ten years or more; else, a new spring is inserted, and a few hours afterward, or at the first winding, even, it breaks. Such accidents are often calculated to bring discredit upon the watchmaker, because according to the views of the layman, it is incomprehensible that a spring, after ten years service, should break after cleaning, or that a new spring should snap.

In both cases the repairer is blamed for the accidents. In the first case, we must suppose that the barrel was correct in its shape, having harbored the spring for ten years; in the second, that possible defects causing the breaking of the first spring, were remedied. Under these suppositions, the cause may be looked for in the careless treatment the spring received. I have often had occasion to witness how the spring, for purposes of cleaning, was seized with a rag, and then drawn out pitilessly and unmercifully. No other consequence can follow such a treatment than the breaking at the earliest possible occasion. Cleaning is best done in the following manner: Lay the spring into benzine. As soon as the adhering oil has become dissolved, it is taken out and seized with a soft linen rag, which imbibes the greatest part of the adhering benzine. Next cover the palm of the left hand with a dry corner of the rag, put the spring flat upon it, and with the index finger of the right hand, around which another part of the rag is wound, press gently upon it, and let it assume a conical shape; by suitable motions of the finger while wiping, the spring will turn, and every part of its blade may easily and thoroughly be cleansed of all impurities. A spring treated in this manner will be freed of all matter, while at the same time its molecular arrangement is not violently interfered with, calculated to injure its elasticity. Another method for cleaning a spring, consists in taking a winding key with wooden handle, wrap one or two turns of clean rag around it, and gently follow the different coils, while for the inner ones, use a brush.

After cleaning, we come to the winding in of the spring—a manipulation either not whatever, else only partly understood and observed, yet it is an operation of high importance; if I had space and inclination, I could recount highly entertaining stories on this subject.

The winding in is either performed with the winder or hand, hooking the spring in the barrel with its outer end, and bending it in little by little; else by putting together the barrel, hooking the spring with its inner end, and turning the arbor, whereby the spring coils around it. The latter two methods cannot be recommended; the sideward flexion of the spring is so strong that its elasticity must suffer thereby.

The spring winder, consequently, is the sole remaining means. Reasonable caution, also, is necessary with it. The main requisite of a good winder is that its arbor, together with shoulder, run truly round and have no shake. The shoulder must correspond exactly to the size of the spring core, around which the spring is to be wound, and all other parts being suitably proportioned, and due care is observed, there is no obstacle in the way of locating the spring flat and firm upon the barrel bottom, without exposing it to injurious side flexion.—[R. T., in *Allg. Journ. d. Uhrm.*

Practical Treatise on the Adjustment of a Cylinder Watch.

[Translated for The Jewelers' Circular from the 2d-prize essay of Vincent Lauér.]

Continued from Page 58.

As I have already said, it often happens that the regulator is placed too much to one side, and the outer spring coil, in such a case, will have to be bent in a corresponding degree out of the center, else it will be drawn to and fro by regulating. If the revolving point of the regulator is only a little from that of the cylinder, the spring end may be bent accordingly; greater deviations would render a regulating difficult, not to mention the unworkmanlike appearance, if the spring end is bent too much from its circle. It is preferable in such a case to put in a new regulator plate, which is done in the following manner: Take a piece of steel, of fully the strength and size required for the plate, drill a hole on the side, and cut in a screw thread, then fasten the piece with a screw to the bridge. Make a mark on the piece of steel, as well as on the bridge, which will enable you to always locate it at the same place. The place for the second screw is indicated by the hole in the bridge, through which it is drilled, and a screw inserted. When the piece has thus been fastened with two screws to the bridge, the hole for the cap jewel is marked with a fine drill and perforated, then widened by a larger one, of a size suitable to the watch in question. File the piece round, and of an approximate size, put it upon a turning arbor and give the plate its requisite form, until it fixes the regulator securely in its place. The middle hole of the plate is countersunk upon both sides, the steel part is tempered and annealed blue.

After hardening grind both its faces, lack the plate upon a chuck of the chuck tool, and polish with an iron wire filed round, the upper countersinking, also chamfer the edges, and polish. Polishing the faces concludes the work, done upon a glass plate or upon a composition file with fine steel crocus.

If it is intended to mount the upper cap do not countersink before tempering; after the plate is tempered the jewel is set; the plate then is turned around and lacked again, the jewel duly opened, and the bevels polished, best done with hard wood or bone and crocus; the remaining manipulation is like the above described.

In place of steel, nickel, hardened by hammering, may be used for the plate; this metal is easily worked, the trouble of hardening is saved, and the jewel can easily be set; such a plate, moreover, takes a good polish, and receives a finished appearance.

If the regulator is mounted by this method, and the curb pins of the regulator fork stand at a correct distance from the center point of the balance arbor, the balance spring may easily be set in order.

Under the supposition that both bridge and regulator have been put into order, the cylinder demands our attention next. Before expending time or trouble upon it, however, we should first investigate its utility, if its dimension stands in true proportion to the scape wheel, its repose faces be round, its walls too thick, etc. Should it have one or more of the specified defects, nothing else is left but to throw it aside, choose and turn in a new one.

The size of the cylinder is investigated by alternately holding a wheel tooth within its interior, and the cylinder again between two wheel teeth, paying particular attention at the same time whether the shake is everywhere the same. Supposing, for instance, the wheel tooth was right, but has more shake within the cylinder than the latter has between the teeth, the cylinder is too large; if the reverse is the case, that is, the wheel teeth have less shake within the cylinder than the latter has between two teeth, it is evident that it is too small. The cylinder is next placed into the depthing tool and critically examined if it runs true; if not, ascertain the cause; perhaps it may be that either one or both pivots do not stand in the center of the cylinder; again, this may be pressed in at the weak place of the small notch, or the operating part of the cylinder may have become warped by tempering. In the latter case the cylinder is useless, and must be replaced by a good one.

If the pivots are not turned on in the center of the cylinder, fit in new plugs, which are turned in thus that the operating part of the cylinder is exactly round. If the upper plug is fitted in truly the cylinder will generally run true to this side, the tube being long enough to give the inserted plug its proper direction. It is otherwise, however, with the lower one, where the tube receiving it is only of moderate length, and the center point of the arbor does not always stand in the center of the cylinder when the plug is inserted in its place. The cylinder here must first be set into order before proceeding with the work, that is, the center point must be turned in the center of the cylinder.

This is done in the following manner: After the plug has been firmly inserted, let the lower small tube of the cylinder run in the trueing point of a turning tool, and at the end of the protruding arbor turn a center. Great care is requisite at this work; the interior of the cylinder, for fear of breaking, is filled with shellac. If the cylinder is pressed in at the small notch endeavor to force it out again, which, however, is always a risky piece of work, as the cylinder easily breaks.

There are several methods for straightening a pressed-in cylinder; I use the following: A piece of steel or iron is filed wedge form, like a screw-driver, so that it may be inserted like a lever into the cylinder notch. Next heat this piece in a flame, until it becomes blue, push it into the small notch and press the lower cylinder tube to the outside; let the piece cool while holding it thus. The cylinder may be bent considerably by this heat, and it has occurred to me several times that I overdid it; the cylinder will take no color by this operation. If only slightly pressed in, or that it cannot be forced out again, a new plug may be inserted, by which the center point is filed, or, better, ground, so much to one side that the operating part of the cylinder becomes round; the pivot is turned on in this direction without heeding how the small tube runs.

The pivots must be investigated, if they have the necessary length, to enable them to stand securely upon their caps, and not to rub with their shoulders in the sinks of the jewel holes. If the pivots are too long it is equally a defect, injurious to the movement; a quick motion or jolt, to which the watch is exposed, may bend, even break them. In the first case, if the pivots do not reach to the caps, turn back the shoulders and repolish the pivots, provided that the defects are not inherent in the jewels, which has been noted already. If the pivots are too long, and cannot be shortened without giving too much shake to the cylinder, nothing remains but to insert new plugs.

After everything has duly been attended to put in the escapement, together with train, as far as the center wheel, in order to examine if the escape wheel may freely enter into the cylinder notch, without the butting or scraping of the teeth. With a proportionate strength of the wheel bottom, it should be one-third of the small cylinder notch, leaving free one-third above, another third below. If there is friction to one side, or if the actual position of the escapement parts does not offer sufficient security for the free passage of the wheel, it has to be altered, either by raising or lowering the cylinder or dishing the wheel. The work necessary to be done to the cylinder or its pivots may be gathered from the proceeding. The dishing of the wheel must, however, only be a trifle, and is done only when the aforementioned defect exists to a small amount.

[The remainder of the chapter is devoted to an exhaustive description of the cylinder, its functions, etc., which, being of little interest for the American watchmaker, was left untranslated.]

CHAPTER X.

THE BALANCE AND ITS SPRING.

We now arrive at those parts which actually govern the watch. Although the escapement periodically detains the motion of the train, yet it offers no adequate security that this process take place with absolute regularity. Such an equable motion is only truly obtained by the balance together with its spring. Owing to its weight, the former permits the cylinder to accomplish its revolution only at a given period, while the latter operates upon the balance, compelling it to accomplish its arcs of vibration in equal periods, and serves for the further purpose of drawing back the balance for the reception of a new impulse from the scape wheel.

The correct rate of a watch chiefly depends from the size and weight of the balance, as well as from the number of coils and strength of its spring. But it is almost impossible to establish fixed rules and proportions upon this subject. As different as are the watches and their motors, as different also must be aforesaid parts. Added to this, it often occurs that the watches possess inherent defects of construction, which cannot all be entirely removed, and said parts must be fitted to each individual watch. Every watchmaker has the opportunity of studying the excellent Manual of Horology, by Cl. Saunier, in which the subject of balance and balance spring is treated at great length; but even after a close perusal, he will find it impossible to work according to established rules, as the author particularly mentions that everything depends upon practical experiments. It is the duty of the repairer to examine if the balance is too heavy or light.

If upon a cursory examination it cannot be fully ascertained whether the balance is suitable or not, leave it for a while in its place and test the result. If it is too heavy for the motive power remove a part of its weight. This is best done by filing off from the lower face, but do not touch the rim inside; it will simply bring it out of round, which does by no means appear handsome in the vibrations. If, on the other hand, it is too light, put another one in its place. If suitable, remove all filthiness, also file off any burr found on the shanks, and equalize small differences by sinks, worked in with the chamferer, on the under face of the balance rim.

The shoulder for the collet is to be inspected, if it be in condition to receive the latter and securely retain it. If too conical, or the balance is badly riveted upon it, so that the collet can neither remain firm nor move round, re-turn it, filling the cylinder with shellac.

The balance thus has been prepared to receive the spring; before it is located, however, arrange first the collet, bridge and curb pins. If it has not been decided, when taking down the movement, if the spring can be used or must be replaced, examine it now by putting it in place, seizing the bridge with a small tongs, lifting it up, and letting the balance vibrate upon a glass plate. It can readily be compared with a regulated watch, whether its vibrations are correct, too slow or too fast. Commonly, the balance has to make 5 vibrations per second, or $5 \times 60 = 300$ per minute. Owing to the short time, it is difficult to count the single vibrations, wherefore each second one, or 150 per minute, is counted.

When seizing the spring at the little bridge the vibrations must be a little slower, the former being shortened by the curb pins.

We also must examine if the spring has enough coils; practical experience has established that there should be from 11 to 14; and if its diameter is suitable for the space in the bridge, etc. Should it not satisfy these demands take it down and lay it aside; the same is also done when the balance collet does not run true, or sits too lightly upon the cylinder. If it does, open the slot by filing, carefully press the collet together, round the hole again, and prepare it thus that it enters hard upon it, finally re-turn it and countersink the hole upon both sides, to prevent any mishaps.

If a new collet is to be made, commonly the well-known drawn bushing-wire is used; if none is on hand, drill a hole in a piece of good, hard brass wire, a little smaller than is necessary for the cylinder shoulder. The hole next is chamfered until the piece fits as far as the middle upon the shoulder; the hole for the reception of the balance spring is drilled next. Great care is requisite for this latter work; the hole should neither penetrate to within the interior of the collet, nor must it be located too far outside; the drill must be guided with care, so that the hole passes through the center of the body; if the drill becomes visible at the end of the hole be careful with your bowings, as it might break.

The collet is now turned off, do not leave it too large; it is not good if the balance spring must be broken off too much. Both ends are turned flat, the corners, especially the lower one, are rounded off; to facilitate the taking down of the collet it is hollowed to within from above, and this hollow then is polished with a pegwood and red. *(To be continued.)*

To Design a Monogram.

SCARCELY anything seems so easy as to design a monogram, yet we see very few successful ones, the most of them being a mass of mixed up letters and ornament, of which we can find neither the beginning nor the end. There is a law regulating the designing of everything, and it is this law that the true designer keeps in mind and applies to his work; the effects of obedience to this law and its violation are seen as clearly in the design for a monogram as in the design for a cathedral.

First, there should be harmony of composition—that is, the letters should so emphasize, subdue, or control each other that the composition should impress us as compact, appropriate, and, being so, beautiful.

Second, there should be no unnecessary ornamentation; there should be a quiet and peace about the design which will always please the truly artistic. Looking at some designs, we get the impression that ornament was so plentiful that the designer saw no other means of consumption than that of burying his designs in it, for we see that there is a mass of curves, angles, shades and leaves, but nothing else.

Third, simplicity of lettering is an important requisite, as there should be no possibility of mistaking an E for a G or a C, and the boundaries or outlines of the letters should be well defined.

Fourth, the order of sequence of the letters should be carefully attended to.

The common idea is, that a certain number of letters are given, with which to make a pleasing design, and so far, that impression is right; but there is something beyond this. There is the art of so placing the letters that one can distinguish at a glance the first, the central, and the last letter. Now the rule to be observed to secure this result is as follows: The *last* letter of the monogram must be the principal feature, and must be the largest, the boldest and the heaviest letter; then the *first* letter must be the next in size, but the lightest in outline and color; then the *central* letter must be the smallest and of an intermediate tint. If the monogram is of four letters, the two intermediate must be the same size, and the second letter lighter in outline and color than the third.—*Art Amateur.*

Scientific Gossip.

—The observatory on Mount Etna is finished. It is 9,653 feet above the level of the sea, or 1,483 feet higher than the Great St. Bernard Monastery.

—New platinum crucibles suffer a greater or less decrease in weight when heated, but it is found that after they have been heated for a number of times no such change occurs.

—Recent experiments show that the tensile strength of glass is between 2,000 and 9,000 pounds per square inch, and the crushing strength between 6,000 and 10,000 pounds per square inch. Mr. Traulionie finds that flooring glass one inch square and one foot between the end supports breaks under a load of 170 pounds.

—There is no ivory waste. Even the powder is sold for making jelly. It is said that one leading cutlery firm in Sheffield made a calculation that to supply themselves with the ivory needed for their business they needed 1,280 elephants every year, and that, even with this number, the tusks were each estimated to weigh 23¾ pounds.

—Iron slag is ceasing rapidly to be a waste product. At an English iron-works it is employed as a non-conductor of heat. When it is ground it is molded into bricks of great toughness, which are also impervious to frost and 30 per cent. lighter than common clay bricks. Cement, concrete, and artifical stone are likewise made from the slag.

—"The trade" distinguish seven varieties of sulphur, assigning the brightest yellow to the grade of "first quality." In Sicily the total quantity annually melted is estimated at about 390,000 tons, and the value of the sulphur when distributed at the various ports of Palermo, Catania, Licuta, Porlo, Empedocle, and Terranova, is nearly $8,600,000.

—The British postal telegraph system seems to be making very satisfactory progress. When private companies owned the wires, the best year's work ever they performed did not exceed 6,000,000 telegrams. Last year the Post Office forwarded 31,000,000 telegrams. Fifty thousand miles of wire in 1870 had increased to more than 100,000 miles in 1882; 2,200 instruments worked by all the companies had increased to nearly 9,000 worked by the Post Office, and 2,500 telegraph offices under the old regime had increased to more than 5,500 under the new. Such are a few of the interesting facts taken from a lecture by Mr. R. W. Johnston, which has just been published.

—A simple process of nickel plating by boiling has been described by Dr. Kaiser. A bath of pure granulated tin tartar and water is prepared, and after being heated to the boiling point, has added to it a small quantity of pure red hot nickel oxide. A portion of the nickel will soon dissolve and give a green color to the liquid over the grains of tin. Articles of copper or brass plunged into this bath acquire in a few minutes a bright metallic coating of almost pure nickel. If a little carbonate or tartrate of cobalt is added to the bath a blueish shade, either light or dark, may be given to the coating, which becomes very brilliant when it is properly polished with chalk or dry sawdust.

—*Les Mondes* states that M. Virlet d'Aousi has proposed to M. Dumas, the President of the International Commission upon the Transit of Venus, a plan for preventing the disturbances of irradiation. It consists of an eclipsing disk or diaphragm which is connected with clockwork so as to move through the field of the telescope with the same rapidity as the planet. The luminous phenomena being thus withdrawn from the eyes of the observers, he thinks they could better appreciate the precise moment of contact, so that Halley's method could be practically applied and an approximation of the solar parallax obtained which would be much more satisfactory than was possible at any previous transit.

THREE THOUSAND WATCHES PER HOUR.—We see by the *Petit Journal* that Paris possesses a monster factory for the production of toy watches. It says: "The industry of toy watches, at Paris, has for several years assumed gigantic proportions, and they are sent by boxes as far as Russia and Turkey. In 1863, we only had three product factories of this article, occupying about 500 men, while at present there are seven, directly employing about 1,000 men, and indirectly, at least four times as many. Men tend to the stamping machinery, while women put in the dials, hands, etc., and put the thing into running order. The factory of M. Houy alone turns out 30,000 of these toys per day—about one-fourth of the entire Parisian production."

—Speaking of the scheme for the establishment of a ring of Polar observatories, the *Nature* says: "Our knowledge of the meteorology of the temperate zone can never be complete until we are acquainted with Arctic conditions, and thus the work to be done at these observatories will have an important bearing. Not only so, but it is maintained that it is only when we have the knowledge which will be collected at these stations that we shall be in a condition to send out an expedition for the pole itself with anything like scientific assurance of success. The countries forming the International Association are Russia, Germany, Norway and Sweden, Denmark, Austria, the United States, and Canada."

—Mr. Pattison Muir gives this method for detecting tin in the presence of antimony. It is based on the fact that stannic chloride is reduced to stannous chloride by boiling with metallic copper. The precipitated sulphides of the arsenic group are warmed with concentrated hydrochloric acid. The insoluble portion is washed and tested for arsenic by Bunsen's film test. The solution is somewhat diluted; about three-fourths of it is boiled for at least 10 minutes with copper turnings, (which must, of course, be free from tin,) poured off from the copper, and tested for stannous chloride by adding mercuric chloride. The remaining smaller portion of the solution is poured on to a plate of platinum, surrounded by a piece of zinc-foil. If the platinum becomes covered with a black deposit it is removed and examined in the ordinary way.

—A new self-recording barometer by a Belgian inventor is thus described: The barometric tube, having a capacious reservoir at top, is fixedly suspended. The cistern is a tube slightly wider and nearly as long; it bears on one side an index, and on the other a pencil working on a moving cylindrical surface, and it forms the upper part of a kind of aerometer, having a downward extension in the form of a closed tube floating in mercury in a wider tube, which communicates below, through a U tube, with a wide and shallow-covered cistern, the level in which is approximately constant. The variation of pressure is marked by the variation of the height of mercury in the reservoir, and this latter is to that of the total height in the barometric cistern (or to the path of the float or of the pencil) in the ratio of the section of the cistern to that of a reservoir (a sixth in the instrument the author represents.) Thus an amplification is realized.

—Mr. Paul W. Hasluck, in a paper on the art of turning, says that an attempt to trace its progress would not only be wearisome, but very speculative, as there are few indisputable data on which to base a connected history. But the rude appliances of the past stand out in striking contrast to those of the present. Long before the flywheel worked by a crank was invented or used, lathes were driven by the aid of a spring pole, and also by bows quite different from the modern drill-bow. Now turnery—both the art itself as well as the objects produced—has been so perfected that it seems difficult to limit the range of its application. The lathe is itself a production of a former lathe. As skill has increased, so have the productions of the lathe increased in perfection. The center lathe gave the means of making the mandrel lathe, and the latter gave birth to the screw-cutting lathe; and so on through all the innumerable varieties of the tool now in everyday use. If lathes larger than the largest now used are wanted, they can be made on the machine now available. If mechanism is to be refined to a greater perfection than now exists, the tools to do it can be made on the lathes we now possess.

—Italian Majolica is earthenware, which, after firing, has been covered with a thin coating of white earth, and then enameled with a composition of the oxides of tin and lead. The whiteness and hardness of the surface are proportionate to the increased quantity of the former ingredient, and the inferior description of ware, or *mezza majolica*, is glazed with lead oxide alone. This opaque metallic varnish imparts to the ware that pearly luster, whose secret, believed to have been learned by the Italian potters from the Moors of Spain, Bernard Palissy spent life and fortune in trying to discover. Porcelain, on the other hand, originally composed of finer clay, owes its texture to a thin coating of true glass, evenly formed over its surface under exposure to a very high temperature, by which its substance is partially vitrified throughout. But porcelain and earthenware, while differing in the composition of their surface enamel, resemble each other in that they receive it in the stage technically known as "biscuit," after they have undergone the first firing. Plunged then into a solution of the glaze constituents, these substances form a white efflorescence over the porous clay, after it has absorbed the fluid in which they were dissolved. The process is finally completed by the second baking of the ware in the glazing kilns and the fusion into a thin crust of enamel, of the elements deposited on its surface.

Workshop Notes.

—Grease spots in paper are first dampened with a fine camel's hair brush dipped in rectified spirits of turpentine, which, when dry, is completely removed by applying a little alcohol.

—German Silver of a very fine grain and excellent quality is produced by melting in a crucible 55 parts copper, 23 nickel, 17 zinc, 3 iron, and 2 tin. This alloy is equal to silver, of the same hardness, and not vitreous.

—Nickel-plated brass or iron, which has become coated with burned grease and dirt, may be cleaned without injury to the nickel surface, by boiling in a strong solution of soda or potash, rinse in water, and rub first with moistened and then with dry rouge or chalk.

Gold Varnish for Metals.—Dr. Kaplas has found in picric and boric acids a gold varnish for metals, giving at once a firm and handsome surface. He recommends a clear solution of shellac in alcohol, with an addition of picric acid, and about ½ per cent. of boric acid.

—Steel which has rusted can be cleaned by brushing with a paste composed of ½ ounce cyanide potassium, ½ ounce castile soap, 1 ounce whiting, and water sufficient to form a paste. The steel should first be washed with a solution of ½ ounce cyanide potassium in 2 ounces of water.

—A cement that resists acids is made by melting 1 part India rubber, with 2 parts linseed oil, and add sufficient white bolus for consistency. Neither muriatic nor nitric acid attack it; it softens a little in heat and its surface does not dry easily; which is produced by adding ⅛ part litharge.

—Steel tempered in oil is not as hard as that in water; softer in tallow than in oil; softer in sealing wax than in tallow. Small drills hardened in sealing wax require no annealing; very thin ones may be tempered by drawing them with a quick motion through the air; they also need no annealing.

Recovering Gold from Galloons.—Previously boil the galloons for a short time with pure wood lye or solution of potash, intensified with calcined lime. When all the gold or silver spun silk threads are dissolved, wash the remaining metals several times with pure water, and collect upon a filter of blotting paper.

Quickly Prepared Cement.—Break an egg and empty its contents; add to the small remainder in the shell the point of a penknifeful of white lead, and with your finger stir it into a batter. Slightly warm the fractured faces, and apply the cement. The piece will adhere very firmly after twelve or fourteen hours.

—It is sometimes necessary to bore one or more holes in porcelain, but the usual way of doing this is not easy. If, however, an ordinary drill be hardened and kept moist with oil of turpentine, it will easily penetrate the porcelain. The drill commonly employed in connection with scroll-cutting machines answers very well.

—It is very injurious to expose a watch or movement to the heat of the sun for any length of time, especially when lately cleaned and oiled—the oil evaporates and becomes viscid. The generated vapors will stick to the train and give it a dull, dark look. It sometimes occurs in anchor watches that the shellac will soften and cause the pallets to loosen; wherefore it is necessary to protect the watch as much as possible against the sun.

Grease Spots in Marble.—Saturate carbonate of magnesia, previously heated to remove every trace of mechanically adhering humidity (still better is freshly calcined, cold magnesia—the so-called magnesia usta) with sufficient pure benzine, that it imbibes without parting with an excess, which only must occur upon being pressed together. Throw a sufficient quantity of this matter upon the provoking grease spot, and rub it upon the place. Perform this operation several times, and the spot will have completely disappeared.

—A correspondent in the *Deutsche Uhrm. Ztg.* desired to be informed how to accelerate the slow striking of a clock. *Answer:* Inspect the fly, whether it be not too heavy, or whether the pivots of both the attachment wheel and fly pinions be not too thick. Next bush the mentioned pivot hole with good, hard bushing, and the striking works will act all right, if no friction of the spring in the barrel takes place, or if it be sufficiently strong. Another correspondent subsequently says: In spite of good depthings and well preserved oil, the correspondent recommends bushing the pivot holes. I have seen no clock up to the present where it was necessary. I corrected such a fault to-day, by turning the unduly large fly down a little, with only a slight improvement. I next inspected the hammer arbor, and here I found the trouble, as it cramped in its holes. After having turned down its pivots and polished them, the clock struck all right. Perhaps your clock was afflicted with the same complaint.

Detonating Watches.—Watches with alarm are an old contrivance, but one which at the appointed time fires a shot, certainly is a product of the present era, not much known yet, and still less "to Solomon in all his glory." The mechanism producing the effect is that in common use, and regulated at the dial; on the outer case rim is a spring which is cocked at the same time, a little piston protrudes upon which a cap is placed. At the appointed hour, the spring flies off, hits and explodes the cap with a noise sufficient to waken Rip Van Winkle himself.

Cleaning Silver.—A correspondent to *La Nature* sends the following recipe, the practical value of which he has tested for years: Cyanide of potassium, 30 gr.; hyposulphite of soda, 20 gr.; water, 1,000 gr.; ammonia, sufficient quantity. The liquid is prepared cold, and the silver immersed cold.

Another subscriber sends the following recipe: water, 1 liter; sulphate of ammonia, 5 gr.; sal ammonia, 10 gr.; cream of tartar, 10 gr.; common salt, 10 gr.; alum, 15 gr. Dissolve and boil, and plunge the articles therein for a short time.

Gold Color upon Brass.—To color brass gold color, dip it, after having been polished bright, into a diluted solution of neutral acetate of copper (crystallized verdigris), in which, however, must be contained no free acid.

Mat, greenish-gray upon same.—Paint it several times with a well diluted solution of chloride of copper.

Violet upon same.—Heat brass until you can barely hold it in your hands, and then, with a ball of loose cotton, paint it uniformly with ordinary officinal chloride of antimony, and it will color a handsome violet.

Nickel-plating.—Dr. Kaiser describes a single process of nickel plating. Prepare a bath of pure granulated tin tartar and water, and having been heated to the boiling point, add to it a small quantity of pure red hot oxide of nickel. A portion will soon dissolve, and give a green color to the grains of tin. Articles of copper or brass plunged into this bath in a few minutes acquire a bright metallic coating of almost pure nickel. If a little carbonate or tartrate of cobalt is added to the bath, a bluish shade, either light or dark, may be given to the coating, which becomes very brilliant, when properly polished with chalk or dry lime dust.

—Amalgamating salt for optical and mechanical use is, according to the *Central Ztg.*, made by dissolving ½ kilo. mercury in a mixture of ½ kilo. nitric acid and ½ kilo. muriatic acid. The solution is best prepared in a porcelain dish in a sand bath, under a well drawing chimney, like a blacksmith's furnace. Another good method is to dissolve 8 parts of oxyde of mercury in 100 parts water and 10 parts muriatic acid. Dip the zinc parts into this fluid for a moment, then rinse and brush them, and they will be found coated with a silver like coat. The application can also be made with a small brush or sponge. Protect your hands against the poisonous properties of the salts of mercury; it might penetrate through the skin into the body and cause salivation and mercury poisoning.

—The Berzelius pencil to cut glass is made in the shape of a pencil, red heated in the fire and applied to the glass, which it cuts with facility; the point of beginning is to be started with a file. It is composed of the following ingredients. Gum arabic, 60 parts; gum tragacanth, 23; benzoin, or benjamin, 23; lamp black, 180; water in sufficient quantity. The gum tragacanth is steeped in water for several hours, and the gum arabic is dissolved in a sufficient quantity of water, while the benzoin is pulverized very finely. The three components then are mixed, the lamp black and enough of water added to make a dough of a consistency to be moulded into pencil shape, which are finished by being rolled between two flat surfaces. With skill, a bottle may be cut into a spiral shape which draws out like a spring; this pencil is a very appropriate tool in the workshop of any tradesman.

—Metallic objects may be colored by immersing them in a bath formed of 640 grains of lead acetate dissolved in 3,450 grains of water and warmed to from 38° to 90° Fah. This mixture gives a precipitate of lead in black flakes, and when the object is plunged into the bath the precipitate deposits on it. The color given depends on the thickness of the skin, and care should be taken to treat the object gradually, so as to get a uniform tint. Iron treated thus acquires a bluish aspect like steel; zinc, on the other hand, becomes brown. On using an equal quantity of sulphuric acid instead of lead acetate, and warming a little more than in the first case, common bronze may be colored red or green with a very durable skin. Imitations of marble are obtained by covering bronze objects, warmed to 100° Fah., with a solution of lead thickened with gum tragacanth, and afterward submitting them to the action of the above mentioned precipitate of lead.

Business Notes.

Alex. W. Miller has succeeded to the business of the firm of Miller & Gregg, wholesale jewelers, 3 Maiden Lane.

Pinover & Castleburg is the name of a new firm of manufacturing jewelers recently established at No. 94 Nassau street, in this city.

Mr. David S. Price, well known in the trade, has made an engagement with Martin Copeland & Co., and will hereafter represent that firm on the road.

Stockwell & Newman have succeeded Stockwell & Gaunt, manufacturing jewelers. The business will be continued at the old place, No. 19 John street.

The co-partnership heretofore existing between Milne & Jourdan has been dissolved by mutual consent. Mr. Milne will continue the business at the old place.

Chas. W. Troughton has severed his connection with Sinnock & Sherrill as their agent in Chicago. He will continue his office there for the sale of goods to the jobbing trade only.

Wm. Payne, for several years in charge of the jewelry department of Messrs. LeBoutillier & Co., has entered into a business engagement with the Gorham Manufacturing Company.

The firm of Fred. I. Marcy & Co., of Providence, has been dissolved by mutual consent, Chas. H. Smith retiring. Mr. Marcy will continue the business, and assume all liabilities of the late firm

The co-partnership heretofore existing between W. Link and J. D. Nesler, under the firm name of Wm. Link & Co., has been dissolved by mutual consent, and a new co-partnership formed with Addison Conkling, under the firm name of Link & Conkling, who will succeed the late firm before mentioned.

Messrs. Jeanne Bros., the well-known diamond jewelers, have just patented a very attractive flexible spiral bangle bracelet, a description of which appears elsewhere in their advertisement. It is very neat, showy, and possesses many substantial advantages, and will doubtless become popular with the trade.

L. Straus & Sons, importers of pottery, glassware and fancy goods, offer the trade unusual facilities for selection in their extensive establishment at Nos. 42, 44 and 46 Warren street. Their stock always contains the latest novelties in their line, and elegant examples of new designs in pottery and glassware.

The American Iridium Company of Cincinnati are manufacturing iridium jewels for watches, which are represented to be superior to the ruby in hardness and durability. This metal alloys with gold, silver and platinum, and does not corrode. It is of great value in the manufacture of mechanical implements, and is also being introduced in jewelry.

Mr. Dennis Valentine, of Syracuse, whose retirement from business was noticed in our issue for March, will sail for Europe in June. Mr. Valentine is negotiating with various persons with a view to becoming their purchasing agent abroad. He has many years experience in the jewelry business, and his knowledge of the requirements of the trade eminently qualifies him for such a position.

E. Ira Richards & Co. are manufacturing an extensive line of extra quality rolled-plate chains. These goods are warranted to be of the best quality, and to wear well. It is well-known that there have been great complaints of late regarding the debased quality of rolled-plate goods, and it is the intention of the above-named firm to supply the demand for the best quality of such goods only.

Mr. J. F. Chatellier has produced for an Easter novelty, an article of jewelry in sterling silver, representing the most popular flowers of the day, that more nearly approaches the natural color of flowers than has heretofore been accomplished by enamel or otherwise. The beautiful and artistic effects are secured by the action of chemicals upon the pure metal, and the results obtained are marvelously natural. Daisies, pansies, pinks, morning glories, and other brilliant flowers are reproduced in silver with all their natural effects and brilliancy. These goods are the result of many labored and costly experiments, extending over several years. Success has now crowned the efforts of Mr. Chatellier, and he is enabled to present to the trade a new, attractive, and desirable line of jewelry, that is unquestionably destined to become exceedingly popular. Silver jewelry has always been an attractive and desirable article of personal adornment, and this presentation of it in new and charming effects will render it more popular than ever.

The enterprising firm of Lapp & Flershem, of Chicago, universally known as the busiest house in America, will remove to more commodious and convenient quarters at Nos. 77, 79 and 81 State street, on May 1st. They will open their new stores with a larger and more attractive stock of goods than ever. This is the second time they have been compelled to enlarge their quarters by increasing trade.

J. E. & J. S. Spencer have disposed of their jewelry department to F. S. Kennedy, and will now devote their entire attention to the optical department. Increasing business has impelled them to extend their manufacturing facilities, in order to keep pace with their orders. They are now bringing out some new and attractive styles in celluloid, and novelties in gold goods that cannot fail to satisfy buyers.

Frank E. Knight, for many years a traveling salesman for the Meriden Silver Plate Company, has left the road and taken charge of the New York office of the company, No. 30 East 14th street. Mr. Knight has an extended acquaintance in the trade, and his location in this city will be a great advantage to the company. Members of the trade visiting New York will find a full line of goods at the office in Fourteenth street.

Hall, Nicoll & Granbery, of 20 and 22 John street, fancy goods dealers, have the following hospitable notice prominently displayed in their windows and stores: "We invite the representatives of the trade to come in and ask for quotations on our goods, though they may have no present intention of purchasing. We would be glad to make the acquaintance of those whom we do not already know." Thus trusting to their low prices to attract purchasers.

One of the latest novelties in combination jewelry is an article patented by Heller & Bardel. It consists of a diamond ring which can be converted into a lace pin or a bracelet at will, thus forming three distinct and elegant articles of personal adornment. In either form it becomes a substantial article, secure in all its fastenings, and in no danger of being lost through insecure adjustment. It is novel and tasteful in design, however worn. These goods will, doubtless, become popular.

An attractive and appropriate Easter novelty is that presented by Aikin, Lambert & Co., which is an extension pencil issuing from an Easter egg. The egg is ornamented in a variety of styles and forms, a very handsome pendant for a watch chain, or an elegant substitute for a locket. It is pleasant to note that our manufacturers are producing attractive and original souvenirs to commemorate special events, and this pleasant tribute to Easter offered by Messrs. Aikin, Lambert & Co., cannot fail to be duly appreciated by the trade and the public.

The success attending the introduction of celluloid show cases, is an evidence not only of their adaptability to the requirements of the trade, but to the almost numberless modes by which celluloid can be made useful. The Celluloid Show Case Company is now working to its full capacity to supply the trade. They have recently issued an attractive catalogue, illustrating the different varieties of cases manufactured by them, and commendatory testimonials are presented, which cannot but be flattering to the management of the company, as they not only attest the practical utility of the cases themselves, but the enterprise of the management. The officers of the company are, Robert A. Johnson, President, J. S. Cooley, Vice-President, and Caleb K. Colby, Treasurer.

The Dueber Watch Case Manufacturing Company, located at Newport, Kentucky, is one of the most enterprising manufacturing industries in this line in this or any other country. The founder of the enterprise is Mr. John C. Dueber, a practical workman of the highest order, who commenced business in a very modest way. Some years ago he established himself in Cincinnati, and by perseverance, merit, and well directed efforts, he secured the confidence of the trade. From small beginnings as a manufacturer of watch cases, he eventually formed the Dueber Watch Case Company, and, as the demand for their goods increased, the company erected large and elegant works at Newport, Ky., their factory being an ornament and a credit to any state, adding largely to its industries, and giving employment to large numbers of workmen. Mr. Dueber continues to be the practical directing head of the company, having entire charge of all its immense business. With regard to workmanship and finish of the cases produced by this company, they are too well known to the trade to require any special commendation at our hands. Every case that leaves the factory bears the impress of the characteristics of the directing mind of the manufacturer's integrity and honesty. It is well known to the trade that THE CIRCULAR is not inclined to deal in fulsome puffery, but, at the same time, it always gives us pleasure to note the progress that modest merit is sure to attain.

Trade Gossip.

Scarf rings are now worn by ladies.

Pearl combs are a Parisian novelty.

Very little jewelry is worn in the street.

Silver hairpins are used by gray-haired ladies.

Silver jewelry is worn with black Lenten dresses.

Bracelets are the favorite article of jewelry this season.

Antique seals and buckles are the most sought after in fob chains.

Cats and kittens are taking the place of elephants and bears on bangle rings, pins, etc.

Gillette & Glynn, formerly of Geneseo, N. Y., succeed Hixon & Lyke, jewelers, of Lockport.

Mitchell's jewelry store at Waterville, Me., was destroyed by fire on the morning of March 1st.

In Paris pearls are now in great fashion. Fine necklaces of Oriental pearls have sold lately from 300,000 to 1,200,000 francs.

Trask, Rowe & Co., of Chicago, have dissolved partnership, Mr. Trask retiring. The firm will hereafter be known as Rowe Bros.

Reuben Lyon, formerly a jeweler and latterly doing a diamond brokerage business in Baltimore recently committed suicide by taking poison.

The firm of Albert Berger & Co. have introduced a new show case for the display of opera glasses, which is a decided improvement to the front of their store.

Mr. Samuel Swartchild, of the firm of Kearney & Swartchild, of Chicago, will sail for Europe in the *Bothnia*, April 26, on matters of business in the interest of his firm.

A silver churn and a magnet, inspired by the song in "Patience," is one of the latest novelties in scarf pins, introduced by those classical manufacturers, Thos. G. Brown & Sons.

Three men and two women have been arrested in Brussels, charged with complicity in the Hatton Garden (London) diamond robbery. A quantity of jewels was found in their possession.

E. Wiggers, of Nashville, failed March 16, with liabilities amounting to about $21,000. His assets are said to be fully equal to this amount, but details of his failure have not yet been received.

Bernhard Hilberth, of Memphis, Tenn., was married March 19, to Miss Gussie Morrison, of New York. Mr. Hilberth is a watchmaker and jeweler of Memphis, and a gentleman favorably known to the trade.

The devastation throughout the Mississippi River valley, caused by recent floods, has caused something of a stringency in all branches of trade and commerce, the jewelry trade feeling its effects in due proportion.

Julius Walker, of Buffalo, has suspended. This is said to be the third time that Mr. Walker has found himself financially embarrassed. We would suggest in the interests of the trade that he now retires from business.

The Minnesota Retail Jewelers' Association held an adjourned meeting at the Metropolitan Hotel, St. Paul, March 15. A detailed report of the proceedings was not received in time for this issue of THE CIRCULAR.

Some unscrupulous persons are palming off upon unwary shopkeepers, imitation onyx goods for genuine. It is hardly necessary to say that to intelligent persons the price will indicate the true character of these goods.

A combined flask and opera glass is the latest. By using this glass properly, a bald-headed gentleman in the back seats can wink at a favorite actress with one eye, and wet the other to her better acquaintance. It's a wonderful invention.

George W. Ludwig, the well-known jeweler of Chambersburg, Pennsylvania, has succumbed to the charms of Miss Emma J. Brengle, to whom he was married March 15, at the residence of the bride's parent's at Cumberland, Md.

An opera glass has been made that can be converted in a moment into a photographic camera. Every girl who has a lover should own one. By popping it on him when he is on his knees popping the question, she'd possess a picture that would have him dead to rights in a breach of promise case.

James Fricker, of Americus, Ga., has opened a new jewelry store in Danville, Virginia, to which place he will remove his family, leaving his brother, C. A. Fricker, in charge of his business at Americus. Mr. Fricker is now in town buying goods for his new establisment.

The Egyptian necklet, worn by the Wilde "sect," is a delicate and beautiful piece of workmanship, and is made of gold-linked tablets, each out-lined with figures from antique bas reliefs. The chain is fastened in front by a double clasp representing a sphinx's head backed by a pyramid.

P. H. Lachicotte, of Charleston, S. C., who is now in the employ of James Allen, of that city, has completed a watch original in conception and construction, that is attracting much attention. It was awarded a silver medal at the late Exhibition at Atlanta, Ga., and is said to possess many points of excellence.

There has been quite a number of failures of late. It is safe to say that there has been a considerable improvement in the character of these failures, as fewer of them present fraudulent features than formerly. None of those of recent date are of sufficient proportions to produce an appreciable effect on the trade.

Samuel Bell, of San Antonio, Texas, died on the afternoon of March 3d. Mr. Bell was a native of Pennsylvania, but many years ago removed to San Antonio, where he engaged in the jewelry business. The deceased was highly respected in the community in which he lived, and his death is regretted by a large circle of friends.

At the last regular monthly meeting of the New York Jewelers' Club, the following named gentlemen were elected members of the Executive Committee, viz., Messrs. L. Bowden, C. Miller, B. W. Ellison, S. P. Howard, G. Fenn and E. Bliss, a clause was also added to the by-laws providing for the admission of honorary members.

John Ryan, an old and well-known jeweler of Mt. Gilead, Ohio, was accidentally killed at Norwalk, while attempting to alight from a moving train. The deceased had the reputation of being one of the best watchmakers in the state. He retired from active business some four years ago, after a very successful career in the jewelry business.

Adolphus Marx, of the firm of Kossuth Marx & Co., who, it will be remembered, has been an inmate of a London hospital for the past seven months, in consequence of the breaking out of an old wound received in a railroad accident, arrived in the *Germanic*, and is now at home in this city. His many friends will be glad to learn of his convalescence, which is progressing slowly.

A report was recently circulated to the effect that Mr. David Dodd was about to form a co-partnership with Mr. William Howkins, and engage in the jewelry trade. Mr. Dodd authorizes us to pronounce this report as wholly without foundation. He is at present engaged in a more lucrative enterprise, having long since realized the fact that in the jewelry trade "all that glitters is not gold."

The building No. 15 Maiden Lane, was recently sold at public auction to settle an estate. There was much spirited bidding by wealthy men in the trade, and it was finally knocked down to Mr. Louis Strasburger, for $97,500. The building is one of the most desirable in the Lane, and is at present occupied by firms in the trade. It will be at once thoroughly repaired and improved, and such inducements offered to tenants as to secure their continued occupancy of their present quarters.

The House Committee on Commerce at Washington at a recent meeting, directed Representative White to make a favorable report to the House on the "Time Ball Bill." This bill appropriates $25,000 to enable the Secretary of the Navy to transmit to maritime cities of the United States, and all other cities of 15,000 inhabitants, who may desire it, daily by telegraph, at meridian, the true Washington time. England and France and other Continental nations already have in successful operation this clock and time ball system.

Custom House officers recently seized a case of jewelry on board the ship *Circassia*. The owner was a Scotchman, who first gave his name as Donald, and then said it was Campbell. On the way over he told the Captain that he was a fine painter, and secured permission to paint the Captain's cabin. The result was that the cabin was soon smeared in a fashion which made the commander of the *Circassia* exceedingly angry. Later the passenger from Glasgow admitted that he was not so decided a success with the brush as he was behind the counter in a pawnshop. He was much exasperated when the Customs officers insisted on seizing his valuables, and followed them to the Custom House dealing out volleys of imprecations. His stock consisted of 15 watches, 17 watch chains, 76 finger rings, 79 brooches, 8 charms, 67 scarf pins, and a half-pound or so of promiscuous decorative articles.

A skilful and daring robbery was recently perpetrated on the jewelry store of E. O. Zadek & Co., of Mobile. The thieves bored holes through the door, by which they removed the fastening and gained an entrance. They succeeded in forcing open one of the safes, obtaining about $2,500 worth of rings and jewelry, but the more expensive portions of the stock were in another safe, which the burglars had no time to operate upon before they were disturbed and took to flight. No clue has yet been obtained to the burglars. Mr. Zadek is to be congratulated on having escaped with so small a loss compared to the stock he had on hand.

There will shortly be presented to the trade by Simpson, Hall, Miller & Co., a new and elegant style of ice pitcher, which is an entirely new departure in this line of goods. The exterior is of porcelain, which is variously decorated by hand painting. The interior is in metal, as heretofore. The porcelain shell affords an opportunity for the greatest amount of ornamental decoration, and variety of style and design. Great progress has been made of late years in the production of artistic porcelain work, and whatever art has done in this direction will be employed in the production of these new styles of ice pitchers. This new device is covered by letters patent, which have, fortunately, been secured by so enterprising a firm as Simpson, Hall, Miller & Co.

The o'd house of Ve J. Magnin, Guédin & Co., of this city, was forced to suspend during the past month. The suspension is due to family complications with the estate of the brothers Delmonico, the famous caterers, two of whom died recently. The misfortune which has thus overtaken the firm of Magnin, Guédin & Co., after half a century of successful business transactions, is much to be regretted by the trade, with whom the firm, and its individual members, have been always popular. A statement of the financial condition of the firm is now being prepared, and will be presented to creditors at an early day. An absurd rumor was put in circulation to the effect that the failure of the firm was due to their carrying an excessive stock of Swiss watches. This statement is as malicious as it is false.

Mr. Fowler, of Fowler Bros., has in his possession a phenomenal diamond, its crystalization being unique. It was found in the Brazilian mine. Its form is nearly cubical; faces of the cube, hexoctahedron, tetrahexahedron and octahedron, are developed on the points and edges of the crystal. The particular interest of the diamond centers upon the depressed square pyramid shown on each cube face. These depressions extend nearly to the middle of the crystal and are beautifully striated with lines parallel to the edge of the pyramid. The cubic edges are salient, which feature is very rare in diamond, but often observed in gold, salt and copper crystals. It is perfectly transparent and white; weighs about one karat. A more interesting diamond crystal has perhaps never been discovered.

The newest cane has a handle of the new red metal, an oxide of gold, placed as an enamel of brilliant dark red on a gold or silver basis. They are generally in crutch or hooked shape. The mascot, or shepherd's crook, is the present form of handle for some of the new canes. The cane itself is usually of reed or bamboo, and the top of antique ivory, horn ebony, hammered gold and silver and tortoise shell. Heads of animals, with elongated ears, such as rabbits and donkeys, the head of an elephant with the trunk curved, dragons, serpents, and designs of this nature, are so well carved as to be really works of art. The crutch-shaped top is a favorite in gold and silver, representing a short stick of natural wood. This design in hammered gold is $100. A double-headed sphinx is a handsome design in antique ivory. Umbrella handles show the same designs.

J. S. Kelley, of Abeline, Kas., offers a reward of $200 for the recovery of the following articles, stolen from his branch store in Buena Vista, on the evening of Sept. 14, viz.: One double time stop watch, gold hunting case; numbers on case, 19,496 and 2,455, second hand; one Rockford (Illinois) movement, key wind, number 20,139, in three-ounce, open face, silver case; one Springfield (Mass.) movement, key wind, number 83,649, in five-ounce silver hunting case; one No. 6 Elgin movement, number 647,784, in four-ounce, stem wind, hunting case; one large cameo ring, marked inside sooc–X102; one solitaire diamond ring, about ⅜ karat stone, black enameled band, in dark marcon velvet box; about 140 rings, marked inside with figures below and letters above, soc–X39, stm–872, etc.; a lot of roll-plate and fire gilt vest chains, ladies' long chains, neck chains, charms, etc.; one 18-size gold shell case, stem wind; one 18-size Mansard case, stem wind; one 18-size gold case, key wind, with straight line Elgin movement, and a lot of 18-k. flat bands, stamped Kelley. One hundred dollars will be paid for the recovery of the goods, and $100 for information leading to the detection and conviction of the thieves.

The latest fashion among the Paris youths of aristocratic pretensions, is a sort of dinner of the "bracelet." A party of about a dozen young prodigals club together and each subscribes 100 francs. With this capital they purchase a bracelet of unique and tasteful design. They then prepare a dinner at some fashionable restaurant, to which they invite an equal number of ladies—the wittiest and prettiest and wickedest of their acquaintance. After the meal has been partaken of, with all its accessories of gay badinage and repartee, the bracelet is put up in a lottery. Of course there is decided excitement as to its destination. If a woman is the happy recipient, well and good; but if it falls into the hands of a man, then follows the rivalry of the feminine guests as to whom he will give it. The "bracelet" dinners are, of course, very popular, and one would think that they would be speedily adopted by the more moral portion of society.

The Retail Jewelers' Association of Iowa held a convention at Des Moines on the 15th ult. We have not received a report of the proceedings as yet. We regret that the Secretaries of these State Associations do not forward us reports in time for publication in our issue succeeding the meetings. They usually come along after we have gone to press, and are too stale to be passed off as news a month later. Our columns are at the service of the Associations for the publication of news of interest to them, but if the officers do not inform us of their proceedings we cannot print them. If they took the interest they should in their Associations they would see that the trade was kept informed of their action. We are indebted to the courtesy of Mr. Weld for the information that the Iowa convention was well attended and satisfactory. There was the best of good feeling exhibited by the members, and a unanimity of action that promises well for the future of the Association.

A story is told of a countryman who called at the Astor House, and who soon attracted the attention of the Providence gang of drummers that frequent the lobbies of that hotel. It was soon rumored among them that he was a western jeweler. The drummers immediately laid siege to him in their usual pertinacious manner. First one would call upon him, and, presenting his card, extol the merits of his goods; and then another, smelling of brass jewelry and onions, would follow suit, and inflict upon the phlegmatic countryman his card and a long rigmarole about the superior excellencies of his goods. The countryman received them all with a smile that was childlike and bland, seeming to relish the excitement he had caused in flash jewelry circles. To each he represented that he was not prepared to buy just at present, but would certainly give them a call when he did. The siege was maintained for the greater part of the day, during which the countryman had received all the cheap drummers in town, and had accumulated a stock of cards that would fill a good sized carpet sack. It finally turned out that the countryman was a farmer, visiting New York for the purpose of buying fertilizers. It was a "put up job" on the "boys," and most of them were taken in. It is only necessary to ask one if he is interested in fertilizers to secure an immediate invitation to "take something." The incident only illustrates the avidity with which these irresponsible drummers seize upon any possible chance to catch a customer.

A correspondent in Louisville, Ky., writes that he has in his possession a curious ring, which formerly belonged to his great-grandmother, who lived in Germany, and that he is inclined to think it was Martin Luther's wedding or engagement ring. On the inner surface is engraved, "D. Martino Luthero—Catharina W. Boun, 13 Juni, 1525." The owner describes his treasure as follows: "On one side of the ring in carved a representation of the Crucifixion; the cross is carved through the gold, and the outlines of the figure stretched upon it are very fine. In the center of the cross-piece of the cross is a fine ruby, around which are carved these letters, I. N. R. I. Just at the foot of the cross on the right is carved a head with a Bishop's hat on it, and on the left side of the cross is a palm; on the other side of the ring are carved a ladder and spear, and between these is an anchor around which is twisted a rope. The gold in the ring is very fine and of a pale hue, and has not the appearance of being so old. I can trace it back about 150 years. How the ring was obtained by my great-grandmother I do not know, but the family were ardent Lutherans, and I think may have gotten possession of the ring in this manner." Martin Luther was undoubtedly married on the 13th of June, 1525, but his wife's name was Katherina von Bora, not Catharina W. Boun, and the present owner of the heirloom will probably do well to take a reasonable pride in possessing a ring which once belonged to his great-grandmother, without attempting to identify it with the hero of the German reformation.

THE

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THE

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☞ *All communications should be addressed to* D. H. HOPKINSON, 42 *Nassau Street, New York.* ☞ *Advertising rates made known on application.*

Retail Dealers' State Associations.

SOME time since, when the retail dealers, especially those of the west, were uttering loud complaints against certain practices indulged in by the jobbing trade, who were expending their energies in seeking the retail trade at the expense of the retailers, THE CIRCULAR was the first to suggest the organization of state associations. We felt that if the prominent retailers would come together and state their grievances, and at the same time show that they were united for the maintenance of their rights, the jobbers would be forced to abandon those practices that were as impolitic as they were unbusinesslike. In this supposition we were correct, for the abuses of which they then complained most loudly, have ceased to exist. We were confident that if the best known retailers in each state resolved upon carrying forward a reform movement, they could do so, and we hoped that the good sense they possess would prevent their associations from being manipulated by schemers and adventurers. We followed their movements with interest, praising whatever of good we saw in their action, and encouraging them to the extent of our power in the enforcement of such measures as we believed to be for the general good of the retail trade; when we saw occasion to criticise their action adversely, we did so, believing that he is the best friend who points out our errors, and not he who flatters and commends regardless of right or wrong. The associations have effected some reforms that are of value to the retail trade, and having done that, there appears to have been a loss of interest in them, and things of importance that remain to be done are left undone. The waning interest in the associations evinced by the retailers, has been the signal for designing men to come forward and seek to use them for their own advantage. It is time the associations were warned of their danger, and steps taken by them to recover lost ground.

A great mistake has been made by some of them in the adoption of a line of goods to be made by a manufacturing company, little known, bearing the Guild stamp, to the exclusion of all other goods of a similar nature. When it was first proposed that the National Guild should adopt a stamp to indicate quality, we approved of it as the next best thing to a national stamp. But we supposed when such stamp was agreed upon, manufacturers would not only be consulted regarding it, but all would be permitted to use it under reasonable conditions to be prescribed by the Guild. This, however, has not been the case. Instead of inviting leading manufacturers to a consultation, with a view to improving the quality of goods, the company referred to comes forward and offers to manufacture flat plated goods bearing the Guild stamp, promising that the plate shall contain ten per cent. more silver than the goods of other manufacturers. It submits, also, a stamp for adoption which has been patented, that is as uncouth and ridiculous as it well can be, and which is not a guaranty of anything. Without officially consulting other manufacturers of similar goods, the Guild accepted the proposition and the stamp, and forthwith commends it to the various state associations. Some of these, with no other recommendation than those made by representatives of the company interested, at once adopt the stamp, and approve of the proposition made. This is, substantially, that members of the associations will sell these goods in preference to the products of other manufacturers. Evidently the retailers did not comprehend what they were doing when they voted to tie themselves to the tail of this Guild stamp kite, or they would have hesitated before doing so. Suppose a dealer who belongs to the association undertakes to push the goods of this company to the exclusion of those of the other manufacturers, he at once antagonizes them, and virtually forces them to adopt retaliatory measures. There are quite as many respectable and responsible dealers outside of the state associations as there are in, and there is scarcely a town in which they are not to be found. It will be a simple matter for the excluded manufacturers to make arrangements with them to under-sell all goods bearing the Guild stamp, and to so stock the market that there will be no demand for the latter. As the old and well-known manufacturers have long catered to the public, and have shown vast enterprise in the production of goods of excellent workmanship and attractive patterns, their names will be quite as good a passport to public favor as the goods produced by a company whose reputation and experience are limited, even when endorsed by the Guild stamp. If the efforts to push these goods promises to be at all formidable, it will become a question of "freezing out," and retailers may expect to see their various localities overrun with auctions of plated goods, and standard articles, of the latest designs and patterns, bearing the names of well-known and popular makers, selling under the hammer at prices that will make the Guild stamp goods wholly unsalable. The manufacturers of plated goods have spent years and many thousands of dollars in bringing their wares to a degree of perfection that has never been equalled anywhere, and they are not going to be crowded out of the market by unfair competition, even though it be endorsed and approved by the National Guild and several state associations.

The mistake that has been made by the manipulators of these associations was in giving any one company, East or West, a monopoly of the manufacture of goods bearing the Guild stamp. Had they secured, as they unquestionably could have done, the co-operation of all manufacturers, and given all an opportunity to share in any advantage to be derived from the stamps, there would have been some sense in the movement. As the matter stands, the associations, by adopting the Guild stamp, and confining its use to a single company, have taken the best possible means to antagonize the other manufacturers in the trade, a fact which cannot but prove disastrous to those retail dealers who carry out the ideas of the associations. Should the other manufacturers find that the Guild stamp goods are affecting their sales at all seriously—which is not likely—self-preservation will impel them to retaliate upon those dealers who attempt to push them. In this case, proscription is a two-edged sword, and can be made to cut both ways. Under the most favorable circumstances, the action taken will create an unhealthy rivalry between retail dealers who are members of the associations and those who are not. Those inside the associations will be limited to the handling of the Guild stamped goods, the reputation of which is yet to be made, while those outside, can handle those of other manufacturers, whose reputations for the production of attractive and desirable goods are world wide.

We regret that the associations have taken this step. By so doing, they have shown their utter incapacity to deal with the stamp question, and they had now better undo what they have done, and inaugurate a movement to secure national legislation on the question. We write on this subject solely in the interest of the retail dealers. We are confident they cannot get the most desirable and most salable goods from the company that contracts to affix upon them the Guild stamp, and we should be sorry to see them cut off from their source of supply, or their trade ruined because of their persistence in attempting to carry out a blunder. For that the Guild and the state associations committed a grave blunder in making the agreement referred to, no reasonable man can doubt. They have attacked the stamp question at the wrong end, and instead of enlisting the co-operation of the large and popular manufacturers, have, by ignoring them, made a grevious mistake. We shall be sorry to see any of the retailers caught in this trap, and the sensible thing for them to do is to ignore it entirely. The stamp question is one of vital importance to retail dealers and the public, but it is altogether of too great magnitude to be handled by selfish manipulators, or to be dealt with by piecemeal. When the reform in the quality of goods is made, it wants to be radical and sweeping, and to this end it must enlist the best and most influential men in the trade. The action of the Guild and the state associations in this matter has tended to aleniate much of the sympathy that has heretofore been manifested for them. It is the retail dealers, not the manufacturers, that are being injured by the course pursued, and we hope they will bring their influence to bear at once, to undo what may become a serious mischief.

Expenses of Commercial Travelers.

COMMERCIAL travelers are usually generous-hearted, free-handed, affable and pleasant gentlemen. These qualifications are necessary to a good salesman; but, unfortunately, they are rarely found in connection with good business methods. Commercial travelers are wont to be somewhat lavish in their expenditures, and seldom render to their employers a clear and intelligible statement of their disbursement. A traveler starting off for a trip goes to the cashier of the establishment and says he wants a certain sum of money, being careful always to draw sufficient to provide for unforseen emergencies. On his return he says to the cashier, "My expenses were so much, here is the balance I owe you." This is a loose way of doing business, and one that will inevitably, sooner or later, operate to the disadvantage of the traveler. An employer is as much entitled to any itemized statement of how his money is spent, as a customer is to an itemized bill of goods. It is his right to know all the details of the cost of keeping his men on the road. For lack of such detailed statements, they are unable to point out where a more rigid economy might be exercised, and some items of expense cut off that would be advantageous alike to them and the traveler. As matters are ordinarily conducted now, an employer has a vague idea that it costs him from $7 to $10 a day to keep a traveler on the road, but of what items that considerable bill of expense is made up he is entirely ignorant, because the traveler renders his accounts in a lump sum, instead of giving in an itemized statement. Emyloyers do not desire their representatives to be niggardly in their expenditures, or to subject themselves to physical discomforts for the sake of saving a dollar, but they do expect them to exercise, while traveling, that same judicious supervision of the expense account that is exercised at the home office. We speak of this matter in the interests of the travelers for they may be assured that the one who combines the best business tact with those qualities essential to a good salesman, is the one who can have his pick of situations and command the best salary. We know of a traveler for a large concern, who was getting a liberal salary, who was dropped from his situation simply because he was an expensive man. He was a splendid salesman on the road, but his expenses were greater than those of other salesmen in the same employment. He never could render an itemized account of his expenses, and when spoken to about his extravagance, his reply would be, "But don't I sell the goods?" True, he sold the goods, but his employers concluded that someone else could sell them at less cost. The gentleman alluded to was forced to seek other employment; and this he found difficult, from the fact that the impression had got abroad in the trade that he was an expensive man to employ. Every year there are numerous changes made by traveling men, and if the truth could be ascertained in every instance, it would be found that many of these were enforced because the person involved was an expensive man. Travelers in the trade will find it to their interest to render full statements of their expenses. Probably it will not diminish their allowances in the least, but it will be a satisfaction to employers to know that their work is being done in an economical manner, and their interests consulted at all times by their representatives. Travelers have no reason to complain if their employers exact such detailed statements of expenses; it is simply a business matter, and should be met in a businesslike way.

As we have said above, respectable and responsible houses do not desire their representatives to be niggardly or mean, but to travel like gentlemen and represent the house as gentlemen should. There are some cheap travelers on the road, representing cheap houses, who can live on the smell of an oil rag and a raw onion; who travel second class, patronize cheap restaurants, or carry their food in their pockets. They are fitting representatives of their employers, and the goods they sell are worthy of both. This class of salesmen are a pest and a nuisance, their pertinacity and offensive manners having a tendency to disgust the trade with travelers of all kinds. Of course, no respectable house desires its salesmen to travel in this "cheap and nasty" way, or to saturate themselves with onions and garlic; nor do they expect them to compete with these in the matter of economy. But there is a middle path between extravagance and meanness, between lavish expenditure and miserliness, that respectable salesmen should endeavor to walk in. Above all, they should deal frankly and in a manly way with their employers, bearing in mind the old adage that "short accounts make long friendships." A straightforward, businesslike way of treating the expense account, will do more to establish and maintain confidence between employers and travelers than any other one thing.

A Temporary Lull in Business.

THERE has been quite a lull in business during the past few weeks; in fact, a season of dullness and depression in the trade that exceeds what was expected Various reasons can be assigned for this, all of which have had more or less influence in producing the result. Probably as potent a factor in producing the dullness of trade in general was the Lenten season. The observance of Lent is becoming more and more general in this country every year, especially in the south. There it is inaugurated with great pomp and ceremony, by the Mardi Gras festival at New Orleans which is represented on a smaller scale in other southern cities, and is maintained with zeal to the end. In other sections it is also much more strictly observed than formerly, and, as a consequence, retail trade falls off. The recent inundations along the Mississippi, and the mud blockade caused thereby, have also had a depressing effect. Little trade could be expected from a region that had been devastated by floods, and from which a cry for help was being sent up that touched the heart of the whole country. Then, too, there have been great fluctuations in the troublesome Wall street barometer, speculation running rife, and the contest between the bulls and bears progressing with varied success. Wall street operations affect the tone of business to a greater or lesser extent, and when matters are unsettled in "the street," there is apt to be depression elsewhere. Probably a more direct cause of dullness in the jewelry trade lies in the fact that jobbers and retailers are generally carrying pretty full stocks—something in excess of their usual supply—while the demand has not been so exhaustive as had been anticipated. It can scarcely be said that they are overstocked, but simply that their sales have not been as active as usual at this season. There are a good many croakers about, who are predicting another financial stringency and consequent hard times, but we fail to ascertain any substantial foundation for their dismal forebodings. The country is certainly prosperous; its prospects are promising; the present indications are in favor of prolific harvests; immigration has been very great, and, as a consequence, there will be a greater area of land cultivated than usual; in fact, we see no reason why our present prosperity should not continue for a number of years at least. The jewelry trade is an essentially sensitive one, and is more easily and quickly affected by depressing causes than any other. These are liable to occur at any time, and, for a few weeks, to cause a dullness, to be quickly followed by a reaction. Notwithstanding the present depression, we predict an active and profitable fall trade.

THE complaint that money will not go so far in our generation as it did a generation ago, is frequent enough, although the compensating truth that money, on the whole, is made more quickly nowadays than it was formerly, is not so frequently dwelt upon. The general sinking of the value of money was most instructively and pleasantly illustrated in a paper read by M. Avenel a few days ago, in Paris, before the Academy of Sciences. His subject was confined to the period of Louis XIII.—1610 to 1643. A tolerably brilliant housekeeping, with ten servants, could be easily managed, as M. Avenel tells us, upon a yearly income of 12,000 francs. This is proved by the account books of Cardinal Richelieu's niece, Madame de Pont Courbay, who had exactly that income, and maintained herself, her two daughters, and no fewer than sixteen servants in the style corresponding to the high place and power of her eminent kinsman.

A nobleman with a revenue of 100,000 francs was held to be amazingly wealthy. This was the *appanage*, M. Avenel says, of Gaston, the King's brother, and also of the Duc de Rohan. The Constable de Montmorenci, the richest nobleman in France, gave his daughter only 300,000 francs as her dowry. Queen Henrietta Maria, the wife of Charles I., only brought about 300,000 francs into her English home as her wedding grant. The rents of the most splendid houses in Paris were extraordinarily low—measured by the scale of two centuries later. Then the English Ambassador in Paris only paid 2,000 francs a year for the hire of his imposing hotel.

THERE are several ways of looking at any summary of the commercial failures for any stated period. For the past three months there were in the United States 2,190 failures, with liabilities of $30,338,271, against 1,761 failures, with liabilities of $24,447,250, for the same period last year. The excess of 429 failures and of $5,891,021 may be in some sense accepted as a measure of the growth of the resources and business of the country. In a more specific sense these tidings of individual mercantile disaster are a measure of the general prosperity. It stands to reason that failures, in any number which the country can stand without a crash, must leave the general commercial structure sounder for the removal of its weaker parts. The fact that the country could stand so large an aggregate of disturbance with so slight an amount of visible effect, attests the general soundness of business credit. The country can stand a good deal of ruining yet.

A New Proposal for a Horological School.

OUR OLD friend, Mr. Aristarchius Plumbago, is in town again. Our readers will remember Plumbago, whose scheme for organizing a new watch company for the manufacture of "the Great American Demagnetized Hydrostatic Time Annihilator," was published in these columns some months ago, and which, for magnitude of scope and benevolent intention, stood without a rival among the beneficent propositions of the day. His Time Annihilators were to be made for less than cost, and were to clothe the naked, christianize the heathen, father the fatherless, husband the widow, and in every conceivable manner confer blessings upon the human race. Plumbago, although in a chronic state of impecuniousness, is the champion philanthropist of the age; he is a whole missionary society in himself, with an orphan asylum and a charity hospital thrown in. In his own estimation, Peter Cooper's philanthropic enterprises are but side-shows to his, while those benevolent persons who have endowed colleges and built churches have done little to earn the praises of the public compared to what he proposes. Measured by his own estimation of himself, he is the great humanitarian of the times, but not being fully appreciated in this degenerate age, he is usually regarded as the veriest Pecksniff among Pecksniffs.

But, as we remarked, Plumbago is in town; being in town, he naturally called to see us. After he had showered greetings and blessings upon us, we asked how he was progressing with the manufacture of the Great American Demagnetized Hydrostatic Time Annihilator.

"Ah! my friend," said Plumbago, while oleaginous tears trickled down his venerable nose, "this is a world of disappointments. Vexation of spirit and petty persecution are the lot of the pure philanthropist and the unselfishly benevolent. It is a singular and remarkable fact that the American public did not respond to my appeal for funds with which to establish that enterprise in that spirit of liberality in which it was entitled to be received. You will remember I showed you a list of subscriptions amounting to $100,000 or more, and stated that I had as much more promised. Alas! the result proved that the men who made those subscriptions were penniless adventurers, who gave their fictitious subscriptions for the sole purpose of controlling the organization of the company, and electing themselves to the best offices. They had no money, but large expectations. As I had proposed, as the inventor of the scheme, to be president, secretary, treasurer and general manager of the company, their views were incompatible with mine, and the company was never brought into being. The only money we received was $25, subscribed by an enthuisiastic but extremely verdant country dealer. Those reckless adventurers insisted that I should divide that among them, but I refused, and reserved the amount to defray my own expenses. It cost me a front tooth and a discolored eye to retain that sacred trust fund, but I am thankful that my physical strength defeated the avaricious greed of those ungodly mockers of christian benevolence."

We commiserated Plumbago on the lack of appreciation bestowed upon him by a cold and unappreciative world, and asked him what he had been doing since the collapse of his watch company scheme, and what were his plans for the future.

"Well, I assure you, the world looked dark to me when my pet scheme proved a failure," replied Plumbago, "and I thought to retire from the hollow and deceiving world and become an Indian agent, but the administration at Washington declined to appoint me, owing to the bigotry and selfishness of certain religious advisers who surrounded the President at that time. The President was impressed with my personal appearance, but was vulgar and unkind enough to suggest that the inflamed appearance of my nose, the result of erysipelas, was due to other causes. My feelings were so lacerated that I left him in disgust, sorrowing over the insincerity and unchristian spirit to be found in high places. I next resolved to connect myself, as secretary or treasurer, with some of those benevolent societies organized by the different trades for relieving the distress of the orphans and widows of deceased members. I had understood that the officers of some of these societies had the handling of large sums of money, and I thought to make one of them cater to the demands of my carnal nature in exchange for my spiritual counsel and advice. But I found on inquiry that the offices of these societies were already filled by self-seekers who were making a worldly profit by their apparent benevolence, and there was no place for me. In vain I worked up combinations to displace some of these men, that true philanthropy, as personified in me, might usurp their places, but in vain. The only reward I received for my labors was the scoffs and gibes of the unthinking, and an attack in a scurrilous newspaper, wherein I was designated as a 'gerrymandering dead beat,' a worldly phrase, as I am informed, highly uncomplimentary. I then engaged in the field of religious journalism, but because of some severe strictures I made upon an ungodly banker who did not advertise in my paper, I was prosecuted for libel, and while undergoing the incarceration ordered by an unappreciative judge, my paper suspended for lack of that moral and literary pabulum I was in the habit of furnishing.

"It is a sad world, my friend, and we who are endowed with superior intellects, philanthropical instincts and empty purses are subjected to many and great vicissitudes. But I have now matured a scheme that is sure to be successful, and to win for me that fame and those pecuniary emoluments for which my soul has sighed so long and so vainly. The idea itself I derived primarily from THE CIRCULAR, but the development of its details, the expansion of the primative thought to a magnificent conception, and its application to my own peculiar characteristics and necessities, is all mine—the result of the daily and nightly cogitation of this massive intellect. I learned from your columns that the great need of the watch and jewelry trade to-day is a Horological School, where the principles of horology and their mechanical application shall be taught. Thus much I learned from you, but my own experience taught me that the mechanics and artisans of to-day, and the youths who desire to become such, are walking in the devious paths of poverty. The highest acquirements of the human mind are impossible to one who suffers mental distress through the medium of a collapsed pocket-book. Neither is man susceptible of mental culture when he is oppressed with anxiety as to the future of the wife of his bosom and the children of his loins. Therefore I have conceived the brilliant idea of combining a horological school with a trade benefit society. I have already sent out prospectuses to the trade, and complimentary notices of the undertaking have appeared in several papers. The title I have selected for this enterprise I consider to be a stroke of genius. It is, 'The Excelsior Academy of Horological Science and Applied Art in Jewelry, and the Horologists' and Jewelers' Vade Mecum Contributive Benevolent Institution.' The title is rather long for rapid pronunciation, but it looks well in advertisements and letter heads. This is to be a stock company, and none but persons connected with the watch and jewelry trade will be permitted to buy shares unless they desire to. The capital stock is fixed at $1,000,000, in $100 shares, of which $1 is to be paid in when the stock is subscribed for, and the remainder in $1 instalments as called for by the president. I am to be president; also secretary, treasurer and general manager of the institution, as well as instructor in the various branches that will be taught. There is no doubt but the trade will greedily seize upon this idea and send in their subscriptions. The establishment is to be located at Chicago, now the center of the earth as well as of civilization, culture and refinement; from this great center radiates all that is worth knowing of this life or the life to come. An enterprising publisher of that city has already placed a fourth story loft at my disposal, in consideration of which I give him favorable mention in my circulars. I propose to teach there the entire science of horology, and all that is desirable to know regarding the art of making jewelry. Watchmakers can come to me and perfect themselves in a knowledge of the art, and young men will be taught everything connected with the jewelry trade and watchmaking for the modest sum of $5 a month. It doesn't matter that I don't know anything about the business; there are lots of elementary works on the subject which I can re-write in the form of lectures. Then I expect manufacturers to furnish the Academy gratuitously with machinery and appliances. In a month or so I expect this great institution of scientific and artistic training to be in excellent working order. The benevolent branch of the concern will, no doubt, prove the most profitable. In the prospectuses I promise to pay $1,000 to the widow and children of any contributor or subscriber to the institution, and in case of the sickness of any member I promise $20 a week. This looks well on paper, and will unquestionably bring many subscriptions to the stock of the institution. Of course, as I am to run the whole affair, my compensation will have to be liberal; the tuition fee will naturally come to me, and I can also disburse the fund subscribed for stock. I shall not be required to make any reports of receipts and disbursements, and shall not be accountable to anyone. I have provided for this in the constitution and by-laws. In fact I regard the constitution and by-laws as something unique and original. They provide that a board of directors shall be elected by the charter members; I am the charter members, having used the names of three or four friends for this purpose; the board of directors elect the officers, and I am chosen president, secretary, treasurer and general manager. It is provided that when this is done the board of directors shall be superseded by the officers, that's me, and all reports of officers (that's me) are to be made to the board of directors (that's me). This prevents all impertinent intermeddling on the part of stockholders. If any of these complain or ask how their money is being used, I shall reply that the institution is necessarily costly, but it should be sufficient for them to know that they have been allowed the distinguished honor of helping to maintain an Academy of such character and influence. This scheme I regard as the greatest effort of my life, and one calculated to bring to me that ease and comfort that I have so long pined for. Of course, we shall have a newspaper connected with the Academy for circulation in the trade, and as I shall be the editor of it, its influence will be thrown in favor of the Academy, and the trade can always be assured of receiving glowing accounts of its success. The trade will, of course, pay liberally for advertising in such a paper, and this will be another source of revenue. My circulars were sent out last week, and favorable responses begin to come in already. Yesterday I received $1 for subscription to the stock, and this I shall invest at once in a few beer glasses to furnish the Academy with. In short, this great educational institution may be considered as open for business. I return to Chicago to-night, to enter upon my duties as Professor of Horology and Kindred Arts, and as custodian of all funds contributed towards the founding and maintenance of The Excelsior Academy of Horological Science and Applied Art in Jewelry, and the Horologists' and Jewelers' Vade Mecum Contributive Benevolent Institution. From time to time I shall address you from that city, and keep you informed as to my public and private enterprises."

With these words Aristarchius Plumbago, the great philanthropist and modern humanitarian, smiled benignantly upon us, and took his departure, first having secured a small loan to enable him to keep an appointment with a pawnbroker.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

At the regular meeting of the Executive Committee held on Friday, April 7th, the following named members were admitted:

William Appleton, Providence, R. I.; Henry Austin, Belton, Texas; Albert Ballowitz, Chicago, Ill.; William J. Barthel, New Orleans, La.; Jacob Becker, Cincinnati, O.; Abram N. Belcher, Troy, N. Y.; Andrew C. Berry, Boston, Mass.; Lorenz Blattner, Allegheny City, Penn.; Geo. W. Boettinger, Baltimore, Md.; August W. Boning, Philadelphia, Penn.; Hubert H. Brainard, Medina, Ohio; John A. Britton, Brooklyn, E. D., N. Y.; Frederick Bucher, Baltimore, Md.; Charles C. Buder, Edward E. Buder, Harry B. Buder, Columbus, Miss.; Bennett H. Buell, Brooklyn, N. Y.; Edward T. Chase, Philadelphia, Penn.; Erastus W. Clark, Tallahasse, Fla.; George W. Chase, Winterset, Iowa; Nicolas A. Claudes, New York City; William S. Connelly, Manheim, Penn.; Benedeto Constantini, Washington, D. C.; Charles S. Cook, Providence, R. I.; William T. Coombs, Brooklyn, N. Y.; John Crocker, Jersey City; Harry M. Cromwell, Philadelphia, Penn.; John C. Daller, Cincinnati, O.; Wilson H. Davis, Circleville, O.; Marenus J. Dobbelaar, New York City; Charles J. A. Doerr, New Orleans, La.; Gerhard Eckhardt, St. Louis, Mo.; August Ehrlich, Jersey City, N. J.; Ernest Emmel, New York City; Charles P. Gay, Providence, R. I.; James E. Gift, Corinth, Miss.; Otto Granzin, New Orleans, La.; Charles H. Hadley, Boston, Mass.; Rudolph Hagar, Charles E. Hancock, North Attleboro, Mass.; Isaac C. Harrell, Greenville, Tenn.; Henry C. Henze, New York City.; Luther A. Herrick, Tomah, Wis.; William E. Hidden, Newark, N. J.; Alvan M. Hill, New Orleans, La.; James E. Hills, Brooklyn, N. Y.; John Hoagland, Providence, R. I.; Adolph Hoffman, Brooklyn, N. Y.; Dixon G. Hughes, Jersey City, N. J.; Jules C. Huguenin, San Francisco, Cal.; Albert S. James, Columbia, Tenn.; John R. Jones, Clinton, Ill.; Adelbert Kaempfer, Chicago, Ill.; Charles A. Keller, Middletown, O.; Alexander F. Kelly, Newark, N. J.; Franklin L. Kelsey, James H. Kelsey, Middletown, Conn.; George P. Kendrick, Louisville, Ky.; Edgar E. Kent, Newark N. J.; George P. Kirtland, Nashville, Tenn.; Quitman N. Kohnke, New Orleans, La.; Jacob Lempert, New York City; Michael Levett, Chicago, Ill.; Hugo H. Liebel, North Attleboro, Mass.; John Linnen brink, Rochester, Penn.; Abraham Lippmann Chicago, Ill.; Philip J. Lockwood, New York City; Arthur V. Loomis, Flint, Mich.; Edward A. Lord, Philadelphia, Penn.; George C. Mackenzie, Salem, Mass.; Carl Mayer, Austin, Texas; Max Mayer, New York City, William H. McCausland, Philipsburg, Pa; John T. McConnaghy, Lafayette, Ala.; John H. McMillin, Cleveland, O.; Daniel O'Hara, New York City; William Paul, Boston, Mass.; Charles H. Pinnell, Jersey City, N. J.; Preston Pond, Boston, Mass.; Abram Reid, Brooklyn, E. D., N. Y.; Emil Rogg, New York City; Bertin Rombach, Clarksville, Texas; Charles E. Rose, Corsicana, Texas; Peder Rovelstad, Elgin, Ill.; John T. Sandmann, Philadelphia, Penn.; Charles W. Scarlett, Chicago, Ill.; George A. Schilling, Oswego, N. Y.; Henry Schreiber, Boston, Mass.; Charles H. Shaw, Brooklyn, N. Y.; S. Fuller Shute, Fredericton, N. B.; Alexander Sirjacques, New Orleans, La.; Alfred C. Smith, Boston, Mass.; William Starr, New Orleans, La.; William P. Sturgis, Hoboken, N. J.; George L. Sweet, Joseph L. Sweet, Attleboro, Mass.; James A. Thayer, South Orange, N. J.; Charles A. Thompson, Nashville, Tenn.; John H. Vanderhoof, Brooklyn, N. Y.; George M. Van Deventer, Jersey City, N. J.; John T. Warde, Washington, D. C.; Walter O. Whipple, Providence, R. I.; Henry F. White, Taunton, Mass.; Charles Wilms, Memphis, Tenn.; William Wilson, Pittsburgh, Penn.; George Winder, Troy, N. Y.; Urs J. Wolf, Frank L. Wood, New York City; Fred. Yesbera, Auburn, Ind.

Three applicants were rejected, 23 were tabled for investigation, and those named, 109 in number, were accepted, making a total membership of 1,901.

This number of applications, 135, is the largest number ever acted upon at a single meeting, and required a sitting of the Committee from 5 o'clock until 11 P. M. Included in this number were ten employés of Robbins & Appleton, and five of J. B. Bowden & Co.; New Orleans was well represented by seven candidates recommended by Louis E. Tyler.

In our April number the statement of proofs of death with reference to John H. Willemin and Edwin C. Taylor, should have read, instead of the latter, Joseph Treulich of Chicago.

At the last meeting of the Committee proofs were presented of the deaths of Edwin C. Taylor, with Tiffany & Co., and George A. Cory, with Pairpoint Manufacturing Co., both of New York City, and being properly presented, assessments Nos. 13 and 14 since organization in June, 1877, amounting to four dollars, were ordered upon each member, notice of which, dated April 8th, has since been sent to the members.

For the small sum which has been paid since January 1st, each member now living, (almost any of whom may be the next member to die), has been insured for over $3,000. The last three deaths occurred after illnesses of respectively six days, five days, and four hours.

The Committee of Eighteen and its sub-committees are earnestly at work deliberating upon matters of importance to the League, and from the careful study given to the various subjects, the conclusions arrived at will, by reason of the experience of and the pride taken in the League by the gentlemen of the Committee, be fully appreciated by the members, and will necessarily have great weight at the annual meeting; the members may feel satisfied that the safest and most enduring plans for the future will be those recommended by the "Committee of Eighteen."

The interest taken in the League by the old firms in New York City is not abating, as will appear from the subjoined complete list of those who have become patrons of the League, by giving to it their interest in the old Chicago fire fund, having an addition of nine firms since the last number of THE JEWELERS' CIRCULAR:

J. A. Abry, (now C. L. Abry); H. F. Barrows; Victor Bishop, (now Victor Bishop & Co.); A. Bernhard & Co.; Philip Bissinger; Bliss & Dean; Erhard Bissinger; Th. Bloch & Bros., (now Bloch Bros.); F. F. Braillard; Brainerd, Goddard & Steele, (now Brainerd & Steele); Estate of Paul A. Brez.; John D. Brez; Brooklyn Watch Case Factory; Brown, Cook & Co., and Maas, Groeschel & Co., (now Cook, Groeschel & Co.); D. Bruhl, (now D. & M. Bruhl); Bruno & Son, (now C. Bruno & Son); T. B. Bynner & Co.; Samuel W. Chamberlain; H. A. & G. M. Church; William Cohen, (now Cohen & Co.); Colby & Johnson; Cooper, Fellows & Co.; Cox & Sedgwick; H. E. Droz; E. C. Dunning & Co.; Estates of L. Durr & Bro.; Earle & Franklin; Samuel Eichberg; Eisenmann Bros.; A. Errico, (now Errico Bros.); Joseph Fahys; Fellows & Co.; M. Fox & Co.; Freund, Goldsmith & Co., (now Max Freund & Co.); Julien Gallet; Giles, Wales & Co.; Henry Ginnel; Hayward & Briggs; Henle Bros.; Hessels & Ludeke; Wm. S. Hicks; Hodenpyl, Tunison & Shiebler, (now Hodenpyl, Tunison & Co.); John E. Hyde's Sons; Jacobs & Pratt; J. W. Johnson; L. & M. Kahn; Ketcham Bros & Co.; (now Ketcham & McDougall); R. Kipling & Son; F. Kroeber; Julius Levin; S. M. Lewis, (now S. M. Lewis & Co.); Lincoln, Tifft & Co.; Albert Lorsch; Estate of George A. Mathewson; H. D. Merritt; J. B. Matthewson & Co.; Miller Bros.; J. M. Morrow; E. Obermeyer & Bro., (now H. Obermeyer); Palmer & Capron; Geo. W. Platt, (now Jas. W. Todd); J. W. Pooler & Co.; (Courvoisier, Wilcox & Co.); Geo. W. Pratt & Co.; J. W. Richardson & Co.; Stephen Richardson & Co.; E. Ira Richards & Co.; John A. Riley & Co.; P. E. Robinson; Saltzmann & Co.; Robert Schell & Co.; J. E. Spencer & Co.; J. T. Scott & Co.; Sillcocks & Cooley; Smith & Hedges, (now Wm. S. Hedges & Co., and Alfred

H. Smith & Co.); Herman Sonntag; E. & D. H. Stites, (now E. Stites' Sons and D. H. Stites & Son); L. Strasburger & Co.; Geo. O. Street & Son; I. Sturn & Co.; Sussfeld, Lorsch & Co., (now Sussfeld, Lorsch & Nordlinger); Vulcanite Jewelry Co.; A. Wallach & Co.; Wheeler, Parsons & Co., (now Wheeler, Parsons & Hayes); Whiting Mfg. Co., and D. H Wickham, making a total of 86 out of 120 subscribers.

A member in Susquehanna, Pa., writes to us: "I am glad to see that the League is looking after the welfare of its members while living, in the way of helping them to obtain employment. I think that it could be of great help to members out of work, and I would be willing to contribute something towards paying the Secretary for keeping a list of applicants, and for corresponding, etc."

In furtherance of the fraternal purposes of the League, the Secretary or President would cheerfully labor in this direction gratis, if assisted by employers stating their requirements.

The Executive Committee has decided to appoint in each of the large towns and cities an authorized surgeon, to whom candidates shall apply for examination, and so soon as a list is prepared it will be published in this column.

By a typographical error in our last number we were made to say that "in 1881 the Banks of New York City subscribed a sum of money," etc. It should have read "1871" the same year in which the fund was subscribed by the jewelry trade, and in all respects took the same course as the jewelers' fund, having been sent to Chicago, a part used, the remainder returned to New York City and placed in the custody of trustees; here, however, the parallelism ceases, the trustees for the Banks having given the fund over to the "Bank Clerk's Association," a society analogous in its purposes to the Jewelers' League.

The beneficiary of Joseph Treulich has been paid $3,258.50, and the guardian of the beneficiary of Edwin C. Taylor received $3,117.90.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

To the Editor of the Jewelers' Circular:

In your April number appears an able editorial in regard to the Guild stamp, but in some respects perhaps, is a trifle misleading. You are right in stating that it is a stamp of value, corresponding to the Hall-mark in England, and is to be applied only to goods that will be for sale by members of the different state associations, and none others.

The retail jewelers have long suffered on account of goods in their line being handled by all classes of merchants, and Guild-stamped goods are to be for sale only by retail jewelers, and not by them unless members of some state organization, said goods to be "*Stamped with an honest stamp for honest men to sell.*"

The Racine Silver Plate Co., of Wisconsin, has entered into a contract to manufacture a line of flat ware, bearing 10 per cent. more silver than any triple plate goods now in the market, and agree to forfeit $1,000 if they fail to perform their part of the contract, and furthermore forfeit a like amount if said goods are supplied to anyone not a member of some association in good standing.

You state that it is to be regretted that it was left to a small and comparatively obscure company to make this experiment, but you must remember that these state associations are a new institution, looked down upon by many of the large manufacturers of the east; hence, in order to try the experiment, and learn if the legitimate retail trade desired to regain its lost position, it was necessary to make the trial in this small manner; and, by the way, the Racine Silver Plate Company appears to be the only company that really makes an effort to confine itself to the regular retail trade, all others to a greater or less extent soliciting trade from crockery and hardware dealers. Some of the larger concerns were conferred with on the subject of this Guild stamp, but would have nothing to do with it unless guaranteed an enormous annual sale of Guild stamped goods, so, in order to get the matter started at all, it was necessary to use the means at our command, and the Racine Silver Plate Company undertook to bring these goods out without any guarantee.

Your apprehension that the members of the trade in the east do not appreciate the importance of these state associations in the west, is mainly correct, though lately, inquiries are being made by eastern retailers. As you say, these western associations were called into existence to combat certain abuses from which we suffered, the greatest and most annoying being the indiscriminate circulation of illustrated catalogues and price lists, which, to a certain extent, we have succeeded in correcting; but these associations have a further mission to perform, and, in a measure, have already succeeded in doing some good, and that is, in creating a fraternal feeling between the members of the trade, whereby each and every one is benefitted by the social intercourse and interchange of ideas at the regular meetings, thus endeavoring to eradicate the petty jealousies existing between members of the same profession, and already a better state of feeling among the retail jewelers is being exhibited.

You are a little premature, however, in stating that it is in the power of the United States Guild to demand Congressional legislation that shall prevent the manufacture and sale of bogus goods, for as yet only a few of the states have associations, and when the associations do exist, only a portion of the trade is identified with the Guild. However desirable such legislation may be, it is a little too early for the United States Guild to demand anything of Congress, but the Guild can persist in its endeavors to create a demand for a better class of goods, and by such persistence, in time may succeed in securing the co-operation of the great majority of the retail trade, and then Congress can be called on to complete the good work.

With this end in view, the several state associations will continue to labor, and may God speed the day when Guild-stamped goods will be in universal demand. Yours truly, W. H. THORP.

TORSION PENDULUM CLOCKS.

To the Editor of the Jewelers' Circular:

In the February number of THE CIRCULAR (page 13) is a sketch and notice of an old torsion pendulum clock. It was indeed an old acquaintance; I have not seen one in some twenty years. It was patented by Aaron D. Crane—then, I believe, of New Jersey—in 1840, (two patents) and extended in 1854. So far as I know, none have been made in many years. My experience with them was not very satisfactory; they did not perform any better than the common style of clock, and gave more trouble to repair, the pendulum spring being so thin was very liable to break. The clock required to stand firmly and not to be moved about; the balls also required to be very carefully balanced, or they would gyrate badly, instead of simply revolving. The escapement also had a large recoil This escapement has been used late years in the striking parts of the fire alarm telegraph gongs, (the hammer being attached to the rod *h*, of your illustration); this device works well there, *if not allowed to run down*. If allowed to run down, the hammer drops so low that the escapement cannot raise it, and so will not start till the hammer is raised by hand nearly to its full height, when the escapement then comes into action, and will go on again all right if kept wound up.

Strangely enough, I had been thinking over this old clock for some months, and that perhaps it might be improved by using the lever escapement and fork, and attach the torsion below as well as above, so as to have a *balance staff*, working in holes, to obviate the gyration of the old mode of applying power to the pendulum.

"Non-corrosive soldering fluid."—Many years ago I used to add bicarbonate of soda to the soldering fluid, to neutralize the acid (or nearly so) and found that ordinarily it worked just as well, and did not rust steel but very little, if any. The best way to remove the fluid from the work, is to boil it out two or three times in alcohol, (fresh every time); this removes the acid much more surely than any other plan I have ever known. Soldering fluid should never be used in watch work, or allowed about the bench. Yours truly,

L. F. M.

The Lever Escapement.

BY THOS. CHARLES SCOTCHFORD.

The following essay was written in competition for the prize offered by the British Horological Institute in 1866. The British Horological Journal from whose columns we take this treatise, says: "Although the language is in many places obscure, and some of the theories advanced are not such as will meet with general acceptance, it is only just to Mr. Scotchford, whose practical knowledge commands respect throughout the trade, to place his treatise in its entirety before our readers."

The detached lever escapement comprises the following pieces, which have the technical names of escape wheel, two pallets, lever, and roller.

The escape wheel is usually made of brass, having sloping teeth, for the purpose of aiding in the minute draught of the pallets and levei inward to the escape wheel at the instant the roller and balance becomes detached from the rest of the mechanism of the watch.

The two pallets and the body of the pallets are shaped out of a solid piece of steel, having stones set in them for the escape wheel to work on.

The lever is a poised piece of steel, having a notch cut in one end of it for action; the steel is hardened and tempered to a blue color, and afterwards polished. The fashion of the lever varies according to taste, the mechanical advantage being the length from the axis to the notch.

The roller is a circular piece of steel, having a pin made of stone fixed perpendicularly in it; the steel is hardened and tempered to a blue color, and afterwards polished. The radius of the roller from the center to the stone pin answers to a crank or handle of a wheel, the wheel being the balance.

There is also a little brass pin fixed perpendicularly in the lever, named the guard pin, and a small crescent shaped hollow is formed in the edge of the roller, right in front of the roller stone pin. The entrance of the little brass pin into the roller hollow constitutes the guard pin depth, to which we shall see more fully hereafter.

Perpendicularly fixed in the frame plate of the watch are two small brass pins, named banking pins, one of them on each side of the lever; or sometimes a circular hole is made in the tail of the lever, and only one pin is fixed central in the ring. The use of these banking pins is to limit the motion of the lever after the escape wheel drops on the pallet locking, for otherwise the lever would move round a considerable distance, so as to run out of action. We shall see more about this run to the banking pins in connection with the guard pin arc.

The whole of the escapement pieces are placed on three axes, made of blue tempered steel, and polished afterwards, fine pivots being made at both ends of each axis to work in jewel holes. Sometimes, for cheapness of production, only one or two pairs of holes are jeweled, the pivots of the other axes working in brass holes.

The escape wheel is placed on the first axis, the body of this axis being a pinion, named the escape pinion, this pinion works in the last wheel of the train, and thus connects the escapement with the train wheels; the last wheel of the train is named the fourth wheel, and upon the axis of this fourth wheel the seconds hand is placed.

The pallets and lever are fastened close together on the second axis, the body of this axis being made quite plain, and the roller and balance are placed at a certain distance apart on the third axis; the body of this axis has a collet plugged on it, upon which the balance is fastened. Sometimes, to obtain unquestionable soundness, the axis and collet are made out of a solid piece of steel, named solid staffs.

As may be seen by the diagram (fig. 1), the mode of connecting the balance and roller with the lever and pallets is by planting the pieces sufficiently close together so that the stone pin of the roller is linked into the lever notch, by which contrivance the lever and roller can turn each other alternately, as we will now proceed to show, first remarking that the vibration of a watch balance is a reciprocating circular motion, the motion being reciprocated by a spiral spring, usually called the balance spring, one end of it being fastened to a collet placed on the balance axis and the other to a stud.

Each of the two pallets is shaped for the double purpose of impulse and locking, being the two impulse planes and the two lockings; by turning the escape wheel forward, a tooth of the wheel passes over one of the impulse planes, and thereby turns the pallets and lever together through a small arc of perhaps about 9°; and as the roller and balance is linked to the lever by the pin and notch, the balance also is simultaneously turned through an arc, the balance's arc always being much greater than the lever's arc, according to the ratio existing between the radii of the small roller and longer lever. At the extreme end of the pallet plane the impulse action ceases, and another tooth of the escape wheel drops on to one of the opposite lockings (just like it is shown in the diagram, where the wheel's tooth is resting on a locking), stopping all the machinery of the watch, except the balance and roller, for at the instant of the escape wheel's drop the roller's stone pin passes out of, or away from, the open notch of the lever, and the balance and roller revolve by themselves, perfectly detached from the rest of the mechanism of the watch

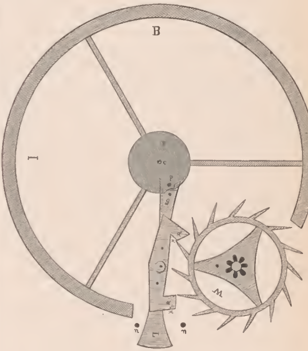


FIG. 1.

The force of the balance's mass in revolving winds up the reciprocating spring, and as soon as this spring has secreted all the balance's force the motion is reciprocated by the uncoiling of the spring. Arrived at the place of the escapement arc (where the lever is lying at the proper angle against one of the banking pins), the roller's stone pin enters the lever notch, and the reciprocated force of the balance, by the aid of the roller pin, now moves round the lever and pallets sufficiently far to draw the locking out from under the escape wheel tooth, and all the mechanism then being set free, the escape wheel moves forward again over the impulse plane of the opposite pallet, giving another impulse to the pieces, and again another tooth of the wheel drops on to the opposite locking, the wheel resting there and stopping all the machinery, while the roller and balance vibrate freely as before.

The foregoing is a description of the constituent pieces and action of this escapement, but we have yet to explain that the complete or full vibration of the balance is a motion begotten by several additions of the impulsive force, the excursion of the balance emanating from the first impulse frequently being about 120° by measure on the balance's circle, while the vibration at the end of the additional impulses is perhaps 200°; this doubled for both sides of vibration makes 400° totally, so that the impulses, as we see them at the full vibration, are given when the balance is already in motion, and no mechanical power ever operates with its full energy when the impelled body is already in motion, and in this case the force of pressure of the escape wheel and lever gradually decreases, as the balance's crank or roller recedes faster from these impulse agents. It is only at the first impulse that the energy of the main power is fully effective in impelling the balance, all the after-impulses gradually decrease in intensity up to the full vibration.

The reason there are these additional impulses to generate the full vibration is because the second and subsequent impulses continue to add more velocity, and consequently force, to the balance than was lost between the discharge of the balance from the impulse arc until the return to the impulse again. Let us suppose the balance started at a velocity and the force of the mass wound up the spring to 120° on the balance's arc; on returning from this excursion let the diminished velocity be exactly replenished by the second impulse, the balance would (in this case be discharged from the opposite side of the escapement arc at the same velocity it was discharged at the initial impulse, and would rise to precisely the same height of 120° on the other side of the vibrating arc, so there would only be these two impulses to generate the full vibration; and similar reasoning applies to three or four, or any other number of additional impulses, for the impulses will go on adding velocity and force to the balance until they cease to increase the velocity at the discharge from the impulse arc, and when this obtains there will be an end to the additional impulses, the after impulses of the same intensity being maintainent only.

If the adjustment of the main spring by the fusee is quite perfect, and the train wheels and pinions dead true and equal, it does not follow that the balance is bound to be discharged from both sides of the escapement arc at precisely the same velocity, for the velocities will be unequal if the two impulses are unequally timed; but fortunately, through the impulsive force of the running impulse roller at the end of the additional impulses being comparatively small, the unequal velocities of the balance at the discharge from the opposite sides of the impulse arc are reduced to a very small portion, and are least unequal when the balance least depends upon impulsive force for the sustenance of the motion. If the whole motion of the balance emanated from the two throws only—one to the right and the other to the left—and the two impulses were unequally timed, the balance would be started at two very unequal velocities. There are several things will unequalize the times, which we shall find as we proceed. Three things cause a loss of the balance's velocity, viz.: the resistance of unlocking the escape wheel, the friction of the pivots in the holes, and the stress of the reciprocating spring on the pivots. If the mass of the balance is unbalanced the pivots will suffer an additional stress from the centrifugal force in revolving. The resistance of unlocking the escape wheel is made greater by a deeper depth, or by the shape of the lockings, or by a stronger pull of the main power on the lockings; and because the main power in turn becomes part of the locking resistance, the same depths and same shaped lockings will form different resistances to the balance's reciprocated force when the main power varies in effect, or when its strength in the barrel varies. When the inertia and frictions of a train and escapement are greater it requires a stronger main power to make them move at the same velocity than it would do if the inertia and frictions were less; and this stronger main power in turn becomes a greater locking resistance, and subtracts a greater portion of the balance's velocity at the first reciprocation of the balance, and at each reciprocation afterwards.

The friction of pivots in the holes is greater when the pivot's circumference is greater; it is also greater when the balance's mass is greater. The spiral reciprocating spring necessarily causes a stress on the pivots in being coiled up, and in its uncoiling.

Balances are sometimes unbalanced to obtain the right time in a vertical position of the watch, when a greater portion of the main power is consumed by the greater frictional action on the sides of the pivots than on the ends of them. There are two cases to be considered with an unbalanced mass, but the chief thing to be observed in either of them is, that to unbalance a balance is to impress terrestrial attraction as an auxiliary for, or against, an extension of the vibrating arc. To exemplify one case, in which we will show the effects in the cross positions:—Firstly, let the balance, when balanced, vibrate one revolution when the watch is lying down, and when hanging up let the vibration fall off to less than one revolution, and let the dial show a gain of time although the train wheels are moving slower; this shows the balance's free arcs gain more than an equivalent to the train wheels' loss. For the sake of perspicuity of exemplification let us assume the lever, when at rest, lies in the straight line of the 6 and 12 o'clock, and the impulses and unlockings take place towards the 6 o'clock side, and the balance made heaviest towards the 12 o'clock side. If now the 12 o'clock is placed uppermost, the heavy part of the balance, in its descending motion, will add to the balance's force, and wind up or unwind the reciprocating spring further than it would have been wound or unwound had the mass been perfectly balanced, and by increasing the extent of the vibrating arc cause the balance's free arcs to take a longer time than when the mass was balanced. If the vibrating arc exceeds half a revolution on each side of the spring's rest, the heavy part of the balance will cross the escapement arc and rise up on the other side of it; and in the return motion the heavy part of the balance falling on this other side of the escapement arc will give an impetus to the mass, and assist the reciprocating spring to return to the balance, though seemingly it ought not to do so, to make equal timed excursive and reciprocated arcs. Secondly, that if a balance be made heaviest at the 12 o'clock, to suit the time when the 6 and 12 are perpendicular, the two pallets ought to be dead equal in the resistance of the two impulse planes to the escape wheel's force, and in the resistance of the two unlockings to the balance's reciprocated force, to obtain equal results when the 3 and 9 o'clock are alternately placed upwards and downwards. To exemplify: as before, let us assume the lever, when at rest, lies in the straight line of the 6 and 12 o'clock, and let the watch be turned on its side so that the 3 and 9 become perpendicular, and the 6 and 12 at right angles to this perpendicular, the effect of terrestrial attraction on the heaviest part of the balance is now altered in relation to the impulses and unlockings, for the heavy part of the balance will be retarded by terrestrial attraction in the ascending motion of the weight, and the balance will have less force to unlock the escape wheel as the weight passes near about the 12 o'clock point; and also the impulse will be done slower through the balance having a less velocity of its own on meeting the impulse. In short, it is easy to see that if the balance is heaviest towards the 12 o'clock side, and the 12 is uppermost, the weight falls and rises on two arches of a like kind; but when the 3 or 9 is placed uppermost one of these arches becomes an upper, and the other a lower arch, whereby the effect is changed, and they ought to be equally so on both sides alike—a thing impossible, as it is not possible to have the two pallets alike.

Whether the balance is poised or not, if there is too much side shake in the pivots and holes there will be a change in the action in two positions of the lever. To exemplify: let the pallets be placed on the lever in the ¾-plate fashion, with the escape wheel coming round towards the lever's notch, and let there be too much side shake in the balance-staff holes only, the pallet's staff holes being right; then the roller pin will enter the lever's notch minutely deeper when the lever's notch is upwards, and will fall away from the notch when the notch is downwards. Next, let the balance-staff holes be right, and too much side shake in the pallet-staff holes, then, when the lever's notch is downwards, the pivots rest on the side of the holes, so as to receive the drop of the escape wheel dead on both lockings; but if the notch be turned upwards, the lever and pallets will fall away from the balance during the time of impulse, and at the drop of the wheel on both lockings, just as the roller pin is about to escape, the lever is pressed upwards to the opposite side of the holes. So the effects of too much side shake in balance and pallet holes are not quite similar.

At the beginning of motion the escape wheel acts by a continual pressure on the pallet impulse face, usually through about two-thirds of the impulse portion of the escapement arc, about two-thirds of the impulse portion of the escapement arc being one-half of the whole arc of the escapement, reckoning the impulse and unlocking together; and at this half-way point of the whole arc the reciprocating spring and balance are at rest when the main spring is down. Thus, suppose the arc of impulse is 9°, and the unlocking 3°, so as to be 12° together, the escape wheel's tooth will stand on the 6° point of the impulse face when the springs and balance are at rest, and from this point to the drop of the wheel would (in this case be exactly two-thirds of the 9° arc of impulse; but after the motion is once reciprocated the impulses of the escape wheel are given partly by an impact and partly by the continued pressure of the wheel along the impulse face afterwards.* The cause of the impact is through the rapid motion of the balance in the unlocking process carrying round the lever and pallet locking a little way too far out from under the escape wheel's tooth before the wheel starts on to impel, this overcarrying of the lever and pallets leaving a small vacuity for the wheel to fly through before it touches the moving pallet, which it does, striking the impact on meeting the pallet's impulse face, and then they go on together to the wheel's drop; there is also an impact struck on the locking by the wheel's drop. All good watches ought to have hard stones in the pallets—either rubies or sapphires—to prevent the digs, more or less, caused by these impacts, for they are very variable with garnet stones. Some watches last many years with scarcely a mark to be seen, while others begin to show the digs before they are two or three years old. It is obvious that when a watch requires a strong main power the impacts will be struck harder than if the main power was weaker; but there is another case to be considered, in which the main power may not be so very strong in proportion to the weight of the balance. Between a given scape pinion and a balance many sets of escapement pieces may be put, the smallest set of pieces having the least inertia, and the smallest escape wheel being easier and quicker started into motion at each intermittent impulse; but the main power acts stronger on the pallets when the escape wheel is smaller, and the balance's renitency is greater when the roller is smaller, and between this stronger action and greater opposition the pieces suffer more in the impacts—hard ruby stones will last as long as the best wheels and pinions, and jewel holes, and the extra cost of them is quite insignificant compared with the advantage. When the velocity of the balance is very great, with a large radius of roller from balance staff to roller pin, and a short radius of lever from pallet staff to roller pin, the lever and pallet is carried round very rapidly in the unlocking, so that in the rapid overdrawing out of the locking from under the wheel's tooth the opposite discharge points of the pallets may strike the back of the wheel's tooth just as the wheel starts forward to impel, unless more shake is given than would be required if the lever and pallet were unlocked more slowly; and if the pallet strikes the back of the wheel's tooth it will minutely interfere with the balance's velocity in the passage through the escapement arc. It is good to unlock the pallet slowly—not slowly by lessening the balance's velocity, but by making a wide disparity in the size of the roller to the lever. It is customary to make the radii of the roller from staff to pin go three or four times lineally in the radii of the lever from staff to notch, but there are some exceptions to this rule, which generally have to be altered after the watch has been going for a time, because it does not give perfect satisfaction.

A good actual velocity of the balance is much liked, because the reciprocating spring must then be stronger to get the watch to time, and the balance is thus kept more under control by this stronger spring, and less liable to an irregular motion from external force in moving the watch about in ordinary.

All pallets ought to have a trifle more shake outside than inside, because, if the lever is moved round, say 1° too far before the escape wheel moves on to impel, this 1° of the lever is an equal space on each side, but the two portions of circles the inner and outer points of the pallets described are unequal spaces, the largest outside circle requiring a trifle more shake to keep the discharge point of the long pallet equally free of the back of the wheel's teeth.

The way to try pallet shakes is simple; but through the minutiæ of the matter, and sight being either wholly or partially denied, it requires a practised hand to try an escapement nicely; bring round the roller pin into the lever notch sufficiently far to draw the locking out from under the wheel until the wheel's tooth stands at the extreme locking corner of the pallet, and holding the balance steady, move the wheel minutely to and fro if there is shake, and if there is no shake the pallets want a trifle off the discharge points. If the wheel's tooth is only a trifle below the locking edges, there will apparently be shake, whereas there may not be any shake at all at the extreme locking corners.

We might now continue on with an explanation of this escapement, but there are some things, such as equalization, etc., which involve principles of an equality of *times*, and therefore I think it will be best to draw the reader's attention to the nature of the motion as affecting the timekeeping principles of the watch, both in respect to the wheels as well as the escapement. I have two reasons for adopting this course; firstly, because, notwithstanding the lever escapement is the most hardy and useful machinery in the whole range of escapements, yet there is an anomalous state of things going on with it; for, strictly, the motion of the wheel and pallets *ought to be* a continual rotary motion of the wheel to a continually oscillating motion of the pallets, and any balanced thing placed on the pallet axis, but no separate vibration of the balance or lockings at all. Secondly, the motion of the train wheels and part of the escapement pieces *is* intermittent to a reciprocating motion of a detached balanced mass, and there is a refinement or reduction of errors going on with intermittent motions of the wheels, which would not obtain if the wheels were revolving and pallets oscillating continually.

It would be impracticable to make a continual motion with this escapement, if it was wanted to be done, because the momentum of the balance arising from the impulse on one side would cause the face of the opposite pallet to strike the wheel's tooth just as the wheel was about to alternate the pallet motion. However, we must not allow this fact to interfere with our inquiry into the nature of the motion and the fundamental principles of construction, for without such inquiry no philosophical account can be rendered.

In any machine the motion of the wheels which carry the hands must be either continuous, or intermittent; if they were continuous, and there was any irregularity in their motion, the errors of what we call time outside on the dial would be the same as the errors of the motion inside the watch, and they are very nearly so in a vertical watch, and would be exactly so were it not for the momentum of the balance causing a backward motion, more or less, of the wheels. It

*Sometimes motion is added by the escape wheel drawing the pallet inwards on the lockings, for if there is run to the bankings, and the length of the lever notch is commensurate, and the wheels drop small, the wheel's tooth will strike the locking before the roller pin escapes from the lever notch; but as the locking stone will enter the wheel deeper on account of this run to the bankings than it otherwise need do, therefore the resistance to unlocking becomes greater than it would have been if the locking stone had not entered the wheel so deeply. The resistance of unlocking these long draughts is generally found to subtract more velocity from the balance than is added by the draught inward, but it necessarily must vary in different classes of manufacture, for the proportion of the balance's force to the locking resistance may be varied in all manner of ways, as by swift moving heavy balances, or slow moving light ones; by easy lockings or hard ones; by economy of power in excellently finished watches, or strong powers to make some balances vibrate decently, etc. If a guard pin was bent back, the bankings closed proportionately, and the lever notch shortened, or the ruby pin flattened, and the balance was then found to vibrate further, it would be a proof that the unlocking resistance originally subtracted more velocity than the draught inward added.

is true, that if those errors caused a loss and gain of time which exactly balanced one another by the end of a certain period of time, there would not be any difference between them, so that the dial would be quite right by the end of the certain period of time; or there may be only a very small difference between them by the end of the time; thus, if nine beats averaged $\frac{1}{10}$ of a beat slower than they ought to be as per train, their sum would be $\frac{9}{10}$ of a beat; and if ten beats averaged $\frac{1}{10}$ of a beat quicker than they ought to be as per train, their sum would be $\frac{10}{10}$; so there would be only the difference between the $\frac{9}{10}$ and $\frac{10}{10}$, or $\frac{1}{10}$ of a beat gained by the end of nineteen beats; and if we had taken a larger number of beats similar reasoning would hold good.

[*To be continued.*]

Rate Changes of Chronometers.

MR. G. PH. VOLLING, Rostock, one of the most eminent chronometer manufacturers of Europe, publishes his criticism on a certain report, in the *Deutsche Uhrm. Ztg.*, as follows: To the report of the late meeting of the Nautical Verein is appended the result of the experiments of Dr. C. Peters, of Kiel, on the behavior of chronometers at sea. Under the supposition that these data will interest all such professional men who are engaged in the higher branches of horology, * * * I would make the following remarks:

Dr. C. Peters says that it is shown anew that the conditions to which chronometers are submitted at sea are entirely different from those ashore, and showing great deviations, and that an approximately correct result would be of great benefit; it has been shown, he says, that after taking the chronometer aboard, at once serious changes of rate have occurred, and it should be accepted that they invariably retard at sea. Of 24 changes, 22 have been proven retarding, and only two as gaining. The differences between the observatory test and that of aboard ship can even by choice chronometers, such as are used on men-of war, be very important. Upon ironclad *Preussen* the rate of difference of three chronometers has been established at 5.2, 5.2 and 8.3 seconds, while those of other ships showed far less difference. This fact has led to the supposition that the cause of these differences might not so well be sought in their construction as in the movement of the ship itself. To prove the truth of this supposition, he, Dr. Peters, has tested the rate of a number of chronometers, placed in a vertical position, starting from the supposition that chronometers, in case they were not furnished with the usual suspension, would be seriously affected by said movements, etc., etc.

The report further says, of greater importance, after being shipped, are changes of rate arising suddenly or gradually during the voyage, and of great significance at times. Also these lean to the retarding side, and are mostly produced by the rusting of the steel and thickening of the oil, etc.

May I be permitted to express my views on these subjects? It is said in the beginning that chronometers without exception retard at sea; this must refer only to those that have overcome their acceleration, and are several years old, therefore; because, as is well known, all *new* chronometers accelerate. That the cause of the differences after being shipped must be ascribed to the ship's motion, I concur in with the learned author, but must state that even if the chronometer has been furnished with the usual Cardan suspension, its placement may, nevertheless, be unfavorable aboard ship, and influence its rate; it must be placed so as to be secure against all shocks, either by the motion of the waves, the jarring and slamming of doors, etc., also a faulty suspension can operate disturbingly upon its rate, and exactly in this regard, much is sinned; because the manner of making the suspension by the chronometer maker as well as by the skipper, in oiling it at times, is of influence. No chronometer maker should deliver an instrument until he has become thoroughly satisfied that it works well, and has called the attention of the captain to the great importance that it should swing free at all times. It has happened to me already, that chronometers came into my shop, the suspension of which was clogged up with wood or cork.

As for the sudden or gradual variation caused by the thickening of the oil or the rusting of the steel parts, the explanation may often be found in the forgetfulness of the captain to put the chronometer upon or into a bed, when casting anchor in deep water; this casting, as is known, jars the ship heavily, and captains say they have noticed a sudden difference of six seconds in their chronometers, although the rate often returns to its usual one.

The Brazilian Diamond Mines.

THESE mines lie in the province Minas Geraes, a depression surrounded by mountains. Admittance is strictly prohibited, and only granted in very exceptional cases, and the narrow passes leading to the mines are guarded by soldiers. The yield has lately much decreased, and only about 1,000 workmen (about one-third of those formerly employed) are at present occupied with diamond washing. Negroes are exclusively employed, and although the number of overseers is very large, the former understand to cheat the latter with much adroitness. The stolen diamonds are sold to smugglers who venture into the mines under cover of the night, and at the risk of life, remaining hidden for days in the cabins until a chance is offered them to slip out unobserved. The condition of the negroes is pitiable; they receive a mere pittance for this work, and are compelled to labor till night, without interruption or meals. They stand in water all day, constantly exposed to the danger of being buried by the cavings of the banks, and many other dangers; yet they prefer this work to any other, in view of the money they may procure from the sale of a stolen diamond, or in hopes of their manumission, should they happen to find a diamond of thirteen or more karats. If a negro has found a diamond, he must raise it between thumb and first finger, show it to the supervisor, and then place it into a box suspended from the roof of the wash house. At night the box is handed to the special administrator, who weighs the diamonds, and puts them into a bag, which he constantly carries about him. They are handed to the treasurer at the end of each month, who again weighs them and notes it in his books. They are sorted annually, being sifted through twelve differently meshed sieves, put into twelve bags, packed in a box, which, having been sealed by the three highest officials, is sent under military escort to Villa Rica, and thence to Rio de Janeiro. At Villa Rica, the list again is sealed by the general stationed there.

Pearl Shells.

THE *Central Anzeiger* contains the following item from Adorf, the chief seat of the German mother-of-pearl industry:

Our mother-of-pearl industry, principally engaged in the manufacture of *articles de luxe*, generally has a dull time before Christmas, as orders for summer goods generally are received only after New Year; but this time our workmen were busily engaged. Orders from America have again been received plentifully, and give rise to the hope that work will be abundant. We must remark about the source of supply of the crude shells, that until now Liverpool supplied all demands, being the center of shell seekers. But according to an item in an American newspaper, America again enters into competition with England. The steamer *Burswell* sailed at the end of last year to Havre, loaded, among other things, with thirty-six hogsheads of pearl shells, which were sent to a manufacturer at Paris. Should they turn out to be good, America will soon be able to send more. In the factories at Adorf, the American sweetwater shell *Cassia*, has been used already, but it is said that the aforesaid vessel transported a new sea shell, found on the southern coast of California, and took them as samples to be tested. That also very valuable finds of shells may be made, is shown by the circumstance that, in 1829, a Paris professor paid the sum of 6,000 francs for a *Spondylus regulus*, and that a few years ago in London, a very handsome shell, without pearl, was sold at auction at 1,200 francs. Should America seriously enter the market as shell furnisher, the crude material will at least not become dearer.

Useful Information for the Trade.

BY G. E. GEE,

Author of the "Silversmith's Handbook."

Silversmith's Alloy.—Copper, 1 oz.; nickel, 3 dwts. 12 grs.; bismuth, 6 grs.; zinc, 2 dwts. 12 grs.; soft iron, 12 grs.; tin, 12 grs. This compound is said to form a fusible and malleable metal, that can be easily worked by the silversmith; it is also said to resist oxidation through atmospheric influences.

Silver Wares.—Never scratch-brush silver ware with a solution of soap and water; neither should it be washed with the solution if it can be avoided, as it gives it the color of pewter; better to scratch in weak ale, or, if plain, rub it with a piece of wash-leather and prepared chalk.

Cleaning Plate.—Carbonate of ammonia, 1 oz.; water, 4 oz.; Paris white, 16 oz.; well mix the ingredients together, and apply to the surface of the plate by means of a piece of soft leather or sponge.

Imitation Silver.—Fine silver, 6 dwts.; nickel, 6 dwts.; copper, 8 dwts. This alloy will cost about 1*s.* 9*d.* per ounce.

Another Recipe.—Fine silver, 5 dwts.; nickel, 6 dwts.: copper, 9 dwts. Cost about 1*s.* 6*d.* per ounce.

Removing Gold from Silver Articles.—Silver articles which have been gilt, may be brought back to their original color, by simply covering them with a thick solution of borax, and then well annealing them. After this process, if the articles are boiled for a short time in one of the whitening mixtures and scratched, they will present a beautiful white and uniform surface.

Oxydizing Silver.—A beautiful deep black color, possessing great lustre, may be given to finished silver work by boiling it in the following preparation for some time:—Bromide, 5 grs.; bromide of potassium, 5 dwts.; water 10 oz. The boiling should be effected in a stoneware pipkin, and generally from two to five minutes will suffice for the purpose. The work is finished after the proper color has been attained, by well rubbing with a soft piece of wash-leather and a little best jeweler's rouge. It is better to make the work as bright as possible before submitting it to this mixture; for this reason it is preferable to thoroughly buff all plain surfaces on a piece of felt by the application of the lathe, as by that means a characteristic brightness is imparted.

Dipping Mixture.—Brass or metal goods may be cleaned and their oxides removed by dipping into the undermentioned liquid for a few seconds only:—Oil of vitriol, five parts; water, five parts; nitric acid, two and a half parts; spirits of salts, two drachms. Well mix the several ingredients together, and immerse the work in the solution cold. The mixture improves after a quantity of work has been dipped into it.

Silver Powder for Copper.—Chloride of silver, two parts; cream-of-tartar, two parts; alum, one part Mix with water to the consistence of a paste, and apply with a soft leather or sponge; when sufficiently whitened, well polish.

Powder for Silver.—Chloride of silver, 1 oz.; sal ammoniac, 2 oz.; sandiver, 2 oz.; white vitriol, 2 oz.; bichloride of mercury, 5 dwts. Make into a paste with water and rub the articles over with it; then expose them to a good heat upon a clear fire, in order to run the silver and evaporate the mercury, after which process dip in very weak sulphuric acid to clean.

To Protect the Polish of Metals.—Melt one part by weight of best wax paraffine and when sufficiently cooled, add three parts of petroleum. Well mix together, and apply to the polished articles by means of a soft brush. The protecting film is required to be only very thin, therefore too much should not be put on.

Silver Stripping Mixture.—Sulphuric acid, six parts; nitric acid, one part. Take a large black-lead crucible or pipkin, and heat the mixture in it; when this is done, put in the work required to be stripped, occasionally withdrawing it to ascertain the progress made. The large proportion of sulphuric acid allows of the dissolution of the silver, and does not sensibly corrode or interfere with copper, or any of its alloys, if kept quite free from water; therefore be careful not to introduce wet articles into the mixture. After finally withdrawing the work, it should be well rinsed, annealed, and then boiled out.

Stripping Silver.—Put some strong oil of vitriol in a similar vessel to those above described, apply heat, and during the process add a few crystals of saltpetre. When the solution has become hot enough the work should be immersed in it, and be moved about or agitated until the silver is dissolved from the surface. The articles should not be allowed to remain too long in the solution, and if it does not remove the silver quickly, more saltpetre should be added from time to time until the desired end be attained.

Soft Solder.—Pure tin, two parts; lead, one part. Melt and well incorporate together; when this is done, pour into strips for use.

Soldering Fluid.—Muriatic acid (spirits of salts), three parts; metallic zinc, one part; or as much as the acid will take up. When dissolved and all effervescence ceases, allow it to settle, then decant the clear solution from the sediment at the bottom of the vessel in which it has been made, and it is ready for use. If a small quantity of water be added to the mixture at this stage, say one sixth, it will answer quite as well for some purposes. For soldering iron and steel, a very small portion of sal ammoniac is of great advantage to the mixture for promoting toughness.

Dissolving fine silver.—Nitric acid, two parts; water one part.

Dissolving silver alloys.—Nitric acid, one part; water, two parts.

Dissolving copper.—Nitric acid, one part; water, four parts.

Dissolving soft solder.—Perchloride of iron, one part; water, four parts.

Dissolving silver solder.—Nitric acid, one part; water, four parts.

Dissolving sealing-wax.—Place for a time in a solution of spirits of wine.

Resist Varnish.—Dissolve resin, or copal in essence of turpentine, or boiled linseed oil; to give it different shades of color, add red lead, chrome yellow, or Prussian blue.

Plate Powder.—Whitening, two parts; white oxide of tin, one part; calcined hartshorn, one part. Reduce to a powder and well mix together; apply as usual.

Electro-plating Soft Solder.—Take nitric acid, 1 oz.; water, 2 oz.; copper, about 1 oz. in small flat pieces; when the copper has all dissolved and effervescence has ceased, the solution is ready for use. To apply it, take up a few drops by means of a camel-hair pencil and apply it to the desired part, then touch it with a bright piece of steel, and there will be instantaneously a film of copper deposited. If the copper has not spread all over the desired part, the process should be repeated, when deposition in the plating bath will take place with perfect success.

Another Recipe.—Take sulphate of copper (that which accumulates in the whitening mixture), one ounce; water, six ounces. Reduce the sulphate of copper to a fine powder and dissolve it in the water. Treat according to the directions given in the previous one. A good mixture for effecting the same result may be made by dissolving verdigris in vinegar.

Testing Silver Wares.—Take nitric acid, six ounces; water, two ounces; bichromate of potash, one ounce. Reduce the salt of potash to a powder and well mix it with the acid and water. The solution is used cold, and should be placed in a stoppered glass bottle, the stopper having a long dropper extending into the mixture, which acts as the agent for conveying the liquid from the bottle to the article to be tested. The surface of the article should be perfectly clean, and to make certain what kind of metallic substance you are testing, it is advisable to rub a file over some obscure part of the surface and to apply the liquid to that part. The test liquid should be used, by means of the glass stopper, to the filed part, and immediately removed by a sponge damped with cold water. If the article consists of pure silver, there will appear a clean blood-red mark, which is less deep and lively in proportion to the quality of the metal. Upon platinum the test liquid has no action whatever; on German silver at first a brown mark appears, but this is removed by the sponge and cold water; on Britannia metal a black mark is produced; and on all the various metals an entirely different result takes place to that on silver; therefore the test is a simple one, and may be advantageously employed for the detection of any fraud in relation to the precious metal.

Another Test.—Water, 2 oz.; sulphuric acid, 2 drs.; chromate of potash, 4 dwts. This mixture is applied in the same way as before and produces a purple color of various depths, according to the quality of the silver. No other metallic element exhibits the same color with this preparation.

Perchloride of Iron.—Take spirits of salts, 8 oz.; crocus powder, (jeweler's polishing material), 1 oz.; well mix them together and keep in solution. In preparing the mixture for the dissolution of soft solder, etc., take 1 oz. of it, and add to it 4 ozs. of boiling water.

Aluminum Alloy.—Copper, 18 dwts.; aluminum, 2 dwts.

New Alloy.—Zinc, 19 dwts.; soft iron, 1 dwt. This alloy is said by the inventor to be remarkable for its whiteness and tenacity.

Removing Gold from Silver Wares.—Sometimes the process of annealing and boiling-out fails to effect the removal of the gold from articles which have been thickly gilt, in which case the work should be submitted to the action of the following chemical preparation:—Sulphuric acid, 6 ozs.; muriatic acid, 1 oz.; nitric acid, ½ oz. This mixture should be heated in a black-lead crucible or earthen vessel, and the work immersed until the dissolution of the gold takes place, carefully watching it during the progress of the operation. The gold may also be removed by using a strong solution of oil of vitriol, to which has been added a fair proportion of common salt.

Silver Plating Fluid.—Nitrate of silver, 1 oz.; cyanide of potassium, 2 ozs.; water, 12 ozs. Put the cyanide and the nitrate of silver into the water; shake them well together until they become thoroughly dissolved, then let the mixture stand till it becomes thoroughly clear. It is then ready for use. If preferred, a little prepared chalk may be used as an additional ingredient.

Plate-cleaning Powder.—Take the finest rouge, and prepared chalk, equal parts, well mix and use dry by means of dry leather.

Solder for Aluminum.—Spelter, 18 dwts.; aluminum, 1 dwt. 6 grs.; copper, 18 grs. To be employed for soldering the *pure* white metal, and not the so-called aluminum bronze, that being commonly soldered with bath-metal solder.

Use of the File and Graver.

THE FIRST operations that a watchmaker ought to learn are to file flat and square, to turn round, to forge, to hammer-harden a piece of metal without deteriorating it. These accomplishments are but too often neglected in the modern training of an apprentice, an omission that is partly owing to the want of good instructors and partly to the shortness of the time he can afford to devote to learning his trade.

It is a very common practice to place an old file in the hands of an apprentice, to file in the jaws of a vice a piece of metal, either brass, iron or steel, and to set him to work rubbing and filing the surfaces with great labor, the only result being that they are utterly mis-shapen, and covered with brilliant spots. This method is bad. The action of the file is mechanical, and the problem that has to be solved is the following: To produce good work in the shortest possible time, and with the least expenditure of force. It is, therefore, only by very slow degrees that an apprentice can hope to acquire the requisite ability, if he is set to work trying to shape an object in some hard metal before he knows how to maintain lines straight and surfaces flat. Not knowing how to proportion his efforts to the resistance to be overcome, and allowing the file to travel irregularly over the surface, he gets confirmed in the tendency to give a rocking motion to the file, whereby the surface is left round, and he will find it all the more difficult to throw this habit aside.

It is far better to let him commence on round pieces of common wood, filing with a rasp or coarse cut file, without removing too much at a time. By this means he may rely on learning to file flat and square by the eye alone, without the aid of a straight edge.

When he works well in common wood he can be set to file harder woods, box for example, roughing with a rasp and finishing with a new bastard file. He should not be allowed to leave hard wood until able to file a surface so well that, on placing a metal rule across it in any direction, it is found to be flat. Let him then advance to brass, which, if cast, should be previously dipped in acid to remove the hard surface, as this should not be filed off. The resistance it opposes would cause a jerky motion of the file that would be apt to disturb the slight amount of decision the hand has already acquired. As brass opposes a considerable resistance, the pupil should be carefully watched, with a view to preventing too rapid movement and an excessive pressure, involving waste of power, while he fancies the work is being proportionately advanced; the manner in which the file is applied to the surface should also be observed, taking care that little or no pressure is applied during the backward stroke. The instructor should both explain and demonstrate that the main secret of success consists in a perfect equilibrium between the actions of the two hands; one should increase as the other decreases, with the horizontal motion of the file, since the two levers in use, namely, the portions on either side of the point of contact, are continually, the one increasing and the other decreasing.

By filing steadily and attentively the hand will gradually acquire sensitiveness or tact that enables each to adjust the pressure in proportion to the other, as well as the knack that enables them to maintain the surface flat. It is important to avoid short and jerky movements.

Practical instruction from a competent teacher must be relied on to complete the directions here given; no written instructions can replace it

It is advisable to use new or nearly new files in the above lessons; the wear will have brought them into good condition for working iron or steel. Proceed with these metals as already explained in regard to brass, and special attention must still be given in order to prevent hurry on the part of the pupil. The files remove less metal at a time and a greater pressure is necessary, so that he does not make such rapid progress as with brass, and this gives rise to a tendency either to use new files, which are soon spoilt, or to give the stroke too suddenly while applying considerable pressure, especially during the return stroke. He thus heats his file, breaks off the crests of the teeth, which become embedded in the metal and do much to further damage the file. Moreover, he will lose some of the sensitiveness of touch that his hand has already acquired.

It would, perhaps, be well to subdivide the day into three parts, for as long as appears necessary; the first to be devoted to filing, the second to turning, and the third to forging and cold hammering. By this means he will be quicker in acquiring the requisite skill of hand and eye, and, when he has attained to this ability, it will be time for him to practice himself in the management of various tools. Feeling certain of himself he will soon become quick in his work.

It is prejudicial to the true instruction of a pupil, and a false economy of both time and money, to let him commence either on a clock or watch before arriving at this point. He will experience difficulty in making even the simplest pieces, which, besides being very badly made, will take up a long time; he will keep forgetting as he goes on, because, owing to the slowness with which he works, the construction of a machine occupies months or even years, whereas it would only have occupied a few weeks or months if he had possessed sufficient skill to enable him to handle properly the file and graver.

We insist specially on the need of this preliminary training of the young horologist, because, with very rare exceptions, if a pupil is set to delicate details before he is master of his tools, he works with a want of decision, and, therefore, with difficulty. He will, as a rule, make a workman of but moderate ability, and will soon become disgusted with his trade, from the mere fact that he cannot work with ease and rapidity.

Time is an element of success; hence gratuitous apprenticeship, for short terms, that becomes a tax on the master if he does not soon make use of his pupil's services, will very seldom produce good watchmakers.

TO FILE FLAT WITH ONE HAND.

When an object is to be held on a cork or wood block fixed in the vise with one hand and filed with the other hand, special care must be taken to lay the file flat without any hesitation after each return stroke, and the hand should be able to *feel* if the file is wrong in this respect, and to at once bring it flat. After the pupil has learnt this he will very soon be able to adjust the pressure and the force exerted in moving the file horizontally, so that it shall remove an equal amount from the entire surface operated upon. It often happens that the object can conveniently be rested upon a finger of the left hand while the right hand holds the file. The maintenance of the file flat is, in that case, much easier.

There are several mechanical devices for filing flat. The "prudel" consists in placing behind the workman a horizontal bar, on which rests one end of the file handle, prolonged for the purpose to about a yard in length; thus the file has two points of support; the bar adjusted at a convenient height behind the workman, and the object to be filed flat fixed in the vise in front. This method, while convenient for amateurs, may be utilized in teaching an apprentice, letting the supports be hinged at one end, and press at the other end on a rather strong spring index, which must be prolonged so as to be brought under the eye of the pupil.

The displacement of the index will show him every false movement of his hands, and will guide him in adjusting them. It would be best if the prolongation of the handle were as light as possible, but rigid, and arranged so that the file can be held naturally.

The Lifting Angle of a Lever Escapement.

BY M. GROSSMANN.

IF WE desire to ascertain what lifting angle is best suited in a lever escapement, we must first examine the effects produced by changing the extent of this angle. A large lifting angle has as consequence a larger intersection arc; attended by increased friction and diminished energy of impulse at each point of its course because the same force must be spent for performing a longer course. A small lifting angle has as consequences the unfavorable extent of the loss of motion by a shake of the parts, and the greater influence of alterations of intended effects by an improper pitching or wear of the pivot holes and pivots. All these considerations are nearly the same, and their result is that any excess in these two directions should be avoided, but that within certain limits, especially in escapements constructed and pitched with all care, the performance of the smaller angle should be preferred, as offering the greater detachment of the balance vibrations.

Still another reason exists against the large lifting angle, which is an extremely unfavorable action of the unlocking, taking place at the two extremes of the lifting arc. It will be seen that this action will be easiest when occurring as near to the center line as possible, and will cause more loss of power when occurring away from this line. This loss of power is not compensated in any other part, and, therefore, should be avoided as much as possible.

One circumstance also greatly influences the decision of this question, and should be mentioned here, although beyond the scope of this article. The unlocking action has to be performed by the return vibration of the balance, which is effected by the tension of the balance spring. This tension, supposing all other conditions to be the same, will be stronger if the unlocking takes place further from the center line, and diminish with its approach toward it, until at last there is no tension at all.

In cases where the balance is small and insufficiently heavy, its vibration slow, and the balance spring weak, the former will have much difficulty in overcoming the unlocking resistance, especially when, for obtaining a large vibration, a mainspring of proportionately great strength is inserted. Under such conditions the escapement will have a tendency to set on the lockings and not go on, except by an external motion imparted to the watch, wherefore, in all cases in which these proportions are not established with the utmost accuracy, and the greatest care in making and pitching the escapement cannot be bestowed, it is not advisable to give a lifting angle of less than 30°.

The respective proportions between the lifting angle at the pallet and at the roller are also not established by any general rules of mechanics, and escapements might possibly be constructed with a small angle at the pallet and a large one at the roller, and *vice versa*. Nor is it essential, by any means, that the angle at the roller be such that the angle at the pallet be contained in it without any fraction. This matter is entirely optional, and without influence upon the mechanical effect. Nevertheless, the considerations which make us choose certain angles as best suited under certain circumstances, being the same for both angles in question, it is very unlikely that anyone, except in some particular case, should make an anchor escapement with a very small angle for arc and a very large one for the other action.

The size and breadth of the impulse pin is also a matter deserving of some attention. Many prefer a broad one for the impulse, for the purpose of facilitating the unlocking. This is quite correct, because a broad pin requires a wide notch in the fork, whereby the unlocking action is brought nearer to the line of centers, which is the most favorable place for it. But it must not be overlooked that every gain on this side is a loss on that of the impulse action, because in the same proportion as the unlocking approaches the center the impelling action removes therefrom; consequently the solidity of the pin itself must be the chief consideration, and a flatter cylindrical pin, with a breadth of 0.06 to 0.07 of the diameter of the scape wheel, may be considered a suitable dimension. The above mentioned circumstance led to the ingenious invention of the two-pin lever by G. Savage, the chief characteristic of which is a complete separation of impulse and unlocking, by which it becomes possible to use a thin pin for the former and a broad one or two pins at suitable distance from each other for the latter.

For an escapement with the two-pin lever the smallest possible lifting angles are practicable, because offering the most favorable conditions for both actions, and the most economical transmission of motive power. With respect to this lever, especially, the proportion of the unlocking radius to the radius of impulse is subject to variations, which, in all other fork and roller actions, are impossible by their nature. It seems to be of great advantage for an easy unlocking to place the unlocking pins as near to the center of the balance as possible, because, by forming a shorter lever and acting upon a greater length of the fork lever, the unlocking resistance may be better overcome. This would be a very great mistake, however, since in the first place it would require a much larger act of balance motion for the unlocking, and, beside, the considerable difference of speed with which the unlocking pins would move, compared to the circumference of the roller, would effect that the notch would have nearly passed the impulse pin before the unlocking is completely accomplished. A much wider notch would thus be required to overcome the butting of these parts, and the drop produced thereby would consume more than the power saved on the unlocking. The best plan, therefore, seems to be to fix the unlocking pins as near to the roller's edge as possible, and four-fifths of the roller radius may be considered as very good proportion of the unlocking radius of the two-pin lever.

The size of the detaining roller is of no great consequence for the action of the lever escapement, as all parts belonging to the safety action are not acting parts in common with the rest of the escapement, but, on the contrary, they are entirely out of action during the common, regular performance of the escapement, and in well-made escapements only act in very exceptional cases, when, by some external influence, an irregularity in the functions of wheel and pallet occurs. Moreover, their action is of very short duration, because the next vibration must necessarily re-establish the regular state of things. It is sufficient for the soundness of the safety action to give the detaining roller just the size of the impulse pin, so as to make its angle of intersection equal to that of the impulse pin.

In these exceptional cases, however, in which the detaining roller performs the functions for which it is intended, it is important to diminish the friction arising from the index pressure or guard pin against the circumference of the roller to the smallest possible quantity, which, supposing the surfaces of these parts to be polished very smoothly, can only be effected by giving the roller the smallest size permitted without prejudice to the soundness of the safety action.

The detaining roller, in good watches with double-roller escapement, is about half the size of the impulse circle, which size still admits a very efficacious safety action, with an arc of intersection of about 80°, under the circumstances here supposed.

The length to be given to the fork horns is not the same for all escapements; it depends from the angle of intersection of the safety action, and from the form and breadth of the impulse pin. Thus the fork of the table-roller escapement may be made with much shorter horns than another one with double roller, and this latter will require a greater length of horns in the same proportion in which the diameter of the safety-roller is made smaller, compared to the impulse circle. A very broad impulse pin, the foreside of which is made to agree with the impulse circle, admits the total omission of the horns, and escapements of this construction would be seen more frequently, if, beside the unfavorable action of lifting caused by such breadth of the impulse pin, there were not an objection to be raised against it, because it restrains the total space allowed for the vibration of the balance to less than two full turns, and thus creates a tendency to banking.

The Recent Exhibition of Fans.

THE oldest fan in the exhibition of the Society of Decorative Art, which dates probably from the beginning of the seventeenth century, is a fan only in seeming, and may be regarded not only as curious in itself, but as a type of the Italian Renaissance. Its smooth ivory case, in shape like any closed fan, is covered with delicate tracery, quaint masks, and fanciful arabesques; but upon removing the small end, a jerk of the hand brings leaping from its concealment in this innocent-looking sheath a very business-like dagger for the defense of its wearer. A waft of air takes us over a gap of a hundred years and lands us in the palmy days of old-fashioned diplomacy, for it was made in Spain to commemorate the signing of the treaty of Utrecht, which took place April 11, 1713, after long conferences between the representatives of France, England, Holland, Prussia, Portugal, and Savoy, and which, being supplemented by the peace of Rastadt in 1714, and other subsequent treaties, ended the war of the Spanish succession by placing Philip V., grandson of Louis XIV., on the throne of Spain. On the leaf may be seen a happy family of preternaturally peaceful monarchs, and the sticks, which overlap each other, and are elaborately painted and carved, are good specimens of Louis XIV. work; another fan, whose sticks are wrought into rather heavy medallions, while the leaf has little sheets of mica introduced into it to serve as windows for curious or coquettish eyes. It will be noticed that there is no attempt to connect the different subjects by the ornamentation, which merely divides and frames them. The next important modification in the style and decoration of fans is due to one Martin, born about 1766, who was a varnisher of coach and chair panels, and some say also a painter of the heraldic ornaments and flower borders which adorned them. After many experiments he succeeded in making a fine transparent polish, resembling Japanese lacquer, and legend has it that he obtained its secret from the missionaries who lived in Japan before the great massacres which closed that country to all except the Dutch traders. From panels, the varnish, named after him, "vernis Martin," was soon applied to fans, which were first exquisitely painted in water colors on slender strips of ivory held together by a narrow ribbon run through the top. * * * The lover of fans must pause in delight over one of the finest and purest specimens of the style of Louis XIV. to be found in the collection. The sticks are of mother-of-pearl inlaid with gold, and the medallion only survives in a subject carved in the center, and separated by their spreading. On the leaf, which is of kid, is painted a woodland scene in which a warrior woos a nymph, while sympathetic Cupids sport around them. This subject is laid carelessly upon the leaf, without the formal balancing and bordering of the earlier day, and the rest of the space is filled by wreaths of flowers, and oval medallions hanging from knotted ribbons, in which groups of Cupids recall the idea of the central scene.

Later in the reign of Louis XIV. fans became much simpler in character and decoration, as the influence of the coming pseudo-classical period was felt, and there are a couple of curious examples in the collection in which the leaf is adorned with noble Romans in togas, while the sticks are carved after the earlier and more elaborate manner which was all that the workman knew.

The aim of the Society of Decorative Art in bringing together this loan collection has been to show different kinds of decoration and mounting, and thus awaken an interest in this particular branch of art, for wherever women are fans will be, and their decoration is an art industry for which women are eminently fitted. It is also hoped that our artists may be more willing in future to work in a field which is not unworthy of their talent, for the leaf of a fan, owing to its shape, offers certain difficulties which are worth conquering, and as the arts are sisters, the fan may be said to be to the painter what the sonnet is to the poet.

Strength of Bronzes.

IN A paper lately read before the American Society of Civil Engineers, Professor R. H. Thurston describes a new bronze alloy of maximum strength. The properties of this alloy were ascertained by Professor Thurston in the course of his examination in the mechanical laboratory of the Stevens Institute of Technology of a series of 36 alloys of copper, tin, and zinc, in which the proportions of the copper were varied from 10 to 80 per cent.; of the tin, from 10 to 80 per cent.; and of the zinc, from 10 to 70 per cent. The results of these experiments pointed to an alloy of the proportions of copper, 55, zinc, 43, and tin, 2, as likely to be that possessing maximum strength, and on Professor Thurston making the alloy he found it to possess a good color, to be close grained, and susceptible of high polish. It was also found to have immense strength, considerable hardness, and moderate ductility, while it could also be forged if carefully heated. For purposes demanding toughness as well as strength, Professor Thurston found, however, an alloy with less tin to be preferable, and he gives the proportions of copper, 55; tin, 0.5; zinc, 44.5; as affording the best results. This alloy, he states, has a tensile strength of 68,900 lbs. per square inch of original area, and 96,136 lbs. per square inch of fractured area, while it elongated from 47 to 51 per cent. (length of test sample not stated), and reduced to 0.69 to 0.71 of its original diameter before fracture. He also states that the shavings produced by the action of the turning tool on this alloy curled closely, and were tough and strong like those of good iron. Professor Thurston also refers to an alloy discovered several years ago by Mr. J. A. Tobin, but which appears not to be generally known. This alloy, which consists of copper, 58.22, tin, 2.3, and zinc, 39.48, had, when cast, a tensile strength of 66,500 lbs. per square inch of original section, while when rolled hot its tenacity rose to 79,000 lbs. per square inch, and when moderately and carefully rolled cold, to 104,000 lbs. per square inch. It could also be bent double either hot or cold, and was found to make excellent bolts and nuts, while it could be forged at a low red heat.

The Story of a Watch.

THIRTY-ONE years ago a gentleman now occupying a prominent place in Masonic circles in San Francisco, Cal., then residing in an interior county of the State, sent an order to London for the manufacture of a fine gold watch, of English make, a duplex movement, heavy gold magic cases, and appropriate scroll work. During the following year, the watch, a masterpiece, costing $400, was received, and worn by its owner for the next nine or ten years. In 1861 a friend started for this city on a visit, bringing the watch with him, since which time nothing has been seen or heard of him, the supposition being that he was murdered and plundered by some of the bad characters that were so prevalent in San Francisco at that time. The missing man had abundant means, and left behind him a piece of mining property worth $30,000 or $40,000, which, by the lapse of time and the local mining laws, passed into other hands, showing conclusively that at least some accident had overtaken him. The owner of the watch mourned the loss of his friend, and regretted the missing time-piece. After some years he moved to San Francisco, where in time the above incidents became to memory as a dream. A few days ago he was conversing with a friend in a jewelry store, when a stranger stepped up alongside of him, laid a watch on the counter and asked the proprietor to purchase it, and, to the astonishment of our masonic friend, he recognized at the first glance the time-piece he had lost 21 years previously, and immediately claimed it. The stranger explained that he was disposing of the watch for a lady in destitute circumstances, and naturally insisted upon having some proof of the claimant's ownership before recognizing the claim. The two, by agreement, went to another jewelry establishment, the proprietor of which had formerly been in business in the same interior town with the claimant, and who had cleaned the watch once or twice twenty odd years before. The watch was handed him, and before anything had been said in reference to it he said, "Why, ——, this is your watch; the one you lost." Another friend who had last seen the watch in 1856 recognized it at first sight. Subsequent investigation revealed that about 1861-2 a gentleman of San Francisco purchased the watch of a man, possibly one who had murdered the visitor from the interior, for $350, and had carried it up to the day of his death, which occurred in Tucson, Arizona, about a year and a half ago. In the settlement of his estate the watch was appraised at the low valuation of $125, and the sister of the deceased, knowing it to be valuable, took it as a portion of her interest in the property. Becoming reduced in circumstances, she put it in the hands of a friend to sell for her, with the result as above told. Not wishing to involve the lady in legal proceedings, and sympathizing with her destitute condition, the pleased owner of his newly found treasure magnanimously paid her $100 for the return of his property, which was found to be in as good condition as the day it was bought.

How Mosaics are Made.

IT IS SAID that in a portrait of Pope Pius V. there are 1,700,000 pieces, each no larger than a grain of millet. The enamel is a kind of glass, colored with metallic oxides, and it is so fusible that it can be drawn out into threads, small rods, or oblong sticks of varying degrees of fineness, slightly resembling the type used by compositors. These polychromatic rods are kept in drawers properly numbered, so that the artist always knows to which case to repair when he requires a fresh supply of a particular tint or tints. When the picture is commenced the first step is to place on the easel a slab of marble, copper, or slate, of the size fixed upon; and this slab is hollowed out to a depth of three and a half inches, leaving a flat border all round, which will be on a level with the completed mosaic. The excavated slab is intersected by transverse grooves or channels, so as to hold more tenaciously the cement in which the mounts of enamel will be embedded. Then the hollowed slab is filled with "gesso," or plaster-of-Paris, on which the proposed design is accurately traced in outline, and usually in pen and ink.

The artist then proceeds to scoop out a small portion of the plaster with a little sharp tool. He fills up the cavity thus made with wet cement or "mastic," and into this mastic he successively thrusts the "spiculæ," or the "tesseræ," as the case may be, according to the pattern at his side. In the broad folds of drapery, or in the even shadows of a background, or a clear sky, his morsels of enamel may be as large as one of a pair of dice; in the details of lips, or eyes, or hair, or foliage, or flowers, the bits of glass may be no larger than pins' heads. The cement, or mastic, is made of slaked lime, finely-powered Tiburtine marble, and linseed oil, and when thoroughly dry, is as hard as flint. Sometimes the mastic which fills the cavity is smoothed and painted in fresco with an exact replica of the pattern, and into this the bits of glass are driven, according to tint, by means of a small wooden mallet. If the effect produced wounds the artist's eye, he can easily amend the defect by withdrawing the offending piece of enamel and driving in another while the cement is still wet; and, by observing proper precautions, it can be kept damp for more than a fortnight. When the work is completed any tiny crevices which may remain are carefully plugged or "stopped" with pounded marble, or with enamel mixed with wax, and the entire surface of the picture is then ground down to a perfect plane, and finally polished with putty and oil. Byzantine may be broadly distinguished from Roman mosaic by the circumstance of the surface of the former being left unground and unpolished—save where there is burnished gold—thus leaving an irregularity of surface productive of great vigor of effect. A virtuous picture of the Byzantine style can at once be recognized as a mosaic, even if it be hung at an altitude of one hundred feet from the ground; but a perfected mosaic picture, after the Roman manner, might easily be mistaken, even at a very short distance, for a very elaborately finished and highly varnished painting in oils.

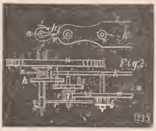
IN THE January number of the *Archives des Sciences*, Professors Dufour and Amstein describe a simple registering barometer now in use in the Meteorological Observatory of Lausanne. It depends on displacement of the center of gravity of a glass tube containing mercury. The form of the tube may be described as that of an L leading down to a U by a vertical portion. The lower end is open. The tube swings in the plane of its angles on a horizontal axis placed above the center of gravity; with increased barometric pressure it inclines to the right, with decreased pressure to the left; and these movements are recorded by means of a style attached to the U part and applied to a moving strip of paper. By a simple contrivance the pendulum of a clock is made to impart a slight shock every second swing to the tube, so as to destroy any adherence of mercury. The instrument is easily made and proves very sensitive and trustworthy.

A description of a barometer for distant points of great altitudes which could be read by means of the electric current was given at a late meeting of the Royal Scottish Society of Arts. The electric barometer consists of twenty-five tubes placed side by side on a board or round a pillar. Into each of the upper ends is fused a fine platinum wire, dipping down by tenths of an inch, so as to get a range of twenty-five tenths, or two and a half inches, with the whole instrument. A wire is taken from each of the twenty-five wires and carefully insulated from each other, together with a return wire from the cistern ends. In all twenty-six wires are made into a cable and continued to any convenient place for the observer. In the observing apartment the wires are separated and attached to a dial, which is connected with an electric bell and battery. If the barometer were placed on a hill and a cable taken therefrom to the observer, the heighth of the mercury would be ascertained by finding the shortest wire. when in circuit, which would ring the bell. To arguments which might be urged that readings of tenths were not fine enough, it might be said that such readings were better than no observations at all.

Duplex Escapement, with Three-Toothed Scape Wheel.

[Invented by W. H. Haake. German Patent Nos. 13,121 and 13,649.]

The train of this watch has, as will be seen by Fig. 2, one more wheel than common, a common wheel *a*, with 42 teeth; it is riveted upon the 8-leaf pinion *b*, which is driven by the fourth wheel with 64 teeth, and said wheel *a* seizes into the 7-leaf scape pinion *c*. Fig. 1 gives an upper view of the escapement. The steel repose wheel *r*



lies against the ruby pin *v*, and the pins of the lifting wheel *s*, work upon the impulse lever *h*; *u* is the balance, and *k* the bridge for the scape wheel and wheel *a*. The performance of the escapement is exactly that of the common duplex—the balance receives a propulsion at each second vibration; the lifting amounts to 50°.

This contrivance counteracts in a very simple and secure manner any over-vibration of the balance; it performs as follows: The impulse lever *h* carries an upright brass pin *i*, which, when the balance is at repose, must stand exactly at the corner *e* of the bridge *k*. A small, thin lever *n*, also moves to and fro upon the balance arbor, generally standing behind, as shown in Fig. 2. Should the balance swing more than one turn, this lever stands in front, not being able to pass corner *e*, and finally places itself, should the vibration continue, between the bridge corner *e* and the pin *i*, and the balance is stopped, as shown in Fig. 2. This contrivance permits a vibration of 650°, or fully 1¾ turns.

The calculation of the train is down to the fourth pinion, the customary one; from the fourth wheel onward it changes, and by a simple calculation* it is found that the watch makes 144 full vibrations, or 17,280 per hour. The balance makes exactly 24 vibrations in 5 seconds, while the impulse wheel makes 12 propulsions, and a single vibration consequently amounts to $\frac{5}{24}$ second. By watches with 18,000 vibrations per hour each one consumes $\frac{5}{25}$ or $\frac{1}{5}$ second of time.

* $\frac{64}{8}\times\frac{42}{7}\times 3\times 2=8\times 6\times 3\times 2=288$.

Burnishing.

By burnishing, the roughness of an object is flattened down until the surface is smooth and polished like a looking glass. Burnishing is an important operation for electro deposits, which consists of a multitude of small crystals, with intervals between them, and with facets reflecting the light in every direction. The deposited metal is hardened and forced into the pores of the underlying metal, and the durability is thus increased to such an extent that, with the same amount of silver, a burnished article will last twice as long as one which has not been so treated. The instruments employed for burnishing are made of different materials, and must be of great hardness and a perfect polish. Such are hardened cast steel, agate, flint, and bloodstone. For metallic electro deposits steel and blood stones are especially employed. There are several qualities of blood stone; its grain should be close, hard, and without seams or veins; it should leave no white lines on the burnished parts, nor take off any metal, and its color should be of an intense black red. The steel must be fine and close grained, and perfectly polished. Should the polish of any burnishing tool alter by use, it is restored by friction upon a skin or leather attached to a wooden block, which is fixed to the bench. The leather is covered with polishing rouge in impalpable powder, or, preferably, with pure alumina, obtained by calcining ammonia alum in a forge fire. Venetian tripoli, rotten stone, tin putty, emery, or many other hard substances finely powdered may be employed. The burnishing tools are of various shapes, such as a lance, a tooth, a knife, a half sphere, or a dog's tongue, and a considerable stock is necessary. The burnishing is divided into two distinct operations. The first consists in roughing, and the second is finishing. The tools for the first have a sharp edge, while for the second operation they have a rounded surface. The tools for the hand or the lathe are fixed by copper ferrules into short round wooden handles, so that the hand is not influenced by their weight. The tools for the arm or vise are fastened to wooden handles sufficiently long to rest their slender part upon the arm or shoulder. The stouter lower portion is grasped by the hand. The burnishing tools and the objects must be frequently wetted by certain solutions, some of which facilitate the sliding of the instrument, or with others which have a chemical action upon the shade of the burnished articles. Of the first are pure water, solutions of soap, decoctions of linseed, and infusions of the roots of marsh mallow or licorice. The second includes wine-lees, cream of tartar, vinegar, alum in water. When burnishing gold applied upon electro deposits of copper, as is gilding with a dead luster by that method, use pure water, for fear of producing a disagreeable red shade. A solution of green soap is sometimes preferred by operators, although when old, it imparts an unpleasant tinge, owing to the sulphides of the liquor. When the burnishing is completed, the surface is wiped longitudinally with a soft and old calico rag. The polish obtained by burnishing is called black when it reflects the rays like a mirror, and should the presence of mercury or a bad deposit prevent the tool from producing a bright surface, the object is said to be greasy. Articles which have been previously polished, and which generally receive a very trifling deposit, are not burnished, but rubbed with chamois leather and the best polishing rouge. Too thick or too rapid electro deposits cannot be burnished, but must be polished by rubbing with a leather and a mixture of oil and powdered pumice stone, tripoli, or tin putty. Coarse powders are used at the beginning, and impalpable ones at the end of the operation. Polished silver deposits are more agreeable to the eye than burnished ones, but the hardening of the latter renders them more durable.

What Next?

Chronographs were represented in the German division of the Paris Electrical Exposition by a single specimen, the Spark chronograph of Siemens & Halske, which measures the one-millionth part of a second with the greatest exactness! The annotation of time is accomplished by a rapidly revolving polished steel drum, upon which the spark records, whereby not alone the marks are registered in sharply defined dots, but the insecurity inherent generally to the electro-magnetic registrations, and caused by the anchor, is overcome. The distance, also, between two given points, can be determined with the utmost precision, by the known velocity of the drum revolution, and its capacity is fully equal to that of the tuning fork chronograph. For the measurement of greater intervals, the apparatus can be retarded in velocity, to measure as much as one-hundredth of a second.

Next after the Spark chronograph, those based upon the electro-magnetic registration engage our attention as being more easy of manipulation in many respects, and furnishing completely satisfactory results. Those exhibited by the French Department of Marine, showed a high degree of perfection. They are constructed to determine the velocity of projectiles, and the pressure of the powder gases indirectly. They emanated from the ateliers of Messrs. Schultz, Marcel Deprez, and Sébert. The measurement of time is accomplished either by a tuning fork, system Dumoulin-Froment, which registers its vibrations upon a drum coated with soot, and which vibrations are excited in an electro-magnetic manner, or, according to the system of Bianchi, determined by a fall chronograph, by which the time in question is ascertained in a direct, straight-line measurement by a piece of iron dropping in a vertical groove, carrying the electro-magnetic index along the front faces of the groove rails. Although not possessing the exactness of the tuning fork chronograph, it is sufficiently correct and easily set to work.

Several chronographs constructed by Bréguet were also exhibited, and were very interesting.—[*Ext. of Rep. of Elec. Exp. of Paris.*

Chronology of the Timepiece.

BY TIMEPIECE we understand that instrument by the aid of which we divide the day into twenty four equal parts. As well known, the ancients already possessed such contrivances, sand or water hour glasses, and sun dials, 740 years B. C., and tradition has it that the obelisks served as gnomens for the Egyptians and Phènicians; Caliph Haroun al Rachid presented Charlemagne, in 809 A. C., with a copper clock propelled by sand. History is very vague with regard to the exact date of the discovery of clocks; it is said that the wheeled timepiece was invented in the 14th century; first by Richard Wallingford, Abbot of St. Albans, England; next by Giovanni Dondi, a doctor and astronomer at Padua, and finally, by Henry von Vick, a German clockmaker, in Paris, who, at the order of Charles V., constructed the first tower clock in Paris (the square is stilled called Place d'Horloge). The honor of the invention of the actual watch pertains to one Peter Hehle, of Nuremberg, (the first watches were called *Nuremberg eggs*), in 1500. Ahout the same time the second Strasbourg clock* was constructed. The subsequent improvements and inventions are due to a great number of watchmakers and men of genius, and in the following we give the names of those who made essential adaptations and inventions, and earned immortal fame.

1595. Gallileo invents the pendulum, whereby the means is offered for regulating the motion of the wheel clock; his son Vincent, however, in 1649, makes the first practical attempt to adapt it to the clock.

1656. Christian Huyghens (pronounce H*oi*gens), a Dutchman, finally succeeds in constructing the first pendulum clock; he later constructs several marine watches, but finally invents the balance spring, by the use of which alone, a marine timepiece becomes a possibility.

1675. Barlow and Quare, London, make the first repeating movements, first for clocks, next for watches.

1680. Clement, London, invents the anchor escapement (clock).

1695. Tampion invents the dead-beat escapement, and uses it first in a watch.

1700. Fatio, of Geneva, perforates rubies, and uses them as pivot holes.

1715. Graham, London, constructs the mercury compensated pendulum, invents the cylinder escapement, and the dead-beat escapement for astronomical clocks.

1726. John Harrison, England, constructs the gridiron compensated pendulum, and in 1761, when 67 years old, the first marine watch, receiving the prize of £10,000 therefor from Parliament. (This excellent horologist died 1776, at the age of 82 years.

1754. Caron de Beaumarchais, the son of a watchmaker, invents the pin escapement for watches; but at a later date, follows his poetical inclination, and composes the Barber of Seville, Figaro's Marriage, etc.

1755. Ferdinand Berthoud, born 1727, in Canton Neuchatel, greatly promotes the interests of horology by his writings and treatises. He also constructed several, and better watches than Harrison, and died in 1807, in California, whither he had gone, at the age of 80, to observe his last clock. Ferd. Berthoud undoubtedly was one of the greatest watchmakers that ever lived. The celebrated *Abbé* Chappe, inventor of telegraphy, was his nephew.

1765. Pierre le Roy invents the compensated balance wheel, after having constructed a marine watch, for which he obtained a prize from the Académie des Sciences.

1770. Duplex, England, invents the escapement named for him, and greatly esteemed at the present day.

1772. John Arnold, also English, makes several improvements, and afterward invents the marine chronometer with dead-beat spring escapement, and approximately correct compensated balance.

1805. Urban Jurgensen, Copenhagen, constructs the first steel cylinder scape wheel, and greatly contributes to raise the art of horology by his improvements and writings. Thus, for instance, he materially improved Arnold's dead-beat chronometer escapement.

1821. Rieussac, Paris, invents the writing clock.

1823. Perrelet constructs an astronomical clock showing the hours, minutes, seconds, even $\frac{1}{10}$ seconds. From this time forward, Breguet, Louis Berthoud, Houriet, Wagner and Perron, by dissertations and practical improvements, gave the incentive to bring the art of horology to a high standard, and to make it commensurate with the requirements of the present age.

It would lead too far to mention the many different inventions and improvements made in this century—the Geneva musical boxes, the orchestrions of the Black Forrest, the astronomical clock of Strasbourg, etc. In the line of watches, the standing seconds, the course of the moon, perpetual almanac, etc., automatically-striking hour, ¼ and ⅛ hour, yea, minute repeaters; again, the remontoirs, and in latest time, the chronographs, etc. If we remember that the art of horology has labored from the year 740 B. C., to the middle of the last century, without leaving its cradle of infancy, and contemplate the grandeur of the inventions of the present time, the thinking mind will be tempted to incline his head in reverence when he hears or sees the names of Graham, Harrison, Breguet, Berthoud and others.

* Strasbourg possessed three different clocks. The first was built in the year 1352, under John von Leichtenberg, and finished in two years; the second one was commenced in 1547, and, on account of death and other interruptions, finished in 1574; the present third clock was built by John Baptist Schwilgue in 1838, and finished in 1842. Only a few insignificant portions of the old clock were retained.

Secrets of Isochronism of the Balance Vibration.

IF WE wish to obtain equal pendulum oscillations, we use a longer or shorter suspension spring, the same holds true of the balance vibration, and its spring.

The length and specific weight of the pendulum conditions the length and thickness of the suspension spring; in the same manner, the diameter and weight of the balance determines the length and thickness of its spring; hereby, however, the curve extensions must specially be considerd, since balance springs of equal length and thickness of blade but different in dimension and curves, offer very different resistance.

It will have happened to the repairer and regulator, that when a ruined or badly inserted balance spring was straightened and set in order by him, the rate of the watch differed materially, and the spring had to be reset; a proof that a spring of equal length and thickness, but of another curve, requires another regulating, the power of resistance or tension of the spring virtually is altered. Generally, when a watch retards, it is presumed that its spring is too weak, or, what is the same, too long, and every watchmaker knows, that by a further inserting through the spiral stud, its vibrations are accelerated. The cause of the acceleration, however, does not lie in the immediate shortening and approach of its two ends, but in the alteration of its curves, whereby the proportion of the curve dimensions to the length, and thereby to the weight of the balance, becomes another, and favors a greater power of resistance. If the proportion of length alone were to decide, then the same quantity of shortening of the balance spring would produce the same effect, which, as everyone knows, is not so. By shortening the spring on its inner end, its power of resistance is sensibly augmented, because the operating power of the balance upon the spring is lessened by the change from the center of the inner curve. For this selfsame reason, the inner curve should be treated with all possible consideration.

This demonstrates that isochronism does not lie in determinable length and thickness of the spring blade, but rather in its curve dimensions, to be ascertained by changing the curve positions of every more or less correctly chosen spring, by finding the true proportion of the inner resistance to the outer. But hereby is necessary not to locate the curves too far from each other, to enable the vibrations, which proceed from the center, and affect the spring through its entire length, to divide more equally upon the individual coils, and ease the resistance of the opposing two ends.

If, for instance, the watch goes right by full, but retards by lessened power, the power of resistance is strengthened at the center by shortening the inner end, and weakened by lengthening, or enlarging the curves, of the outer; because the greater the curve, the smaller the resistance, or power of tension, and *vice versa*. If by full power the watch retards, but goes right by lessened power, the spring can be shortened by additional drawing in through the stud, to increase its power of resistance of the outer curve by its decrease and approach of the two ends. If necessary, and the condition of the spring permits, the inner curve, by approaching to the center, is shortened, and the power of resistance increased thereby. Generally, the spring should accomplish the smaller vibrations rather more quickly than the larger ones, because the thickening of the oil produces a certain laxity of the operating power upon the lifting and mobility of the balance.

Jurgensen, in his work on isochronism, chapter 14, paragraph 228, second edition, says: "Isochronism is obtained by a more or less long spring. Too short a spring accomplishes the large vibrations quicker than the small ones, and, on the other hand, too long a spring consumes more time to accomplish the former than the latter. It is clear, therefore, that between both limits a medium can be found, in which the vibrations may be made equally long, or isochronous. When the large vibrations have less velocity than the small ones, it may be remedied by shortening the spring; when the contrary occurs, it becomes necessary to choose a longer spring."

In these few sentences, Jurgensen elucidates the entire mystery of isochronism; I say mystery, because both isochronism and regulating, by those who understand it, are treated as things mysterious, and the inexperienced watchmaker, for want of thoroughly understanding the nature of the balance spring in all its bearings, will have many a difficulty and vexatious hour before him, until he fully comprehends the import of Jurgensen's axioms.

Iridium in the Arts.

IRIDIUM is a metal that has long been known as possessing the quality of hardness in a high degree, and has been extensively used for the "diamond" points of gold pens. It has, however, been an intractable metal, difficult to work, and for this reason has been but little used. It remained for Mr. John Holland, the well known gold pen maker, of Cincinnati, to discover a process by which the metal is made available for use in the arts. For upwards of eighteen years he conducted experiments with iridium, with a view to making it more readily available for use for pen points. He has succeeded in producing, in fact, a new metal, which has a bright metallic color, similar to that of hardened steel; it takes a high polish, which does not tarnish or oxidize in the air; it does not dissolve in the strongest acids or alkalies; and it is harder than steel, agate, rock-crystal, and ruby. Iridium can be soldered to gold, silver, brass, copper, iron, steel and other metals. With these wonderful properties it can be adopted with great success for a multitude of mechanical uses, and has already been applied to many with great success.

Iridium is found in considerable quantities in the platinum ores, in the forms of platiniridium, which is an alloy of platinum and iridium, and osmiridium or iridosmine, which is an alloy of osmium and iridium. The platiniridium occurs in grains, and sometimes in cubes with rounded edges. The iridosmine is usually found in the form of flat, irregular grains, and occasionally in hexagonal prisms. The geographical distribution of this metal is quite wide; it is found in California, Oregon, Russia, East India, Borneo, South America, Canada, and Australia, and in small quantities in France, Germany, and Spain. As usually found, iridosmine, or the so-called native iridium, is associated with numerous rare metals; viz: osmium, platinum, rhodium, ruthenium, and palladium, and also with iron and copper. Iridium possesses a white luster resembling that of steel. In the cold it is quite brittle, but at a white heat is somewhat malleable. It is one of the heaviest of metals, having a specific gravity of 22.38. When an alcoholic solution of the sulphate of iridium is exposed to sunlight, it deposits an impalpable black powder, which has the very peculiar property of setting fire to a piece of paper saturated with alcohol when brought into contact with the slightest trace of it.

The iridium melted by the Holland process is compact and crystalline; it is harder than the natural metal. The operation of sawing the metal is accomplished by means of a copper disc, making about 5,000 revolutions per minute, assisted by emery and water. When the metal is ground to a smooth surface by means of emery on a copper wheel as described, it acquires a good polish, which may be increased by using "crocus powder" afterwards on a similar wheel. Iridium which has been melted by Mr. Holland's process is nearly as hard as the ruby, which is next in hardness to the diamond. It cuts glass readily; the best files are ruined by attempting to file it. It has about the color of steel. It is not attacked by acids and does not tarnish. The best steel tools fail to make any impression upon it. A metal with this wonderful combination of valuable properties, will undoubtedly find many uses to which it can he applied with great advantage.

It has already been successfully applied to electric lights; for contact points for telegraphic instruments; for bearings for balances; for fine scales; for jewels of watches and clocks; for bearings for mariner's compasses; for stytuses; for drawing and ruling pens; for dental tools, etc. As iridium has a handsome, bright color, and is susceptible of a high polish, which does not tarnish or scratch, it pomises to become an important factor in the manufacture of jewelry. Already it is being extensively used in combination with gold, silver and platinum, with which it alloys readily, in the production of sleeve buttons, pins, studs, etc. It is also used for jeweling watches, and promises to be more valuable than the ruby for this purpose. Watch cases will also be soon introduced made of iridium.

This metal is now produced by the American Iridium Company, of Cincinnati, and letters patent have been taken out for the United States, Europe and Canada. It can be produced in masses of almost any shape desired, and the company is now making it in a varity of shapes to fill orders from some of the largest manufacturing jewelers in the country. Unquestionably iridium has a promising future before it, and its adoption in the arts will be watched with interest.

SOME interesting facts regarding the influence of heat on the molecular structure of zinc are given in a recent paper by Herr Kalischer to the Berlin Chemical Society. Rolled zinc becomes crystalline when strongly heated, and the author recommends as a lecture experiment dipping a heated strip of zinc for half a minute in concentrated sulphate of copper solution, then washing off the precipitated copper with water, whereupon distinct signs of crystallization appear. The effect is not merely superficial; plates $\frac{1}{30}$ mm. to 5 mm. thick (no thicker were tried) proved crystalline throughout. The mode of cooling quick or slow) has no marked influence. Zinc, when heated loses its ring, and if bent, gives a sound like the "cry" of tin; this fact, with the crystallization, confirms the view that the cry of tin is also due to crystalline structure. Zinc must be heated over 150° C. to show crystallization on corrosion, but the "cry" is perceptible at about 130°, and increases with the temperature. As the tenacity of rolled zinc diminishes with crystalization, and the cry undoubtedly proves incipient crystallization, some important deductions for technical work are indicated. Herr Kalischer finds the ratio of the specific gravity of zinc in crystalline to that in ordinary state is 1.0004:1, or an increase for the former of about $\frac{4}{100}$ per cent. The ratio of elastic resistance of zinc wire ordinary to crystalline = 1.0302:1, or a decrease for the latter of about 3 per cent. Herr Kalischer was unable to prove so fully crystallization in copper, brass, iron, and aluminum, but there were indications of it in some of these.

Patent Reports.

PROCESS OF MANUFACTURING CELLULOID CLOCK CASES.—Reuben T. Triplett, New York, N. Y. Filed Sept. 7, 1881.

Claim.—1. The described mode of forming clock cases and their dials in one structure by first forming the dial separately from a plate of celluloid, then placing this dial in a mold with a space in said mold beyond or around the edges of said dial, and corresponding to the walls of the clock case, and finally filling said molding space with celluloid, so as to form the sides or walls of the case and unite with the said dial plate at the same time, substantially as herein shown and described.

2. As a new article of manufacture, a clock case formed of celluloid, as herein set forth.

3. A clock case formed of an internal core or skeleton of suitable material, and an external sheath or layer of celluloid, substantially as herein set forth.

4. A clock case formed of celluloid, with a dial plate made separately therefrom, but united with the case in the act of molding the same, substantially as herein set forth.

5. A clock case formed of an internal metallic core or skeleton and an external layer or sheath of celluloid, substantially as herein specified.

BRACELET.—Gamaliel B. Goff and Gustavus Lenau, Attleboro, Mass., assignors to S. E. Fisher & Co., same place. Filed Jan. 16, 1882.

Brief.—The bracelet wings are connected by a joint.

Claim.—1. In a bracelet, the combination of wings A B, the lateral tubes forming a joint, and a spring passing laterally through such tubes.

2. The combination of the wings A B, connected to lateral tubes D G, the spring, the notches 5 6 in the tubes, and the pins.

3. The combination, with the wings of a bracelet, of the arms C F and the lateral tubes D G.

4. The wings A B, arms C F, and tubes D G, in combination with the ferrule.

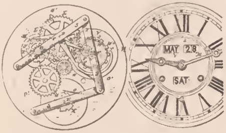
5. In combination, the wings A B, the arms C F, connected to the side of the said wings by the beads 1, and the described joint, all substantially as set forth.

STUD AND BUTTON FASTENING.—Parke P. Flournoy, Bethesda, Md. Filed Feb. 8, 1882.

Claim.—As an improved article of manufacture, an ornamental stud or button having the shank A permanently secured thereto and formed of a single piece of wire, bent at a, and having a return-bend at B, so that the parallel continuation C will be sprung against the bend a to prevent accidental unfastening, the whole constructed and arranged substantially as shown and described.

TIME-PIECE CALENDAR.—George Elmer Sanford, Genoa, N. Y. Filed July 14, 1881.

Brief.—Indicates the hour and the day of the week and month, making the necessary corrections for months of different lengths and for leap years. Adapted for clocks or watches.



Claim.—1. In a time-piece calendar, the gage-wheel L and spring R, arranged to be wound upon the shaft of said wheel during the month or while the gage-wheel advances, and to react upon said wheel when released, in combination with mechanism for automatically releasing said wheel at the end of the calendar-month, as set forth.

2. In a time-piece calendar, the gage-wheel L, having arm G' and stepped flange H', substantially as set forth.

3. The combination of the units-wheel having projecting arm N with the tens-wheel P, having notches O, the toothed tens disk Z, the regulator-wheel A', having crank B', the pitman D', and the spring S^3, all substantially as and for the purpose set forth.

4. The combination of the year-wheel having a notched rim, W, with the lever T, having spring K', the gage-wheel L, and the toothed wheel or units-wheel I, all substantially as shown, for the purpose specified.

5. The gage-wheel L, having arm G' and stepped flange H', in combination with the units-wheel I, the drive-wheel D^2, having arms E' F', and the week-wheel X, as herein described, for the purpose set forth.

6. In a calendar time-piece, the driving-wheel D^2, placed loosely upon one of the winding-posts, engaging the dial-wheel C^2, and having arms E' F', for simultaneously actuating the day-wheel and the unit-disk of the month-register, as herein shown and specified.

7. The combination of the year-wheel having rim W, provided with teeth W^2 and notches 28 30, the lever T, having spring K', and curved arm provided with hook M' and tooth N', and the gage-wheel L, having stepped flange H, substantially as set forth.

8. The combination of the units-wheel I, having teeth or ratchets J, the gage-wheel L, the lever T, having arm L', and the spring O', substantially as set forth.

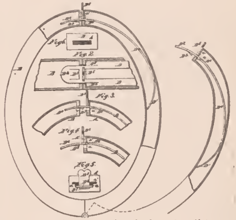
9. The combination of the year-wheel having notched rim W, the four-year wheel having projection R', the gage-wheel L, and the lever T, all arranged and operating substantially as and for the purpose herein shown and specified.

NECK OR BRACELET CHAIN.—Doliver S. Spaulding, Mansfield, Mass. Filed Jan. 9, 1882.

Brief.—The filling-cup closes the edge cup and hides the connecting-wires therein from view. It also prevents foreign matter collecting in the edge cup.

Claim.—The combination of the filling C with each fellow pair of edge cups A and their connection or connections and immediately-intervening links or units B, such fillings being arranged within the edge cups, substantially as specified and represented.

BRACELET.—Irad L. Garside, Paterson, N. J. Filed March 15, 1881.



Claim.—1. The spring composing the bracelet-click D, having the root D', body D^4, and shoulders D^6, adapted to be engaged and retained in the part a a' of a bracelet by its own elasticity, as herein specified.

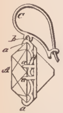
2. The click described, having the shoulder D^3 and the shoulder or shoulders D^6, in combination with a bracelet having hollow parts, one part, A, having a mortised end adapted to receive the main body of the click and to permanently retain it by reason of the shoulders D^6, and the other part, B, having a mortised end adapted to engage and release the shoulder D^3 at will, as herein specified.

3. The click D, bearing inward or toward the arm of the wearer

at the catch end, in combination with a bracelet and with the knob D^6, arranged to release the click by a tensile strain, as herein set forth.

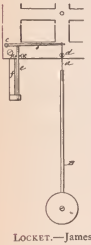
4. The knob D^5, formed integral with the body D^4 and arranged to serve as the operating means for disconnecting by a tensile strain, and also to serve with the shoulders D^6 to hold the click against being forced inward, as herein specified.

JEWELRY SETTING.—Harrison B. Smith, New York, N. Y. Filed Jan. 22, 1882.



Brief.—The stone is set in a narrow band, through which it projects to show the back as well as the front.

Claim.—An improved jewelry setting consisting of the narrow beveled band or ring *B*, adapted to receive and fit upon the edge of the stone, and provided with the cramps *a*, for securing it to the same, and with the eye *b* between two of the said cramps, for receiving the ear-wire, substantially as herein shown and described, whereby both the front and back of the stone project trhough the band, and the stone is displayed to the best advantage, as set forth.



COMPENSATING PENDULUM.—James Asher, Fort Erie, Ontario, Canada. Filed Jan. 13, 1882.

Claim.—1. A clock pendulum suspended from a lever above the center on which it swings, the lever being sustained on a compensation rod, substantially as shown and described.

2. The combination of rod *e*, lever *b*, split stud *d*, and pendulum *B*, substantially as shown and described, for the purposes specified.

3. The combination, with a pendulum, of a compensating rod and a multiplying lever connected for supporting the pendulum at a point above its center of oscillation, substantially as shown and described.

LOCKET.—James Rothschild, Newark, N. J. Filed Jan. 31, 1882.

Brief.—The central opening is slightly beveled to hold the setting in front. Narrow strips are soldered against the longer inner sides of the frame to receive the ends of cross bars, which firmly hold the stone at the rear.

Claim.—1. A frame for articles of jewelry having a central opening for a stone or ornament and side edges at right angles to each other, in combination with interior side bars *C C*, and cross bars *c c*, substantially as described.

2. In a locket or analogous article, the hollow frame *A*, having face *a* and rim *a'* at right angles to each other, having within the inner surfaces of its longer sides strips *C C*, in combination with cross bars *c c*, all arranged as described, adapted to hold the setting *B* firmly in position within said frame *A*, as and for the purpose intended, substantially as described.

BRACELET.—Charles A. Faas, Brooklyn, assignor to himself and George A. Eaton, New York, N. Y. Filed Jan. 30, 1882.

Brief.—The bracelet is made in two sections with slip-joints at the ends, and is provided with helical springs within the sections, through which the wires pass.

Claim.—1. The combination, in a bracelet, of two or more hollow sections, chains, or wires passing from one section into the other at both ends of the sections, and helical springs within the sections, through which the wires or chains pass, and to which they are attached at the inner ends, as set forth.

2. The combination, in a bracelet, of two or more sections, couplings at the respective ends of the sections, springs within the sections, a wire or chain passing from one section into the other at each end of the section, and abutments for the ends of the springs, through which abutments and springs the wires or chains pass and are attached, substantially as set forth.

WATCHMAKER'S CHUCK.—John Spickerman, Jefferson, N. Y. Filed Jan. 13, 1882.

Claim.—1. A chuck for jeweler's lathes, composed of the holder *A* and clamp *B C*, arranged and operating substantially as and for the purpose herein specified.

2. The watch-wheel clamp composed of the parts *B C*, constructed and operating substantially as and for the purpose herein specified.

Copying Drawings.

TILHET'S method of copying drawings in any desired color is thus described in the *Polytechnisches Notizblatt:*

The paper on which the copy is to appear is first dipped in a bath consisting of 30 parts of white soap, 30 parts of alum, 40 parts of English glue, 10 parts of albumen, 2 parts of glacial acetic acid, 10 parts of alcohol of 60°, and 500 parts of water. It is afterward put into a second bath, which contains 50 parts of burnt umber ground in alcohol, 20 parts of lampblack, 10 parts of English glue, and 10 parts of bichromate of potash in 500 parts of water. They are now sensitive to light, and must, therefore, be preserved in the dark. In preparing paper to make the positive print, another bath is made just like the first one, except that lampblack is substituted for the burnt umber. To obtain colored positives the black is replaced by some red, blue, or other pigment.

In making the copy, the drawirg to be copied is put in a photographic printing frame, and the negative paper laid on it, and then exposed in the usual manner. In clear weather an illumination of two minutes will suffice. After the exposure the negative is put in water to develope it, and the drawing will appear in white on a dark ground; in other words, it is a negative or reversed picture. The paper is then dried and a positive made from it by placing it on the glass of a printing frame, and laying the positive paper upon it and exposing as before. After placing the frame in the sun for two minutes the positive is taken out and put in water. The black dissolves off without the necessity of moving it back and forth.

Patina of Antique Bronce.

PATINA is called the compact green, blue or brown green coating forming upon copper and bronce by the influence of humidity and air, and consisting of basic carbonate of copper. The observation has been made of late years that bronce statues in large cities do no longer cover with this patina, but simply turn black, while in parks, away from factories, a handsome coating is still formed. Many alloys are more rapidly covered with this patina than others, especially those which contain much zinc, little lead, and no tin. The main originating cause, however, is a clean surface, to be produced by filing, polishing and pickling, and maintained by repeatedly washing with water. A monthly rubbing with olive oil is very good.

Artificial patina is produced by dipping the purified bronce into a mixture of vinegar and water, and exposing it for several weeks to the action of moist carbonic oxide; also, if the bronce is rubbed with a solution of 4½ parts sal ammonia, and 1 part bioxalate of potash, in 94½ parts distilled vinegar.

The modern imitated patina upon lamps, etc., may be produced by mixing carbonate of copper with the palest alcohol lac (sandarac or negative lac of photographers) and applying this with a brush upon the article. The green color remains in the hollows, and after drying, appears as patina. This method is very commendable for damaged articles with imitated patina. Carbonate of copper gives a bluish patina, verdigris (basic acetate of copper) a pale green. Medium colors are obtained by mixing both the preparations.

Proceedings of the Horological Club.

A Distinguished Body of Watch and Clock Makers.

Ninety-fifth Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the Circular for the next month.

NEW TOOLS—TOOL FOR SETTING RUBY PINS—BEAT BLOCK AND SCREW HOLDER.

Secretary of Horological Club:

Knowing that your columns were always open for articles that are of benefit to the trade, and thinking that perhaps I could suggest a few ways of making good and handy tools that are not in general use, in return for the many useful hints I have taken from your very valuable paper, I concluded to write. There are at present many nice tools for setting roller jewels, but I believe the one I have used for a long while, if made properly, is as good as any, and can be made in a short time. Take an old pair of tweezers, (mine are made of a pair of "A" tweezers), cut them off about ½ an inch from the end, take a small, perfectly flat disk of any kind of metal, as large, about, as a 3-cent piece, and solder or rivet on the *edge* of one prong of the tweezer, so that it is perfectly flat on top of the tweezer. Then take and drill a small hole up through the disk beside the prong of the tweezer, on the inside, then broach it out a little larger, and file a small notch in the inside of the other prong of the tweezer. Then, about an ⅛ or so back, drill out a narrow slot in the metal piece for the staff to protrude through, and, if made right, you will find you can set a roller jewel with ease. I think this is equal to any of the patent ones now in use, and answers to all purposes as well.

Another nice thing, not used by many jewelers, is a beat block. It is very handy, and does away with marking the balance, etc., etc. My beat block I make to also answer the purpose of a screw stand, when taking down Swiss watches. It is about as large as a half dollar, and stands on 4 legs about ⅜ inch high. In the center I drilled a hole large enough to let through the lower end of a staff, and then a little way from the center cut a slot large enough to just let a roller jewel through. Then you take out a balance that is in beat, and drop the staff through the center hole and the ruby pin through the slot, and mark where the hair spring stud comes, and do so with all the American makes, marking a line from the center out, and marking the lines to correspond to the makes. Then, when putting up a watch, put on your roller, drop your balance in the beat block, place your hair spring on so that the stud stand over the corresponding mark, and you have your watch in perfect beat every time, so far as the balance is concerned. Around the edge you can drill holes to hold movement screws. Anyone can make this in a few hours, and can make it to look quite ornamental if they care to do so. If this will be of any benefit to anyone, you can publish it. If not, I still will read your paper, and be ever grateful for the many No. 1 things of interest it contains for all interested in the craft.

Michigan.

Mr. O'Lever said that, as he understood the description, the roller was to rest on the outside of the metal piece, while the staff protruded through the oblong slot outside of the prong, and the ruby pin through the other hole, between the two prongs of the tweezers. If this was the case, then it was a mistake to file a notch in the inside of the *other* prong, as that should be left flat, in order to hold the flat of the ruby pin exactly at a right angle with the balance, without any special fitting or even looking at it. Omitting this notch, and leaving the prong flat and level, he thought it would be very handy for the purpose. The tweezers would be gently heated sufficiently to melt the cement, and the parts easily held in position till it cooled and became hard. The beat block also would save much time, when but few kinds of movements are ordinarily met with, or principally used there. But in large places, two or three blocks might be needed, as there are now so many different grades even in American watches. We shall be glad to hear from our correspondent again, and also from all others who have tools or attachments or ways of working which they think go ahead of "the rest of the boys."

ENAMEL FOR AMERICAN WATCH DIALS.

Secretary of Horological Club:

Can any member tell me the formula for the making of hard white enamel, such as is used in the manufacture of the dials upon American watches? I desire to know the ingredients and proportions.

Isca.

Mr. Waltham replied that it is a secret composition, which the American Watch Co. would not care to divulge. Many receipts for making the enamels commonly used have been published in The Circular at different times.

CLEANING WATCHES—SPECIMEN OF BOTCH WORK—HOW TO KILL OUT THE BOTCHES.

Secretary of Horological Club:

I have lately been looking over the back numbers of The Circular, (of which I have nearly seven volumes), and would advise all who have back numbers of any amount to look them over often, and they will, no doubt, find much valuable information that has been forgotten by them.

I am glad to see that so many are using old half-worn cotton for cleaning. In my opinion there is nothing to equal a soft cotton rag for cleaning mainsprings, or other parts that have an excess of oil.

We admit, however, that so far as appearance goes, it does not look very tidy to have a piece of our last years shirt on the watch bench, but, as Mr McFuzee truthfully remarked, in answer to "57" in the December Circular, "The proper test is not 'for appearance sake,' but how can we do this or any other job" most easily and quickly, and at the same time in such a manner as will be best for the watch.

My liquid for cleaning is Atwood's 95 per cent. alcohol, with enough Electro Silicon to give it a slight milky appearance, and is used by passing the quill of a camels hair brush through the cork of any convenient bottle in which the solution is kept, (an old mucilage bottle is good). Give the bottle a shake, pull out the cork and brush, apply a small quantity to the part to be cleaned, and brush very lightly with a soft brush. Don't file off the gilding with a stiff brush.

There being so little said about the botches of late, might lead some to think they were all dead, but such is not the case, and in evidence of that fact, I send a balance wheel, staff, etc. for your inspection. I had a customer who carried a very heavy watch with "P. S. B." movement. I had kept it in order for several years and flattered myself that it was in good order. He broke a balance pivot, and was told by a tramp jeweler (one who goes about from town to town, working in bar-rooms and saloons), that I had been robbing him, that I would probably charge him $1.00 for a new pivot, while he, (being honest), would do the job for fifty cents. He did it; afterwards the watch was brought to me. Besides beer stains and finger marks on the plates, I found a balance jewel broken, and the balance wheel and other parts as you see them.

Please examine this job carefully, and as I do not give the fellows name, he will not meet with violence at the hands of the Club. Of course you are at liberty to do what you please with the specimen sent, but let me suggest that they be kept in the ante-room to be used in harrowing up the feelings of candidates at your initiatory services. Or if any member of the club be troubled with unpleasant dreams, let him place it under his pillow at night, for undoubtedly such a job would give a nightmare the epizootic.

These tramps and botches are a terrible curse to this part of the country. However, they fill my shop with work, but it is very disagreable to undo their jobs, and seldom can the owner be made to realize the extent of damage done, and they often ruin a watch beyond redemption.

I will give a few facts to illustrate their abominable ignorance.

One came in my shop last week, saying that an English watch in his possession had run several minutes after the mainspring was broken, and that he could not possibly account for it. Another rivits the end of the mainspring in the barrel, and warrants it—"to never unhook." Another, who is now in Wisconsin, used to keep a magnet on his bench: "It was so handy to pick up small pieces." Another who is out with business cards and printed letter heads, propounds the broad question "are centennial watches hard to fix."

Morehouse.

The specimen was an expansion balance, staff, and table roller blackened with heat, the roller scratched with file marks, and a brass peg for a ruby pin. Mr. McFuzee objected to putting it under anybody's pillow, as he thought it more likely to give a watchmaker a nightmare, than a nightmare the epizootic. He thought the safest place for it would be "Ten-thousand leagues under the sea," where it could not harrow up anybody's feelings by the horrible sight.

The club has not forgotten the botches, for they cannot be overlooked as long as they continue to exist, as they leave their marks on every watch they handle, and not only disgrace the trade, but expose the good workman to the suspicion of trying to swindle his customer if he asks a fair price for making good the damages done by the botch. There are only two ways to get rid of botches. One is for the customer to prosecute a man who has damaged his watch, for cost of reinstating it. This can only be done when it has been previously kept in order by a workman of acknowledged probity and skill, who could swear that the parts damaged were in good condition when he last had the watch, and the owner could swear that it had been in no other shop except that of the botch. But this demands a cordial co-operation of watchmaker and owner, and the former is apt to think, under such circumstances, that as the owner went back on him, he may suffer the consequences. The other remedy is that suggested by Excelsior—to place within reach of the botches such information as they need, and educate them up into good workmen; then there will be no botches, except men who are too lazy or dishonest to do good work when they know how, and they will leave the business when they find themselves without company, and denounced by all the skilful workmen around them. The club is the more inclined to favor this method for the reason that the same publishing of information to improve the botches will also benefit workmen who are not botches. None of us know *everything* about the trade, and, if we did, there are new ideas and improvements coming up all the time. These we need to know, and the dissemination of this information is necessary for us, irrespective of the advantage to the botches. But when it is also instrumental in removing the curse of botch workmen, the beneficence of that plan must be obvious to all. We therefore ask all *good* workmen to exert themselves to increase the circulation of good Horological periodicals and books, as the most effective means of spreading information—and also to send in to such publications items of information possessed by them, which are not commonly known or are superior to the methods or tools generally used. Whoever benefits and elevates the trade also benefits himself as a member of it—and, if every one would do a little in that line, each would receive back a hundred times as much as he gave, for each would be instructed by all the rest. Those who can write complete and instructive articles on any subject will find the columns of THE CIRCULAR always open to them, and short articles, notes, or questions may be sent to the club. We shall be glad to receive them, and add to or explain them in such a way as to make them intelligible to our readers, or supply omissions or details which the writers perhaps overlooked from want of time. No matter how small the item is—if it is good it will be acceptable—if old, there is no harm done. Send them in, and the oftener the better.

PREPARATION FOR TESTING JEWELRY.

Secretary of Horological Club:

I send to-day, in care of Mr. Hopkinson, a sample of my preparation for testing low quality of plated jewelry. Please apply with a splint of wood to any base metals; copper, brass, German silver, or oreide, (so called), and you will find it will leave a black mark; applied to gold or silver, or rolled plate, (not polished through), it leaves no mark, much of the thin plate has been polished through to the base metal.

This will show such defects better than acid. You will do me and the trade generally, a favor if you will test the sample sent, and report in CIRCULAR.

I am intending to supply all demands from the trade with sample at 25 cents—enough to test thousands of pieces of jewelry, and save much annoyance to swindled victims, and all others not thoroughly acquainted with tests and appearance of low grades of jewelry. Such preparations will not be found for sale by dealers in cheap jewelry, for the simple reason that it would expose the quality of their wares. Advertisement of the above will appear in THE JEWELERS' CIRCULAR.

HENRY ROGERS, Sabula, Iowa.

Mr. Clerkenwell said that he had tested this preparation, and found it to operate as stated, but it did not seem to turn nickel, so far as he had tried. He had not had time to try it on low grades of gold, and observe its action with the different qualities, but it would probably depend on the nature of the alloy used. As Mr. R. had doubtless observed its action thoroughly, he could furnish buyers with statement of how it should operate with each different grade, and thus make it a very useful article for dealers to use when buying or testing goods.

WATCHES ADJUSTED TO POSITIONS—HOROLOGICAL LITERATURE FOR "OLD TIMER."

Secretary of Horological Club:

Does adjusting a watch to "positions" have any effect upon the *rate?* Is this adjustment, in the minds of the club, of *any importance* whatever?

Excelsior says (Practical Treatise on the Balance Spring, page 57), * * * * "The time required to accomplish a vibration is dependent upon its *extent*, and not at all upon friction"—and goes on to prove his theory, expressing surprise that any man of ordinary intelligence should think differently. Now, taking this theory as a fact, if a watch is *thoroughly* adjusted to Isochronism, I fail to see how adjusting to *positions* can alter the running of the watch, notwithstanding some of our watch factories advertise watches "Adjusted to positions," at a cost of, say $25.00, I have taken this position, and tell my customers who talk about "*A watch adjusted to positions*," that when a watch is isochronized it is *practically* adjusted to position.

If "Old Timer," (see club for March), would subscribe for THE CIRCULAR, (if he has not already—and there are some other papers published in America that would not hurt him), get "Excelsior's Treatise," "Saunier's Treatise," and a few other such works, and study them *diligently* for a year, he would be suprised at the amount he can learn, notwithstanding his 35 years at the bench—which however is a good thing to have around.

HAWKEYE.

Mr. Uhrmacher thought that our correspondent was, in one sense, correct, for if a watch was thoroughly isochronized it would not be affected by lack of adjustment to positions—at least, if the watch was clean and in good order. But he should remember that the adjustment to isochronism is not complete until it will cover all the irregularities and disturbing causes. Consequently, if the watch is adjusted to positions, so that the vibrations of the balance will be of equal extent in all positions, one great disturbing cause is removed, and there is so much less for the adjustment to isochronism to compensate for. If the position-errors were large, it might be entirely impracticable to isochronize the watch until they were in some degree lessened. If they are entirely removed, the adjustment to isochronism is so much easier to perfect. It is generally understood that "adjusted to isochronism" covers, not *everything*, as the words would imply, but only the action of the spring itself. Hence, any errors caused by poor fitting of the balance pivots, or of the escapement, are not considered as any fault of that adjustment. That is not what Excelsior regards as "adjusted to isochronism," for he looks at that adjustment as intended to cover all of those faults, as the ordinary signification of the words would lead anyone to suppose. And undoubtedly, a watch is not *really* isochronized until it does cover all those errors. But in buying watches, we must take trade terms with the meanings which the usage of the trade has given them. And, as before stated, although "isochronized" *should* cover all those points, it is not meant, commercially, as covering any more than such adjustment of the spring as would make the balance vibrations isochronous in the absence of any fault in other parts of the movement. That is to say, watch manufacturers understand the adjustment to isochronism as doing its own work, but not accountable for any of the other faults of the watch. Excelsior recognizes this fact, for he says plainly, in his book, that the adjustment to positions should precede that to isochronism, thus virtually declaring that his readers should not expect the latter adjustment to do the work of the former. Hence our correspondent is really and theoretically correct, but wrong according to the custom of watch manufacturers.

NEW POLISHING POWDER HOLDER.

Secretary of Horological Club:

I send you by express a watchmakers' "powder holder," or "polishing block," as they are now called. The old style consists of two or three plates with as many lids, one above the other, the different grades being mixed for use upon each plate. Those who have used the old style know what a nuisance it is to have to lay everything down, and take both hands to open the different lids of the old style box. In my powder holder I use a concave plate divided off in compartments—one for stone dust, another for crocus, and another for safferine, etc., or whatever is used. It can be mixed up ready for use, all on one surface, without danger of getting mixed, one with the other. The surface being concave, causes the oil with which the powder is mixed to gravitate toward the center. In this case you remove the lid, use one powder, then the next, and so on until your job is finished. There is also a groove around the edge of the plate, to prevent any particles of powder getting lost. Will you have the kindness to present this to the Club for their inspection, and after they are through present it to "Excel ior," as I desire in some way to show my appreciation of the incalculable benefits derived from the study of his articles on watch repairing.

I will also state that it has been patented, Dec. 6th, 1881. I would be glad to hear from some in the wholesale or jobbing trade in regard to handling this article for me. I design having them made of Spence metal, nickel plated, with glass plate and divisions.

Lancaster, Pa. H. B. WEILAND.

The Secretary then exhibited the new polishing block, which is well described in Mr. Weiland's letter. It is very neatly gotten up, the powders being held on a concave glass plate, divided into four parts by glass partitions meeting at the center. The whole is tight and solid, so that there is no danger of the powders getting mixed together, and lifting one cover exposes any or all of the divisions. When not in use, the cover can be squeezed on so tightly it will not come off even if overturned. The whole is quite tasty looking, and certainly very convenient. We hope Mr. Weiland may find a large sale for them, and give his address, so that jobbers may communicate with him. The Secretary then said that the box should be promptly forwarded to Excelsior, who would, undoubtedly, appreciate all its good points, as he was a great friend of all new improvements of every kind.

"METAL LAP FINISH" FOR PLAIN GOLD BAND RINGS.

Secretary of Horological Club:

Will some one of your honorable body be kind enough to explain the *modus operandi* of finishing and pollshing plain gold band rings, so as to *retain* the *square edges*, known as the "metal lap finish," and how the laps are charged with the polishing materials, such as rouge, etc., or any other information? Also, who we can get the metal laps from? K. & C.

Mr. Rolliver answered, you can buy a metal lap of any material dealer. Charge the lap with fine emery, number one. Rub it in by using a *perfectly* flat piece of hardened steel; lay the lap on a bench or table while charging it. After you have rubbed in a sufficient quantity of emery, put the lap to the lathe, and polish about one or two inches of it nearest the edge, by holding a flat piece of stone, such as agate or flint. Put the stone on a stick with cement and bear on the lap very hard, until you have polished it. You cut the gold with the unpolished part, and finish it with the polished part.

REMOVING MAGNETISM FROM WATCHES.

Secretary of Horological Club:

Will any of the members of the Horological Club be kind enough to inform me how to take the magnetism out of a watch after it has been magnetized, and greatly oblige, M. W. R.

Mr. Electrode advised Mr. R. to send it to L. & A. Mathey, New York. They are the only parties who make a specialty of destroying magnetism in watches. The electrical instrument used for the purpose is quite expensive. A method was explained in THE CIRCULAR for December, 1879, and January and February, 1880, by which a watchmaker who has a strong bar magnet and a magnetometer, can demagnetize a watch himself, but it is quite a long and tedious operation to do it in that way. It will be found more profitable to send it to the city at once and have it thoroughly done.

AGE OF AN ANTIQUATED WATCH.

Secretary of Horological Club:

A customer owning an old "bull's-eye" watch, silver case, carried by his grandfather, is anxious to ascertain, if possible, when it was made. Engraved on the movement is "Bullingford, London, 1674." Inside the outer case are four different papers; one being the arms of Great Britian, the others being respectively, "T. Terry, Clock and Watch Maker, Plain Gold Rings, Duplex, Horizontal, Patent and Repeating Watches Carefully Repaired;" "Henry Gooding, Watchmaker and Jeweler, No. 5, Dock Square, Boston;" "Church & Rogers, Fashionable Gold and Silver Ware, Fancy Goods, etc. Watches of all kinds Sold and Repaired, Main street, Hartford." On the back of this last paper can be deciphered, "Feb. 2, 1824." Will someone of your honorable body estimate on the age of the watch? F. A. M.

Mr. Clerkenwell said that Bullingford was a watchmaker in London in 1645, and was quite a noted workman in his time. There are but few watches of his make known. It has no especial value as a relic. T. Terry was in business in Boston in the early part of the present century, and the papers were probably inserted by watchmakers into whose hands the watch was placed for repairs.

REPAIRING A MAINSPRING BARREL—TO TELL IF BANKING PINS ARE SET CORRECTLY.

Secretary of Horological Club:

Will some of your honorable body please inform me of a practical method of repairing a mainspring barrel when the teeth are moved so as to cause catching and clogging, without putting in a new barrel? I know that the teeth are to be rounded up and then set the barrel nearer the center wheel, but my inquiry is *how* to do the work? A full explanation will oblige and instruct me very much. Am I to judge by the motion of the balance whether the banking pins are set correctly or not? P. C. T.

Mr. Horologer said that he could not, as a rule, advise such repairs of a barrel, unless the injury was slight. But as it is sometimes necessary, in a cheap watch, he would describe a method. In rounding up the teeth in a rounding-up tool, it is not advisable to put the wheel in the tool at once, because the cutters bear equally on both sides, and cut equally off the front of a tooth and the back of the next one, whereas we need most of the cutting done on the backs of the teeth, and only enough on the fronts to take off the corners a little and get the grooves out. If we cut an equal amount of metal off each, we mutilate the fronts, or else cut the teeth down so thin in the bodies that they are unsafe. Rather than do this, it would be better to file the teeth up by eye alone. Before attempting the final rounding with the tool, use a cutter with one safe edge, to reduce the backs only, so that the final rounding will have the same amount of metal to take off on both backs and fronts. It will then be safe to use the ordinary cutters to round up with. The selection of the proper cutters, to give a suitable shape to the teeth, so that they will work easily and not "cut" as they did before, is too large a subject to be explained in a few words, and Mr. T. should examine Excelsior's "Practical Hints" on gearings, where he will find the most complete and practical instructions yet published.

The method of setting the barrel nearer the center wheel is to move the supporting bridge, and alter the screw and steady-pin holes to secure it firmly in its new position. Occasionally, but only when the alteration is slight, the position of the barrel arbor in its bridge is changed—letting the bridge stand where it was before. But more often the steady pins have to be filed off, the screw holes solidly plugged up, the bridge moved up so that the main wheel gears properly in the center pinion and secured there, and new holes drilled in the plate for the screws and in the bridge for the steady pins.

The proper positions for them are carefully marked through the old holes, and the bridge is then loosened and removed. If the new steady pin holes would come at places in the bridge where they could not be allowed, then the bridge should be again secured in position and new holes for the steady pins drilled through the plate into the bridge, but not through it so as to mar the gilded surface. Then file a pin of hard brass with very little or no taper, fitted solidly in the bridge. It can be screw threaded if deemed advisable for security. Before finally driving or screwing it into place, file a notch around the point where it is to be cut off, which will prevent spreading the end with the cutting pliers. Then ream out the hole in the plate so that the pin will enter it easily, and fit snugly but not tightly. All this is considerable labor, and to do it well requires considerable time and skill.

The banking pins have two functions to perform. In the first place, they must be arranged to keep the point of the lever far enough from the edge of the roller table to prevent their touching, even when the movement is held so that the balance falls towards it. But the point must be so near the roller edge, or in other words, the lever should be long enough, that if the point should be jarred against the roller, it will not clog against it and stop or impede the balance. They also hold the lower fork in position to receive the ruby pin properly. The other function of the banking pins is to hold the lever in such a position when at rest against them, that the scape wheel teeth rest securely on the locking surface of the pallets—not deeply enough to cause laborious unlocking, nor so shallow that a little jar will shake the tooth off the locking face, and over the edge on to the driving face of the pallet. That is to say, the banking pins should hold the lever in the most advantageous position for the action both of the balance and the escape wheel. If the working parts are not properly made and fitted in, the banking pins will not remedy the fault, no matter what their position is, although they may palliate it. The only way to tell whether the banking pins are properly placed is to test the actions of the escapement. The motion of the balance may indicate the presence of a fault, but not its position, and it may be in many places besides in the banking pins To discover the exact nature of the fault may require a number of tests, which could only be described by giving explanations of the theory of lever escapements, to show how the parts should act, or what faults are present when the action varies in any way from the normal. Mr. T. should obtain the back numbers of THE CIRCULAR containing Excelsior's articles on the lever escapement. He believed there were four or five articles, describing the escapement and the methods of testing it for every kind of fault. If he wished works on the theory of the escapement, he could obtain Grossmann's Treatise on the Lever Escapement, the price of which he believed was $4 for the English edition—and Saunier's Modern Horology, price $15.

The Loose Roll in the Clock.

[BY C. H. SCHNEIDER, FURTWANGEN.]

AN OPINION is sometimes heard in the workshop by men charged with supervising weight regulators, that a clock weight increases the deeper it sinks, and at the end of the going time of a clock, it is heaviest. This will sound preposterous to anyone at all familiar with the elements of natural philosophy, and yet, whence this apparently unfounded opinion? The uneducated workman makes the observation that, for instance, an eight or fourteen-day regulator, at the end of its going time, sometimes sensibly loses time, and he also observes that the oscillation angle by the scale, has increased; and since he knows from experience that such a state of affairs takes place when the propelling power of the clock, consequently its weight is increased, he immediately jumps to the conclusion that one and the same weight must be heavier when nearly run down, than when wound up. If chance placed a book treating of the attraction of gravity or kindred subjects, into his hands, that the attraction is greatest immediately above the earth, and decreases geometrically from it, it will appear to him as clear as daylight that his clock weight, at the end of the clock's rate, must be heavier than at the commencement; but he only learned half his lesson, or does not take into account that this attraction, within the limits of a man's height, remains unaltered.

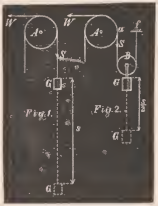
This workman is, by chance, thrown into the society of another, who also has suspended and attended to weight regulators, and in the course of conversation the latter is informed of the conclusions and deductions by the former. He, however, has also been an observer; he has manipulated regulators which did not lose, but gain, near the expiration of the going time, notwithstanding that the pendulum increased its angle of oscillation at the same time.

The preceding is not an imaginary occurrence, but is founded upon actual experience, to be made daily in clock factories, and it is impossible to convince these workmen of their error, which has been inherited from father to son. It will therefore not be entirely superfluous, perhaps, to enter somewhat into the details of these occurrences, and let us first treat of the instance when the weight hangs directly on the cord, in order to establish a mechanical principle, and to elucidate it.

"A weight will move uniformly downward if the mechanical labor thereby generated is equal to the labor consumed by the resistance, which is to be overcome by the sinking weight."

By mechanical labor, we here understand the product from a power, and the way taken by the direction of the power in its point of attack.

Let *A*, Fig. 1 be a chain or cord roll of the motion apparatus of a weight clock, and *G* the weight, suspended directly from the chain or cord, by which the clock is to be kept in motion, from which it may be presupposed that this weight moves uniformly downward. Further, let *W* be the resistance of the entire clock movement, reduced upon the circumference of roll *A*, and *S* the torsion created by weight *G*, in the chain or cord. If, now, the clock shall regulate, that is, that weight *G* shall uniformly sink, then the labor of *G* must be equal to the labor of the resistance *W*. If we designate by *S* the circumference of roll *A*, then by one revolution, weight *G* sinks by this amount *S*, and the points of attack of resistance *W*, and the tension *S*, accomplish the same distance on the roll circumference, to which they stand in the direction of a tangent. The mechanical labors of the three powers, *G*, *S*, and *W*, are equal to each other, wherefore



$$Gs = Ss = Ws, \text{ whence, } G = S = W.$$

That is: If by a clock with cord roll, the weight hangs directly on the cord, then the tension of the cord is equally large with the weight, and the resistance necessary to sustain the clock motion, upon the circumference of the roll, and to be overcome, is also as large as the weight, while this resistance again is equal to the cord tension. This deduction is independent from the height of the weight, and therefore (not considering the weight of the cord) the weight, in all its different positions of height, during the entire motion period of the clock, produces the same unaltering effect; wherefore the propelling power, reduced upon the roll circumference, remains unalteringly the same during the entire motion period.

This is mainly the reason why clocks, furnished with the arrangement drawn in Fig. 1, even if carelessly executed in detail, and by the use of small and light pendulums, with rapid and great oscillating angles, yet keep good time.

The weight hangs on a loose drum; the cords are parallel. If by such an arrangement of the motion apparatus, the cord roll, for instance, revolves once, and if *s* again stands for the circumference of the cord roll, the total resistance *W* of the clockwork, reduced upon the circumference of the cord roll, and the cord tension originated by weight *G*, accomplish the distance *s*, while weight *G*, from which the unwinding cord piece of the length *s* divides upon both parallel cord parts, only accomplishes the distance *s*-2, so that while the clock's motion for uniform downward motion of the weight, the mechanical labors of three powers must be equal, or $Gs\text{-}2 = Ss = Ws$, whence follows

$$\tfrac{1}{2}G = S = W, \text{ or } G = 2S = 2W, \text{ that is:}$$

If by a clock with cord roll, the weight hangs on a loose roll, and if the cord ends are parallel, then the tension of the cord is only half as large as the weight, and the resistance requisite for sustaining the clock motion upon the circumference of the cord roll, and to be overcome, is also only half as large as the weight, while the cord tension and the resistance are equal to one another. Or, reversedly, the weight is twice as large as the two equal powers, cord tension and resistance.

This deduction is independent from the height of the weight, and therefore (without reference to the weight of the cord), the weight causes at all times, in all its different positions, during the entire going time of the clock, the same unchangeable effect upon the roll circumference. This, however, holds good only while the cord ends remain parallel, with which is connected again the condition that the horizontal distance of the escape points *a*, of the cord upon the roll, and fixed point *f* of the cord are always equal to the diameter *B* of the loose roll.

We have in this case, at *A*, Fig. 2, supposed a cord roll. The above obtained conclusions are also of value if *A* stands for a cord drum, as long as the cord ends remain parallel; but they cease to possess this virtue, when this condition is no longer complied with; a circumstance which always occurs by the ordinary arrangement of the cord drum and loose roll, in the progress of the going time, because the distance of the points *a* and *f*, Fig. 2. changes, whereby the parallelism of the cord ends is annulled, and a changing inclination of the cord ends takes its place. What influence this exerts upon the operation, produced by the weight upon the circumference of the cord roll, we will endeavor to explain.

Alchemy.

[JEAN PFAFFRATH, *Journ. d. Goldsch.*]

BY THE name of alchemy is understood the art of changing baser metals into noble ones, such as, for instance, tin into silver, or copper into gold. The word alchemy comes from the Arabian *Cham*, the eye, this being the symbol of the secret, and chemistry penetrates into the hidden secrets of nature. *Al* is the article.

It may safely be assumed that gold is the oldest of all metals known to man, from the fact that it often occurs in a metallic state, and, stranger to say, is found in almost all parts of the globe. As gold is easily beaten and fashioned, not attacked by the common oxides, rust, verdigris, etc., it was from early stages adopted as standard for money. From this period forward, the cravings of man were directed upon its possession, as not alone purchasing the sustenance of life, but exchangeable as an equivalent for all its luxuries and enjoyments. Hence forward, the motto was, Gold; to obtain it was the sole object of all acts and deeds of man; gold was the enchantive rod, by the possession of which, everything could be accomplished; gold was the powerful ruler, before whom humanity bowed; gold purchased all desires upon earth, and with gold, blessedness of the future state itself could be purchased; gold was the theme of the poet, the preacher, the king, the beggar, and it is no wonder that the desire arose to produce it artificially.

It is probable that the conception first arose in the artisans of the races of antiquity, who observed that an alloy differing in color, texture, grain, etc., could be produced from two metals, say, for instance, copper and tin, from which arose a goldlike mass. According to the ancient and universally spread tradition, Hermes Trismegistes is said to have been the thrice greatest of all the founders of the Black Art. But doubts exist as to who he was. Some believe him identical with King Siphoas (2,000 years B. C.), others assume him to have been a son of the god Anubis (equal to Mercury of the Greek and Roman mythology); he generally is set down as a sage and high priest, 2,500–2,700 B. C. He is said to have written more than 36,000 volumes on the alchemic and magic sciences, to have been the inventor of the gold test on the touchstone, invented the alphabet, and several other useful sciences. His name has been preserved up to the present day, for instance, *hermetical*. Whether he was a tangible or merely an imaginary personage cannot now be decided, at any rate, all fables and traditions point to Egypt as the cradle of alchemy.

The alchemists, also called adepts, called all metals "sick gold." The further its properties were removed from those of gold, the "sicker" they were. Copper was not as sick as tin, and silver was almost well. For curing the infirmity they thought it necessary to have a material, a panacea, that must contain the primary substance of all things, whereby it had the power to dissolve all other metals into their primary components. If the metals could be decomposed at will, they might also be recomposed at will, and the missing ingredient, characteristically belonging to gold, either by melting or in any other manner, might be supplied to any other metal, in order to transmutate it into the genuine gold. This primary substance of gold was called the "stone of the sages," "lapis philosophorum," "menstruum universale," the "Great Elixir," the "Great Magisterium," the "Red Lion," the "Red Tincture," the "Philosophers' Stone." It was imagined to be a preparation of a compact body and red color, and if only the smallest particle were added to another fluid metal, it cured its infirmity and changed it into genuine gold.

Some of the adepts also took the word "sickness," in its real meaning, and deemed the philosophers' stone to be a universal panacea curing all diseases, retaining the body in health and strength, and prolonging life to the hundredfolds of its natural limits. Hence it is often called the Panacea of Life, and Potable Gold, *aurum potabile.*

In every epoch and nation, if it arose to any eminence, we find Alchemists; the Spaniard, under Pizarro, found them even among the Peruvian priests.

From Egypt, it went to Greece; although history has preserved the name of no Greek adept; and in common with all sciences and arts, it soon made its way to the Romans During the time of the most senseless luxury under the tyrants, when all the treasures of the world were wasted recklessly at Rome, gold was often wanting, and the pretended discovery of the transmutation of metals was hailed with joy, by which gold was promised in boundless proportions. Emperor Caligula, 37–41 A. C. instituted such experiments. Diocletian, 285–304 A. C. on the contrary, ordered that all books treating on the art of goldmaking should be burned. Since, however, the persecution of an idea, always contributes to spreading it, we find alchemy flourishing about this time. The suppression, however, effected that the adepts enveloped their science in a mysterious fold, they called themselves the "hermetical chain," and in aught bearing on their art expressed themselves in mysterious representations and language. At a subsequent date, the alchemists found it of advantage to retain this secretmongery, in order to shroud their secrets from the vulgar.

The signs and names used by them to designate the seven old metals, were as follows:

Gold, ☉ Helios.	Silver, ☽ Selene.
Mercury, ☿ Mercurius.	Copper, ♀ Venus.
Tin, ♃ Jupiter.	Lead, ♄ Saturn.
Iron, ♂ Mars.	

Which symbols have been retained in metallurgy until the present day.

About this time also arose among the adepts the so-called Theurgy, that it, the power, by mysterious ceremonies, to summon the departed, and to press them into service, when the master could compel the spirit to reveal to him all secrets, especially the preparation of the Philosophers' stone. To do this, the most horrible crimes against the life of a fellow-man was often committed, the quintessence requisite for this ceremony was human blood; because it was even then well known that "blood is a peculiar juice."

After the destruction of the Roman Empire, the art flourished in the Byzantine. Later, it was adopted by the Arabs, who, together with other sciences, raised it to a high standard. The first Arab who wrote of alchemy, was the doctor and chemist Geber, in the eighth century, in whose works already occurs a method for mercury preparations. The most celebrated of all Arabian alchemists was

Lullus; according to his system, all metals consist only of sulphur and mercury; correctly proportioned, all metals might be composed of these two ingredients—also gold (not alone Zinnabar).

During the middle ages, the monks were often occupied with alchemy, although it was forbidden by the Popes; the Franciscan friar, Berthold Schwarz, as is well known, in one of his alchemical experiments, invented powder. But we find adepts even among the Popes; John XXII., and many churchmen high in authority, dabbled in the goldmaker's art. Among the temporal ruler, also, we find seekers for the Great Magisterium, Rudolph II., German Emperor, 1576–1612. In general, the adepts found their warmest supporters during the middle ages in the both great and small potentates, for the simple reason that they always found themselves in a chronic state of impecuniosity, and thought to obtain the much coveted prize quickest through these alchemists. What of it, if, after having been disappointed by them, they should deal out summary punishment—the rack and the gallows. Thus the adept John F. Böttcher, druggist, was kept imprisoned by his Saxonian ruler, and barely escaped death, when in place of the philosopher's stone, he discovered the Meissen porcelain. Frederic I., of Prussia, caused an alchemist, because he was not successful in the transmutation business, to be suspended from a gallows decorated with gold paper.

The most celebrated adept of the middle age was friar Basilius, a monk, living in Erfurt, in the 15th century. His system rested upon salt, sulphur, and mercury, (*sal, sulphur, et mercurium*). In the 16th century we find the celebrated Swiss doctor, Paracelsus; in the 17th, Beuther, in the court of August I, of Saxony, sharing the fortunes of most of the alchemists, who entered into princely service. He was tortured, maimed, and imprisoned for life. The Dutch Dr. van Helmont, who, in the enthusiasm for the art, christened his son "Mercurius," who also died an adept in 1699. Dr. Helvetius, who was at first a bitter enemy to alchemy, but finally died one of its most devoted followers. Kunkel, who discovered the ruby glass and phosphorus, and many others might be named.

The researches, extending over 4,000 years, of these adepts have led to the most important discoveries and inventions in the field of chemistry, technic, and medicine. The first raised the condition of the people, and the latter has reduced sickness and disease to a minimum, and prolonged life, therefore the Philosopher's stone has been partly discovered, but in another form than was imagined by the alchemists.

There may have been many frauds and pretenders in the guise of alchemists, a few really are said to have been able to transmutate baser metals into gold, for instance, a stranger caused such a transmutation in presence of Helvetius, who thereupon changed his opinion. That there were as many cheats among the adepts as history records, is undoubtedly one of its well known lies; a person who lived as retired as they did, only in communion with and in pursuit of his idea, with but few necessities, like the majority of the adepts, is generally no cheat and swindler.

The Manufacture of Diamonds.

THE periodicals of both hemispheres, toward the beginning of 1880, contained the notice that a chemist, James McTrar, from Glasgow, Scotland, had succeeded in producing diamonds artificially. Samples had been submitted to the test of experts. They were said to be pure diamonds, although very small, yet very beautiful. The rumor spread and entered the portals of the Académie des Sciences, of Paris. Dispatches were interchanged between the *savans* and for at least a week the deception could be indulged in that at last the "philosophers' stone," the problem to make diamonds, had finally been discovered. "Sweet was the dream, but bitter the awakening." The jewel, to be a pure diamond, must before all else, consist of pure, crystalized carbon; but the products of Mr. McTrar, as it appears, are silicates, combinations of silicic acids and many bases, wherefore they pertain without farther ado to the glass jewels, strass, etc.

Barely was McTrar with his artificial diamonds dispatched, when the Academy of Paris received a dispatch, on the 27th of February: "Royal Society of London. Last meeting in Burlington House. Mr. Hannay has just now succeeded in artificially manufacturing diamonds."

Twice in less than one month! and by two Scotch chemists. Singular coincidence!

Again a deception? No, this time it appears to contain a germ of truth; at least, it contains traces worthy of credence; nevertheless, we publish the information with all moral reservation. Hannay at least has shown the success of his researches to the Academy. We will endeavor to give a synopsis of the most essential parts of his procedure.

Diamond, as well known, is crystalized carbon, and the experimenter endeavored, in common with his predecessor, to find a dissolving agent for carbon. It is well known that a mineral, once dissolved, by simple evaporization of the dissolving fluid, precipitates in crystals. In common with his predecessor, Hannay met with no success, and he started from another basis.

Certain bodies, indissoluble in water at ordinary temperature, such as silicic acid, alumina, oxide of zinc, etc., dissolve in superheated steam. Why should not a steam or a gas be found, which, at a high temperature and extraordinary pressure, dissolves the carbon, and acts in the same manner as steam does on silicic acid or alumina? Hannay experimented with a great number of gaseous dissolving agents, and submitted charcoal, graphite and soot to its influence. Vain endeavor! Meanwhile, another chemist, Stokes, gave him an idea, which caused him to change his method.

Graham has shown by ever memorable experiments, that certain metals, especially palladium, platinum, etc, if brought to a high temperature, acquire the peculiar property of absorbing extremely large amounts of hydrogen; many chemists go so far as to believe that this absorbed hydrogen even partly combines with the metal. Again, there are other gases which are formed by a combination of carbon and hydrogen, for instance, illuminating gas. Now, would this combination be of utility if these gases were heated under strong pressure, in presence of correctly chosen metals? Would not the metal absorb the hydrogen, and the liberated carbon deposit in crystals upon cooling? This is the experiment tried by Hannay.

He took a wrought-iron tube, capable of great resistance, with extraordinary thick walls, open at one end, closed at the other. By the open end he introduced compressed carburetted hydrogen under the extraordinary pressure of several hundred atmospheres, and beside a compact nitrogen combination, for the purpose of facilitating the partition of the carbon. The tube was then exposed for several hours to a dark red glow-heat. After cooling, the apparatus was taken apart, the tube sawed open, and there were found, according to the assurance of Hannay, numerous crystals of carbon, real diamonds.*

Really, no grave doubts need be entertained that those samples exhibited to the Royal Society were not real carbon crystals, of a handsome and brilliant white. They exhibit all the peculiarities of a diamond. Maskelyar, the scientific director of the British Museum, examined them, and has no doubt as to their composition, and his view has been fully supported by Professor Roscoe, of Manchester. The crystals have the characteristic octahedron form, the same hardness, have no influence upon polarized light, and are not attacked by boiling acids. Heated in an electric current, they become black; burned in pure oxygen, they gave 95 per cent. of carbon upon analysis.

Maskelyar at first was prepared to doubt, not the composition of the crystals, but the genuineness of their origin. The samples are very small, and do not weigh even $\frac{1}{10}$ karat; they are fragments—broken

* The process described by the English periodicals, appears to us developed in darkness. To all appearance, the carburetted hydrogen decomposed at the temperature to which the tube was heated. The hydrogen, at this temperature, escaped through the iron, and the carbon deposits on the walls inside. Similar trials have often been made in France in the laboratories of Henry Deville and Berthilot, while experimenting with said gas.

pieces, explained by the author that they doubtless became broken by the violent blows necessary to part them from the tube. Upon desire of several chemists and Spottiswoode, the President of the Royal Society, it has been determined that Hannay should repeat his experiments, and to suspend any judgment until then.

This is the present state of affairs. Even if not fully justified to conclude that Hannay has produced real diamonds, it would be equally unjust to deny his success, and it is best to await further results.

The crystals are microscopically small, and their value does not rise beyond five or six francs; to obtain them, more than 150 francs have been expended, wherefore, the process is neither practical nor cheap. It is a test, an experiment, a research, from which everything may be expected. Is not everything possible to science? The great Massachusetts statesman, Charles Sumner, said once that he was afraid to state where the limit of the possible ended and that of the impossible commenced. The first step has been taken in the production of diamonds by artificial means; the genius of man, that loves to grapple with the most difficult questions of Nature, that seeks to read the hidden laws by which the universe is governed, will add a second, and a third, and a hundredth essay to that of Hannay.

Aluminum.

[H. Busch, Hull, *Journ. d. Goldschm.*]

ALUMINUM is a white metal, between silver and zinc in color, and, in elaboration, is both malleable and ductile, but must often be re-glow heated during rolling and drawing into wire, in order to preserve its ductility.

The specific weight of the metal is 2.5 after being cast into bars and compacted; it increases to 3.7 after hammering. Its point of fusion is between silver and zinc. The pure metal suffers no change in humid or sulphurous air, and when alloyed with silver or copper, it resists the influence of the atmosphere better than pure silver or copper, or alloyed with other metals. Cold nitric or sulphuric acid barely attacks the metal, and heated acids only to a small degree, but it is easily dissolved by concentrated chloric acid. It is not, whatever, changed by the vegetable acids, and, therefore, is peculiarly suitable for kitchen and table utensils, and is at present much employed for this purpose in France.

The minerals from which metal is extracted are found in greater proportions than that of any other metal; it is contained in almost all aluminous earth, (clay), but is chiefly obtained from fluor spar and chrysolite, by admixture of salt and soda.

Aluminum was first obtained by Sir Humphrey Davis; in too elementary a form, however, to be of utility. Professor Wöhler experimented with it afterward, and succeeded, in 1827, to precipitate it in the shape of a gray powder, and to shape it into little balls. The greatest merit, however, is due to M. St. Clair Deville, in Paris, whose method has been patented by M. Rousseau Frères and M. Paul Morire, and manufactured by the Société anonyme de l'Aluminium, which furnishes the metal in bars at 130 frs. per kilogr.

The metal is fused without addition of melting powder or flux, and can be cast in molds, either for further elaboration or ornament.

The difficulty of soldering it has hitherto prevented its being generally employed; in the customary manner it is very difficult to let the solder flow between the joints, which, however, can be overcome in a very simple manner, by permitting the solder to first spread upon the article, then joining the two pieces, and resoldering, when the solder of the two pieces will unite and produce a good joint. After soldering, the articles are laid in diluted sulphuric acid, which, however, must not be heated. A good solder for aluminum is prepared of 4 parts copper, 5 parts aluminum, and 90 parts zinc; the copper is melted first, the aluminum is added, together with a little tallow, and when perfectly fused, the zinc is added in small pieces, rapidly, however, and before casting, it is well stirred with an iron rod. It is advisable to heat the zinc in an iron pan above the fire, since, when added in a cold state to the fluid metal it cools it, and impedes a thorough mixing.

The metal may be filed, scratched, engraved and turned like any other; it is advisable, however, by scratching, engraving and turning, to keep the tool well moistened with turpentine, in order to produce smooth cuts and lines. The surface takes a fine polish, and rolled sheet may be pressed into any desired shape. It may be ground with tripoli and red, or polished with the polishing steel, by using a mixture of olive oil and rum. A peculiar manner to give a ready-made article a pleasing appearance, is to dip it into a mixture of equal parts of nitric and fluor acid, and to rinse it at once in cold water, by which process the surface becomes finely grained.

Aluminum may, like any other metal, be galvanic gilt or silvered, and on the other hand, may be used as coating upon any other metal, and the preparation for this purpose is effected as follows: To a saturated solution of alum in water, is added in small quantities, a saturated solution of sal ammonia, or hartshorn, whereby a filling of alumina is generated. The precipitate is placed upon a filter and washed, then dipped into a neutral solution of cream of tartar and potash, and the solution evaporized; the residue is redissolved in sulphuric acid and put into a cool place, whereby the solution crystalizes. These crystals are dissolved in water, and the fluid for galvanizing is ready. No cyanide of potash is necessary for this solution. Any battery may be used for galvanizing, and as anode, either a piece of rolled steel aluminum, or a linen bag containing above alumina, is employed. The cleaning of articles must be done in very diluted potash or soda solution, as strong solutions readily attack the metal, and even consume it.

The notable peculiarity of the metal is its specific weight, in consequence of which it is adaptable for use as material for weights, in the chemical laboratory and metallic institutes; it possesses another remarkable property—its high sound; a suspended bar, struck by a hard metal, sounds like glass.

Aluminum alloys with most metals, but in practice is profitably employed with silver or copper. With from five to ten per cent. silver it gives a very white metal, suitable especially for casting small ornaments, which, since it well conforms to the mold, and is less attacked by oxidation than pure silver; however, the metallic ductility of these metals is lost, and it cannot be hammered. A mixture of equal parts of aluminum and silver gives an excellent alloy for galvanic silver plating, as it is much cheaper than pure silver, possesses the same white color of silver, and is only attacked very indifferently by a sulphurous atmosphere. The alloy of 10 parts aluminum and 90 parts copper is extensively used, and produces the so-called aluminum bronce This alloy has a specific weight of 7.7, is as hard as steel, malleable, can be rolled and drawn into thin wire, has the color of 18-karat gold, and is very suitable for jewelry, as it resists the influence of the air better than any other base metal. Many experiments have satisfactorily established that it may with advantage be used for wheels, escapement parts, clicks, pivot holes and many other purposes, in horology, immediately after steel, resisting the effects of wear.

Aluminum is at present much used for nautical, philosophical and optical instruments, especially for glass settings in opera glasses; also spectacles and eye-glasses are manufactured from it.

The use of aluminum for watch wheels, owing to its light weight and handsome color, is said to be very commendable, and trials have been instituted.

Rolled into thin leaves, it is largely used for ornamenting bindings of books and all sorts of fine leather ware. It also serves as coating to iron which is exposed to wind and weather, as it retains its natural color without varnish. In a pulverized state, it is used for bronzing, and pyrotechnics, for the production of pale blue flames. Several firms in Germany are at present engaged in producing it in large quantities.

The Sultan's Treasury.

THE American ministers to Turkey and Austria, General Wallace and Mr. Phelps, "received permission—now very rarely granted—to inspect the Imperial Treasury, and were suprised at the amount of treasure in the vaults and the great number of precious stones displayed. There were forty officials in attendance," the dispatch went on, "who opened the locks with many formalities." Not the least curious of the anomalics to be noticed at Constantinople is the existence of this treasury, perhaps the richest in the world, while at the same time the Government is hopelessly in debt—bankrupt to all intents and purposes. Mr. Dwight, in his "Turkish Life in War Time" gives an interesting description of a visit to the Imperial Treasury at Constantinople, which is situated within the inner court of the Seraglio, in one of the heavy stone outbuildings of the ancient palace. One going thither from the city must pass through three massive walls ere he enters the court where stands the treasure-house, a building of dull gray stone roofed with lead, and having a single door of massive iron. A low, arched doorway leads to the interior, two connecting chambers, each about eighteen feet square, heavily vaulted and lighted by small windows with strong iron gratings. Round each room runs a gallery, and the wall space to the ceiling is occupied by glass cases, while in the center of each apartment is a large glass show-case. There is a guard at the outer door, and at intervals of four or five feet all round the walls stand sentinels, mute and motionless, all clad in the everlasting black broadcloth and red fez, introduced by the last of the great Sultans, Mahmoud the Reformer. One gallery is occupied with effigies of the Sultans, each in the robes and jewels and armor of the monarch as he lived. The dresses are mostly of silk brocade and cloth of gold, and many of the figures are weighed down with jewels and magnificent arms. Prominent among them is Mohammed II., the conqueror of Constantinople, who left the mark of his bloody hand high up on the piller of what is now the mosque of St. Sophia; the hilt of his dagger is a single emerald, two inches long and half as large. All the figures save two wear the turban bedecked with diamonds, the exceptions being little Osman II., butchered in his boyhood, and Mahmoud the Reformer, whose effigy is the last in the list. He appears in European broadcloth, with the red fez; the head-covering, however, being ornamented with a plume of bird of paradise feathers, caught up by a great spray of diamonds. Two thrones are in the outer room. One that of Nadir Shah, of Persia, is of fine, dark wood, delicately inlaid with pearl and ivory, and having a canopy of the same material, from which is suspended a great golden ball, decorated with precious stones. The other is about as splendid and uncomfortable a seat as could be devised. It is a platform about two and one-half feet square, with a cushion of cloth of gold, embroidered with rubies, diamonds and pearls. Around three sides of the cushion is a low rail supported by miniature columns and standing some eight inches high; it is of gold studded with clusters of rubies, and the whole throne is covered with plates of gold. In one cabinet is shown the state cradle of many sultans, which stands low on its rockers like those still in use in the East. The two ends rise a foot above the mattress, and are connected at the top by a bar running lengthwise as a support for a curtain. The whole is of solid gold, crusted on the outside with pearls, diamonds, rubies and turquoises. It would not be possible to describe in detail the contents of these rooms. "There are," says Mr. Dwight, "antique arms and armor, heavy with gold and jewels; there are innumerable horse-trappings and saddles, covered with plates of gold and studded with emeralds, rubies, topazes, diamonds and pearls; there are saddle-cloths embroidered with precious stones. Several sofa covers hang in the cabinets as background to the smaller articles, they are worth $150,000 apiece, and are of heavy cloth of gold embroidered with seed pearls." There are bird-cages of gold, some with clocks face downward, at the bottom; sacks of velvet embroidered with gold and pearls and diamonds; "samplers" of red velvet on which texts from the Koran are embroidered in diamonds; amber mouthpieces for pipes studded with diamonds and rubies; vases of crystal, agate and onyx, many enriched with jewels; inkstands and snuff-boxes innumerable, coffee-sets, tea-sets, knives, forks and spoons of solid gold, with jewels on their handles; an immense array of clocks; fans beyond counting; umbrellas of white silk, exquisitely embroidered with gold and having for handles, matchless sprays of coral a yard long; tea-sets of tortoise-shell as thin as paper. Mr. Dwight describes one toy—"a figure of a Sultan seated on his throne under a golden canopy ribbed with alternate rubies and emeralds, the whole structure being perhaps six inches high. The body of the figure is a single huge pearl; the lower extremities are carved from a blue turquoise, and the turban is a solid mass of diamonds." "After every conceivable use has been made of the jewels, the surplus unmounted stones are gathered by handfuls into crystal bowls," in one of which are three uncut emeralds, the largest the size of a man's fist, and the smallest as big a sa hen's egg. During the late war the Government pledged some of its jewels to the banks for a loan of $30,000,000. The bankers removed to their own vaults precious stones of value sufficient to secure the loan fully, yet the contents of the three small boxes left no appreciable gap in the great accumulation. Such is the treasure-house of the bankrupt ruler of a ruined nation. The Commander of the Faithful, it may be added, has at his disposition, under certain circumstances, a still more remarkable accumulation of wealth. This is the "Treasure of Islam," the offering of gold and silver deposited by many successive generations of pilgrims to the three Holy Places—the Caaba at Mecca, the vaults of the Mosque of Soliman at Jerusalem and the crypt of the tomb of Ali at the gates of Bagdad. The funds thus collected are designed solely for the defense of Islam in its extremity, and their guardians would yield them for no other purpose. According to tradition a Persian emperor during the sixteenth century, undertook to obtain possession of the treasure of the Tomb of Ali, but the force he sent to despoil the shrine was miraculously hindered, the soldiers' legs being stiffened almost intostone, so that they could not approach the sanctuary, and the spirits of the air, controlled by Soliman, are fabled to have concealed the treasures at Jerusalem during the occupation by the Crusaders. A contemporory calculator has placed the rate of accumulation at $600,000 a year, and the total value of the funds at $600,000,000; but these figures are by less enthusiastic authorities regarded as largely beyond the truth, and it is added that on several occasions in modern times the Sultan has drawn upon the funds for war expenditures. Nevertheless the "Treasure of Islam" must amount to many millions of money.

Roman Sun Dials.

THE ancient Romans and Greeks possessed sun dials which they wore like our modern watches. Such a one was found in the year 1776, near Rome. Unhappily, from having been buried for so many years, it has suffered greatly, and its description can only be approximate. The entire watch consists of a bronce circular disc, ⅓ inch thick and 3½ in diameter. Two concentric rings are fastened upon it, and are intersected by an equator and meridian. Two other diameters are drawn thus that each cuts a segment of 25° with the equator. Each of these segments again is divided into six equal parts, and each such part into two parts, whereby both segments are divided into twenty-four parts. Doubtlessly, they represented the six morning and six afternoon hours. At about three-fourths its length from the center are found remnants of what once may have been the gnomen. The meridian of the watch was set in correspondence to that of the place, by arrangements no longer discernible. To determine the hours not alone for Rome, but also for all Roman provinces, by means of this watch, the names of the latter are given on the lower surface, together with an opposite figure of an exactly determined place; for instance, opposite to Africa, XL.; Syria, XXXVIII.: Babylon, XXX ; Germania, L., etc. The meaning of these figures can no longer be determined from the construction of the dial.

Foreign Gossip.

—Zurich, according to the city directory of 1882, has forty-two watchmakers and watch stores. Of these, four are wholesale dealers.

Old Watchmaker.—One of the oldest watchmakers of Paris, Mr. Fatton, a former journeyman of Bréguet, lately died there at the advanced age of 84 years.

Ophir.—A German geographer is of the opinion that the diamond mines of South Africa are the celebrated Ophir of the Bible from which King Solomon obtained his gold and precious stones.

Swindle.—A Swiss manufacturer lately received an order by letter from Constantinople, signed Maalif Pasha, for a gold watch and chain to the value of 1,100 francs, but upon further inquiries it was found that no such person exists.

Patent Laws.—Both Turkey and Siberia have patent laws at present, and a patent may be obtained even in these two countries on liberal terms; they were heretofore deemed as standing at the lowest grade of civilization. Again are the states of Switzerland and Holland distanced.

A New Horological School.—The horological industry has received a great impulse in the Jura, Switzerland; several projects are on foot tending to perfect its products, and to ameliorate the condition of the workman. The project is agitated of instituting a school of horology at Porrentruy and l'Hopital, in the Canton Bern.

Motive Force.—A company in Paris at present supplies motive power to small shops and families by means of vacuum. It has already constructed a line of about 700 meters, and furnished force to several small shops. A powerful machine, with air pumps creating a vacuum of about three-fourths atmospheres, furnishes the exhausting power.

Telephone.—While the telephone does not meet with its full deserved success in Europe, the Chinese have seized upon it with great avidity. The circumstance that each Chinese word has a separate word sign hindered the *queued* inhabitants of the flowery kingdom from using the telegraph, but the telephone, on the contrary, also speaks Chinese!

Neuchatel.—A Swiss watch manufacturer some time ago was sued for fraud, having sold a 7-karat gold watch case for 14-karat. Six watch case manufacturers from Locle were present as witnesses, and acknowledged freely and openly that this species of fraud had existed for years, and they could not understand why suits should be instituted for such a trifle. The manufacturer was sentenced to one month's imprisonment.

Revue Chronometrique.—The *Revue Chronométrique*, Cl. Saunier, author of the Treatise of Modern Horology, chevalier of the Legion of Honor, editor, comes to our exchange table, greatly improved and enlarged. We congratulate our old friend upon his successful encounter with his enemies, and would counsel them to ponder well over the weighty words of their illustrious countryman, Richelieu, that "The pen is mightier than the sword." Exit *Chambre Syndicale*, enter *Revue Chronométrique*.

Reckoning of Time by Chinese.—Little note is taken by the Chinese of the flight of time; they date their common events by "the year of the great snow storm," or "in the night that the white cow was born." Larger towns have sun dials, and the hours are sounded on large drums at the principal places. The mandarins and well-to-do people have lately affected not one, but a pair of watches, of the costliest Switzerland or France is able to produce; a child born at eleven o'clock, December 31, 1880, is, at one minute past twelve, one year old; he was born in 1880, *ergo*, he must be one year old in 1881.

Professional Schools.—Paris counts at present four large schools, in which young boys having an elementary instruction, may acquire a trade. Each day, the children, aged from eight to nine years, pass several hours in the shops, and, beside, are taught theoretical principles, designing, and modeling. The Municipal School of Apprentices, at Villette, offers the opportunity to boys of the age of thirteen or fourteen, to choose a profession best adapted to their tastes and capacity. For this purpose, they may, during the first year, change from trade to trade, without troubling themselves about material ruined, and at the expiration ot twelve months, are required to make their final choice. This plan of study consists of five hours per day devoted to instruction, and six hours passed in the shop. It is difficult to imagine a better system for obtaining superior and intelligent workmen.

Find of Money.—In Wernigerode on the Harz an interesting find of money has been made, while renovating an old church. The walled-in charity box has often enough been emptied, heaven knows, having been constructed in 1220, but it was not detected that a crack had sprung across the bottom, through which a large percentage of the offerings had dropped into the masonry underneath. When taken out lately, a large amount of money was found underneath the box, partly consisting of coins of which not even a specimen or a knowledge had been preserved.

New Free Schools in Paris.—A French paper gives the following list of new free schools to be opened in Paris: In the course of the present year, several new schools for apprentices will be opened. The programs have been prepared, and the necessary funds voted, and nothing else remains but to find a suitable locality, which most certainly should not be hard to find. The schools are five in number, and will be as follows: 1. Apprentices' school for the furniture industry; 2. For building; 3. For mathematical instruments; 4. For teaching young girls the art of housekeeping and professional duties; 5. A school for natural history and chemistry.

—The request of the Swiss Confederate Council, directed to the European governments, for a congress to establish an international standard of the noble metals, as well as a general stamp, has been refused by Austria, Hungary, Germany, England, France, Italy and Russia. It is indeed a pity, as the use of 6, 4, and even 3-karat gold grows from year to year. The "really genuine" gold trinkets consist of 1 part gold and 7 parts alloy, and must sometimes even be gilt, to appear as if gold; in spite of their cheap price, they are still paid for too high by the purchaser, and are eminently calculated to injure the conscientious manufacturer very seriously.

Professional English Instruction.—Great efforts are at present made in England to raise the standard of professional instruction. The government has nominated a special commission to personally examine the methods pursued in other countries. This royal commission presided over by Mr. Samuelson, M. P., commenced work in Paris, by visiting the School of Apprentices of the Boulevard of Villette, the School of Horology of the Faubourg du Temple, and the Communal Schools of Trades. After having visited the superior and inferior technical schools of Paris, the commission will go to Chalons, Lyon, Rouen, etc., and next visit Germany, Belgium and Switzerland in the spring, and, if possible, the United States next fall.

Pearl Necklace.—The famous pearl necklace once owned by Empress Eugénie, now is the property of Countess Henckel, one of the richest ladies of Europe. One of her ladies, in company with the imperial widow and two ladies, sold them to an English jeweler, and the Countess Henckel purchased them for 360,000 frs. She had a few of the less beautiful pearls removed, and added two other rows; one of which came from the jewels sold by the Queen of Naples, the other from the necklace of the Virgin of Atocha—and sold by a famous Spanish nobleman. The pearl necklace, as it is at present, together with earrings and brooch, is worth between 800,000 and 900,000 frs., and held to be the finest collection of pearls in the world.

Expositions for 1883.—The *Revue Chronométrique* says: We have received from Mr. E. Agostini, Commissioner General, several documents relating to the exposition to be held in Amsterdam, the capital of the Netherlands, from the month of May to October, 1883. We would state that the colonies of the Netherlands are peopled by about 25,000,000 of inhabitants, and a new and large market is opened for our manufacturers.

At Bordeaux, also, will be opened on the first of June, a general exposition of agricultural products, industry and industrial and ancient arts. Watchmakers who wish to compete should hurry up; we are afraid it is a little late, already. In any case, they might direct an inquiry to Monsieur le Président de la Société philomathique, premier adjoint au Moire de Bordeaux, rue du Chateau-Trampette, 8.

French Competetive Prizes.—Prize Pierret, 500 frs., to any watchmaker who shall have made a pocket watch or mantel clock; also 300 frs. for such a production of second class. They must either be distinguished by some originality or handsome finish; until September, 1882.

Three medals, gold, silver and bronce, for a new watchmakers' turning tool, capable of being propelled either by drill bow or fly wheel, to be easily mounted and dismounted, and to be in all respects, solidly and well constructed, to serve as companion for the traveling watchmaker. No nationality is mentioned, and it suffices to send a drawing well elucidated.

The *Société d'Encouragement* offers a prize of 1,000 frs. for the best dissertation on American watch manufacture.

Kindly read the last volume of The Jewelers' Circular and Horological Review, and remit us the money at once.

Workshop Notes.

—The teeth of the anchor scape wheel of watches should receive a litte oil. By steel forks, many watchmakers give a little oil to the ruby pin, to prevent the rusting of those steel parts; none is given, however, to those of aluminum, bronce, brass or gold.

—To obtain gold from old watch plates, take equal quantities of saltpeter and borax, and dissolve in a small quantity of water. Next glow-heat the gilt pieces and plunge them into this solution. By repeating this several times, the gold will loosen and precipitate in the fluid.

Good Cement.—Stir to a thick batter with silicate of soda, 12 parts Portland cement, 6 parts slaked lime, 6 parts fine sand, 1 part infusorial earth. Very excellent for marble and alabaster. The cemented object need not be heated. After 24 hours, the fracture is firm and the place can with difficulty be found.

Sweaty Hands.—Immerse your hands in freshly drawn well or spring water, and leave them therein until chilled; the evil of perspiring hands may thus be removed in about two weeks. The gentleman who recommends above treatment says that he has handled polished steel on the hottest summer day since, without even leaving the imprint of his fingers thereon.

—To color iron and steel brown, dissolve in 4 parts water, 2 parts crystalized chloride of iron, 2 chloride of antimonium, and a trifle of tannic acid, and apply this mixture with a cloth or sponge upon the surface, then let it dry. Repeat the application, according to the depth of the color desired. This coating fully protects the steel against humidity. The chloride of antimonium should be as little acid as possible.

Protection of Polished Brass.—To protect polished brass against dimming, it must be coated with a transparent varnish. Such a one consists of 1 part white shellac and 5 parts alcohol; or, 1 part shellac, 1 mastic, and 7 alcohol; or, 8 parts shellac, 2 sandarac, 1 Venetian turpentine, and 50 parts alcohol; or, 12 parts sandarac, 6 mastic, 2 elemi, 1 Venetian turpentine, and 64 alcohol. The articles, before being varnished, must be well cleaned, and no more be touched by the hand, and heated to about 75° C.

To Perforate Glass.—To perforate glass by electricity, Fayes, (*Chem. Ztg.*), makes a sheet of hard caoutchouc, 18 cm. long and 12 cm. broad, for a battery of 12 cm. spark, runs a brass wire through it, and fastens it with a screw. The wire end he moistens by a few drops of olive oil, places the glass plate upon it, and passes the current conduit of the other pole over the glass. The spark is then permitted to pass through the glass. By drawing the glass plate slowly over the caoutchouc, many small holes, closely situated together, are obtained, and the glass may be broken in their direction.

To Protect Steel.—After having cleaned the iron or steel article, anoint it with a solution of wax in benzine, using a fine camel's hair brush. By this treatment, articles exposed to acid vapors, may be protected against rusting, tools, etc.

Another coating may be made if the steel or iron is covered with a layer of a mixture obtained by boiling sulphur with turpentine oil; this evaporates and leaves the sulphur upon the surface as pure sulphur, which again combines with the metal and forms sulphuret of iron, by heating the articles, if small, over a gas or alcohol flame.

Lyons Gold, or Tomback.—According to Prof. Dr. Böttger, Frankfurt, brightly scoured or polished copper articles, if immersed in a boiling concentrated solution of caustic soda, in which so-called tin grey, that is, finely powdered metallic zinc were boiled for some time, with an excess of the former, in the alkaline zinc solution, becomes coated with a mirror-lustrous layer of metallic zinc. If an article thus coated, in a dry state, is dipped into olive oil, heated to from 120° to 140° C., or sand of the same temperature, the zinc coat will unite with the copper base, and produce the gold-colored alloy known by the name of tomback, or Lyons gold.

Cleaning Mat Gold Articles.—For cleaning mat gold articles that have become blackened by exposure, I would recommend a solution of 60 grams carbonate of soda, 30 g. chloride of lime, 15 g. table salt, and ½ quart water. It is best to restore the luster either of bright or mat gold.

Another recipe gives different proportions: 80 grams chloride of lime, 80 g. bicarbonate of soda, and 20 g. table salt; dissolve these ingredients in 3 liters distilled water. For cleaning an article, lay it into a porcelain dish, cover it with the fluid, and if difficult to clean, heat the latter; next rinse in alcohol and dry in sawdust. The fluid used is no longer good. Store the remainder for use, in glass bottles.

Business Notes.

Mr. E. Aug. Neresheimer sailed for Europe April 12th, in the steamer *Maine.*

Mr. J. Guntzberger, of Guntzberger Bros., sailed for Europe April 15, on the *Germanic.*

Mr. Veith, of Oppenheimer Bros. & Veith, sailed for Europe on the *Germanic* April 15.

Leopold Weil, of Messrs. Leopold Weil & Co., will sail for Europe May 6 in the *Britannic.*

David Marx, of the firm of Marx & Weiss, of this city, sailed for Europe on the steamer *Elbe*, April 26.

Wm. Trier, of Trier Bros., of this city, will leave for Europe in the steamer *City of Berlin* about May 13.

H. C. Haskell has added to stock this season a complete line of silver jewelry, comprising many novelties.

Max Freund, of the firm of Max Freund & Co., and his brother Henry Freund, left for Europe on the 24th ult.

Mr. F. Kroeber, the well-known clock importer and manufacturer, will make his usual annual trip to Europe early in May, in search of novelties in his line.

F. I. Marcy & Co., makers of the celebrated Acme Lever Button, have opened a branch office at No. 26 John street, where a full line of samples may be found.

John A. Riley, of John A. Riley & Co., sailed for Europe in the *City of Rome*, April 22. Mr. Riley has been overworked for some time, and a rest is demanded for the recuperation of his physical energies.

J. B. Klune, of Sacramento, Cal., is one of the most enterprising and prosperous business men in that city. He carries a large, clean and carefully selected stock of jewelry, and his store is the resort of the *élite* of the city.

Alfred H. Smith & Co. have removed from their office No. 170 to 125 State street, Chicago, in the Marshal Fields building, corner of Madison street. They will carry an extensive stock of fine diamonds which cannot fail to satisfy the most critical buyers.

Mr. Leroy W. Fairchild shows in his advertisement in this number of The Circular, cuts of his new patent Ready Writer Fountain Pen, which is one of the most convenient pens ever put on the market. The ink flows freely, and unlike the stylographic pens, enables the writer to shade.

Alfred H. Smith & Co. have leased offices at No. 182 Broadway, which they are fitting up in a most attractive and convenient manner for the requirements of their extensive business. Before the next issue of The Circular, they will, doubtless, be comfortably settled in their new quarters.

Louis Herzog & Co. have purchased the building 52 Maiden Lane, which they will convert into desirable offices for jewelers, as soon as some of the existing leases expire. The trade has been gradually extending towards William street, and will soon entirely occupy both blocks between Broadway and that street.

P. Gottesleben, of Denver, Col., is erecting a very commodious and beautiful store in one of the best locations in that city. Mr. Gottesleben is a gentleman of culture and refined taste, and is noted as being one of the most artistic and careful buyers that visits this market. He has been prospered in his business at Denver, and his new building is put up with the surplus he has acquired, and does not in any way embarrass his business arrangements. He will move into his new quarters about June 1.

The following named firms will remove to their new business homes on or about May 1st: R. M. Tripp & Co. from No. 4 Maiden Lane to 658 Broadway; Bliss & Dean from 24 John street to 194 Broadway; Reichhelm & Koester, from 67 to 80 Nassau street; Louis Herzog & Co., from 33 to 52 Maiden Lane; M. Ginsberg, from 14 John to 66 Nassau; Churchill, Lewis & Co., from 180 to 692 Broadway; Goldsmith & Kuhn, from 35 Maiden Lane to 66 Nassau; E. Howard Watch & Clock Co., from 2 Maiden Lane to the corner of Nassau and Maiden Lane, under Randel, Baremore & Co.

E. F. Bowman, of Lancaster, Pa., is about to give up his retail business, and will confine himself in future to an exclusively jobbing trade. He could have sold out his retail business to good advantage, but preferred to allow his competitors to absorb it gradually, to placing another rival in the field. Mr. Bowman is well known in the trade as an enterprising and pushing business man, and his new departure will be watched with interest, accompanied by best wishes for his success. W. Thompson, who has long been in the employ of Mr. Bowman as a watchmaker, will open a store in that town for the purpose of carrying on the business of watch repairing.

Trade Gossip.

New bracelets represent gold beads.

Herman Levy sailed for Europe on the 22d ult.

A turtle of sardonyx, set with diamonds, makes a fashionable breastpin.

Holtmann & Schien, manufacturers of cases and trays, succeed Wm. Dahlem.

A silver fly with wings of Rhine crystals and ruby eyes, on a golden leaf, is a late design in hairpins.

The firm of Wilkinson & Lennon have dissolved by mutual consent. J. D. Lennon will continue the business.

The kitten and the serpent in silver, with diamond or rococo jewel enameling, are favorite designs for all kinds of ornaments.

One of the prettiest mock jewel brooches is a harp of silver set with crystals and mock rubies, with twisted golden strings.

A very elegant clock has been placed in the Executive Chamber in the new Capitol, at Albany. It stands about ten feet high.

The associations of working jewelers are holding meetings in New York and Newark, with a view to demanding increased compensation.

The numerous friends of Mr. A. C. Titcomb, of San Francisco, will be pained to learn of the death of his wife, and the sympathy of the trade is extended to him in his bereavement.

The business outlook on the Pacific Coast is regarded as unusually promising. There have been abundant rains, so that the prospects for a good crop of everything produced on the western slope are unusually bright.

Three employés of the American Watch Company, of Waltham, were recently convicted of stealing watch material from the rooms in which they were employed in the factory. The arrests caused much excitement among the 1,800 employés of the Company.

G. W. Hewitt, of Greenville, Pa., has been having an auction for the purpose of closing out his business. Col. J. Rutherford, of Philadelphia, has conducted the sale, whose eloquence, together with the attractiveness of the goods offered, made the sale quite a success.

One of the latest and most pleasing designs in rings for gentlemen is called the Prince Albert. It is certainly a showy and elegant setting. They are made in a great variety of shapes, and include stones of all kinds. The novelty of the setting is especially attractive and artistic.

A paper watch has been exhibited by a Dresden watchmaker. The paper is prepared in such a manner as to render the watch as serviceable as those in general use. Attempts have been made in this country to establish watch companies made of paper, but the schemes did not work.

The Executive Committee of the New York Jewelers' Club held a meeting Saturday, April 8th, elected officers, and divided the Committee into sub committees, to make arrangements for the entertainment of the New England Jewelers' Club of Providence, which will take place early in July.

C. H. Smith, late of the firm of F. I. Marcy & Co., died at his late residence in Providence, March 26th, of consumption. The deceased was an indefatigable worker and universally popular with the jobbing trade, with whom his firm largely dealt. His remains were taken to Hartland, Vermont, for interment.

We have again to caution the trade against imitation turquoise that have of late been hawked about the market. They are a close imitation of turquoise, but soon turn to a greenish white. They are absolutely worthless. We have received many complaints regarding these imitation goods, and we warn the trade accordingly.

With somewhat curious taste, a jeweler in Middlebury, Vt., has constructed a clock containing a representation in miniature of the scene of the assassination of President Garfield. The automata are of wood, about two inches high. The whole movement, which includes the execution of Guiteau, takes about three minutes.

Col. A. Andrews, an enterprising and well-known jeweler of San Francisco, recently gave an elegant banquet to leading members of the trade and his principal customers, to commemorate the tenth anniversary of his establishment in business in that city. Col. Andrews is possessed of great energy, good business tact, and a thorough knowledge of the business, and has, consequently, been well prospered. The banquet was a notable event, complimentary and congratulatory remarks being made by a number of the distinguished guests. Among those present was W. A. Weil, representing E. Aug. Neresheimer, of this city, and several representatives of the trade in the west.

A $900 diamond pin and a Waltham watch and gold chain, stolen by Jesse James from Ex-Gov. Burbank, of Dakota, have been returned to that gentleman since the assassination of that notorious outlaw. These things were taken by James during the robbery of a railroad train eight years ago, and were found among his effects after his death.

A meeting of the watchmakers of San Francisco was recently held in that city, with a view to agreeing upon a uniform scale of prices for work, similar to that adopted by several of the western state associations. This is one of the best things accomplished by these associations, and the scale adopted by them may well serve as a basis of charges to be made by watchmakers in every city in the Union.

Mr. Faulkenau, formerly of the firm of Faulkenau & Pollak, died in Maderia recently, after a lingering illness. Mr. F. had retired from business, and has been living abroad for a number of years on account of declining health. He was one of the oldest chain makers of this city, and had an excellent reputation in the trade. He was an affable, courteous gentleman, and had a large circle of friends. A wife and several grown-up children survive him.

Henrichensen & Greenburg, of Portland, Oregon, are among the most enterprising and progressive dealers on the Pacific Coast. They carry an excellent stock of attractive goods, are industrious and are highly spoken of by travelers as courteous and affable gentlemen. It is rumored that Mr. Greenberg is about to desert the ranks of the loved ones, and join the great and growing army of matrimonial martyrs, having surrendered to the charms of one of Portland's fairest daughters. Congratulations are in order.

Mr. Schwartz, a clothing and dry goods dealer, of Fort Madison, Iowa, who also kept a lot of cheap watches, clocks and jewelry, was recently robbed by some bold burglars. The goods were abstracted from show cases, where they were left loose and unprotected. Had Mr. Schwartz confined himself to his legitimate occupation, he probably would not have been robbed, but his cheap jewelry proved too great a temptation to the thieves. Mr. Schwartz does not meet with that sympathy that would be extended to a regular dealer.

An amateur was chaffering about the price of a table service in Dresden china. "But it is much too dear! There is not a single piece in it which has not been mended." The dealer has his answer pat. "My dear sir," he says, "why that is the very thing that makes the set valuabe. This is the table service that Bonaparte broke when he kicked over the preliminaries at Leoben!" The amateur, a little taken aback by this thrust, says: "Are you perfectly sure of that?" "Certainly I am. Would you like the same service without its being mended? I have that also."

A valuable ring, set with twelve one-karat diamonds around a ten-karat ruby, has been seized by the Custom House authorities, for alleged non-payment of duty. The ring is said to have formerly belonged to Ex-Queen Isabella of Spain, and its estimated value is $10,000. The ring has been in the hands of several jewelry merchants in this City, who have found it difficult to secure a purchaser, there evidently being just now no great local demand for ten-thousand-dollar finger rings. The duty on the ring is 25 per cent. of its valuation of $10,000. If the jewels had been imported unset, the duty would have been but 10 per cent.

The Jewelers' League of the State of Texas has just been organized, with a membership of between 100 and 150 retail dealers. The list embraces the names of some of the best firms in that section of the country, and comprises more generally the leading dealers of the state than any other of the state associations. With such an auspicious beginning, the Texas League should be a power in the trade for good. Its object is similar to that of other state associations, being for the protection and advancement of the interests of the retail trade. We wish the organization every possible success, but caution it to be careful from the first about letting schemers get control of the organization, or using it for their individual profit.

Louis Bowden, with J. B. Bowden & Co., is not only a genial gentleman, but one of the luckiest travelers on the road. While at Cincinnati recently, there was a raffle got up for a very handsome clock, the tickets being mostly taken by commercial travelers who were present. When the drawing was held, Louis proved to be the lucky winner of the clock, but when search was made for him, it was found he had left the city. This was a grevious disappointment to the "boys," but they were not to be deprived of their consolation for the inner man. Obtaining a bill-head of Duhme & Co., a bill for "refreshments," to the amount of $7.50 was duly made out and sent to Louis. Supposing it to be legitimate, he sent the money to the firm in payment, when the joke was discovered. The refreshments were participated in by those who enjoy a good thing, and while Louis' clock is going, that $7.50 is irretrievably gone.

Lace pins are assuming more eccentric designs than ever in Paris. The latest novelties are groups of birds, such as half a dozen diamond swallows in full flight, or a pair of ruby or emerald humming birds chasing a diamond butterfly. A diamond poodle in the act of leaping through a hoop studded with sapphires and rubies, is a popular device, as is also three mice, with bodies of a single black pearl, pursuing each other along a bar of gold. Any one of these delicate trifles would make a suitable bridal present, or a pleasing Christmas or Easter gift from a young man to his latest love, always supposing that he was of a liberal turn, and had a good balance at his banker's.

The fashion for wearing jeweled garters has spread so rapidly that jewelers all keep the article in stock, and are very expensive. They are designed to match the tint of the dress worn with them. In one case two heart-shaped clasps of colored gold, inlaid with cross-bars of turquoises and pearls, joined the ends of a scarlet band with little frills of silk along the edges. The price was $100. A pair with two oval clasps of hammered gold, perhaps an inch in length, could be bought for $48, while the cheapest pair, with plain gold clasps, was $46. A pair just completed are worth $1,200. On one side the lady's monogram is worked in pearls, and on the other the coat-of-arms, with frosted storks' heads, a crest of delicately carved gold, and a motto set in chip diamonds. It was a present from a mother to her daughter, who is to be married soon.

Actions for breach of promise are so rare in Germany that when one does occur it is interesting to read the details. A Miss Constance Kirschner recently brought an action of this kind against her faithless swain, a goldsmith named Mr. John Fundel, in which she sued for the fulfilment of his promise, or, alternatively, damages to the amount of £150. In the present state of the law in Germany, the court could not award the fair plaintiff any pecuniary compensation, but the defendant was formally adjudged to be guilty of breaking his promise, and, further, legally bound to marry his betrothed. This judgment having been duly communicated to all the matrimonial courts in the empire, Miss Kirschner has the satisfaction of knowing that if her truant lover will not marry her, he cannot marry any other lady in Germany.

The Wisconsin Retail Jewelers' Association will hold their second annual convention at Waukesha, July 12th. It is already known that there will be an unusually large attendance of dealers present, and as they are also invited to bring their wives with them, for the purpose of having a pleasant social reunion at the close of the convention, the affair will be of special interest We are pleased to note the inauguration of the social feature in the meetings of the state associations, for it is one that heightens interest in the proceedings, and lends an added charm to the friendly intercourse usual on such occasions. We advise every dealer in the state to be present; and if he hasn't got a wife, let him take his sister; and if he has no sister, let him fasten on to some other fellow's sister, and thereby contribute his share to the social feature of the occasion.

The large jewelry establishment on East street, North Attleboro, Mass., owned by E. K. Dunbar, of Boston, and the heirs of the late Stephen Richardson, was destroyed by fire on the morning of the 5th ult. The flames were discovered at 5 o'clock in the north wing over the engine room. The following is a list of manufacturing jewelers who were completely burned out: Stephen Richardson & Co., Thomas Totten & Co., Schofield, Aston & Co., Somes, Bodge & Christy, F. S. Bailey & Co., Clark & Coombs, J. J. & J. M. Richards, and Marsh & Bigney. The following are the losses: On building, engine and boiler, $30,000; Stephen Richardson & Co, first floor, $30,000; Marsh & Bigney, fourth floor, $7,000; J. J. & J. M. Richards, $30,000; F. S. Bailey & Co., second floor, $10,000; Somes, Bodge & Christy, basement, $10,000; Thomas Totten & Co., first floor, $17,000; Clark & Coombs, third floor, $5,000; J. W. Richardson, $500, and Schofield, Aston & Co., $4,000. Other minor losses have been sustained. About two hundred and fifty jewelers are thrown out of work. It is now ascertained that besides an amount insured in New York, policies aggregating about $30,000 had been insured through the home agency of H. M. Dagget, Jr., divided among the following companies: Queen, Guardian and Phœnix of England; Providence, of Providence; Orient, of Hartford; Watertown, and Manufacturers' and Builders' of New York; Union, of Philadelphia, and Firemen's and Union, of California. The whole amount of insurance on the building, stock and tools is in the neighborhood of $80,000. A later examination makes the losses and insurance as follows: Thomas Totten & Co., loss $20,000, insured for $11,000; Stephen Richardson & Co, loss $150,000, insurance $75,000; J. J & J. M. Richards, loss $25,000, insurance $15,000; Schofield, Aston & Co., loss $15,000. The contents of all the safes were found uninjured.

The Watchmakers' and Jewelers' Guild of the United States will hold its annual meeting in the parlors of the Julian House, Dubuque, Iowa, on May 10. Members of the Watchmakers' and Jewelers' Guild doing business where no state organization exists, are earnestly requested to attend if possible, as matters of great importance to the trade will be brought up for consideration and action. Should any delegate be unable to attend on account of sickness, he will please notify the Executive Committee of his state, and they will appoint someone to fill his place. Any retail jeweler desiring to join the association, where no state association exists, can do so by sending $2 with his business card, to Joseph Baker, Secretary, Rock Island, Ill.

I. W. Freidman, of L. & M. Kahn, of this city, had a little adventure in a railroad car in Missouri, lately. A big, drunken bully of a cow boy from Texas entered the car, blustering and swaggering, and using much profane language, to the disgust of the lady passengers. He finally planted himself in a seat behind Mr. Friedman, and amused himself throwing his feet about in a loose and offensive manner, and spitting tobacco juice all about him. The passengers were indignant, but could do nothing. Finally the Texan threw his feet on Mr. Friedman's overcoat, whereupon that gentleman arose and gave the cow boy a severe thrashing, after which the conductor came along and ejected the loafer. Mr. Freidman was congratulated on his straight-out hitting from the shoulder.

Lying unticketed in a miscellaneous jumble of watches, rings, lockets, and trinkets, in the window of S. L. Newberry's jewelry store in Newark street, Hoboken, is a big and clumsy silver watch, the rims of whose cases are studded with big gold knobs. On the back in fine script is this inscription in French: "In remembrance. Lafayette to his dear friend Wayne, General of the Federal army, Fredericksburg, Va., June 5, 1781." "Is that watch one which the Marquis de Lafayette presented to Mad Anthony Wayne?" a reporter asked of the jeweler. "It is," he replied. "Gen. Wayne's daughter Mary, if I am not mistaken, lived with a family named Coles, in Moorestown, N. J., below Philadelphia, and, dying there, left this watch. A school teacher secured it and sold it to me. I have been offered $400 for it, but think it is worth more."

The annual meeting of the Providence Jewelers' Club was held at their new rooms, Nos. 15 and 16 Wilcox building, at 8 o'clock, April 3, President Walter Gardiner in the chair. Messrs. J. S. Haskell, David A. Ray, G. E. Adams and A. Vester were elected regular members, and Mr. Charles H. Swords an honorary member. The treasurer reported $274.92 in the treasury. The resignations of Charles T. Cheney and G. E. Luther were accepted. The report of the executive committee showed that nine business meetings had been held, 64 regular members and 23 honorary members had been elected, and the names of three members had been stricken from the roll, and four others had resigned, and that two assessments had been made during the past year. The committee on the revision of the constitution and by-laws reported, and the matter was taken up and voted upon in sections. The name of the club was changed to "The New England Manufacturing Jewelers' Association." All the jewelry manufacturers in the New England states, and all the members of kindred trades are eligible to membership Sec. VI of the by-laws provides for a base ball club which shall consist of twelve members of the association. A set of rules for the governing of the rooms was adopted. They provide that no intoxicating liquors shall be brought or used in the rooms, or that any gambling shall be allowed. The rooms are not to be kept open after 12 P. M, excepting when the business of a regular meeting is not settled at that hour. No amusements of any description are to be indulged in on Sundays. Residents of Providence, not members of the association, will be admitted to the rooms between the hours of 9 A. M. and 6 P. M., on Mondays only. The annual meeting was fixed for the first Monday in April, and the other meetings for the first Monday of each month. The annual election of officers then ensued, and resulted as follows: President, Alfred S. Potter; Vice-Presidents, Wm. H. Luther, Dutee Wilcox; Secretary, John A. McCloy; Treasurer, R. S. Hamilton, Jr.; Executive Committee, Geo. B. Champlin, Thomas W. Manchester, H. H. Howard; Hall Committee, Wm. H. Luther, E. A. Potter, H. S. Dorchester; Manager of Ball Club, Benj. L. Hall. President Potter was escorted to the chair and returned thanks for the honor conferred upon him. A vote of thanks was extended to the retiring President, after which the association adjourned until Monday, May 1st. The new rooms of the association are complete in every appointment and have a very bright and cheerful aspect. The association is entirely distinct from the merely social jewelers' clubs which exist in that city, and was formed for the advancement and protection by unity of action of the manufacturing jewelry trade of Providence and adjacent manufacturing towns.

THE

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

The recognized organ of the Trade, and the official representative of the Jewelers' League.

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A Government vs. a Guild Stamp.

ON ANOTHER page of this issue of THE CIRCULAR will be found a letter from John E. Boynton, who has been an earnest worker in establishing state associations of retail dealers. He was also instrumental in the organization of the National Guild, and has been active in furthering all reforms effected or contemplated by these various associations. In his letter he gives the reasons why the retail dealers of the west desire goods manufactured under the protection of a Guild stamp. These reasons may be summed up in the statement that the retail dealers desire to have a class of goods made for them of an improved quality, and which cannot be obtained by persons who are not members in good standing of some one of the state associations. This would be well enough, provided it was permitted to all manufacturers to make the goods required by members under equal conditions. But this is not so. The leading manufacturers of flat plated ware, for instance, have been ignored, and the contract for making this class of goods awarded to a company but little known. A stamp to designate such goods has been devised and patented, so that no one but the Guild can use it. The leading manufacturers of this class of goods, who have spent years of labor in perfecting their work, and have millions of dollars invested in the business, are not going to give up their trade at the behest of the state associations. They will reach the public in some way, and if they cannot do it by means of the dealers who are members of the associations, other mediums will be devised, and, if necessary, the war will be carried into the camp of the association members. In such a fight, the associations would undoubtedly go to the wall, for their members are largely dependent upon the manufacturers. Mr. Boynton says these associations have about 1,000 members, which is scarcely a twentieth part of the whole number of dealers in the country. Those dealers who are not members, and who cannot, consequently, buy the Guild stamp goods, will be only too glad of an opportunity to run an active competition with those who are members, and whenever the large manufacturers deem it necessary to enter into such competition, there will be lively times for those who rely upon the Guild stamp for their salvation. The other manufacturers will cut the prices, and pit their reputation and their well-known goods against the stamped articles, flood the towns and cities where the association dealers do business, and supply the demand for such goods at prices far below what the association goods can be sold for. As we have before said, the manner pursued in the adoption of the Guild stamp is likely to lead to a bad feeling between dealers, which will be shared by manufacturers, resulting in an unhealthy competition that will be disastrous to the dealers. The manufacturers in general will not consent to be discriminated against in favor of a single company, nor to lose their trade without a bitter fight, and that fight will be precipitated just so soon as discrimination begins. It is because the method adopted does make just this discrimination that THE CIRCULAR is, in the interests of the dealers, opposed to the Guild stamp. When we first suggested the idea of such a stamp, it was under the impression that wisdom would sit at the councils adopting it, and that prejudice and favoritism would be excluded; that a stamp indicative of quality would be adopted, but that it would be left for manufacturers generally to use it, if they were so inclined, upon compliance with the requirements of the Guild. But in giving a single company the exclusive right to use such a stamp, virtually excluding all other companies from competition in goods bearing the Guild stamp, the Guild has shown its incapacity to deal with the subject in a broad and liberal manner, and we, therefore, advise the abandonment of what has been done thus far, regarding the action taken, if persisted in, as promising disaster to those dealers who attempt to abide by it.

Mr. Boynton argues that the adoption of a government stamp of value, which we have advocated, while it would be a protection to the public, would not be a benefit to the retail dealers. As it is evident that Mr. Boynton does not fully comprehend our proposition, we will restate it. We desire to have Congress enact a law defining, first, the standard of pure gold. Suppose this to be 24 karats, as in England. Then to declare that any goods alloyed below 12 karats shall not be regarded as gold goods, but shall be sold as base metal; that all goods alloyed with gold—whether above or below 12 karats—shall be stamped, where possible, in legible characters, showing in karats the quality of the gold they contain; that where it is impossible to stamp them, a certificate of quality shall be given by the seller, and for this purpose, an ordinary bill naming the quality shall be held to be a certificate; then heavy penalties, involving fines, imprisonment and confiscation of goods, should be provided for infractions or evasions of the law. With such a law in force, all "skin" goods would be driven from the market, for the inducement for their manufacture lies in the ability to sell them for a better quality than they really are; the profit in them consists in their being a medium for perpetrating frauds and swindling the public, and in this transaction the retail dealers are frequently made *particeps criminis*, and are without redress. It is true that goods bearing a government stamp would be accessible to all comers, but those persons who now handle the cheap goods would not want them; they would still cling to the cheap goods, leaving to the jeweler that which properly belongs to him, and from which he should never have been tempted to depart, the sale of goods having an intrinsic value as well as artistic worth. They would then be jewelers in fact, and not mere hucksters of trash, that may be found as well in the furnishing goods house as in the cases of the jeweler. Such a law enacted by Congress would draw a broad line of demarkation between jewelers and hucksters—between dealers in honest goods and sellers of brass finery and gilt watches. The sooner such distinction can be made, and the public taught that when they want jewelry that is honest they must go to a jeweler for it, the better it will be for the retail dealers. Look at the condition of the retail dealers to-day, with their shelves loaded down with goods of all qualities, and some without any quality. How are they estimated in their communities? Dealing in cheap goods, that the barber and the hardware dealers carry to catch the eye of the verdant, they are classed in the same category, and rated as men who handle any kind of goods for a profit. A jeweler should be something more than this; a dealer in works of art, and goods of ornament and use, that have an actual value in the quality of the materials of which they are composed. His goods should be of standard quality, and such as he can stake his reputation upon. To-day, if he selects a gold ring from his case, and ventures to warrant it as 18-k. fine, because it is so stamped, he is not sure but it will be thrown back on his hands to-morrow, with evidence to prove that it is but a filled ring. and such gold as is in it but 12-k. fine. Suppose such a case to occur, where will he obtain redress? Under a national law, as we have suggested, the person of whom he bought it would be liable to a criminal prosecution. It is the introduction of cheap "skin" goods that has brought the name of jeweler down from the reputable position it once held to the level of a peddler of brass finery. The sale of genuine artistic goods, possessing intrinsic value in the genuineness of the metal and gems of which they are composed, never brought discredit to any man, but when it once becomes known that a dealer carries cheap, imitation goods in his stock, those that are genuine are regarded with suspicion, and he is obliged to make the explanation that "these are real diamonds," or "this is real gold." When all goods having a pretense of gold about them are put on the market at their actual value, and it is made a criminal offense to misrepresent their quality, the dignity of the trade will be greatly advanced, and individual dealers will command the respect of their fellow citizens in a much higher degree than they now do. We regard such a national law as entirely feasible, and believe the times are ripe for an attempt to be made to secure such legislation. If ever such an attempt is made, it will be found that the only ones opposed to it are those engaged in misrepresenting the quality of their goods, and making their profit by swindling the public.

A Proposal for Standard Time.

THE CIRCULAR has frequently called attention to the importance of securing standard time that should be uniform in all parts of the country, and we are gratified to know that a bill has been introduced in the lower house of Congress, having this object in view. The bill, which was referred to the Committee on Commerce, proposes to appropriate $25,000 for the purpose of sending time signals once every day, by telegraph, from the Naval Observatory at Washington, to all the principal maritime ports, and to such other cities, having a population of 15,000 or upwards, as will provide a suitable clock for receiving it. The importance of having accurate time for the regulation of the affairs of life increases as those affairs increase in number and importance. Before the days of railroads and telegraphs, when the principal occupations of mankind made no demand upon the co-operation of his fellows at great distances from each other, the rudest methods of measuring time sufficed for all practical purposes. But in these days of great enterprises, requiring speedy communication between men remote from each other, when inter-state commerce exceeds in volume the entire commercial transactions of the country a few years ago, time forms an important element in all business transactions, and perfect uniformity is demanded for the maintenance of that systematic method, so necessary to the success of all business enterprises. In these stirring, active, busy days, it becomes necessary to measure time, not by days and hours, but by seconds and fractions of seconds. If accurate time is important to the man of business, it is still more important to the great lines of railroad, to secure the prompt transmission of the mails, passengers and freight, but is even more necessary to enable them to run their numerous trains with that degree of precision that will avoid disasters destructive of life and property. Accurate time is even more necessary to the navigator of the ocean than to the business men on shore, for he depends upon his timekeeper to determine his position at sea. Upon the exactitude with which he can do this depends the safety of his ship, his cargo, and the lives of his numerous passengers. The chronometers which are used in navigation are made with all the appliances for accuracy that human skill has been able to devise. Theoretical knowledge, joined to mechanical skill, has produced in the ship chronometer a timekeeper which, under favorable conditions of temperature, does not vary five-tenths of a second in twenty-four hours—though the large majority of ship chronometers do not perform so well. By this statement it is not intended to assert that any chronometer ever indicates the time within five-tenths of a second. The best timekeepers always gain or lose time, and the above statement only means that in the best instruments this gain or loss does not vary more than five-tenths of a second in twenty four hours. For instance, a good chronometer may gain or lose two seconds per day, but the gain or loss will continue to be two seconds per day nearly. This daily gain or loss is called the rate of the chronometer, and the accumulated rate is called the error of the chronometer. When the navigator knows at any moment the error of his chronometer, he knows his time, and consequently his longitude, with the same degree of accuracy. It is, therefore, a matter of the first importance to a navigator, to be able to determine the error and rate of his chronometers. This must be done on shore, and the rate thus determined used for the succeeding voyage. To enable the navigator to obtain the error and rate of his chronometer, it is proposed to drop a time-ball at the principal maritime ports of the country, at Washington mean noon. Noon at the meridian of the Naval Observatory at Washington is chosen because the position of that Observatory is known to all navigators. It is the National Observatory, and the only one in the country under the control of the Government, and fitted for the determination of time to the last degree of precision. Besides, it is proper that the standard time of the country should be the time of the national capital. The bill under consideration by the Committee on Commerce provides for the establishment of a time-ball at all the principal maritime ports, which balls shall be controlled by telegraph wires connected with the Washington Observatory. Observing the dropping of the time-ball at any port, will enable navigators, by a reference to the nautical almanac and a simple mathematical calculation, to read his chronometer correctly, regardless of the meridian to which it may be set, whether Washington, Greenwich, or any other. The dropping of the ball will not only point out to him the actual differences in meridian time, but the error of his chronometer. So far as the navigator is concerned, it makes no difference whether the standard of time be that of Washington or Greenwich, for he is always obliged to make a calculation for his position at sea, but for practical purposes on land, the standard adopted should be that of the meridian of Washington. The official railway guides show that upwards of sixty different standards of time are in use by the railroads of this country. The trouble and annoyance caused travelers by this lack of uniformity is well known. It could be easily remedied if standard time was announced from Washington daily, in all the important cities of the country. All trains would be run to connect in accordance with that standard, and travelers would be able to make their calculations regarding their arrivals and departures with accuracy.

Standard time would be quite as acceptable to business men in the large cities as to any other class, although not so imperatively demanded. Business offices are usually so remote from places of residence that some means of transportation have to be employed, and railroads, surface and elevated, carry many thousands of persons to and from the city daily. The importance of connecting with particular trains can only be realized by those who are dependent upon them. Indeed, there is scarcely anyone who would not be benefitted by the adoption of a standard of time that should be uniform throughout the country, and serve to regulate its business and its business men. We hope to see the bill now before Congress enacted into a law before the adjournment.

WE ARE pleased to announce that Dr. Bucklin, the well-known occulist, has consented to contribute a series of articles to THE CIRCULAR on the diseases of the eye, and the adjustment of lenses to improve the sight. Dr. Bucklin has had an extensive experience in the opthalmic hospitals of Europe, as well as in private practice in this country, and probably no one is better qualified to write upon the subject than he. His articles will be of an essentially practical nature, calculated to instruct those in the trade who have especially to do with optical goods. A practical series of articles on the adjustment of lenses to the varied peculiarities of vision, that are brought to the attention of opticians and dealers in lenses, cannot fail to be of great value. There is no branch of the business that requires special instruction so much, or where the responsibility is greater. Persons desiring to purchase spectacles or eye-glasses, seldom know what kind they require to meet the defect in their vision, but trust the matter of selection entirely to the person who serves them. Unless he has some knowledge of the diseases of the eye, he is quite as apt to provide his customers with lenses that will aggravate their complaint as to alleviate it. Dr. Bucklin proposes to treat the subject in such a way as to enablealmost anyone possessed of good judgment, to adjust lenses according to the needs of the individual, without danger of inflicting further injury upon the sight.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box* 3,444, *P. O., New York*, or the office of THE CIRCULAR.

At the regular monthly meeting of the Executive Committee on Friday evening, May 5th, two members sent in their resignations for sufficient reasons, but the latest assessment was unpaid by them, and as a consequence their names must be dishonorably dropped from the roll. Resignations, in order to be accepted, and the member honorably discharged, should be presented when no assessment is being collected, else they should be accompanied by the amount of the assessment payable at the time of resignation. Expulsion will follow any other course.

The "Committee of Eighteen," which has under advisement such methods of business as will insure the permanence and solidity of the League, held a meeting on Monday, April 24th, at which several sub-committees reported the progress made in the course of their study and research. The question of grading the assessments according to the age of the member, is projecting itself before the sub-committees, and the topic is being discussed with interest. The subject of a reserve fund, its sources of accumulation, and other important subjects are also under consideration by the sub-committee of which Mr. Geo. C. White, Jr., is chairman, and have been ably handled by that committee. The "Committee of Eighteen" has received several letters from members, referring to the subjects before it, thus indicating the interest taken in the League by the body of members. The humblest member's views are welcomed, and will secure such consideration as their merit and fitness shall command. From letters received expressing opinion that the amount of benefit paid by the League, so far as the members most requiring such benefit are concerned, is excessive for the circumstances of the families of many, the point presents itself, whether it may not be advisable to create another or other "chapters" in the League, paying less of benefit, and with less consequent cost in assessments; it certainly is practicable, and may be the means of developing the beneficent operations of the League to many men who would gladly avail themselves of such benefit as they could afford to pay for.

Secretary W. L. Sexton is of the opinion that the League would be saved unnecessary expense in postage and stationery, if members would send their remittances *as soon as they receive the notice of assessment*, and before such notice is mislaid, or lost, or "pigeon-holed" and forgotten until the Secretary reminds them of it by a second notice. This second notice is purely voluntary on the part of the Secretary and should not be relied upon as a second prompting; he is not required by the laws to send it. Checks or drafts in payment of assessments, should be made payable to the order of "W. L. Sexton, Secretary."

President Woglom has been asked by several up-town jewelers, in the City of New York, to receive, for the benefit of the League, their interest in the Chicago fire fund, but, unfortunately, the names of these generously disposed gentlemen do not appear on the list of subscribers to that particular fund of which all was not expended. The fund, of which so large a proportion has been directed by the donors to be given to the League, is the unused portion of the amount subscribed by the, at that time (October 13th, 1871), "'Down-town' wholesale dealers in watches, diamonds, jewelry, clocks, etc., in New York." (We quote from the letter which accompanied the funds when sent to Chicago). Thus it appears that a portion of the subscription by jewelers who, in 1871, were "down-town," was unused and returned to New York, while the amount subscribed and sent through other channels by the "up-town" jewelers, was all expended for the purpose intended. An officer of the League who stands at our elbow, suggests that, rather than have the generous inclinations of these gentlemen checked, they might shape their inclinations into a check, and send it to the Secretary for the permanent fund. Following is a list of the firms who have already become patrons of the League in the direction indicated:

J. A. Abry, (now C. L. Abry); H. F. Barrows; Victor Bishop, (now Victor Bishop & Co.); A. Bernhard & Co.; Philip Bissinger; Bliss & Dean; Erhard Bissinger; Th. Bloch & Bros., (now Bloch Bros.); F. F. Braillard; Brainerd, Goddard & Steele, (now Brainerd & Steele); Estate of Paul A. Brez.; John D. Brez; Brooklyn Watch Case Factory; Brown, Cook & Co., and Maas, Groeschel & Co., (now Cook, Groeschel & Co.); D. Bruhl, (now D. & M. Bruhl); Bruno & Son, (now C. Bruno & Son); T. B. Bynner & Co.; Samuel W. Chamberlain; H. A. & G. M. Church; William Cohen, (now Cohen & Co.); Colby & Johnson; Cooper, Fellows & Co.; Cox & Sedgwick; H. E. Droz; E. C. Dunning & Co.; Estates of L. Durr & Bro.; Earle & Franklin; Samuel Eichberg; Eisenmann Bros.; A. Errico, (now Errico Bros.); Joseph Fahys; Fellows & Co.; M. Fox & Co.; Freund, Goldsmith & Co., (now Max Freund & Co.); Julien Gallet; Giles, Wales & Co.; Henry Ginnel; Hayward & Briggs; Henle Bros.; Hessels & Ludeke; Wm. S. Hicks; Hodenpyl, Tunison & Shiebler, (now Hodenpyl, Tunison & Co.); John E. Hyde's Sons; Jacobs & Pratt; J. W. Johnson; L. & M. Kahn; Ketcham Bros & Co.; (now Ketcham & McDougall); R. Kipling & Son; F. Kroeber; Julius Levin; S. M. Lewis, (now S. M. Lewis & Co.); Lincoln, Tifft & Co.; Albert Lorsch; Estate of George A. Mathewson; H. D. Merritt; J. B. Matthewson & Co.; Miller Bros.; J. M. Morrow; E. Obermeyer & Bro., (now H. Obermeyer); Palmer & Capron; Geo. W. Platt, (now Jas. W. Todd); J. W. Pooler & Co.; (Courvoisier, Wilcox & Co.); Geo. W. Pratt & Co.; J. W. Richardson & Co.; Stephen Richardson & Co.; E. Ira Richards & Co.; John A. Riley & Co.; P. E. Robinson; Saltzmann & Co.; Robert Schell & Co.; J. E. Spencer & Co.; J. T. Scott & Co.; Sillcocks & Cooley; Smith & Hedges, (now Wm. S. Hedges & Co., and Alfred

H. Smith & Co.); Herman Sonntag; E. & D. H. Stites, (now E. Stites' Sons and D. H. Stites & Son); L. Strasburger & Co.; Geo. O. Street & Son; Sussfeld, Lorsch & Co., (now Sussfeld, Lorsch & Nordlinger); Vulcanite Jewelry Co.; A. Wallach & Co.; Wheeler, Parsons & Co., (now Wheeler, Parsons & Hayes); Whiting Mfg. Co., and D. H Wickham. These patrons represent considerably over sixty per centum of the amount of the fund.

With regret we announce the death of James A. Bogart, of the Finance Committee, an old and highly esteemed New York member, at the time of his death in the employ of Joseph F. Chatellier, formerly of the firm of Greason, Bogart & Pearce, and prior to that for many years identified with the old firm of Arthur, Rumrill & Co. The assessment in consequence of his death, will be made in due time, and notice thereof sent to the members.

At the meeting on May 5th, the following candidates were admitted to membership:

James H. Addington, Buffalo, N. Y.; E. P. Rapelye, Flushing, N. Y.; Fred. Marks, Troy, N. Y.; Chas. J. Leyers, Newark, N. J.; Byron B. Culver, Vineland, N. J.; Albert J. Smith, Edwin L. Peck, John A. McCloy, Chas. T. Cheney, Providence, R. I.; Arthur B. Ryan, Middletown, Conn.; George Rockwell, Meriden, Conn.; Frank T. Preston, Danielsonville, Mass; Urban Smith, New Bedford, Mass.; Samuel W. Gould, William H. Gould, Attleboro, Mass.; John Etzensperger, John Kennedy, Patrick A. Kiolin, North Attleboro, Mass.; John L. Stedman, Mauch Chunk, Pa.; Edwin S. Heath, Kennerdell, Pa.; Wm. Boudenhamer, Hanover, Penn.; Otto Winnig, Joseph Muhr, Philadelphia, Pa.; Henry D. Pierce, Alliance, Ohio; John M. Tyler, Dayton, Ohio; F. Gunzenhauzer, Cleveland, Ohio; Aaron Herman, Wells Isbell, Otto Zeil, Cincinnati, Ohio; Frank H. Gale, Norfolk, Va.; Henry Wolf, Louisville, Ky.; John S. Reed, Huntsville, Ala.; John H. Davis, L. A. Wagner, Marion Court House, S. C.; Emil Lehnhardt, San Francisco, Cal.; John E. Humphrey, Denver, Col.; Fritz Hehne, Omaha, Neb.; Henry L. Lyman, Montreal, Canada; F. D. Gros Claude, Nashville, Tenn.; Frank O. Byrd, Memphis, Tenn.; Albert M. Baker, Evanston, Ill.; O. C. Lamphear, Galesburg, Ill.; Wilbur W. Sweet, Springfield, Ill. Joseph Deckert, Werner Frese, Edward Reinke, Henry Sartorious, Louis Stein, Chicago, Ill.; Darius P. Richards, Columbia, Mo.; Julius Friton, Nicholas L. Vattron, St. Louis, Mo.; Mulford M. Fenneman, Chas. E. F. Lewis, Louis W. Miller, Wm. Payne, Brooklyn, N. Y.; Joseph Jessuruer, Reinhold Kaemlen, Wm. H. Ferns, Wm. J. Duff, Wm. M. Hicks, Henry E. Hull, Frank H. Hoyt, John H. Jackson, Albert Kahn, Wm. A. Knapp, Bernard Mayer, Jacob A. Rauth, Louis Schloss, Chas. F. Terhune, Fred. Goldsmith, New York City.

Thirteen applications were laid on the table for further consideration, and two were rejected.

The membership is now 1,962, "and several counties yet to be heard from."

Aristarchius Plumbago Proposes a New Watch Company.

To the Editor :

I see by the May number of THE CIRCULAR that you gave wide publicity to my scheme for a Horological School and Watchmakers' and Jewelers' Benefit Society, and while you exaggerated my ideas somewhat, and evidently intended to satarize my modest statements, still, I do not know that I can honestly complain of the notoriety thus thrust upon me. Notoriety is twin brother to fame, and I am seeking fame as a means to the acquisition of wealth. Agreeably to my promise to keep you informed of my movements, I now drop you this letter.

I arrived in Chicago in due course of train, and immediately began feeling the pulse of the trade regarding my idea of founding a Horological School, of which I should be the head and front. Imagine my surprise, and conceive of my chagrin, when I ascertained that the scheme was not a new one—that, in fact, it has been agitated by several other persons. I sought interviews with these persons, and was disgusted to learn the degree of selfishness that actuated them all. They were simply seeking to impose upon the trade an alleged industrial and benevolent scheme, solely that they might make a profit thereby. I found their ideas were very similar to my own, and so tried to associate myself with them, but investigation showed me that they had apportioned among themselves all those lucrative positions that I had designed to honor by accepting myself, and they, consequently, refused to make room for me. The discovery of this intense phase of selfishness saddened me to the soul, especially as it convinced me that my proposition for a like establishment, from which I should derive all the honor and the profit, was rendered inoperative by the greed of these men. Disappointed and sick at heart, I moralized upon the situation, and as I turned the subject over in my mind, I came to the conclusion that the scheme was not likely to be much of a success anyway. The practical men in the trade, the hard-working watchmakers and jewelers, have been so often imposed upon by designing men, with so-called philanthrophic and benevolent schemes, that it is doubtful if they would support the genuine article I proposed in their interest. Therefore, I have abandoned the Horological School and Benefit Society project, and am now waiting for something else to turn up.

Fortunately, on my way west, I became acquainted with a gentleman residing in Cincinnati, whom I succeeded in interesting in certain information I gave him regarding the watch industry of this country. He is a gentleman of wealth, and cordially invited me to visit him. Being now disengaged, and in that state of impecuniosity that has become chronic with me, I have resolved to enliven him with my presence for a month or two, and to delight his ears with pleasant discourse, in return for my board and lodging. During my conversation with this gentleman, he incidentally mentioned to me that with all her boasted industrial resources, Cincinnati had no watch factory. Heretofore that city has devoted so much time and attention, not to say capital, to the cultivation of pork, that the more æsthetical industries have been neglected. This seems to be my opportunity. Every well regulated city should have a watch manufactory. It gives employment to many persons and much capital, and should provide ample compensation for the organizer of the project. The more I revolve the subject within the inmost recesses of my giant intellect, the more am I convinced that the great need of Cincinnati to-day is a watch factory, and that the propogation and elaboration of this scheme is, at present, my best hold.

Already I have outlined the matter in my mind's eye, and am confident that I have the nucleus—the nub end, as it were—of a plan of operations that will not only be alluringly attractive, but will result in bringing me many shekels to add to a bank account that is now represented by zero. I find that the organization of a stock company is attended with difficulty. The game has been worked too often by the promoters of various speculative enterprises, mining schemes, etc., so that a person who goes about offering stock of any kind for sale is looked upon with suspicion. Therefore, I propose to offer a substitute for the stock scheme. Of course, our organization will be on the stock company plan, but instead of issuing stock, we shall sell privileges. Suppose the company to be organized, with myself as president, board of directors, general manager, superintendent, etc. I appeal to the retail trade to aid me in the philanthropical undertaking of establishing a watch manufactory in opposition to the hated monopolists now occupying the field, and controlling the sale of watches throughout this country, and invading the rest of the world. Instead of asking them to buy the stock of this new opposition company, I ask them to buy privileges. That is to say, I will sell privileges which will entitle the holders to buy our watches at jobbers' prices. This, to the retail dealer, is a great privilege, and he should be willing to pay well for it. I propose to issue these privileges at $200 each, and to sell 250 of them to so many retail dealers. All I ask is an advance payment of $20 on each privilege, the remainder to be paid when called for by the president (that's me) and board of directors (that's me). The term privilege sounds better than stock, and, like grey hair, it can be made to cover a multitude of sin, provided it is properly and indefinitely worded. I shall have them so conditioned that subscribers shall have the privilege of withdrawing their subscriptions at any time before ground is broken for the new factory; it will be an easy matter to spade up somebody's back garden any time, and thus make the subscriptions binding. The privilege to buy our watches at jobbers' prices is, as you will observe, indefinite and illusory. The establishment of prices will rest solely with me, and I do not think it will take many watches to satisfy all the privileges. As to the kind and character of the watches that we may have to sell, that is a secondary consideration. It might be quite as cheap, and I am sure it would be better, to buy them ready made. The regular manufacturers now in the business have acquired a habit of selling good watches at a price so low that it is impossible to even hope to compete with them as to quality and price both, and if anything is to be sacrificed in those we make, I prefer it shall be quality rather than price. Still, for the sake of keeping up appearances, and satisfying holders of privileges, it may be necessary to put up a cheap building and secure some machinery. I know where there are the remains of a bankrupt and exploded watch company, and, for a few hundred dollars, I can buy enough discarded machinery to make a very good showing with. I have known of a case where $2,500 thus invested, enabled the purchaser to realize $25,000, from a company that he organized upon the strength of owning such a valuable plant. Perhaps I can be equally fortunate.

Another opportunity for profit lies in the generosity of property owners in the suburbs of Cincinnati. Gentlemen owning large tracts of suburban property, as my Cincinnati friend informed me, will be glad to give liberally of their land to any manufacturing company that will locate upon it. I calculate to be able to obtain several blocks of desirable land in this way, for a site for our factory. A few hundred dollars will put up a temporary factory on a small lot, and this will bring the remainder into market. By dividing up the property so that every lot shall be a corner one, I hope to sell them at a good price.

This is merely an outline of my scheme as it presents itself to my mental vision, but from this you can readily conceive of its possibilities. I shall associate with me, for the purpose of selling privileges, a gentleman who has been wonderfully successful in organizing stock companies, and who has probably sold for a good price, more stock that is now valuable, than any man living. He has been somewhat identified with enterprises connected with the jewelry trade, is a plausible talker, and we will co-operate heartily. I flatter myself that the retail trade will be worked on the privilege racket as it has never been worked before. I shall keep you informed of the progress made in this new undertaking. I shall leave for Cincinnati at once, and as soon as I learn the number of the Post Office box of the gentleman who is to have the honor of entertaining me, I will send you my address. Yours, sanguinely, anticipating fame and fortune,

Chicago, May 15, 1882. ARISTARCHIUS PLUMBAGO.

The Great Diamonds of the World.

MR. EDWIN W. STREETER'S remarkable, if not important book on diamonds, has just been announced by the English press, although the date of publication has not been fixed. For many years, it seems, Mr. Edwin W. Streeter, a well-known diamond merchant, through whose hands some of the most important modern gems have passed, has been engaged in collecting material for a trustworthy history of the world's greatest and most famous gems He has been in correspondence with all the courts of Europe and with many rulers of the east. He has sent special messengers to India, Turkey and Russia to clear up contradictory stories which have been handed down from book to book. He has at the present time one son in India, occupied in hunting up all the information that can be got in regard to the Peacock Throne of eastern history. Another son is studying diamond mining at the Cape of Good Hope, and a third is conducting a pearl fishery somewhere in the Polynesian seas. Mr. Streeter, apart from his great business in Bond street and at Ceylon, has evidently an ambition not only to be a practical authority upon diamonds, but to be their literary historian. A member of the Geographical and other learned societies, he has already published several books in this diamantiferous direction. His latest was "Precious Stones and Gems," a reproduction of which appeared in the columns of THE CIRCULAR a year or two ago. How important his recent researches are in this romantic field of history, will be shown in his correction of the numerous mistakes set forth in his previous book, which was, after all, little better than a compilation. It repeated in many cases the old stories of old writers. Wherever the author could add special information of his own he did so; but without direct intercourse with the owners of great diamonds, he could only perpetuate the traditions and fables of those who had gone before. It is a singular feature of books upon diamonds, that the most learned authors have been content to accept without inquiry the theories of their predecessors. In this way some of the most historical gems have got inextricably mixed, so that one is at a loss to know which is the "Koh-i-noor" or which the "Great Mogul," which the real "Moon of Mountains," which "The Sancy," or which the "Tajemah." Tavernier, the great French dealer of the last century, succeeded in solving a good many mysteries in this respect, but it has been left to Mr. Streeter to tell for the first time, the real history of some of the most famous stones. In his forthcoming work he has had the assistance as collaborators and annotators of two literary gentlemen not unknown in the world of letters, and, what is more, he has had the practical aid, verbal and epistolary, of royalties, Ministers and Ambassadors. The Queen of England herself has revised the story of the Koh-i-Noor in manuscript, while the ex Empress Eugénie has given some interesting information regarding the "Pitt" diamond. Three of the volume's chapters are printed below. They relate to the Koh-i-Noor, the Pitt or Regent, and the Eugénie diamonds, the first chapter having been read in manuscript by Queen Victoria, and the second and third read, revised, and corrected in proof by the ex-Empress of the French. That on the Koh-i-Noor possesses exceptional interest and value, since the story of this most celebrated jewel is declared here for the first time to be correctly and completely told.

THE KOH-I-NOOR.

I.

EARLIEST HISTORICAL FACTS ABOUT IT.

"This is pre-eminently the 'great diamond of history and romance.' Its stirring adventures, when divorced from all connection with Travernier's Great Mogul, become intelligible enough. The first distinct and authentic reference to the Koh-i-Noor occurs in the subjoined passage from the 'Memoirs of Sultan Baber,' the author of which was a direct descendant of Tamerlane, the founder of the so-called Mogul Empire in Hindustan. Under the date of May 4, 1526, the Sultan writes:

"'Bikermajit, a Hindu, who was Rajah of Gwalior, had governed that country for upward of a hundred years. In the battle in which Ibrahim was defeated, Bikermajit was sent to hell. Bikermajit's family and the heads of his clan were at this moment in Agra. When Humaiun arrived, Bikermajit's people attempted to escape, but were taken by the parties which Humaiun had placed upon the watch and put in custody. Humaiun did not permit them to be plundered. Of their own free will they presented to Humaiun a "peshkesh," (tribute or present,) consisting of a quantity of jewels and precious stones. Among these was one famous diamond, which had been acquired by Sultan Ala-ed-din. It is so valuable that a judge of diamonds valued it at half of the daily expense of the whole world. It is about eight mishkels. On my arrival, Humaiun presented it to me as a peshkesh, and I gave it back to him as a present.'

"That the diamond here referred to is the Koh-i-Noor there can be no reasonable doubt, nor indeed has the fact ever been seriously called into question. It will be noticed that although he speaks of it as already 'famous,' Baber gives it no particular name, and it did not take its present designation till it passed into the hands of Nadir Shah. The illustrious historian mentions, however, that it 'had been acquired by Sultan Ala-ed-din,' which enables us to trace its existence some 200 years further back. The Ala-ed-din here spoken of belonged to the Khilji dynasty, which succeeded that of the Ghuri, and which ruled over a large portion of Hindustan for 33 years, from A. D. 1288 to 1321, when they were replaced by the Toghlaks. Ala-ed-din Khilji had obtained possession of the 'famous diamond' in the year 1304, when he defeated the Rajah of Malwa, in whose family it had been as an heirloom from time out of mind. One tradition carries it back to the somewhat legendary Vikramaditya, an ancestor of the Rajah of Malwa here spoken of, and of Baber's Bikermajit, Rajah of Gwalior. This Vikramaditya flourished in 57 B. C., and is said to have driven the Saca (by which are no doubt meant the Scythians) out of India. But no value can attach to the tradition, which is evidently sort of an afterthought suggested by the similarity, or rather identity, of the two names Likermajit and Vikramaditya. At the same time the association is significant, as it serves to show that the gem was at all times regarded as the property of the Rajahs of Malwa, who are sometimes spoken of as Rajahs of Ujein and Gwalior; for all these places were formerly included in the territory of Malwa, which has since been subdivided among the states of Bhopal, Indore, and Gwalior—the dominions of Scindia. We now understand how it happened that the diamond, after being acquired by the Sultan Ala-ed-din in 1304, is found in the possession of Bikermajit, Rajah of Gwalior, in 1526. It had evidently been restored to Bikermajit's family by the Khilji ruler, after peace had been established between the two states.

"A still more obscure and extravagant tradition identifies this stone with one discovered first some 5,000 years ago in the bed of the Lower Godavery River, near Masulipatam, and afterward worn as a sacred talisman by Carna, Rajah of Anga, who figures in the legendary wars of the Mahabharata. That such a stone should have been found in such a place is likely enough, as it may well have been washed down to the delta of the Godavery, which flows through one of the oldest and richest diamantiferous regions in the world. But its identification with the stone under consideration rests on no solid foundation, nor will it readily be believed that a gem, which remained unnamed till the eighteenth century, could be unerringly traced back to prehistoric times.

"Its subsequent history from the time when it fell into the hands of Baber to the present day is inseparably associated with many of the most stirring and romantic events of modern days. But, to quote Maskelyne, though 'one long romance from then till now, it is well authenticated at every step, as history seems never to have lost sight of this stone of fate, from the days when Ala-ed-din took it from the Rajah of Malwa, five centuries and a half ago, to the day when it became the crown jewel of England.'

"Bernier tells us that, on the death of Shah Jehan, Aurung zeb 'set out immediately for Agra, where Begum Sahel received him with distinguished honor. On arriving at the women's apartments, the Princess presented him with a large golden basin full of precious stones, her own jewels and those which belonged to Shah Jehan.' The Princess here referred to was Jihanira, the too-well-beloved daughter of Shah Jehan, who remained with him to the last, and who had used her influence to prevent him from destroying his jewels rather than surrender them to Aurung-zeb, as mentioned in our account of the Great Mogul. It is uncertain whether Baber's diamond was one of those contained in the golden basin; or whether it had already been given to Aurung-zeb during his father's life-time. The former supposition seems to have been the most probable; for among Aurung-zeb's treasures exhibited to Tavernier, Nov. 3, 1665, there was only one diamond of great size—the Mogul—and Shah Jehan, already afflicted by a fatal disease, died in the following February. But the point is of little consequence, as in any case the stone remained in the possession of the Mogul dynasty until Nadir Shah's invasion of India, during the reign of Mohammed Shah, in 1739."

II.

HOW IT GOT ITS PRESENT NAME.

"In our account of the Orloff diamond it was stated on the authority of Whittaker that Aurung-zeb made use of the Koh-i-Noor as one of the eyes of the peacock, adorning his Peacock Throne, and that Nadir carried off and broke up this throne, thus gaining possession of the famous gem. But according to another and apparently more trustworthy account, when he seized on the Delhi Treasury, this stone, which he was bent on securing, was found to be missing, and for a long time all his efforts to obtain it were baffled. At last a woman from Mohammed's harem betrayed the secret, informing Nadir that the Emperor wore it concealed in his turban, which he never on any occasion laid aside.

"Nadir had now recourse to a very clever trick in order to secure the coveted prize. Having already seized on the bulk of the Delhi treasures, and concluded a treaty with the ill-fated Mogul Emperor, he had no further pretext for quarreling, and could not, therefore, resort to violence in order to effect his purpose. But he skilfully availed himself of a time-honored Oriental custom, seldom omitted by Princes of equal rank on state occasions. At the grand ceremony a few days afterward, held in Delhi for the purpose of reinstating Mohammed on the throne of his Tartar ancestor, Nadir suddenly took the opportunity of asking him to exchange turbans in token of reconciliation, and in order to cement the eternal friendship that they had just sworn for each other. Taken completely aback by this sudden move, and lacking the leisure even for reflection, Mohammed found himself checkmated by his wily rival, and was fain, with as much grace as possible, to accept the insiduous request. Indeed, the Persian conqueror left him no option, for he quickly removed his own national sheepskin head-dress, glittering with costly gems, and replaced it with the Emperor's turban. Maintaining the proverbial self-command of Oriental potentates, Mohammed betrayed his surprise and chagrin by no outward sign, and so indifferent did he seem to the exchange, that for a moment Nadir began to fear he had been misled. Anxious to be relieved of his doubts, he hastily dismissed the durbar, with renewed assurances of friendship and devotion. Withdrawing to his tent he unfolded the turban to discover with selfish rapture the long-coveted stone. He hailed the sparkling gem with the exclamation, Koh-i-Noor! signifying 'Mountain of Light.'

"At Nadir's death most of his treasures were dispersed, but the Koh-i-Noor, henceforth known by this title, passed, together with many other jewels, into the hands of his feeble son and temporary successor, Shah Rokh. On him it brought nothing but misfortune; yet he clung to it with amazing tenacity, refusing to part with it under pressure of the most atrocious tortures, including even loss of sight. After his overthrow he had been permitted to reside at Meshd, as Governor of that city and district. Hither he brought the Koh-i-Noor, together with many other gems of great value, which formed part of the plunder carried off by his father from India. Aga Mohammed, who had an insatiable appetite for such things, determined to get possession of them, and in order the more easily to effect his purpose, he advanced with a large force toward Meshd, under the pretext of visiting the sacred shrine of the Inam Riza, which is annually resorted to by many thousands of Shiah pilgrims. He thus succeeded in quietly occupying the city. After performing his devotions at the tomb of the saint, suddenly throwing off all disguise, he ordered the blind Prince to deliver up his concealed treasures. As the infatuated Shah Rokh still protested that he had already parted with them, he was ordered to be put to fresh torture, which had the effect of bringing to light several costly gems. But as neither the Koh-i-Noor nor the immense ruby known to have been in the crown of Aurung-zeb were among them, Aga Mohammed devised a truly diabolical expedient to get hold of them. He ordered his victim's head to be closely shaved and encircled with a diadem of paste, and boiling oil to be poured into the receptacle thus formed. But even the frightful agony of this torture could only induce the victim to surrender the ruby. He still retained his hold of the great diamond. The miserable monarch never recovered from these injuries. Before his death, Ahmed Shah, founder of the Durani Afghan Empire, came to his assistance in 1751, concluded an alliance with him, and received in return the fatal gem, whose brilliancy could no longer rejoice the lack-luster eyes of Shah Rokh.*

"Possession of the unlucky gem proved no less disastrous to the Durani dynasty than it had to the Mogul Emperors and to Nadir's family. At his death Ahmed Shah bequeathed it to his son and heir, Taimur Shah, who removed the seat of government from Kandahar to Kabul, and who died in 1793. From Taimur it descended, with the crown, to his eldest son, Shah Zaman, who was deposed and deprived of his sight by his next brother, Shah Shuja-ul-Mulk. The usurper thus became possessed of the Koh-i-Noor, which he rtained almost to his death; but which, nevertheless, involved him in an uninterrupted series of calamities and sufferings. After having remained for many years concealed in the wall of a stronghold, where Shah Zaman had been confined, the diamond was brought to light by the merest accident. Shah Zaman had, as he supposed, securely imbedded it in the plaster of his prison wall. But in course of time a portion of the plaster crumbled away, leaving one of the sharp angles of the crystal exposed, or slightly protruding on the surface. Against this, one of the officials happening to scratch his hand, his attention was attracted to the spot, his eye fell on the sparkling facet, and the Koh-i-Noor was once more rescued from its hiding-place. At all state ceremonials Shah Shuja now wore it on his breast, where it glittered when Elphinstone was sent by the Indian Government as Envoy to Peshawur during that Prince's troubled reign."

III.

LAST DAYS OF ITS CAREER IN ASIA.

"In his turn dethroned, deprived of his sight, and driven into exile by Shah Mahmud, third son of Taimur, Shah Shuja had contrived, amid all his disasters, to retain possession of the great diamond, with which he now withdrew to the Court of the famous Runjit-Singh, the 'Lion of the Punjaub,' accompanied by his brother, Shah Zaman, whom, as stated, he had himself already rendered sightless, according to the brutal fashion of the Durani Court.

"Runjit at first received the two ill-starred brothers with open arms, and even declared war on their behalf against Shah Mahmud, from whom he took the territory of Kashmir, which at that time formed part of the Afghan dominions. He, however, not only forgot to restore their possessions to the unfortunate brothers, but began to oppress them in every way, and to extort from them all the treasures they had brought away from Kabul. Among these the Koh-i-Noor was coveted more than all the rest, and Runjit spared no efforts to get hold of it. How he at last effected his purpose is thus related by Kluge:

"'Driven from Peshawur to Kashmir, and hence to Lahore, Shah Shuja became apparently the guest, but in reality the prisoner, of Runjit Singh, who, though no connoisseur of precious stones, none the less attached great importance to their possession. Of the Koh-i-Noor he had heard only by report, and employed every means to secure it. Wuffo-Begum, consort of the unhappy King, had also sought and obtained protection from Runjit, and was consequently now residing in Shadera. Runjit ordered her to deliver up the stone, which, however, she protested was not in her possession. Thereupon he caused all her effects to be seized and brought to Lahore, thus acquiring jewels of greater value than any he had ever possessed before. Supposing that the Koh-i-Noor was among them, the bulk of the property, including shawls, carpets and gems, was retained, and a few trifles returned to the Begum. But soon ascertaining that the Koh-i-Noor was not to be found among the jewels, he had the Begum closely watched; two of her most intimate attendants were thrown into prison, and the other members of the Zenana deprived even of bread and water. No one, without being first searched, was allowed to approach or leave the Princess, and it was at the same time intimated that nothing but the surrender of the diamond would satisfy Runjit. Thereupon the Begum sent him some very costly stones, and among them a ruby of considerable value. Having, as stated, no personal knowledge of gems, the tyrant of the Punjaub now fancied that this ruby, which surpassed everything he had yet seen, must be the real stone. But, in order to make assurance doubly sure, he sent for a person acquainted with the Koh-i-Noor, placed all the stones before him, and asked, "Which is the Koh-i-Noor?" He received answer that it was not among those gems, which, compared to it, were of little value. This made him all the more eager to procure it, and he again began to treat the Begum and her family with great harshness. After keeping them without food for two days, finding that she still held out, he gave up the hope of bringing her to terms by such means, and had recourse to more insinuating ways. She now promised to give up the stone, provided Runjit released Shah Shuja from captivity in Kashmir, and conferred a life pension on him, besides sundry favors on herself and friends. Shah Shuja was liberated at once, but some of the conditions not having been fulfilled, the Begum declared that the stone was not in her keeping, but that it had been pledged to a merchant in Kandahar. Runjit thereupon returned to the former coercive measures, and the Princess was once more deprived of food, but all to no purpose. At last Shah Shuja himself volunteered to surrender the stone, and a time was fixed on which he promised to produce it.

"'On June 1, 1813, the appointed day, Runjit, accompanied by several confidential friends and some experts acquainted with the stone, proceeded to Shadera, where Shah Shuja was then residing. At the ensuing interview, after both were seated, a profound silence prevailed, which neither side seemed disposed to break. An hour was thus spent, and Runjit, notwithstanding his impatience, still abstained from interrupting the solemn stillness. He, however, hinted to a confidant that he might quietly remind Shah Shuja of the object of their interview. Thereupon the latter nodded to a slave, who withdrew, and presently returned with a packet, which he placed on the carpet, at an equal distance from the two Princes. Deep silence again ensues; Runjit's impatience grows to a fever heat; no longer able to control his feelings, he directs one of the attendants to take up the packet; it is opened, and a glittering gem of unusual size is revealed, and recognized by the experts as the true Koh-i-Noor. At sight of the long-coveted prize, Runjit forgets the past, and breaks the silence with the question, "At what price do you value it?" To which Shah Shuja replies, "At good luck, for it has ever been the associate of him who has vanquished his foes." And he might have added with equal truth, "At bad luck, for sorrow and suffering have ever followed in its wake!" But by his answer he betrayed the true secret of the mysterious reverence, akin to worship, with which choice gems of this sort have ever been regarded in the east, and till recently in the West.' Much in the same way Marbœuf, Bishop of Rennes, in the eleventh century, described, in barbarous Latin verse, the virtues of the agate, thus translated by King:

"'The agate on the wearer strength bestows,
With ruddy health his fresh complexion glows;
Both eloquence and grace by it are given,
He gains the favor both of earth and heaven.'

"According to the account of a trustworthy eye-witness, Shah Shuja's bearing throughout this interview was such as to command the deepest respect, and produced a marked effect on the audience. He received from Runjit a sum of 125,000 rupees, and soon after this occurrence he withdrew with his brother, Shah Zaman, to Ludia-

* Early in 1751, Ahmed was recalled to Meshd by the revolt of Mir Allum Khan, (Aga Mohammed) Chief of Kauin, who had seized on the treasure at Meshd and blinded and dethroned Shah Rokh Murza. Ahmed restored Shah Rokh, and soon after took Kauin and put Mir Allum to death. Elphinstone's "Kabul," page 579. But according to other accounts Shah Rokh had already been blinded before the events here related.

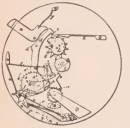
nah, in British territory, where they resided for some time on an annual pension of 60,000 rupees each, and 6,000 to each of their eldest sons. Here Whittaker tells us that he saw them in 1821, and he adds that Runjit at that time had the diamond at Lahore, capital of the Sikh states. A Bengali shroff, or banker, named Silchurd, resident at Ludianah, having occasion to visit Lahore on the Rajah's business, asked his Highness for permission to see the jewel, which being granted, Silchurd fell on his face and worshipped the stone.

"The further adventures of this splendid gem are soon told. Runjit caused it to be set in a bracelet which he wore on all public occasions. On his death-bed, in 1839, an attempt was made to induce him to conciliate the favor of the gods by presenting the stone to the famous shrine of Jaganath, (Juggernaut). He is even said to have given his consent by an inclination of the head; but the crown jeweler refused to surrender the treasure without a duly signed written warrant, which was being prepared when Runjit breathed his last. It thus remained in the Lahore jewel-chamber till the young Rajah Dhulip-Singh was recognized by the British Government, (after the murder of Shu-Singh,) when an English agent was stationed with a strong body-guard in Lahore. Then followed the mutiny of the two Sikh regiments, which brought about the final annexation of the Punjaub in 1849, when, as related by Hunt, 'the civil authorities took possession of the Lahore Treasury, under the stipulations previously made that all the property of the state should be confiscated to the East India Company, in part payment of the debt due by the Lahore Government, and of the expenses of the war. It was at the same time stipulated that the Koh-i-Noor should be presented to the Queen of England. After the company became possessed of the gem, it was taken in charge by Lord Dalhousie, and sent by him to England in custody of two officers.' Thus this great historical diamond passed with victory from east to west, and was presented to the future Kaiser-i-Hind on June 3, 1850. It was shown at the first great exhibition, held the following year in Hyde Park, on which occasion it attracted a great deal of attention, although it had been so unskilfully treated by the Indian cutter that it looked little better than an ordinary crystal.'

(To be continued.)

Patent Reports.

Repeating Movement for Watches.—Williams E. Huguenin, Locle, Switzerland. Filed Aug. 27, 1881.



Claim.—1. The combination, with the repeating mechanism, of the sliding bolt *b*, within the ring *w*, and guided by said ring and by the pins c^2 c^2, and provided with a finger-piece projecting through a slot in the ring *w*, and with a notch to receive the end of a lever, substantially as and for the purposes set forth.

2. In a repeating-watch, the toothed lever *d*, pinion *c*, spring barrel *B*, and disk *e*, in combination with the hour-snail *L*, and hammer for striking the hour, substantially as and for the purpose specified.

3. The toothed lever *d*, hour-snail *L*, pinion *c*, spring barrel *B*, disk *e*, and pin *f*, in combination with the quarters-piece *p*, notched lever *g*, and quarters-snail *l*, substantially as and for the purposes specified.

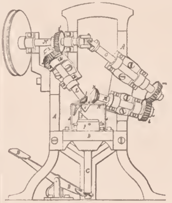
4. In a repeating watch, the combination of the toothed lever *d*, hour-snail *L*, spring barrel, and pinion *c*, substantially as and for the purposes specified.

5. In a repeating watch, in combination with the star wheel *E*, and quarters-snail *l*, the surprise, made as a plate, *s*, upon a sleeve surrounding the canon of the quarters-snail, and with a finger extending from said sleeve for acting upon the star wheel of the hour-snail, and with a pin upon the snail entering a slot in *s*, substantially as specified.

Clock Case.—John R. Lomas, West Haven, Conn. Filed Dec. 8, 1881.

Claim.—1. A cover for clocks, consisting of two parts *B B'*, hinged to the clock case, and so as to divide and swing therefrom in a plane at substantially right angles to the axis of the clock, to expose the clock, or brought together to inclose the clock, substantially as described.

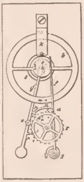
2. A cover for clocks, consisting of the two parts *B B'*, hinged to the clock case, and so as to divide and swing therefrom in a plane at substantially right angles to the axis of the clock, to expose the clock, or brought together to inclose the clock, the said parts arranged to be turned beneath the clock to form a base or support for the clock, substantially as described.



Machinery for Beveling Watch Gear.—Joseph A. Morin, St. Hyacinthe, Quebec, Canada. Filed Dec. 22, 1881.

Claim.—The combination of the revoluble and recessed vertically-reciprocating carrying-head *E*, having the series of arms *c* as set forth, with the stationary ring *H*, and cams *e*, *f*, and *g*, and with the cutters *I* and *K*, provided with mechanism for revolving them, all being substantially and to operate and for the purpose as specified.

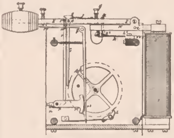
Escapement for Clocks and Watches.—Eduard Wensch, Vienna, Austria-Hungary, assignor of one-half to John James Hanhart, same place. Filed Dec. 12, 1881.



Claim.—1. The combination, with the balance wheel *b*, and the escapement wheel *r*, of the pivoted lever *f*, provided with a projection *a*, and means for pressing it toward the escapement wheel, the pin *i*, the pivoted rod *g*, provided with teeth *p p'*, and an arm *n*, substantially as herein shown and described, and for the purpose set forth.

2. The combination, with the balance wheel *b*, having an eccentric pin *i*, and with the escapement wheel *r*, of the eccentric *e* on the shaft of the balance wheel, the pivoted rod *g*, provided with a fork and with teeth *p p'*, and an arm *n*, and of the pivoted lever *f*, provided with a projection, *a*, substantially as herein shown and described, and for the purpose set forth.

Electric Clock.—Jakob Schweizer, Soleure, Switzerland, assignor to Cornelius Roosevelt, New York, N. Y. Filed Sept. 2, 1881.



Claim.—1. The combination, with the clock train and balance wheel and ratchet disk connected with the arbor of the minute hand in said train through an elastic bar or spring, of a weight heavy enough to operate the said train, a device for conveying power, such as a lever connected with said weight, an impulse pawl between said device and the ratchet disk, and an electro-magnet, said parts being constructed and arranged as described, so that the said weight, serving as the motive power of the clock, descends gradually, and in its descent operates the clock train through the said impulse pawl and ratchet disk, and at the end of its fall is instantaneously raised by the said electro-magnet, independent of said clock train, substantially as set forth.

2. The combination, with an electro-magnet and a weighted lever provided with an impulse pawl, of an arbor, a ratchet disc mounted loosely on said arbor and adapted to be advanced by said pawl, an elastic bar or spring, having sufficient stiffness after a slight yielding to resist the pressure of the weight, and revolving with the ratchet disk and arbor, to convey gradually to the said arbor the power of

the descending weight applied to the ratchet disk through the pawl, and electric contacts for closing a circuit through the electro magnet as said lever descends, and for breaking the circuit when it is raised, so that said weight serves as the motive power for revolving the arbor, and the said elastic bar or spring acts simply to maintain the power during the instant required to restore the weighted lever, substantially as described.

3. In an electric clock, the combination, with the weighted lever, pawl and ratchet, electro-magnet, armature, and contacts for automatically closing the circuit through the electro-magnet as the lever descends, of means, as indicated, for regulating or varying the point in the descent of said lever at which the circuit is closed, and thus regulating or varying the play of the armature and the effective stroke of the said pawl, substantially as described.

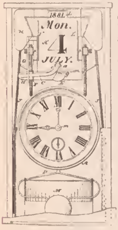
4. The combination, with a weighted lever, an electro-magnet, its armature, and contacts for automatically closing and breaking the circuit through the electro-magnet, as the weight alternately descends and is raised, of an auxiliary circuit-breaker, arranged, as described, for automatically breaking the circuit when the armature is no longer drawn to the electro-magnet on closing the circuit through the latter, substantially as described.

5. The combination of a shaft, contact spring, disk mounted on said shaft for making contact with the spring, insulated disk provided with pins or projections for breaking the contact, and an additional spring for holding said contact spring away from the disk, until it is itself withdrawn, substantially as described.

6. The combination of a commutator for making and breaking an electric circuit, means, such as an unbalanced arm, for shifting said commutator when released, a trip pawl for retaining said arm in place, a vibratory lever operating a ratchet through an impulse pawl, an electro-magnet in the circuit of commutator, and devices connected with said lever for alternately tripping the said trip pawl to allow the commutator to be shifted by the aforesaid unbalanced arm, and for restoring the commutator, substantially as described.

7. An electric clock comprising a clock train with balance wheel, an elastic bar or spring, a ratchet disk, a click, an impulse pawl, a weighted lever, an electro-magnet, and a commutator, constructed, combined, and arranged substantially as described, so that said weighted lever is raised by said electro-magnet independently of the clock train, and operates in its ascent the commutator, to break the circuit of the electro-magnet, and then gradually descends by gravity, operating the clock by means of the impulse pawl and ratchet through the elastic bar or spring, and at the end of its fall operates the commutator to restore the circuit through the electro-magnet, said elastic bar or spring being sufficiently elastic and yielding to keep the clock going while the weighted lever is lifted, and of sufficient stiffness to resist the pressure of the weight, and cause the weight to descend gradually as the said spring with the arbor of the clock train is revolved, as set forth.

Calendar Clock.—Carl Votti, Philadelphia, Pa. Filed July 14, 1881.



Claim.—1. A pack of disconnected calendar cards and a holder therefor, in combination with a timepiece or motor, mechanism operated by said piece for removing the cards, and a chute whereby when the cards are removed from a holder they drop therefrom, and are directed to and deposited by the chute in a separated receptacle, substantially as and for the purpose set forth.

2. A pack of disconnected calendar cards, a holder therefor, and a timepiece or motor, in combination with a rotary and sliding finger provided with a downwardly-extending hook, *c*, substantially as described, whereby each card is grasped by the finger, drawn out from holder, and then caused to drop clear of the finger and the holder.

3. The card holder, in combination with the finger *C* and deflector *F*, substantially as and for the purpose set forth.

4. The card holder and the rotary reciprocating finger, the toggle, and gearing of the motor, combined and operating substantially as and for the purpose set forth.

5. The card holder, in combination with the rotary wing *E*, substantially as and for the purpose set forth.

6. The cards, with openings *a*, and the covering pieces *b*, adapted for operation with the finger *C*, substantially as and for the purpose set forth.

7. The card holder provided with guides *K*, and the cards with channels *n*, combined and operating substantially as and for the purpose set forth.

8. The card holder provided with the guard *L* and spring *L'*, substantially as and for the purpose set forth.

9. The timepiece or motor, the card holder, and operating finger, in combination with the chute *M*, substantially as and for the purpose set forth.

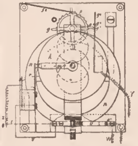
10. In a calendar clock provided with a delivery chute for the purpose set forth, the pendulum having its arm of the form of a frame, as stated.

Clock Movement.—Frederic A. Lane, New Haven, Conn. Filed Dec. 30, 1881.

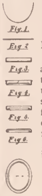
Claim.—1. In a marine clock movement, the verge constructed with banking pins *i i*, projecting from the working surface of the verge, substantially as described.

2. In a marine clock movement, the verge constructed with banking-pins *i i*, projecting from the working surface of the verge, made in one and the same piece with the lever or arm *C*, substantially as described.

Striking Device for Electric and other Clocks.—Alphonse Lemoine, Paris, France. Filed Dec. 9, 1881. Patented in France, Oct. 24, 1881.



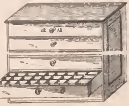
Claim.—A striking device for electric or other clocks, consisting of an insulated disk *k*, provided with a conducting segment *l*, and a conducting disk *n*, having projections *p*, in combination with a connecting conductor strip *m*, two insulated contact springs *r s*, and two contact springs *v v'*, operated by an insulated pin *u*, mounted in the pendulum, the whole actuated to make and break an electric circuit a suitable number of times at the end of each hour, and cause the sounding device to strike the hour, as described.



Manufacture of Locket Rims.—Gustavus R. W. Kuntze, Providence, R. I. Filed Dec. 9, 1880.

Claim.—The described process for forming a locket rim and field piece in one piece of stock, with a joint groove in the edge of the field piece, which consists, first, in striking up the disk to a cup form, (shown in Fig. 3); second, in striking up the beveled rim of the field piece and the groove for the joint at one operation, as shown in Fig. 4; third, in cutting out the central portion of the bottom of the cup, and removing the surplus exterior flange of the rim, as shown in Fig. 5; fourth, in bending the raised rim inward, as shown in Fig. 6, and thus completing the locket rim.

Case or Cabinet for the Displav of Watch Crystals.—Norman Clark, Sterling, Ill. Filed Nov. 11, 1881.



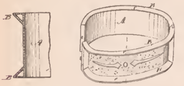
Claim.—1. The watchmakers' case or cabinet provided with trays or drawers *B*, having rectangularly-arranged compartments marked and numbered, respectively, to indicate convexities and diameter of crystals, substantially as set forth.

2. A tray for watch crystals, having compartments regularly marked and numbered from left to right, to indi-

cate the convexities, and from front to rear to indicate the diameters or the reverse arrangement, substantially as set forth.

BRACELET.—William Link, Newark, assignor to himself and Addison Conkling, Elizabeth, N. J. Filed Feb. 8, 1882.

Brief.—The outer edges of the plates are provided with flanges which reach from the edges toward the center of the plates.

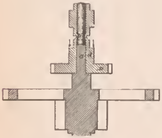


Claim.—1. The bracelet made substantially as herein shown and described, formed of the main plates *A A*, and the hollow reinforcing flanges or ribs *B B*, secured upon the outer surface of the plates at their edges, as set forth.

2. The flanges *B B*, formed of the straight portion *c*, and the diagonal or inclined portion *e*, and adapted to be secured upon the outside and at the edges of the plates *A*, substantially as and for the purposes set forth.

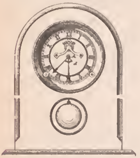
3. The method of forming the ribs or flanges *B B*, which consists in stamping or otherwise bending a plate of metal into double acute angles, and then cutting the bent plate longitudinally in the center, substantially as described.

CANON PINION FOR WATCHES.—Antoine Cordin, Elgin, Ill. Filed Dec. 22, 1881.



Claim.—1. A canon pinion having its canon or barrel reduced in thickness, so as to give it the elasticity of a spring, in combination with an arbor having a groove or tapering neck, the canon pinion and arbor being held together by the reduced portion of the canon being indented into the groove or neck of the arbor, substantially as set forth.

2. A canon pinion, the barrel or canon of which has a continuous periphery, and is reduced in thickness till it has the elasticity of a spring and is adapted to be indented, as and for the purpose specified.



MECHANISM FOR REGULATING CLOCK PENDULUMS.—John W. Williams, New York, N. Y.

Claim.—As an improvement in clocks, the combination, with the center arbor, of an axially-turning pinion or toothed segment having a fixed pointer arm bent over the dial with a vertically sliding and guided rack carrying a split movable stud, and with a pendulum rod suspended from a fixed stud above the movable stud, substantially as set forth.

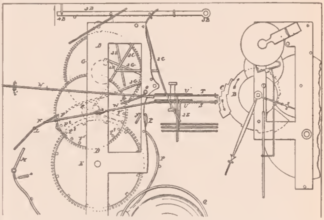
CLOCK MOVEMENT.—Frederic A. Lane, New Haven, Conn. Filed Jan. 25, 1882.

Claim.—The combination, in a clock movement, of a plate forming the rear bearing of the main and center wheel shafts, a center plate forming a front bearing for the main-wheel shaft, and rear bearings for the shafts of the train and balance wheel, the short front plate forming front bearings for the shafts of the center wheel and train, and a support for the front end of the balance wheel shaft, all substantially as described.

REPEATING MECHANISM FOR CLOCKS.—Edwin Y. Judd, Hartford, Conn. Filed Nov. 12, 1881.

Claim.—1. The hour snail *C*, concentric with the arbor of the minute hand of a clock train, and provided with a series of teeth or notches on the side, in combination with said arbor and a ratchet or spring pawl, *C'*, and a device, *B'*, turning with the minute arbor for operating said pawl, whereby the said snail is moved one notch for each revolution of the minute arbor, substantially as described.

2. The combination of one or more feelers, *S T*, connected by suitable mechanism with the striking levers *K N*, for operating them, with said levers and a series of pins of different lengths upon the wheel *F*, whereby said levers are made to engage a greater or less number of the pins, according to the position of said feelers, and with mechanism for releasing said feelers at will, and allowing them to drop upon snails operated by the clock movement and withdrawing them after one turn of the wheel *F*, substantially as described.



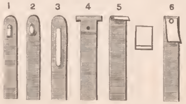
3. The combination of the bar 2^a, the lever 2^c, having the arm 3^c, and the spring 2^n, the feelers *S T*, and the wheel *F*, having a slot for the end of the arm 3^c, whereby the said feelers are released, and kept released during the revolution of the wheel *F*, and then withdrawn, substantially as described.

4. The combination of the snails *C B*, the feelers *S T*, the levers *K N*, having their positions regulated by said feelers by connecting mechanism, the repeating train, constructed as described, and driven by a spring, *H*, or its equivalent, the levers *M P*, carrying the hammers of the bells *Q R*, the releasing bar 2^a, the lever 2^c 3^c, and the lever 2^a 3^a, with a clock movement, the whole forming an independent repeating mechanism for clocks, substantially as described.

Watch Mainspringing.

THE subject of fitting mainsprings to watches is one of paramount importance to all watch repairers, and, in a remote way, to watch-wearers. In these days of half-and-half apprenticeship, when many young lads are in a measure left to their own resources to "pick up" what little knowledge may be gleaned by observation rather than actual teaching, a few words of practical instruction and advice may serve to help a few of the lame dogs over the stiles of difficulty they meet with, at almost every turn in their daily work. When it is considered how large a part the mainspring plays in the economy of a watch, seeing that it is the life, so to speak, thereof, it will not, I think, be occupying space uselessly, if a little close study of its action, mode of fitting, relation to the barrel, some causes of breakages, advantage and disadvantage of stop-work, and the benefit of sliding-clicks, be made.

It will be necessary to set before the reader figures of the various forms of hooking and attachment of the ends of the mainsprings to the barrels. I apprehend that the treatment of such questions as these may to many appear needless; so to those I would say, pass it by. The following examples of spring hooking will show the various forms now in general use. References will be made to them as I proceed. Until a comparatively recent period only about two forms of hooking were in vogue, and these are depicted in Figs. 1 and 2. Fig.



1, with the hook made of steel, riveted to the end of the spring, and fitting loosely in a correspondingly shaped aperture in the barrel ring or rim as it is sometimes called; the hook being sloped and undercut to the pull of the spring, and the face of the hole sloped in like manner, thereby insuring that the hook be not pulled out when the tension is on the spring. In Fig. 2, the hook, instead of being attached to the spring, is screwed or riveted in the barrel ring, and its protruding point undercut a little to catch and hold the spring, which, it will be seen, has a hole made in its extremity. Each of these forms—as, in fact, do all the others—have their advocates, and, all things duly considered, not without reason, although it cannot be denied that a given make of hooking may be quite unsuited to a given make of barrel. There seems to be no rule as regards this—various makers selecting whichever form pleases them best. This, then, brings me to the desired point, *i. e.*, which form of hooking is best for this barrel or that. In modern lever watches one more frequently finds the hook fixed in the barrel, and where the hook is made of good brass, of a consistent strength, and properly fitted and shaped, no form of hooking, to my mind, is safer. In practice it is frequently found that with the form of hooking in Fig. 1, the spring breaks close to the riveting. One reason being that the end is not properly softened; and the other, that enough room in the hole is not left to accommodate the swell of the rivet when hammered over. In consequence of which, the metal round the hole is unduly strained, and a fracture there, sooner or later results. My practical readers will endorse what I say of this form of hooking, that even when the barrel has been adapted to the hook-on-spring style, the hook-on-barrel has been substituted for it, because it has, from one cause or another, failed to hold securely. This is evidence that the hook-on-barrel style is more reliable.

I hold that this form is best, but with this proviso, that the hook is properly fitted. Frequently, from want of careful fitting, the hook "draws," and a new one is needed. I will speak, further on, upon the subject of fitting these hooks, as it is to young hands a source of frequent trouble and vexation. In all the better and middle class of Geneva watches, the form of hooking is as in Fig. 2, where the hole is made in the spring, and the hook fixed in the barrel. In some of the cheaper grades of these watches, as also in some of the lower class Americans, the forms of hooking are as in Figs. 5 and 6, whilst Figs. 3 and 4 represent respectively the better class American and the English Company's styles. Taking these examples in the order here described, we have in Fig. 5 a very rough and ready form, which, although possessed of strength and reliability, is certainly a very bungling way of attaining that end. In this case, either a pin is fixed in the barrel ring, against which the short piece of spring is drawn by the hooked end of the main spring, or a slot is cut in the barrel ring, which answers the same purpose. The same remarks will apply to Fig. 6, excepting that in this instance, the short piece is riveted to the spring instead of being merely caught up by it. The action of hooking up is the same.

In Fig. 3 we find the same principle carried out in a neater and improved form; but, to the ordinary English workman, more particularly in the provinces, this form of hooking is hardly practicable. inasmuch as very few indeed keep springs of that make in their stocks, and, as far as I know, no punching tool for the purpose of producing the tang from the substance of the spring, has yet been brought out by trade tool makers or venders. If these springs get broken, comparatively few workmen take the trouble to procure a new spring of the same sort; they invariably take an ordinary lever or strong Geneva spring, and rivet a small, narrow piece of spring to its end, or break off the portion of the original spring, as represented in Fig. 3, and rivet that to the new one. This practice is bad, because, either from the rivet-head projecting, or owing to the thickness of the additional piece of spring, valuable room is occupied to little purpose. However, one or two advantages accrue to this form of spring, which greatly outweigh objections on the score of replacing if broken. These are that the probability of "blocking" by undue friction, and the chance of the spring giving way at its hooking up, are reduced to a minimum. In Fig. 4, we have the English Company's form of hooking or pivoting, as it may more correctly be called. In conjunction with their patent sliding click, this form of attachment has little or no fault to be found with it; all that is needed to insure safety being that the pivots be properly set in the barrel bottom and the cover. Blocking of the spring in the barrel is impossible with these, as, after winding, the returning click allows release to the spring. If the spring gets broken, the small pivoted piece may readily be riveted on a new one. Thus far I have endeavored to put before my readers the prevailing modes of hooking among watchmakers of the present day. I will not say more as to their merits or demerits, as each in its proper place serves, for good or bad, the purpose for which it was intended.

It is needless for me to enter into a long course of instructions as to the manner of making the various forms of hooking, as anyone having even a very slight knowledge of the use of a file could make and shape as required. In fitting the hook, as in Fig. 1, the rivet should be kept well forward to its face, to prevent the point or edge of the hook rising above the surface of the barrel ring, as the spring is wound up. Should this occur, and not be corrected, the chain may be forced outwards, and catch up in the potence "chain hollow," thereby stopping the watch.

Apart from the subject of hooking, there are other matters having a bearing upon the subject of mainspringing, which are of great importance to correctness of fit and proper working, and the first of these which I will treat of is the before mentioned "blocking." By "blocking," I mean that state into which the spring gets when too tightly drawn up.

The friction of the coils, one against the other, is so great, that the tendency of the spring to uncoil itself is overcome, and there is produced either a total loss of power, or the power is exerted with difficulty, until a sufficient "release" has come about to enable the spring to uncoil at an equal rate of speed.

Again, if the number of coils of spring in the barrel is too great, a less number of turns is got than with a shorter spring. If a spring is too short, then the like fault results, so that the mean of these two extremes is the length to be sought for. There are various theoretical and mechanical modes for determining the length a spring ought to be, but most workmen trust to judgment and the eye alone, and when much practice has been had they seldom fail to get a correct length. One very good rule is to divide the space between the arbor and the ring of the barrel in two parts, and let the spring fill one of them. This invariably allows a correct space for the spring to work in. Where stop work is fitted to the barrel, and is in perfect working order, the mainspring is always at a tension, *i. e.*, it is never fully down, nor ever fully wound up, consequently, "blocking" of the spring never happens, excepting it be fouled with dirty, hard oil, which prevents the coils gliding over each other easily. All springs require free oil to them, so any dirty oil should be cleaned away, either by removing the spring from the barrel, (which is best done by taking hold of the *second* or *third* coil, and easing up gently, not by the *first*, which is generally soft and easily bent), or by working a thinly pointed peg between the coils as far as possible. In cleaning a watch that has been running a long time, it is always wise to see to the cleanliness of the mainspring. This, being the source of power, should in every respect be free. It is no uncommon thing to find the stop work wheels either partly or altogether removed from the barrel. Generally speaking, the stop works are badly fitted, or in the course of time get badly strained, and are a source of evil to the watch unless corrected, replaced with new, or altogether removed; which last, I think, is more frequently done. When the stop work is perfect in its action, the full force of the winding, at the last pull, is not felt at the barrel hook, because the stop work takes it; but when it is absent, then the hook takes the whole strain, and it is in such barrels that strong and reliable hooks are most needed, and the weak and insecure ones fail. When a spring is fitted with a tang, stop work is seldom or never used.

I will now direct the attention of my readers to some known causes of breakage, which may in a great measure be obviated by care in fitting. My experience has been that eight out of a dozen springs, more particularly in watches of a common class, get broken in either the second or third coil. I attribute this in some measure to inattention to the size and make of the arbor hook, and to want of correct tempering of the inner coils of the spring. In the earlier and the better class of Geneva and English watches, it was usual to cut away a portion of the arbor, thus having the hook contained within the circle of the "roller," as it is sometimes called. Consequently, the spring is wound round a true circle, and not anyhow, as is too frequently the case where the hook is sticking a considerable distance out of the roller. In this case, the spring is unevenly coiled, and from the pressure of the outer coils against the inner, and these against the hook, which presents only a point, be it remembered, and that right in the *center* of the breadth of the spring, it cannot be at all wondered at if the spring does break. In no case should the hook be left longer than is necessary to catch and hold the spring, and the inner coil of the spring should fit close around the roller. The roller hook should be a little undercut. When a new spring is fitted, it should always be observed to have a sufficiently large hole in its inner coil to fit on the roller hook, without its being pressed up or down in the barrel.

Always examine the new springs for any specks of rust. If marked with it, it is always wise to discard them, as the smallest particle of rust may prove fatal to the durability of the spring. Where springs are kept in quantities, it is a very good plan to cover them with thoroughly dry slaked lime. Springs may be kept for years, without a sign of rust appearing upon them, if treated in this way. Being only a dry powder, the lime may readily be removed by wiping. It is no uncommon thing, either, when a spring breaks, for the hook in the barrel ring to be forced out, and so necessitate a new one. In doing this little repair, the hole should either be fresh tapped, or a new hole drilled and tapped, if the old one be too large. Never insert the old one and secure with solder, as is frequently done; it is a horrid patch, and never safe. In fitting a new hook, it should be observed to have the thread on it one size larger, according to the number of the hole in the tap plate, than the tap was with which the hole was threaded. For example, if the hole was threaded with a No. 10 tap, the hook should be threaded in a No. 9—*i. e.*, one size larger. This insures a tight-fitting screw. The point of the hook should in all ways be finished before screwing in, so that only cutting off and filing down outside the barrel is necessary. Occasionally one sees a hook made by inserting a piece of wire in a drill hole, turned round, and soldered. This, at its best, is a wretched and unworkmanlike way of doing what, even when done in a perfect manner, is only a simple job.

Always take care, in fitting a new hook, that the hole comes in the center of the ring. If otherwise, the spring, unless it has a large, square hooking hole, will be pressed upwards or downwards in the barrel, and so be bound. Always keep a little clearance between the springs and the barrel lid.

If the lid, when pressed home to its seat, rests also on the spring, it will undoubtedly be bound, and be robbed of much of its power, and so cause it to act in a jerky manner. Always clean out the barrel holes and the arbor, and re-oil them. In pinning on the stop finger of a Geneva barrel, care should be taken that in doing so it is not pressing on the barrel lid. The least portion of clearance suffices. It may have seemed needless to allude to these little matters, but it is well known that watches frequently stop through neglect of these seemingly trite faults. Remember that small leaks sink great ships, and that one or two apparently insignificant errors may cause the worker more trouble, if neglected, than might a glaring fault which he feels cannot be passed over without correction.

It is always false economy on the part of the repairer to put cheap springs in watches; the difference in the cost of good and bad is but small.

When fitting springs with hooks riveted to them, the workman should always shape the hook and polish its face before it is put in the barrel. If finished off after, as is far too frequently done, the gilding on the barrel will be sure to be injured in the process. The rivet of the hook should be kept well to the front, so as to prevent the face of the hook rising after the spring is wound in the barrel. Never, on any account, if possible, wind in a spring to a verge or lever barrel without the proper winder. If wound in the barrel by the fingers alone, it is sure to get telescoped, and, consequently, will not work free in it. Geneva springs may in some cases be wound in with the winder, and in others by hooking the inner end on the arbor roller, placing the thumb on the barrel lid over the spring, and turning with a key. See, too, that the arbor has end shake when the lid is put on. Should a barrel lid fit loosely, burnish the edges over with a tool until tighness is obtained.

When winding in a spring, never let the recoil be great, and the hook snatch into the hole, or the spring on the barrel hook. It may either be injured or torn away by doing so.

I would like, now, to say a few words to watch wearers ere I conclude my rather lengthy letter. You get very much vexed, do you not, when you hear that ominous buzzing, whizzing rush of the spring, when it has departed this life? Of course you do, and, mentally, you anathematize the workman who last had your watch in hand; but you think yourselves blameless. Not so fast, good friends! Take a piece of cotton thread, and attach to it a weight, say, a pound or so; lift it gently, and you will raise the weight in safety. Now set it down again, and with a sudden jerk try to raise it again. What is the result? Why, the thread breaks, of course. So it is with the spring of a watch. Either through a badly-fitting key, or a spasmodic rolling-up-a-well bucket style of winding, the spring is unduly jerked and strained, and soon or late "is not among the things that are." Wind up smoothly and regularly, and ten chances to one, a good quality spring will last many years. I have seen springs in good working order after fifty or sixty years' wear and constant useage. Something more than mere quality of metal must have contributed to such a long drawn out existence.

I had intended to have written a little about punching, and otherwise making the holes, but my letter has been spun out to such an abnormal length, that I fear it will be excluded if I trespass any further.

ALFOJOE.

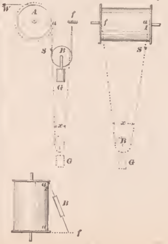
The Loose Roller in the Clock.

[BY C. H. SCHNEIDER, FURTWANGEN.]

(*Concluded.*)

THE WEIGHT is suspended from a loose roller; the cord ends are not parallel. To establish the proportions between G, W, and S, we make use of Fig. 3, in which we assume the loose roller B (Fig. 2) concentrated upon a point. Weight G is represented by an arrow. Now, if weight G shall descend uniformly, the performance of G must be equal to that of S and W. The distance accomplished by these two powers is obtained as follows:

If roller A revolves by a small angle, whereby a point upon its circumference describes the little arc s, then this value s is the distance accomplished by the attacking points of resistance W and tension S, upon the roller circumference, to which they stand in a tangential direction; the simultaneously accomplished distance $m\ n$, of weight G is obtained by the following reasoning: If in Fig. 3, $a\ m\ f$ is the commencing position of the cord passing around the loose drum, and x the angle of inclination of both cord ends, then comes, after the little piece of cord s, when it has unwound from the roller, the cord passing around the loose drum, assumes the position $a\ n\ f$. Let us imagine a and f connected by a line; we must consider $a\ m\ f$ and $a\ n\ f$ as two equilateral triangles, the sides of which are proportioned thus that



FIGS. 3 and 4.

$$a\ n + n\ f = a\ m + m\ f + s$$

$$\text{or, } 2\ a\ n = 2\ a\ m + s$$

$$\text{and } a\ n = a\ m + s\text{-}2.$$

Now, if $a\ o = a\ m$, then,

$$a\ n - a\ o = s\text{-}2,$$

$$\text{or, } o\ n = s\text{-}2.$$

If we draw $o\ m$, we have a little triangle $n\ o\ m$, which, by a very small s, may, at o, be regarded as a right angle, and its angle $o\ n\ m$ as differing very little from the original half inclination angle, so that for the small distance $n\ m$, accomplished by the weight in the vertical direction, if upon the roller circumference A, the powers W and S accomplish the little distance s, together with their points of attack, the proportion is $n\ m = s \div 2 \cos x\text{-}2$, whence follows, according to the axiom of the uniformity of the mechanical labors:

$$G \frac{S}{2 \cos x\text{-}2} = S\,s = W\,s, \text{ or } \tfrac{1}{2} \frac{G}{\cos x\text{-}2} = S = W,$$

and also $G = 2 \cos x\text{-}2\ S = 2 \cos x\text{-}2\ W$.

These conclusions may also be deduced in another manner, by dismembering weight G, by the parallelogram of the powers in the two cord directions, as shown in Fig. 4. From this will be seen that although resistance W and cord tension S are equal to each other, yet both are changeable, as soon as the angle of inclination, x, of the cord ends changes. If $x=0$ (zero), then the two cord ends are parallel, and W and S are equal to half the weight G; but if x continually increases, both S and W will also correspondingly increase, and for $x=180°$, even these two powers would become immensely large. The following table gives a review of fhe value of S for different angles of inclination x:

x in degrees.	Value of $W=S$ as multiple of the weight G
0°	$S=0.5\ G$
5°	$S=0.5004\ G$
10°	$S=0.5019\ G$
20°	$S=0.5077\ G$
40°	$S=0.5321\ G$
60°	$S=0.5774\ G$
120°	$S=G$
178°	$S=2.865\ G$

The same result may also be obtained by drawing; by supposing for the weight a straight line, and dividing it into tenths and hundredths, and constructing for the different values of x above, which is the distance representing the weight, the parallelogram of the powers (Fig. 4), and then measuring the sides of the parallelogram, which represent tension S, with the same measure by which G was divided. The measure thus obtained is S.

Such large angles of inclinations as were supposed here at the end of the above table, for the cord ends of course, do not exist in practice; we simply wished to show by this table how one is enabled, with one and the same weight G, to produce a very different effect upon the circumference of cord roller A, in accordance with the inclination of the cord ends, and this inclination continually changes with the height of the weight.

Horological writings do not treat of the different styles of effect produced by the weights suspended from loose cords, but only of the special case when the cord ends are parallel, and the preceding explanation on the influcnce of the angle of inclination of the cord ends is therefore the more appropriate, as in practice the arrangement of a fixed point f of one of the cord ends (Figs. 2 and 3) in a clock movement, is often entirely overlooked, whether the cord ends running around a loose roller are parallel or not—the view appears to be entertained that it is of no consequence.

If clocks with weights suspended from loose rollers are examined, the inclination angle of the cord ends will often be found to contain as many as 20 and more degrees.

Change of the angle of inclination of the cord ends during the time of going, which are at first parallel.—The arrangement represented in Fig. 3, does not actually occur in clocks; the place of the cord roller A, Fig. 3, is occupied by the cord drum—to which one end of the cord is fastened, and upon which the cord winds itself. Fig. 5 gives upper, lower and side views.

Let us suppose that the weight is fully wound up, and the fixed point f is thus fastened that the cord ends run parallel; then the draught exerted by weight G upon the circumference of the drum is equal to ½ G, and we suppose that this draught is sufficient to overcome all the resistances, W, of the clock train, and reduced upon the drum circumference by a uniform motion of weight G, and that at this height of the weight the clock goes right and keeps good time. The weight gradually sinks. The fixed point f of the cord remains unchanged, but the point of escape a of the cord on the drum runs along the drum, and gradually removes farther and farther from fixed point f, and therefore previously existing parallelism of the cord ends is abolished, and an increasing inclination takes place, whereby also an increasing operation of draught effect of the weight G upon the circumference of the drum arises, thus that the draught effect becomes larger than the sum of the resistances, W, of the clock train, reduced upon the circumference of the drum. This excess of draught effect, in comparison to that of the weight at the beginning of the time of going, by parallel cord ends, when the escape point a of the drum has reached its greatest distance from fixed point f, is greatest, and, of course, duly influences the pendulum motion, in what manner the clock's rate is influenced thereby, we will see afterward.

It will be seen by this that the view of the workman, according to which the weight gradually increases the farther it sinks, and is heaviest at the end of the clock's rate, is not as incorrect as it might be, and only wrongly expresses a fact—the weight does not become heavier, but the draught effect of the same weight upon the circumference of the drum increases with the sinking of the weight. Whereby is shown that by the customary arrangement of the loose roller, a weight should not whatever be considered as an unalterable propelling power of a clock. Of course, this is nothing new, and the defect is sometimes sought to be corrected in clocks with cord drums.

The author has seen clocks in which the drum was not cylindric, as is commonly the case, but conical toward the escaping end, whereby the increasing draught effect of the escaping weight operated with increasing drum lever, and the influence of the weight upon the clock train remains unchanged—it is an arrangement similar to the fuzee of spring watches.

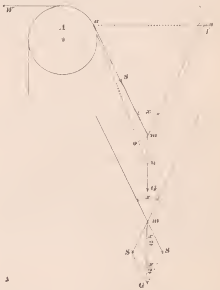


FIG. 5.

There are still other means of compensating almost entirely or approximately, the changeable operation of the weight suspended from a loose roller. The fixed point of the one cord end is not fastened as indicated in Fig. 5, but nearly opposite to the drum center, making the drum as short as practicable, and using thin cords, whereby the increase of the angles of inclination is much contracted. The fixed point f may also be made movable, to preserve its removal from escaping point *a* unchangeable, as well as the previous parallelism of the cord ends.

We have not, in this instance, as we did in Figs. 1, 2 and 3, established the mathematical relations between weight, cord tension, and resistance upon the circumference of the drum, it being a little more complicated in these than in the former instances, beside not being necessary for the purposes intended to be demonstrated by this. The previously established simple proportion, whereby cord tension G was equal to resistance W, here ceases, since the direction of S is outside of a normal plane of the drum to its revolving axis, and therefore only one of its components is equal to the resistance W, while the other components operate in the direction of its drum axis, and seeks to displace it in its axial direction.

Final remarks.—It solely remains to establish what influence the above ascertained increased draught operation of the weight upon the circumference of the drum has, by an increasing inclination of the cord ends. If we have a clock with a slowly oscillating and heavy pendulum with a small angle, then the increasing excess of power, transported upon the pendulum, will only to a trifling amount increase the dimension of the oscillation angle, and if the angle still remained within 3°, then the pendulum oscillations remain isochronous, and nothing is changed in the clock's rate; the inclination of the cord ends remains without influence.

If we have a clock, however, with a short, light pendulum, its oscillation angle increases by an increase of the excess of power, and it now depends upon the suspension spring of the clocks in comparison to the pendulum weight, to establish what influence it has upon the clock's rate. If the suspension spring is feeble in comparison to the pendulum weight of the clock, the latter will retard, because the angle of oscillation increases; if, however, said spring is strong, the clock will gain, because under the governing influence of the strong spring, the laws of the freely oscillating pendulum are changed in so far that the greater oscillation angles will be accomplished in less time than the smaller. A clock also may be found which, notwithstanding the larger oscillation angle, does not change its rate; this will be found to be the case, if the strength of the spring stands in such proportions to the pendulum weight, that it influences the free oscillations thus that all oscillations, no matter how large, remain isochronous. With regulators from factories, the case of feeble springs, and the retarding of the clock, by the sinking weight, will oftenest be the case.

The Origin of the Medallion.

THIS interesting question was treated by the custos of the Vienna Antique Cabinet, Dr. Kenner, in a masterly manner in a discourse delivered before the Numismatic Society. Several views exist on the origin of the word *medallion*. Commonly, it is held to be derived from *metalla*, with time corrupting into *medallha*, *medallia*, etc. The medallion in olden times appears to have possessed a monetary value; while later on, they served as ornaments. Only the portrait of the present ruler, male or female, or throne heir was allowed to be engraven on the medallion. The transgression of this law was punished with death. These medallions, in the first century, were made of gold and silver, under Commodus, in the second century, also bronce medals appeared; to be followed by a time when only gold medallions were worn.

Sight.

WHAT THE OPTICIAN SHOULD KNOW ABOUT OPTICS.

IT IS necessary for my readers to have a clear knowledge of the theory or philosophy of "sight" before they can follow me with any interest into the consideration of practical points regarding defective vision. A failure on the part of most opticians to have familiarized themselves with this interesting subject, before commencing their duties as village or city opticians, has led to many unnecessary misunderstandings between them and their patrons. You must not think that the chapter of optics as applied to the correction of visual defects, is lacking in exactness because you happen to know some enthusiastic oculist, who is constantly making blunders, while he is claiming to do his work with hair-splitting exactness. I know myself of one "oculist," who enjoys the greatest reputation as being quite the proper man on glasses, who has been known to give convex, No. 20, to one who has normal vision, and convex, No. 36, where No. 12 should have been given. I hardly think any of my readers can make greater blunders. This case illustrates the fact that many men have made great reputations by systematically and carefully hiding their blunders.

It is my most earnest desire to so educate those dealing in spectacles, that they will make it uncomfortable for the *impostors* who infest the country.

THEORY OF VISION.

If we take a magnifying glass, No. four, in one hand, and allow rays of light, reflected from an object twenty or more feet distant, to pass through the lens, there will be formed, at a little more than four inches behind the lens, a distinct *inverted* picture of the object, which may be seen by holding a sheet of paper at this point. Let the magnifying lens represent the cornea and lens of the eye; the space between the lens and paper, the dark chamber or diameter of the globe; and the sheet of paper, the retina—or expanded nervous apparatus connected with the brain, and we have the same condition as in the eye, when adjusted for distant objects.

It seems very simple for us, with the light of the present age, to explain the theory of vision, but it was for centuries that the world was without the slightest knowledge of the theory of vision. Francis Maurolycus was the first to approach the correct theory of vision, in 1575. He compared a simple convex lens with the lens of the eye. He, however, argued himself out of his conclusions, on the ground that if the lens were identical with a simple glass lens, we would see all objects inverted. The next step after Maurolycus' discovery was made by John Baptista Porta, the inventor of the camera obscura; he compared the instrument invented by him with the eye. He, however, supposed that the cornea was the lens, and that the images were received on the anterior surface of the lens.

As clear a theory of vision as we have given with the lens and sheet of paper, was first given by John Kepler, in 1604. Des Cartes, 1637, was probably the first to practically demonstrate that an inverted image of observed objects is formed upon the retina. He removed all the coatings from the posterior pole of an eye, and placed in the opening a piece of ground glass, upon which he had the satisfaction of seeing the retinal image formed. Our rudely constructed illustration of an eye, possesses the ability of casting distinct images upon the retina, from objects at a given distance only. If the object is brought nearer than twenty feet, the rays coming from it are no longer parallel, they are diverging; consequently, the lens No. four will not be able to bring them to a focus upon the paper. They will come to a focus behind the paper; consequently, it is necessary that the paper be moved further back, or the strength of the lens must be increased. In the eye it is impossible to change the length of the globe, therefore, the thickness of the lens is increased. The eye is constantly changing its adjustment.

Accommodation is the name applied to this faculty of changing the focus of the eye for near and distant objects. When the lens, through the effects of age, becomes so stiff that the muscle cannot increase its thickness sufficiently to focus rays of light from near objects, we have simple presbyopia, or old sight; this trouble constitutes eight-tenths of the cases who apply to an optician for spectacles. The defect is so easily remedied, and the patient, although he receives an improper glass, is so well pleased, that opticians are very reluctant to make themselves sufficiently acquainted with troubles that are less frequent. In presbyopia, or "old sight," this slight failure on the part of the lens is compensated for by the use of weak magnifying glasses. In our illustration it is a little more than four inches from the lens to the paper, a distance a little more than four times the diameter of the eye. Should we in round numbers shorten the eye ½ inch, by bringing the paper half an inch nearer to the lens, we would produce

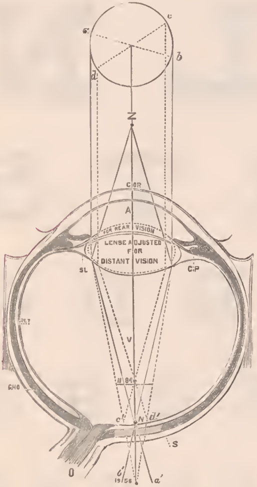
HYPEROPIA.

(Far-sightedness), ⅓; that is, it requires convex lens, No. 3, to be placed before the eye, in order that light from distant objects shall not be focused behind the retina, but may be brought to a focus (while the eye is at rest) upon the retina. Such a person, although a child, may require convex No. 3 to read with. It is thus seen that persons who have any degree of far-sightedness, require in old age, spectacles which are out of proportion to their age, but perfectly in keeping with their eyes.

If we lengthen the eye twice as much (one inch) as we shortened it in the case of "far-sight," we will produce the same degree of near-sight (Myopia, ⅓). If the eye must be lengthened twice as much to produce a given degree of myopia, as shortened to produce the same degree of hyperopia, it appears that the myopic eye sees twice as indistinctly as the hyperopic eye with an equal degree of imperfection.

The myopic eye which has myopia ⅓, requires a concave glass No. 3, to see distant objects.

Having roughly illustrated the theory of vision, and the nature of hyperopia, myopia and accommodation for near objects, let us apply the principles learned to a diagramatic eye, and then proceed to the more practical parts of our subject.



ACCOMMODATION.

In the cut before us we see the lens attached to the muscle, which enables it to change its form and adapt its strength for objects at all distances. It is adjusted for distant visions, or parallel rays of light; those coming in the direction of dark lines *a b*, are from distant objects, and are focused upon the retina. If we bring the observed object nearer, say three inches, or at the point *z*, the light would be divergent, and would be brought to a focus so far behind the retina that the object would be seen very indistinctly. The lens, however, changes its form, as is indicated by the dotted line, and in so doing it increases its strength sufficiently to focus the light from the near object just as distinctly as it formerly did the light from the distant object. If we shorten this eye ½ an inch, we have hyperopia, ⅓. Such an eye, to see at a distance of twenty feet, has just as much strain as a normal eye has to read at three inches distance. If this diagramatic eye is lengthened one inch, we have myopia, ⅓.

ASTIGMATISM.

The eye may be ovoid, not spherical, the curve of the sphere being much sharper in one meridian than in the meridian at right angles to it, in which case a pin hole in a card held to the light will not appear round, but will appear oval, the distorted diameter of the hole being in the direction of the sharpest curve. Let us, in the diagram, imagine the black lines to pass in the vertical plane, and be focused upon the retina, while the rays represented by the dotted lines *c d*, passing in the horizontal meridian, are brought to a focus at 19 millimeters behind the retina. Great indistinctness of vision attends this congenital defect, and it can only be relieved by having a glass carefully ground to correct each individual case.

The questions which you have daily to decide upon, are, Why does this person come for glasses? and, What shall I do for him?

From his age, a knowledge of the average acuteness of vision, and the statements of the patient, you can usually draw a correct conclusion as to the nature of the difficulty. It is my object to assist the optician to do all that is possible for him to do, and to show him how to detect visual imperfections, which, in many instances, he cannot correct. There are also many diseases which the optician is the only one who has a chance to observe early, and if recognized by him, he can, by giving timely warning, save his fellow from becoming blind.

ACUTENESS OF VISION.

The visual tests introduced on the following page are the standard tests for measuring the acuteness of distant vision. At ten or more feet the radiating lines should all appear equally dark; if they do not, the person has astigmatism, and will require a special cylindrical lens* ground to correct his special case.

Section of Common Convex Periscopic Spectacle.

Section of Convex Cylindrical Lens, Axis Horizontal.

To use the letters, the patient should be placed at twenty feet from them; if he can read the last line, his vision is normal, and is numerically expressed as $\frac{20}{20}$; if he can only read the line marked xxx, he has $\frac{20}{30}$ of normal vision. The distance in feet between patient and letters is always the numerator of the fraction which expresses his acuteness of vision, while the number over the line is the denominator of this fraction. From these test letters the acuteness of vision, as compared with *the average* man, may be readily determined. It is very important to have a universal measure, by which it may be determined if a man's vision is poor, how poor it is, and, if it is from day to day growing poorer. It is also important to measure the amount of improvement produced by glasses or other means. You will find these tests very useful as long as you select glasses, and I advise you to preserve them for future reference.

[*To be continued.*]

* See nature of spectacles.

FOR FITTING PRESBYOPIA OR OLD SIGHT.—Hold this page about 12 or 15 inches from the eye, find smallest type a person can read at that distance; the number corresponding will be the number of spectacles required.

1st. The Jewelers' Circular and Horological Review, 42 Nassau Street. 60 to 50.

2d. The Recognized Organ of the Jewelry Trade of the United States. 50 to 40.

3d. The Official Representative of the Jewelers' League. 40 to 36.

4th. Subscription, $2.00 per Annum. 36 to 30.

5th. The first thing to be done is to subscribe. 30 to 26.

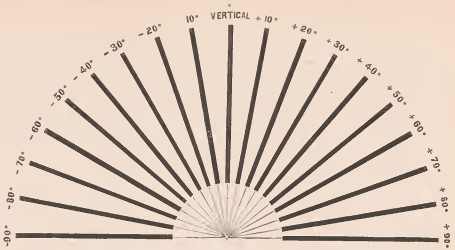
6th. Obtain a soft, cooling eye-glass. 26 to 20.

7th. Or Spectacle, constructed 20 to 18.

8th. Upon scientific. 16 to 13.

9th. Principles are the 13 to 11.

10th. Best for use. 11 to 9.



The above lines should all appear equally black at five, ten, and fifteen feet. Those to whom they do not appear alike have a visual defect that ordinary spectacles will not remedy.

LXX.

G L N

L.

P R T 5

XL.

V Z B D 4

XXX.

F H K O S 3

XX.

U Y A C E G L 2

The Retail Jewelers' Association of Texas.

A STATE jewelers' convention, styled "The Retail Jewelers' Protective Association of Texas," was organized in this city on May 5th. The call for this convention originated here some months ago, and, though signed by many jewelers throughout the state, to the retail jewelers of Houston is due the credit of having paved the way for the organization of the Association, and, in appreciation of this fact, one of the leading retail dealers of this city, and one of the oldest jewelers of Houston, Mr. S. Conradi, was unanimously elected the first President of the Association, a deserving acknowledgment of his assiduous labor in bringing about the organization, the first jewelers' association organized in Texas.

The representation at the convention was small, there being but about 20 delegates to organize the Association, as charter members, and the majority of that number were local dealers. This is not considered, however, as ominous of any want of success attending the movement, as the history of such organizations, especially in this state, will show that their commencement is always regarded as more or less experimental, and are frequently looked upon with distrust; those who are eligible to membership holding back to observe the success of the movement before affiliating with it. This fact is attended with its advantages, as small bodies are always more effective in perfecting an organization, and the few jewelers who assembled here on the 5th, unencumbered in their work by cumbersome members, organized their Association expeditiously, and have laid the foundation for most any superstructure that may be built upon it. The delegates present from other sections of the state were very hospitably entertained while here, by the local dealers, and their labors concluded, they were banqueted, feasted, and generally entertained in a manner that will render their first meeting, one attended with very pleasant recollections.

THE ORGANIZATION.

The only business transacted was that of permanent organization, and the adoption of a constitution and by-laws. The following preamble to the constitution sets forth the objects of the Association in clear and concise manner:

"The jewelers of the State of Texas, being desirous by unity, mutual intercourse and interchange of knowledge, to further their interests and raise their trade to its highest standard, and being also conscious of the great injury done to them by unscrupulous wholesalers, who, not content with the wholesale trade, seek also to divert the retail trade from its legitimate channels by means of price lists and catalogues, do hereby, in convention assembled, adopt the following preamble and constitution, and respectfully urge that their fellow jewelers in the United States assist them by co-operation, in their efforts to protect the legitimate interests of the trade."

Especially do they uncompromisingly condemn the practice of a number of jobbing houses to issue and scatter broadcast general jewelry price lists and illustrated catalogues.

There is no retailer but has suffered constantly in loss of trade and of his legitimate living profits by these price lists, which are sent to him unsolicited and in increasing quantities. No amount of assurance that they are sent to the trade alters the fact that they find their way to the public, and are ruinous to the business, and wholly unnecessary. The old houses so well known to the trade do not use these grasping means to secure trade at any cost, but reach their customers through the legitimate channels of trade papers and through their travelers.

Now, in view of these facts, the jewelers of Texas, supported as they believe themselves to be, by the whole retail trade of the United States, respectfully request these jobbers to entirely discontinue the obnoxious practice of publishing and distributing general jewelry price lists, except in sealed envelopes, and directed to a person known to be a practical or retail jeweler, who makes that his leading business, and we hope that this, their just and united demand, will be promptly complied with.

To those jobbing houses, who, after the 1st of July, persist in violating this rule, they would say that necessity and self-preservation will force them to regard these jobbers as distant retailers, who attempt to withdraw the tradè of the surrounding country, and, as such, deserve neither countenance nor custom. It is not proposed to prevent the advertisement of novelties, and especially those which may be sent in sealed envelopes, or the circulation of material catalogues, which are useless to the outside public, but simply to stop the issue of general jewelry lists, which are a jewelry store in themselves, and tend to rob the dealer of his legitimate and living profits.

To those jobbers who will promptly comply with our demands, we would say that we shall welcome them, or their representatives, at our homes, visit them in their cities, study their advertisements in our trade papers, and their goods on their merits.

The constitution and by-laws adopted merely regulates the working machinery of the Association, prescribing the duties of standing committees, officers, etc.

Under the constitution the following officers were elected for the first year: President, S. Conradi, Houston; First Vice-President, John Fisher, Dallas; Second Vice-President, B. Heidbrink, Austin; Third Vice-President, J. F. Woodmanse, Flatonia; Secretary and Treasurer, E. L. Coombs, Houston. The Executive Committee: J. L. Mitchell and Max Roy, of Houston, and D. Goodin, of McKinney.

Mr. E. R. P. Schurly, of Chicago, was present at the convention, and was created an honorary member of the Association.

The regular conventions of the Association are fixed upon the fourth Monday in April of each year, and Dallas was selected for the place of holding the next annual convention.

Those who were present and who signed the constitution as charter members of the organization, are: Geo. F. Flint, of Mineola, Jno. F. Woodmanse, of Flatonia; D. Goodin, of McKinney; B. Heidbrink, of Austin; Chas. Bente, L. Schuster, E. Froment, Louis Peine, Henry Pepin, J. L. Mitchell, S. Conradi, J. J. Sweeney, E. L. Coombs, H. E. Reunmann, Max Roy and E. Fremont, Jr., of Houston; H. Pypinski, of Calvert, and Jno. Fisher, of Dallas.

THE PROSPECTIVE MEMBERSHIP.

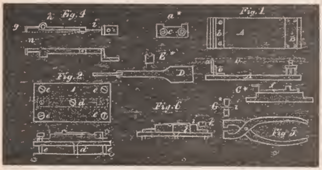
The committee on credentials reported the following list, which includes nearly every reputable retail jeweler in Texas, as containing the names of those of the craft eligible to membership:

O. J. Lawrence, Arlington; A. Bahn, H. S Cooper, L. Erk, P. Humbert, S. A. Packson, C. Meyer, J. S. Vredenberge and B. C. Wells, Austin; A. Schwander, Beaumont; T. A. Pell, Bells, Grayson County: Henry Austin and Jule Tobler, Belton; M. A. Bridges and H. W. Grabler, Brenham; F. Larasguito and F. C. Mason, Brownsville; J. M. Crendwell, Brownwood; J. T. Wise, Bryan; C. O. Wingren, Burnet; A. Pypinski and G. S. Tait, Calvert; E. P. Graves & Son, Centerville; C. B. Linn, Cisco; Lawrence Pool and Walter Tims, Cleburne; F. Stoppel and J. M. Clover, Columbus; E. Buhert, Flowaday; Thomas & Co., C. E. Rose and A. Stahlberg, Corpus Christi; R. C. Springs, Crockett; J. D. Walker, Cuero; F. Austin, E. A. Bohne, F. M. Clover, R. Cohen, John Fisher, John Knepfly & Son, J. M. Gram, J. H. Phillips, C. A. Souter, G. B. Stearns, W. Warren and J. W. Webb, Dallas; P. H. Slutzky, H. T. Walker and J. D. Woodyard, Denison; F. C. Dell, Eagle Pass; C. Dolt, H. Pionskowsky, and Rothschild & Marcus, El Paso; F. A. Boerner, Ennis; E. Fink and J. F. Woodmansell, Flatonia; Howard & Day, W. A. Soutu, H. Tully and A. J. Williams, Fort Worth; H. R. Richter, Fredericksburg; G. Bourgower and A. E. Cash, Gainesville; A. Cadot, J. F. Edwards, Theo. Goldman, Aug. Hempel, Louis Kaufman, A. Neiman, N. Salyman, M. W. Shaw, Jul. Socha and T. E. Thompson, Galveston; W. C. Plaffle and R. W. Winning, Georgetown; A. Lange, Goliad; Burbee Blake and J. R. Hams, Gonzales; J. W. Terrell, Halletsville; A. Vinder, Hamilton; John Miller, Hearne; J. Rubin, Hempstead; T. Terry, Honey Grove; E. Rothschild, Jacksonville; Day & Chandler, E. W. Mitchell and R. Walhanderfer, La Grange; A. Joseph and F. Under-wood. Laredo; F. Blum and S. B. Glendwing, Lockhart; J. S. Day, Longview; M. Hendry, Luling; W. S. Cloyd and D. Goodwin, McKinney; J. T. Pae, Longview; Gus Seidel, Schulenberg; H. Kressden, Seguin; L. F. Ely and J. Lintz & Bro., Sherman; W. H. Henley, Stevensville; W. F. Adair, W. A. Rutledge and W. R. Walker, Sulphur Springs; Louis Dinnelly, Torrell; A. M. Murphy and J. P. Whitney, Tyler; G. Diesbeck and W. G. Morris, Victoria; J. Leavinsky, S. A. Pardee, W. M. Ragland, W. P. Rivers, M. Schmidt and J. D. Wood, Waco; F. C. Boerner and J. C. Woodlief, Waxahachie; James Semper, Weatherford; Oliphant & Stewart, Weimer; W. M. Martin and W. W. Wilson, Whitesboro; N. S. Chapton, Wills Point; W. T. Hyde, Woodville; Copeland Bros., M. Dukert and F. W. Slater, Marshall; J. M. Day. Mexia; Geo. F. Flint, Mineola; H. C. Musterson, Montague; J. H. King, Mount Pleasant; Louis Brook, Navasota; P. A. Rohlstadt & Bro., and M. Wimer Palestine; S. G. Hudle and J. A. Martin, Paris; Newberry & Co., Pilot Point; Bell Bros., J. M. Emerson, C. F. Fisher, E. Herzberger, C. F. Klein, H. Klockenkemper, Perida Bros., L. Rouvalt, A. Sarter, J. Schmidt, B. Schwartz and A. Sens, San Antonio; L Hopkins, San Augustine; A. L. Esterele and E. Woodman, San Saba.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

IN MAKING a detent for a chronometer, the certainty of touch and action based on long experience, is about as perfectly illustrated as in any case which could possibly be selected. It is one of those pieces which require great skill and care; but if the instructions here given are perfectly observed, success is certain, and all danger of breaking the delicate spring close to the attachment will be avoided. In the majority of cases the workman will have the old detent to go by, and, if in case the old one should be lost or entirely destroyed, the better way would be to obtain one of nearly the same size for a pattern. A piece of Stubbs steel wire, first filed square and then gradually roughed into shape, is the first step. The last of the filing is done with a three-inch (long) square file, and a No. 8 cut. After the piece is roughed out to the correct length, and about twice the size—it should be in cross section—it should be hardened, and this is the best done by leaving a piece of the wire it was made from, (about three inches long), attached to it. The hole where the locking jewel goes, and the screw for the lifting spring, should be drilled, and the latter tapped before hardening. The detent should be plunged endwise in oil to harden it, and then have oil or beeswax



burned off it, to anneal it. The filing now can be resumed until nearly of the size required; this is to be ascertained by measuring with a Grossmann guage, or some equally delicate measuring tool. There are a great variety of ways of making a detent, but the form shown is as usual as any, and the same general rules will apply. The grinding apparatus is the same in principle as already shown for finishing scape wheels, except that it is not used in the lathe, and has a bed with adjustable pieces. Fig. 1 shows a plan of such a grinder; *B* is a bed of thick hrass, $1\frac{1}{2}\times4\frac{1}{2}$ inches; this should be made tolerably flat and true; the piece *b* is of heavy brass, bent at a right angle in the direction of its length—size $1\frac{1}{2}\times1$; about No. 14 brass is heavy enough. The piece *a* acts as a guide and steady piece, and is attached to *b* with two screws; this piece is shown separate at *a**. The piece *B*, Fig. 1, shown enlarged and separate at *B**, is of No. 14 brass, $2\frac{1}{2}\times1$ inch; it is attached to the bed plate *A*, with one screw shown at *d;* this screw is countersunk in *B*, and tapped into *A*. Four screws shown at *c*, cut *B**, serves to tip or tilt the plate *B*, at such inclinations as may be necded in grinding. At *C* is shown a pin $1\frac{1}{2}$ inches long, $\frac{1}{8}\times\frac{3}{16}$ square; the ends are cut down as shown in *C**, to admit screws for attaching it to the piece *B*. At *C** a detent is shown attached to *C* with shellac. We will now describe the *modus operandi* of grinding. At Fig. 4 is shown a detent, the upper view being a plan, and the lower as if seen in the direction of the arrow; the surface shown in continuation of the dotted line *g*, is simply ground flat and polished on the ground glass and tin lap; the surfaces parallel are ground and polished wiih a bell metal slip in the piece *D*, worked as described for the scape wheel teeth. The object in having the piece *B* arranged with screws as shown, is to allow of its being turned on the screw *d*, and tilted with the screws *e e e e*, so as to let the bell metal slip in *D*, act as desired. The convex portion of the detent around the locking jewel shown at *h*, Fig. 4, is ground with a slip of bell metal, with a groove shaped in cross sections, as shown at *E**. After each grinding, the detent and bell metal slip should be washed and "crumbed off" with soft bread, as described in former article, and polishing down with the same slip of bell metal, using diamantine and oil, or better, steel rouge and oil. The method of proceeding, except notching the piece *C*, with a file to approximately fit the detent as it is changed, so as to bring the different sides into position, are only repeats. The whole matter is only a question of time and patience, except grinding the thin spring part shown at *i*, Fig. 4; this should be left much too thick until all the other parts are finished, when, by shellacing the part of the detent from *m* to *h*, Fig. 4, to a short pin shown at *k*, Fig. 6—this piece (*k*) should have steady pins in *B*, to prevent turning, as it will have to be removed frequently to measure the thickness of *i*. The piece *l* is only to let *i* (Fig. 4) rest on when being ground, and needs no steady pins, as it has not to be moved from the commencement until done. The spring *i* should be a very trifle thinner in the center than at each end. If you have the old spring, you can grind to the same thickness. An important matter is to make the whole detent as light as possible. After your detent is complete, it should have a sharp set or bend in the direction of the dotted line *n*, Fig. 4. This is best (and safest) done by means of a special tool shown at Fig. 5, and is only a rough pair of pliers made of No. 12 or 14 sheet brass, and shaped as shown. At *G** is shown the shape of the end of jaws. To use them the ends are heated until any thin steel piece clasped is blued. It is a well-known fact that a piece of steel bent and heated to 600 degrees (at which steel burns a bright blue), although of a spring temper, sets or stays bent. The concave jaw can be filed deeper until the right set is obtained. By increasing this bend or set, the action of the spring *i* can be quickened. The blue color can be removed by muriatic acid, but boil the detent in alcohol, which has a little chalk scraped in to prevent rust. In regard to the strength or quickness of the spring *i*, no definite rule can be given, as there are several factors in the proposition; if the detent is too heavy and the spring should lag, merely lightening the detent will make it quick enough; but if as directed above, the detent is made as light as possible with safety, of course this could not be done; or may be the unlocking jewel on the staff carries the detent farther than is absolutely necessary to free the scape wheel; if this is the case, shortening the lifting spring will correct the matter. One thing is important, and that is the spring *i* should be no stronger, either by being left too thick, or by set or bending, than is absolutely necessary to ensure safety in locking. To test this matter after your detent is in, and all the jewels set for proper action, remove the hair spring and let the train run down by the balance turning in one direction; if the detent does not miss locking (to be told by listening attentively), when the second hand makes two and one-half revolutions per minute, the spring *i* is strong enough; if it does not miss at three revolutions of the second hand per minute (compared with some other timepiece), it is too strong. There will have to be extra power applied to the train, probably, to get the speed mentioned. I suppose it is entirely unnecessary to speak of fastening the jewel in the detent, as it has been told time and again; only I may beg to say that shellac dissolved is not as good as shellac drawn out into threads; and same applies to setting jewel pins. An addition of ¼ gum myrrh to the shellac makes it work more freely. Duplex scape wheels can be cut in the engine described, by making special cutters, but the writer's advice would be that any duplex watch which needed a new scape wheel, would be much more easily got rid of by advising a change to a cylinder, which can easily be done without disturbing any of the jewels. There seems to be, among some of the members of the craft, a sort of dislike to the chronometer escapement. This, I think, would in a measure be removed if they would take the trouble to understand it better. One thing is certain, and that is, that better rates have been realized as an average, with this escapement, than any other, and probably the reason for this is that it performs its work without oil. Several other escapements profess to do the same, but so far the old Arnold is ahead.

Obituary.

E. IRA RICHARDS, of the firm of E. Ira Richards & Co., died at his house in Attleboro, Mass., on the 15th ult., in the 67th year of his age. Mr. Richards was one of the pioneers in the plated jewelry business, and has been closely identified with its progress and development. He was an energetic, enterprising man, and these personal characteristics made his name famous in the trade. It is related that he commenced business with a capital of $2,000, and that his energy and enterprise resulted in bringing him a profit of $20,000 the first year. His father, who was identified with another house at the time, recognized the business ability of his son, and immediately gave up his own business and joined forces with him. The house had a career of continued prosperity, for which it was indebted to the shrewdness and foresight of E. Ira Richards. The deceased was always prominent in the local affairs of Attleboro, and enjoyed the confidence and esteem of its financial and social circles. There are many jewelry firms in Attleboro that have been aided by his capital as well as by his counsel, and owe to him their first start in business. With him there was no such word as fail, and it was a maxim with him that every enterprise with which he was connected, directly or indirectly, must and should succeed. The family relations and surroundings of Mr. Richards were most happy, and he was looked up to by his fellow townsmen as one of their most prominent and trustworthy citizens. His funeral was attended by all the prominent persons of Attleboro, who vied with each other in paying their tributes of respect to his memory. The deceased had an extensive acquaintance in the trade, and enjoyed the confidence and respect of all with whom he came in contact.

Mrs. Cooke, mother of Wm. L. Cooke, of Philadelphia, died on the 16th ult. Her ten children—six sons and four daughters—were present at her death, and received her last farewell. The immediate occasion of her death was heart disease. She was the widow of the late B. J. Cooke, founder of the house of B. J. Cooke's Son.

The Metric System and Horological School.

WE HAVE received from Mr. Louis Hoefer, of Keokuk, Iowa, a copy of an address delivered by him before one or two of the western associations, on the subject of a uniform system of measures for all industries. He also advocates the establishment of a horological school, and gives good reasons why it should be done. Unfortunately, the press copy of the address sent us, is very indistinct, and in parts entirely illegible. So far as we can decipher it, however, it appears to be an able argument in favor of the adoption of the metric system. Mr. Hoefer urges the jewelers to prepare petitions to Congress favoring the enactment of a law making the metric system the national standard. He is also very pronounced as to the necessity for a horological school. We give the following extract:

"If we had a horological school, we would also have the metric system; one must bring the other. Here is a sore spot in our trade, but with a little good will, we can also master this. Now, gentlemen, I am about to touch a subject, whereby some of us may feel offended, though it is not my intention to hurt, yet it is better for us if we confess our shortcomings frankly, than if we try to cover them, and profess knowledge when there is nothing of the kind. Nobody has any reason to be ashamed about something he don't know, when he had no chance to learn, though our customers have a right to expect we ought to know. The public treat us as a class, with much suspicion, and they feel why? Because, when we want to confess the naked truth, we must acknowledge that, as a craft, we *are not watchmakers*, we are only *watch tinkers*, more or less competent, but after all we remain TINKERS. The public, as a whole, cannot tell who is a watchmaker or a watch tinker, and even a good watchmaker may be a very poor watch repairer, or a good watch repairer a poor watchmaker; the public cannot judge us, or only partially, by our work. Our work is too small and hidden from sight, and therefore we are treated all alike, botch or artist, it don't care. The botch with a sleek tongue is ahead now of the most accomplished workman, not possessing the power of persuasion, and whilst the former fills his purse, the latter goes starving, because it takes years for a good watchmaker to establish a reputation. If we have a school paid and maintained by our Guild, we can show everybody that we prize knowledge as high as profits. Without such a school, gentlemen, I am afraid our organization will pass into oblivion, because we will lack an intellectual center. Most of us, of course, are too old to be benefitted by the school, but we can give, anyhow, our children a chance, which was denied to most of us, to become artisans, instead of tinkers. If the watchmakers in Germany, France and Switzerland could raise funds for such a purpose, why can't we do it? In comparison with us, they are less able to do it."

We are heartily in accord with Mr. Hoefer so far as the adoption of the metric system is concerned, deeming it a necessity that uniformity of measurements should be obtained. We are also in favor of a horological school, but desire to see such an institution established upon a proper and substantial basis, and not made a hospital for incompetent adventurers. When a plan is proposed that is calculated to enlist the sympathy and co-operation of the prominent members of the trade, and which shall have for its object the benefitting of watchmakers, instead of relying upon watchmakers for its support, we shall give it our hearty endorsement.

ALONZO B. BRAY, for many years identified with the jewelry trade, and for the past ten years with the Gorham Manufacturing Company, has gone into the provision and grain business. His associates in the Gorham Manufacturing Company presented to him at his departure, a sterling silver "Love cup" and plate, upon which was engraved his monogram, and inscribed,

"Presented to Alonzo B. Bray, as a token of esteem, by his friends with the Gorham Manufacturing Co., May 20th, 1882.

The presentation was made, accompanying the following lines:

We are going to sing
Of a very strange thing,
But no less an established fact,
That our friend Bray
Is going away,
To other cities in business to act.

We hope that he will
Remember us still,
Who have been in harness together.
That he will never forget
The least of the set
Of fellows in friendly tether.

We wish him God speed,
That he may succeed
To a fortune piled up so high,
That when he looks back
To the old beaten track,
It will never be with a sigh.

As, so soon he will go
Out to Chicago,
To deal in provision and grain,
We give him this cup,
From it wine to sup,
Until, not one drop shall remain.

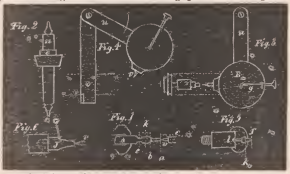
Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

ERRATA should be made my last article, page 67, second column, line 34, for "crosses," read "carries;" also, in line 61, same column, for "shape," read "shake." And in the cut, a portion of Fig. 8 is reversed, *i e.*, the screw *m* should appear to the right instead of the left, as shown. The reader is, of course, aware that in designing on the wood block for the cut, all work is reversed—everything is as if seen in looking glass. By inspecting Figs. 6 and 7 with this explanation, I think everything will be understood. The writer is desirous that the principle should be made plain, or, in other words, the "idea" to be conveyed, comprehended. The writer does not insist that the parts shown are in all particulars the very best, for many readers may suggest changes which would simplify the mechanism; but he offers the instrument as a tried and useful tool for the purpose. And all watchmakers of the present day who endeavor to keep up to standard of progress, are well aware that "good work done quickly," is at the top of the market; and to obtain these results we must be able to measure with precision, and at the same time the instrument must be "handy," to use a Yankee phrase. Our instrument is eminently convenient; it is first used to take all the measurements, and then is quickly applied to the lathe, and assist the workman in getting at his heights accurately and quickly. One thing I am sure the reader will agree with me in, and that is that all tools in use for this purpose are very imperfect; and it has been the writer's experience in examining watches which have had new stops and cylinders, that in respect to heights, fully two thirds of such watches are not exactly what they should be. The instrument described can easily be made, and I pledge my word that if ever the reader gets to using such a tool, he would not be persuaded easily to do without it. The writer would beg to call attention to certain features, first, in measuring down through the hole jewel against the cap jewel; it may seem as if it was a little risky, but I don't think I have broken more than two or three points(*v* in cut)in the seven or eight years in which I have had such an instrument in use; second, have the spiral spring which works the measuring bar, draw it back; this prevents its falling, and it keeps the point *v* drawn up out of the way; third, having the measuring part so it can be taken from the bed *A* and upright pin *C* (April number), and applied to the lathe as described. I shall speak further of this at risk of seeming prolix. We will assume that we are to take the measurements and turn a staff for a full plate American, (though the method is the same in all kinds of watches), we first take the top plate off and remove the foot cap jewel, and with the jewel guage get the size of our lower pivot; now restore the cap and put the plate together, leaving the dial off and train out; now proceed to measure down through the lower hole jewel, as directed in April number, and, to make our illustration still plainer, we will suppose our measurements actually taken and recorded in $\frac{1}{1000}$ (degrees on the dial):

Height to top of fork........................	.98
Allowance for space between fork and roller....	.10
Height to top of upper plate..................	1.13
Space between balance and plate..	.15

Next measure for the entire length of the staff by putting on the bridge, and measuring to the upper surface of the cock hole jewels; assume this to be 254. Now comes the manner of conveying those measurements to the lathe. In Fig. 2 (cut in March number), is shown the method of turning the lower portion of a staff; this Fig. is reproduced at Fig. 1, present number, with the addition of the measuring point *v*. The reader will please recollect that the measuring tool, when applied to the lathe as shown in Figs. 6, 7, 8 and 9, April number, has two swinging motions, the first on the screw *z*, to swing the instrument out of the way when turning; this motion is further illustrated in Fig. 4, present number. The second swinging motion is very slight and is procured by the piece *w**, April number, turning on the screw *t;* this motion is also indicated by the dotted line *c*, Fig. 1, present number. The roughly blocked out staff (hardened and tempered) is inserted as shown at Fig. 1, and the space between the dotted lines *a k*, shows the (a little less) length of the staff below the shoulder where the balance goes. Fig. 2 shows the staff complete, and the dotted lines the heights. To continue the turning of our imaginary staff: The lower end of our staff is faced off by holding a file flat against it until the length between *a b* is right. The measuring tool is swung around as shown in Fig. 3, and *v* is set against the



lower end of the staff by gently pressing on the button *h;* the hand *g* is set at *o*, (or 500). Swing the dial around out of the way as shown in Fig. 4, and turn the lower part of the staff and pivot to size, using your michrometer calipers. Now comes facing off the shoulder on the line *b*. We must add to the height from the face of the lower cap jewel to the top of the lever fork, the thickness of the roller and safety space, to keep the roller from rubbing on the fork; suppose the thickness of the roller to be $\frac{23}{1000}$, add $\frac{10}{1000}$ for safety space, and $\frac{98}{1000}$ for height to top of fork, and we have $\frac{131}{1000}$ as the height from the end of the pivot to the shoulder, or between the lines *a b*. If the lower part from the line *k* is finished and polished, (the face on the line *k* is where the balance goes, and should not be finished until the staff is reversed in the wax), it—the staff—can now be broken off on the line *c*, and put into the wax chuck, as described in March number, but in the cut (Fig. 3), the staff is shown with the wrong (lever) end protruding; in the present instance it should be inserted as shown at Fig. 5, present number. To get our measurements applied, we must set our dial (or hand) again; this can be done in two ways, by removing the wax from the chuck *B*, Fig. 5, and letting the point *v*, go to the bottom of the hollow cone *l*, and setting the hand *g* at *o;* the reader will see that all measurements now will be the same as the original (from the cap jewel up). Another method is to have a substitute chuck, which is just the same height to the end *m*, Fig. 6, as the bottom of the cone *l*. The first described method is probably the best, as it necessitates new wax for each operation, and this is desirable, as reheating the wax rots it and makes it brittle. After the staff is in the wax and runs perfectly true, face the end of *f* to exactly the right length, $\frac{254}{1000}$. The size for the place where the balance goes, shown at *o*, Fig. 2, in the cut, should now be carefully turned. A short lecture here will not be misplaced. A balance should never be riveted on. Have a set of tapers (the taper arbors such as are used with a bow lathe will do), turned to use the same as your jewel guage, and turn the bearing where the balance goes (*o*, Fig. 2), $\frac{5}{10000}$ larger than the hole in the balance; let the height be the same as the thickness of the balance arms, if a cut (or imitation): if a plain steel one, the same thickness as the hub. If these instructions are rigidly observed, a balance will stake on dead true. If the balance is a little out of true, and the watch is sprung above, (over-sprung some say), it is a good plan to lay it flat on a fine bench file, and by moving it back and forth with the tip of the forefinger applied immediately over the center, make the surface around the hole true and flat; if the balance is one belonging to a fine watch, the file marks can be ground off and polished. A staff turned to size as described, two or three light blows in the staking tool, and the balance is on secure, and nothing will ever remove it except such a force as would twist the balance out of all shape. The height of *n*, where the hair spring collet goes, is got from the collet. Suppose after the staff is first put in the wax, and the dial is set at *o*, that the arms (or hub) of the balance is applied to the end *f*, and *v* brought down to it, the dial would give the thickness, and, consequently, the height of *o*, Fig. 2; the hair spring collet is measured in the same way; the thickness of the roller (table) is got when the staff is as shown in Fig. 1. By substituting a thick strong point for *v*, this instrument can be used to measure anything up to half an inch. The method of using the piece *v**, April number, for getting inside measures, will have to lay over until next month.

Proceedings of the Horological Club.

A Distinguished Body of Watch and Clock Makers.

Ninety-sixth Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the Circular for the next month.

GAUGE FOR TAKING HEIGHTS OF SHOULDERS, ETC.

Secretary of Horological Club:

In the February Circular, page 13, is a description of a pinion gauge, with an attachment for obtaining the true height of shoulders on staffs. I send you a drawing of one I have used for some time, which my father says he made over forty years ago. For use, I think it is just as good as the one described, and for simplicity it would be hard to beat. You can see at a glance how it can be used, by placing the pivot perpendicular on the long arm, and bringing the short arm to the height of the shoulder.

It is also useful in obtaining the extreme length of a staff. If in a Swiss watch, place the face of the long point upon the bridge, (the cap being removed) and get the length with the other point. For an English watch, measure from the lower end. The long point is narrow enough to go into the dovetail. E. B. L.

Mr. Uhrmacher said that, judging from the sketch, one arm of an ordinary pinion guage was straightened, and one side of the point filed away until its perpendicular side was under the other point, which was curved much as usual. This caused the straight point to project out further than the curved one, and thus permit of taking vertical measurements of any portion of the staff or shoulders, and with entire accuracy. Indeed, it would be hard to see how any guage could do more, although a micrometer or calipers will of course *indicate* the true distance or height, as well as ascertain it. The construction of the parts would also perhaps make it more easy to apply the gauge to a piece while turning it, than with the ordinary pinion gauge.

Mr. Clerkenwell suggested that the straight jaw was not one of the original jaws straightened out, but was made from a spiral piece of that substituted for one of the original jaws. He thought it would be easier to make, and would also admit of being made differently, in some respects, from what would be practicable with the original jaw. All thought that it was a good idea, and we should be pleased to hear from our correspondent again, or any others, with tools or attachments which they consider superior to those commonly used.

TOOL FOR SETTING RUBY PINS OF WATCHES.

Secretary of Horological Club:

When I sent you my watch oiler, I promised you another invention pertaining to the craft. In my experience as watchmaker, I have found that a great many watches would not regulate well; the reason was that the jewel pin was not firm in the table roller, which will happen when the jewel pin is moved in the moment the shellac settles in cooling, or it has been left too long in alcohol.

But to a still greater extent do I see watches in which the jewel pin has been left in a very critical position, either by carelessness or inability, by the mechanic who last handled it. I will admit it is quite an irksome job to fix a jewel pin correctly in some kinds of watches, where the hole in the roller is a good deal too large for the jewel pin. I have for years used a mechanical contrivance for that purpose, but lately I constructed and patented an instrument, so that it can be used by watchmakers in general, who like to get over a tedious job in a few minutes. With the patent jewel pin holder, a jewel pin can be put in true and square every time, without taking off the roller, or even removing the spiral spring from the balance, as those parts are guarded from the effect of the direct heat by the plate of the tool, which I find a considerable saving of time, and very convenient. In case that a jewel pin has only to be adjusted in position, or moved from or towards the center, all there is to do is to put the balance, with roller and jewel pin, in the instrument, warm till the cement melts, and the pin will correct itself. When cold, the balance can be taken right from the instrument and put in the watch for trial, as it does not get soiled or handled with the fingers. For preventing damage by overheating, there is a thermometer which indicates the proper amount of heat sufficient to melt shellac, which is of great importance when it is a compensating balance.

Please submit this sample of the jewel pin holder to the Proceedings of the Horological Club, and the opinion of some of the members about it would greatly oblige

Portland, Oregon. F. Gundorph.

Mr. McFuzee described the tool as consisting of a round brass plate with bone handle; near the center of the plate is a slot, in which moves a steel slide pressed forward by a spring, by which the ruby pin is firmly held between the end of the slide and of the slot. The surface of the whole being level, the ruby pin is held vertically to the surface of the roller table when that rests upon the plate, and the flat end of the slide brings the flat of the ruby pin squarely in front of the balance staff, which drops through a smaller slot beyond the one with the slide. The thermometer is a curved metallic strip, which straightens when heat is applied to the plate, and the amount of curvature indicates the temperature with sufficient accuracy for the purpose. The whole is neatly gotten up, and appears to be a very useful and convenient tool for ruby pin setting.

Of course, the hole for the ruby pin must first be well cleaned from grease, by putting the roller in ether or benzine, then apply a little shellac dissolved in alcohol, rather thick, in the hole, which is pressed down over the projecting end of the ruby pin, and the roller settles upon the plate of the tool, bringing all the parts into position. Heat is then applied until the thermometer expands to the mark, when the whole is set away to cool. If more shellac than necessary is used, the roller would be cemented to the tool, in which case it must be heated again, the balance and roller removed, and the tool and ruby pin dropped in alcohol to dissolve the cement, after which the cementing process may be repeated anew.

ALL ABOUT WATCH REPAIRING.

Secretary of Horological Club:

Is there any way of picking out balances when the old one is lost, as to size and heft? Which is best for a watch, to have a small or large table roller? How are escape wheels and pallets picked out when the original ones are lost? How is steel, brass and nickel polished to a real high polish, as is seen on the finest grade movements? Any member answering these questions will greatly oblige,

J. G., Jr.

Mr. Horologer said that to give the information our correspondent required, in a way to be of any real service to him, would take a long time, and the whole of The Jewelers' Circular would be too small to contain it. Mr. G. should purchase the standard works on the trade and study them thoroughly. There are no short and easy rules for selecting balances, escape wheels, and pallets, but the workman must know what is necessary to make an escapement correct, and adapted to the movement, before he can judge of the correctness of a part of it. The size of the table roller must be in proportion to the length of the lever and the angles of the pallets. Some require large and some small rollers, but they are always required to be suitable to the escapement as a whole, so in some varieties of watches they require to be much larger, in proportion, than are used in others. The detached lever escapement was thoroughly explained, with the modes of testing all its actions, in Excelsior's Practical Hints on Watch Repairing, published in The Circular about three years ago. If he can get the back numbers containing those articles, he will have what will be worth more to him than anything else he can find in the way of printed instructions on that subject.

Nickel objects, (which are generally only plated with nickel), should be polished before the plating is put on, as nickel is hard and difficult to polish. It will have a polish, if deposited on a well polished surface. As for polishing steel and brass, Mr. G. will find directions in some of the articles in almost every number of The Circular, so it is needless for us to reiterate them here.

THAT VARYING WATCH AGAIN.

Secretary of Horological Club:

Your answer to my communication is not to the point. It is true that I forgot to mention in what position I had the watch while trying it. I wish to state that the watch was made by V. Kullberg, who got the second prize at the Australian Exhibition. The watch is in particularly good condition, and nothing, as far as I could see, was not in the best state from which good performance ought to be expected. I kept it hanging on my rack through the day, and placed it in same position at night, the temperature being about the same. What I would like to know is this: What must be done to *correct* the *going slow and then fast*, of a fine watch, within a *given* 24 *hours*, *all other things about the watch being right?* Please recollect that my watch has a *fusee*, a thing in its favor as regards equal driving power.

Yours respectfully, C. K.

Mr. Isochronal remarked that the case was now more puzzling than before. Mr. K. says that the watch was kept in the same position, hanging, all the time, consequently, the variation could not be a position error. He says the temperature was uniform, hence the error could not arise from any lack of compensation. He also states that the watch has a fuzee, and we may therefore infer that the motion force is practically uniform, and the balance vibrations are of the same extent throughout the 24 hours, so that the error cannot arise from a lack of isochronism in the hair spring, nor want of poise in the balance. In other words, there is no apparent cause in the escapement which could produce the variation, and he further states that the movement is in "particularly good condition," which precludes any supposition that the fault is in the train. It necessarily follows, if Mr. K. is correct in his conclusions, that the fault is not in the watch itself, but must be due to some exterior influence.

This may possibly be a magnet or magnetized body, exerting an attraction on the steel parts during that part of the day when the watch is placed near it, and not at other times. It may be due to the watch being jarred or shaken, or vibrating loosely on its hook, during one part of the day. It may be that when the watch is laid away at night it is so packed that the case is pressed down upon the center post or some other part, and thus affects the running. If the case is a hunter, it is probably closed at night, and perhaps the lifting spring interferes with or presses against some part of the movement, springing it a little out of position, and causing a change in the running. Sometimes a dial is pressed down, bearing on the end stones, some pivot, the hour or minute wheel, etc., or it may be pressed to one side and bind against the socket of the seconds hand. These and other similar points should all be carefully looked after.

But is Mr. K. quite certain of the correctness of his opinions about the matters stated by him? Is the temperature really uniform? A variation of only a few degrees may make quite a difference in the rate, if the compensation for heat and cold is not properly adjusted. Without doubt it was closely adjusted when made, but the adjustment is very easily destroyed, and, if the watch has ever been in the hands of a "plug" watch repairer, Mr. K. had better examine the compensation—for doing which he will find full instructions in Excelsior's book called the "Practical Treatise on the Balance Spring and the Various Adjustments of Watches and Chronometers." If the balance has ever been heated, or the segments of the rim bent by careless handling, the adjustment of the compensation may be injured or ruined. Is it not possible that the sun may shine on it or heat be reflected upon it, or something of the sort?

Again, it would be well to examine the extent of the vibrations of the balance at different times, especially during the hours when the watch gains most and when it loses most, to see if they are really equal. This is easily done, by noticing the exact spot to which the cut in the rim reaches at the end of the vibration, while holding the watch in a hanging position. If he finds a difference amounting to, say one-eighth of an inch or more, at those times, he has discovered a cause sufficient to account for the error. If the original mainspring has been broken, the new one may not be suitable for the curves of the fuzee, in which the motion force would not be equalized by it. Even "keying up" a suitable mainspring too much or too little will prevent the fuzee from equalizing its action upon the train. This and similar matters have been so fully treated by Excelsior in his Practical Hints on Watch Repairing, that it is unnecessary to dilate upon them now. But even if the motive force is uniform, there may possibly be a defect in the movement which would exert an influence similar and equally injurious. If so, it will be detected by watching the balance vibrations, as before mentioned. When their extent is the most disturbed, the disturbing cause, whatever it may be, is most active, and can generally be most easily detected. There is certainly a fault *somewhere*, and Mr. K. must not take anything for granted, and suppose any part to be right because executed by a famous maker, but must test every point for himself.

If he is unable to ascertain the cause of the irregular vibrations, or to correct it, it will then be in order to ascertain how they act to injure the rate, and, if possible, to prevent or modify those effects. If the balance is carefully poised, the trouble cannot be there, but may be looked for in want of isochronism, or other defect in the hair spring, some part of the balance running too closely to some other part, the table roller may not be true on the staff, and may rub during the large vibrations and not during the smaller ones; a pivot may be slightly bent, and may almost bind in a jewel not set exactly level, or in any one out of many possible mechanical errors. Which one of them is the real cause, can only be told by carefully testing the different parts and their actions. Even to name over the various faults and what to look for, with the necessary instructions for the examination, would be too much for our space in THE CIRCULAR. Mr. K. will find several articles given to these points, in Excelsior's Practical Hints, and all the details are explained in a clear, practical way, which makes the workman understand why he does a thing, as well as tells him what to do. There is a tangible cause for the variations complained of, and it can be found if properly looked for. Mr. K. should look upon this as a test of his skill in the art of "examining," and not rest till he has ascertained definitely and positively what the cause is. The correction of it will then prove whether he is right or not.

CAN WATCHES BE DEMAGNETIZED WITHOUT TAKING THEM APART?

Secretary of Horological Club:

I observe that a Mr. Th. Gribi insists that watches cannot be demagnetized in the way described by Prof. Mayer in the *Scientific American*, and copied in THE CIRCULAR, a short time ago. He reasons that some of the steel parts of the movement are upright, some horizontal, and the springs are in long coils, so that the North and South poles of the different pieces do not all point in the same direction, but in all directions, and while the upper ends of some of the pinions might have North polarity, those of the others might be south poles. Then, of course, the demagnetizing process, which would diminish the magnetism of some of them, would at the same time *strengthen* those of opposite polarity, and there would be no end to it. Indeed, the movement would be a magnet of such a complicated order that it would be hard to tell even where the poles are. Then, as regards the mainspring and hair spring, he shows that one end would be of North and the other of South polarity, and the magnetic axis of the spring as a whole, would not be *anywhere*, because it would be in a line between the two ends, and, as the ends continually change their relative positions, by the vibration of the balance or by winding the mainspring; the magnetic axis of the spring would have no fixed position, but would at different times be in every possible position, and it would be impossible to demagnetize it by any one manipulation. So far as I can see, his statements about magnetism are correct, and he also says, positively, that he has tried Prof. Mayer's process, and it failed to remove the magnetism. Now, will your honorable body please answer whether a watch can be demagnetized in that way, or in any way except by taking the watch to pieces and taking the magnetism out of each piece separately?

G. W. G.

Mr. Electrode said that Mr. Gribi must have been very much in the same condition as a near-sighted man he once read about, who judged everything by what he saw of it. Standing one day before a magnificent building, of which he could only see a few square feet of surface, he insisted that there was no building there, but only a few bricks and a little mortar. Touching the wall, he said, "Don't you see the bricks? And there is the mortar. That is all there is here." The trouble was that the scope of his vision was extremely limited. He was perfectly correct so far as he saw—it was brick and mortar, as he insisted—but while others could see the entire structure, he could only perceive those few bricks directly before his eyes.

So it is with Mr. Gribi. His theories and reasonings about magnetism were doubtless correct, but they had no application to the present question. They were doubtless true, as statements of fact, but they had nothing to do with the demagnetization of watches. In that process it is immaterial whether the operation increases the magnetism of some of the parts or not. In fact, the very gist of the machine process now followed in this city, is to first magnetize the entire movement so powerfully, as to overpower and drown out all the little magnetisms of the various parts, and compel one uniform magnetization of the whole. This magnetism is instantly reversed, and these rapidly recurring reversals of magnetism are accompanied by a gradual diminution of the strength of the magnetization. This process goes on, the magnetism being continually reversed and weakened, until at last it is so weak that it cannot be detected by the most delicate tools, when the watch is, of course, practically free from magnetism. Our correspondent may be assured that watches can be demagnetized perfectly, without taking them apart, or even without taking the movement out of the case. Every steel part in both the movement and the case will be freed from the slightest trace of magnetism more thoroughly than anyone could do by hand with the separate pieces. This is not mere assertion, but it is being done every day by Mathey Bros. & Mathez, of this city, who find plenty of employment for their machine, on watches sent to them from all parts of the country. A short time ago they had a very large number of watches sent in by one of the American watch companies, which had been magnetized by lightning. These were demagnetized by their machine, and were completely restored to their previous condition, and rendered as perfect and serviceable as they ever had been, and Messrs. Mathey hold certificates to that effect. Our correspondent, and any others who have magnetized watches, may therefore send them to that firm with entire confidence that they will be fully restored to their original usefulness.

TOOL FOR EQUALIZING ESCAPE WHEELS.

Secretary of Horological Club:

I have just invented (as a necessity) a new tool, for the purpose of equalizing the escape wheels which are out of round, and the escape angles untrue, and of an unequal distance from the revolving center. Also a tool to go with same, for setting exposed pallet jewels. This tool will correct the above named faults to a mathematical fraction, with but very little practice. Now, what I wish to know is this, does your honorable body of distinguished horologists think it would be worth getting a patent on this combination tool? As my experience goes to show me that there is a great many of American watch movements on the market that have deficient escapements, and unless corrected, these movements never can give satisfaction to the owners, and by this very simple combination of correction, any of them can be corrected in a very few minutes to the last fraction of correction. Please give your answer in your next CIRCULAR.

SOLON NEFF.

Mr. O'Lever replied that if the tool would do what Mr. Neff states, and is practical and easy for any ordinary workman to use, there would undoubtedly be a demand for it by the trade, provided it can be sold at a reasonably low price. Mr. Neff had better send one to the club for examination and description as soon as his patent is secured, or even before. The patent laws allow two years' public use before application for patent, without endangering its validity. If Mr. Neff applies for patent within two years from the first use of the tool in public, his rights will be perfectly safe.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

THE GUILD STAMP.

To the Editor of the Jewelers' Circular:

I observe that THE CIRCULAR is opposed to the Guild stamp as it has been adopted by the National Guild and several of the western associations of retail dealers, and that you favor a government stamp. From conversation with a large number of the best class of retail jewelers, extending over a term of four or five years, I know this feeling is very general, viz: If we could have a line of goods of superior quality, that none but jewelers could buy, it would be a very great advantage. Now that is the whole thing in a nut-shell. A government stamp does not favor the retail jeweler, for the reason that it is common property. You would take a twenty-dollar gold piece from a horse thief, because it has the government stamp. You would also purchase a set of silver spoons from the horse thief, if they bore the Guild stamp, because you believe that they are honest goods; but the horse thief cannot get the Guild-stamped goods, while the honest retail jeweler can. That is the difference, and we think it is a very great difference in our favor. Evidently, you in the east do not know what the western retailer has to contend with. Opposition in our own towns, where we look for patronage and encouragement, imposition by many of the so-called jobbers, ignored by many of the eastern manufacturers, we have heretofore carried on a guerilla-like warfare: have almost literally fought for every dollar that we got; fought even among ourselves. We have tried to hold our ground, each by the strength of his own arm. Education in our case has been slow, but we took a long step in the right direction when we began to unite. Beginning actually with nothing, we to-day number over one thousand actual members. And we find these different societies, (united into one by the Guild), so pleasant, so harmonious, as well as profitable, that we will never give them up. We fear no enemy; we are right!

We understand your position on the question of government stamp; it would undoubtedly benefit the public, but what would it do for the retail jeweler? Nothing. We are not working for the public, except what the public pays us for; we depend on it for bread and clothing. We want the public to know that it can get from us, better watches, better jewelry, better spoons, better silverware, better spectacles, and so on through the list, for the same money, than can be had outside of the jewelry trade. Under these favorable surroundings our trade will prosper. You will be benefitted, for the circulation of your really excellent paper will be increased. Manufacturers will be benefitted, for there will be fewer failures; and the jobber, when he learns to be decent, will get all of his trade back again, and more with it. Trusting that I have answered all your points, and assuring you that we all look upon THE CIRCULAR as a genuine friend, I am, yours truly,

JOHN E. BOYNTON, Sec. and Treas.

To the Editor of the Jewelers' Circular:

Can you give me any information relative to the Watchmakers' and Jewelers' Mutual Aid Society, of Chicago? Who are its officers at present, and what is the condition of the society, if it still lives? Some time ago I was induced to become a member, paid my money to a person who made great promises as to what the society was going to do, but since then I have been unable to learn anything about it. I would like to know how many members there are, and what has been done with the money they paid. If the society is still in existence. If any statement of its condition, for the information of the members, has ever been published, etc. Any information you can give me regarding this society, will be duly appreciated by A WORKMAN.

We have no information regarding the society referred to, either as to its condition or management. It seems to us that the members are entitled to know how the officers are discharging the trust confided to them.—[Editor THE CIRCULAR.]

ROLLED-PLATE GOODS.

To the Editor of the Jewelers' Circular:

I have been pleased to notice the articles in THE CIRCULAR relative to the debased character of rolled-plate goods. There is scarcely anything in the trade that more needed improvement, for in some goods of this class the quality has been so debased that they are little better than fire gilt. A few years ago rolled-plate goods were not only heavily plated, but the quality of the gold ranged from 14 to 16 k., and their wearing qualities were equal to the finest goods.

Chains that I sold ten years ago look to-day better than some of those I sold six months ago, because of this difference in the quality of the plate used. I am glad to know that one manufacturer at least, has taken the advice given in your columns, and is now making rolled-plate goods fully equal to the old standard. Your rules prevent my giving the name, but his advertisement, which I see in THE CIRCULAR, should be made more prominent, and the retail dealers impressed with the fact that the firm makes goods that can be sold on honor. I have had some of the rolled-plate chains made by this firm, and can testify, from positive knowledge, that they are made of heavier plate and a finer quality of gold of any similar goods I have seen in years. If other manufacturers will follow this example, and give us as good rolled plate as they used to, they will find their profit in so doing. Yours truly, RETAILER.

Chronographs or Watches for Observation.

BY M. GROSSMAN.

THE simplest contrivance formerly offered for purposes of measuring the lapse of time of an occurring event, was the verge watch, with seconds hand upon the crown pivot, and a small lever arrangement, by means of which its motion could be arrested. The initiative point of the observation had to be estimated by the position of the hand, and at the end, the watch was stopped; else, it was stopped at the commencement to estimate the time as closely as possible. Such watches were much sought after, 40 or 50 years ago by mariners. They were set in the cabin with the chronometer, and served for observation upon deck. That by this arrangement the entire motion of the timepiece was interrupted, was of little consequence by the verge watches, whose daily differences of rate amounted to minutes, and consequently was not as objectionable as it would be with our modern timepieces.

These watches were perfected, even if only for purposes of observation, by placing the crown wheel into the center of the movement, whereby the motion of the second hand became concentric (from the center of the dial).

A very singular contrivance, belonging to this group, is the so-called Chinese watch—a duplex movement, with fourth wheel also in the center, and carrying a large seconds hand. In order to obtain the doubtful advantage of the entire second, the movement has been contrived in such a manner that the watch does not offer that guarantee for exactitude of rate to be expected from a good duplex. The scape wheel has 6 teeth, and each of these teeth 2 points of repose. While, now, by an ordinary duplex, of each 2 vibrations the balance receives one with impulse, we here find 3 empty ones, and only at each fourth vibration the impulse is renewed.

These watches with the peculiarly ornamented works form an important article of manufacture for Fleurier (Canton Neuchatel), and mostly go to the Flowery Empire, for whose gratification the embellishment of case and movement has been undertaken. It should be supposed that if these watches were furnished with a correct duplex wheel of 12 teeth, they would give a better rate. At the same time the hand would indicate half seconds, and, therefore, such an arrangement be an advantage. As self-suggestive as it is, the trial has not yet been made.

Commensurate with the progressing perfection of watches, such as the attachment to verge watches, became finally impossible, because who at the present day, when the chief requisite of a good watch is that it shall show no, or barely any, perceptible deviation, would dream of stopping his watch for the purpose of observation?

Since it was intended to simply stop the second, without disturbing the rate of the watch, endeavors must be directed toward constructing a seconds work separate from the running. From this resulted the watch with independent or dead center seconds. This movement is universally known; and although completely distanced and antiquated, numbers are in use, and, what is still more singular, are specially demanded!

We will point out its chief defects in a few words:

a. Its construction is very complicated, since 2 complete running works with barrels must be present. In consequence of which, the separate parts, destined for the measurement of time, are decreased in dimensions.

b. Its price consequently is higher.

c. It is troublesome to wind up two works. In our day, when the winding by the stem is not simply a matter of taste, but is rightfully demanded with each good watch, it must be confessed that a very ingenious winding apparatus has also been introduced into them, but it is too complicated and expensive.

Beside these defects, which may fully be designated *constructive*, it is burthened with others, none the less serious, and interfering with its chief function, for observation purposes—consequently of grave importance. *For observations intended to be even approximately exact, they are thoroughly useless;* because:

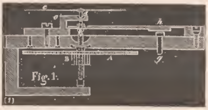
d. They do not show a smaller division of time than one second, and with any of its fractional parts, the observer must resort to estimating.

e. When the case pusher is made use of at the commencement of an observation, to free the seconds hand, and to stop it again at the end, these two limits are subject to important irregularities, pertaining so thoroughly to the construction that they cannot be estimated. The springing of the seconds hand in entire second is caused by a little lever, the so-called whip, fastened upon the last pinion of the seconds running work, and dropping into the teeth of a star fastened upon the arbor of the scape pinion. This pinion makes one revolution in 6 seconds, and the star has 6 teeth, wherefore, once each second the whip end will drop from the corresponding star tooth; when the whip has made one entire revolution, it drops into the next star tooth, and so forth. This performance progresses uninterruptedly, as long as the seconds proceed continuously. When stopped however, and freed again, the above mentioned irregularities occurs. Let us suppose the watch stopped; the whip, when unlocked, will drop into the star. The angle of passage of each star tooth, however, is equal to about 50°. Now, if the whip end drops in, when the angle has almost been passed through, a tooth drop occurs immediately, and the second hand springs by a full second, while only perhaps one-tenth has elapsed. Only when the whip drops in at the commencement of this angle of passage, the first second is nearly correct. At the end of the observation, again, the lever is interposed, whereby the further whip motion is stopped. If, now, said whip at this moment only dropped into the star, the consequence is that under the most unfavorable conditions, again $\frac{9}{10}$ seconds pass before this operation occurs, and, thus, an observation may be made with such a watch appearing nearly 2 seconds longer than it really is.

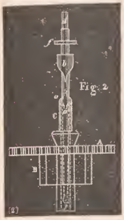
Let this suffice to show that an approximately exact observation is impossible with them If in spite of all defects, they are still demanded for purposes of observation, it must partly be accredited to the proclivity of human nature that it stubbornly adheres to handed down traditions, and again, that the more perfect constructions of the present day are not yet sufficiently known.

Several very interesting mile posts upon the road to perfecting such watches may be pointed out.

We first have the watch with springing second, first constructed by Winnerl, in Paris, 1831. Its seconds pinion is perforated with a fine



hole, and the pivot, carrying the seconds hand, is fitted into this hole entering freely, but revolving without shake therein, thus that it can only move up and down. The pivot of the second pinion, in shape of a thin canon, is at its free end formed into two inclined planes, and at the lower end of this face is a little notch between both. The pivot carrying the hand, and sliding into the canon, is provided with a collet in form of a spring bill. Its point enters into the aforementioned notch, until the pivot has penetrated down to the bottom of the canon. By such a mutual position of its parts, the watch shows no difference when compared with an ordinary one with the customary seconds hand.



A steel bridge fastened upon the plate, is provided with a hole through which the seconds pivot freely passes. Under this bridge the pivot swells, as far as shoulder *f* in order to permit this part to enter freely and without shake into the bridge hole *o*. This arrangement has as consequence, that when the arbor is raised, until shoulder *f* lies against the bridge below, the point of the inclined plane *a* may pass under the bill of the collet *b* without touching it.

If intended to stop the seconds hand, a pressure is exerted upon a button, which, by a little bridge *g*, suddenly raises spring *h*, fastened upon the plate; the outer end of this spring is cut forked, it lifts shoulder *f* and presses it against the lower side of bridge *o*; wheel *A* continues to progress independent of the hand, but as soon as the pusher has gone back, spring *h* having become free, places itself upon collet *b*, whose bill, having glided down upon the inclined planes *a*, sets the arbor with the seconds hand into motion again until it encounters notch *a'* in order to march along; at the same time the end of the spring *h* braces itself against a little abuttment, attached below bridge *o*, whereby it neither touches collet *b* nor shoulder *f* again.

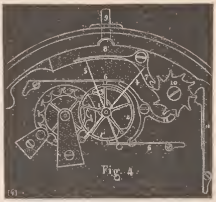
We will finally add that the return of the hand by the operation of piece *b*, called, on account of its shape, spring bill, is very secure and exact upon the inclined surface *a*, it possesses the single defect of requiring height.

Counter for Continuous Observation.—Winnerl has constructed several of these counters in different styles, and found described in the *Revue Chronométrique*, t. III. We borrow the following description:

The point of the fourth wheel axis is somewhat longer and conical; a small piece of steel is fitted upon it, cut in heart shape. This piece, seen at 1, Fig. 4, must be at sufficient distance to be removed beyond the reach of the oil. Upon the protruding part of the pivot, a very slender disc is permitted to revolve free, (2, Fig. 4, and *r*, Fig. 3), provided with a click, (3, Fig. 4, and *d*, Fig. 3.), and its spring (*b*, Fig. 3). This spring presses the click against the circumference of the heart curve.

The disc canon (*a*, Fig. 3) carries the seconds hand of gold, (*c*, Fig. 3, and 4, Fig. 4), and fitted upon the pivot end protruding beyond hand *c* of Fig. 3, is a hand of blue steel with a little shoulder, having a little vertical shake, for the canon of the disc. The two springs 6, 6, (Fig. 4) are of uniform strength, and by pressing simultaneously on both sides of the disc, they keep it motionless and well in the center, in order to insure sufficient motion to the fourth-wheel pivot, which continues to revolve. Only a slight friction of the click upon the periphery of the heart piece remains, the rim of which must be rounded, and carefully polished.

All this well understood, the operation of the entire mechanism will be easily comprehended.



The click 7, screwed upon piece 8, ends in 2 teeth, corresponding to one-half the distance between the ratchet teeth, 10, from each other. Now, by pressing pushes 9, the click will press the ratchet forward by half a tooth, and spring 11, equally with double end, will either retain the ratchet by one or two teeth, thus, that the teeth of the ratchet pass one after the other by piece 12, which, by lifting the springs 6, liberates disc 2. Click 3, while gliding upon the inclined plane of the small heart, will bring back gold hand 4 under steel hand 5.

A fault of this construction, represented in Fig. 4, is that the two springs 6, 6, must be of truly equal strength, and apply themselves at the same moment to disc 2, and lift off from it. If such is not the case, a side pressure is exerted upon the pivots, which being so close to the escapement parts, must be of injurious influence.

V. Kullberg, of London, has overcome these defects in a simple as well as ingenious manner, by making the springs of one piece and by a cross piece uniting them to one common spring foot. This foot is without foot pins, and is only retained by a stop screw, around which it may revolve freely. The consequence of this arrangement is that the springs apply themselves with equal pressure to both sides of the disc, because each inequality would at once be followed by a corresponding revolution of the entire piece. Both springs are provided with a prolongation at their loose ends, united again upon the other side of the disc. Opposite to these somewhat beveled ends lies the wedge form pointed end of the stop lever. If by an exterior pressure this lever end is pressed between both springs, the disc becomes free, and the observation finger progresses. The return of the lever effects the closing of the springs with truly equal pressure upon both sides of the disc. This arrangement is fully described in the *Horological Journal*, London, t. XIII., p. 136.

Another defect inherent in this kind of watches with observation seconds is its unequal operation, which, by impeded auxiliary hand, the motion of the fourth wheel suffers by the rising and falling of the little lever *d* (figs. 3 and 4) upon the heart curve 1. Also this drawback has been reduced to a minimum by the ingenious Kullberg, by a very delicate contrivance, equally to be found described and represented in the above volume.

Both the single seconds counter by Winnerl, as well as that with the double seconds hand, may be regarded as a progress, inasmuch as they permit an observation to be made amounting to the fractional part of a second, (¼ or ⅕, according to the vibration tempo of the balance) and operate immediately both on starting and stopping, without any of the previously described irregularities of the watch with independent second. Still, they comply with the purposes of observation but imperfectly, only recording one period, in accordance with the manipulation of the mechanism, either the beginning or the end of the occurrence, while the other is still vague, and left to estimation, owing to the rapid motion of the hand. It appears that Winnerl himself has perceived this drawback, because he made a small number of watches in which both systems were united; a few, even, in which 3 seconds hands passed over each other, of which one could be arrested at the beginning, the other at the end of the observation, thus that the two time limits could be ascertained at ease, and noted when a pressure liberated and reunited the motion of all three. It is apparent that such an arrangement must be extremely delicate and complicated, and, moreover, demands a not insignificant height.

The endeavors toward perfection in the domain of observation, led to the so-called chronographs, which should rather be called chronoscopes, because they do not *write*, but simply *show* the time to the eye.

These watches have a simple running work, the fourth pinion of which carries a firmly fitted, extremely finely divided toothed wheel *a* (Fig. 5). A lever, *b*, is thus contrived that it revolves exactly

around the center of the fourth wheel. This lever *b* carries a finely toothed wheel *c*, of equal dimensions and toothing with the former; both stand in connection with each other by depthing, and the motion of lever *b*, having its center in the axis of the fourth wheel, changes nothing by this depthing. A third, also finely divided, wheel *d*, equal in all respects to the other two, sits in the center of the movement upon an extremely thin arbor of the canon pinion. A small motion of lever *b* brings the second wheel *c* into depthing with this third wheel, and all three being of equal dimensions and toothing it follows that by a pressed-in depthing, wheel *d*, in the center, makes one revolution per minute, and, in general, moves exactly as the fourth wheel itself. The large second hand upon this wheel, consequently shows, in case the watch has an anchor movement, one-fifth seconds

A spring *g* presses against the rim of the fourth wheel in the center *d*, as soon as the depthing is pressed out, in order to secure the permanent arrest of the seconds hand, which now shows the end of the observation.

As soon as ascertained, another contrivance effects the return of the seconds hand, in whatever place of the dial it may be, to *o*. For this purpose, a heart *e*, of steel, is fastened upon fourth wheel *d*, and a lever *f*, propelled by a spring *h*, falls with its corner 1 against heart curve *e*, and effects that the seconds hand moves into that position where the zero lever *f* lies upon the lowest place of heart curve *e*.

These three operations must be produced in a manner requiring no special attention on the part of the observed. This is effected by a star *i*, with 18 ratchet teeth upon its circumference, and 6 arising at right angles to its place. The latter teeth are simply produced by radial straight notches, and their outer sufaces, therefore, are parts of the original circle circumference. This star *i* is revolvable around a stop screw, and a lever *k*, carrying a movable claw *l*, when a pressure is exerted upon the other free end *p* of this lever, effects the progress of the star by one of its 18 ratchet teeth, whereupon it is retained by the spring *q* in the new effected position, but lever *k* returns again to its position of repose by the operation of a spring *m*.

As the ends of the impeding lever *b*, a protruding corner 2 of the zero lever *f*, and also such a corner 3 of stop spring *g*, brace against the exterior face of the 6 vertical star teeth, it must follow by such an arrangement that by a pressure upon end *p* of lever *k*, a threefold different effect is produced. By the first pressure, the end of the impeding lever *b* falls into the space of the vertical star teeth, and the observation second is moved in; simultaneously, however, corner 2 of zero lever *f*, which occupied a space of the star, is pushed out as far as its exterior face, and the heart thus becomes free, which otherwise would impede the motion of the fourth wheel, connected therewith. The seconds hand commences to start from zero.

By the second pressure, the end of impeding lever *b* comes again upon a rise of the star, and the depthing is moved out, the seconds hands progress no further. To also guard against any accidental jolt, whereby the watch might change its position, stop spring *g*, whose protruding corner 3 falls into a space of the star, braces against the circumference of fourth wheel *d*.

Upon a third pressure, this spring *g* is again pushed out, and wheel *d* becomes liberated thereby. Simultaneously, corner 2 of zero lever *f*, falls into the star space *i*, and the point 1 of the lever effects the zero position by its pressure upon the circumference of heart curve *e*.

This performance is repeated in exactly the same succession, and upon each third pressure, exactly the same operations are repeated.

It will at once be seen that a watch with this arrangement offers a convenience and security for the observation of small periods of time, such as were not had hitherto. Since the large seconds hand is only set in motion, when required, it always starts out from zero (o); it is no further necessary to estimate the initial period of an observation, or to divert ones attention from the event under observation. The final period of the observation is durably established by arresting the motion of the seconds hand, and as this always proceeds from *o*, the time can easily be ascertained from the dial, in one-fifth seconds. In cases when it is necessary to be quickly prepared for further observations, it is of great importance to be able to effect the return of the hand to *o* by a single pressure.

Anyone who has become accustomed to such a watch, and places any value upon correctly measured observations, will esteem them highly; especially the more so, as the arrangement, if executed with skill, does not by any means require a contraction or miserly division of the space requisite for those parts of the movement changed with the duty of serving for the measurement of time.

For observations extending far beyond the duration of one minute, the so-called double chronographs have been constructed. They have, besides the registering seconds hand, also a similarly provided minute hand.

This kind of observation watches should be far better known and used, if their high price were not an impediment. A watch with such an observation second, costs at least 100 Marks more than an ordinary watch, as these mechanisms are very delicate and complicated, and in no manner permit an indifferent execution. The price for a double chronograph would be fully 200 Marks more.

The price is often an effectual bar to prevent a man who already possesses a good and costly watch, from making a second large expenditure for a like article; wherefore creditable essays have been made to separate the observation mechanism from the watch, and to endow it with all the requisites necessary for observation. The seconds counters or instruments solely devoted to purposes of observation originated herefrom, and were endowed with the most manifold purposes,

(*To be continued.*)

The Lever Escapement.

BY THOS. CHARLES SCOTCHFORD.

[*Continued from page* 106.]

NOW, with intermittent motions of the wheels,* the time by the dial does not depend upon the velocity of the wheels alone, because there is the time of the free or separated motion of the balance also to be taken into the whole time which elapses between two beats; but as the wheels and fixed arcs of the escapement and balance all move simultaneously, therefore, for the sake of brevity, we may say the fixed arcs and the free arcs must together form an integral sum, if the watch makes its beats in precisely equidistant periods of time, such as $\frac{1}{18000}$ of an hour, and $\frac{1}{5}$ of a second, etc., the unlocking of the escape wheel always being included in the time of the balance's free arcs, the time of the fixed arcs being from the instant the wheels begin to move until the instant the roller pin is set free to begin its excursion; or, the time of the detached part of the balance's motion must be the complement of the time of the attached part of the balance's motion.

To put the case of integration as simply as I can, suppose the wheels and fixed arcs of the escapement take one-half the whole time of the beat, and are then stopped, while the balance continues to vibrate to and fro alone, and they rest; these balances' free arcs must then take the other half of the whole time, the two halves forming the whole, or integral beat. But, as it is customary, by having little arcs of the escapement, and large arcs of vibration, to very unequally divide the whole interval of time between two beats, therefore, suppose the fixed arcs take the fraction $\frac{1}{10}$, the free arcs must then take the other fraction $\frac{9}{10}$, so that the sum of $\frac{1}{10} + \frac{9}{10}$ is equal to $\frac{10}{10}$, equal to one whole beat. Or, again, suppose the fixed arcs take the still less fraction of $\frac{1}{20}$, the free arcs must then take the other greater fraction of $\frac{19}{20}$—together they are $\frac{20}{20} = 1$ whole, or in any other ratio. These two motions are mutually dependent on each other; thus, if the train work is irregular, or the adjustment of the mainspring by the fuzee imperfect, the fixed arcs will be slower and quicker, and the impulsive force weaker and stronger, whereby the free arcs are made shorter and longer. But even if the train wheels and adjustment of the mainspring were quite perfect, a change of temperature, by altering the elasticity of the reciprocating spring, would cause this spring to differently secrete the balance's force at the first excursion† of the balance from the impulse arc, and differently reciprocate the motion at the first reciprocation; so that the balance, having a different velocity of its own on meeting the second impulse, will cause the velocity of the wheels and fixed arcs to be changed from the second impulse through all the additional impulses up to the full vibration. Change of position will vary the velocity of the fixed arcs and the free arcs when the frictions are greater in one position than in another. A changed state of the oil will vary the velocity, and in a different way to an imperfect adjustment, or irregular train, because, since we have *two motions*, therefore the thickening of the oil will diminish the velocity and force of impulse of all the pieces up to the lever, similar to a weaker main power; but then the thickening of the oil in the balance staff holes will diminish the velocity of the balance in its revolving; and this latter thing is not the case in a clean watch, when the impulsive force varies, or when the main power is weakened to test the watch in short vibrating arcs. So that in the face of so many liabilities to variation, perfect integration may not be attained in all cases. However, since integration is the fundamental principle of timing, it follows, that to preserve an integer whole under change of velocity, the integer must be reformed in different fractional times by an equivalent loss and gain of the fixed arcs and the free arcs.‡ Thus, suppose the interval between two beats had been divided equally between the two motions, and for a small instant—through some imperfection in the machinery—let the fixed arcs take $\frac{1}{10}$ longer time, the free arcs must then take $\frac{1}{10}$ less time, (or $\frac{1}{10}$ of $\frac{1}{2}$, equal to $\frac{1}{20}$ of the whole beat less time). An equal loss and gain would be required in this case, because the whole interval between two beats is supposed to be equally divided between the two motions; and if there was this reciprocity between them, an integer would be formed anew in different fractional times, the times now becoming $\frac{11}{20} + \frac{9}{20}$, equal to $\frac{20}{20}$, equal to one whole beat. Or, again, suppose the whole interval between two beats is unequally divided between the two motions; the loss of one motion to gain of the other motions will then have to be equivalent; thus, suppose the interval between two beats is divided as $\frac{1}{10}$ for the fixed arcs, and $\frac{9}{10}$ for the free arcs, together, $\frac{10}{10} = 1$ whole; and for a small instant—through some imperfection in the machinery—let the fixed arcs take $\frac{1}{10}$ longer time; the free arcs now need take only $\frac{1}{90}$ less time (or $\frac{1}{10}$ of $\frac{1}{10} = \frac{1}{100}$ of a beat less time), because $\frac{1}{90}$ of the time of the free arcs is equivalent to $\frac{1}{10}$ of the time of the fixed arcs. And if there was this reciprocity between the two motions, an integer would be formed anew in different fractional times, the fractions now becoming $\frac{11}{100} + \frac{89}{100} = \frac{100}{100} = 1$ whole beat, and so on still finer as the whole interval between the beats become still more unequally divided between the two motions; for if the time of the fixed arcs was $\frac{1}{20}$, and the time of the free arcs $\frac{19}{20}$, and these wheels and fixed arcs took $\frac{1}{10}$ longer time, the balance's free arcs then need only take $\frac{1}{190}$ less time ($\frac{1}{10}$ of $\frac{1}{20} = \frac{1}{200}$ of the whole beat less time), a $\frac{1}{190}$ of the time of the balance's free arcs being equivalent to $\frac{1}{10}$ of the time of the wheels and fixed arcs.

With such rapid motions, and no measure to measure their time separately, no person who understands anything of the subject will imagine we can tell how long each motion takes. What can be done

* The class of watches called "Remontoirs" is not considered in this treatise.

† Some escapements are not started from rest by the power of the mainspring—a chronometer requires external force to unlock it before it can be started, and this external force also starts the balance; nevertheless, the ultimate vibrating arc will be the same as if the main power did start the balance, after the unlocking.

‡ An integer could not possibly be preserved whole in the *same fractional times*, when the motion varies from a variation of the action of the machinery. If ever such a thing could be achieved, it must be when the motion varies by change of temperature affecting the metals, and altering the elastic force of the balance spring. There are four things to be considered in the motion, viz., the main power, the inertia of the balance's mass, the balance's reciprocating power, and the unlocking resistance. Now if any one of these things—such as the elasticity of the balance's reciprocating power—is altered, the other three things would have to be *proportionately* altered to keep the angular velocities and fractional times of both fixed arcs and free arcs, the same as they were at a previous temperature. The main power must be altered to impel a changed inertia of the balance through the escapement arc at the original velocity, and the changed force of the balance must then go on and wind up the changed state of the balance spring to the original height on the vibrating arc; the balance spring must then whirl back the balance through the same angular space in the same time. Arrived at the unlocking, the balance must lose the same moiety of its velocity, so that the second and succeeding impulses, added to the balance's own velocity, will make the balance rise to the same height on the arc as at a previous temperature. If we assume *all the machinery of the watch perfectly equable*—as we must do to speak of compensation—and the balance spring's elasticity is changed by change of temperature, and the balance's inertia also made variable by change of temperature, these are only two things out of the four that are operated on; and the change in the balance's inertia is not to suit any one thing—such as the balance spring—more than the others. The condition now is for the inertia to change in such a manner as to form an integer anew, in new ratios, by the new velocities of both the fixed arcs of the wheels and free arcs of the balance. The ratios of change may be any two fractions that together will form a whole beat as per train, provided the time is only required at two different temperatures; but for a range of temperatures, apparently the fractions would have to go on in a regular increasing or decreasing ratio, beginning from some temperature in which the watch was first timed; thus, suppose at a temperature of 32 degrees, the time of the wheels was 1-10, and the balance's free arcs 9-10 or 10-10, equal to 1, this would be the ratio at the beginning from a low temperature. If then the balance's inertia is lessened in heat, and the wheel's velocity should be quickened, so that they took the fraction 1-20 only, the free arcs must then take the other fraction, 19-20, and these would be the new ratios, at the new temperature, etc. The difference in time between any two fractions may be equal or unequal, according to circumstances; if the wheels progressed as 1-10, 1-20, 1-30, 1-40, etc., of the whole beat, the differences in time would be in a decreasing ratio from 1-10 to 1-40, and in an increasing ratio back again from 1-40 to 1-10—all depends upon the rate at which they change in velocity, which velocity depends upon the variation in the spring's elasticity and the balance's inertia, and these things depend on trial. A main power's effect might be changed by placing a ruby collet on one of the wheels furthest from the main power, and having a long, thin piece of compound metal—like the balance's rim—of a curved form, fastened to the plate, so that the changing temperature brought the curved piece of metal to press on, or be taken off the ruby collet. It is only employing a frictional action of the pivots and holes to vary the effect of the impulsive force, and consequently the velocities and times of both fixed arcs and free arcs, and the pressure would have to be so light, that it would not hurt the pivots more than the pressure of the wheel on a duplex roller or on a cylinder. Such a contrivance might be found very useful when a person got used to adjusting it.

is this: by watching the vibrating arc, and trying the impulse arc of the escapement, and dividing the arc of vibration by the arc of impulse, we can tell, very nearly, the time each of the two motions would take if the motion were an uniform one—we could tell exactly if we were quite sure that we could catch the extent of the vibrating arc, and measure the impulse arc exactly; thus, divide the vibrating arc of 459° by an impulse arc of 27°.

$$\begin{array}{r} 27)\ 459\ (17 \\ \underline{27} \\ 189 \\ \underline{189} \end{array}$$

The quotient shows that the arc of 27° is contained 17 times in the arc of 459°, and $\frac{1}{17}$ of the whole interval between two beats would be the time taken by the fixed arcs, and the other $\frac{16}{17}$ by the free arcs, if the motions were uniform at the mean velocity of the acceleration or retardation. So the time of the fixed arcs would be something less than $\frac{1}{17}$ of the whole beat—perhaps not more than $\frac{1}{20}$, for the impulse is done near the highest velocity, and itself quickens the velocity.

The foregoing dissertation on the motion plainly shows us the use of intermittent motions of the wheels, where (as in watches) those wheels take so considerably the least fraction of the whole time between the beats—for if there is a variation in their velocity, and the time of crossing the impulse arc is only $\frac{1}{20}$ of the whole beat, the error is refined twenty times, because it is only an error of this $\frac{1}{20}$ of the whole beat, instead of being an error of the whole beat. And if there are variations in the velocity of the wheels which cause them to take, say $\frac{1}{10}$ longer or shorter time, or the impulse is $\frac{1}{10}$ unequal in their times, the error becomes only $\frac{1}{10}$ of $\frac{1}{20}$, equal to $\frac{1}{200}$ of the whole beat unequal. But the result on the dial can be known only by trial; however, this is the great use of intermittent motions, for without this redemption, and the balance spring together, we could not have such good timekeepers.

In order to prevent any misunderstanding about the subject we are now engaged on, let us recapitulate, in a concise manner, the substance of what has just been stated, viz., the reduction of every internal error of uniformity or equality of the motion of the pieces in the watch up to the lever, is due to the plan of stopping the wheels and letting them rest, while the principle portion of the time is expended by the free or separated motion of the balance. In theory, we might reduce the errors to any extent, by simply shortening the impulse arc of the balance and increasing the arc of vibration. But the impulse arc of the balance is ruled, to an extent, by the sufficiency of the guard pin's arc, and a fair throw of a convenient sized impulse pin.

In conjunction with the intermittent motions of the escapement and wheels, we have the fact that motions by springs take very nearly the same time, whether the extent of winding the spring and the angular space of the balance is somewhat greater or less. And if it were possible to adapt the reciprocating spring so as to cause the balance's free arcs to gain when the wheels lose, and lose when the wheels gain, in equivalent ratios, *beat by beat*, the dial would always be strictly right to time. Or, to reverse the reasoning, if we knew for certain that the motion of the free arcs of the balance and spring would gain in the short arcs, and only gain an exceeding small amount, then we should know that the shortest arc of impulse would certainly be the best adapted, or nearly so, to form an integer. And if we knew that the gain in the shorter free arcs was a greater amount, a longer arc of impulse would then suit better. But if the time was longer in short arcs than long arcs, the spring would be useless to amend the errors of the wheels, for the wheels are sure to be slower when the impulsive force is weaker, and the vibrating arc shorter; but, unfortunately, no experiments can be made; the only knowledge that can be obtained is in the work of timing the watch, although it is worth while to have definite notions on the subject.

A thing extraordinary has been held to be true, without proof, by many persons at home and abroad, both of the past and present generations, viz., that there are certain sorts of springs which will whirl a balance through unequal arcs in equal times, hence the appellation, "isochronism of the spring." In respect to a spring alone, unconnected with a balanced mass, it is impossible for it to *move itself* through variable extents of uncoiling in precisely equal times, although the times would be more nearly coincident when the spring is more wound up, because its power of restitution goes on in a greatly increasing ratio. But when the spring is attached to a balance nobody can tell what the times would be unless they could experimentalize in each case, which is impossible to be accurately done with such rapid motions, when the spring and balance is isolated from the rest of the watch. To assert that when a spring and balance is connected with the machinery, and the motion is variable, and the dial continues to show the same time, that such advantage is due to an isochronous action of the spring, is absurd, because such assertion includes a latent assumption that a spring and balance is first set in motion by an external force *only*, and the motion of them made variable by external influences *only*, and that the main power and all the pieces in the watch adapt themselves to follow the balance's variable motion to register, without adding anything at all to its velocity. But all persons who have asserted this isochronous action of the spring, have also spoken of the main power's impulse, proving their inconsistency. The machinery by which the balance is impelled must pass through space, and take time. The smallness of the space, or shortness of the time, does not abrogate the priority of the wheels and escapement arc; and so far from isochronal springs being any use, the fact is, if they could be proved to exist, they would be the very springs to avoid, for if the motion is variable with such springs, the dial would be in error perhaps even more than the wheels took longer and shorter time in moving through their fixed spaces, and the only way a watch could ever show the right time would be by obtaining an average of gains and losses by the end of a certain period of time. If there was no unlocking, the dial would be in error *exactly* the amount the wheels took longer and shorter time in moving through their fixed spaces, but in unlocking—say short arcs of vibration—as the balance's velocity is less, and its force less, the unlocking would probably take a longer time, and this very minutely longer time would be added to the longer time of the wheels' slower and weaker impulse.

Provided the variation in the velocity of the wheels is small, it is not possible to tell very readily whether the balance spring causes the time of the free arcs of the balance to wholly or partially amend the errors of the wheels' times or not; for even if the free arcs and fixed arcs together lose or gain, and the loss or gain is small, the dial cannot very readily show the error. Or if the balance's free arcs gain or lose more than is wanted to amend the wheels' errors, and the over-gain or over-loss is small, the dial cannot very readily show the error.

As an example of both fixed arcs and free arcs together losing or gaining small fractions of a beat, let the time of crossing the impulse arc be $\frac{1}{20}$ of the whole beat, and the free arcs of the balance, unlocking inclusive, taking $\frac{19}{20}$ of the whole beat, together, $\frac{20}{20}$, equal one whole.

(*To be continued.*)

THE MOST valuable diamonds are not those which are entirely colorless, but those known to merchants as "blue-white." Of blue diamonds, the finest known is the "Hope," valued at $150,000, and formerly in the collection of Henry Thomas Hope, of England. This stone is in color of a beautiful sapphire blue, and there are only three or four other diamonds known in Europe which can really be termed blue. The only known specimen of a red diamond is now in the hands of a great connoisseur residing in London. It weighs about three grains, and is valued at $4,000. The finest green diamond—a pure emerald green—is the property of a West End, London, merchant, and weighs about four grains. There is no other stone known at all, approaching this for depth of color. It is valued at $5,000. Diamonds that contain a slight tinge of color are numerous, but have no special value.

Scientific Notes.

—Varnish for writing on glass may be made of 500 grains ether, 30 grains sandarac, and 30 grains mastic. Dissolve and add benzine until the varnish imparts to glass a roughened appearance. Use cold.

—The boiling temperature of zinc has been found by M. Violle to be 930°, closely agreeing with the observation of M. Becouerel, who gave the temperature at 932°. MM. Seville and Terrost set the figure at 1,042°.

—A new method of tempering steel has been published by M. Clemandot. The metals are heated to a cherry red, and then compressed strongly until they are cool. The result is great hardness and an exceedingly fine grain. Steel thus treated makes excellent permanent magnets.

—Soldering cast iron, says the *Engineer*, is generally considered to be very difficult, but it seems to be only a question of thoroughly making bright the surface to be soldered, and using good solder and a clean swab with muriatic acid. Sodium amalgam might be usefully employed for the purpose.

—In a book published by Bohn in Haarlem, 1842, and written by Herr Elias, there is a tolerably good description of that portion of the electrical machines of Gramme and Pacinotti and all of their type which is called the "ring." The chief portion of the invention of both Gramme and Pacinotti had, therefore, been anticipated. Elias was born in Amsterdam on April 18, 1804.

—Recently, while Dr. A. H. Best, of Savannah, Ga., was silver-plating a small article with silver cyanide solution, he used an old Spanish silver coin as anode. The coin was worn perfectly smooth, and had been hammered to twice its original size; yet in a little while after it was put in the bath, every letter and figure became plainly visible. The date, 1800, though defaced so as to be beyond deciphering with a powerful glass, became plain.

—The Paris correspondent of the *Nature* lately inspected at Feil's workshop, the large flint glass disk which has been cast for the Lick Observatory in California, and purchased by the Trustees for $10,000. It is now on its way to Clarke's for polishing. Its diameter is 97 centimeters, its thickness 55 centimeters, and its weight 170 kilogrammes. The casting occupied four days, during which eight tons of coal were consumed. The cooling of the mass required 30 days. The optical tests showed that the glass was perfect in all its parts. At the time the correspondent wrote, the crown-glass disk was cast, and the process of cooling was going on.

—This is Mr. A. A. Common's receipt for the silvering of glass: Solution 1—Nitrate of silver, 1 ounce; water, 10 ounces. Solution 2—Caustic potash, 1 ounce; water, 10 ounces. Solution 3—Glucose, ½ ounce; water, 10 ounces. The above quantities are estimated for 250 square inches of surface. Add ammonia to solution No. 1 until the turbidity first produced is just cleared. Now add No. 2 solution, and again ammonia to clear; then a little solution, drop by drop, until the appearance is decidedly turbid again. Then add No. 3 solution, and apply to the clean surface. A film was obtained in 43 minutes at a temperature of 56° Fahrenheit.

—The London *Times* describes a recent trial of a new musical instrument invented by Mr. Bailie Hamilton, which resembles in shape and in the means of producing sound, the harmonium or cabinet organ. There is, however, one important difference. Mr. Hamilton employs what is technically known as "free reeds," but instead of acting upon them singly, he divides them into groups of three, connected by a bridge, which so modifies their individual sounds as to emit a single note of great sonorous beauty and power. To each group of reeds belongs a sounding-box or cavity through which the air passes much as the breath in singing passes through the throat, the intention being to produce a quality of tone resembling the human voice. In this attempt Mr. Hamilton has been remarkably successful, by means entirely different from those employed in the "vox humana" stops of ordinary organs. The timbre of the new invention varies somewhat between the voice and the softer wind instruments, such as the French horn, clarionet, etc., partaking of the qualities of both, the beauty of the sustained notes being, indeed, remarkable. The chief defect of the instrument is its slowness of speech, which makes the execution of rapid passages a matter of extreme difficulty, if not impossibility. This drawback, however, does not appear to be structural, and may no doubt be remedied in subsequent specimens.

—An apparatus for the determination of melting points has been described by Mr. C. F. Cross and Mr. E. J. Bevan. It consists of a small platform of thin ferrotype iron or silver, having an opening for the reception of a thermometer bulb, and a small indentation or depression. A very small quantity of the substance is melted in the little depression, and while still liquid, a thin platinum wire, bent like an L and fused in a glass float, is immersed in the liquid and held there until the substance solidifies. A thermometer is then inserted in the opening and the whole apparatus plunged under mercury, which is gently heated, and the thermometer meanwhile is carefully watched. When the substance melts, the float rises instantly, and the temperature is noted.

—One of the chief defects in the arc electric light is the slight unsteadiness arising from imperfect regulation of the carbons. M. Salignac, one of the most active electricians of Paris, has discovered a new regulator which was to be one of the curiosities of the *grande soirée* to be given at the Observatoire on March 13. Each of the two carbons is supplied with a parallel rod of glass, to which it is attached in a solid manner. These two rods being placed horizontally, are pushed by a spring, and the spark is lighted between them. But between the two glass rods there is a glass stopper which is warmed by the light in such proportion that the rods yield gradually to the pressure of the springs, and the carbons can approach each other, as is required for the constancy of illumination. A correspondent of *Nature*, who witnessed some preliminary experiments, states that they were a wonderful success.

—Sir W. Thomson showed in his inaugural address last year to the British Association, that if it were desired to transmit 26,250 horse-power by a copper wire half an inch in diameter, from Niagara to New York, which is about 300 miles distance, and not to lose more than one-fifth of the whole amount of work—that is, to deliver up in New York 21,000 horse power—the electromotive force between the two wires must be 80,000 volts. Now, what, asks Professor Ayrton, is to be done with this enormous electromotive force at the New York end of the wires?

The solution of this problem, he says, was also given by Sir W. Thomson on the same occasion, and it consists in using large numbers of accumulators. All that is necessary to do in order to subdivide the enormous electromotive into what may be called small commercial electromotive forces, is to keep a Faure battery of 40,000 cells always charged direct from the main current, and to apply a methodical system of removing sets of fifty, and placing them on the town supply circuits, while other sets of fifty are being regularly introduced into the main circuit that is being charged. Of course, this removal does not mean bodily removal of the cells, but merely disconnecting the wires. It is probable that this employment of secondary batteries will be of great importance, since it overcomes the last difficulty in the economical electrical transmission of power over long distances.

Mechanical Music.—The Black Forest is famous for these mechanical organs—orchestrions, as they are called—and in some instances they are brought to great perfection. There is a shop close to the exhibition, bearing the name of Lamy Söhne, full of clocks and singing birds and orchestrions, where you may pass half an hour in a fairyland of surprises and all kinds of mechanical music. One morning I went in with an old lady and gentleman—the latter a grave dignitary of the Church of England. "A very tiring place," said the old lady; "all up and down hill; the only fault I find with the Black Forest. Couldn't they level it, my dear?"—to her husband—"or build viaducts or something? Or at the very least, couldn't they organize pony chaises all over the country—like those, you know, that we found so useful at Bournemouth last year?" "Take a chair, my love," said the old gentleman, without committing himself to an opinion. And he placed one for her, while the young man in the shop (whose jolly, good-natured face and broad grin delighted one to behold) wound up the orchestrion. The old lady sat down somewhat heavily from sheer exhaustion, and immediately the chair struck up the lively air of "The Watch on the Rhine," with a decidedly martial influence upon its occupant. She sprang from her seat as if it had been a gridiron, and asked her husband reproachfully if he was amusing himself at her expense, and whether her age was not sufficient to secure her from practical joking. "Dear me!" cried he, in amazement, looking at the offending chair as though he expected it to walk away of its own accord. "What a musical nation these Black Foresters are! It's music everywhere! The very chairs you sit down upon are full of it." At this moment the orchestrion struck up a selection from "Don Giovanni," and the old lady recovered her amiability in listening to a really splendid instrument. I left them still enjoying it, marveling at all the birds and boxes, and thinking each one more wonderful than another.

Workshop Notes.

—Mr. Duchemin, in a late session of the Académie des Sciences, Paris, proposes to substitute pivots made of iridized platinum, in place of common steel pivots of chronometers.

CLEANING-RAGS.—Cloths with which metallic surfaces may easily and rapidly be cleaned, are made by steeping woolen cloths in a solution of 4 grams Castile soap and 20 g. water, adding 2 g. tripoli to the solution, and dyeing it red with fuchsine.

STAMPING COLOR.—A color that dries slowly upon the color pad, yet is quickly absorbed by the paper is preferred; of 16 parts firm aniline color (blue, violet, red, etc.), 7 glycerine, 3 syrup, and 80 distilled water. The aniline color is dissolved in the hot water, and the other parts are added, while stirring.

NEW ALLOY.—The *Revue Chronom.* publishes a recipe of an English alloy, remarkable for its conducting, malleable, and permanent properties. An analysis by Mr. Philipps proved it to be composed of, platinum, 80.660; iridium, 19.079, rhodium, 0.122; iron, 0.098; ruthenium, 0.046 parts=100.005 parts.

ORIGIN OF DIAMOND.—Mr. J. A. Roord Smith publishes in the *Archives Neerlandaises des Sciences exactes*, a treatise on the diamond mines of South Africa. He states that the diamond is found in a primitive gangue of a volcanic origin; the presence of a bicarbonaceous silicate of lime is a characteristic sign of these mines, and deems them to be extinct craters of volcanoes. His hypothesis is that the diamond is of volcanic origin, and formed by the assistance of organic matter under the influence of great pressure and a high temperature. The late artificial production of diamonds appears to favor this view.

—It has been found that by an addition of from 1 to 13 per cent. of phosphorus to bronce, a very desirable alloy is produced, different in appearance and properties from the common bronce. It assumes an extra degree of hardness, which permits it to be employed with an advantage in the mechanical arts. Many parts of machinery, bearings, knobs, drawers, slides, etc., exposed to great wear and tear, may be manufactured therefrom.

Another alloy consists of copper and nickel, and evinces far more powers of resistance than the ordinary alloy of brass and copper; it is gradually being introduced into the manufacture of articles of commerce.

ETCHING UPON METALS.—Cover the surface of the metal on which you desire to etch, with white melted wax; when cold, trace the design or character upon it with a sharp point, which penetrates through the wax layer. Into these lines pour either very strong vinegar or pure acetic acid, and spread upon it a powder made of 100 grams rock alum, and the same weight of sulphate of copper, previously calcined in a crucible in the fire. To have the engraving deeper, as soon as the effect of the first mordant is spent, wash the wax in cold water, without rubbing, however, let it dry and repeat the operation. By renewing it as often as necessary, the workman has it in his power to regulate the depth of the engraving according to his liking.

COLD PULVERIZED GILDING—Immerse 15 grains white finely pulverized sal ammoniac in 250 g. nitromuriatic acid, mix it well together, and let it dissolve over glowing coals. Filter the mixture through filtering paper, into a glass alembic; then add 2 grams gold, thinly beaten and cut. Hold the alembic over glowing coals, and the gold will gradually dissolve. When effected, also dissolve 15 g. rock salt in this mixture. Into this solution, sufficient linen rag is immersed to imbibe all the fluid, which then is left to dry by a stove or in the sun, and when dry, it is burnt to tinder in a new crucible or porcelain dish, and is rubbed to a fine powder, (gold powder). To use it for purposes of gilding, a cork moistened either by saliva or salt water is dipped into this powder, and rubbed on the well-ground and purified article until it is thoroughly gold washed. The rubbed-in places are wiped, and burnished with the steel. This powder is most excellent for objects with ornamented surfaces. To produce a red gold powder, prepare it mainly as above specified, only from 3 to 5 parts finely pulverized French verdigris is added to the contents of the alembic, (the red color increases with the proportion of the verdigris). This dissolves also in the nitro muriatic acid, mixes with the dissolved gold, and, of course, passes as such. The great advantage of gilding with this red gold powder is that it retains its color until completely worn away, an advantage not shared by any other manner of gilding. Red gold powder is more difficult to be applied, but is more durable.

Foreign Gossip.

EXPORT.—The Grand Duchy of Baden, during 1881, exported watches and watch material to the value of M. 23,068 to the United States. The value of gold ware amounted to 39,902 marks.

TIME OF NIGHT.—Many large cities, as is well known, are poor in illuminated clocks, whereby to know the time at night. Antwerp, Holland, has lately had a clock inserted into each street corner lamp post, whereby the passer is enabled to know the time.

A DISTRACTED HOROLOGIST.—The *Revue Chronométrique* speaks of a watchmaker who sits in his shop surrounded by clocks awaiting to be regulated, and ticking away in a manner understood only by non-regulated timepieces. He suddenly remembers an appointment at four o'clock. The day wanes, and inquietude seizes him, so, rushing out on the street he inquires of the first passer-by, "What time is it, if you please?"

JUSTICE.—The Russian Prince Eristoff, who, on account of a swindle perpetrated on a jeweler in Berlin, in the fall of 1881, was condemned to two years penitentiary, and brought to Plötzensee to serve his term, has been pardoned by the Emperor, with the proviso that he leave the country, and never re-enter Prussia. Eristoff agreed to the terms, and was therefore taken from the penitentiary, and conducted under guard as far as the Russian line.

EXHIBITIONS.—Exhibitions are a product of our century, although France instituted one such during the time of the Revolution, in 1790, in which 110 exhibitors represented their products.

The first industrial exhibition in Germany was held in Munich, in 1818; next in 1824, Dresden; 1827, Berlin; 1828, Prague; 1835 and 1839, Vienna; Moscow, 1825; Madrid, 1841. In France, in 1801, 1806, 1819, 1823, 1827, 1834, 1839, 1844, 1849. England remained cool, and only instituted its first exhibition in 1843, at Manchester; next in London in 1845, 1847, 1849. London opened the course of the World Exhibitions, in 1851, which have been continued up to date, but appear to give way again to country exhibitions.

ANOTHER MONSTER BELL.—St. Paul's Cathedral, London, will at an early date be provided with a new bell, that may well rank among the monster bells of the world. It was cast on the 23d day of November last, in the factory of M. Taylor, of Loughborough. The smelting occupied 8½ hours, and the casting, four minutes; but only after six days the cast was sufficiently cool to issue from the mold. The dimensions of the bell are, height, 2.692 m.; diameter, 2.896 m.—(0.91 meter=one yard). It has not yet been weighed, but it is presumed that it may be classed between the bell of Olmütz (18,182 kilog.), and that of Vienna (17,980 kg.). Next comes that of Erfurt, 13,960 kg., of Sens, 13,200 kg., and of Paris, 12,190 kg. The St. Paul Bell will cost about 75,000 frs., in which is comprised the cost of putting it *in situ* in the northwest steeple of the church.

VALUABLE DISCOVERY.—We read in the *Petit Marseillaise* of April 10: During the past few days, several huntsmen were hunting in the country of the Island of Formentera, in the Beleaves. While pursuing their game through a thicket, they came upon a deep excavation, which they resolved to explore. Blackberry thickets guarded the entrance; farther on, enormous stone blocks, and both time and work were necessary to open the passage; but according as they penetrated into the cavity, their astonishment grew. The passage which opened before them was made by the hand of man; both to right and left, the walls were covered with numerous and unknown writings.

After several hours' work, they at last arrived into a spacious room, of Moorish construction, admirably preserved, and in the middle were two magnificent tombs of a very original form and of inconceivable richness.

Excited by curiosity, our huntsmen, having become archæologists for the nonce, followed their investigations farther. A sort of a metal lid covered the two sarcophagi, which they raised without difficulty, and what was their stupefaction? A mummy reposed within each one. That to the right appeared to belong to a young woman, to the left, an older man. Their sizes were colossal. The young woman's head was adorned by an inestimable diadem, supposing that the jewel ornaments were genuine; they threw their sparkle afar off; a pearl necklace adorned her breast, and her fingers were covered with rings, and a carbuncle was fastened to each ear. The man wears an imperial crown, and in his right hand, a scepter.

The little Island of Formentera is highly excited about the discovery; the hole was no secret to the inhabitants of the country, who supposed it belonged to some wild animals, which are numerous hereabouts. Of the six huntsmen in question, four have remained for protection, while two have gone to Madrid to notify the authorities of their discovery.

Trade Gossip.

P. Jandorf & Bro. have removed from 182 to 196 Broadway.

Cape Colony exported last year $22,500,000 worth of diamonds.

The settings of precious stones are made as invisible as possible.

C. I. Richards, Brown & Co., have opened an office at No. 202 Broadway.

R. Tannenbaum has removed from 222 Bowery to 18 West Fourteenth street.

Manufacturers are at a loss to know what style of goods to make for the fall trade.

Gems of all kinds are fashionable, and profusely worn by the wealthy ladies of society.

Day & Clark, manufacturing jewelers of Newark, have opened an office at 194 Broadway.

S. A. Crittenden of Newark has purchased the refining and assaying business of David Prince.

O. A. Hendrick & Co., makers of gold chain, have established a New York office at 194 Broadway.

Richards & Co., agents of the Battersea works, London, have removed from 4 Murray street to 398 Bowery.

We are indebted to the courtesy of the Spencer Optical Co. for the use of the cuts in our article on "Sight."

Large emeralds and pale yellow topazes, separated by diamonds, are frequently mounted together in a lace pin.

Novelties in real jewelry are pale pink pearls and turquoises mounted together, and set in small fine diamonds.

Nicholas Mullers' Sons, importers of clocks, bronzes, etc., have removed from 8 Cortlandt to No. 117 Chambers street.

There has been an immense demand for fine fancy metal candlesticks, and fine porcelain and metal oil lamps this season.

Color in jewelry is at present studied as a fine art. It takes an artist to blend colored stones to advantage in fine ornaments.

Messrs. Krementz & Co. will have, when completed, one of the handsomest and most convenient offices of any house in the jewelry trade.

Jewelers say that their trade in fancy novelties is better this year than for many seasons. Taste runs to other jewels as well as diamonds.

Mr. Chatterton, of Springfield, Ill., has been confined to his hotel in this city for some days with a severe illness. He is now convalescent.

It is not considered good form to ask a young gentleman with a fob ribbon if he is aware that the end of his suspender is hanging below his vest.

Gems are always favored; just at present rubies are in great demand. Pearls clustered with emeralds and sapphires are the latest style of gem necklace.

It is reported that the citizens of Rockford, Ill, have offered the Racine Silver Plate Co., a capital of $150,000, if they will move to that enterprising town.

Necklaces are not considered exactly fashionable, although they are still extensively worn. The most stylish are composed of rows of beads, drawn high about the throat.

Imitation pink pearls, carved out of pale pink coral, are so irridescent when finely polished as to be indistinguishable from the real pearls, except under the close inspection of an expert.

The firm of Wilkinson & Lennon has been dissolved by mutual consent. J. D. Lennon will continue the business at No. 142 Fulton street, while Mr. Wilkinson has opened an office at No. 8 John street.

L. Lehmann has, in consequence of increasing business, been compelled to materially increase his manufacturing facilities. His specialties of imitation morocco cases being in great demand with the trade.

A Swiss experimenter is reported to have manufactured artificial mother-of-pearl which cannot be distinguished from the genuine. It is not stated what name he will give to the new article—mother-in-law of pearl, perhaps.

There are several pleasing changes in jewelry. The antique style of bracelet is growing in public favor, and is sure to find favor with society dressers. A new design represents a coiled rope of three braided strands, and are of polished gold alternating—one end is finished with a ball of gold with a single pearl set in the top and ornamented with filigree work. The other end has a rosetted filigree ornament, and a shell-shaped piece set in at the side.

Baldwin, Sexton & Peterson have just been refitting and decorating their offices in the Whiting building. They have made a very handsome place of business, having a substantial appearance, in keeping with the character of the firm.

One of the most superb jewel *parures* lately mounted for a Parisian leader of fashion—an American, of course—is composed of a necklace, bracelet diadem, earrings, and Louis XVI. brooch of turquoises set in diamonds, with large pear-shaped pink pearls for pendants.

Welch & Miller have, in consequence of increasing business, been compelled to seek more commodious manufacturing facilities, consequently have fitted up a well-appointed factory at No. 12 Maiden Lane. The firm will, however, continue their business office at No. 169 Broadway.

James Fricker, of Americus, Ga., has admitted to partnership in his business, Charles A. Fricker, his brother. The firm name will be Jas. Fricker & Bro. Charles A. will have charge of the business at Americus, while James will attend to the large establishment recently opened at Danville, Va.

St. Paul's Chapel, in Broadway, has the oldest tower clock in the city, having been made in London in 1778. It has two weights of 1,000 pounds each, and it takes three-quarters of an hour to wind it. The clock in Trinity Church, made in 1846, has three weights of 1,500 pounds each, and is wound up in an hour and a half.

The New York Dial Co. have opened a factory at 108 Liberty street, for the manufacture of French, Swiss, English and American watch and clock dials, and are now prepared to do any kind of enamel work, moon phase, chronograph, chronometer and sunk dials of all sizes, both plain and fancy, etc., at the shortest notice.

The following named gentlemen have been elected officers of the Illinois Retail Jewelers' Association: O. E. Curtis, President, Decatur; E. H. Goulding, Vice-President, Albion; John E Boynton, Secretary and Treasurer, Jerseyville. All communications should be addressed to the Secretary and Treasurer, enclosing stamp for reply.

Clarke & Andrews have just established themselves in the jewelry business at St. Joseph, Mo. They open with a very desirable stock of new goods, and rely upon their energy and business capacity to secure a large number of friends and customers. Mr. Clarke will be remembered as having formerly been in the employ of the Meriden Britannia Company.

The safe of N. Howard & Son, manufacturers of gold chains and rings, at Springfield, Mass., was forced open by burglars on the evening of the 2d ult., and the entire contents, consisting of finished and unfinished goods, taken. The loss is fully $8,000. The burglars left a full kit of tools. It is thought to be the work of professionals. There is no clue to them.

An intelligent constituency in Keokuk, Iowa, have given evidence of their good sense by electing Mr. David J. Ayers Mayor of that city. Mr. Ayers is a member of the firm of T. R. J. Ayers & Sons, one of the most eminent jewelry houses in the west. The city is to be congratulated on having secured the services of such an enterprising, practical, business man.

Dan G. Golding, a young and active member of the trade, has been located at Leadville, Col., for several years, and we are glad to learn that his industry has met with a substantial reward. His business is now in a thriving condition. He handles fine goods mostly, and makes a specialty of fine watches and diamonds. Mr. Golding's success has been well deserved.

The celebrated W. B. & Co. watch glasses are universally acknowledged to be the standard watch glass made. They have a world wide reputation for uniformity of temper, accuracy of guage, and superior clearness. The size of each series of glasses are readily distinguished by noting the number on the combination label, which gives the Geneva standard as well as Lunett size.

The pearl is liable to be discolored by acids, gas and noxious vapors of all kinds. For this reason Her Majesty's Theatre is supplied with candles, and at the balls of the English aristocracy gas is never used. The best way to retain the beauty of genuine pearls is never to wet them. Dampness is a great injury to this gem. When not in use, put them in magnesia, and their brilliancy will not fade.

The firm of May & Stern dissolved May 17th, by mutual consent. Mr. Henry May continues at No. 19 John street. Mr. Joseph Stern has formed a copartnership with his brothers Simon Stern and Jacob Stern, and will conduct a general jewelry, watch and diamond business at No. 6 Maiden Lane, under the firm name of Stern & Stern. The Messrs. Stern have been in the jewelry business since 1864. Mr. "Mo" Ettinger and Mr. Arthur Horsch, for many years traveling salesmen for May & Stern, will travel for Stern & Stern.

The following named gentlemen have sailed for Europe, viz: W. S. Ginnel, son of Mr. Henry Ginnel, in the *Adriatic*, May 11; Mr. Harvey Galbraith, of Messrs. Duhme & Co., of Cincinnati, in the *Servia*, May 17th; Charles S. Perret, of Julien Gallet, in the *Germanic*, May 20th; W. C. Edge, of Dorrance, Edge & Co., left in the *Adriatic*, May 11th; S. Bendit, buyer for A. Bernhard & Co., will sail in the *Britannic* June 10th; Jules Gruet in the *France*, May 3d.

A. M. Hill, one of the most enterprising jewelers of New Orleans, has bought out the bankrupt stock of George Strong, and is now running the two stores. It will be remembered that Mr. Strong went to New Orleans for the purpose of winding up the Tyler estate, but by a turn of the wheel some way, the estate succeeded in winding up Mr. Strong. It was a case where the tail couldn't waggle the dog. After Mr. Strong's failure, the establishment was run for a time in the interests of the creditors, but was finally disposed of to Mr. Hill.

In the recent disastrous fire at Racine, Wis., the Racine Silver Plate Company was one of the largest sufferers, losing between $40,000 and $50,000, with an insurance of $32,000. Under the management of Mr. Kelly, who is an able and enterprising gentleman, the prospect of the company seemed most promising. The same energy that built up the company will now be invoked to rebuild the works. We also note that Mr. O. Anderson was also a sufferer by the fire, but it is reported that he succeeded in saving most of his goods.

Ladies do really wear live bugs attached to them with a gold chain. One of our Philadelphia belles, a beautiful girl, allows a long-legged, brilliant-backed reptile to crawl from shoulder to shoulder, and seems unconscious of its very existence. An Irishman in a street car the other day, watching the capers of the thing, became so absorbed in gazing that he forgot his manners, and exclaimed in a loud voice: "Bad luck to me, if it aint alive!" The possessor and vehicle of the fashionable pet blushed and gathered in her treasure away from the rude stare of ignorant people.

For a long time Durand & Co., manufacturers of jewelry in Frank lin street, Newark, knew that gold scraps were stolen from the factory every week. Stockton Hurd, who was formerly in the employ of the firm, was in the habit of calling at the factory on Sunday morning, when he chatted with the watchman. On Saturday marked pieces of gold were placed in the pans, and the following morning Mr. Durand and Detective McManus concealed themselves in the factory. Hurd entered and greeted the watchman. While the latter was not observing him Hurd slipped some gold into his pockets. The officer arrested him. He confessed he had been stealing gold many months.

A lot of diamonds, pearls, coral necklaces, mosaics, gold bracelets, and other articles of jewelry were recently found concealed in a package of books sent in the mails from England to this city, were examined at the Custom House a few days since, and their value estimated at $2,500. After the examination, Custodian Isaac Trimble placed the property in the strong fireproof vault adjoining the seizure room. The package, which was mailed at London, bore the address, "A. Millard, Cincinnati, Ohio, U. S A." A detective connected with Special Agent Brackett's department, accompanied by an official from the Post Office here, started for Cincinnati for the purpose of investigating the case. It is suspected by Captain Brackett that there is a regularly organized company of smugglers, who are making use of the mails to carry on their nefarious business. The number of packages of goods smuggled through the mails is growing alarmingly large. Among the latest irregular importations of the kind were dry goods, musical boxes and ivory caskets. The Customs and Postal authorities are determined to break up the business if possible.

The Elgin Watch Co. received recently, a package of jewels from Europe, to be used in the manufacture of their watches. On their arrival in Chicago, it was found that one package, valued at from $4,000 to $6,000, was missing. As these goods had been sent in bond, the Collector was much exercised over the loss, and strenuous efforts were made to fix the responsibility for it. The express company through whom the goods were sent, offered a reward of $500 for their recovery. A few days since a young lad presented a package of stones to one of the clerks in Cross & Beguelin's and asked their value. The clerk identified them as the Elgin Co.'s jewels, and secured them, delivering them to the agent of that company in this city. On claiming the reward offered, he was met by the statement that "it was only offered as a bluff." The young man has begun suit to recover the reward offered. Subsequently the money was placed in the hands of the attorney for the clerk to await the decision of the court. If importers of watch jewels would imitate the example of P. T. Barnum, and make affidavit that the jewels are intended for breeding purposes, they would escape the heavy duty and extraordinary risk to which they are now subjected.

The New York Jewelers' Club held their regular monthly meeting Tuesday, May 9th. Quite a number of the trade joined the club at this meeting. A communication was received from the Providence Club, naming Thursday, July 6th as the date of their proposed visit to the city. The question of what the entertainment upon that day will consist, is in the hands of the Executive Committee, who will probably make their report at the next meeting. We understand the Providence Club leased a large building last fall, and have been practising ball tossing all winter. It consequently behooves our New York boys to be on the alert.

The crown jewels of France, which are to be sold at auction, with certain exceptions, have been in the courts for some months, and a decision is now rendered concerning the disputed points. Among the condemned objects are the crown of Napoleon III., and the swords of Louis XVIII. and the Duc de Berri, all of which will be melted down. Jewels which have a scientific value will be preserved in the Museum of Natural History, or in the School of Mines. It is estimated that from 10,000,000f. to 12,000,000f. will be derived from the sale. The sum will be devoted to works of public utility, and to the relief of sick and disabled workmen.

There are many busy-bodies in the trade who delight to put in circulation rumors that are calculated to reflect upon the good name and fame of reputable manufacturers or dealers. If a factory shuts down for repairs, or a dealer restricts his purchases, some gossipping tale-bearer starts a report that they are in trouble, and the tale grows as it travels, till finally it culminates in a reported failure of the parties. When persons have nothing better to do than circulate rumors reflecting upon others, as to the truth of which they know nothing, they had better get out of decent society. They would be better employed editing a column of alleged wit in a religious newspaper.

The old *Evening Post* building, corner of Liberty and Nassau streets, is now being torn down, and on its site an elegant building is to be erected for office purposes. We would suggest that this presents a splendid opportunity for a concentration of the jewelry business, without removal from the locality where it has become so well known. Elegant offices will be provided in this building, light, airy, and provided with every convenience. All trucking could be done through Liberty Alley, in the rear, and the blockade of wagons in the street thus avoided. A pre-eminent consideration for such occupancy of the new building lies in the fact that it is in close proximity to the office of THE CIRCULAR.

A number of retail jewelers have lately taken small offices in this city, or hired desk room, and put out a sign announcing themselves as jobbers, and take particular pains to circulate their business cards bearing a similar description. They do this solely for the purpose of imposing upon the manufacturers by buying goods at jobbers' prices. The goods so purchased are sent to their retail stores in the country, thus securing an advantage over their fellow retailers. Manufacturers should exercise greater precaution in selling goods to buyers of this class. Something besides a rickety desk and a bottomless chair is required to make a jobber, and it ought not to be a difficult thing for a manufacturer to ascertain that an intending purchaser, who wants every advantage in the trade, is a jobber in fact, as well as by self-assertion. This game has been extensively played of late, and is unjust to legitimate retail dealers.

Mr. Julius Walker, of Buffalo, who has failed on several occasions, as the trade well knows, successfully accomplished his last transaction in this line in April last. His statement presented to his creditors was a model of neatness and detail, including a schedule not only of his stock, but also of personal property, to wit: One night-shirt and some collars. While these are not regarded as especially available in payment of debts, the creditors, nevertheless, appreciate the sacrifice made by Mr. Walker, in thus surrendering so large a portion of his wardrobe. Mr. Hastings, of the firm of Carter, Sloan & Co., accepted the trusteeship for the benefit of the creditors, and proceeded to Buffalo to administer on the estate. He found that the liabilities amounted to $14,700; preferred claims, $6,500; assets, liberally estimated at $20,000, consisting of stock, nominal value, $15,876, and collaterals, $4,000. He immediately paid off the preferred claims, and took possession of the stock and other assets, giving an indemnity bond to Mr. H. F. Allen, the assignee. The stock was then sold to T. & E. Dickinson, they being the highest bidders. After reserving themselves the best of the stock, the Dickinsons sold the remainder to Walker for $9,038, of which $6,000 was cash, and the balance in four, six and eight months' notes. By his judicious manipulation of this matter, Mr. Hastings has secured for the creditors about fifty per cent. of their claims. Mr. Walker is now reinstated in business, and announces that he is ready to see his old friends once more, Thus endeth the third or fourth lesson—we forget which.

THE

Jewelers' Circular and Horological Review.

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

The recognized organ of the Trade, and the official representative of the Jewelers' League.

A Monthly Journal devoted to the interests of Watchmakers, Jewelers, Silversmiths, Electro-plate Manufacturers, and those engaged in the kindred branches of art industry.

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Horological Schools and Watch Companies.

A CORRESPONDENT, in the course of a friendly letter, remarks that THE CIRCULAR is in favor of the establishment of a horological school, yet opposes every scheme presented for such establishment; also, that we oppose every plan that is proposed for the formation of a new watch company. He proceeds to ask if we are not inconsistent in these respects, and wants us to define our position. We had supposed that every regular and intelligent reader of THE CIRCULAR understood just where we stand on these subjects, but as there appears to be a doubt, we will explain.

A horological school is one of the most pressing necessities of the trade. But if ever such an institution is established, it wants to be a horological school in fact as well as in name. To make it such, an endowment fund of not less than $50,000 is required, and this should be cash in hand. At such a school the science of horology should be taught, as well as its practical application; instructions should also be given in everything pertaining to the goldsmiths' and jewelers' arts, including designing. There must be a corps of practical teachers, and sufficient mechanical apparatus as will enable them to illustrate practically what they teach. In the establishment of such an institution, tuition fees should form no part of its reliance, at least during its earlier years, but the young, ambitious men and boys in the trade should be invited to attend it free of cost, or until they become sufficiently proficient to enable them to command compensation that will permit them to pay for tuition. Such a school wants to be so organized that it will do for the jewelers' trade what the Cooper Institute is doing in this city for hundreds of young men engaged in various artistic and industrial pursuits. All Peter Cooper's philanthropy could never have accomplished the magnificent work done as it has been by his philanthropy combined with liberal donations of cash. What a horological school can do towards developing and perfecting artistic workmanship it is needless to discuss—the lack of such training as could be there obtained, is painfully apparent in all branches of the horological, jewelers' and goldsmiths' arts. Not but good work is now done, but wherein are our workmen making progress? Where is the next generation of workmen to get their training? While we are anxious to see such a school established, upon a proper basis, with a sufficient endowment to ensure its success and permanence, we are opposed to all the schemes that have yet been put forward by penniless adventurers, whose sole object in fathering the project is self-aggrandizement. Of the several schemes presented, we have yet to see one that has not pure selfishness at its foundation, or that has coupled with it the name of a single person competent to take charge of such an industrial school. When a project for a horological school is put forward upon a reasonable basis, intended to benefit the trade instead of self-seeking individuals, having the pledge of competent persons as instructors, that they will be identified with it, THE CIRCULAR pledges itself to raise $10,000 towards its founding and maintenance. But we will never be a party to foisting upon the trade a bastard attempt at such an establishment, in the interests of penniless adventurers, who only desire it as a means for securing good salaries and comfortable places for themselves.

Substantially the same reasons actuate us in opposing the visionary schemes that are put forward every little while for the formation of a new watch company. Possibly there is room for such a company, but it will require a large amount of capital behind it as a pledge of its good faith and its solvency. Several projects have been put forward lately for the organization of watch companies, each one of which appealed to the retail dealers to become stockholders in the concern. Their projectors had neither originality of conception regarding the manufacture of watches, nor capital with which to commence operations with borrowed or stolen ideas. There was no excuse for the existence of such a company as they proposed, save the desire of the projectors to make liberal provision for themselves. To this end, the retail dealers have been solicited to subscribe the required capital, in return for which they were promised certain advantages in making future purchases. No guarantee was offered them that a watch factory would be founded, nor was the character of the watches to be produced vouched for; they were simply asked to tie themselves to the tail of the kite of these scheming adventurers, furnish the motive power to propel the kite, and permit these schemers to manipulate the string to suit themselves. There is no sense nor prospect of success in such wild flights of fancy. The land is strewn with the wrecks of similar visionary enterprises, and thousands of persons mourn the loss of their money in consequence of having listened to the vaporings of these visionary intriguers. We do not desire to see the retail trade caught in this way, and so have protested against these projects, and shall continue to protest against every similar scheme that relies upon the retail dealers to furnish the capital to put them in operation. Retail dealers are essentially merchants, not manufacturers, and they need all the capital of which they are possessed to manage their private affairs successfully. To entrust their hard-earned savings to adventurers to use in a great manufacturing enterprise, in the control of which they would have no voice, would be reckless and foolhardy in the extreme. It is true that just at present there is an active demand for watches of American manufacture, but it is unfortunate that such demand has been created and stimulated by the unwise introduction of a cheap grade of watches, that are of a better quality than can be afforded for the price charged for them. They were introduced to the trade for the purpose of attracting attention to their better grade watches, precisely as a dry goods merchant will sometimes offer standard goods at less than cost, for the purpose of securing custom. Unfortunately, these cheap watches became too popular, and the manufacturers cannot afford to fill their orders for them, nor can they afford to turn the resources of their factories to the making of these watches. Consequently there has gone forth the idea that the demand for watches is greater than the supply, when, in truth, the demand is for the cheap rather than the high grades of watches. The company that should undertake to cater exclusively to this demand, would soon find itself hopelessly insolvent. To establish a watch manufactory successfully, requires not only a large amount of capital, but a liberal allowance of brains—there must be originality as well as mechanism, and these qualities have been conspicuous by their absence in the schemes alluded to. They have been conceived in the fertile imaginations of visionary adventurers, who had everything to gain and nothing to lose by imposing upon retail dealers. It is to this class of projects that we are opposed. But when capitalists come forward and put their money into a new watch industry, and are supplied with the requisite horological and mechanical talent to warrant a success, making a class of goods that will benefit the retailer, we shall cordially extend to them the hand of welcome. We take pleasure at all times in commending any project that is calculated to advance the watch industry of this country, but we have no encouragement to offer to those visionary schemers—half knave and half fool—who attempt to prey upon the retail trade in their selfish efforts for self-aggrandizement. Honest enterprise will always have our earnest sympathy and support, but we have no tolerance for knaves or imbeciles.

The Tribulations of a Conscientious Editor.

CANDOR and professional pride compel us to affirm that all editors are conscientious, truthful and honestly intent upon serving their fellow men. Some of them, however, are wofully tempted to stray from the path of rectitude—not for filthy lucre, for that your true editor scorns, but through the intensity of his ambition to do just the right thing, oblige his friends, and extend a helping hand to impecunious but deserving merit. He is more often misled through his good-heartedness and human sympathy than any other cause. We have had editorial experience with all classes of journals—daily, weekly, monthly, semi-occasional, political, religious and profane, but nowhere have we experienced such trials and tribulations as beset the pathway of the editor of a trade journal. In the conduct of THE CIRCULAR we are actuated by the highest motives, and seek to promote the best interests of the legitimate trade; our ambition is to make an art journal, not only elegant in its typographical appearance, but that shall contain such instructive articles as shall stir the ambition of all persons who honestly seek to advance the arts of the goldsmith, the watchmaker and the jeweler, and make them emulous of better things than have heretofore been accomplished in their respective fields of labor. In this publication it is necessary, in addition to instructive articles treating of the technicalities of the business, for us to give the news transpiring in trade circles, and to comment editorially upon the varying conditions of the business; in short, to give such information as shall be of value commercially to the merchants in the trade, as well as to its artisans. This we seek to do in a dignified manner, adjuring personalities, seeking to offend no man, but striving to tell the truth fairly, squarely and manfully.

No one, however, who has not attempted to conduct a trade journal, can imagine the difficulties interposed to swerve us from our purpose. For instance, we pen an editorial exposing the unbusiness like practices of certain jobbers, who seek to cultivate, by surreptitious means, a retail trade, and so rob the retail dealers of that patronage to which they are justly entitled, when forthwith some jobber who feels that the cap fits him, writes us an indignant letter, threatening to withdraw his patronage and use his influence against us. Not content with abusing us, he assails the retail dealers, declares they do not pay their debts, that they are unscrupulous in their dealings with the public, palming off bogus goods for genuine; he charges them with being responsible for the degradation of the quality of goods by their constant demand for cheaper articles, and, in fact, holds them responsible for all the ills the trade is heir to. On some other occasion we read the retail dealers a lecture on the bad practices of which they are guilty, and forthwith we are overwhelmed with indignant protests from dealers, who declare that the articles are inspired by unscrupulous jobbers, and that the paper is "run" in their interests and that of watch companies. If rumor is to be believed, every advertiser in the paper is its sole proprietor, while the gentleman whose name appears as editor and proprietor is a mere figurehead, and his position is that of a cheap clerk. This, however, is comparatively trifling; they are annoyances that every editor has to submit to, and go to verify the old adage that he who tries to please everybody will please nobody. The special province of a journalist is to criticise, and he must expect to be criticised in turn; but if he be honest, and manfully maintains his convictions, his opponents will respect and sustain him, however much they may differ from his expressed views.

The greatest difficulty the editor of a trade journal has to contend with is the bitterness engendered by active rivalry in business, and spirited competition. It is unfortunate that active, energetic rivalry generally degenerates into bitter personalities. Misrepresentation of one another's goods is a practice frequently indulged in, and crimination and recrimination result. Both the contending parties are probably friends of the editor, and patrons of his paper; each, therefore, feels that he has a right to demand that the influence of the paper shall be employed in his behalf to expose the alleged rascality of his rival. They forget that the general readers of the paper care nothing for their petty personal quarrels, but insist that its columns shall be used to gratify their private animosity. Knowing the parties to the quarrel to be honorable men in their private capacity, the judicious editor refuses to parade their grievances before the public, or to prostitute his paper to the level of an individual organ. That competition is good for trade is unquestionably a fact, as the adage says, but when one seeks to build up his own trade by misrepresenting the goods of a competitor, he passes the bounds of legitimate competition and becomes absolutely dishonest. Misrepresentation of this kind is exposed sooner or later, and is sure to react upon the person indulging in it. A salesman who disparages the goods of his competitors, declares them to be degraded in quality and fraudulent in construction, naturally invites a closer inspection of the articles he himself is offering, and the intending purchaser soliloquizes to himself, "if those other travelers were liars, how can I believe this one?" More ill feeling is engendered in the trade by indulgence in this kind of misrepresentation and back-biting than from any other cause. And the worst of it is, the editor of the trade journal must listen to all these grievances, and is expected to take both sides in the quarrel. How to steer his craft successfully past Scylla and escape Charybdis is a problem that has caused many a hair in the editor's head to turn gray, and he expects to be carried to an untimely grave and leave it still unsolved.

An important function of the trade journal is to notice all new inventions or devices that are introduced in that branch of business to which he caters. In the jewelry trade, for instance, if a manufacturer obtains a patent for a new style of ring or pin, or designs a new form of setting for precious stones, it is a legitimate part of our duty to note the fact, and to pass a just criticism upon the merits of the goods, and, where necessary, to speak of the enterprise of a person to whom the trade is indebted for a novelty. We do this gratuitously and cheerfully as a matter of news. But scarcely will the item be printed before a score or more persons come clamoring for a notice of their goods, which have neither the merit of newness nor originality. They argue that they patronize the paper as well as he whose new device was noticed, and are as much entitled to a "puff" as he. They fail to recognize the difference between a deliberate "puff," the giving of which we seek to avoid, and a notice of something new and desirable, of which the trade knows nothing. The one is a legitimate piece of news, while the "puff direct" is a fulsome piece of flattery, given without just cause or provocation, and is as discreditable to the person named therein as to the paper printing it. Items of news, even though they involve personal mention, belong to the legitimate sphere of journalism, while puffery does not. But there are many persons in the trade who seem to feel that if they patronize a paper, they are entitled to frequent notices in reading matter columns. No such obligation is imposed upon the editor by the advertising contracts entered into. Those call for advertisements, and the advertiser gets the worth of his money through the circulation of the paper. But some men are so eager to see their names in a notice that they get indignant when the editor refuses to insert "puffs" of them. We could sell our reading columns every month at liberal prices, but can truthfully say that never, since THE CIRCULAR was established, has an article in its editorial columns been paid for. Advertisers may say what they please in their business cards, but their patronage cannot influence the expression of our editorial opinions.

A daily journal caters to the multitude, and is naturally oblivious of special interests; the trade journal, on the contrary, caters to a special interest, and ignores the general public. Within his special field the editor of the trade journal finds a great variety of individual interests, clashing at times like Chinese cymbals, and he is a skilful pilot who can steer his craft so successfully as to avoid all the breakers. The difficulty lies with his patrons, who, each seeking his own personal welfare, ignore the general interests of the trade at large, and who regard everything as an attack upon themselves unless it harmonizes with their views. Judging from the advice we receive from one and another, we are sometimes inclined to think that the editor of THE CIRCULAR is the worst possible person that could be found for the position. Yet we keep right along in the even tenor of our way, maintaining the stand we took at first, to seek to promote the interests of the entire trade, and not those of individuals; if in so doing individuals are benefitted, we rejoice at their success, and feel thankful at having been permitted to contribute to it. As a moral to this article, we desire to suggest that our critics strive to view matters pertaining to the trade from our disinterested standpoint before writing us denunciatory letters; sink your individuality for a moment and consider the welfare of the trade in general; then, as you believe in the sincerity and honesty of your own purposes, give us credit for the same qualities. You may differ from our conclusions, but at least admit that we may be honest in them.

A MOVEMENT is contemplated among the manufacturers of watch cases that is calculated to put the selling of silver cases on a better basis than heretofore. It has been the practice to sell silver cases at so much an ounce, plain cases and ornamental ones being the same. But the demand is largely for highly ornamented cases, calling for the work of the most skilled engravers, to whom high prices must be paid. Under the existing system of selling, it has been necessary to put a high price on plain cases, in order to make up for the elaborate work of engraving the ornamented cases. It is now proposed to put the price of plain cases as low as possible, and then to charge extra for the ornamentation. This is certainly an equitable arrangement, and one that does not require the person buying a plain case to help pay for the artistic engraving that is to ornament some other fellow's watch. Under the proposed plan, a purchaser can have as much or little engraving as he chooses to pay for; he can have a perfectly plain case at a nominal price, or one engraved with a representation of a horse race, or a copy of a painting by some old master, according as his fancy and the length of his purse warrants. This seems to be a fair and equitable method of selling cases—charge what is a fair price for a plain case, and a proportionate one for fancy workmanship and artistic skill.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

Since the June number of THE JEWELERS' CIRCULAR was issued, five more have made formal assignments to the President of the League, of their interest in the unexpended balance of the Chicago fire fund, now in the custody of Enos Richardson and Henry Randel, Trustees. The complete list of those who have become patrons of the League by directing their share of the fund to be paid to the League, is as follows:

J. A. Abry, (now C. L. Abry); H. F. Barrows; Albert Berger & Co.; Victor Bishop, (now Victor Bishop & Co.); A. Bernhard & Co.; Philip Bissinger; Bliss & Dean; Erhard Bissinger; Th. Bloch & Bros., (now Bloch Bros.); F. F. Braillard; Brainerd, Goddard & Steele, (now Brainerd & Steele); Estate of Paul A. Brez.; John D. Brez; Brooklyn Watch Case Factory; Brown, Cook & Co., and Maas, Groeschel & Co., (now Cook, Groeschel & Co.); D. Bruhl, (now D. & M. Bruhl); Bruno & Son, (now C. Bruno & Son); Buckenham, Cole & Hall, (now E. G. Buckenham); T. B. Bynner & Co.; Samuel W. Chamberlain; H. A. & G. M. Church; William Cohen, (now Cohen & Co.); Colby & Johnson; Cooper, Fellows & Co.; Cox & Sedgwick; H. E. Droz; E. C. Dunning & Co.; Estates of L. Durr & Bro.; Earle & Franklin; Samuel Eichberg; Eisenmann Bros.; A. Errico, (now Errico Bros.); Joseph Fahys; Fellows & Co.; M. Fox & Co.; Charles Francke & Co., (now C. J. Francke); Freund, Goldsmith & Co., (now Max Freund & Co); Julien Gallet; Giles, Wales & Co.; Henry Ginnel; Hayward & Briggs; Henle Bros.; Hessels & Ludeke; Wm. S. Hicks; Hodenpyl, Tunison & Shiebler, (now Hodenpyl, Tunison & Co.); John E. Hyde's Sons; Jacobs & Pratt; J. W. Johnson; L. & M. Kahn; Ketcham Bros & Co.; (now Ketcham & McDougall); R. Kipling & Son; F. Kroeber; Julius Levin; S. M. Lewis, (now S. M. Lewis & Co.); Lincoln, Tifft & Co.; Albert Lorsch; Estate of George A. Mathewson; H. D. Merritt; J. B. Matthewson & Co.; Rachel Merrill, two-thirds of the interest of the firm of Merrill, Fitch & Allin; Miller Bros.; J. M. Morrow; Nordmann Bros.; E. Obermeyer & Bro., (now H. Obermeyer); Palmer & Capron; Geo. W. Platt, (now Jas. W. Todd); J. W. Pooler & Co., (Courvoisier, Wilcox & Co.); Geo. W. Pratt & Co.; J.W. Richardson & Co.; Stephen Richardson & Co.; E. Ira Richards & Co.; John A. Riley & Co.; P. E. Robinson; Saltzmann & Co.; Robert Schell & Co.; J. E. Spencer & Co.; J. T. Scott & Co.; Sillcocks & Cooley; Smith & Hedges, (now Wm. S. Hedges & Co., and Alfred H. Smith & Co.); Herman Sonntag; E. & D. H. Stites, (now E. Stites' Sons and D. H. Stites & Son); L. Strasburger & Co.; Geo. O. Street & Son; Sussfeld, Lorsch & Co., (now Sussfeld, Lorsch & Nordlinger); Vulcanite Jewelry Co.; A. Wallach & Co.; Wheeler, Parsons & Co., (now Wheeler, Parsons & Hayes); Whiting Mfg. Co., and D. H. Wickham.

On April 13th, six months after the issue of the circular announcing the existence of this fund (which, having been subscribed ten years prior to that date, had been, like all good deeds should be, almost forgotten by the generous donors), most of the subscribers had assigned their shares to the President, as trustee, for the good work of the League. President Woglom, up to that date, having been presented with the assignments evidenced by sealed instruments, all duly acknowledged before notaries public, by over 70 of the subscribers, on May 13th made a formal requisition on the Trustees for the payment to him of the percentage of the fund to which he, as Trustee, was entitled. On May 22d, at an interview with the Trustees, they stated their preference for a discharge from their Trusteeship by a Court rather than to accept a bond of indemnity as offered by the President, to hold them harmless as to claims against them by subscribers; it was therefore agreed as the alternative of the Trustees, that a friendly suit should be instituted by the League, for the surrender by them of the respective shares of those who had assigned their interest to the League, to which they promised no captious defence; accordingly the case is now being prepared by the counsel of the League, and the course pursued by the two litigants, the Jewelers' League on the one side and the two Trustees on the other, will be noted with as keen interest by the members all over the country, as has been shown in the matter up to this stage of the case.

The Committee of Eighteen, who have under consideration such plans as may conduce to the best interests of the League, both in its present form and in its future welfare, held a meeting on June 5th, and listened to the reading by the President, of a carefully prepared paper on a system of assessments called the "graded assessment plan," that is, the member paying at each assessment an amount proportioned to his age at the time. The subject was treated fully and ably, and the paper was listened to with great interest by the meeting.

At the regular meeting of the Executive Committee on Friday evening, June 2d, the following named gentlemen were admitted to membership:

Bernhard Frolke, 45 Chatham street, Robert L. Keach, care Keach & Pine, 196 Broadway, Edward Loesser, care A. S. Fridberg, 25 John street, Edward B. Nock, care Hodenpyl, Tunison & Co., 170 Broadway, Alexander S. Fridberg, 25 John street, George F. Peacock, 25 John street, Chas. Schlang, 360 Bowery, Philipp M. Thoma, 15 Maiden Lane, New York City; Hans P. Alsted, care W. B. Clapp, Bro. & Co., 170 State street, Isaac Seligman, care Henry Oppenheimer & Co., 84 State street, George H. Shaw, care W. B. Clapp, Bro. & Co., 170 State street, Chicago, Ill.; Robert Wilson, Jr., care Samuel C. Tappan, 286 River street, Troy, N. Y, Louis H. Zepernick, care Zeil & Zepernick, 5th and Race streets, Cincinnati, O.; Joshua M. Wiestling, care I. G. Dillon, Wheeling, W. Va.; Henry Wicke, 1117 Franklin avenue, St. Louis, Mo.; Julius A. Weis, Montgomery, Ala.; Geo. S. Van Wickle, A. C. Voorhees, 17 Peace street, New Brunswick, N. J.; Albert Vogt, Montgomery, Mo.; Charles F. Tryon, Lake City, Minn.; Calvin Thomas, Terre Haute, Ind.; Albert C. Taylor, Cedar Rapids, Iowa; Joseph Rickesheiser, care Bowler & Burdick, 208 Superior street, Cleveland, O.; James K. Rauch, Bethlehem, Pa.; Wilfred Patterson, care Bailey, Banks & Biddle, Philadelphia, Pa.; W. H. Parnell, care Shreve, Crump & Low, Boston, Mass.; Chas. H. Osgood, care H. A. Osgood & Son, Lewiston, Me.; Leon K. Nowierski, care D. P. Richards, Columbia, Mo.; James O. Nason, care Joslyn & Park, Leadville, Col.; Frederick C. Lingg, care Lingg & Bro., 1031 Market street, Philadelphia, Pa.; John W. Lenan, care Potter & Buffinton, 19 Snow street, Providence, R. I.; Edward H. Kelly, Jackson, Tenn.; Horace D. Johnson, care Chas. H. Schiller, Utica, N. Y.; Frank A. Jewett, Norwalk, O.; F. P. Iannarone, 507½ Pa. ave., Washington, D. C.; Jos. B. Hudson, Washington Court House, O.; Rufus Hooper, care Carrington, Thomas & Co., Charleston, S. C.; Joseph Harris, care R. B. Holden & Co., 109 Friendship street, Providence, R. I.; Geo. E. Goddard, care Goddard, Hill & Co., Pittsburgh, Pa.: Alexander A. Gambeth, care Carrington, Thomas & Co., Charleston, S. C.; Urban W. Frink, Brattleboro, Vt.; Augustus G. Friedertce, Meridian, Miss.; Geo. F. Dorrance, Jackson, Mich.; John A. Doar, care Carrington, Thomas & Co., Charleston, S. C.; Norman W. Dickson, Maple Park, Ill.; Fred. Crake, P. O. Box 1623, Montreal, Canada; Henry W. Coulter, care A. M. Hill, 84 St. Charles street, New Orleans, La.; William P. Cooke, care P. A. Landing, Thunder Bay, Ont. Can.; Thomas A. Cobb, care W. E. White & Co., Providence, R. I.; Henry G. Bradshaw, Martinsville, Ill.; William E. Bemis, Le Grange, Mo., and James Thomson, with Jaques & Marcus, New York City.

Fifty-two total; four candidates were referred for further investigation, one was rejected, and one member, (dropped from the roll for non-payment of assessment) having complied with the requirements, was reinstated. The full membership is now, just five years after the date of organization, June 1st, 1877, two thousand, (2,000).

It is worthy of note that not one cent has been paid to agents or others for the securing of members; the work has been purely voluntary and mutual on the part of the members, assisted by the publicity given to the purposes of the League through the columns of THE JEWELERS' CIRCULAR

One candidate forwarded to the Secretary with his application, an imperial photograph of himself; the picture was accepted by the Committee as the "schedule thereunto annexed," an' next candidate was taken by the Committee and acted upon in their usual methodical manner.

Assessments Nos. 14 and 15 were ordered, in consequence of the deaths of James A. Bogart, whose loss we mentioned in our June number, and Ganson B. Holton, a traveling salesman in the employ of W. B. Clapp & Co., of Chicago, notice of which, dated June 2d, has since been sent out to the members.

The beneficiary of James A. Bogart has been paid, $3,568.20.

It will surprise many to learn the good which has been quietly accomplished by the League during the first five years of its life; a review of the following amounts paid to the beneficiaries of members without cavil, within thirty days, will show that nearly thirty-five thousand dollars ($35,000) have been paid.

1. Chas. W. Menge, Jersey City, N. J.	$ 459	80
2. John J. Barker, Brooklyn, N. Y.	1,599	80
3. Thomas Slater, President, Newark, N. J.	1,647	30
4. George A. Harris, Norwich, N. Y.	1,776	50
5. James D. Nelson, Jersey City, N. J.	1,850	55
6. J. J. Acheson, Brooklyn, N. Y.	2,498	55
7. Geo. D. Stevens, Orange, N. J.	2,684	70
8. Samuel Strauss, New York City	2,718	90
9. Andrew P. McGowan, New York City	2,882	30
10. John H. Willemin, Springfield, Mo.	3,142	60
11. Edwin C. Taylor, New York City	3,117	90
12. Joseph Treulich, Chicago, Ill.	3,258	50
13. George A. Cory, Jamestown, R. I.	3,231	90
14. James A. Bogart, Cranford, N. J.	3,568	20
	$34,437	50

Reuben A. Thompson, with J. B. Mathewson & Co., New York City, was appointed member of the Examining Finance Committee, *vice* James A. Bogart, deceased.

Secretary Harrop, of the Merchants' and Salesmen's Association, in his annual report, made some remarks on the payment of assessments, which are as germane to the League as to his association; we commend them to the consideration of the members of the League:

"The Association being *entirely* composed of business men, and of a class that would be naturally supposed to appreciate the advantages of PROMPTNESS in the payment of all dues and assessments, it is singular to notice the large and increasing number of our members who habitually delay their payments to the last day, and quite a number to the last hour of the last day.

"This entails upon the Secretary the extra labor, and upon the Association the extra cost, of sending out second notices, in the apprehension that his regular notices have miscarried.

"When the fact is stated that in several instances on the day preceding the expiration of an assessment, the number of those who had not yet paid has exceeded one hundred and fifty in one instance, very recently was 370 odd, the extent of the evil will become apparent.

"The by-laws plainly set forth the fact that the sending of ONE NOTICE through the U. S. mail to each member's last recorded address, is the full extent of the duty of your officer in this matter; yet he does not hesitate to say, that had he strictly adhered to this line of duty, and had the full penalty for non-payment in time then been enforced, that our membership list to-day, instead of being nearly 1,000 (now over that figure), would be in all probability much nearer one-half that number.

"The idea seems to be prevalent among the general membership that the thirty days limit granted by the Association rules, to cover possible absentees traveling on business, and whose notices may not at once reach them, is in the nature of a credit given, while the contrary is really the case.

"Some few (*very few*) have signified to your officer that his sending a second notice prior to the expiration of the thirty days, was in wretched bad taste, not to say insulting; claiming the right to pay on the last day, and not wishing to be dunned before the account was past due.

"An assessment is due and payable at once the day it is issued, because the Association has incurred a loss which the said assessment is to repair; and it certainly was not anticipated by the framers of our rules, that any percentage of the membership would delay their payments any length of time.

"It has frequently happened of late, and will in all probability occur more frequently hereafter, as our numbers increase, that we have two of our associates dead at about the same time, thereby necessitating double assessments, and as we have but one benefit in the treasury at one time, one of these losses is paid inside a very few days, while the other beneficiary is compelled to wait several weeks longer. Much of this delay could be avoided by prompt payments of our assessments. This is not presented in any spirit of fault-finding, but for the thoughtful consideration of the entire membership, to the end that we may secure the best management of the Association."

These remarks are quoted approvingly by the *Commercial Traveler*, the organ of the well-known and popular Commercial Travelers' Association, with the following comments:

"We have just one other suggestion to add to this, and in the same spirit. It is the common experience of all associations that at every assessment more or less members lapse, and their names are stricken from the roll in accordance with the constitution. It may not have occurred to these gentlemen who thus permit their names to be dropped, that they have received two months insurance from their comrades, *free of expense* to themselves. This is the fact, as well as that they have violated their own sacred compact with the widowed or orphaned beneficiaries of their deceased comrades, and virtually defrauded them of the amount of the assessment. It may seem a little matter, but no wrong is a little one. It is in truth nothing but stealing, and that of the meanest kind, for the victims are widows and orphans. There is an honorable method of withdrawing from the Association, free from any such stain. If one has paid all obligations and assessments, he may resign honorably and retain the respect and confidence of all his comrades. We are happy to know that of those who withdraw from the associations, some pursue this course; but too many, either thoughtlessly, or ignorantly, or worse, suffer their names to be dropped with obligations unsettled."

The League has had but little occasion to chide its members in this direction, but we give these remarks as a possible preventive rather than a cure.

Chronographs or Watches for Observation.

BY M. GROSSMAN.

Concluded.

WITH a mechanism not charged with the functions of recording the hour of the day, but simply to measure an elapsing event between two well-defined limits, an important object is gained by being able to control the motion of the hands, and causing them to reassume a previous standpoint; they may be set into motion by loosening the balance, and brought to a sudden stop by arresting the latter. The entire mechanism is simplified, and the delicate connection, especially necessary to effect the moving in and out of the finely-toothed depthing for the seconds transport, is entirely dispensed with.

After I had made the manufacture of observation watches the special line of my factory, the necessity for simply-constructed but correct mechanisms for the purposes of observation, naturally suggested itself to me, and I will endeavor to describe a few made according to the desire of my customers.

I started from the basis, to retain the shape of a watch, on account of its handy form, and not to surpass the dimensions of a full-sized one. The stem-winding arrangement is a great commodity, wherefore I retained it. A motion period of three hours for one winding will also be found sufficient for the longest observations.

After having drafted a movement in tenor with these conditions, with a dial 45 m. large, corresponding to a 20-line watch, I manufactured a quantity, and constructed the contrivances necessary for observations, in four different sorts:

No. 1 is provided with a star, upon which three different operations, by pressing upon a button, are produced, as was described by the chronoscope watches. The difference consists in doing away with the finely-toothed depthing, together with the contrivance for moving it in and out, and a lever is moved by a sideward motion instead. The spring end of this lever, which stretches away from the star, is conducted upon a little star, and is lifted thereby. A pin fitted into one end of the lever and reaching through the lower plate, previously rested on the lower side of the balance, and retained it. By this lifting, the balance is freed. The lever is similar to the one represented in fig. 6 by *e f g*; *n* is a small screw with beveled head, and when end *g* of the lever is pushed upon this level, the above-mentioned operation ensues.

With the second pressure, the short end *e* of the lever falls into the interval of the star, end *g* slides from the bevel *n*, and the pin again retains the balance, whereby, of course, also the hands are arrested.

With the third pressure, this position is not changed, but the zero lever, until now lifted from the star, drops into the interval, and effects upon heart discs *a* and *b* the zero position of the seconds and minute hands. The seconds hand is set into motion in exactly the same manner as the minute hand of a common watch; the minute hand, however, sits upon the canon of minute wheel *c*, and into this seizes the canon pinion *d*, placed upon the protruding pivot of the third-wheel pinion.

In this manner both hands also proceed from zero, are arrested at the conclusion of the observation, and placed back to zero.

The seconds counter No. 2, for which I obtained a patent in January, 1878, is simplified from the preceding one, and its mechanism is given in Fig. 6. As will be seen, the star which automatically produces the three motions, is left out, and in its place a push button for each of the three motions is placed on the exterior. It is visible at *l*, *m* and *o*. It would be a great imperfection if, while the observer's attention is fixed upon the event, he should have to pause and consider which of the two first push buttons must be touched, to set the hands in motion or retain them, or if, by accident, he should press upon the wrong push button. Impelled by this reason, I have arranged them in such a manner that they are attached to the whip piece, which by spring *k* can assume only two determined positions. In consequence of this arrangement, one of the push buttons is always flat with the case rim, and only protrudes when the other is pushed in. The third button serves for the zero position; it is of a different shape, and a mistake is thus fully excluded.

Demands were sometimes made for instruments of a dial graduated still more minutely than ⅕ seconds. It would be impossible to construct a watch of such a speed, because no quicker motion can be given to the hand than is allowed by the balance If a watchmaker were to construct a watch with vibrations less than ¼ seconds, it would be of doubtful value for practical purposes, especially for continued service. With these observing instruments, however, only used now and then for short periods of time, the mechanism can be adapted to the requirements of the occasion. I, therefore, constructed thirds-counters of a larger form, (diameter of dial, 70 m.), and making 40 vibrations per second, with a peculiarly constructed cylinder escapement. The thirds-counter, making one revolution per second, sits upon the prolonged pivot of the scape pinion.

Beside this, the movement has a seconds and minute hand. I was also called upon to construct similar instruments, of portable dimensions, however, for military purposes. They are of the same size as the seconds counters (diameter of dial, 45 m.), and contain the same work, but make 25 vibrations per second. As the dial is divided into 300 parts, and the seconds hand makes one revolution in 12 seconds, each single part corresponds to $\frac{1}{25}$ part of a second. This kind of seconds counters is made use of as acoustic distance meter in firing. The officer who has to estimate the distance by help of this instrument, observes the flash of the powder and the arrrival of the detonation, and judges the distance accordingly, knowing the velocity proportions of light and sound.

I will finally mention a variety of the seconds counter—the dotting chronograph. It has a peculiarly contrived seconds hand, by means of which the position of this may at any time be durably recorded upon the dial by a black dot. It is useful wherever a succession of events occur rapidly upon each other, such as horse or foot racing, etc.

The original puncturing chronograph of Foucher, Paris, had a stationary seconds hand, while the dial rotated once per minute. This faulty construction was improved later by the mechanism rep-

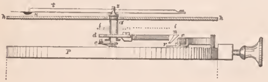


Fig. 7.

resented in Fig. 7. The cut gives only the underplate *p*, the dial *h*, the latter in cross section, as well as the peculiar parts of the instrument.

Over the dial *h*, is seen the double seconds hand *t u*, consisting of the chief hand carrying at *u* a little vessel or inkstand, provided with a fine perforation through the center. A second very delicate hand *t*, the dotting hand, is fastened with its hind end upon the large hand, and its forward bent-down part dips into the ink and passes free through the small hole in the bottom of the inkstand. By the least pressure exerted upon this small hand *t*, its point penetrates through the opening of the stand and makes a small dot upon the dial, to be enameled in order to easily efface those dots.

Upon plate *p* is fastened a striking spring *s u*, shaped thus that push button *v*, when rapidly pressed in, lifts the spring and as quickly drops it again, while by its return motion, it only permits a sideward motion of the spring.

The seconds hand also sits upon a canon fitted upon the center axis, to be seen dotted and enlarged in Fig. 8. Heart *c* is riveted to the lower end upon this canon. Below it is provided with a small spring which braces upon the shoulder of the center arbor, and effects a gentle but sufficient friction of the hand of axis *l*. A hollow tube, with shoulder *a a*, is fitted very loosely upon the canon, ending above in a fork *z* (Figs. 7 and 8). A fine pin passes through the fork from *z* to *z* (Fig. 9), and this pin rests upon a flexible part of the dotting hand *t*. Tube *a a* is continuously raised through the resistance of this hand.

It will be seen by the different arrangements that a rapid pressure,

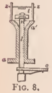


Fig. 8.

exerted upon the push button, will push spring end *c* under the button *v n* of spring *s*, and lift the wheel *d s n*, which rises as high as *i*. Upon pressure of the button, spring *v* has arrived at *i i*, where it suddenly drops head *d* of spring *b d*, and lets it strike upon the lower rim of canon *a*. Thereby hand *t* is bent, it passes through the inkstand, and effects a small black point upon the dial near to the seconds division.

When the finger leaves the button, button *v* pushes the spring *n*, and both reassume their positions of rest. The dotting can take place continuously, as the motion velocity of the hand is less than that of the spring and hands. Of course, for the perfection of these instruments they are also provided with a zero position.

It will be gathered from thi: description of these dotting chronographs, and still more from the accompanying figures, that these instruments must be constructed of a size neither portable nor handy, in comparison with watches. They require greater height, specially demanded for the striking spring and tube, which draws down the dotting hand. These impediments to so useful an instrument were removed by H. Robert, of Paris, by an ingenious arrangement, which, when compared to the former, is a decided simplification.

I will attempt to describe its most essential parts from an instrument shown me by Mr. Robert, on my visit to Paris, in 1877.

The dotting hand, which, according to the above-described arrangement, springs toward above, that is, away from the dial, and is sustained through the operation of striking spring *d*, Fig. 7, whereby it makes a dot upon it, works in a reverse manner in the chronograph by Robert; that is, it springs toward the dial, and would continually rest upon it, if it were not prevented. This is done in the following manner: The center pinion is perforated in its entire length, as is common in watches; it also has a prolongation of its perforated arbor which reaches beyond the dial, thus that the canon, carrying the seconds hand, fits upon it. Through this hole in the center pinion passes a well-fitting pin, moving freely within it. A spring screwed upon the upper plate of the movement presses this pin toward the dial side, and removes the dotting hand from the dial by surmounting its spring power.

The mentioned spring reaches over the whole surface of the upper plate, to the pendant place of the case, and at its end it is provided with a little angular lever, revolving round a pin. A button, whose inner, conically formed end lies opposite to this small lever, by rapid pressing, for a moment annuls the effect of the spring, thus that the dotting hand, obedient to its power of springing, makes a dot upon the dial. Upon return motion, the small angular lever revolves around its revolving point, without exerting any influence.

In this manner the dotting chronograph may well be executed in the dimensions of a large-sized watch, and in fact the handsome and useful instrument is in great favor, not alone for the purposes of the so-called sport, but also for scientific purposes, for instance, observations with the passage instrument, when the ten passages through the hair crosses may in this manner be very accurately registered, afterward to be copied.

Instruments giving still smaller divisions of time, cannot be executed in a portable size, since they have to be endowed with mechanism to make them independent from human imperfections, and must be provided with automatic rests.

How Watch Crystals are Made.

[From *Révue Chronométrique.*]

WE CONTINUE our description of the manufacture of watch crystals; first, however, desire to correct a typographical error that inadvertently occurred in a previous article, in our April number—the names of the gentlemen mentioned as the chief promoters of this industry at Goetzenbrück, are A. & T. Walter, not Dalter.

The large blown, very thin glass balloons, after having cooled sufficiently, are cut into a great number of strips, 20 cm. broad, and 25 or 30 cm. long, by aid of red-heated steel rods; these dimensions furnish the requisite size for the crystal. Also a certain kind of turning frame (*tournette*) and compasses, armed at one of its horizontal ends with a diamond, are used. These thus excised almost flat glass planes are converted into Chevé glasses, by turning up their edges. For this purpose, they are introduced into a small muffle, heated by coke. Within this muffle are several small molds, of a very fine clay, of exactly the shape intended for the crystals, therefore, an almost level plane, with slightly curved edges, as is shown at *m*, Fig. 1.

A workman places a disc *a b*, upon one of these molds *m*, previously dusted with a very fine powder of lime and clay, to prevent the adhering of the glass. He next quickly pushes the mold into the muffle, and when the glass has become sufficiently softened, withdraws it with an iron hook, and rubs the glass with a paper wad, until it has conformed to the shape of the mold. A skilled workman, who can superintend several muffles, can produce a good many of these crystals per day. Both the mold and the wad leave traces upon both sides, however, that must be removed by subsequent polishing, by which operation the price of the Chevé glasses is considerably increased.

Messrs. Walter & Berger have invented another method for this process; it consists in the use of raised molds of clay, in place of the hollow ones. Crystal disc *c d* must protrude in its entire circumference, a little beyond mold *n*; the mold, after heating, is withdrawn from the muffle upon a platform before it, and the workman imparts to the crystal its requisite shape *o v*, by using a little conical, suitably hollowed wooden instrument. That part protruding beyond mold *n*, intended to be curved, heats more rapidly than that supported by the mold.

FIG. 1.

This work proceeds with greater rapidity than the first described one, and the rims simply need be polished. This is done by a round grindstone. Also the oblique, slightly rounded rim, necessary for the crystal to enter into the bezel, is produced in this manner; the rim is finally polished by a cork wheel.

The latter method has been much simplified by Mr. Walter; the crystal, after it has been excised by aid of the diamond, at once enters the grinding room, in which the oblique rim is ground on; it then receives its requisite shape as Chevé crystal, in the muffle; the effect of the fire, which softens the glass, also rounds the previous sharpness of the oblique rim, and it remains perfectly transparent and lustrous, at the same time, harder and more durable, and less liable to the crumbling of the edge when sprung into the watch bezel. Several processes are dispensed with by this method, such as equalizing the rim, rounding and blunting the dullness of the edges, and polishing.

The ready crystals are divided according to quality, diameter and curve; each piece is separately wrapped in paper, placed together by dozens, and wrapped in bulks of half gross. These crystals, thus prepared for commerce, are worth, according to number and quality, from 2 francs 50 cent., to 8 francs per gross.

Chemical Composition.—The glass matter used for crystals must be very dense, in order not to become flowy, or lose its polish during use; it also must attract no moisture—a condition easily occurring by soft, easily fusible, and very alkaline glass. That intended for watch crystals must contain a great percentage of silica, and only fuse at a very high temperature. The following composition is used at Goetzenbrück (Lothringen).

Silica	parts,	65
Carbonate of soda	"	17
Carbonate of potash	"	6
Lime	"	10
Soda saltpeter	"	1.5
Arsenic	"	0.5
Total	parts	100.0

A piece of this glass scratches the ordinary white bottle glass similar to a steel point.

In the production of Chevé crystals, hand labor is two-thirds, crude and firing material the other third of the cost.

To complete our remarks on watch crystals, we will close by giving a few technical and historical sketches.

Cutting the glass by aid of the tournette is said to have been invented by Louis Veyret, a watchmaker in Lyons. By means of this little instrument, mentioned in a previous paragraph, ten circles were at first drawn with the diamond point upon the large balloon, one of which must lie exactly opposite to the pipe hole. The main question arose on detaching one of these segments, and was done by punching that piece lying opposite the hole, from within. When the first piece was detached, (the most time-consuming and difficult of the entire operation), the workman inserted his thumb through the opened hole, and by a gentle pressure and due manipulation, was enabled to press out the other pieces.

Separating by means of the blowpipe was done in the following manner: A model of a watch crystal was made, generally of metal, and laid upon the large balloon, or upon one of the large strips cut therefrom; it was held upon it by one hand, while a white-heated blowpipe was drawn around the edge. The circle heated thereby only need be moistened with cold water, and the more or less arched segment separated, in consequence of the sudden contraction of the glass.

It is said that the modeling of crystals, first upon a ball, and next upon the mold, as is shown in Figs. 3 and 4, was invented by Genevan manufacturers. We will soon see, however, that this method has been in use in France since 1791.

The arching of the glasses, shown in Fig. 4 at *N*, is said to have been brought by Lembach from America, also the rounding of the crystals by the round grindstone. They were formerly rounded in the chuck tool. The glass was fastened upon a chuck, and while rotating, it was covered with the so-called hat, a hollow cone, which contained the polishing agent. It is presumable that this process was used with the first Chevé crystals, to polish their rims.

We will close by inserting two letters on the history of these Chevé crystals. One was published in the *Révue Chronométrique*, and proves that the first Chevé crystals were made as early as 1791 in France. Royer Père was the first who succeeded, after many trials, in imparting to the crystals the desired arched form, by laying them upon the bottom of a crucible and belaboring them until they assumed the required form. These letters read:

"My father, Pierre Royer, manufactured the flat arched crystals about the year 1791. Abraham Bréguet, to whom he furnished these glasses, and whose genius had already created the flat watch, sought my father, and said to him, 'The crystals you sent me, and which you manufacture from large balloons, give me much difficulty for the use for which they are intended. They are much too high in the center and too flat around the rim. Could you not make me a crystal flat on top and raised on the rim?'

"Bréguet consequently demanded a crystal arched at the rim, and 'Chevé' signifies nothing else than arched; and as my father made the crystals arched on the rim, they were called Chevé crystals.

"The watchmakers often say to me, 'But if your father invented these crystals about 1791, why did he not name them for him?'

"I only can reply by saying that the inventor of the Chevé crystals was not called 'Chevé;' as little as the inventor of the cylinder watches was called 'cylinder.' Every invention was not called by the name of the inventor at that age, as is the custom to-day.

"My father was undoubtedly the inventor of said crystals, and only to honor his memory I elucidate the point.

"I finish by publishing a letter from Bréguet, confirming my statement in all particulars. ROYER JEUNE, Paris."

"A. M. ROYER:—According to the examination instituted by us, we perceive by our business books that the first Chevé crystals, furnished by your father to us, date to the year 1791.

"Our books were kept rather loosely at that time, and we are unable to ascertain whether your father worked for us prior to that year, although we do not believe it, judging by his presumable age.

"We are of the firm conviction that Louis Ab. Bréguet, the great founder of our house, was the first one who had the conception, after having constructed the first flat watch, to order those Chevé crystals, and which were at once imitated in Switzerland; as it has sought in other branches to imitate the inventions of our Louis A. Bréguet.

BREGUET, NEVEU & CIE."

The Autodynamic Clock.

A SO-CALLED autodynamic clock was placed in the Vienna City Park last November, and maintained in motion by no other motor than the change of tension of the atmosphere, and has given satisfactory results until now. This peculiar physico-mechanical construction is causing a great deal of attraction, occasioned by the fact that it operates independent of any motor, needing no winding or consuming any material. We extract the following remarks from a lecture delivered by its inventor, Friederich v. Loehr, Esq., before the Nether Austrian Industrial Union, in Vienna.

It is known that the so-called physical perpetuum mobile is based upon the use of primary motive power in Nature, rendered visible to us in the coursing of streams and creeks, the wind, the change of ebb and tide, the changeability of the atmospheric pressure, the oscillations of the temperature, the hygrometric process in organic substances, and many other similar procedures in the operation of changes. These natural powers are distinguished from those of man and animal, also from those of our steam engines, gas, caloric and electric machines, etc., in that they voluntarily and unceasingly progress around us, without requiring feeding, firing, chemical bodies, or any other material.

A water mill or hydraulic ram might improperly be classed in this category, or called a physical perpetuum mobile; but both are very imperfect ones, and cannot dispense with the control and care of man, for instance, in regulating the current of the water, by sluices, etc., and it is besides fixed to a determined locality.

On the other hand, a barometer, whose mercury column, in consequence of the ever-varying pressure of the natural atmosphere, continually rises and falls without any assistance, and is never at rest, is, in this regard, a perfect physical perpetuum mobile. It is open to the sole objection that it effects no actual labor. Still it is enabled to perform actual continued labor. For instance, if we place a small weight upon the mercury of a valve barometer, whenever it rises, (on the open end of the glass tube) and prevent it from sinking, then the obtained labor, that is, the lifted weight, although slowly, would increase *ad infinitum*. Such a practical employment of the mercury column, as motor, was already made with success in 1840, or thereabouts, in a clock movement exhibised in Cox's Museum in London, and attracted great attention as a perpetuum mobile.

The mercury motion of a thermometer might also be used as a motor; both contrivances, however, furnish so little motive power that it can only be used for extremely delicate and subtle clock movements. The barometric apparatus can not be regarded as an absolutely durable one, because the mercury in the lower cup, exposed to the air, gradually oxidizes, and the original equilibrium of the two vessels alters, and is finally destroyed altogether. For this reason, the last mentioned clock very probably only remained in motion for a few years.

After this explanation, we arrive at the autodynamic clock, which is based upon the barometric, and, at the same time, the thermometric processes in the atmosphere, *i. e.*, upon the varied changes of tension in the air. Neither the mercury nor any other fluid perform the functions of a pressure agent, but the air itself acts directly upon the motor of the clock, and in such a manner, that for different movements any desirable quantity and intensity of power is secured, and the construction of the motor can be executed with desirable compactness and unlimited duration.

It is known that the air envelope, by which our globe is surrounded, has a determined weight, and consequently exerts a certain pressure upon the surface of the earth.

This pressure amounts to about 1 kilogram upon each square centimeter, at sea level, on an average, by about three per cent. more than 1 kg.; here (in Vienna), about one per cent. more than 1 kg. per square centimeter. This pressure does not operate alone in a perpendicular direction upon the earth's surface, but, the air being a fluid, also uniformly toward all directions. By this uniformity with which the air pressure encloses all bodies upon the surface of the earth, and penetrates into all indentations and pores of the bodies, is established a thorough equilibrium, and generally is not palpable and recognizable.

If, however, the air contained in a vessel is artificially removed, the atmospheric pressure at once becomes operative, and will crush it, if not endowed with sufficient power of resistance. But if only a part of the air be removed from the vessel, the remaining air will expand, and, by power of its elasticity, still occupy the entire vessel, yet in a rarified condition, and in lessened tension, thus that it offers to the exterior air pressure a proportionately lessened resistance.

It is also known that the height and the previously-given weight of the atmosphere do not always remain the same at the same place, but vary constantly, and that also the lowest stratum, upon the earth's surface, assumes different densities and tensions from the varying pressures of the superincumbent strata. The latter vary sometimes as much as four and five per cent. of the average tension. And thus it happens that a quantity of air, that has been hermetically enclosed in a vessel, and was forced to retain its primitive density and tension, after a short time does not coincide with the varying external air tension. For instance, if the latter has decreased by one per cent., that from within presses by ten grams upon each square centimeter of the glass wall, or, if the external air tension has increased by one per cent., such glass walls suffer a pressure from outside of ten grams upon each centimeter.

If, next, a part of the vessel wall is arranged to be slidable, it will, when it offers a surface of 500 square centimeters, by the specified instances, be displaced toward the exterior or interior by a pressure of 5 kg. If the tension difference was only $\frac{1}{5}$ per cent., then the displacing pressure would be one kg. The linear straight-line displacement, therefore, depends from the quantity, *i. e.*, the cube contents, of the enclosed air.

In the same manner as the decrease or increase of the external air tension, measurable by the barometer, produces the said pressure development, such a one may also be effected by the influence of the change of temperature by the thermometric influence upon the inclosed air. Since the air, by a change of temperature of only 1° C., expands or contracts more than $\frac{1}{3}$ per cent. of its volume and density, and the air in the closed space equally increases or decreases in tension, it is apparent that the thermometrically caused changes may operate more energetically than the barometric.

It will be deduced from the above explanations that the necessary sliding pressure surface and the requisite quantity of air may be calculated with great exactness for each consumption of power.

As far as regards the constructive arrangement of such a slideable surface, the following method of execution, after many years of tests and experiments, was found to be the most suitable one.

Several centrically folded elastic ring plates are piled upon each other, hermetically united by the rims with each other, by an upright tube. A sort of double cylinder is thus formed, which, hermetically closed above and below with a covering plate, is capable of responding to every relative increase or decrease of tension of the inclosed air, by an expansion or contraction of its longitudinal axis. Such double cylinders are used as motors for the present clock system.

Even if the inner or outer atmospheric pressure upon each ring plate only produces an extremely small concentric flexion, yet the sum of all these flexions finally concentrated upon the uper covering plate, may be as large as desired, because the constructor may increase at will the number of the ring plates to be set in operation. In other words, the upper covering plate may be made as long as is desired.

Again, the quantity, or the energy, of the pressure that can be exerted by the covering plate, depends from its surface; and since the surface of the covering plate, as well as of all ring plates, depend from desire, the amount of the pressure influence may also be chosen at will. Of course, with the proviso that a sufficient quantity of inclosed air stand at disposal.

The motor is connected by a tube with the inclosed air, and it thus occurs that the expansion and condensation of the entire quantity of air present participates in the contraction and expansion of the motor, and that the rising and falling motion of the covering plate is produced by the continuous change of tension of the entire quantity of air inclosed. The covering plate stands in connection with the clock movement, and transports its motion thither, in such a manner that the propelling clock weight, serving as power accumulator and regulator, is always maintained in a wound condition. By the clock in the park, the stored air is enclosed within the column serving as pedestal. This column consists of two "telescoped" cylinders, thus that the hereby formed and hermetically enclosed space serves as air vessel.

It may be stated at the same time that the air receiver may be at any distance from the clock, and in such a case communication is established by a small lead pipe with the motor of the clock, and the clock may thus dispense with its pedestal column, and be smaller, according to desire, than the customary form of a common wall or mantel clock.

The quantity of air inclosed in the column under debate, is about 250,000 cube centimeters (¼ cube meter). The expansion or contraction of this quantity, for each millimeter at which the barometer rises or falls, amounts to about 320 cube centimeters, and for each degree, which the Celsius thermometer rises or falls, about 900 cube centimeters. The motor may be located in stand clocks in the socket of the pedestal column, as if in a chamber, and communicating with the free air, and, in short, is adaptable to any situation.

If such a stand clock is located in open air, where, beside the barometric influence, also the change of temperature may operate upon the inclosed air, a motor of small capacity, of about 30 plate rings, or elements, is sufficient. Its dynamic surface amounts to about 300 cube centimeters, consequently the theoretical pressure exerted thereby with a barometric change of 1 mm., each time ½ kg., and by a change of temperature of 1° Celsius, about 1½ kg.

The motion capacity of its covering plate extends to the height or length of 12 cm., if each ring plate toward both directions is supposed to exert a maximum flexion of 2 mm., a quantity never necessary.

If a clock, together with air receiver, is to be located in a dwelling room, where the temperature differences are less energetic, either a simple motor with a greater number of ring plates, or two, three and more motors may operate in concert, which double, treble, etc., the capacity, similar to the battery of an electric motor.

Said cluck in the park is propelled by a treble motor, and possesses in all 87 plate rings, or elements. Its dynamic pressure surface measures beyond 900 square centimeters, and its theoretical capacity, by the change of 1 mm. barometer, is about 1½ kg., and by 1° change, about 4¾ kg.

The preceding remarks suffice to explain the motor arrangement of the clock, and we next wish to speak of the regulating valve.

This is opened automatically by a mechanism, in order to establish the communication and the equilibrium of the outer atmosphere with the inclosed air quantity each time, when the upward or downward motion of the motor covering plate has reached its maximum limit. The ring plates are hereby protected against every undue use of their elasticity, and every useless consumption of power is obviated.

The motor returns to its position of rest after the opening of its valve, and from this, its temporary zero, it is prepared for new tension changes. It operates from here with its theoretic pressure capacity.

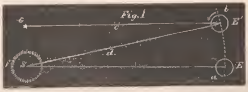
The same vent discharges another function. As soon as the propelling weight has reached its highest permissible point, the valve also opens and thereby prevents an injurious pulling and jerking in the winding part, whereby the weight is not incapacitated from discharging its full functions, and the motor equally not called upon to perform useless services; of course the valve closes as soon as the weight begins to sink. The chief result of which is that the weight is constantly kept up high. As soon as the valve opens, it either expels or breathes in air, and in this respect it may be compared to a living being.

The first clock of this system was submitted to, and observed by, a scientific body of Vienna, and after the lapse of seven years, it shows no sort of ailment; its propelling weight is at the same height to-day as it was on the first day.

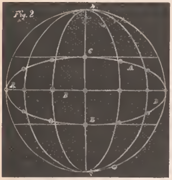
The only objection to these clocks is their cost, but they are excellently well suited for large rooms, depots, halls, terraces, etc., but more especially for town, street and steeple clocks, and possess the advantage of not being disarranged by opening or paving the streets.

Correct Local Time and How to Obtain it.

THE term *mean time*, or mean solar time, has reference to the rotation of the earth on its axis relative to the sun. The time occupied in these revolutions constantly varying back and forth, from the sun being fast and slow of clock, to the extent of 16¼ minutes. It must not be understood that the actual revulutions of the earth vary to this extent, for they do not; as the earth is a very exact timekeeper, and if we had some way of taking off the motion and conveying it to a dial, we should have a perfect timekeeper, as the earth performs a revolution in exactly 23 hours, 56 minutes, 4.09 seconds of mean solar time. The earth makes 366 revolutions on its axis, counting from any fixed point in the universe (a fixed star, fur instance) in 365 solar days. For convenience, the solar day is divided into periods of 24 hours, so that at the end of the year (or any number of years) they come out even. This equalizing is called mean solar time. Four times in the year the sun and a correctly-running clock, (keeping mean solar time) will be together viz., Apr. 15th, June 15th, Sept 1st, Dec. 25th. The cause for this seeming disagreement between sun and clock arises from two causes, the inclination of the earth's axis to its orbit, and the inequality of its motion around the sun. I will first explain how there are 366 ***siderial*** star days or revolutions, counting by a star, and 365 solar days or revolutions in a year, and then explain the cause of the sun being alternately too fast and too slow of the clock. At Fig. 1 in the accompanying cut, S represents the sun, and $E\,E'$ the earth; the



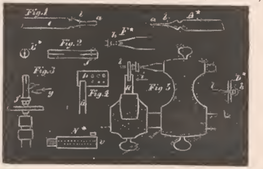
dotted line $a\,b$, the earth's orbit. As the earth in one day moves through a little less than one degree of its orbit, consequently, when it has passed frum E to E', in its orbit, it will have to make a little more than a revolution, counting by the star G, before the sun will be on meridian. This will keep on aggregating until, when the earth is on the opposite side at f, there will be half a revolution lost, and, consequently, during a complete circuit, will lose an entire day. Now, as regards the variation of the sun and clock, the general principles of this are not difficult to understand. Astronomers, as the position of the pole of the earth seems to occupy a permanent position in the heavens, assumed that it did so, and have extended imaginary circles in the heavens, corresponding to our equator and parallels of latitude. The circle in the heavens corresponding to the equator is called the equinoctial. Latitude in the heavens is distance north or south of the ecliptic and at right angles to it. In order to locate positions in the heavens, astronomers have adopted terms which correspond to latitude and longitude on the earth, and call them *Declination* and *Right Ascension*. Declinatiun is distance north or south of the equinoctial, measured on a meridian, and is noted as northern or southern declination, and is measured by degrees, minutes and seconds. Right Ascension, which, as remarked above, corresponds to longitude, is not usually measured by degrees, but by hours, minutes and seconds; and the commencing point does not begin with any point on earth, like Greenwich or Washington, but an imaginary point on the equinoctial, which the sun crosses on the 21st of March, called the vernal equinox. This starting point is called the first point of Aries, or the sign of the zodiac represented by the ram. The heavens are divided into hour circles corresponding to meridians 15 degrees apart. To define any position in the heavens, astronomers say so many degrees north or south declination, marked N. dec., or S. dec.; and so many hours and minutes right ascension, marked R. A.; or, in other words, so many hours and minutes after the first point of Aries has passed the meridian. In explanation of the cause of the clock and sun dial discrepancy, the accompanying cut is shown. The difference between *mean* and *apparent* time, or in other words, between equinoctial and ecliptic time, may be shown by this figure, which represents the circles of the sphere. Let it be first premised that *equinoctial* time is clock time, and that ecliptic time is solar or *apparent* time. It appears that from Aries to Cancer, the sun, in the ecliptic, (A) comes to the meridian before the equinoctial (B) sun; from Cancer to Libra after it; from Libra to Capricorn, *before* it, and from Capricorn to Aries *after* it. If we notice what months the sun is in these several quarters, we shall find that from the 25th of December to the 15th of April, and from the 15th of June to the 1st of September, the clock is faster than the sun dial; and that from the 15th of April to the 15th of June, and from the 1st of September to the 25th of December, the sun dial is faster than the clock. In the cut B represents the equinoctial, A A the ecliptic. The four divisions mentioned above are represented by the letters R, C, D, E. R represents Aries; C, Cancer; D, Libra; E, Capricorn. The above illustration gives one cause for the disagreement of clock and sun dial; the next cause is the inequality of the earth's motion around the sun. It is a universal fact that none of the planets are perfect spheres, but oblate spheroids; nor are their orbits perfect circles, but ellipses, having two foci, with the sun in one of them. Fig. 3 shows at A D B E an ellipse. The line A B is called the transverse axis, and the line drawn through the middle of this line and perpendicular to it, is the conjugate axis. The point C, the middle of the transverse axis, is the center of the ellipse. The points F and f, equally distant from C, are called the *foci*. C F, the distance from the center to one of the foci, is called the eccentricity. The orbits of the planets being ellipses, having the sun in one of the foci, if A D B E be the orbit of the earth, with the sun in the focus F, when the earth is at the point A, it will be in its *perihelion*, or nearest the sun; and when at the point B, in its *aphelion*, or its greatest distance from the sun. The difference in these distances is evidently equal to F f, that is, equal to twice the eccentricity of its orbit. In every revolution the earth passes through its perihelion and aphelion. The eccentricity of the earth's orbit is about one and one-half millions of miles; hence, she is 3,000,000 of miles nearer the sun in her perihelion than in her aphelion. Now, as the sun remains fixed in the lower focus of the earth's orbit, it is easy to perceive that a line passing centrally through the sun at right angles with the longer axis of the orbit, will divide it into two unequal segments. Precisely thus it is divided by the equinoctial, and the nearer the earth approaches the sun, the more rapid its motion in its orbit. The entire details of this problem would be too long for this article, and it is not the writer's intention to instruct the reader how to make the calculations for a nautical almanac, but to take advantage of the data furnished by the generality of almanacs, so that he can either by the sun or the stars set his regulator to exact time. In order to determine time to any great degree of accuracy, it is essential to have a transit instrument, and it is also equally necessary to have the transit set correctly, that is, exactly on the meridian. The magnetic needle of a compass does not point exactly north, only in rare instances; and even if it did do so in the morning, it would fluctuate a few seconds during the day, and at the end of a year might be several seconds away. The magnetic pole does not correspond to the true pole, but is constantly varying, and the positions on the earth where the compass agrees with the true pole, are called the lines of no variation. On all large and important maps the variation is given, say 7 degrees, 42 minutes E. Neither is the polar star exactly north, except for an instant twice in 24 hours. In my next communication I will give a cut and all necessary instructions for determining an exact meridian, and also give a simple plan for an inexpensive instrument for determining correct local time within four seconds.



Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

PIVOTING is by far the most frequent job one has to do on any lathe, and yet how few watchmakers can do a real nice job of pivoting. We have in almost all large cities men who style themselves "lightning pivoters"—men who make a specialty of such work. As a rule, the work done by such men is far from satisfactory, and should not be countenanced; not that I would be understood to censure good workmen who work for *the trade*, but rather those persons who stab in a pivot, some way, any way, leaving it long enough to be cut to any length. Such pivots are worthless; the least jar or fall will either bend or break one; rather let all watchmakers do their own pivoting, doing it well and getting a good price for their work. Some men urge that such jobs are good enough for the class of work; now, the question is, is the pivot put in as good and serviceable as was the original? and candid and sincere answer must be, "No." Make it a rule, no matter how fine the watch, never to make any repairs inferior. In pivoting, the first great essential is the drilling, and the art of making a fine drill is one of the tricks of the trade. I have no doubt but much the largest half of all the drills made are burnt in hardening; it is indeed a delicate operation to harden a drill not much larger than a hair, without letting it get too hot; and for this reason it is well to heat several at a time; in fact, make up a batch of drills at once, it certainly saves time in the long run. If you have an American lathe you are all right for drill making; select a size of steel wire suitable for your purpose (about 54 or 55, Stubs' wire gauge), and select a split chuck, and turn your drill as you would a conical pivot, only letting the part from a to b, Fig. 1, be longer in proportion (about five diameters from a to b) than for a pivot. The extreme point at a is turned to a cone, as shown, and



the portion between a and b should be turned a trifle smaller, so as to run free; the cut shows about the right proportion. In making such drills the wire should be cut into lengths about 1⅜ inches long, so as to have a drill at each end, and the whole length of the pieces hardened. This can be readily done by cutting a foot length into ten pieces, and making them up into a bundle with binding wire; smear the bundle with some of the anti-scaling compounds—or a paste of castile soap answers—heat the bundle red hot, and plunge into cold water; reduce the bundle to a soft spring temper by burning off in beeswax or oil; the latter stinks up one's place, and the wax is quite as good; the wax should be allowed to burn entirely off, so as to have a soft spring temper. The object in this first tempering is to stiffen the wire so as to have it turn with greater facility. After the drills are turned as shown, with a fine new pivot file flatten the part *a b*, as shown at *A**, leaving the extreme conical point *a*, exactly in the middle; finally, give the bevel to the point for cutting, the extreme conical point of *a* serving again for a guide. In this way, by using a high magnifying power (double eye-glass), very perfect drills can be made, and you have the advantage of making them of just the size required. After your drills are filed up, make them up into a bundle again, smear only the ends with a thick paste of castile soap, and heat again and plunge into cold olive oil. For such a bundle you should have at least three fluid ounces of oil. The drills will need no reducing or running down, as there is no fear of their being burnt. Few staffs or pinions will resist such a drill. In some cases you can drill a job dry better than with oil, but if a staff will not permit drilling, soften the end to be drilled a little; it does no harm, and it certainly expedites matters. The writer never found a pinion which would resist such a drill. To soften the end of a staff, take a piece of copper wire about $\frac{1}{8}$ of an inch in diameter and $\frac{5}{8}$ long, and saw into each end for $\frac{1}{4}$ of an inch, as shown in Fig. 2; a slide like the ring on a pin slide is slipped on when the jaw comes perfectly together. The central part is relieved by a little filing, but arranged so as to close the saw kerf when the slide is at the dotted lines *f*; this piece can be clamped on the stump of a pivot and the flame of your alcohol lamp directed against the clamp, as shown at *c*, Fig. 3; it will soon become red hot and reduce the temper in the staff so as to admit of drilling. Any bluing can be removed by a match splint dipped in muriatic acid and applied to the blued portion; the staff should be boiled in chalk and alcohol to remove any trace of acid. We now have our drills of the best possible make, and next comes the way to use them; as the bow lathe is the simplest this will be treated first. One fact should be noticed in passing remark, that all those rapid pivoters, both here and in London, use the wax chuck lathe, and usually of the Bottum (or the Swiss outcome of the Bottum) lathe. The reasons urged by such workmen for choice of this lathe is that it runs much easier than the American, which is undoubtedly true. As far as accuracy is concerned, the American used with a wax chuck is quite as correct. Another fact to be deduced from these experiences, is, that as far as rapidity is concerned, the wax chuck takes the lead. A simple centering and drilling arrangement for the bow lathe is shown in Figs. 4 and 5, and consists of a lathe center in which the conical pit or countersink for holding the work is drilled in so as to let the staff run on its shoulder. At *F** is shown a magnified illustration, the dotted outline at *h* representing the staff. The opposite end, which is the one supposed to be drilled and pivoted, is held in a cavity countersunk in a steel plate let into a piece of large wire, which goes into the rest holder. Fig. 4 shows a view of such a plate and wire seen in the direction of the arrow *i*, Fig. 5. The plate *D* is of steel (hardened) about $\frac{3}{8}$ by $\frac{3}{4}$, and $\frac{1}{32}$ of an inch thick, and is pierced with five or six holes of different sizes; these holes are countersunk on each side at *D**; this view is an enlarged cross section of a portion of the plate *D*. The hole through the plate *D* should be about the size of the drill. This form of centering and drilling is in frequent use, though the drilled center *F** is rare. To those who know and use such a device, I beg their indulgence. The drill used should only be a trifle larger than the pivot. After the hole is drilled, the pivot can be driven in, cut to the right length and rolled down to size. In pivoting cylinders the roller or collet for the bow should be cemented on with shellac. Of course, in the last method you can hardly use drills turned as described, although if one has to file them up entirely, still, it is policy to make up a lot at once, and harden them in a bundle to avoid burning. To resume pivoting in a wax chuck lathe after the hole is drilled and the lengths (heights) are determined, the wax should be warmed and the staff trued up by the shoulder, holding a piece of pegwood against it. If the pivots are conical, the plug or pivot driven in should be turned so as to exactly correspond—in fact, a job of pivoting is not well done, unless after it is finished it will defy detection, even when examined with an eye-glass. The plug or inserted pivot is as well made of a needle; an assorted paper, 5 to 10's. The temper can be determined by the color; blue is not soft enough—a little experimenting with the end of a new mainspring, which is generally left bright, having never been blued; the color, when heated slowly over the lamp, comes in the following order: straw, onion, purple, blue; after the blue comes some delicate changes of color, which give hard and soft-spring tempers; after the positive blue comes a greenish blue, this is hard-spring temper. After this shade comes a peculiar, violacious, coppery hue; this is soft-spring temper, which will bend a little before breaking. If the reader please, he can make a little trough of sheet iron (an old steel pen answers), lay a dozen needles in, with a lump of beeswax as large as a small pea, and heat over the lamp until all is burnt off. These can be kept for pivots. For a live spindle lathe with no split chucks, a modified form of the six-screw chuck described in former article can be used; but for drill purposes, only one set screw is needed. An illustration is given at *N**, the hole *v* can be drilled through the entire length.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to tho jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his truo name to the editor. Anonymous communications will not be noticed.

THE GUILD STAMP.

To the Editor of the Jewelers' Circular:

I am constrained to reply to your editorial in the May number, regarding the state associations, Guild stamp, etc., but I hardly feel competent to do the subject justice. It is very evident that you do not fully comprehend the situation, and do not speak from experience so much as feeling.

In the first place you state that THE CIRCULAR was the first to suggest the organization of the state associations, a remark that I cannot dispute, not having been a subscriber until after the organizations came into existence, but it is very evident that you did not know of what stuff our western jobbers are made, or you would not say that they would abandon their impolitic and unbusinesslike practices simply because the prominent retailers might come together and request them to do so. No, the jobbers thought they had too good a thing to give up their outside trade just because they were requested to do so. It was necessary to touch their pockets in order to make any impression on them, and even now that we are pursuing such a course, it is hard for them to be brought to see the error of their ways. Again, it was not the prominent retailers of the country that felt the ill effects produced by the jobbers' acts, but the small dealers whose business was being undermined; hence there was no hope to be expected from the more prominent ones, for they had all they could do to look after their individual business, without thinking for a moment that their weaker brethren in the trade needed their assistance. When any reform is started, it is always those who feel the need of reform that have to take hold and start the work, else reform will never come. Hence it was the small retailers all through the West that felt the bad effects created by the impolitic and unbusinesslike practices of the jobbers, and had to take hold of the work to get it started, hoping their stronger brethren, the prominent retailers, might be induced to lend their assistance, some of whom have done so, and the catalogue nuisance, one of the abuses from which we suffered most, has nearly ceased to exist outside the trade in the states where associations have sprung up. You intimate that the associations are being manipulated by schemers and adventurers. I don't know where you got any such impression, for no one but retailers have anything to do with them, while your article leads one to infer that the schemers and adventurers you refer to mean jobbers and manufacturers, presumably the Silver Plate Co. that has agreed to manufacture a line of Guild stamped goods, for you state that they come forward with a stamp of their own designing and persuade the associations to fall into their trap, or words to that effect. Right here is where you have made several mistakes all in a lump. The schemers and adventurers you allude to, have not had the least voice in the manipulation of our associations; neither did the manufacturing company referred to come forward and make the offer you mention, but on the contrary, to the best of my knowledge, said company was approached after other well-known and leading companies had refused to entertain the proposition, except under impossible conditions.

The Circular has heretofore and now does approve of a Guild stamp as the next best thing to a national stamp. Such being the case, it is obvious that an effort of some sort be made to get the Guild stamp started, and see if the trade and public take kindly to it, so when the larger and best known companies will do nothing, I do not know whereby they can be compelled to do anything about it, and the next best thing to do is to use the means that can be placed at our disposal.

Because a company is young, obscure, and comparatively unknown, is no reason it shall be ignored or abused, any more than a young man just starting in business should have no customers, simply because his competitor has been in trade a long time and is well known and liked. The Racine Silver Plate Co. is a western institution, and the associations are also all out west, and as the goods are to be used only by members of the associations, what can be more proper than that a western concern should first start out with the Guild stamp?

You made still another mistake in stating that those inside the associations will be limited to the sale of Guild stamped goods, which is not the case, for not a single member is obliged to keep the goods unless he may so elect, but many will so elect, for they will consider it to their interest to do so.

You say "if other manufacturers find the Guild stamp goods affect their sales seriously—which is not likely—self preservation will impel them to retaliate upon those dealers who attempt to push them." If Guild stamped goods do not affect their sales, of course there is no need of their howling, and if they do affect their sales, then they will be anxious to manufacture such goods themselves, and the short time of two years that the Racine Co. have been given the exclusive use of it, is none too long to make the trial.

The other companies can do no more than they have been doing to injure us retailers, for every hardware store in the country has their goods for sale, and they can sell no more simply because a new brand is put upon the market, and if they adopt retaliatory measures, it will react on the dealers who do not belong to the associations as much as on those who handle Guild stamped goods.

You appear to feel as though this Guild stamp business is the rock on which the associations will split, but thus far, since its adoption, there has been a very apparent revival of the interest in the associations, for many in the trade now realize that there is one article in market that cannot be obtained by illegitimate dealers, and the chances are that in less than two years the associations will grow in size and strength, and there will be such a demand for Guild stamp goods that it will be applied to other goods besides flat ware.

This is quite a lengthy communication, and I trust it will not try your patience, but this is a fruitful subject, and cannot be easily exhausted. There is much more I would like to write, but will leave the rest till some other time. Yours respectfully,

W. H. Thorp.

[We give place to the above communication not because it is in any sense an answer to our article in the May number, on the western associations and the Guild stamp, but because we desire to give the widest scope possible to the discussion of the subject. We agree with the writer, that the western associations have done much good in breaking up some evil practices that a certain class of jobbers formerly indulged in, to the prejudice of the retail dealers. No one did more to expose the evil effects of these practices than The Circular, or more severely denounced the jobbers. True, we did not call them names, nor put them in a black list, the one being undignified, and the other unlawful, but we did much to arouse that spirit of resistance that led to the organization of the state associations, and the reforms that have resulted. In speaking of schemers and adventurers manipulating the associations in their own interests, we did not allude to the Racine Company, as our correspondent infers, but to certain members of those associations. That they have used these various associations for self-aggrandizement has been manifested in other instances besides the Guild stamp matter. They are very shrewd, as such men are apt to be, but their work is transparent enough to outsiders. We do not blame the Racine Company in the least for obtaining the exclusive privilege of making Guild stamp goods; if they think there is money in it, they would have been foolish not to take the contract. The trouble lies with the associations giving them this privilege, and ignoring the older and better known manufacturers. A Guild stamp should be open to anyone to use under certain well-defined and reasonable conditions, that should place all manufacturers upon an equality. It is because of the discrimination made against all manufacturers save one that we anticipate trouble for the retailers, and protest against it. The quality of Guild stamp goods could be regulated quite as well if made by a dozen manufacturers as it can be under the present arrangement, and there would have been something of the spirit of fairness, had the opportunity been offered to all manufacturers on the same conditions that were given the Racine Company to use the Guild stamp. The fact that the company is young and has yet, to a great extent, to make its reputation, is nothing against it, but the question is "can the retailers afford to tie themselves up with an exclusive contract of this kind?" We did not say that members of the associations were limited to the sale of these goods, but that the sale of the goods was limited to the members of the association, which is a difference. As but a small proportion of retailers are members, the Guild stamp goods are not likely to occupy an important place in the plated ware trade. As but one class of goods are to be so stamped, what will retailers do to fill up their lines if the other manufacturers refuse to sell to those who buy the stamped goods? As we said before, the larger and better known manufacturers are not likely to surrender their trade without a struggle, and if they find dealers pushing the stamp goods at the expense of theirs, they will be pretty apt to adopt retaliatory measures. Among such will be a refusal to sell any goods to dealers who handle the Guild stamp goods, and such a cutting of prices where they come in competition with the association dealers, as will break the prices on the Guild stamp goods. Such a disastrous competition we do not care to see, and, therefore, deprecate a contract that is calculated to produce it. In adopting a Guild stamp it would have been sufficient for the associations to say, "we want goods better in quality by ten per cent. than we are now getting, which shall be made on honor, and bear a stamp of our selection, which shall be a guarantee of quality; whoever manufactures goods so stamped must contract with us that he will not sell them to outsiders." Under such conditions the retailers would have been protected, and all manufacturers placed on an equality; those who chose to avail themselves of the privilege of making such goods under the conditions specified, could do so, and those who did not would have no cause of complaint. We do not regard the present arrangement as being in the interests of the retail dealers, and think that those who refuse to tie themselves up with it will be better off than those who do. It will do little if anything towards driving "skin" goods from the market, and this is an evil that we do not expect to see abolished until a standard of quality is established by the general government. The reform needs to be radical in all branches of the jewelry trade, and the efforts of the associations thus far to secure a better quality of goods of all kinds, are about on a par with Mrs. Partington's attempt to sweep back the tides of the ocean with a broom. Their very first move is one calculated to antagonize interests whose active and earnest co-operation is most earnestly to be desired.]

THE GUILD STAMP.

To the Editor of the Jewelers' Circular:

I have been much interested in the Guild stamp discussions in your columns, and I entirely agree with you, that the Guild has commenced the proposed work of reform from a narrow guage standpoint. I belong to one of the associations that has adopted this stamp, but am wholly unable to see where it is going to benefit me in the slightest degree. A contract has been made for the production of flat plated ware that is to contain, according to promise, ten per cent. more silver than the goods we are now getting. But, even admitting that they prove to be better in quality, how is that going to help the rest of my stock? The quantity of such goods that I handle is not a flea bite compared to the rest of my stock, and the improved quality will not make any difference in my sales. If all silver plated goods were to be so improved in quality, and we could be sure in getting all we wanted in new designs and patterns, it would be a matter of some moment, but the present arrangement amounts to nothing. I, for one, shall not bother with it, but prefer to order all my plated ware from manufacturers who will furnish a full line identical in quality. The name of the manufacturer is a good enough stamp for me, and it is their reputation, not mine, that I trade on when I sell these goods, and I buy and sell at prices graded according to quality. If they or anyone else, put more silver in their goods than is commonly used, we have got to pay more and charge more for it. The nearer the quality approaches pure silver the greater the cost, and the greater the cost the less the demand. Plated ware, however, is the least of my troubles, for such goods I sell on the reputation of the manufacturers. It is the gold goods that give me most annoyance, the quality of some so-called gold goods having been degraded till it is little better than fire gilt, while they are sold to us for fine quality goods. This is a barefaced swindle that we cannot detect, and when we sell goods for what they are represented to be, we are apt to have them thrown back on our hands as fraudulent. We suffer in reputation and have no redress. What is wanted is a general reform in all kinds of goods; this prodding at a small corner of the evil will do no good whatever. I am decidedly in favor of your idea of a national standard of value, and heavy penalties for making or selling goods by misrepresentation and fraud.

WESTERN DEALER.

To the Editor of the Jewelers' Circular:

An article in the June number on "Watch Mainspringing," has attracted my attention, and although apparently intended for those who have served but a half-and-half apprenticeship, and are left to "pick up," still, it hardly becomes us who have sons or apprentices at the bench, to pass it by without a few corrections. I am the more moved to do this by the inference that the article alluded to was written in the Provinces, an imputation I wish to be spared. I agree with the writer in this, that a few words of sound practical instruction in mainspringing might serve a good purpose. As a rule, the subject matter of THE CIRCULAR is interesting, instructive and reliable, and evidently written by people who seem to know what they are about. There are, however, exceptions. It is not my intention to take up the subject fully, but only to review the most objectionable points. A glance at Fig. 1 in the June number, will decide that "Alfojoe" was not quite up to the mark to be accepted as a teacher in the matter. In this method of hooking, the end of the spring should extend about a third of an inch beyond the hook, or sufficient to fill up the space that would otherwise exist between the hook and that point where the first coil begins to touch the side of the barrel, or rather where it begins to angle off from the side. It should be narrowed to a point by reducing the sides, and also thinned gradually from the hook to the point. This shape is given to it not merely out of whim, or for appearance, but decided upon after scientific thought and care, the object being to form a slow and gradual rise from the point or end of the spring to the rivet of the hook, for the second coil to rest against, and more particularly so as to impart evenly all round the barrel the concussion that occurs when the chain breaks. Besides, the long end does not have the leverage or tendency to trip the hook out of its place that a short and abrupt one does. In short, the arrangement is one of expediency, and not of choice.

The hook should not be made of steel, as Alfojoe says, but of the softest and best of iron. A piece of an American clock pendulum rod, or a horse-shoe nail, are excellent for the purpose. Iron is used because it is more easily and more firmly riveted, and easier cut off and finished.

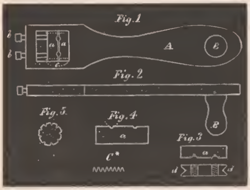
I can't think that there are many practical watchmakers who will agree with Mr. A. in substituting a hook on the barrel for that on the spring, in a watch with a fuzee and chain. I have seen the change made, but what is the inevitable result? The first time the chain breaks, the barrel is bulged out on the side, caused by the recoil of the spring against the hook, and in all probability ruined beyond redemption. Mr. A. says the workman should always shape the hook on the spring, and polish its face before it is put in the barrel. Now it may be possible to do it, but it is not practical nor customary. Perhaps it will not be out of place to describe the method of fitting this kind of hook. A piece of soft iron is held in a pin vise, and filed to fit the hole in the barrel, round or square, whichever it may be, giving it as little taper as possible; pass the wire so fitted into the hole in the barrel from the outside, in, giving it the same slant as the hole, and make a scratch with a sharp point across it and on the inside of the barrel; withdraw the wire and turn it end for end in the vise, bringing the end faces of the jaws even with the scratch. You now place this vise with the wire in it, in a perpendicular position in the bench vise; first shorten the wire and then proceed to fit it to the hole in the mainspring, which has been previously punched, countersunk and pointed, as already described, allowing the jaws of the pin vise to act as a gauge for the scratch made on the wire, remove the wire from the pin vise and grip it firmly in the left side of the bench vise, close up, but not so as to injure the part which is to form the hook. Put the spring in its place and rivet up carefully and solidly; have the spring so countersunk as not to permit any of the rivet to project above the surface of the spring. Take it out of the vise and cut off, leaving just enough to form the hook. Try if the hook fits by putting it backward in the hole in the barrel, from the outside, for it is possible to distort its shape in riveting, etc. Being satisfied, and not having the hook excessively long, wind it in and ship the hook. You now take the barrel between the thumb and point of the middle finger and slap it on the bench, first on one side, then the other, till you see that the hook is well home to its place. Put in the arbor and cover—presuming that the spring was oiled before winding it in. All that remains to be done now is to finish the hook outside the barrel, which is done by carefully filing it down till you come close to the gilded side or edge of the barrel; you then take a piece of thin writing paper and lay over it, and go on filing both paper and hook together, till you touch, but not deface the barrel. It is well now to grip the square of the arbor in a pin vise, and set the spring up to test the efficiency of the hook, and if possible to force it further through the barrel, in which case you repeat the filing through a fresh piece of paper. You now finish the job by passing a clear flat burnisher over it a few times, also through a piece of paper. I consider it quite impossible for a hook on the spring that is properly fitted, to fail to hold securely. How comes it that box chronometers of all nations' make, have the hook on the spring? I will readily admit the insufficiency as represented in Alfojoe's cut, but we may conjecture that when we see the hook of a watch with fuzee and chain altered from the spring to the barrel, that it was the work of one who was either too lazy or incompetent to do the job, but will not accept it as evidence that the hook-on-barrel style is the more reliable.

NOT FOR JOE.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH.

THESE articles were, from the first, designed to furnish the young workman hints and instructions which were a little out of the routine of the general workshop—this explanation may be deemed necessary from the abrupt manner in which the writer drops a subject and takes up another, but it is intended to treat all matters fully and completely, and if the reader is at any time at fault, ask through the columns of this journal, and any point will be fully explained. It is frequently desirable to have a screw a trifle (or a good deal perhaps) larger than those which are used in watch repairing. I mean such as would be required for music boxes and French clocks, or any little mechanism one might be desirous of doing for some tool or experiment. A great variety of screws can be bought now very cheap, also a tap to fit, but the thread seldom fits imported work; and as any screw plate which you can buy gives only three or four sizes, it is desirable to know how you can produce a greater range at a moderate cost of labor or money. Here, as in many other instances, the charcoal annealing box described in a former article, is indispensable for preparing the steel to produce the dies and taps, although for the latter the ordinary steel wire is soft enough. A very simple form of screw plate is shown at Fig. 1; it can be made of hard brass, either cast or thick sheet; or iron can be used; if the latter is selected, it should be wrought and not cast, as cast iron breaks too easily. The general form is given in Fig. 1, and Fig. 2 is an edge view of the same. Fig. 3 shows the dies *a a* removed. The plate should be about 4 inches long, 1 inch wide, $\frac{3}{16}$ thick; the size of the opening where the dies go should be $\frac{3}{4} \times 1\frac{1}{8}$ inches. The pin *B* is to use as a crank to expedite



the cutting, but it is well not to make use of it until the thread is well established. A good plan is to get some pieces of good cast steel forged a scant $\frac{1}{4}$ thick by $\frac{3}{8}$ wide, and say 6 inches long; four such pieces, after being annealed, will make thirty-two dies, probably twice as many as you would ever use. The dies should be nicely fitted up, and the ends notched as shown at *d d*, Fig. 3; the notches engage with projections on the flat *A*, and extend for the space shown at the dotted line *c*, Fig. 1; the manner in which this is done is too common in movable screw plates to need further description. The dies *a a* are closed together by the two screws *b b*, Fig. 1. After the dies are fitted, they should be clamped together by the screws *b b*, and holes drilled, cutting half into each die; these holes are drilled smaller than the tap, and are filed with a round file until the curve is about one-third of a circle, thus allowing a screw to be cut smaller than the original tap. In order to get threads into our dies, steel taps cut in other plates can be used after being hardened. Such taps should not be filed square or grooved out like those you buy of the standard make, but filed with a knife-edge file—a three-square will do, but do not let the incision be deeper than the thread. Copies of iron screws can be made, or rather you can cut dies from a common iron screw by case-hardening it with yellow prussiate of potash. It is well to make a tube of common sheet iron, a trifle larger than the screw, and pack the screw in it with powdered yellow prussiate of potash; but merely making a paste of the prussiate with water, and applying a thick coat answers, but the coating of steel formed is quite thin, and the cutting of a die from such a screw must proceed slowly. The screw must be kept red hot and completely covered with the melted prussiate (it fuses like borax) for several seconds and then plunged into cold water, when it will be quite white, and the outside as hard as a file. The screw can now be used as a tap to cut dies—it needs no annealing or running down. At Fig. 5 is shown how the screw should be grooved before hardening. The thread on the United States standard screws is an angle of 60 degrees; this does well enough for such pieces as do not have to come frequently apart, but for clock work a screw should have a deeper thread, that is, something like the thread shown at *C**. This can be easily obtained by cutting your thread deeper with a knife-edge file. We will suppose you wish to copy a common iron screw; take the screw by the head in your hand vice and lay it in a notch in your filing block, and with a double knife-edge file (the angle of a double-edge file is about right) file out the groove which forms the thread, until deep enough; now notch it as shown in Fig. 5; case-harden it as described, and you will have a tap which will cut a splendid pair of dies. In using screws such as you buy, it is well to run them over with your plate to deepen and smooth the thread. The steel taps you will cut with your dies for general use are best fluted or grooved with a small round file. Such dies admit of two, and in some cases, three holes or places for cutting screws, each of different size. The case-hardened taps do not do well for general use, but steel taps should be cut as soon as your dies are hardened, of about three sizes to each hole or thread; and a taper tap can be cut by gradually closing the dies as you come up, that is, close the dies as you unscrew the tap. A screw either right or left-handed can be created of any pitch or number of threads to the inch, in a very simple manner, by winding binding wire around a wire a trifle smaller than the tap you desire to cut, making a spiral spring, in fact; when your spring is first wound, the coils touch each other. Now keep stretching your spring until the coils correspond to the thread you wish to cut; this spiral should now be slipped on the steel wire you intend to use for a tap, and soft-soldered fast. The ends of the spiral should be wrapped with extra binding wire, to hold them in place, or when the spiral is heated to solder it fast, it is apt to uncoil a little, or *creep*. The spiral should be longer than the tap, also the steel wire for the tap, the excess can be broken off. After the spiral is soldered on, it should be brushed with chalk and alcohol, or washed with soap and water, to remove the soldering fluid. The groove between the coils serves as a guide to the file; if the coils are very close together, a screw-head file; if not so close, a knife-edge. The reader will see that according as the wire is wound so will the thread run—right or left. Filing threads for $\frac{1}{2}$ an inch in length is quite enough. Of course, the reader will understand how to proceed after the thread is filed. Loose screw plates, if firmly fitted up, can be used for much smaller screws than generally supposed, but the writer would not encourage any idea of making a screw for a watch except in extreme cases. But it will be admissible to say it is an excellent idea to have your screws assorted into something like sizes, and English, Swiss and American kept separate; not that you need a separate box, but merely divisions. In very fine watches a screw should be made if one is broken, and of course charged for in proportion to the labor involved. The screws in fine watches are polished not only on the head, but the thread; the latter is not glossed or bright polished, but the worm of the screw is perfectly smooth, and goes to its place with ease and yet securely. With many so-called watchmakers, anything that will hold is good enough; smash a screw in the vise—upset it with the hammer; one workman whom I knew, used to facetiously remark, "another screw made fatter," after he had done such a piece of botchwork. It is no botch's job to make a fine screw, and make it as it should be with an ordinary screw plate. If a screw is turned in your lathe large enough to cut a perfect thread, it will run too tight in any hole tapped with a tap cut in the same hole; about the best way to obviate this is to turn your screw and cut it in your plate, and while still fast to the wire, immerse in dilute aquafortis (4 parts water to 1 of acid), moving it about in the acid, so as to have it eat as fast at the bottom of the thread as at the top. One or two trials will put you up to the trick. The screw should now be polished with oilstone dust and oil; to do this, take a piece of pegwood and split it a little way, and put some oil and oilstone dust into the cleft, put the screw into the cleft as if into a screw plate and revolve the screw, and it will come smooth very quickly. Such steel as is needed for dies ($\frac{1}{4} \times \frac{3}{8}$) can be bought in foot for fifteen cents. Any large material or artisan tool dealer has it.

A Stroll through a Balance Spring Factory.

G. BOLEY, IN *Deutsche Uhrmacher Zeitung.*

IT WILL perhaps be interesting to every watchmaker to understand the manufacture of one of the most important parts of the watch—its balance spring; and presuming such an anxiety on their part, I invite them to accompany me on a tour of inspection through the balance spring factory of Messrs. Bahni, in Biel, Switzerland.

We will first examine those rooms in which the steel passes through its preparatory course, where it is drawn into long thin wire; and the first thing that strikes our attention is a water motor.

The great aqueduct erected for the past few years by the City of Biel, is a great commodity, and by its presence, the city is become eminently fitted as main seat for that class of factories requiring no great motive force, to which watch manufacture may be counted. The machine before us is of two-horse power, and drives several belts, by which the machinery serving for the drawing of the wire is impelled. This room resembles a spinning factory, upon first glance, only the threads spun here are neither wool nor cotton, but steel wire. Furthermore, we see a long table, upon which sixteen wire-drawing machines are placed, all of which automatically draw and wind the wire upon spools. The steel wire, as it comes from England, of about $\frac{3}{10}$ to $\frac{5}{10}$ mm. diameter, enters upon the first machine, and gradually passes through all the others, until it is of the desired thickness, or rather thinness. It appears to be a very simple process, and yet upon this preliminary preparation, this first step in the fabrication, is based the chief condition of a good balance spring. I would remark that the steel cannot be heated during the entire treatment, and yet it must oftentimes pass through 100 and more wire gauges; whence follows that it has to be of the best quality, and the sets of gauges must only decrease exceedingly little, otherwise it would be impossible to obtain such a result.

Although, as already said, only the very best steel can be used in the manufacture of balance springs, it often varies so much that while one may be drawn to the fineness of a human hair, before obtaining the suitable springing capacity necessary, the other, after thirty or forty drawings only, has already obtained that degree of hardness. It is utterly impossible, therefore, to determine beforehand to what number a certain wire shall be drawn; it is altogether a matter of accident, because, if drawing were continued after the steel has reached its proper degree of hardness, much breaking would ensue, and, on the contrary, if left too soft, it is self-evident that no good springs will be obtained. It will be seen, therefore, that the manufacturer must have at all times a good supply of wire on hand, in order not to suspend work, and to be at all times assorted in all numbers. Let us examine such a gauge, of which a series of fifty pieces accompanies each drawing; we see a round plate, in the center of which is a perforated jewel, corresponding to a certain number of wire. The jewel must be the hardest substance obtainable, and the hardest sapphire is generally chosen. Gauges of diamond were formerly employed, but I believe they have been abandoned, on account of their high price, I believe 80 francs apiece. It is, perhaps, unnecessary to mention that the gauge hole must be at all times perfectly polished, else the steel wire would not become so, and which would be injurious to the color. A little machine is employed for this purpose for polishing the holes from time to time, whereby they become a trifle larger each time, and receive another number. A great practice and experience are necessary for the work, because dealing with barely measureable dimensions. If, for instance, the steel, after having been drawn through a previous number, goes too heavily, it is necessary to repolish; and if too easily, another number must be interposed. It is altogether an affair of the touch of the human hand. Also the shape of the gauge hole is determined with great nicety, as will be seen in the accompanying Fig. 1. If the arching of the walls is too straight, the wire will not become nice, and the gauge wears out quickly; if too flat, then the wire draws too heavily.

FIG. 1.

When drawn to the desired strength and hardness, the wire must be cleaned of the adhering filth and fat, applied to the gauge; this lubricator consists of a mixture of beeswax and bone oil; oil would be too fluid, as the steel heats upon drawing. These fatty particles must be removed; and the wire at the same time polished to a high burnish, for which function two machines are employed, through which the wire passes. In the first, it is treated with thin oil and coarse red, in the second with fine dry red. Both machines pass the steel through series of leather-covered rollers, on the different sides, upon which the polishing agent is placed, and it finally passes through clean leather, to remove even the most trifling particle of impurity, and then winds upon spools. To prevent any flexion, a contrivance lays thread by thread, similar to thread spools.

Let us now enter into the workrooms in which the rolling apparatus operates. But before we enter, we pause to examine the machine by which the cylinders are polished. The cylinder is the soul of the balance spring factory, and the manufacturer willingly pays 200 francs for a pair of rollers that answer all requirements; and even more, although only about 60 mm. in diameter, and 20 mm broad. Before all other requirements—such a cylinder must be of the very dearest steel obtainable, therefore, steel welded of large pieces reduced to these dimensions, and only by a prolonged welding and hammering of the steel can this result be obtained. The cylinder, again, must be glass hard, and not be attacked anywhere, even by the finest graver; if it shows even the least mat place after use, the cylinder is useless, because the steel passing through at this place would not be uniform in thickness, and the balance spring produced thereby would show irregularities not easily remedied. In all cases, the manufacture of springs would become too costly by a bad cylinder, because all springs would have to be redressed by hand, a very complicated and troublesome piece of work. Each cylinder must run almost mathematically true, and the pair working together must lie truly flat upon each other, for which purpose the aforesaid machine is constructed. The polishing is a matter of extreme nicety; only diamond dust will attack the hard cylinder with difficulty, and it runs sometimes for days before the necessary degree of polish is attained.

Let us next inspect the rolling room. We see six cylinders set up, and this number is necessary, because the manufacturer would not dare to use those intended for very fine springs, upon any coarser grades; it might get injured thereby, because the thinner and finer the spring, the more exact must be the adjustment of the cylinders. A few are also always kept extra, as they must be repolished repeatedly, because by all possible care, an occasional wear cannot be prevented.

An arrangement is fastened to the cylinder for exactly indicating the distance of one from the other, and it should be believed that it were easy to obtain a desired thickness at any time, but it is not so easily done, where the difference is sometimes $\frac{1}{1000}$ mm., and even less; the very changes of temperature in the room may mar all calculations. When the cylinder has been set and reasonable hopes can be entertained of its furnishing the desired springs, wire is placed between them, and the rollers are set in motion. After a piece has passed through, it is cut off, several springs made of it, calibered and weighed, and these tests are continued until the cylinders are set true, when work is begun. They are stopped from time to time for cooling, and in spite of all care it happens sometimes that the rolled spring, from one end to the other, varies an entire number. The rolled wire is wound evenly upon spools, as before described, also done automatically. When the spool is full, it is taken off, tagged with its number, and locked into a box.

It is very self evident that this room must be kept very clean, in order to prevent all dust; and no one not specially engaged within, is permitted to enter.

Exact tables determine the number of wire suitable for the different sorts of springs, as the breadth and height of the spring blade must not pass beyond a certain proportion.

(To be continued.)

Remarks on the Watch.

OF ALL the different escapements, a well constructed anchor is undoubtedly the best for all practical purposes. A pocket chronometer is not as reliable, while, if of larger dimensions, and provided with all the possible mechanical appliances, adjuncts, and improvements, a marine chronometer doubtlessly is the best timepiece constructed. When we say "for practical purposes," we do not by any means wish to have it interpreted that the watch may be treated with impunity to any and every indignity, or be used as a toy for children. Let us examine any other piece of machinery; how strong and powerful it is in any and all its parts; still, it is never required to perform one-half the work of the tiny watch, which unremittingly labors day and night, week day and Sunday, month and year, without intermission or stop, and if it has been duly cared for and tenderly treated, it may arrive at the good old age of one hundred years, while the ponderous machinery is cleaned and oiled every day, with hosts of men to attend to its wants, and lasts only for a span of years.

It will be easily seen that any exterior motions exert an important influence upon the vibration, and consequently upon the arbor and pivots of the balance. If this external motion is in the direction of the vibrating plane of the balance, and a vibration occurs simultaneously in the same direction, the vibration arc is increased; if in the opposite direction, such an arc will be decreased, and it is only without damage if it occurs vertical to the balance axis.

The most ordinary external motions, however, occur in another direction than that of the balance, whereby a sensible pressure is exerted upon the axis of the vibrating mass, productive of an increased friction of the pivots upon their bearings, etc., and a retarding, never an acceleration, takes place. For instance, the balance of a watch of a better construction vibrates 18,000 per hour, consequently 432,000 vibrations in twenty-four hours.* Let us suppose such a watch were quietly laid down or hung up for about ten hours—whereby it would go correctly; but in the next succeeding fourteen hours, it would be worn, the general length of time, and if each vibration of the balance were retarded only by 0.0001, it would be equal in fourteen hours to 25.2 vibrations, or 5.04 seconds; by a regular use, therefore, in one week, 35.28 seconds, and in one month, 2.52, or nearly three minutes.

By most watches, where the pivot holes are of ruby, the retard of a watch is far larger, and stands pretty well in ratio with the construction and finish of the movement.

A marine chronometer, regulated to an almost imperceptible difference, and having proved excellent upon a long sea voyage, would, when worn as a watch, in consequence of the external motion experienced, go too slow, and far more so than a good anchor watch. Beside all imaginable advantageous improvements, these chronometers are fitted into a separate box, in the so-called compass suspension, and suspended in such a manner that they do or should remain in an equal position in all the different motions of the ship.

From the preceding remarks it is very clear that a careful treatment of any, especially a fine-graded watch, is of great moment, and only with such care it will go apparently correct. The winding should be performed slowly, and strong external motion be prevented, and always be done in the morning; it thus will work well during the day, with the best traction power of its spring, whereby the external motions to which it is exposed during daytime, are pretty well counterbalanced, and immensely better than when wound at night, because it has only the weakened spring to offer as resistance next day. The breaking of the spring, also, need not be feared, as it is no longer at full tension during the night, and can stand better the ensuing cold. The morning hour is also better fitted for such winding, because dressing takes place generally at nearly the same hour, more so than going to bed at night.

* Vibrations—18,000 per hour; 432,000 per day; 12,960,000 in 30 days (one month); 157,680,000 in 365 days. A seconds pendulum makes 3,600 oscillations in one hour; 86,400 a day; 2,592,000 in 30 days (1 month); 31,536,000 in 365 days—one year. A marine chronometer, which marks ½ seconds, makes 14,400 in an hour, 345,600 per day; 10,368,000 in 30 days; 126,144,000 in 365 days.

Keys of soft metal should be shunned; also those which fit badly, because ruining the winding square, and leaving metallic dust in the movement. If the watch is laid either at an inclination, or flat, or suspended at night, it should always be done in the same manner—not differing every night. The rate difference between vertical and horizontal is often significant; by second rate watches sometimes two or three minutes in one night; if it is suspended from a nail, in such a manner that it may rock to and fro with the vibration, an accident which occurs often, and a watch provided with a heavy balance will gain, and, *vice versa*, one with a light one will lose. Of course this is in the nature of things. Similar observations have been made by clocks which were not firm within their case.

The temperature difference between the heat of the pocket and a wall nearly to the freezing point, is about 20° or 25° Celsius, and a watch should, therefore, never either be suspended or laid upon it; the sudden change of temperature may produce the sudden breaking of the spring; also the oil thickens, especially if no longer pure, which, as aforesaid, produces irregularities of rate; if the balance o. the watch is not compensated, it must gain from the above-mentioned carelessness, and if it possesses constructive defects, it may stand still from the cold.†

It is necessary to clean the watch pocket frequently, to free it from accumulating dust and fibers. Even by the cleanest pursuits, a sort of fiber dust will gather in the pocket, caused by the friction of the watch case, and this is very easily transported to the interior of the movement, and is much more pernicious than common dust, by wrapping around the little component parts, and retards—sometimes prevents, their motion, similar to the cobweb with flies.

No other articles should be carried in the watch pocket, such as keys, coin, etc.; it is often done, yet highly detrimental and careless. Watch crystals may be broken, and the dial and hands be injured; if the case is not strong, parts of the train are liable to injury, but in the most favorable condition, the case itself may be injured. The watch should never be worn against the bony part of the body.

The dust cover should never be opened without necessity; dust and fiber is always located around the rim, also the air is continuously charged with dust particles. The canons of the key equally may introduce dust, tobacco and other impurities into the movement, and it should be cleaned frequently. But by even the greatest of care, it is impossible that the watch can go forever without occasional repairs, and it should be cleaned at least once every year. All manner of machinery requires an occasional supervision, and it should be performed at least once a year on a watch; the oil has dried up by this time and become mixed with particles of metallic dust, which act like emery. The author, during a long practice, has had occasion to manipulate costly watches, and several of them were almost ruined beyond repair by having run beyond the time. They generally belonged to people who were afraid to trust their timepieces to bad workmen, and rather risked the consequences. In such a case, it would be better to lock the watch away.

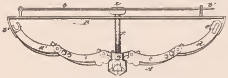
We have endeavored to give a few of the details of how a watch should be treated. Entire chapters could be written without exhausting the subject, but let the above suffice for the layman.

† The author leaves his watch always in the vest pocket, and hangs this on a peg; the watch is thereby prevented from rocking, and escapes other misfortunes, especially when traveling and lodging at strange hotels, where one is called late at times, and something is generally forgotten in the hurry; it is also possible that the watch, instead of being placed in the watch shoe, may be immersed in the holy water vessel, as happened a friend of ours in a Catholic country.

Patent Reports.

Combined Finger Ring, Lace Pin and Bracelet.—Leon Maison, New York, N. Y., assignor to Heller & Bardel, same place. Filed Feb. 13, 1882.

Brief.—The flexible ornament is adapted to be clasped together and worn as a finger ring, and to be unfolded and straightened out and worn as the ornamental portion of a lace pin or bracelet.



Claim.—1. As an improved article of manufacture, a flexible ornament, *A*, consisting of a series of quadrantal sections hinged to each other and adapted to be clasped together to form a finger ring and to be straightened out to form the ornamental portion of a lace pin or bracelet, substantially as herein shown and described.

2. The combination, with the flexible ornament *A*, of the pin-plate *B*, provided with the plate *b″*, and means, substantially as herein shown and described, for securing the said plate to the ornament, as set forth.

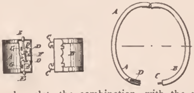
3. The central section, *a*, of the flexible ornament, formed with the threaded socket *a′*, and having the sections *c* and *d d′* hinged thereto, in combination with the pin-plate *B* and screw *E*, substantially as described.

4. The combination, with the pin-plate *B*, provided with the hinged pin *b*, of the flexible ornament *A*, provided with the ornamental extension plate *f* on one of its sections, substantially as and for the purpose set forth.

Art of Making Watch Cases.—Chas. Schwitter, Brooklyn, N. Y. Filed Dec. 15, 1881.

Claim.—The method herein described of making covers for watch cases, which consists in cutting or stamping out the ornamental rim *A* in a single homogeneous piece of metal, then stamping or striking up from a blank the head *B*, and finally uniting the rim to the edges of the head by means of solder, substantially in the manner and for the purpose described.

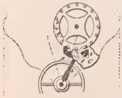
Fastening for Bracelets and Scarf Rings.—Elijah Atkins, Birmingham, County of Warwick, England. Filed Aug. 26, 1881. Patented in England Jan. 29, 1881.



Claim.—In a bracelet, the combination, with the rigid notched catches *C* of the part *B*, of the catches *D*, consisting of an angle bar or plate provided with plates *a a′* on the outer end of its shorter arm, and with the lug *b* at its angle, and the spring *F*, interposed between and connected to the said catches between the lugs *a′ b*, arranged in the hollow end of the section *A*, substantially as herein shown and described.

Clock Escapement.—Frederic A. Lane, New Haven, Conn. Filed Mar. 2, 1882.

Claim.—1. The herein described improvement in marine clock-movements, consisting of the thin metal verge and lever *a b*, in one and the same piece, combined with the collar *d*, attached thereto to form connection with the shaft, and the crown-wheel, constructed with pins projecting from its side parallel with the axis of the wheel, substantially as described.



2. In a marine clock-movement, the pin *f*, extending from the verge or lever, and the frame, constructed with a triangular opening, through which said pin projects, and upon opposite sides of which the said pin will bank, and between which sides the said pin may be adjusted, substantially as and for the purpose described.

Ornamental Chain.—Warren W. Briggs, Providence, R. I., assignor to S. & B. Lederer, same place. Filed Mar. 13, 1882.

Brief.—The rings inclose and retain the blanks.

Claim.—1. An ornamental chain provided with blanks secured at intervals by passing the connecting link or links around the blank, as described, as a new article of manufacture.

2. In an ornamental chain, the combination, with the links *a a* and *b b*, of the blanks *c c*, constructed so that the link passing around the blank will firmly hold the same, as described.

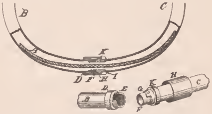
3. In an ornamental chain, the combination, with the links, of blanks or ornamental designs provided with the recesses *d d*, constructed to be secured by entering the links into the recesses, as described.

Watch Regulator.—Richard Oliver, Brooklyn, N. Y. Filed Dec. 30, 1881.

Claim.—1. The combination of the slotted regulator-lever *A*, quadrant-rank *B*, provided with pin *D*, operating in the slot *F*, and pinion-wheel *E*, substantially as described.

2. The combination, with the regulator-lever, of a toothed quadrant, over which said lever extends, a bearing for the lever upon the quadrant near the pivot of the latter, and a pinion gearing with the quadrant, substantially as set forth.

Bracelet.—Charles McIntire, Newark, N. J. Filed Jan. 28, 1882.



Claim.—1. In a bracelet, the combination of the section *B*, provided with the fixed collar *D*, and the section *C*, provided with the tube *F* and collar *K*, the spring *A*, and the slide *H*, having the flange *I*, adapted to slip onto the section *C*, so that the flange *I* shall engage the collar *K*, and the opposite end of said sleeve or slide be soldered fast to the collar *K*, all substantially as and for the purpose specified.

2. The combination of the section *B*, having the collar *D* and notch *E*, the section *C*, carrying the collar *K* and tube *F*, said tube supporting the stop-projection *G*, the slide *H*, with its flange *I*, and the spring *A*, all substantially as and for the purpose set forth.

Gold and Silver—their Elaboration.

GOLD, CHEMICALLY CONSIDERED.

As known, gold and silver are denominated the "noble metals;" even without considering their great material value, we may also call them noble from a chemical point of view. Metals, according to their behavior upon continued exposure to air and heat, may be divided into two comprehensive classes. viz , *noble* and *base.*

Base metals are those which, upon exposure to atmosphere, become chemically altered; they become coated with a powder, a rust, consisting of a combination of the metal with oxygen and water, for instance, common iron rust; else it contains also an addition of carbonic acid, like copper *rust* (falsely called *verdigris*).

Upon heating the base metals in air, their affinity for oxygen becomes so powerful that they actually burn; zinc burns at red, iron at white heat, emitting scintillations, and when this happens, combinations occur between the metals and oxygen, forming an oxide.

The noble metals, to which gold, silver and platinum are to be classed, are completely unalterable in pure dry, and in many cases in moist air, and remain in their unalterable state even if fused, and thus exposed to the highest temperatures; the affinity of these metals for oxygen is so small that they cannot be combined with them directly. Although combinations of these metals with oxygen may be made chemically, yet they are so loosely united that they can rapidly be separated, and the metal is obtained in a pure condition. We will have occasion to see further on how this property is used for coating mirrors, and for gilding and silvering.

While gold and silver are completely impervious to the influence of pure air, sulphuretted hydrogen (sewer gas), affects them strongly. (This sulphuretted hydrogen has the odor of rotten eggs, and is developed by many springs, sulphur springs, pools, etc., also organic substances in a state of decomposition; it chiefly occurs in the air of large, populous cities, less in that of the country).

Silver quickly tarnishes in such air, and turns black, loses its luster, and becomes coated with sulphuret of silver; gold articles, of the well-known yellow color, assume a tomback-brown, the generated sulphuret of gold being of a brown color.

Gold is with rapidity attacked by several chemical reagents, for instance, chlorine; it suffices to expose gold articles for a short time to atmosphere containing only sufficient chloric gas to be barely perceptible, to lose their luster. The coating of chloride of gold, forming upon the surface, is the cause of this alteration.

Pure gold, that is, such as contains no admixture of any foreign body, possesses different colors, according to the condition in which it is found; in a compact state, for instance, it is of a peculiar yellow color, called *gold yellow*. In that finely divided state in which gold is precipitated from its solution, it appears as a yellowish-brown, perfectly lusterless powder.

Gold crystalizes in forms pertaining to the tissular crystalline system; if the fine gold powder obtained by precipitating a gold solution by a sulphate of iron (iron vitriol) solution, is examined under the microscope, it will be seen to consist of cubes; upon being rubbed with the polishing steel it assumes both the color and luster of gold.

The specific weight of gold is very high, above 19—that is, one volume of gold weighs as much as 19 times its volume of water. Cast gold has the specific weight of from 19 27 to 19.31; when hammered, it increases from 19.63 to 19.65, and it is only excelled in density by platinum.

Gold is so soft that it cannot be worked in a pure condition; if the hardness of hard drawn steel is assumed at 100, then 14-karat annealed gold is equal to 73, that of pure annealed gold only 27, or barely more than one-fourth part, and owing to this softness, gold is always alloyed with other metals, these additions producing a far greater hardness.

In regard to ductility, gold exceeds all other metals, and it may be manufactured so excessively thin that the foil transmits a green light; when treating of the elaboration of gold we will further explain this peculiarity.

For practical purposes, it is a very important condition that the admixture of a very small percentage of foreign metals suffices to materially decrease its ductility. The foreign metals behave differently, and we will enumerate them according to the degree of the influence they exert upon ductility: lead, antimony, bismuth, zinc, nickel, tin, platinum, copper, silver; a percentage of $\frac{1}{1000}$ of antimony, arsenic, lead, bismuth, unsuits gold for coining or pressing.

Also the malleability, ductility, and the capacity of being conductors of heat and electricity, are very much influenced by the presence of foreign metals, and are especially of great importance for the electrician and galvanizer.

Gold fuses at a very high temperature, higher than that of silver; the fusing point is given at from 1,200 to 1,240° C.; fusing gold exhibits a peculiar, bluish-green, glittering color. Heat has a great influence upon gold, and expands it between 0 and 100° C., by $\frac{1}{682}$; melted gold contracts materially upon cooling, and the casting of large gold articles is very difficult, the construction not being very uniform upon cooling. It is very volatile in the heat of a porcelain furnace in active fire, and may easily be converted into vapor by a strong electric current.

The mixtures of gold with other metals, the gold alloys, show very different properties, according to the kind of the metal added, and its amount; and these alloys are of the greatest possible importance to the gold worker, because generally engaged with alloys, barely ever with the pure gold; we will therefore reserve a chapter for the gold alloys.

GOLD PREPARATIONS.

The goldsmith is not alone engaged with pure gold, or its alloys, but he is frequently called upon to work with the different gold preparations, especially when required to provide metallic surfaces with a gold coating, or to give gold articles a certain color. It is eminently benefitting every goldsmith to be as independent as possible upon outside sources, and to understand himself how to make his own chemical preparations, because only thus can he reckon with full certainty on the success of the work wherewith he is engaged. We will therefore devote a few chapters on the manufacture of gold preparations, important for every goldsmith, because in daily use.

Dissolving Gold.—The starting point in the manufacture of gold preparations always is the dissolving gold in nitro-muriatic acid, to be done as follows: Gold, in a condition of the greatest possible comminution, because acted upon easiest, is put into the beaker glass, which is placed into a porcelain dish filled with water. The gold to be used may be any desirable alloy, and is best used in the shape of rolled sheets, cut into small pieces with the shears.

As dissolving agent is used nitro-muriatic acid, and this acid must always be freshly prepared, because it decomposes upon being preserved. Four weight parts acid are sufficient to dissolve one weight part gold The nitro-muriatic acid develops free chlorine, and the solution of the gold is effected thereby, thus that chloride of gold is obtained.

If nitro-muriatic acid is poured over gold, small gas bubbles will be seen to arise from the little metal pieces, and the fluid assumes a yellow-brown appearance; solution takes place gradually by common temperature, quickly, however, if the water in aforesaid porcelain dish is heated to 50° or 60° C.

Pure gold, or such not containing silver, dissolves completely in nitro-muriatic acid; if silver is present in the alloy, an insoluble precipitate of chloride of silver deposits; the gold solution is to be decanted carefully, the residue is poured over with distilled water, shaken, and the whole is poured upon a filter of blotting paper inserted into a glass funnel; the escaping fluid is united with the gold solution, the residue of chloride of silver, remaining upon the filter, is worked with pure silver (of which hereafter).

The gold solution obtained in the above-described manner, still contains large quantities of acids in excess, the presence of which would be injurious in many cases. In order to remove the acid, the solution is placed into a porcelain dish and heated so far that although the fluid strongly evaporates, yet it must not boil. A brown crystal mass finally remains, dissolving in air, and represents impure chloride of gold.

The production of pure gold.—Above-mentioned crystalline mass, beside chloride of gold, contains all other metals found in the gold, as alloys in form of chlorine combinations, and is used for the production of pure gold. For this purpose, it is dissolved in about tenfold its weight quantity of distilled water, and, on the other hand, a solution of pure sulphate of iron (iron vitriol), or of oxalic acid in water, is prepared.

If part of the sulphate of iron solution is poured into that of the gold, the fluid colors dark brown to black, and in a short time a very heavy, finely-pulverized precipitate occurs, of metallic, yellow-brown color, and consisting of chemically pure gold. A filtered sample of the fluid is tested, whether it parts with more gold upon another addition of sulphate of iron, and the solution is added as long as a precipitate ensues; when it has ceased, all gold is separated.

A separation of the gold also occurs if a solution of oxalic acid is used in place of the sulphate of iron, but the fluid does not become dark-colored thereby. By the employment of concentrated gold solutions, the gold separates sometimes in form of lustrous foils, and adheres to the walls of the vessel. The precipitate obtained by any of the specified methods, is filtered, washed with distilled water, and after drying forms a yellow-brown powder, chemically pure gold, and this is the starting point for the production of chemically pure gold preparations.

We will remark that for many purposes to which gold preparations are employed, it is not unconditionally necessary to use chemically pure gold, but that preparations containing copper chloride together with gold chloride, are suitable for many practicable purposes. In this case the preceding specified rules need not be observed, but gold containing only a trifle of copper, such as coin gold, is simply dissolved in nitro-muriatic acid, and at once used for gold preparations.

Chloride of gold.—This preparation is obtained if nitro-muriatic acid is poured over chemically pure gold; the solution is accomplished in a very short time, owing to the finely divided state of the gold. The solution is carefully evaporated until only a solid residue is left, consisting of pure chloride of gold, but still containing a certain quantity of acid. To liberate this the dry salt mass is heated very carefully, finally raising the degree to melting, whereby a ruby-red fluid is formed, solidifying to a yellow crystallic mass; by too strong a heat, the chloride of gold would become decomposed, the chlorine escape, and gold remain.

In a pure condition, the terchloride of gold consists of yellow, acicular crystals, easily soluble in water and alcohol. The solution must be stored in darkness, the influence of the light sufficing to effect a separation. Either applied to the skin or other organic substances, it colors them red; most of the metals dipped into the solution, effect the separation of gold.

The separation of a metal from its combinations is called reduction; chloride of gold belongs to the easier reduceable salts.

THE CHLORIDE OF GOLD-SODIUM.

Owing to the easy decomposition for which chloride of gold is distinguished, a double salt is very often used in its stead, consisting of terchloride of gold and chloride of sodium, obtained by dissolving 65 parts gold in 260 parts nitro-muriatic acid, evaporating the solution until a sample taken from the dish with a glass rod solidifies thereon, when 100 parts chloride of sodium (cooking salt) are added. The mass is stirred together well for some time, heated to complete dryness, and, while still warm, it is filled into a receptacle of black glass, and well closed.

The chloride of gold-sodium absorbs but little moisture from the air, and consists of an orange-yellow mass easily soluble in water, which, prepared by above formula, contains exactly 50 per cent. chloride of gold; the preparation is poisonous.

THE GOLD SALT.

The preparation occurring in commerce by this name, consists of the double salts of the gold chloride, and are chiefly produced in the manner specified for chloride of gold soda, only with this difference, that the varied quantities of chloride of gold and chloride of sodium are employed.

We annex a few recipes for the production of this preparation: 8 parts gold dissolved in nitro-muriatic acid, 2 parts chloride of sodium are added, evaporated to dryness; or, 1 part gold dissolved in a mixture of 4 parts muriatic acid, and 1 part nitric acid, evaporated to crystallization, and dissolved in 8 parts water, mixed with 0.25 parts salt, and again evaporated to dryness; if free acid is present, it is removed by dissolving the mass in water, evaporating to dryness, and repeated several times. Or, 100 parts gold dissolved in 400 parts muriatic acid, and 100 parts nitric acid, heated until all nitric acid is decomposed, mixed with 73 parts of carbonate of soda, and evaporated to dryness.

In place of the chloride of sodium (cooking salt), or the carbonate of soda, chloride of lime or carbonate of potash may be used, and a preparation is thus obtained, also called a gold salt, and consisting of terchloride of gold and chloride of calcium; both preparations may be used in galvanic gilding; its chief employment, however, is in photography, for the so-called coloring of the picture, in order to impart them a livelier tone.

The protocyanide of gold.—For the production of this preparation, an acid solution of chloride of gold with one of cyanide of potassium, whereby an excess of the latter is to be prevented; a yellow, crystalline precipitate is formed, insoluble in water and alcohol, easily soluble in cyanide of potassium solution, by forming a double salt; protocyanide of gold-potassium. By careful evaporation of this solution, the double salt is obtained in form of large, colorless prisms, soluble in 7 parts cold water and a very small quantity of boiling. The solution of the protocyanide of gold-potassium is very easily decomposed by the electric current, by the separation of metallic gold, and consequently is much employed in galvanic gilding.

Cyanide of gold.—If a solution of protocyanide of gold potash is mixed with a solution of nitrate of silver, and the thereby arising precipitate treated with a very small trifling amount of muriatic acid, a solution of cyanide of gold is produced, from which crystals are obtained by evaporating under the air pump. The double salt, obtained by this combination, and formed by the cyanide of potassium, is also important in the trades.

The cyanide of gold-potassium is easiest obtained if chloride of gold is mixed to a concentrated hot solution of cyanide of potassium, and permitted to slowly cool; the transparent crystals are easily soluble in water, and the solution is decomposed by the electric current.

The greatest care is necessary by the production of these, and, in fact, all cyanide preparations, and they should be executed in open rooms, or under a so-called air-furnace, because the emanation of the cyanogen and any of its combinations, is poisonous in the highest degree.

Gold purple.—This preparation, also called Cassius purple, for its inventor, imparts to glass meltings and enamels the most beautiful purple color imaginable, wherefore it is employed as well in the porcelain painting and manufacture of glass, as in the art of enameling. Gold purple appears to have no determined chemical composition, and it is unconditionally necessary to work according to determined formulæ, in order to obtain a preparation furnishing a handsome fiery color; we add several, the observance of which, in practical execution, will furnish a beautiful product in all respects.

The solution of chloruret of tin, necessary for the production of the gold purple, is produced by dissolving pure tin in pure muriatic acid, free from iron, in such a manner that a little tin remain undissolved, and the solution, in which a piece of tin is laid, is evaporated to crystallization. The gold purple contains, together with the gold, most probably the two combinations of the tin and oxygen; protoxide and oxide of tin, and the beauty of the color appears to be dependent upon their correct proportion to the gold.

Light purple.—Dissolve 2 grams tin in boiling nitro-muriatic acid; evaporate the solution to thickness by gentle heat; dissolve in distilled water and add 2 grams of chloruret of tin solution (of the specific weight of 1.7), diluted with 10 liters water, stirring the fluid into a chloride of gold solution, composed of 0.5 grams gold, and which must have no excess of acid (this is obtained by evaporating the solution of gold chloride to dryness, and heating for some time at about 160° C.). The fluid becomes turbid upon an addition of 50 grams liquid ammonia, and parts with its purple.

The latter is quickly filtered, washed, and, while still moist, triturated with the glass flux. This consists of 20 grams lead flux, 1 gram quartz sand, 2 grams irenium, and 1 gram calcined borax, together with 3 grams carbonate of silver.

Dark gold purple.—Gold solution of 0.5 gram gold, 7.5 grams chloruret of tin solution, of 1.7 specific weight, diluting with 10 liters water, separate the purple by a few drops of sulphuric acid, wash and mix it with 10 grams lead flux and 0.5 gram carbonate of silver.

Rose purple.—Gold solution of 1 gram gold, solution of 50 grams alum in 20 liters water, add 1.5 grams chloruret of tin solution, of 1.7 specific weight, and also sufficient ammonia until all precipitate has ceased; mix the washed, still moist precipitate with 70 grams of lead flux, and 2.5 grams carbonate of silver.

Sight.

WHAT THE OPTICIAN SHOULD KNOW ABOUT OPTICS.

Continued from page 143.

THE block letters which we have before us are the universal standard by which the acuteness of distant vision is measured in all civilized countries. As opticians hear so many stories about different kinds of sight, it will not be without interest to follow back one of these stories, and see (though untrue) how a yarn about "telescope sight" may be handed down from generation to generation.

This universal visual test, which at present is in general use, although a good measure of the average acuteness of distant vision, is based upon an erroneous statement made by Hooke in 1705, who said that the sharpest eye could hardly distinguish two stars that were less than half a minute apart, and not more than one in a hundred could distinguish stars which were less than one minute apart.

A more faulty statement could not have been made. Under the most favorable circumstances, stars which are 6½ minutes apart, require the sharpest eyes to distinguish the spaces between them. A tailor named Schöne, who died in Breslau, Germany, in 1837, was the only man who has ever been able to distinguish the third and fourth moons of Jupiter with his naked eye. The third moon is five minutes and the fourth eight to ten minutes from the planet; consequently, if seeing the intervening space between two heavenly bodies which are eight to ten minutes apart, represents the acuteness of vision of the acutest eye ever known, the incorrectness of Hooke's statement is very glaring. Hooke's statement has been handed down from author to author till it has become a law; so that Boettcher, who found that terrestrial bodies were not seen under so small an angle as one minute, wrote a treatise in 1870, explaining why heavenly bodies are seen under a smaller angle than terrestrial bodies. Professor Snellen, supposing Hooke's statement was correct, constructed our present system of letters for measuring the acuteness of vision. He, supposing one minute was the smallest angle under which two heavenly bodies could be seen apart, attempted to construct a system of letters, which, in order to read at the required distance, one would be obliged to distinguish two objects that were one minute apart. He placed himself in the center of a circle forty Paris feet in diameter, and constructed a row of letters, the height of which is five minutes of this circle; the stripes and openings of the letters are one minute—thus in the letter C, the stroke is one minute, and to distinguish it from O, the white opening must be seen, which measures one minute. He supposed that eyes which could read C, could distinguish objects one minute apart. What one sees when he sees a letter is hard to say; he says it is a C because he is acquainted with the character and knows it. One who can tell the letter C with ease will find it impossible to count the squares of a checker board where the black squares are seen under one minute, and the intervening spaces are the same. Therefore, the man who can read the last line of Snellen, although his acuteness of vision is up to the normal standard, does not distinguish objects situated one minute apart. Although this test does not fulfil the scientific requirements for which it is constructed, still, it is a good measure for determining the acuteness of vision, and the last line, at 20 feet, just represents the average acuteness of vision. Hooke's statement is therefore nearly true of terrestrial bodies, and entirely untrue of heavenly bodies.

An analomical fact which determines under how small a visual angle two points can be seen apart is not without interest.

The visual spot upon which all our impressions of the outer world are received, is the $\frac{1}{5}$ to $\frac{1}{6}$ of a millimeter in diameter. It consists of cone-like nervous elements, which are in connection with the brain through the optic nerve, and which stand very near to each other.

The diameter of these cones is the three thousandths of a millimeter. Therefore, as long as the retinal image is not larger than the three-thousandths of a millimeter, it can only fall upon one cone or upon two adjoining cones. In this case the two black points would be seen only as one, that is, they would run together. As soon as the retinal image is the four-thousandths of a millimeter, then it is large enough to cover three cones, thus leaving one at each extremity of the retinal image to discern the black points, and one in the middle of the retinal image to perceive the intervening white space. Therefore, the four-thousandths of a millimeter is the smallest retinal image by which two points can be seen separately. In the average normal eye THIS retinal image corresponds to an object seen under an angle of about one minute. Therefore, one minute is the smallest possible angle under which two distinct points can be seen separately. The above may seem superfluous for a practical article on sight, but unless you thoroughly understand this subject, you are being constantly victimized with optical instruments which have the appearance of being scientific, when they are not.

The cone elements which we have considered above, are frequently displaced from their normal position after a fit of sneezing or disease, giving rise to most remarkable peculiarities, namely: Large vision—megalopsia; small vision—mikropsia; irregular vision—metamorphopsia.

In large vision, the cones, owing to the contraction of tissue which has been inflamed, are drawn closer together, so that a retinal image, which formerly fell on cones which were six-thousandths of a millimeter apart, falls upon cones which were twelve-thousandths of a millimeter apart, consequently the impression of the object carried to the brain, is the same as when the object was large enough to cast an image upon these cones before they had changed their positions. Thus the patient may claim that objects look twice as large in one eye as they formerly did; they may look large in one eye and small in the other. They may look larger or smaller than usual in both eyes. The effusion of fluid under or between these cones may separate them, producing exactly the opposite effect of drawing them together, and everything looks small. In irregular vision the cones are irregularly displaced; thus a straight line may appear bent in either direction, or may have a wavy appearance.

CHROMATIC ABERRATION.

The effects of color on distance is due largely to this visual imperfection. It is the only visual imperfection which exists in every eye. Clergymen, who study in rooms illuminated with stained glass windows suffer from this visual defect. Persons studying by lamps covered with fancy shades of two or more colors also suffer from this defect. One plain glass window which illuminates the study table, or a plain lamp shade, and the troubled vision disappears.

Artists avail themselves of this general visual defect, in producing distance on canvas, by coloring an object red when they wish it to appear near, and violet when they wish to retire it.

We have already seen that the nearer an object is, the stronger we must make our lens to see it distinctly. A prism of glass bends or deflects red rays of light from their original path, much less than violet rays of light; it therefore follows that the red rays are more difficult to deflect or converge than the violet rays.

This was also true of divergent rays of light, or rays from a near object as compared with parallel rays of light. This makes it evident that color and distance, independent of light and shade, are interchangeable. The lens of the human eye should unite rays of light from violet and red objects at the same point, but it does not.

The discussion between Newton and Euler, as to whether this error existed in the human eye, is not without interest. Newton's belief that the human eye had this defect, and also that it was impossible to construct a lens that was free from it, led to his inventing the reflecting telescope, while Euler's belief that it did not exist in the eye, led to his inventing refractive telescopes, now in common use. Without referring to the details of Fraunhofer's experiments, by which he not only demonstrated the existence of this error in the human eye, but with which he measured it. I will give you his results:

At the far point of distinct vision with the eye at rest, a violet object must be *twenty-six inches nearer* in order to be seen with the same distinctness as a red object. Chromatic aberration exists in every eye. In our next we will be able to take in the selection of spectacles.

[*To be continued.*]

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Ninety-seventh Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

TELEGRAPH INSTRUMENTS NEAR WATCHES.

Secretary of Horological Club:

I have in my shop a 20 ohm telegraph instrument. It is an end office, on a two-mile line. We use seven cells of battery, which is in the cellar, ten feet from the instrument. The instrument is directly under the watch case, two feet from nearest watches, and four feet from the top ones. I have a "cut out" outside of the building, and cut the instrument out during storms. No wires are nearer than two feet to case. Is there danger of injuring the watches? If so, how far must instrument and wires be removed to avoid that danger?

Yours respectfully, M.

Mr. Electrode replied that the vicinity of a voltaic battery was not injurious to watches, except by the fumes or vapors given off, either by the acids or solution with which it is charged, or during and in consequence of the action of the battery while in use. Nor was the vicinity of a wire conveying an electric current injurious, unless the balance of the watch was already magnetized. In that case, there would be a tendency of the center-bar of the balance to place itself at right angles to the current, or the wire carrying it, at the nearest point. But, practically, this effect or tendency would be so slight that it might be disregarded, except when the current is very strong or very near. The "cut-out" is merely to prevent lightning from entering the building and injuring the instruments. It would have nothing to do with the safety of the watches, except by preventing the stroke of lightning from leaving the wire or the instruments, and jumping to the watches, on its way to the earth. This, however, would be extremely unlikely to occur, because the electric current always takes that route to the earth which offers the least resistance. From the way in which watches are usually hung in a shop, there would be a very great resistance to the passage of a current from them to the earth, and consequently there would be no tendency of the current to strike across them, unless they were in the route of least resistance, or presented a considerable mass of metal at a point where the progress of the current was obstructed. They would then attract the current, which, after charging them, would, if it found no easy way of exit, pass off by an explosive discharge, or by burning or melting the metal parts. But there is no danger of that occurring in this case, if the cut out is a good one, and is kept in order. The principal danger to which Mr. M.'s watches are exposed is from the magnets of the instruments. How far the influence of magnets can reach is unknown, but experiments have been made in which the variations in the strength of an ordinary electro-magnet, during use, have been detected and followed at a distance of sixty feet. The effect at that distance is too slight to disturb the running of a watch, unless it is already magnetized or is regulated so closely that the slightest disturbing influence is shown in the rate. But two feet is entirely too close for the safety of the watches. They may or may not be permanently magnetized by an instrument placed at that distance, but they are certainly likely to be more or less affected in the running. This effect is so much a matter of circumstances, and depends so much upon the construction of the instruments and the fineness of the watches, that it is impossible to say what distance would be far enough for safety. But he would not think of allowing them nearer than ten or twelve feet, and the greater their distance apart, the less the risk of injury by magnetic induction upon the watches, or by permanent magnetization.

HALL'S DIAMOND LAPS AND DRILLS.

Secretary of Horological Club:

We sent you by mail last week a diamond lap, three drills, and taper to fit the same. Will you kindly bring the same before the Club? The lap is composed of a steel disc, set on a brass collar, which fits the taper, as also do the collars in which the drills are set. It is designed to use in an ordinary lathe, and to have a second taper turned on the end of the steel wire to fit the chuck of the lathe it is to be used in. We find this lap the nicest thing we have ever seen for making and grinding fine drills; also useful in grinding any small pieces of hardened steel. The lap should be kept constantly moistened with a little swab soaked in kerosene oil, when in use. We are now prepared to furnish these articles to the trade as follows: Diamond lap, at $1.50 each; single or double taper, 25 cents each; drills set in brass collars, 25 cents each. We can furnish any size drills, from 50 to 75 by Stubb's wire gauge, also five sizes finer than 75, which we number 76 to 80 inclusive. You will notice that the drills are soft-soldered into the sockets or collars, so that, after a workman once has the set, he can readily make and set his own drills if he prefers. We also will furnish the blanks for the drills, ready to set and grind, (all tempered,) at ten cents each. We have put the above prices very low, within the reach of all, and think workmen will find these drills superior to any now in the market. The diamond laps will last a long time if used with care, and when worn out we will recharge them at 75 cents each.

Very truly yours,

J. G. HALL MFG. CO.

Mr. Uhrmacher, who had taken the liberty to "gobble" the articles for "his own, his very own," exhibited them to the Club. The explanatory letter sent with them describes them so fully that it is only necessary to add that they are made in the careful and substantial manner which characterizes all the productions of these manufacturers, and that they will be found a great convenience for workmen. Mr. Uhrmacher suggested in conclusion, that if the gentlemen would send him the rest of the set, his happiness would be complete.

AN ELABORATE WATCH DIAL.

Secretary of Horological Club:

Mr. A. S. Wormood, of the Illinois Watch Co., has a wonderfully curious watch dial on a movement of this company's make. Instead of the Roman numerals to denote the hours, there are eleven small but very distinct silhouette figures, repesenting a man starting out with his dog for a day's sport. At 7 o'clock, he is seen starting out with his gun and dog; at 8 o'clock he makes a shot; at 9 o'clock he has a sand hill crane, which measures as long as himself; at 10 o'cock the man and his dog are scared at the sight of a jack-rabbit, which is seen sitting upon his hind legs, with his big long ears raised above the bushes; at 11 o'clock, the hunter takes a drink, and while in this attitude, the dog sits in front of his master with his nose pointing directly at the flask; at 12 o'clock the sportsman is seen sitting on a stump, and is eating a lunch—the dog is eyeing the piece of bread which the hunter has in his hand. At 1 o'clock he starts out to fish the rest of the day, and so he takes his dog and fishing tackle, and goes to the water; at 2 o'clock, the dog, which is behind his master, has been caught with the hook by an attempt to throw in his line; at 3 o'clock, he and the dog are all straightened out again, and the line is in the water. He has both hands on the pole, and his foot braced on a stump by the water's edge, as though he had a tremendous bite; at 4 o'clock the man has got a big fish on his line, which has pulled him off his feet, and he falls on the dog and doubles him all up—but the man is holding fast to the pole, which is bent almost double; at 5 o'clock, he is all straightened out again. His pole is thrown across his shoulder, and with his fish in the other hand, he starts out for home, the dog following behind with his head hanging down, being all tired out. "A. S. Wormood," is also painted in the center of the dial in rustic letters. This handsome dial reflects a great deal of credit upon the artist, Mr. Chas. Geyer, who was formerly at Springfield, Ill., but is now working at Springfield, Mass. This dial is valued at twenty-five dollars, on account of its oddity and complicated designs, and is highly prized by the owner, Mr. A. S. Wormood.

Mr. Expert said that it was indeed a curiosity in the way of a watch dial, and regretted that he could not see the production itself. He suggested that perhaps the vacant space at the figure VI., might be utilized for a home scene, showing the hunter regaling himself upon the culinary results of his day's sport, as tastefully cooked and laid out by the good housewife, while the seconds hand successively pointed to the different articles as it went its rounds.

AMERICAN CLOCKS—PATENT REPORTS—WHAT IS A "FULL TURN?"

Secretary of Horological Club:

It has been some time since I have had time to write, as I have just finished building a neat, cosy shop and store; but I find time to read THE CIRCULAR, and in it I find that H. Seivert makes a remark that, if I understand it, goes hard against American clock makers, when he says in Feb. No., page 14, that the torsion pendulum clock was an American invention, and as such was as *common* as all other American clocks are. Now, I *do* think that of all the clocks made, those made in Schwartzwald are the roughest, most crude of any that come to a shop for repairs; and while we may not make the *very finest*, yet we come so near to it as not to be ridiculed.

Now, Friend Hopkinson, a word to you. I have always valued your journal very highly, but lately you have introduced into THE CIRCULAR an item, that of all matter, is the most useless, and can do no reader any good—and that is the introduction of the "patent reports," which wind up with "for the purpose shown," "for the purpose specified," "for the purpose set forth," "substantially as set forth," etc., which have no meaning to anyone not acquainted with the patented article, and besides this you take up as much as three pages to such *stuff*. If the articles would describe the patented machines, it would be better, but they do not, and I for one will be grateful when that kind of matter is expunged from THE CIRCULAR.

I wrote once before on the subject of "turns." Now, in Feb. No., p. 22, I find, "When by a sudden circular motion of the watch in the plane of the balance * * * the vibration increases beyond two full turns, the impulse pin strikes against the outside of the fork." Now, I never can understand what a full turn is, or two full turns; it surely can't mean a revolution of the balance, and I don't know what it can mean. Please explain, and then hereafter I will read intelligently. E. Y. D.

Mr. McFuzee observed that he did not remember noticing the statement attributed to Mr. Seivert, but if he really made it, he evidently stated what everybody knows is not the case. The torsion pendulum was "common" enough to be known to all workmen, but they never constituted the $\frac{1}{100}$ or $\frac{1}{1000}$ part of the clocks used in this country—hence were not "as common as all other American clocks" Mr. Seivert probably had no intention to ridicule our clocks, but merely to say that, although the "torsion pendulum" was a great curiosity in Germany, or in Europe, it was old and well known to us.

As regards the "Patent Reports," he feared Mr. D. was not as ardent in pursuit of knowledge as some readers are. The patent reports show precisely what new improvements have been patented from month to month, and are very interesting and useful to those who wish to keep thoroughly posted and abreast of the times. Although they may have no interest to Mr. D., they undoubtedly have to a great many others. Only the "claims" are published, because a patent does not cover everything described in it, but only what is *claimed*, and allowed by the Patent Office as being new. Mr. D. can get the full description of any device regarding which he would like further information, by sending 25 cents to the Patent Office for a copy of the patent, which will include all the drawings, etc. The words "as set forth," etc., to which Mr. D. objects, mean that the patentee is allowed to claim only the particular device or construction "set forth" by him, and not all constructions for a like purpose, or of a like character. It is, therefore, a very important part of the claims, in construing the legal scope and meaning of the antecedent phraseology. If Mr. D. does not care to read such matter, he is not compelled to do so, but he should not object to others having that privilege.

The meaning of a "turn" was explained to Mr. D. by some member of this body several months ago, stating distinctly that it *did* mean one complete revolution of the balance. That is, when any screw or part of the balance moves through a complete circle of 360°, from the beginning to the end of its swing or vibration. If the screw, while in vibration, passes the point from which it started, goes on around, until it reaches the same point a second time, it has then passed or vibrated through two full circles or "turns," and so with any proportion of the same, as 1½ turns, etc. Mr. McFuzee hoped this would make the matter entirely clear to Mr. D.

PROTECTIVE PASTE FOR JEWELRY WHILE BEING SOFT-SOLDERED.

Secretary of Horological Club:

Please find enclosed an article which I find of great use to me. Would like the opinion of the Club on it, and do you think that it would pay me to make it for the trade? I have been taking the journal but a few months, and would not be without it for twice what it costs me, for it has given me a great deal of valuable information. I want to get several works on horology as soon as I am able, but as I am just starting, it keeps me busy to make everything come out straight. Yours respectfully, A BEGINNER.

Mr. Blow Pipe reported that he had tested the article, and found it useful. It is applied wet, with a brush, and the jewelry is then dried in the lamp before soldering. It keeps the solder from flowing where it is not wanted. After the work is done, the paste is washed off with a stiff brush and alcohol. He hardly thought it would pay our correspondent to make it for sale to the trade, however, for two reasons. Few workmen would take the required trouble, and wait long enough to apply it and then dry the article before soldering; and, besides, the protective coverings already in use by jewelers, answer the same purpose as that sent to us. There would probably be "no money" in making it, and therefore no inducement.

OLIVER'S REGULATOR FOR FINE WATCHES.

Mr. Richard Oliver presented for examination a new and improved regulator invented by him, designed for use upon the best class of watches, for securing the utmost accuracy of rate. As Mr. O. is one of the most prominent members of the Horological Club, the entire body immediately arose *en masse*, and protested against it being examined, or even shown, within the sacred precincts occupied by this distinguished association. The unanimous sentiment was that it would be far better that all regulators (and all watches, too,) should be buried at the bottom of the sea, rather than the slightest suspicion should rest upon the fairness and impartiality which characterize the proceedings of this honorable body, and that it was therefore entirely out of the question to permit the examination of anything invented by a member. Many of the gentlemen present also had a lively recollection of the patent safety non-breakable balance, exhibited here a number of months ago, which was to be tested by dropping the watch from the top of a step-ladder down upon their bald heads, and they objected to any such disrespectful trifling with their feelings, by Mr. O. or anybody else. Some of them plainly declared it as their firm belief that it was not a watch at all, but some sort of infernal machine gotten up by Uncle Dick to impose upon our unsuspecting innocence, and contrived to suddenly explode and blow us all up—after the manner of Uncle Dick himself, only more so.

Mr. O. stoutly insisted that truth was truth, even when spoken by the Club, and solemnly guaranteed that the thing was not loaded, and wouldn't go off, anyway, without his express directions. He demanded, as one of his inalienable rights, that it should be examined by the Club, and its merits candidly reported upon After considerable negotiation, a compromise was finally made, and it was agreed that if Uncle Dick would be responsible for all damages inflicted by his contrivance upon person or property, while being inspected, and would stand outside of two doors, with his face turned the other way, during our deliberations, so that it would be impossible that the members should be under the magnetic influence of that powerful eye, they would look into the thing as deeply as a proper regard for their personal safety would permit, and make a report of whatever they might discover.

Mr. O. accordingly opened the cases to their full openness, with his own hands, pointed a powerful opera glass squarely upon the interior of the contrivance, and, after adjuring his fellow members by all the saints and saintesses to do him justice, reluctantly withdrew. The gentlemen present skirmished around somewhat timidly at first, but soon ascertained that the watch was not dangerous, but was a *bona fide* chronometer of the finest grade, fitted with Mr. Oliver's new regulator.

This consists of a regulator similar in form to those ordinarily used, but having, near the socket, a steel pin projecting downward and clasped between two arms, upon the outer extremity of which is a toothed rack forming the sector of a circle. A pinion is arranged to gear into this rack, and planted vertically, with slots in its upper end, adapting it to be turned by an ordinary screw driver. In consequence of the two leverages—the pinion and rack, and the two arms clasping the pin placed at, say, one-sixth the length of the regulator—any motion given to the pinion will move the regulator only about one one-hundredth part as far, thus enabling the workman to make the most microscopic alterations of the regulator with ease and certainty. All the motions are positive, and the construction is such that changes of temperature cannot affect the result. The whole is strong and simple, and will undoubtedly be liked by the trade. We understand that there is already a considerable demand for them by owners of fine watches, who wish these regulators applied to them in order to reach the acme of possible time keeping.

PATENT RUBBER WATCH CAPS.

Secretary of Horological Club:

Protection against dust, humidity and injury by external shock, these caps are one of the most interesting and useful novelties in the trade. They are made of one piece of rubber; must be drawn over the watch case by first inserting the bow and pendant into the interior of the cap, and slipping them through the small hole in it. After this, it can be drawn over the case.

They are waterproof, and, shutting tightly over the case, they prevent any dust from penetrating into the watch. The periphery of the cap being thicker than the rest of it, forms, by its elasticity, a protection against injury when the watch is dropped.

The patent cap allows of winding and setting hands of any stem-winding open face watch, without being taken off.

The gold and silver cases *keep their original brightness and do not wear*, if they are worn in these caps. Being *a cheap article*, they are within reach of everybody, and can be strongly recommended to *soldiers, sailors, travelers, farmers*, etc., whose watches are exposed to dust, rain and perspiration.

For dealers they offer the advantage that *not more than three sizes are required* to cover all the wants of the trade. Being of very little weight, they can be sent in a letter.

The *sale by patent right of this object for the United States* may be acquired from the inventor, Mr. Gustav Speckhart, watchmaker in Nürnberg, Germany. For terms apply to the undersigned.

Glashütte, Saxony. M. GROSSMANN.

Mr. Horologer said he had often wondered why some cheap means could not be devised to protect a watch from unusual dangers, as, when a man went out sailing, or fishing—also for the use of persons who perspired very freely, and always had tarnished or blackened watch cases. This little contrivance seemed to "fill the bill" completely. If he understood the description correctly, it consisted of an elastic rubber bag, which would stretch, and could be pulled over the case whenever desired to protect it from injury or dampness. Certainly nothing could be simpler, and, apparently, more effective. We shall be pleased to have our friend Grossmann send us descriptions of any other useful "notions" for the benefit of the trade, and, whenever convenient, samples of the same, to be shown and discussed by the Club.

ABOUT PATENTS ON INVENTIONS.

Secretary of Horological Club:

At the report of a meeting of the Horological Club in the June number of THE JEWELERS' CIRCULAR, it is stated by "Mr. O'Lever" that the patent laws of the United States allow "two years' public use of an invention without endangering its validity." Such being the case, an inventor would be safe, then, I presume, in offering his invention for sale before taking out a patent. C. W. C.

Mr. O'Lever replied that the invention could be used. put into practical public use, or sold, at the pleasure of the inventor, provided he applied for a patent therefor within two years from the time it was first publicly known or used. That will not affect the *validity* of the patent, but the inventor of course runs the risk of its coming to the notice of someone else who may have invented the same thing, and who may also apply for a patent on it. In case he applied before Mr. C. filed his case in the Patent Office, he would probably get his patent. Then when Mr. C. applied, he would have to go through what is called an Interference Porceeding, the object of which would be to determine which one was the first inventor of the device. If Mr. C. should prove priority of invention, he would obtain his patent, which would then be on an equality, in the Courts, with the previous patent, with liberty to commence legal proceedings to have it annulled or set aside. It is, therefore, advisable, whenever another *may* have invented the same thing, to *apply* for patent as soon as the invention is fully perfected, although the patent may not be actually issued for months, or even years afterwards.

WATCHES STOPPED BY MAINSPRINGS BEING WOUND TOO TIGHTLY.

Secretary of Horological Club:

I have just been reading the valuable and elaborate article on mainsprings by "Alfojoe," in THE CIRCULAR for June, and there is one point introduced that I would like to bring before your honorable body for your comments and opinion.

The points to which I refer is what the writer calls "blocking." He says, "the friction of the coils, one against the other, is so great, that the tendency of the spring to uncoil itself is overcome," or, in other words, that it is possible to coil up a watch spring so tightly, that the friction of the coils, one against the other, will be so great as to neutralize the expansive force of the spring, and stop the watch, simply from being wound too tight.

I know that it is a common idea among the watch-wearing public, that watches are liable to stop from being wound too tight, but I have never met a watchmaker who did not pronounce it a fallacy. It is an unknown thing in my experience.

The great majority of American watches are not provided with a stop work, and as a consequence, the spring is always coiled tight. Who ever knew such a watch to stop from the spring being coiled too tightly? A. F. B.

Mr. McFuzee said that he had often known of watches which refused to go when wound very tightly, but which went after the spring had run down a little. The trouble was not altogether in the winding of the spring, but there was generally some other trouble with it. If the spring was rough or rusty, the coils bent so that they bound in the barrel, or rubbed forcibly on the head, or the oil was thick and gummy, it was quite possible to produce "blocking" by winding up tightly. This would not "neutralize the expansive force of the spring," but it might so greatly lessen it that, if the movement was in poor order and required considerable motive force, it would be unable to run until the blocking of the spring had been eased up a little. Although the stoppage would be really due to a combination of faults, yet in one sense it would be caused by over-winding, since if that had not existed, the other faults would not have prevented the watch from running—therefore the over-winding was the last straw (or one of the principal straws), which brought about the stoppage. As regards the American watches never stopping in that way, if Mr. B. ever gets hold of one which some botch has thoroughly tinkered up, he will very soon be satisfied that they can and do stop by over-winding. Of course, a watch which is *right* in every other respect, with a spring suited for it, will not stop from that cause alone—at least, he had not known of such a case.

The Great Diamonds of the World.

Continued from Page 136.

IV.

RECUT BY ADVICE OF THE PRINCE CONSORT.

"When brought to Europe the Koh-i-Noor was found to weigh exactly $186\frac{1}{16}$ karats. We have seen that Baber gives the weight of Bikermajit's diamond at 'about eight mishkels,' or somewhat over 187 karats, while Tavernier repeatedly declares that the Great Mogul was reduced by Borgio to 279 karats. Again, the two stones were of totally different form, and the Mogul was without a history, having been quite recently discovered in the Kollur mine, whereas authentic records carried the Koh-i-Noor back to the year 1304, beyond which date it had a tradition giving it an antiquity of some 50 centuries, Several recent writers still, however, persist in regarding these two distinct stones as one and the same gem. Even Prof. Nichol, in the last edition of the 'Encyclopædia Britannica,' revives this theory, and goes the length of suggesting that the Great Mogul, the Koh-i-Noor, and the stone found in Cucha in 1832, were all pieces of one original crystal. Speaking of the Koh-i-Noor, he remarks that 'its lower side is flat, and undoubtedly corresponds to a cleavage plane. Hence it has been conjectured that it and the Russian Orloff diamond are portions of the original stone belonging to the great Mogul, while a stone of 132 karats obtained by Abbas Mirza at the storming of Cucha, in Khorassan, in 1832, may be a third fragment. This portion was long used by a peasant as a flint for striking fire. The three united would have nearly the form and size given by Tavernier, and the Koh-i-Noor would then surpass all known diamonds in its magnitude as in its eventful history.' For a refutation of this theory the reader is referred to our account of the Abbas Mirza diamond.

"In consequence of the clumsy way in which the Hindoo cutter had handled the Koh-i-Noor, at a time when the art was still, doubtless, in its infancy, Prince Albert consulted Sir David Brewster as to how it might be recut to the best possible advantage. He found in it, as is the case with many other large diamonds, several little caves, which he declared (according to his theory) to be the result of the expansive force of condensed gases. This, together with the flaws already noticed, he considered would make the cutting of it, without serious diminution, a very difficult thing. Messrs. Coster, however, of Amsterdam, thought that in the hands of skilful workmen, the difficulties might be overcome. Several patterns of cuts were laid before her Majesty and the Prince Consort, and after due consultation, selection was made of the form which it now has, and which may be described as that of a regularly cut brilliant.

"Mr. Voorsanger, of Mr. Coster's establishment, was the workman intrusted with the responsible task of recutting the famous gem, and his labors were conducted in the *atelier* of the crown jewels, in London. To assist his object a small four-horse machine was erected, and the cutting commenced by the Prince Consort placing the diamond on the mill on the 6th of July, 1852. The operation was completed at the end of thirty-eight days of twelve hours each. The Star of the South, a much larger stone, was afterward cut by the same hand in three months. But the Pitt, or Regent, treated by the slower hand process of the eighteenth century, had occupied no less than two years.

"One of the flaws in the Koh-i-Noor gave great trouble. In order to remove it the number of revolutions of the cutting wheel had to be increased to 3,000 per minute, and even then the object was only attained very slowly. During the process of reduction the diamond lost exactly 80 karats in weight, having been reduced from 186 1/16 to its present weight of 106 1/16 karats.

"After all, the result was far from giving universal satisfaction, although obtained at a cost of no less than £8,000. The Prince Consort, who took the greatest interest in the operation, and whose sound advice had probably prevented a total failure, openly expressed his dissatisfaction with the work.

"On the treatment which the Koh-i-Noor received in the cutter's hands, King is very severe, remarking that owing to the flattened and oval figure of the stone, the brilliant pattern selected by the Queen's advisers 'entailed the greatest possible amount of waste.' He adds that Mr. Coster would have preferred the drop form, but that, 'in a historical relic like this, the sole course that would have recommended itself to a person of taste, was the judicious one pursued some years before by Messrs. Rundell and Bridge, in their recutting of the Nassak, both in its native and artificial figure. In this, by following the trails of the Hindoo cutter, amending his defects and accommodating the pattern to the exigencies of the subject matter, they transformed the rudely faceted, lusterless mass into a diamond of perfect brilliancy, at the sacrifice of no more than ten per cent. of its original weight.'

"It may also be remarked that, although said to be cut as a brilliant, this great Oriental talisman is really only such in name, being much too thin to have satisfied the Jeffries, Ralph Potters, and the other great dealers of the last and beginning of the present century. In fact, the cutting of the Koh-i-Noor on this occasion revealed the painful fact that the art was then extinct in England, while even the Amsterdam and Paris operators had lost much of their former cunning. They followed a system of mere routine, betraying little inventive power, and showing themselves incapable of grappling with the problem of how best to reduce a stone with the least sacrifice of its weight, and the greatest display of its natural luster.*

"The Koh-i-Noor is preserved in Windsor Castle. A model of the gem is kept in the jewel room of the Tower of London, to satisfy the laudable curiosity of her Majesty's faithful lieges. Although not of the very finest water, and of a grayish tinge, the stone was valued before being recut at about £140,000. But Barbot considers it far from being worth such a sum. He allows, however, that it is still an extraordinary stone, 'but more on account of its great surface than for its play, which is almost neutralized by its great spread.' It must, however, be remembered that this is the criticism of a Frenchman, naturally alarmed for the hitherto unrivalled reputation of the Regent. Since Barbot's time it will be seen in our account of the English Dresden that the luster even of the Regent has been somewhat dimmed by the absolutely faultless character of the Bagagem crystal.

"Although yielding to these and perhaps to one or two others in brilliancy, as it does to several in size, the Koh-i-Noor must ever remain without a rival for the intense interest attaching to the sanguinary and romantic incidents associated with its marvelous career. A strange fatality presided over its early vicissitudes, but its alleged 'uncanny' powers have now ceased to be a subject of apprehension. Its latest history eloquently demonstrates the fact that extended empire is a blessing, just in proportion as it finds hearts and hands willing to fulfil the high duties which increased privileges involve."

THE PITT OR REGENT.

I.

FOUND BY A SLAVE AND ALWAYS GIVING TROUBLE.

"First known as the Pitt, then as the Regent, this perfect diamond has a remarkable history. There are two stories of its original discovery. They do not differ sufficiently to cast a doubt upon the general facts. The second version of the narrative is easily reconcilable with the first.

"The adventures of the Pitt begin very much on the lines of several other great stones. Cupidity, murder, remorse, are factors in the opening chapter. Trouble—political, social and personal—accompany the gem to its latest resting place. It was found by a slave in the Parteal mines, on the Kistna, in the year 1701. The story goes that, to secure his treasure, he cut a hole in the calf of his leg and concealed it, one account says, in the wound itself, another, in the bandages. As the stone weighed 410 karats before it was cut, the last version of the method of concealment is, no doubt, the correct one. The slave escaped to the coast with his property. Unfortunately for himself, and also for the peace of mind of his confidant, he met with an English skipper, whom he trusted with his secret. It is said he offered to give the diamond to the mariner in return for his liberty, which was to be secured by the skipper carrying him to a free country. But it seems probable that he supplemented this with a money condition as well, otherwise the skipper's treatment of the poor creature is as devoid of reason as it is of humanity. The English skipper, professing to accept the slave's proposals, took him on board his ship, and, having obtained possession of the jewel, flung the slave into the sea. He afterward, so this first version of the narrative goes, sold the diamond to Mr. Tohmas Pitt, Governor of Fort St. George, for £1,000, squandered the money in dissipation, and finally, in a fit of delirium tremens and remorse, hanged himself.

"There is no reason to doubt the substantial accuracy of this characteristic beginning of the adventures of the great diamond, with a trifling exception. The English sea captain sold it in all probability for £1,000, not to Mr. Pitt, but to Jamchund, at that time the largest diamond merchant in the east, who, it will be seen in the course of our history, sold it to Mr. Pitt for £20,400. The circumstances connected with his purchase of the gem are fully related by Pitt himself, who, on his return to Europe in 1710, was suspected, and even

* The art, however, has within the last few years not only been revived, but now far surpasses anything ever hitherto accomplished.

openly accused, of having procured it by foul or unfair means. Among others, Pope was supposed to point at something of the kind in the oft-quoted lines from the 'Man of Ross:'

"'Asleep and naked as an Indian lay,
An honest factor stole a gem away:
He pledged it to the Knight, the Knight had wit,
So kept the diamond, and the rogue was hit."

"These scandalous reports, to which, however, much credence never seems to have been attached, having reached the ex-Governor, at that time in Norway, he sent a letter from Bergen to the editor of the *European Magazine* for October, 1710, setting forth the true facts of the case. A certified copy of this document was carefully preserved in the Pitt family, and, in consequence of some fresh rumors regarding the early history of the diamond, was again published by them in the *Daily Post* for Nov. 3, 1743, that is, 17 years after Pitt's death. The chief passages bearing on the transaction are here subjoined from the latter source:

"'Since my coming into this melancholy place of Bergen, I have been often thinking of the most unparalleled villainy of William Fraser, Thomas Frederick, and Sampa, a black merchant, who brought a paper before Governor Addison in Council, insinuating that I had unfairly got possession of a large diamond, which tended so much to the prejudice of my reputation and the ruin of my estate that I thought necessary to keep by me the true relation how I purchased it in all respects, that so, in case of sudden mortality, my children and friends may be apprised of the whole matter, and so be enabled thereby to put to silence, and confound those and all other villains in their base attempts against either.

"'About two or three years after my arrival at Madras, which was in July, 1698, I heard there were large diamonds in the country to be sold, which I encouraged to be brought down, promising to be their chaperon, if they would be reasonable therein, upon which Jamchund, one of the most eminent diamond merchants in these parts, came down about December, 1701, and brought with him a large, rough stone, about 305 mangelins, and some small ones, which myself and others bought. But he asking a very extravagant price for the great one, I did not think of meddling with it; when he left it with me for some days and then came and took it away again, and did so several times, insisting upon not less than 200,000 padagoes, and, as I best remember, I did not bid him more than 30,000, and had little thoughts of buying it for that. I considered that there were many and great risks to be run, not only in cutting it, but whether it would prove foul or clean, or the water good. Besides, I thought it too great an amount to venture home in one bottom, so that Jamchund resolved to return speedily to his own country, so that, I best remember, it was in February following he came again to me, (with Vincaty Chittee, who was always with him when I discoursed about it,) and pressed me to know whether I resolved to buy it, when he came down to 100,000 padagoes, and something under, before we parted, when we agreed upon a day to meet and to make a final end thereof, one way or other, which I believe was the latter end of the aforesaid month, or the beginning of March, when we met in the consultation room, when, after a great deal of talk, I brought him down to 55,000 padagoes, and advanced to 45,000, resolving to give no more and he likewise not to abate, so delivered him up the stone, and we took a friendly leave of one another. Mr. Benyon was then writing in my closet, with whom I discoursed what had passed, and told him now I was clear of it; when about half an hour after, my servant brought me word that Jamchund and Vincaty Chittee were at the door, who, when being called in, they used a great many expressions in praise of the stone, and told me he had rather I should buy it than anybody; and, to give an instance thereof, he offered it for 50,000. So, believing it must be a pennyworth if it proved good, I offered to part the 5,000 padagoes that were between us, which he would not hearken to, and was going out of the room again, when he turned back and told me I should have it for 49,000. But I still adhered to what I had before offered him, when presently he came to 48,000, and made a solemn vow he would not part with it for a padagoe under; when I went again into the closet to Mr. Benyon, and told him what had passed, saying, that if it was worth 47,500, it was worth 48,000.* So I closed with him for that sum, when he delivered me the stone, for which I paid him honorably, as by my books doth appear. And I here further call God to witness that I never used the least threatening word at any of our meetings to induce him to sell it to me; and God himself knows it never was so much as in my thoughts so to do. Since which I have had frequent and considerable dealings with this man, and trusted him with several sums of money, and balanced several accounts with him, and left upwards of 2,000 padagoes in his hands at my coming away. So had I used the least indirect means to have got it from him, would he not have made himself satisfaction, when he has had my money so often in his hands? Or would I have trusted him afterward, as I did preferable to all other diamond merchants? As this is the truth, so I hope for God's blessing upon this and all my other affairs in this world, and eternal happiness hereafter.—Written and signed by me in Bergen, July 29, 1710.—THO. PITT.'"

"On the back of this declaration the following words are written: 'In case of the death of me, Tho. Pitt, I direct that this paper, sealed as it is, be delivered to my son, Robert Pitt.'"

II.

FORTUNES OF THE PITT HOUSE RESTORED.

"In publishing this document the editor of the *Daily Post* observes that he does so 'at this time of day,' (that is, 17 years after Pitt's death, 'by desire, and hopes the following piece will give satisfaction to all those who may still suspect that that gentleman did not fairly come by the said stone.'

"No doubt Pitt drove rather a hard bargain with Jamchund; but there was otherwise nothing dishonorable or even unusual in the transaction. It will be noticed that in this account there is no reference to the story of the slave, about which neither Pitt nor Jamchund were likely to know anything. The Governor was evidently under the impression that the dealer had brought the stone with many others from the diamond fields, while the dealer, if he picked up such a gem for £1,000 from a sea captain on the coast, would naturally abstain from asking any indiscreet questions, whatever his suspicions might be. The fact that Jamchund ultimately closed for 48,000 pagodas, or a little over £20,000, after asking 200,000 pagodas, or £85,000, would almost imply that he was glad to get rid of the diamond 'at a sacrifice,' because conscious that the circumstances attending its purchase would not bear any severe scrutiny.

Pitt's account of his share in the transaction was afterward fully confirmed by Mr. Salmon, who was present on the occasion. Yet it appears that the stone, which had been consigned by Pitt to Sir Stephen Evance, of London, and sent home in the ship Bedford, (Capt. John Hudson,) was charged in the original bill of lading at 6,500 pagodas only. This might have been done either to save freight, or more probably to avoid attracting attention to the stone, and thereby exposing it to the risk of being stolen.

"The diamond was cut very skilfully in London, and in the process, which lasted two years, it was reduced from 410 to 136¾ karats. The editor of the *Museum Britannicum* stated at the time that the cutting and polishing cost £5,000, and Jeffries, who points out the mistake made in the operation, and shows how it might be improved, remarks that there is only one small speck, and that placed in such a position as not to be detected in the setting. He also says that another £5,000 was spent in negotiating its sale to the Regent, Duke of Orleans, who purchased it in 1717, during the minority of Louis XV., for £135,000. The cleavage and dust obtained in the cutting were also valued at from £7,000 to £8,000,† so that Pitt must have

* Pitt, who throughout spells "padagoe" for pagoda, here appends a note in which he reduces the 48,000 pagodas to "£20,400 sterling, at 8s. 6d. per padagoe."

† These figures, like almost everything else connected with the history of great historical diamonds, are variously given in different writers. Thus Murray gives as here stated, "from £7,000 to £8,000;" while King says that "the value of the fragments separated in shaping it amounted to $3,500." He adds that it became by the process "for perfection of shape as well as for purity of water the first diamond in the world; as it still continues."

netted at least £100,000 by his venture. With this he restored the fortunes of the ancient house of Pitt, which was destined later on to give to England two of her greatest statesmen and orators, for the Governor of Fort. St. George was grandfather of the Great Earl of Chatham, father of the illustrious William Pitt. He was born at Blandford, in Dorsetshire, where he was buried in May, 1726. In the funeral oration preached on the occasion by the Rev. Canon R. Eyre, the following reference was made to the diamond scandal: 'That he should have enemies, no wonder, when envy will make them, and when their malice could reach him in no other way, it is as little to be wondered at that they should make such an attempt upon his credit by an abusive story, as if it had been by some stretch of his power that he got that diamond, which was of too great value for any subject to purchase, an ornament more fitly becoming an imperial crown, which, if it be considered, may be one reason why it was brought to the Governor by the merchant who sold it in the Indies, and it was brought to him once or twice before he could be persuaded to part with so great a sum of money for it as it cost him.' "

(*To be continued.*)

The Lever Escapement.

BY THOS. CHARLES SCOTCHFORD.

[*Continued from page* 156.]

LET an error spring up during the revolution of some wheel, or from the imperfect adjustment of the mainspring, which causes the wheels and impulse arc to take $\frac{1}{10}$ longer time; then they are slow $\frac{1}{10}$ of $\frac{1}{20}$, $= \frac{1}{200}$ of the whole beat. Also let the shorter free arcs of the balance take $\frac{1}{200}$ of the beat longer time, the $\frac{2}{200}$ is only a $\frac{1}{100}$ of the whole beat; so there must be 100 beats made, all losing at this rate, before the dial could show a single beat in error. In a case of gaining, if the balance's shorter free arcs gained *more* than $\frac{1}{200}$ of a beat, there would still be an error accruing, but it would be a gaining error instead of a losing one.

When an error is found at the end of some hours, the error may be the aggregate of gains or losses, or the difference of gains and losses; but whichever it is, the same operation of altering the spring or the balance's inertia, or both of them, has to be performed to rectify the error. If the error is an aggregate, and the error is rectified, every beat throughout the hours would be integral; but if the error is the difference, the beats cannot be integral, although the error may be rectified; because an error—say one minute—if diffused among all the beats from the beginning of the hours, is so much per beat *on an average*, and if the spring, or spring and balance is altered so that the sum of the two motions takes this *average* longer or shorter time, as the case may be, the dial will be right by the end of the hours. Watches that are got exceeding near to time have compound balances, because by the screws the inertia can be altered to a nicety, or unpoised to a nicety. With the lever escapement, if the adjustment of the mainspring is perfect, and the wheels and pinions true and equal, and the two impulses and unlockings are performed in equal times, the accuracy of the time by the dial would depend upon forming two integers—such as $\frac{2}{18000}$ of an hour, etc. And if either the two impulses or the two unlockings were not performed in equal times, then the accuracy of the time would depend upon forming two beats together amounting to $\frac{2}{18000}$ of an hour, etc. But if either the two integers, or a sum equivalent to them, were not perfectly formed, the excess or minus would cause a constant gaining or constant losing error all day.

From whence it is easy to perceive, that what with the insuperable difficulty of making a large number of wheels and pallets strictly alike, and true to their principle, and some doubt existing about levers always being perfectly equalized and centralized, *a small amount of irregularity* in the motion of the train, or of the mainspring, will probably do more good than harm, because, should it be impossible to perfectly form the two integral beats with some of these unequal timed impulses or unlockings, *the small irregularity* of the motion will prevent the defect from the two integers forming a constant gaining or constant losing error of time, and the result would be, that by the end of a certain period of time the dial would show only the difference (if any) of gains and losses, instead of the aggregate of gains or losses—a defect of only $\frac{1}{1000}$ of a beat, by constantly accruing, will amount to full 86 seconds in 24 hours.

To prove the correct principle of the pallets. we must have recourse to diagrams, but we must observe that a small amount of non-equalization or non-centralization of the lever will also unequalize the times of the two impulses, and probably in a greater degree than most of the pallets usually used for watches at the present day. The equalization of the lever is this: that assuming the centers of the pallet axis, guard pin, and lever notch are all in one straight line, the lever is twisted round on the pallet axis, so that when the escapement is tried in the frame, the roller pin will stand alternately at each corner of the lever notch, simultaneously with the escape wheel leaving the pallet impulse plane to drop on the opposite locking; and at this time the distance between the lever tail and banking pins is alternately equidistant, so that there is equal shake on the bankings and equal shake of the guard pin. If there is obliged to be run to the bankings to bring out the guard pin to the roller edge, there will be a greater distance between the lever tail and banking pin when the wheel drops, than there is shake of the guard pin, but still they must be equal on each side. If there is unequal run to the bankings, and the lever is *equalized*, there will also be unequal shake of the guard pin, in wich case it is simply one of the banking pins wants bending, and the thing is all right. But if the lever is *not equalized*, and there is unequal run to the bankings, there will be equal shake of the guard pin, and if the banking pin were bent to make the run to the bankings equal, the shake of the guard pin would then be unequal; these things show the lever wants twisting round to equalize it. The masses of the pallets and lever have to be poised.

The centralization of the lever is this: that assuming the lever is equalized, the balance's reciprocating spring is pinned into the collet and stud, so that this spring, when at rest, will keep the lever midway of the whole arc of the escapement from drop to drop of the escape wheel; and at the midway point the pallet axis, guard pin, roller pin, and balance axis are all in one straight line, or centralized. Assuming the guard pin is brought out to the roller's edge simultaneously with the escape wheel's drop, the lever's length of notch is frequently regulated so that the roller pin in passing out of the notch, *minutely* moves the lever toward the banking, and as frequently the front of the roller pin is flatted away, so that the pin passes out of the notch without moving the lever at all. The minute moving of the lever towards the banking will secure a doubtful pallet depth, but is highly dangerous, because it depends upon the balance's velocity being sufficiently great to carry round the lever and locking stone quicker than the escape wheel can drop; and should the balance's velocity be lessened from any cause, the lever will not then be moved round so quick, and the escape wheel will then drop or pitch right on the locking edge of the pallet, and very probably stop the watch.

When the oil thickens, the balance's velocity is sure to be less, and the watch that goes when clean will often stop when the oil thickens from the cause just stated, viz., that the lever is not moved round quick enough to bring up the locking stone to receive the wheel's drop, and so the wheel pitches on the locking edge and sticks there. A trifle larger wheel should be put if the depth is shallow on both pallets.

The use of the guard pin in the lever is to prevent the lever passing across to the wrong side of action when the hands of the watch are turned backwards, for if the canon pinion is fitted tight on the arbor of the center wheel, and the hands are turned backwards, all the pieces, up to the lever, would tend to be turned backwards with great force; and now the guard pin is brought into use by its pressure against the roller's edge preventing the reversion of the pieces, and when the key is taken off, the watch will go on again all right.

The force of the pressure of the guard pin against the roller's edge is moderated by the nice fitting of the canon pinion.

When the guard-pin depth is planted, it is not planted by its depth *in* the roller; it is planted by the arc some depth would make supposing it possible for the guard pin to cut out a segment of the roller's circle, and the wider the arc the deeper will the guard pin be in the roller's crescent when in the line of centers. Now, suppose the guard pin's arc is planted so great that at the drop of the escape wheel the guard pin is not brought out to the roller's edge, so that the smallest amount of shake on the guard pin and bankings will suffice; then the guard pin and lever must arc round further after the escape wheel has dropped, causing a longer run to the bankings than there is shake of the guard pin on the roller's edge.

Now, suppose we wish to bring out the guard pin to the same roller's edge simultaneously with the drop of the escape wheel, keeping the same thickness of guard pin, and length of lever to the guard pin, and the same pallet depth, or arc of unlocking, then we must have more angle on the impulse faces of the pallets, holding to the same number of teeth in the wheel, and the pallets made as full to the wheel.

Or we may keep the same sort of pallets, and have the levers a trifle longer.

Probably if the guard-pin depth and arc is demanded much sounder, and you wish to have the same sort of pallets, the lever will have to be a trifle longer, and the roller a trifle smaller.

In whatever way we increase the arc of the roller and balance, such as by putting a smaller roller, or longer lever, or increased arc by the pallets, we thereby increase the tendency to "set" on the impulse face of the pallet, because the balance spring must be wound up further before the roller pin can escape; and sometimes the machine is brought to a state of equilibrium, or a "set," as it is technically called. Speaking on the broad scale, the set usually takes place on the impulse face in the medium and large size watches, especially with heavy balances and strong balance springs, those springs necessarily being adapted to get the watches to time after the additional impulses are completed, regardless of the initial movement from rest.

In most cases the set on the lockings takes place in small watches, because the slender balance springs, when they are so nearly "down," have not the power to twist round the pieces to extricate the locking out from under the wheel's tooth.

If a set is but slight, it is not worthy a moment's consideration, but if it is very hard, the ways to try to alter it are spoken of near the end of this treatise, when speaking of repairing.

In respect to pallet lockings, their equality of sharpness of draught inward is readily judged to be about equal by trial—some persons try them by placing the guard pin against the round edge of the roller, and gently putting the peg on the escape wheel. But the equality of their draught inward does not quite prove their equal resistance to the balance's reciprocated force, neither do I know any way to prove when they are so strictly, but I will make some remarks on them. It is to be observed that the two lockings are at unequal distances from the pallet's center, and also that with deeper depths the wheel drops further under the inside locking, so that in unlocking, the wheel has to be moved further back to get the locking out from under the tooth; still, as the radius to the inside locking is the shortest, therefore the long arm of the lever bears a greater ratio to that shortest pallet radius, and although the inside locking of itself may be a trifle the hardest, yet it may not subtract any more velocity from the balance in unlocking than the outside one; and, indeed, if the inside locking of itself was as easy to unlock as the outside one, we should then be sure the resistances to the balance's force would be unequal, as the two radii to the lockings were unequal. Unequal radii must have unequal resisting lockings to subtract equal portions of velocity from the same reciprocated force of the balance.

In light pallet depths the wheel has only to be moved back in the unlocking a mere trifle, but in very deep depths, or long run to the bankings, the wheel has to be moved back a good bit. It is moving back the wheel to get the locking out from under the tooth that causes the principal resistance to the balance's force, for if there was no motion backwards of the wheel, the unlocking would only be a frictional resistance, like in a regulator clock; but this is impossible in watches, for there must be a detachment by draught inwards sharp enough to free the guard pin without any hesitation, or else there is danger of the balance's vibration frequently being interfered with, and, in some cases, will stop the watch.

All pallets that make equal arcs by the two unlockings have, and must have, the deepest hold of the outside locking. Suppose the depth hold to be such that each of the pallets make an arc of 3° in the unlocking, it is easily seen that 3° of the larger outer circle which the pallets describe is a greater space than 3° of the smaller inner circle, and the piece of stone which must enter the wheel is the greatest on the outside locking; and if pallets were made to draw off equally, that depth at which they would do so must be planted precisely, or they would be unequal in the draw off. As a rule it will be found that if the wheel just catches a tripping hold of the outside locking, and just skips the inside locking when tried in a depth tool before closing the tool to the depth, the unlockings will draw off pretty nearly equal when in at the depth, provided the depth is not very deep.

In the two-pin escapement the equality of the arcs in unlocking is more important than in the one-pin escapement, because, if the unlocking arcs are unequal, and the escapement is made for each of the two pins of the roller alternately to unlock the pallet depth, one side of the roller notch will come foul of the guard pin during the process of unlocking, while the other side will be free; this is assuming the pins and notches of both lever and roller are equidistant on each side of the line of centers. The two-pin escapement, in experienced makers' hands, has held its place among first-class watches for many years, and will continue to do so; but it is impossible for such an escapement ever to become general, because it requires such intense application to the business, and persons are very likely to spoil some levers and rollers before they will get the right sizes and places of the pins. I have heard much about the way in which this escapement should be made, but, however, here is one way, which is valuable, and which I will preface with a few remarks. That if there is an advantage in a two-pin escapement over a one-pin escapement, it depends upon these points being attained, viz., that the impact on the pallet impulse face and drop across of the guard pin are both blows done almost together, so that there must not be a very long drop across of the guard pin in the roller notch, or the blows will not be done so near together; but if the drop across of the guard pin is small, whereby both blows are done near together, the first, and perhaps the chief part of the impulse being so clear, and so near the line of centers, is the most effective mode of impulsation. Another merit is, that by the great width of the lever notch, the position assumed by that side of the notch by which the unlocking is effected, allows the leading pin, on coming in, to take hold of the notch fairly at once.

Description.—The greatest exactitude is required in planting the two roller pins equidistant of the roller notch, and well out towards the roller edge, whereby the space moved through on the roller edge is not much greater than the space moved through on the circle wherein the two pins are planted. If the two pins are much inwards towards the balance staff, the roller edge will advance through a great space while a light pallet depth is being unlocked, and in such case the roller notch will have to be very wide to keep free of the guard pin during the unlocking, and there will be a long drop across of the guard pin at the impact on the pallet face, causing a great loss of impulse arc, and the blows on the pallet face and in the roller notch will not be done so near together. If the roller notch is narrow when the two pins are too much inwards, it will be impossible to completely unlock the pallet depth by the roller pin and lever notch, for the side of the roller notch will come foul of the guard pin, and the unlocking will be partly effected by the roller pin and lever notch, and finished by the roller notch and guard pin. The escapement should be made thus: Have the impulse faces of the pallets to make 10° of arc, or nearly so. Have perfect escape wheels cut clean up underneath the teeth. Make the roller's two pins well out towards the edge, and a good distance apart. Plant a light pallet depth of about 2° with equal draw off in unlocking, and plant the guard pin more than half across the pin in the roller notch. My friends who are first-class planters tell me they have it quite two-thirds in the notch. Have some shake of the pin in the notch, enough to allow the notch to move to and fro about 2° without touching the guard pin. Regulate, by trial, the breadth of the lever notch, so that the side of the notch comes against one of the roller pins about 2° of the lever before the wheel leaves the impulse face of the pallet, and as the edge of the roller will move on in advance during the action of the lever notch on the roller pin, the guard pin must be found, at the wheel's drop, at the corner of the roller notch *opposite* to the side it had been driving. If the corner of the roller notch comes foul of the guard pin an instant *before* the wheel drops, it shows the roller notch is barely wide enough, or the lever notch comes into action too soon; but when the wheel has dropped, if the corner of the roller notch touches the guard pin in moving round, it shows that either the guard pin is too deep, or else more angle is wanted on the pallets to make a wider arc; which of them it is wants altering must be determined by the planter. Also in unlocking, if the pallet depth is not completely unlocked by the roller pin and lever notch, without the side of the roller notch finishing it by the guard pin, it shows the roller notch is hardly wide enough, or else that the pallet depth is too deep. In an equality, whatever amount of arc is made in unlocking the pallet depth, such as 2°, *exactly* that same amount of 2° should be made by the lever notch on the roller pin in finishing the impulse, the breadth of the roller notch being made commensurate thereto.

In trying the escapement.—As the wheel passes over the pallet's impulse face, the guard pin and roller notch should be moving the balance; but quite 2° before the wheel leaves the pallet face, the lever notch should overtake one of the roller pins wherewith the impulse is finished; and, as the lever notch and roller pin finish the impulse, so the notch of the roller moves on in advance, and at the wheel's drop the guard pin will be at the corner of the roller notch opposite to the side it had been driving. The wheel now having dropped on to a depth of 2°, if the balance be returned, that same roller pin wherewith the impulse was finished will move the lever by its notch and unlock the pallet depth, and the roller notch again passes across, and the guard will then be at the same side (almost) of the roller it had *formerly* been driving. The wheel now being unlocked, when the balance is in full motion, flies forward and strikes a blow on the pallet face, and the guard pin also is driven across and strikes a blow against the side of the roller notch.

This escapement is as two levers and rollers, having unequal radii, and making unequal arcs of motion; and the arc at the balance will be the sum of the arcs made by the guard pin and roller notch, and by the lever notch and roller pin. Allowing for loss of arc while the guard pin drops across, if the arc afterwards by the guard pin and roller notch is 20°, and the arc by the lever notch and roller pin in finishing the impulse arc is 6°, and 6° is made by the roller in unlocking the pallet depth, the arc of the balance from drop to drop will be 32°.

The double roller escapement is made at a very short arc, and yet has a very sound guard-pin depth without any supplementary run to the bankings to bring out the guard pin. The pallet depth is about the same as usual, the shortness of the arc being made by reducing the angles of the pallets' impulse faces, whereby their arc of motion is lessened. The actual roller is a crank piece holding only the impulse pin. The soundness of the guard-pin depth is obtained by having the guard pin bent over lengthwise to reach to a plain table roller, whose radius is somewhat smaller than the crank piece holding the ruby pin; the guard pin depth is thus secured by this bent pin operating as a longer leverage on a smaller roller. Sometimes a sounder and exceedingly finer piece of work is made by fastening a solid stud on the lever projecting lengthwise, instead of bending the guard pin. This escapement is hardly likely to "set" on the pallets' impulse face, because the balance spring is not wound up so far by a short arc before the roller pin escapes. So the use of a double roller escapement is its less likelihood to set, and a very sound roller depth without any run up to the bankings.

There are other sorts of lever escapements extant, the chief of which is the "anchor escapement." Why it is so called I do not know. The escape wheel is called a "club-tooth wheel," part of the plane being on the face of the wheel's tooth, and part on the pallet's face. In theory, *all* the plane ought to be on the wheel's tooth, acting on a cylindrical piece of stone or steel, whose substance is not considered to be material; the planes of the wheel's teeth, when produced, forming equal chords of the wheel's circle, the cylinder being as two equal radii. When the planes are *all* on the pallets, thickness of the point of the wheel's tooth is not considered material, the pallet planes, when produced, forming equal chords of the pallet's circle; and when those chords are produced in the wheel's circle, the segments containing angles which have a difference of 12° between them when the wheel's arc is 12°, or 4° if the wheel's arc is 4°. I mention this now that the reader may understand the difference in the principles when the planes are wholly on the wheel, or wholly on the pallets; and, in strict theory, they ought *all* to be on the wheel or on the pallets. We will now proceed with the theory of the pallets and lever in a detailed manner, making practical remarks as we go on.

FIG. 2.

It is proper to apprise the reader that the frictions and inertia of the escape wheel, pallets and lever will be neglected when speaking of the theory of these pieces, because the frictions and inertia may be different in sets of pieces of the same size—much more so in different sizes. This is purely a practical question.

In laying down the design for wheels and pallets, we must divide the escape wheel into double the number of arcs as there are teeth in the wheel; thus, suppose there are fifteen teeth in the wheel, each space from point to point of the teeth is 24° of the circle, but we must divide the wheel into arcs of 12° each, as though there were thirty teeth in the wheel; and as the fifteen-toothed wheel is the one generally used for lever watches, with the pallets embracing three spaces of the teeth, or an arc of 72° of the wheel circle, therefore it will be best to demonstrate the correct principle of them, and the reader, if he pleases, can afterwards strike out the correct theory of other sorts of pallets by similar rules, the only difference being in the arcs of motion and number of teeth, or spaces of teeth, embraced by the pallets. These things being premised—Fig. 2, from center *W*, describe a circle to represent the escape wheel, and mark off an arch of 36° of the wheel circle in three equal arcs of 12° each. Draw the secant *A B C*, cutting the wheel circle in the points *A B*, the furthermost arc of 12°, and produce the radius of the wheel to meet the secant in *C*. If we suppose an axis placed in *C*, the secant would revolve on that axis. This is the place to drill the pallet hole.

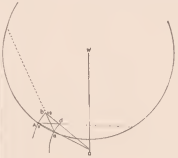


FIG. 3.

In Fig. 3, with the longer and shorter parts of the secant as radii, as *C A* and *C B*, describe arches of circles, and on either of those arches mark off 12° of *that* circle, and draw the radial line *C b*, forming an angle of 12° at *C*, whereby the pallet sector *A C b* is similar to the wheel's sector *A W B* in Fig. 2. Between these sectorial lines and arches of circles (or their chords when drawn) draw the lines *A a* and *B b*, which will represent the shapes or angles of the only sort of pallets that are correct. When the escape wheel moves round on its arc towards the line of centers *W C*, it will press outwards the plane *A a*, the pallets making an arc of 12° of their circle, and the wheel also making an arc of 12° of its circle. This is technically called the plane or impulse face of the short pallet.

(*To be continued.*)

Workshop Notes.

Scarce Brass Alloys.—Bristol brass (Prince metal), 6 parts copper, 2 zinc; Japanese brass (Sinchu), 10 parts copper, 5 zinc. White brass, 1 part copper, 8 zinc, 1 iron—very suitable for statue casts in place of bronce.

Rust.—Nuts are oftentimes so tightly rusted upon screws that other means must be made use of to loosen them; kerosene or naptha, even turpentine, will in a short time penetrate between nut and stem. Next heat them in fire, which quickly severs them.

Bronce.—Dronier claims to have discovered a simple method to make bronce malleable; it consists in the addition of from ½ to 2 per cent. of mercury, and appears to act rather mechanically than chemically. It is added to one of the metals of which the alloy is made.

Broncing Medals.—According to the *Revue ind.*, medals are bronced in the Paris mint by boiling them in a copper kettle, not tinned, however, in a solution of 500 grams pulverized verdigris, and 475 g. pulverized sal ammoniac, in 160 g. strong vinegar and 2 liters water. The medals are kept apart by wood or glass rods.

Polishing Steel.—If the steel is of moderately good temper, use a zinc polisher with diamantine; a tin polisher is better for soft steel. The diamantine should be mixed on glass, using a beater also of glass, with very little watch oil. Diamantine mixed with oil becomes gummy, and quite unfit in a day or two, and turns black, if brought into contact with metal, in mixing.

Cleaning Rags.—These rags, which are excellent for polishing metal surfaces, are prepared in the following manner: Dip flannel rags into solution of 20 parts dextrine and 30 parts oxalic acid in 20 parts logwood decoction, wring them gently, and sift over them a mixture of finely pulverized tripoli and pumice stone. The moist rags are piled above each other, placing a layer of the powder between each two. They are then pressed, taken apart and dried.

Wrapping Paper for Silver.—The *Archiv. d. Pharm.* gives the following for preparing a good wrapping-paper: 6 parts caustic soda are dissolved in sufficient water until the hydrometer shows 20° Beaumé; 4 parts oxidized zinc are added to this solution and boiled until dissolved. Sufficient water is then added to dilute the mixture to 10° B. The paper or calico is dipped into it, and dried. All silver articles wrapped in it, are protected against the sulphuretted hydrogen, which, as is known, is contained in the air of all large cities.

Varnishes.—*Gold varnish for brass objects, physical instruments,* etc.: Gum lac, in grains, pulverized, 90 grams; copal, 30 g.; dragon's blood, 1 g.; red sandal wood, 1 g.; pounded glass, 10 g.; strong alcohol, 600 g.; after sufficient maceration, filter. The pulverized glass simply serves for accelerating the dissolving, by interposing between the particles of gum lac and copel.

Varnish for pasteboard, wood, metal, etc. Marine glue, 2 parts, yellow gum lac, in scales, 1 part. Dissolve in wood spirits (pyroligneous spirits). This varnish may be applied to paper, pasteboard, wood and metals. If thick, it may be used for glueing wood.

Cement for Caoutchouc.—It is recommended to macerate pulverized shellac in ten-fold its weight of a strong aqueous solution of ammonia, so-called spirits of hartshorn, whereby a transparent, gelatinous mass arises, which becomes fluid if the bottle containing the gelatine is immersed in hot water. It also becomes fluid after standing from three to four weeks. When to be applied, both surfaces to be united are moistened with the mass and pressed together. As soon as the ammonia is evaporated, the caoutchouc becomes as hard as the homogenous caoutchouc mass itself. The cement is also suitable for uniting caoutchouc to glass, metal, etc., in fact, upon all smooth surfaces.

Cleaning Ivory Ornaments.—Ivory ornaments are quickly cleaned by brushing them with a new, not very sharp tooth brush, to which a little soap is given; then rinse the ornament in lukewarm water; next dry the trinket and brush a little, and continue brushing until the luster reappears, which can be increased by pouring a little alcohol upon the brush and applying it to the trinket. Should this have become a little yellow, dry it in gentle heat, and it will appear as if new.

Ivory that has become yellow may easily be bleached in the following manner: The article is placed under a glass bell, together with a small quantity of chloride of lime and muriatic acid, whereby chlorine is developed, and exposed to sunlight. Be very cautious not to breathe the vapors, as they are very poisonous. The bleaching power of the chlorine destroys the yellow pigment upon the surface, and the article will be restored to its original luster.

Soft Gold Solder.—Melt equal parts of 14-karat gold and silver solder, and hammer it into a thin sheet upon the anvil. This solder will satisfy all the demands of a watch repairer. It is advisable to use silver solder for low grade, say 6 or 8-karat gold goods, which consists of 2 parts fine silver and 1 brass, with the addition of a gram of tin.

Another nice soft solder for 8 and 14-karat gold consists of 1.5 parts fine silver, 0.5 fine copper, 1.6 14-karat gold, and 0.4 zinc: the first three metals are well melted and mixed together, and when well in a fluid state, the zinc is added, the whole left for a few moments in fusion, until it melts, not volatilizes, and then cast.

To Silver Glass.—Dissolve 3 grains of ammoniacal nitrate of silver in 1 oz. distilled water, which solution must be rendered somewhat clouded by sufficient nitrate of silver, and then filtered. Immediately before use, mix 1 oz. of this solution with 2½ grains Rochelle salt. The glass to be silvered having been cleaned to its utmost, is placed into a suitable vessel, the bottom of which is provided with a few wax cones, thus raising the glass about one inch above the bottom, and the fluid is poured over it. The vessel is placed on the northern side of the house, or in a place with deadened light, and the silver precipitate will be sufficiently thick in two hours. It is taken out, washed and dried; if the glass with the silver pellicle is to be used as reflector or speculum, the coating must be protected by varnish.

Crystals.—Dr. Böttcher publishes a very simple method for coating paper, wood, or glass with crystals: Mix a very concentrated salt solution, in cold, with dextrine, and apply the fluid with a broad, soft brush upon the surface to be decorated, spreading it in a layer as thin as possible. After drying, the surface will show a very handsome, pearl-lustrous coating, which, on account of the dextrine, very tenaciously adheres to the surface. It may be made adhesive to glass by coating it with an alcoholic solution. Salts especially suitable for the purpose are specified by Dr. Böttcher to be sulphate of magnesia, acetate of soda, and sulphate of zinc. If paper is to be decorated in the same manner, it must be sized. Unsized paper absorbs the fluid, and prevents a regular formation upon its surface. Visiting cards of this style, by the name of alabaster cards, have for some time been in high favor. Colored glass provided with such a coating, is very handsome if light can penetrate it.

An Indian Bronce.—The Hindoos possess a remarkable ability for making alloys of iron, copper, zinc and tin. Let us cite the *biddery*; the alloy is called after the city where it is mostly prepared, and is most encountered in all its purity. The eminent qualities of this alloy are, that it is non-oxidizable in air, even if the latter is charged with humidity, under the burning tropical sun. It is perfectly malleable and does not crack, except, perhaps, by violent blows.

Objects of art manufactured from this alloy, are colored black by plunging them into a simple solution of saltpeter and sal ammonia, or sea salt and blue vitriol. One recipe for preparing the alloy reads as follows: 16 parts copper, 4 lead and 2 tin, melted together. Zinc is combined with this mixture in a proportion of 3 to 10.

Doctor Hamilton gives another formula: zinc, 126 parts; copper, 460; lead, 414 (without tin). These parts are finely broken, and enclosed in a crucible with a mixture of beeswax and resin, to prevent calcination, and to simply effect fusion. The fusing alloy is run into an earth mold, and shaped into the desired form. To give it a black color, a solution of sulphate of copper is used.

Correcting Brittle Gold.—As soon as a gold ingot shows sufficient ductility to withstand the first two or three annealings without breaking, and if by the effect of this first test it gives indications of brittleness, by the appearance of cracks and fissures upon its surface, recourse must be had to a sort of mold casting, what the French call "brassage." This operation is easily performed. It consists in taking a soldering coal, sufficiently large to receive the ingot, preparing it thus with a file that a deepened half-round hollow is worked in. The ingot is now heated upon a coal to nearly white heat, and in this condition it is laid upon the prepared coal, and covered with borax at all points, to facilitate the melting, which is about to be undertaken; the thus prepared ingot is exposed to the influence of a heavy wick of the soldering lamp, and by aid of a somewhat long blowpipe, the flame is directed upon one end; the fire is maintained until the surface begins to melt, whereby all cracks disappear, without raising the temperature sufficiently, however, to either shorten the ingot, or separate it into several parts. The requisite degree of heat will be recognized, as soon as the bar begins to give way, and begins to conform to the smallest angles of the coal, as well as by the rainbow hues which begin to appear upon its surface, and, finally, by the union of the cracks, which disappear in proportion as the angles of the bar conform to the angles of the coal, under the heat of the flame. When the ingot has reached this degree of heat, in its entire extent, the operator may be assured of its malleability.

Foreign Gossip.

Sleeve Links and Studs.—The present style in Europe, "all the rage," consists of small dogs' and cats' heads, of enamel, under crystal, set in gold. Each sleeve link has a dog's and a cat's head

—The *Niederschlesische Anzeiger*, No. 90, contained the following advertisement: "Anchor and cylinder watches, as well as chimneys, cleaned for 50 pfennige; mantel clocks, 10 pfennige. Petruschke Mason."

Crisis.—A correspondent from Biel, Switzerland, writes to the *Solo. Tagbl.*, that the watch industry is threatened with a crisis. The factory of St. George, lately suspended, it was fondly hoped would soon commence operations, but the late failures in Paris, Lyons, Vienna, Peterbourg, etc., have postponed it again for an indefinite time. Complaints of hard times are loud in the Burnese Zura.

Some Silver Plating.—At the silver plating establishment of MM. Christoffle, of Paris, there is annually deposited more than 6,000 kg. of silver; and since 1842, when the establishment was erected, 169,000 kg. of silver have been used, deposited on an endless variety of objects. The average thickness accepted is 3 grams to the square decimeter, or 300 grams per square meter of surface. The deposits of this amount of silver from the time of starting would cover about 140 acres of ground. Paris consumes about 25,000 kilograms of silver every year, for electro-plating; while the consumption of Europe and America foots up to about 125,000 kg., worth 25,000,000 francs.

Insensible to Magnetism.—The field of magnetism and electricity is widening daily, and it behooves the watchmaker to search for material insensible to these influences, for constructing timepieces for gentlemen who manipulate with these agencies. A well-known London firm offers such movements for sale; its parts do not consist of steel, but only other metal—except the mainspring, by which, owing to its slow motion and superior force, it is immaterial whether it be magnetic or not. The balance spring may well be replaced by an aluminum spring; aluminum bronze would undoubtedly be suitable for the other parts of escapement; arbors and pivots might remain steel; for a common balance, gold would be best; for compensation balances, however, it would be desirable to first institute experiments as to what metal would best replace steel, considering at the same time the difficulties offered for elaboration of many of these metals. The late Mr. Ulrich, of London, made very notable experiments with silver and aluminum strips.

The French "Regent" Not to be Sold.—We see by late advices from Paris, that another motion has been made in the French Chamber of Deputies to sell the crown jewels. The committee to whom was referred the resolution, had the jewels—they are at present kept in the safe deposit of the ministry of finance—brought before them, summoned the minister of arts, and the jewelers Messrs. Bapst, whose house has been for several generations jewelers of the Court, and inspected the collection. The following trinkets were placed aside, on account of their historic value: A collection of order decorations, valued at 200,000 francs, presented to the monarch by foreign potentates; a watch valued at 3,000 francs gold, sent by the Dey of Algiers to Louis XIV; the so-called reliquia brooch, dating from the time when diamond cutting first began in France, and valued at 60,000 to 80,000 frs.; a sword, valued at 250,000 frs., manufactured in 1824, the hilt of which is a worthy representative of the goldsmithing of that age. According to the opinion of Messrs. Bapst, it would be commendable to expose these articles, the value of which does not rise beyond the sum of 450,000 frs., in a showcase in the Louvre (Gallery d'Appollon). These gentlemen expressed themselves decidedly against the sale of the "Regent," a diamond unsurpassed in circumference; it was valued at one time at 12,000,000 frs.; it might bring about 600,000 or 700,000 francs at forced sale, and it should by no means be exposed to the destiny of a public sale; else the nation would suffer the infamy of seeing it wandering from town to town under the protection of some Barnum The others, valued at 10,000,000 or 12,000,000 of frs., have no historical value. With the exception of a sapphire ornament, a turquoise ornament, and one of rubies, made for the Duchess de Berry, none of this jewelry has preserved its original form, but all were altered by order of the Empress Eugénie. The whims of this woman were fully as great as her want of taste. She saw one day in the drama *La Biche au Bois* (the deer doe) a belt of chrysoprase worn by the actress Delval, which pleased her so much that she did not rest content until she had a belt of genuine jewels manufactured according to the pattern. The whim cost 800,000 or 900,000 frs., and, of course, the ornament was so tasteless that the Empress, after once appearing with it, never used it again.

—A pearl was found at Kimberley, Western Australia, for which $5,000 were offered. It is of an olive shape, and quite perfect. Several other pearls were found in the vicinity, some of which were valued as high as $1,500.

—The late Electrical Exposition at Paris, according to the *Journal Official*, closed with a net profit of 325,000 frs. According to the decree of the President of the Republic, a central laboratory for electrical elements, etc., to be placed under the superintendency of the Minister of Mails and Telegraphs, shall be opened with this money.

The paper also says the American Government participated at the Exposition by sending a complete sample of all the American patents bearing on electricity, and accompanied them with suitable registers. The work embraced sixteen admirable volumes, and attracted universal attention at the Exposition. The prize judges discerned it a medal of honor.

Remontoirs.—Z., in *Allg. Journ.*, says that the word remontoir is actually a nonsensical expression. Remontoir is a French word, and signifies winding; the Frenchman distinguishes remontoir pendant, winding at the pendant, and remontoirs à la clef, winding with the key. Pendant winding is actually very old; a few years ago I repaired a verge repeater with jewel holes (!) of Quare, No. 4, London, made about 1690, the tone spring of which was wound by pressing in a button rod near the pendant knob; wherefore a remontoir au pendant. The present stem winding arrangement, with hand setting, appears to have been invented about fifty years ago. The *Uhrmacher Ztg.* of 1845, p. 85, says: "Franz Josef Dorer, of Kronstadt, Siebenburgen, obtained a patent in 1830 for the arrangement of a watch wound without the use of a key; a crownwheel seizes into the spring wheel, which in turn seizes into a pinion, the prolonged axis of which protrudes through the stem, and there is provided with a small disc, which is turned for purpose of winding. A similar contrivance regulates the hands, for which purpose a little button protruding to one side is turned backward or forward."

Marine Chronometers.—In a late number of The Jewelers' Circular, we gave a translation of an article by Ph. Völling, of Rostock, Germany, to which Mr. Em. Berg, Charlton, Eng., publishes the following observations in the *Deutsche Uhrm. Ztg.*: "Your paper touches a defect frequently laid to the fault of the imperfect mechanical execution of chronometers, although astronomers and observatories have furnished the chronometer maker with te timonials, according to which the mechanical arrangement and execution of his timepiece was at least 'good.'

"When a chronometer, both carefully prepared and well calculated a rate, is placed on board ship, and begins to show differences of rate, I hold that such differences must not alone be ascribed to the motion, but also to the magnetism of a ship, which, as is well known, is sometimes strong enough to influence the compass needle in a serious manner. How this ship magnetism is created, is a simple experiment, to be executed by anyone.

"Take a bar of iron, the thickness of a finger, and about one yard long, and test it for magnetism, by exposing its ends to both the poles of a magnetized needle, whereby attractions will occur, in favorable conditions. If next this rod is held parallel to an inclination needle, and the upper end is struck with a hammer, so marked a magnetism will develop that the proof is really striking, and the physical law that 'poles of the same name repel, while poles of a contrary name attract each other,' is fully confirmed. The thus produced magnetism can be suspended again by hammering on the other end, whereby north and south poles are changed.

"At the building of a ship, the carpenters hammer in the magnetism in a similar manner, the intensity of which depends upon the duration of the work and the quantity of iron, while the polarity depends upon the direction of the lines of the magnetic power of the earth, indicated by the inclination needle.

"The steel of a chronometer balance is an unmagnetized magnetic substance, and consists, therefore, according to the present theory, of magnetic molecules, pointing with its poles to all directions, capable, however, of being transformed into a veritable magnet, whereby a magnetic power is generated in its ends. Such a balance, therefore, contains a certain degree of magnetism, and the mutual influence of balance and ship's magnetism may force the former to a retardation, if the repelling power of two equally-named poles is present, and an acceleration may ensue with unequal ones. According to which a rate difference must occur by a chronometer when the ship upon a voyage changes its latitude, and has to contend with violent waves, whereby not alone its magnetism is dispersed and renewed more forcibly than before, but also its very polarity may become an opposite one."

Business Notes.

The firm of Crittenden & Earle succeed S. A. Crittenden, Newark, N. J.

Loehr & Koerner, manufacturers of jewelry cases, have removed from 83 Nassau street to 96 Liberty street.

The firm of Somes, Bodge & Christy have dissolved by mutual consent. Bodge & Christy succeed the old firm.

Mr. W. A. Giles, senior member of the firm of Giles Bro. & Co., sailed for Europe June 28, to look after novelties for the fall trade.

W. E. White & Co. will introduce in July for the fall trade, an entirely new line of novelties, which it will be to the interest of the trade to examine.

Miller Bros. are preparing for the fall trade an extensive line of novelties, possessing many valuable and desirable features. It will pay buyers to examine them.

Simons, Bro. & Co. present an attractive cane case for the use of retail dealers. It is a useful device, and will, no doubt, find its way into the stores of most dealers.

Rosenkrans & Weber have got settled in their new quarters, directly opposite the Palmer, making one of the lightest and most convenient places on the street

Joseph P. Wathier has removed to 178 West Madison street, Chicago, where he has much larger quarters for his increasing business. He has added largely to his stock of materials.

Mr. Henry May, of the late firm of May & Stern, will continue the wholesale jewelry business at the old stand, No. 19 John street, N. Y. His agents will be on the road in the west in time for the fall trade.

The E. Howard Watch Co. is now located in their new offices, corner of Maiden Lane and Nassau street. Their rooms are elegantly fitted up, and filled with an extensive stock of clocks, watches, regulators. etc.

Mr. J. Quincy Walker, for several years western manager for the William L. Gilbert Clock Co., has resigned from that position, and is succeeded by Mr. Groove Sackett, who has been connected with the Chicago office of the company for some time.

A novelty in the way of watch charms is a miniature knife, which combines knife blades, scissors, cigar cutter, glove buttoner and various other useful articles. They are beautifully mounted in gold with various devices, and are not only ornamental, but exceedingly useful.

H. Muhr's Sons have been refitting their Chicago office, No. 137 State street, where the trade will find, as well as at their office No. 1½ Maiden Lane, New York, a complete line of samples of their rings and crown filled cases—of which they have introduced many new designs for the fall.

The "Roskopf" watch has long been recognized in the trade as one of the best cheap watches of foreign manufacture. The "Triumph" was its rival in this respect, but recently the two movements have been combined, and the "Triumph-Roskopf" is the result. It is claimed that the combination gives a watch possessing all the advantages of both the others, and one that is better than either of them. J. T. Scott & Co. are the importers of the new "Triumph-Roskopf," and are making it one of their specialties.

A gentleman in the trade who owned a fine watch that he especially valued because of its excellent qualities as a timekeeper, desired to have it changed from a key to a stem-winder. He finally applied to W. H. Ludeman, of this city, who undertook the task, which was declared to be a most difficult one. Mr. Ludeman was entirely successful, and produced a piece of work that experts declare to be as skilful a job of watchmaking as they ever saw. The quality of the watch as a timekeeper was not impaired in the slightest, while the change to a stem-winder so delighted the owner that he added a handsome gratuity to the price Mr. Ludeman charged for his work

The Gorham Manufacturing Company has established a western department, at No. 170 State street, Chicago. Extensive offices and salesrooms have been elegantly fitted up at that location, and a full line of goods made by the company will hereafter be found there. This move is designed especially for the benefit of dealers in the west and northwest, who can then examine the goods as intelligently in Chicago as by making the longer journey to New York. As a large stock of goods will be kept constantly on hand, dealers can be supplied with less loss of time than heretofore. Mr. Holbrook, manager for the company, recognizing the importance of affording better facilities to their western customers, has, by establishing the western department, given another illustration of the enterprise that is characteristic of the Gorham Company.

Trade Gossip.

A great variety of fancy jewelry will be worn this summer.

La France & Wise have just opened a very pretty jewelry store in Elmira, N. Y.

Gustave Walter, of Albert Berger & Co., sailed for Europe on Tuesday, June 27th.

Meyer Eisenberg has disposed of his interest and withdrawn from the firm of Harris, Spier & Co.

Some London jewelers are exhibiting a late Hungarian noble's scarf pins—759 in number, and very valuable.

Mr. Henry Fera arrived from Europe on the steamer *Elbe*, June 17th, and E. Aug. Neresheimer on the steamer *City of Rome*, June 24th.

E. Y. Dollenmayer, of Wilson, Kansas, has just completed an attractive store and shop, which he has filled with an attractive stock of desirable goods.

At a recent meeting of the Silver Plated Flat Ware Association, a reduction of about five per cent. was made in the prices of forks and spoons, to take effect July 1st.

Timothy Dixon, silver plater of 45 John street, in his suit against the DeKalb ave. R. R. Co., in Brooklyn, for injuries received over a year ago, recovered a verdict for $9,000.

R. H. Witherell, of San Buenaventura, Cal., has mounted several fine opals recently found on the beach at that place. They are said to be very fine specimens, and attract considerable attention.

A special dispatch from Chilton, Wis., states that gold in paying quantities has been discovered on the farm of Mr. Maxwell, in the town of Stockbridge, and machinery has been purchased to work the mines.

A gentleman in the trade in going home a few evenings since, lost his watch on the elevated road. It was made by Tobias, of Liverpool, is numbered 44,259. A suitable reward will be paid for its return to this office.

Mr. D. Valentine, formerly of Syracuse, N. Y., sailed for Europe in the *Germanic* on the 24th. He will make his headquarters for several months in Geneva, care of Patek, Philippe & Co., where any communications will reach him.

T. A. Atkinson, a jeweler of Newmarket, Canada, recently failed, and his stock was disposed of by the sheriff. W. C. Fox & Co., of Toronto, have also fallen into the keeping of the bailiff. The particulars of these failures have not transpired.

A man named T. A. McDonald, who had desk room at No. 38 Maiden Lane, was recently arrested on a charge of swindling. He is alleged to have obtained goods from various dealers "on approval," which he failed to return or account for. He was held for examination.

Mr. E. Dreyfus, of Levy, Dreyfus & Co., sailed for home in the steamer *Germanic*, June 8th, after a prolonged business trip of five months, in which he has added many novelties, including graposcopes, microcopes, astronomical telescopes, traveling clocks, etc., to the stock of his firm.

Fred. Morck, a jeweler of Warren, Pa., is one of the lucky owners of a new oil well recently struck in Pennsylvania, and which is now flowing at the rate of 1,000 barrels a day. We congratulate him on his good fortune, and the pluck with which he surmounted the difficulties he found in his path.

Messrs. Leimbach Bros., of 51 Nassau street, N. Y., have, under date of May 30th, 1882, secured letters patent for a safety catch for lace pins and ear rings, which they are now placing before the trade. Manufacturers would do well to examine this new device, which, it is claimed, fills a want that has long been felt by the retail trade.

A pretty new design for a fan with a whip attached is of painted linen. The whip is fastened on the top of one side of the fan and twisted around, and then fastened on the lower part on the same side. The end of the handle bears a design of a horse shoe. The whip is very useful for excursionists, and the new design is quite unique.

The Dueber Watch Case Co., of Newport, Ky., have nearly completed an addition to their already extensive works, which is to be known as Factory C. It has a front of 80 feet by 200 feet deep, and is three stories in height. At one corner there will be a nine-story tower, containing a clock with a 1600 pound bell, and an electric light. This addition will cost about $90,000, and will give the company a capacity of 2,500 cases a day. The company has put in gas works of its own, and at a recent test the supply was satisfactory in every respect.

The "Jewelers' Amateur Athletic Club" is the name of an organization recently formed in the trade, consisting of the younger members. It is proposed to have a club room, with a gymnasium, and to indulge in base ball, rowing, and athletic exercises in general. Any-one connected with the trade who is over fifteen years of age iseligible to membership.

Mr. S. T. Little, of Cumberland, Md., recently died, in the 54th year of his age. The disease which terminated fatally was induced by overwork and close confinement to his business. The deceased was a well-known jeweler and watchmaker, an enterprising citizen, and possessed the respect of all who knew him. Mr. Little left a wife and three children.

Burglars recently entered the store of William Show, in the Bowery, and escaped with about $1,000 worth of jewelry. They were evidently disturbed while trying to force the safe, in which was about $20,000 worth of diamonds and fine goods. A man named James Whelan was subsequently arrested with the stolen goods in his possession, and was held for trial. The police hope to secure his accomplices.

The Annual Meeting of the Chicago Jewelers' Association was held at the association rooms, 170 State street, on Tuesday, June 6th, when the following officers were elected for the current year: President, Theodore Kearney; Vice-President, Otto Young; Secretary and Treasurer, L. W. Flershem; Directors, H. F. Hahn, Paul Juergens, Benjamin Allen, Henry Oppenheimer, C. H. Knights and H. S. Peck.

The Racine Silver Plate Company has been merged in that of the Rockford Silver Plate Company, the capital employed in the amalgamated company being $150,000. A new factory is to be built to accommodate the business. The Rockford Company will assume the construction of the "Guild stamp" goods for which the Racine Company had the contract. George B. Kelley, of Rockford, is secretary and manager of the new company.

In the advertisement of Stern & Stern, in last month's issue of THE CIRCULAR, by a typographical error, it read, "Joseph Stern, formerly May & Stern." The omission of the little word "of" made the difference. It should have read "Joseph Stern, formerly of May & Stern." The error was one of those that will occur in the best regulated printing offices, and for which the editor can do nothing but apologize to those interested, as we now do, and swear at the printers for his own satisfaction.

The jury in the suit of Franklin Horton against Public Administrator Algernon S. Sullivan, to recover $20,000 out of the estate of the late John D. Grady, the diamond peddler—the value of stolen diamonds, which, it is alleged, Grady had once in his possession, knowing them to have been stolen from Horton, returned a verdict in the Kings County Supreme Court for $21,066.65. The evidence showed that negotiations had been held with Grady for the return of the goods, and that he fixed a price for their return.

THE CIRCULAR has frequently called attention to the necessity of teaching our young men the art of designing. What a little teaching in this direction will do, we recently saw illustrated in the public schools at Orange, N. J., where drawing is taught to all pupils who desire it. At the exhibition of their term's work last week, there were some examples of original designs that would have done credit to much older heads than these children possess. Among the drawings were designs for tiles, carpets, oilcloth, various ornamentation for woodwork, cabinets, mantels, etc., but that which particularly pleased us was an original design for a silver and gold vase, made by a lad fifteen years old, named Theodore Thomas. It was unique in form, and beautifully decorated with birds, flowers and foliage. The lad shows a remarkable talent for work of this character, and should find employment in some of the workshops of the trade.

A meeting of the retail jewelers of Philadelphia was held at the Continental Hotel recently, to discuss the condition of the trade, and to devise means for protecting the retailers' interests against dry goods houses who sell watches and jewelry, and against those jobbers who do a retail business, and who scatter catalogues, price lists and trade-discount circulars with promiscuous profusion over the city and state. Mr. J. Wilbur Russell presided. There were about thirty jewelers in attendance, but upon the call for the meeting appeared seventy names, representing the leading retail houses. Addresses were made by Messrs. Herchberg, Suddards and Chairman Russell, all coinciding in the idea that by organizing into a permanent body, with articles of association and an efficient management, the retail jewelers could notify jobbers that unless the latter stopped retailing, the members of the association would refuse to buy from them. A committee of five, consisting of Messrs. Bedichimer, Herzberg, Childs, Riggs, and C. Smith, Jr., of C. R. Smith & Co., was appointed to arrange for a permanent organization.

"Paddle and Portage" is the title of a beautiful little work by Thomas Sedgwick Steele, a jeweler of Hartford. Mr. Steele is an enthusiastic sportsman, and last year related his fishing adventures in the wilds of Maine, in a book entitled "Canoe and Camera," to which the present work is a companion. "Paddle and Portage" is descriptive of a canoe trip in the fishing regions of Maine, and is not only graphically written, but is illustrated with sixty beautiful woodcuts, to look upon which excites a longing for the cool shades and adventure in the woods. The work is printed in the highest style of typographic art, and is a gem which all lovers of sport should possess.

The fan is every day becoming more tempting and original in style and make. Many of them are of two colors in silk or satin, the divisions being alternately plain and decorated. The size of fans to be used at the seaside this season is enormous, some fans being as large as four feet in semi-circumference. The most beautiful fans offered in the market are in mother-of-pearl, in ivory, in elegant and expensive woods, with lace, embroidery, rare feathers, and other beautiful and costly ornaments. The old-fashioned palm-leaf fan is still sold and used as much as ever, and the Japanese fans, both round and folding, will be offered in the market, decorated in that unique manner customary with the Japs.

Pearl fishing on the coast of Lower California is an important industry, no less than 1,000 divers being employed in bringing up the costly black pearl, which is found in a great state of perfection in the deep waters of La Paz. The pearl oysters are found from one to six miles off shore, in water from one to twenty-one fathoms deep. Merchants provide hats, diving apparatus, etc., for the prosecution of the business, on condition that they can purchase all the pearls found at prices to be agreed upon. These boats, which are usually of about five tons burden, sail up and down the coast from May to November, searching for treasures. The product of the year's work is about $500,000, estimating the pearls at their first value.

The New York Jewelers' Club have completed their arrangements for the annual entertainment of the New England Manufacturing Jewelers' Association, July 6th. The eastern club, to the extent of about 200, will arrive in the morning by boat, where they will be met by a committee of the New York Club, escorted to the Astor House for breakfast, after which the two clubs will form in line and march down Broadway to John street, to Nassau street, to Maiden Lane, to Broadway, to Warren street, to the river, where they will take the steamer *Blackbird* to Hoboken, play their usual game of ball, then again take the steamer up the Hudson river to the Palisade Mountain House, where a dinner will be provided for the party.

Two pretty novelties in finger rings to be found at the principal jewelry stores are very popular among young people in fashionable society. One has a round setting of small stones, the other three parallel bars studded with little gems, pretty combinations being preserved, such as turquoises and pearls, diamonds and rubies, or rubies and emeralds. The feature of their construction which charms the young folks is that, by a very ingenious device, each setting conceals a delicately enameled inscription, which can be kept hidden or disclosed, as the wearer desires. By pressing an almost imperceptible point at one side under the round setting, a little plate slides out to sight with its motto, "Love never dies," "Remember this true heart," "Forever thine," or something of that sort. And by turning the central bar in the other style, three flat sides are exposed successively, each of which may bear an inscription.

One of the results of the late disastrous war waged in South America, has been the sale of a large number of gold and silver church ornaments set with precious stones, and old personal jewelry sent from Lima by patriotic persons, in order to procure funds toward the defence of Peru. Of nearly 500 lots, which realized various prices, the following were sold at the highest rates: A pair of long pearl and diamond ear rings, with four large Oriental pearl buttons, and a pair of extraordinarily large pearl drops, £235; a curious silver gilt mitre, enriched with scrolls of diamonds, emeralds, rubies and other stones, £273; a magnificent old chased fine gold monstrance, enriched with a large number of precious stones, including fine emeralds, rubies, sapphires, diamonds and amethysts, likewise pearls, total weight, 378 oz. 10 dwt., £2,000; an old gold monstrance, with a center of large diamonds and topazes, with rays of diamonds, rubies, and topazes, £940; fourteen gold rays for a monstrance, set with topazes and diamonds, £640; a gold crescent of eighteen brilliants, £200; an old silver-gilt monstrance, with a gold door and lining, 298 oz. 10 dwt., £200; a life-size silver figure of a pelican, with an enameled gold breast, the eyes and aigrette set with large emeralds cut *en cabochon*, three silver-gilt figures of young pelicans, £380; an old enameled frame in three pieces, enriched with emeralds, £275. Total of the prices, £10,778.

THE

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THE

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Trade Prospects.

THE usual dullness of the summer has hung over the trade during the recent hot weather, and the chronic grumblers have come to the front, croaking as usual and predicting a continuation of dullness. There is neither sense nor reason in such prognostications, and it is a pity that those who give vent to their gloomy forebodings at all times could not be suppressed. But it is their nature to look at the dark side only, and they would not be happy unless they contrived to put a drop of wormwood in their neighbor's cup. The outlook, so far from being gloomy and cheerless, has seldom been brighter or more promising for a prosperous fall trade. Notwithstanding there have been a few weeks of comparative dullness, as a matter of fact the trade for the first six months of this year was better than during the corresponding months of last year, when everyone was satisfied and cheerful. Even the most conservative houses in the trade did a better business the first half of this year than they did the first half of last year, while those possessing more enterprise and push experienced a marked improvement. Present indications are all in favor of a most excellent fall trade, a demand that will be permanent, not spasmodic. One of the very best indications is found in the fact that the retail trade owes less to New York jobbers and manufacturers than for years before, and is, consequently, in a better condition to give orders. At the present time, too, retailers are selling more goods than they are buying, getting rid of their old stock preparatory to purchasing fresh goods. They have been stocking up of late only as necessity compelled them to, adding such goods as were necessary to keep their stock looking fresh. The more enterprising retailers have even been pushing off their old stock at a sacrifice—a wise thing to do, for they can buy fresh goods now for less than what the old ones cost them. If they can only make up their minds to it, they had better sacrifice ten per cent. of what they have been carrying for months, for they can save more than that on new goods at present prices. Those of them who are equal to the emergency, will find themselves, when the fall trade begins, with shelves depleted of goods *passé* in style, and a well-stocked and liberal market from which to make selections of new styles and patterns, and so fill up with goods that are both attractive and salable. The best informed houses in this city are well satisfied with the present condition of the retailers, and are confident that the fall trade will open briskly, and be well sustained.

Reports from all sections of the country indicate abundant crops of all staple products. In the south, the cotton crop is excellent, and, in addition, the spirit of enterprise is aroused in that section, and a new era of prosperity seems to have set in for the southern states. Emigration has been flowing in upon them during the past year to an unprecedented extent, and already its stirring influence is being felt. Among other indications of this is the fact that three new railroads, radiating from Atlanta, are now under way, pushing into the southern states, and opening up direct communication with many places that have heretofore lain dormant Other southern crops besides cotton promise well, and it is not hazardous to predict that there will be more money circulating among the residents of that section this fall than there has been for many years before. In the west, the promise of bountiful crops of wheat, corn, oats, and other agricultural products, is also excellent. Reports indicate that the harvest will be something amazing, owing, in part, to the increased acreage under cultivation, and in part to the favorable weather. The Pacific Coast also sends favorable reports regarding the coming harvest. All the elements seem to have conspired to make this one of the most prosperous years in our history.

Why should it not be? With the earth yielding abundantly of all crops, our commerce thriving, our commercial intercourse with other nations leaving the balance on the right side of *our* ledger; our financial condition satisfactory; our circulation on a gold basis, and all business transactions conforming thereto; no symptoms of inflation or undue speculation hanging over us; and all values estimated at their intrinsic worth—why should the country not be prospered? When general business is good, and money circulating freely in the hands of the people, the jewelry trade is sure to be brisk and active.

Another reason for our future prosperity is to be found in the unsettled condition of Europe. England's war upon Egypt is a signal for all other European nations to prepare to maintain their rights, that are liable to be trespassed upon at any time in the struggle that must ensue. Armies must be recruited; navies equipped; farmers taken from their fields; mechanics from their workshops. The producers become consumers, and the United States must supply those necessaries of life which the hands now engaged in strife fail to produce. Already, under the incentive of an increased foreign demand, the price of breadstuffs has advanced in our markets, and when our crops are harvested, our producers will find better prices ruling than they have been wont to receive. Europe's disasters are our gain; it is the law of supply and demand; we may regret the cause that creates the demand, but must comply with the law all the same. Fond as our people are of getting and hoarding, we are sure they would forego the profit this war promises to them if by that means the war could be stopped. But we must take things as they come, and if European wars create a good market for the necessaries of life, the country that gives shelter to Europe's refugees is the one that should be benefitted by it.

During the first part of the present year, the number of failures in the trade increased somewhat over the first six months of last year, but the losses thereby have been less. The failures were among the smaller houses, and the amount of their credit was not extensive. Then, too, jobbers and manufacturers have been more careful in extending credit, and have kept a sharper eye on their outstanding accounts, so that the losses by failure have not been so great. This is partly due, also, to the fact that compromises at ten per cent. are no longer effected; creditors have been less liberal in this respect, and chronic failers have had less opportunity to practice their little games. It nearly breaks their hearts, they have got so in the habit of selling at ten cents on the dollar, to be required to pay fifty or sixty, but the trade is becoming inexorable, and is, consequently, improving in this respect. We hope to see the lines still more closely drawn, so that no rascal who happens to call himself a jeweler, can make profit for himself by swindling his creditors.

There is an increased and steadily growing demand for the better classes of goods, from the high-priced diamond and fine stone work, through the various grades of gold goods, to the best qualities of rolled plate. More goods of the finer quality have been sold during the first half of this year than in a long time, and manufacturers are greatly encouraged in consequence. New designs, many of them unique and elegant, are constantly being brought out, and, as a genaral thing, find ready purchasers. This is a most hopeful sign of the times, and should be encouraged by everyone who has the best interests of the trade at heart.

From every point of view, the condition of the trade is promising; buyers and sellers have more confidence in each other; the retailers feel more keenly the importance of keeping their credit good, while the manufacturers and jobbers are zealous in catering to the demands nf consumers. The fall trade, we predict, will commence early, will be brisk and lively, and will continue steadily till after the holidays.

State Taxes on Commercial Travelers.

WE HAVE frequently commented on the injustice of the tax imposed by certain states on commercial travelers, and the evil effects of those local laws upon the retail dealers as well as the jobbing trade. Commercial travelers form an important class in the business community, and are a link in the chain that brings the consumers into direct contact with the manufacturer; he is the medium that brings Demand knocking at the door of Supply; that carries to those needing it, the products of Labor. The "drummer," as the commercial traveler is called in popular parlance, has long been a favorite butt for the newspaper humorist, and his peculiarities, thus exaggerated, are far better known than his commercial importance. A list has been given of ten associations of travelers, in as many cities, having at the time a membership of 11,477. The two largest were one in this state, with 2,625, organized in Syracuse in 1872, and the North-western Association, of 2,500, organized in Chicago in 1875. Special journals in this city, Syracuse and Chicago, devoted to the interests of travelers, urge such purposes as insurance, concessions from carriers and hotels, interchange of information, social intercourse, and so on; and yet the associations represented were believed to include not more than twelve per cent. of the commercial travelers of America. The comparative advantage of this expensive instrumentality of communication between manufacturers and wholesalers, or wholesalers and retailers, is always in order for contention, but the fact is that the traveler is almost entirely a trade development of the last quarter century, and he is expanding. This seems conclusive as to his usefulness, for those for whom he "drums" would not keep him if they could sell better, and those at whom he does this would not listen to him if they could buy better, in any other way. Quicker transportation and communication does not suppress him, and he must be supposed to be worth while.

But in some states the hostility of local traders, who naturally dislike to have competition come from a thousand miles away to their very doors, has demanded interference, seconded by that ever-present disposition to put taxes on what seems to be distant and foreign. Hence, states, and even municipalities have imposed license laws. Twenty states and six territories make no attempt to deprive commercial travelers of freedom; nine levy no tax, but authorize municipalities to do so; in two states there are both kinds of tax; eight states and two territories lay a tax by the state authority, and in about half the Provinces north of us the tax system prevails. We should add, however, that this summary is from data about a year old, and no attempt has been made to correct it to date, inasmuch as the intent is only to show about the extent of this taxing system, rather than give an exact schedule of it from state to state.

Judge Hughes, of the United States District Court, sitting in Richmond, last month rendered a decision in the habeas corpus case of Thornton, a traveler for Baltimore parties, who was imprisoned in Norfolk for selling by sample without having paid the state tax. The governing law on this subject was laid down in the leading case of Ward *versus* Maryland, (12 Wallace, 418) decided at the December (1870) term of the United States Supreme Court. The complainant, a Jerseyman, had sold harness in Baltimore by sample, and was indicted and fined $400. The case was taken up by the association of travelers, who employed Mr. Evarts to carry it up from the highest court of the state. The law applied to all traders, resident or non-resident, but not alike, the latter being required to pay $300 for a license to sell, while the former were to pay according to a sliding scale, which was based on business done, but not above $150 maximum. Justice Clifford rendered a decision against the state, of course upon the ground of the discrimination exercised against non-residents. "Grant," said he, "that the state may impose discriminating taxes against citizens of other states, and it will soon be found that the power conferred upon Congress to regulate inter-state commerce is of no value, as the unrestricted power of the state tax will prove to be more effective to produce inequalities than any regulations which Congress can pass, to preserve the equality of rights contemplated by the Constitution among the citizens of the several states." Justice Bradley, concurring, was unwilling to stop there, but went further, pronouncing the law in violation of the commercial clause of the Constitution, which gives Congress the control over inter-state commerce, and he declared that it is indifferent whether there is any discrimination in the tax. "Such a law," said he, would effectually prevent the manufacturers of the manufacturing states from selling their goods in other states, unless they established commercial houses therein, or sold to resident merchants who chose to send them orders. Is is, in fact, a duty upon importations from one state to another, under the name of a tax. I therefore dissent from any expression in the opinion of this court which in any way implies that such a burden, whether in the shape of a tax or a penalty, if made equally upon residents and non-residents, would be constitutional."

The Thornton case has now been decided by Judge Hughes in favor of the state of Virginia, on the sole and express ground (as far as appears from the statement of it by telegraph) that there is no discrimination in the law. But the question arises, not whether a state may tax residents and non-residents equally, but whether a state may tax outsiders at all. There can be no doubt that, as respects commercial intercourse, state lines are obliterated by the Federal compact, which intended to make it impossible that the states could become little principalities, each with power to put embargoes on trade. A state cannot levy import duties. A contrary doctrine gives each state power to exclude goods by statute; for, if the tax itself be admitted, the amount of it cannot be defined. But the decision of Judge Hughes will, undoubtedly, be appealed to the United States Supreme Court, and that the decision there will be against state taxation of commercial travelers is clearly foreshadowed in the opinions above recorded of Justices Clifford and Bradley. A final decision of this much-vexed question at an early day will be highly acceptable. Mature, intelligent legislators in the states where such laws exist, would do well to anticipate the inevitable, and blot out from their statute books all traces of such obnoxious legislation.

Auctioneers and Peddlers.

RETAIL jewelers have many difficulties to overcome to secure the patronage of their customers. Hundreds of ways are devised by unscrupulous jobbers and manufacturers to divert the trade of the consumer from the regular channels, and so rob the retailers of their share of the profits of the business. But the greatest nuisance to the retailers, and the most pestiferous element that steps between them and their legitimate customers, is made up of auctioneers and peddlers. The first of these is the worst, for the auctioneer who deals in jewelry is generally thoroughly unscrupulous, is glib of tongue, is better at coining lies than telling the truth, and adopts various means for attracting public attention. Entering a thriving town, the auctioneer rents a vacant store temporarily, where he makes as conspicuous a display as possible of his cheap goods. He advertises liberally in the local papers, whereby he usually secures, also, a good notice in the local columns; he placards the place with showy handbills announcing a "peremptory sale of a bankrupt stock of jewelry and silverware;" if the authorities will permit it, two or three boys are sent out ringing bells and announcing the auction sale. Everything possible is done to attract attention, and especially to secure the attendance of ladies, the auctioneer relying largely upon their well-known proclivity for attending auctions. The *Mrs. Toodles* are not all dead yet, by any means, for there are ladies in every town who regard it as a religious duty to attend every auction and buy something, always hugging the fond delusion that they are getting "bargains," when in fact, they are being egregiously swindled. It is a good thing for a jewelry auctioneer to get two or three women bidding on his goods, for the men are sure to follow their lead, under the vain supposition that women ought to be great judges of such things.

The goods handled by these jewelry auctioneers is generally of the very poorest quality, made for this very trade—or they are the tail end of stocks that have been culled over, and these unsaleable remnants sent out to feed gudgeons with. Of one thing the public can be assured, that manufacturers of respectability do not send their fine goods to the auction rooms, for they would not trust the value of them to these itinerant auctioneers, who have neither character nor money with which to do a legitimate business. Nevertheless, they succeed in working off every year such a quantity of their pinchbeck stuff, as to materially interfere with the sales of the retail dealers. The auctioneer is generally possessed of pleasing address, some familiarity with the business, and a pleasing and taking way of telling the most unblushing lies, even swearing to them, if occasion requires.

On a recent visit to an interior town, we chanced to encounter one of these peripetic jewelry auctioneers. He was haranguing a motley crowd of men and women, and cramming them with any number of Munchausen stories, which they laughed over hugely and swallowed without flinching, much more readily than they would so much Gospel. Holding up a brass chain, for instance, his harangue ran about as follows:

"Here, ladies and gentlemen, I offer you a magnificent chain. I don't pretend that it is an eighteen-karat gold chain, for it ain't, but it looks just as good as one, and will wear better and keep bright longer. No! this is not a gold chain—if it was it would be worth $50—but it is a regular genuine fire gilt chain; none of your plated stuff, with a little gold plate on the outside and all brass inside. No! this is a genuine Tobias fire gilt chain, and all of Tobias' chains are warranted genuine. No rolled plate or electro-plate about a Tobias chain—they are all fire gilt, every one of 'em, made by Tobias himself in New York City. When I talk of these Tobias it makes me think of my boyhood days, for old Tobias and I used to go to school together. I tell you this is a genuine Tobias chain, and I ought to know, for we were great chums at school. Why we used to play marbles and fly kites together, and finally got to sparking the same girl. I wanted to marry her, but Tobias allowed he could cut me out, and I said he couldn't, but he did—yes he did, and he married the gal and went to New York, where he began to make these genuine fire gilt Tobias chains. Why he's made millions of dollars making these chains, and is one of the nabobs of New York, while I am out here trying to make a living selling the only original Tobias fire gilt chains. How much am I offered for it?"

During his harangue he kept asking for bids, and finally succeeded in selling several at $4 each, when they would have been dear at fifty cents a bushel. Such harangues are wonderfully taking with a mixed crowd, especially if interlarded with a little abuse of retail dealers, and some denunciation of their alleged high prices. This auction business is found to be so profitable that many auctioneers do nothing but travel from place to place with bogus goods, and some manufacturers are unscrupulous enough to cater for their trade. Of course their sales interfere with the trade of the local dealers, for it takes from the people money that might otherwise be applied to the purchase of goods of a respectable character. These auctioneers generally carry with them a mixed stock of alleged gold goods and plated ware, all of which is so poor in quality that it could not find a place in the stock of any respectable dealer.

Peddlers are also a nuisance to the retail trade, and a fraud upon the public. They deal in about the same quality of cheap jewelry as the auctioneers, but not in so public a manner. They rather seek the by-ways and country roads, victimizing the poorer classes in the villages and the verdant country women along the road. Being, like the auctioneers, good talkers, they readily get the best of ignorant women and servants, and contrive to work off a large amount of their bogus stuff in the course of a year. There are factories in Providence and Attleboro that make goods especially for the auctioneers and peddlers, and have grown rich by it. A ten-dollar bill will equip a peddler with a very good assortment of goods, and if he can't sell them for fifty or sixty dollars he is not fit for the business.

There is, also, the itinerant dealer in optical goods, who is working much mischief to retail dealers. He goes about with a great variety of spectacles and eye-glasses, professes to be an oculist, to have made the various diseases of the eye a special study, and to be able to fit glasses to the eyes of those afflicted with defective eyesight, that will entirely remedy their difficulty. So far as his professional knowledge goes, he is the veriest charlatan and quack. Beyond having at his tongue's end a few professional phrases, he has no knowledge of the calling he pretends to make a specialty. But he looks wise, talks positively, and succeeds in selling any quantity of cheap glasses at fabulous prices. If the public did not take so much pleasure in being gulled, it would know that scientific oculists have no need to travel about the country peddling spectacles; such men are scarce, and can get all the patronage they want at home, and big fees for attending to their patients. These spectacle dealers, besides being swindlers, have done a vast amount of injury to the eyes of persons who have been deceived into buying their worthless trash. Auctioneers and peddlers are bad enough, but the spectacle dealer is so much worse than they, that he should be ridden on a rail out of every town wherein he attempts to secure fresh victims.

The abuses above referred to are of long standing, and have received due notice in these columns on previous occasions. We refer to them now for the purpose of calling the attention of the various state associations of retail dealers to them, with a view to securing united action that will lead to their suppression. The best way to do that is to touch their pockets. Retail dealers are obliged to pay rent for their stores, to bear their share of the burdens of taxation, and the product of their sales is spent in the community that contributes to it. The auctioneers, the peddlers, and the traveling "oculists" escape these burdens, and are intent solely on making all they can in a place, and carrying it away with them. The proper way to reach them is to make them pay roundly for the privilege of swindling the people. An auctioneer's license can be placed at such a high figure in every town, that it will take a goodly share of his profits to pay it; the same course should be pursued with peddlers and itinerants of all kinds. It is entirely within the scope of the state associations to act in this matter, and any reasonable recommendation they make, would, doubtless, be adopted in the cities and villages of their several states. Such licenses are usually imposed by city councils or town boards, and if the matter was properly presented to them by the associations and urged by the local dealers, there is little doubt but the license fees would be made so high as to be prohibitory upon these nomadic swindlers.

Where Old Chronometers Go.

THE old conundrum, "Where do all the pins go to?" has its counterpart almost, in the query, "What becomes of the old chronometers?" No one ever saw a worn out and cast off chronometer, any more than our soldiers saw a dead mule in the first years of the war. Nevertheless, chronometers must, in the course of nature, wear out; they are not conceived or constructed on the perpetual motion plan, and, consequently, there must some time come an end to their trustworthiness as infallible timekeepers. Indeed, captains of vessels have been known to charge every disaster that occurred to their ships to their aged and worn out chronometers. It made no difference whether they ran their vessels ashore upon some unknown and unsuspected shore, or collided in the lower bay with an Italian scow belonging to the street-cleaning department; if they were fortunate enough to possess an aged chronometer, that should have been venerated for its past usefulness, it was always made a convenient scapegoat for present disaster. We once heard of a gallant captain, however, who refused to avail himself of any such base subterfuge, but when his ancient and respected chronometer did actually "go back on him," pluckily brought his vessel around the Horn, and his cargo safe into the port of New York, by one of Seth Thomas' spring clocks. But such instances of fidelity to old friends is rare, and the innocent chronometer has, in its old age, been made to bear many sins of bad seamanship, even as the Jews are held responsible for most of the moral shortcomings of the present generation. Nevertheless, there must be old and worn out chronometers, especially in this age of decadence of American shipping, and the question is, "What becomes of them?"

A partial solution of this conundrum was vouchsafed us recently, while on a fishing excursion up in the wilds of Canada. Stopping for a day at Portland, Me., we made the acquaintance of a veteran chronometer keeper, who has devoted half a century to the study and adjustment of this indispensable marine timekeeper. This veteran is well known in the business, and his name is as familiar as household words to the sea-faring community, and in half the sea ports of the world. When Portland did a much more extensive shipping business than at present, this gentleman was employed nearly all his time adjusting chronometers for the vessels in port, and it was no uncommon thing for him to have as many as fifty at a time undergoing the necessary regulation to fit them for the next voyage. But, alas! Portland has lost her importance as a sea port, and the vessels that now drift in there by accidental stress of weather, are few and far between. Our veteran chronometer doctor is, therefore, forced to seek other means of livelihood. From him we learned that there is an extensive trade carried on in second-hand and weak-kneed chronometers. When the master of a vessel resolves to discard his marine timepiece, he sells it to some dealer in second-hand furniture of this kind. It is then doctored up, polished and brightened; perhaps a new balance spring added, an impaired tooth extracted, and otherwise placed in an attractive but positive state of disability. In this condition it is again placed in the market, and is usually worked off on some country jeweler, who is ambitious to furnish the correct time to his baliwick. Most of these are sent west, where they form a costly, attractive, and annoying addition to the stocks of small dealers.

"Why," said our friend, "I have known a single one of these patched-up chronometers to demoralize an entire community. The jeweler receives it; it is a curiosity in his town; every man, woman and child comes to set their watches by it, and then go home and try to regulate their clocks by their watches; the town clock has always been their guide and mainstay heretofore, but the chronometer and the town clock do not agree; neither do the watches and clocks in the community; nor does the chronometer with itself; one day the town clock will be ahead, and next day the chronometer will pass under the wire first; neither chronometer nor town clock agrees with railroad time, and the unfortunate citizen who depends upon either to catch a train is sure to get left. In one town the congregation that owned the town clock quarreled over the new second-hand chronometer that a dealer brought there. Some of the members wanted to have it run with the chronometer, and others preferred to have it run as their forefathers had permitted it to do, without interference from mortal hands. Result, a schism in the church, two deacons with black eyes, and three suits for divorce, alimony and the custody of children. Sometimes these old chronometers find their way aboard sailing vessels on the inland lakes, but the skipper soon finds out their tricks and their manners, and works out his position by the factory whistles along shore.

"But it is a great shame such impositions can go unpunished. They are downright swindles, and should be prohibited by law. A second-hand chronometer that has lived a respectable life of usefulness, should be retired in its old age, like a veteran war horse, and held in veneration for the good it has done. It has its period of life, like everything else, and when it loses its vitality, it passes into the stage of driveling old age. You can no more cure old age in a chronometer than you can in a human being. Quacks may tinker it, and fit it out with new fangled liver pads and abdominal supporters, but old age remains and can't be cured. A patched-up chronometer is worse than useless; it is deceptive, and apt to lead to disaster. To fit new parts to old ones is to destroy the symmetry and harmony of the whole, and to make its movements fitful and uncertain. Besides, if a skipper knows he has a second-hand chronometer, it destroys his confidence; he is never certain that it is right, and never fully trusts either that or himself. No! old chronometers should be retired from service entirely, but, unfortunately, they are not. On the contrary, there are lots of unscrupulous men in the trade who patch them up and palm them off upon the unsuspecting as new ones. They buy them for about the price of old junk, and after furbishing them up, sell them for $75 or $100 to country dealers or inland lake navigators."

And this is where the old chronometers go.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

The meetings of the League have heretofore been held in the offices of the several officers, who have also furnished accommodations for Committee meetings. But the League has outgrown an itinerancy of this kind, and has become large and strong enough to have a "local habitation" as well as a name. To this end a committee was recently appointed to secure suitable rooms for the occupancy of the League, without incurring unreasonable expense. This committee has secured, at a moderate monthly rental, desirable quarters at No. 61 Nassau street, which will hereafter constitute the headquarters of the League. Members will at all times be welcome, and will receive such courtesies as the gentlemanly officers are in the habit of extending to friends. These rooms are regarded as but temporary quarters, and no permanent arrangement will be made that will involve any material expenditure from the funds of the League.

At the regular monthly meeting of the Executive Committee, held on Friday, July 7th, the following named gentlemen were admitted to membership, and are entitled to all its benefits:

William E. Heeren, Pittsburg, Pa.; Henry Huestis, William F. Keach, Providence, R. I.; Chas. H. Lamson, Portland, Me.; Chas. H. Lindemann, San Francisco, Cal.; Chas. H. Lindemeyer, Brooklyn, N. Y.; William H. McCan, Port Perry, Ontario, Can.; Geo. S. Obear, Jr., Macon, Ga.; Edwin M. Parker, Bridgeport, Ct.; C. N. Phillips, pelier, Vt.; Henry Schiller, San Francisco, Cal.; Jacob Schlenker, Buffalo, N. Y.; John H. Scott, Jr., Philadelphia, Pa.; Chas. A. Starbuck, New York City; Simon Straus, Belleville, Ill.; C. J. Theuerner, Newark, N. J.; Geo. O. Wadsworth, New York City; William E. Waugelin, Belleville, Ill.; Aaron Wemstein, New York City; Robert J. Wilson, Philadelphia, Pa.; Alonzo C. Allen, Suffield, Conn.; L. W. Arnold, Chicago, Ill.; E. E. Bausenbach, Chicago, Ill.; John Bernhardt, Terre Haute, Ind.; G. Berson, Trenton, Tenn.; Fred. Bohren, Brooklyn, N. Y.; S. S. Bradford, Attleboro, Mass.; Thos. F. Brogan, New York City; Joseph Brookman, Chicago, Ill.; Theodore Burkhart, Trenton, Mo.; Fred. F. Cobb, Philadelphia, Pa.; Horace Cole, Norway, Maine; Chas. L. Cooke, Clarkesville, Tenn.; Arthur E. Dean, North Attleboro, Mass.; Chas. H. Downs, Providence, R. I.; Baro Forcheimer, Cleveland, O.; John H. Gingrich, Moberly, Mo.; William H. Glines, William S. Godfrey, Providence, R. I.; Geo. H. Griffith, Winona, Minn.

Forty members accepted. Twenty Applications were deferred, and will be brought up at the next meeting of the Executive Committee.

The death of Hiram Sweet, of Atchison, Kansas, was announced during last month, and the proofs of death were laid over for action at the August meeting.

Four requests for changes of beneficiaries were presented and granted.

Notwithstanding the excessively hot weather in the city, the Executive Committee meets promptly and regularly for the transaction of business. Their attendance often involves great personal sacrifice and inconvenience, but in the interests of the League, nothing is allowed to stand between them and the performance of a voluntary and onerous duty. It is a beautiful sight to see the genial and benignant Woglom, the eloquent and classical Johnson, Kimball, always alert and conservative, the mild and docile Lyon, the gentlemanly and suave Bowden, and the bland and guileless Sexton, assembled for business on a sweltering day, when the mercury marks 96° in the shade. Japanesque fans stir the sultry atmosphere that surrounds them, but nevertheless, perspiration oozes from every pore. The various matters of the League requiring their attention are faithfully gone over, and such action taken as each case requires, after which the committee adjourns to the welcome shores of Coney Island, to regale themselves on the seductive but insidious clam—a Dutch treat, each man paying his own score. Then they lave themselves in the surf of the ocean and return home with a feeling that they have done their duty to man and their Maker. The absence of the President affords us an opportunity to pay this deserved compliment to the energy and faithfulness of the officers of the League.—Editor.

Soldering.

It is well known that a *solder* is an alloy employed to unite, by the aid of heat, two metallic bodies that are placed in contact. A solder, then, must be much more fusible than the metals it unites, otherwise these latter would be damaged by the degree of heat applied. Solder is all the less tenacious, and melts the more easily, according as the proportion of the most fusible metal present is increased.

This fact is taken advantage of when several solderings have to be performed on the same object. The alloy last employed will require to be considerably more fusible than the first, as otherwise the heat would be so great that the earlier joints would melt. In an ordinary lead-tin solder, the fusibility is increased by increasing the proportion of the latter metal till the lead is to tin, as 6 is to 1. This alloy melts at 194° C. (380° F.), and the melting point may be still further reduced by adding a gradually increasing proportion of bismuth.

As the melting point of the solder approximates to that of the metals to be united, the risk of damaging these latter is of course increased, but, at the same time, the joint will be all the stronger as the metal will be almost as strong there as at any other point, and it can be forged, etc.

Solders are distinguished as *hard* or *soft*; the former require the application of a red heat, and can therefore only be used for such metals as gold, silver, brass; whereas the latter melt at very low temperatures, and can be employed for metals that have low melting points, or when it is important not to exceed a moderate degree of heat. The joint is, however, the more solid according as the heat employed approximates to that at which the metal will melt.

Composition of solders.—The solders ordinarily employed can be obtained at tool-shops, but it is advisable to give here the composition of some of the more important, specifying the metal to which they are applicable.

Aluminum solders.—I. Zinc, 70 parts; copper, 15; aluminum, 15.

II. M. Mourey employs a series of aluminum-zinc alloys, commencing with 2 per cent. aluminum with 98 per cent. zinc, and progressing to 20 per cent. of the former to 80 per cent. of the latter metal.

Gold solders.—I. Gold, 6 parts; copper, 1 part; silver, 2 parts.

II. Gold, 15 parts; silver, 2 parts; copper, 1 part.

III. Gold, 11.94 parts; silver, 54.74 parts; copper, 28.17 parts; zinc, 5.81 parts. The three first metals are melted together in a crucible, and when they have somewhat cooled, a rather greater proportion of zinc than is here indicated (to allow for loss by volatization) added, and the alloy constantly stirred.

Silver solders.—I. Silver, 2 parts; brass (for pin-wire), 1 part.

II. Silver, 5 parts; pin-wire brass, 1 part.

III. Silver, 10 parts; pin-wire brass, 5 parts; pure zinc, 1 part.

Tin solders.—I. (Ordinary soft solder.) Tin, 2 parts; lead, 1 part.

II. (Harder, and known as "Plumbers' Sealed" solder.) Tin, 1 part; lead, 2 parts.

III. Many other proportions of tin and lead are occasionally used. ranging from tin, 1 part; lead, 25 parts; to tin, 6 parts; lead, 1 part.

IV. (Very fusible solder melting in boiling water.) Lead, 3 parts; tin, 5 parts; bismuth, 8 parts. The fusibility is still further increased by adding mercury or cadmium.

Spelter solders.—(Used for brazing.) Copper and zinc in varying proportions. It becomes more fusible as the amount of zinc present is increased.

METHODS OF SOLDERING.

A thorough cleansing of the surfaces to be united is always needful, but more especially so in the case of soft soldering. It may be effected by means of acids or with a graver or scraper, etc.; the cleaned surfaces must not be touched with the fingers, and the soldering should be done at once. If acids are employed, the objects should be thoroughly washed after soldering, in order to avoid rust; and, after drying, they should be rinsed with alcohol.

The parts to be soldered are held in position with clamps, tweezers, pins, or iron wire. This latter known as *binding wire*, is used for delicate object and should be very pliable. When a high degree of heat is to be applied, all risk of the iron uniting with gold may be avoided by mixing a little sandiver with the borax employed.

Before heating, if there are already parts united with solder, they should be covered with borax to prevent softening.

Only a moderate heat should at first be applied, so as to melt the borax or sal-ammoniac without displacing it. The violent frothing up, which is very liable to displace the parts or the fragments of solder, can thus in great part be avoided. If a naked lamp-flame is used, or if it is directed on to the object with a blow-pipe, it should be, so to speak, large and soft, and the jet should not be directed to the point of juncture until the solder is observed to have fused. In soldering brass to steel, it is sometimes necessary to direct the flame against the brass only, in order, as far as possible, to avoid softening the steel. The hard solder for gold, silver, etc., require a considerable degree of heat, so that the objects must be heated to redness.

To solder gold and platinum to each other or to themselves.—On a hard wetted surface, marble, for example, rub a piece of borax until a white liquid paste is obtained, (or the powdered borax sold by chemists can be made into paste direct). Having prepared the borax, the surfaces to be united are cleansed either by scraping or with dilute nitric acid; the acid may be previously heated to boiling as it will then act more rapidly; and the surfaces are subsequently scraped. They are now covered with the borax with a paint brush, set in position, and small pieces of solder placed on the junction. As already observed, the heating must at first be gentle to avoid displacing the solder by the frothing of the borax.

To solder silver.—Also for uniting gold to silver, or silver, brass, steel to each other or to themselves.—Proceed in the manner already explained for gold and platinum, except that the borax paste must be sensibly thicker.

To solder tin.—Also for uniting gold, silver, brass to each other or to other metals, such as steel, iron, etc.—Clean the surface with a graver or scraper; sulphuric or hydrochloric acid may be used, but in this case the cleansing afterwards must not be forgotten.

The heating is effected as in soldering gold, unless a soldering iron is used, when the directions subsequently given should be followed.

To solder aluminum.—M. Mourey recommends the following methods:—

One of the series of aluminum solders, before mentioned, is employed, and, as a flux, two-thirds of balsam of copaiba, one-third very pure Venice turpentine, and a few drops of the juice of a citron; these constituents are pounded together in order to secure a perfect admixture.

The surfaces to be united are covered with solder (employing a soldering iron of aluminum) just as in the case of tinning, the flux just mentioned being used. The two surfaces, thus prepared, are placed in contact and maintained in the required position, and, after laying on the joint particles of solder that are richer in aluminum than the one used for preparing the surfaces, the whole is placed over a charcoal fire or heated before the blow-pipe, pressing gently on the pieces of solder, which will soon melt and should be distributed by means of a little tool of aluminum.

During this second stage of the process, it is necessary to be very cautious in the application of the flux; the pieces of solder should only be dipped in it before being placed in position, for the flux is mainly for use in preparing the surfaces; as soon as the solder has run well, the temperature should be lowered in order not to dry up and burn the solder, which would be apt to become brittle.

In preparing the solders, the aluminum is first fused and stirred with a small iron rod ; then add the zinc and stir agani ; add a liltte tallow and cast the solder into rods.

The zinc must not be too much heated, as it will volatilize, leaving the alloy rich in aluminum and therefore brittle.

Fluxes for soldering.—Various substances can be employed as fluxes for cleansing the surfaces to be united.

Sal-ammoniac reduced to powder and made into a paste with sweet oil, or merely dissolved in water.—A paste formed of *sal-ammoniac* and *resin*, reduced to powder with water or oil.—*Resin* alone will suffice for the soft soldering of copper or brass.—*Venice turpentine*, which has the advantage of not causing steel to rust, although it makes the objects sticky so that they require to be afterwards rinsed in alcohol or turpentine.

Various acid solutions are sold for the purpose and experience will enable the watchmaker to select that which is best adapted to his requirements.

Lastly, saturated *chloride of zinc* can be recommended. It is prepared as follows:—

Some dilute *hydrochloric acid* (which also goes by the name of spirits of salts, or muriatic acid) is placed in a glass flask and strips of zinc are added one by one ; the flask must be left uncorked and the zinc added a little at a time, less the effervescence that occurs should break the vessel. When the zinc added is not acted on by the fluid it may be concluded that the acid is saturated or "killed." and the fluid may then be transferred to a stoppered or corked bottle for use. In using it a small quantity is spread over the surfaces that are to be united and the solder will be found to run with great freedom (some authorities recommend the addition of sal-ammoniac to the extent of one-fourth the weight of acid taken.) It is well again to warn the reader that the pieces must be thoroughly washed after employing these liquids, for, otherwise, they will cause tools with which they are brought in contact to rust and will rust themselves if they consist wholly or in part of iron or steel. The vessel containing the fluid must be kept well away from the work-bench.

The liquid can be used immediately after being prepared as above explained ; but all acid reaction may be prevented by evaporating at a moderate temperature until of the consistency of oil ; it is then allowed to cool and kept in a bottle.

The soldering iron with a head of copper, such as is used by tinplate workers, is well known ; if made on a small scale it may occasionally be of service to the watchmaker. The tool may be **T**-shaped, one end of the horizontal portion, the copper head, terminating in a rather thin blade and the other enlarged, so that, when held in the flame of a lamp, it will store up a sufficient amount of heat. The upright part of the **T** corresponds, of course, to the handle. After the iron has been heated just short of redness in the dark, the end of the blade is moistened with soldering fluid and a small piece of solder attached to it. The object to be united is gently heated and also moistened with the fluid ; the iron charged with solder is presented to it, often with the enlarged extremity of the head maintained in the flame of a lamp, and the solder will, as a rule, run without again heating the object, although this might be done while the iron is still in contact. It may be found convenient to fix the iron in a suitable position with the lamp below the large end of the head ; the object will then be brought against the iron after being moistened with the fluid.

It is often advisable to *tin* the surfaces to be united previous to soldering them ; in order to do this they are moistened with soldering fluid, small pieces of solder are then spread over, and these are fused by passing the hot iron over the surface ; or the solder can be spread after fusion by means of a metallic rod charged with the liquid.

Brazing.—This operation consists in soldering iron, steel, brass, or copper, with an easily fusible brass, which is specially prepared in the form of coarse dust, termed spelter solder, or cut in thin strips of convenient shape. The method resembles, in all essential particulars the application of hard solders previously referred to.

Heat is usually applied direct by the blow pipe, borax being used as a flux; it is necessary to avoid a greater degree of heat than would melt the brass, since the object might in that case be fused. For fine work it is better to employ silver solder.

On an emergency, two pieces of steel can be united by brazing and subsequently hardened, and we have successfully practised this method in such a case as the following:—A small portion having been broken off from the quarter-piece of a repeater, we dovetailed into it another piece of steel of the required form, but a trifle too large at the upper side. When the brass had run well into the joint, and the piece was still at a full cherry-red heat, it was hardened, and afterwards cleaned and tempered to a blue color. The upper surface was then brought to shape with a good file, resting it on a wooden block against a projection, and, after making sure that it would act correctly, the whole was smoothed and polished. It has since worked well and does not show signs of wear.

Jewelers' Day.

FOLLOWING the precedent of several years, the 6th of July was observed as Jewelers' Day by a large number of representatives of the trade of New England and New York City. Nominally the occasion for the observance of this day is the annual game of base ball played between the jewelers' nine of Providence and the New York club, but in reality the game is little more than a pretext for a social reunion of jewelers. The festivities pertaining to such an occasion have been enjoyed alternately in New York and Providence. Four games of ball have been played, and each club has won two. More than usual interest centered in the game played in New York on the 6th ult., for the reason that an admirable programme had been arranged by the New York Club, which was enjoyed by about 500 gentlemen identified with the trade, and guests of the clubs. We present below a plain, unvarnished record of the day's proceedings.

On the morning of July 6th the New York Jewelers' Club assembled at the Astor House at 6 o'clock A. M., and soon after marched in a body to the foot of Warren street to await the arrival of the Providence boat with the New England Club on board. The steamer *Massachusetts* soon arrived, having a delegation of 200 persons, including a band of forty pieces.

After the usual exchange of courtesies the two Clubs formed in line and marched to the Astor House, where breakfast was served to the entire party. After breakfast, order was called, when Alfred S. Potter, President of the New England Manufacturing Jewelers' Association, presented, on behalf of his Club, to the New York Club an elegant silk American flag, which was received by President Marsh in a few well-chosen words; after this an hour was spent in conversation. At 8.30 line was again formed on Vesey street, the right resting on Broadway. The two Clubs, headed by the 13th Regt. band, now numbering about 400, took up line of march down Broadway to John street, to Nassau street, to Maiden Lane, to Broadway, to foot of Warren street. Every man in the procession carried a Japanese parasol, to shield him from the sun, which gave a unique and picturesque appearance to the marching column.

At the foot of Warren street the steamer *Blackbird* was in waiting to transport the entire party to Hoboken. It is to be regretted that the march through the streets occupied mainly by the trade occured so early in the morning that a large portion of those engaged in it could not see what a fine appearance the two Clubs made. Arriving at Hoboken, the column marched to the St. George Cricket Ground, where the annual base ball contest took place. Before commencing the game, Mr. Luther, of Luther Bros., called the players around him and informed them that he had prepared nine badges for the winning team. They were very pretty, surmounted with a gold rooster, suspended from which was a blue ribbon with "Champion" inscribed thereon. Underneath this was a corkscrew.

The game was the finest of the series that has been played, and resulted in a victory for the New York Club by the following score:

PROVIDENCE JEWELERS.

Players.	*R.*	*1B.*	*O.*	*A.*	*E.*
Davis, 1b	0	0	6	0	0
Cottrell, c	1	0	9	1	1
Pitts, p	1	0	0	5	0
Luff, c. f	0	0	0	0	1
Gardiner, 2b	0	1	0	0	0
Combs, 3b	0	0	1	1	0
Griffith, s. s	0	0	0	1	1
Carr, l. f	0	0	0	0	0
Fiske, r. f	0	0	0	0	0
Totals	2	1	16	8	3

NEW YORK JEWELERS.

Players.	*R.*	*1B.*	*O.*	*A.*	*E.*
Gaunt, c	0	3	12	4	0
Parks, 1b	1	0	4	0	1
Ford, 3b	0	0	2	0	1
Fenn, 2b	1	1	0	0	0
Cummings, p	1	1	0	0	0
Scribner, l. f	0	1	2	0	1
Kean, c. f	0	0	0	0	0
Dana, s. s	0	1	1	0	0
Fuller, r. f	1	1	0	0	0
Totals	4	8	21	4	3

Score by Innings.

Clubs.	*1st.*	*2d.*	*3d.*	*4th.*	*5th.*	*6th.*	*7th.*	
Providence Jewelers	1	0	0	0	0	0	1	2
New York Jewelers	3	0	0	0	0	1	—	4

Runs earned—Providence Jewelers, 0; New York Jewelers, 0. First base by errors of opponents—Providence Jewelers, 2; New York Jewelers, 3. Total left on bases—Providence Jewelers, 2; New York Jewelers, 6. Total base hits—Providence Jewelers, 1; New York Jewelers, 8. Struck out—Providence Jewelers, 8; New York Jewelers, 10. Wild pitches—Cummings, 1. Pass balls—Gaunt, 3; Cottrell, 4.

Time of game—One hour and thirty minutes.

Umpire—Mr. Gill, of the Nameless club.

There was considerable fault found with the managers for calling the game at the close of the seventh inning, but it was found to be absolutely necessary in order to complete the programme of the entertainment.

At the close of the game the column was again formed, and the clubs marched back to the *Blackbird* and sailed up the Hudson to the Palisades, landing at the dock of the Palisade Mountain House. Then came the most tedious march of the day, up the Palisades to the hotel, where dinner was served in the spacious dining rooms of the hotel. After dinner the following toasts and responses were given:

"The Day we Celebrate." Responded to by Frank E. Knight.

Mr. K., in response to the toast of "The Day we Celebrate," called attention to the fact that the New York Jewelers' Club were glad to celebrate the occasion of their meeting with their genial friends from Providence, who had before so royally entertained our association on our visit east. That an opportunity to witness the youth and beauty, the flower of the trade, so to speak, was a fit event to be celebrated.

That as we were seen this morning on the streets of the great metropolis in all the glory of our kaliedioscopic array, the feeling was to every man of us on this, "the day *we* celebrate," I'm a jeweler and proud of it. He then called attention to the appropriateness of the selection of that day, the 6th, to be a day to celebrate, owing to the fact that roll-plate jewelry and lever sleeve buttons were first made on July 6th; and if he remembered history aright, Christopher Columbus, from the deck of the *Mayflower*, discovered "Rocky Point" on July 6th, which was about the best place in the world for a hungry and thirsty voyager to land, as we, the New York Jewelers, discovered on a 6th of July only one year back. He also was informed that the Declaration of Independence was originally to have been signed on the 6th of July, but some of the Continental Congress, which was largely composed of jewelers and loyal members of the New England Manufacturing Jewelers' Association, had a little picnic on hand for the 6th, and like good business men, thought they'd better sign up that little document and get it out of the way, so that they might go off and enjoy themselves on picnic day. These were reasons enough, he said, why we should continue to celebrate as we do this famous day.

The remarks were closed by the mention of the fact that there was a day we hoped to celebrate some future 6th of July, when the New York Jewelers' Club might be instrumental in a movement to open the doors to our friends in the trade from all parts of the country, of a "Jewelers' Exchange," for business purposes, where matters and business of trade importance could be regulated as the affairs of other trades were by similar institutions—suggesting that benefits in a social and business way would certainly arise, advantageous to the trade. To that we would all look forward. It would be "*The* Day we Celebrate."

Mr. Alfred S. Potter, of the New England Club, also responded briefly to this sentiment, in a few well-chosen and graceful remarks. He was glad to assist at a social entertainment of this character, of members of the trade, and paid a high tribute to the character of the men engaged in it.

The second toast, "Our Guests," was appropriately and pleasantly responded to by General E. H. Rhodes, of Providence, who said it gave him great pleasure to meet so many representatives of one of the largest and most prosperous industries of the country.

The next toast was "The Jeweler," which was responded to in a spirited and eulogistic manner by A. Mohle, on behalf of the New York jewelers. The speaker said the jewelers' art was one of the most ancient and highly respected of any known. It was frequently spoken of in the Scriptures, and had been especially favored by royalty through all ages. He spoke in the highest terms of the commercial integrity and high moral character that had always pervaded the trade, and that made the name of the jeweler respected everywhere. The speaker elicited hearty applause by his numerous well-made points, and at the conclusion of his remarks was heartily cheered.

Mr. Benjamin Hall also responded to this toast on behalf of the New England representatives. His remarks were well-chosen and appropriate.

It was with difficulty that the speakers could make themselves heard in the large dining room, where several hundred persons were indulging in more or less conversation and moving about. The reporters certainly were unable to make connected reports of the speeches, and this must be our excuse for not giving a more extended report of them. It had been announced that the steamer would leave on her return trip at 4:30 o'clock, to enable those of the Providence Club who desired to return by the *Massachusetts* that night, and it was necessary, therefore, to defer the responses to the remaining toasts until the party had reassembled on the boat. The other toasts and responses were as follows:

"The Commercial Traveler." Response by T. L. Parker.

Mr. President and Gentlemen;

In response to the toast of the "Commercial Traveler," permit me to say that I am happy and proud to respond for so large and influential a body of gentlemen, and to be classed and recognized as one of them.

The limited time allowed me will not permit of tracing the origin or commencement of Commercial Travelers—suffice it to say they are of ancient origin, and descended from good solid stock. I can safely say 18-k. at least.

Let me briefly state some of the qualifications possessed by a Commercial Traveler: 1st, he is energetic; no drone is he in this bustling world, but alert always, never tiring, shrinking not from difficulties that would appal others, and should he by some mischance be thrust aside, quickly recovers, and is ready with some new expedient, and from apparent defeat, brings victory.

2d. Capability and honesty.

Probably there is no business in this wide world that requires as much ability to achieve success as a Commercial Traveler. He must combine the buyer and seller—must be thoroughly conversant with the goods he represents, and keep thoroughly posted regarding their market value, and in this age of sharp competition, be ready at any moment to act promptly, with good judgment, to advance or protect the interests of those he represents.

Of his honesty I presume I need go no further than to appeal to our own business—which is one where thousands of dollars in value are placed in the possession of Commercial Travelers to dispose of; how careful they are of such trusts; what watchful care do they exercise, and "I must look after my trunk," is the first consideration, and until the safety of his goods is assured, is oblivious to all his surroundings.

That the Commercial Traveler possesses this ability is undisputed; that it is recognized by our business houses is also true, and much of the prosperity and large business done by our leading merchants is directly traceable to their Travelers.

3d. Faithful to his duty.

In this particular I yield to no one the superiority of being faithful—claiming for the Commercial Traveler that he has greater difficulties to surmount to perform his duty, than has any other class.

Remember, he is always expected to be at his post irrespective of circumstances. In summer's heat or winter's cold—when the thermometer is hovering around the nineties, or sinking below zero—it is expected he will be "on time" as to his schedule; will always be pleasant and agreeable. The annoyances which others complain of (and with just cause), he is expected to become hardened to, and like the martyrs of old, smile sweetest when suffering most keenly, mentally or physically.

To perform duties under such difficulties requires well-grounded and firm convictions of faithfulness.

Mr. President, I cannot close my remarks without ascribing just praise to the Commercial Traveler for his morals. Just glance, if you will, at the temptations he is surrounded by constantly; how easy to do wrong, how hard to do right! Remember, he is away from home and its refining and restraining influences, and if he should err, if he should fall, enter no harsh judgment against him. Conscious of your own frailties, remember, to err is human; to forgive divine,

The "Jewelers' League." Response by R. A. Johnson, of New York.

If I had received the slightest intimation that I was to be called upon to speak, I should have prepared as best I could, a response worthy of the theme and of the occasion. But to be called upon thus suddenly, without even a moment's time for preparation, surprises me, saddens me, embarrasses me, demoralizes me, breaks me up. [Here the speaker produced a roll of manuscript, and read his speech as follows]: I thank you most sincerely for the reception you have accorded me, as a representative of an Association that I love, and with which, through the kindness of its members, I have been officially connected since its very organization. We have a grand association, and we are very proud of it. We have a membership that extends all over the broad land. We are the banner association of our kind, and the white plume of the Jewelers' League, like that of Henry of Navarre, is always to be seen at the front. I congratulate all of you who are members, and most respectfully suggest to those of you who are not, who have near ones and dear ones dependent upon you, that it is your privilege, and it may perhaps be your duty to become members. Five years have elapsed since the ground was broken for the erection of this typical edifice of ours, "The Jewelers' League of the City of New York." Silently, like some mythical palace in the Arabian Nights, has the fair building loomed up into view, and to-day it stands almost complete in its beautiful proportions. But its foundations are on the solid rock, and not in the cloud land. It is real and substantial, not imaginary and etherial. It may be necessary to make additions to the structure to increase its capacity; it may be necessary to alter in some respects the original plans of the architects to increase its stability, its solidity, and then the building should stand, the building will stand through the ages, for its every stone has been well and properly laid by our mutual efforts; its every stone is cemented by our mutual interests, and it has for its corner stone the brotherhood of man. There is that scattereth and yet increaseth. Come with us you that are not with us, and get good for yourselves as you do good for others. Already we have the sweet satisfaction of the good we have done, and so it will be in all the future. From state, and city, and village, from store, and office, and bench, let us gather in those we were organized to benefit, and let us say with Longfellow:

Then come the wild weather,
Come sleet or come snow,
We will stand by each other
However it blow.
Oppression and sickness,
And sorrow and pain,
Shall be to our Union
As links in the chain.

T. W. Manchester also responded to this sentiment in behalf of the New England Club, as follows:

Mr. Toastmaster and Gentlemen:

To be honored with a call to respond to a toast upon this occasion, is no surprise to me, yet I am not prepared to do the subject justice. Intense application to the duties of the Executive Committee of the New England Manufacturing Jewelers' Association for the past four weeks, has prevented my giving the subject of speech-making a single thought.

Every man, on receipt of his certificate of membership in the Jewelers' League, becomes a full-fledged life insurance agent, and is expected to work faithfully, and without commission, to increase its membership.

They have performed their duties, and to-day we have a membership of two thousand, scattered all over this country, in the Canadas, and even in France.

They have left nothing for me to talk about on the subject of the League that you are not already familiar with.

We have from the start been extremely fortunate in securing able and efficient officers, and to-day we have a President, Vice-Presidents, Executive Committee and Secretary, who are eminently qualified to fill any position in the gift of the American people.

This is the second time I have been honored with a call to respond to a toast. The first time occurred fourteen years ago, at a camp fire of Prescott Post Department of Rhode Island, G. A. R. How well I succeeded on that occasion I will leave you to be the judges, when I tell you that I have attended nearly all the camp fires of that post during the past fourteen years, and have never been called on for a speech since.

I trust I shall be equally as successful with this, my second attempt. I will close by presenting this sentiment:

"The Jewelers' League of the City of New York. May the League be as fortunate in securing 'good men and true' for officers in the future, as it has in the past."

"The Press." Response by Clifford Thomson, of New York.

Mr. Chairman and Gentlemen:

After the very delightful excursion we have had to-day—after witnessing the very exciting game of base ball that has been played—and especially after partaking of the very bountiful repast to which we all brought such voracious appetites—it seems almost like the refinement of cruelty to ask these patient gentlemen to listen to any remarks from so inexperienced and unaccustomed a speaker as myself. The editorial training is opposed to oratorical effort. We are in the habit of committing our ideas to paper instead of declaiming, and, consequently, the art of speech-making is a difficult one for journalists to acquire. But speech-making is as much a national game as base ball, and if we were to disperse to-day without the customary display of oratory, the star spangled banner would be disgraced, and the American eagle outraged.

We have a saying in newspaper circles that "he writes best of that which he knows least," and, logically, he must write badly of that which he knows most. This is an excellent reason why I should not have been asked to respond to this toast, for I have been identified with the press nearly all my life, and know too much of its tricks and manners to become a satisfactory eulogist of it. By the rule I have mentioned, you might with propriety have asked me to say something about jewelry, for literally I know nothing about it. How should I? Chronically impecunious editors never have money enough at one time to *buy* jewelry, and nobody ever gives them any, so that they can't be expected to know anything about it, and, consequently, are duly qualified to write or talk about it without limit. How I would like at this present time to glorify your art—to extol the wonders of your handicraft—to speak glowingly of the art and skill combined in your productions. How my imagination would revel in descriptions of your pearls and sapphires, your rubies and opals; how I could delight your ears with tributes of the marvelous luster of your diamonds, that flash back the rays of the sun with all the sun's brilliancy. I should like to compliment you upon the success with which you have wedded art to skilled labor, and to praise the wonderful progeny of masterpieces that have resulted from that union. Why I could speak of these things by the hour, for I know absolutely nothing about them, and there would be no restraint upon my imagination. But I am to speak of the press, and am expected to entertain you with remarks upon a theme that constitutes the humdrum routine of my daily life. When I try to concentrate my thoughts upon this familiar topic, I find my wits are wool-gathering—they have been taken prisoner by the recollection of the stirring events of the day, and will not come at my bidding. It reminds me of the Irish soldier on picket duty during the war. He had been stationed in an exposed position on the Rapahannock, in full sight of the rebel pickets across the river. Along towards night his captain visited the post, but no sentry was visible. Thereupon the captain began to call.

"Pat McCarty, Pat McCarty, where are you."

A voice from the distant brush on the other side of the river responded,

"Here I am captain."

"Come here, Pat," said the captain.

"I can't," said Pat.

"Why not?" said the captain.

"I have a prisoner," said Pat.

"Bring him with you," said the captain.

"I can't do it," said Pat.

"Then come without him," said the captain.

"*He won't let me*," said Pat.

But to resume my theme—The Press. If there is any one thing more than another that I don't know anything about, it is base ball. To be sure, I used to play what we called base ball when a boy, but it bore no more resemblance to the scientific game we saw to-day than a fire gilt hole does to an 18-karat wedding ring. If you had only asked me to respond to a toast about the national game, I should have given a long dissertation about the diamond field, home bases, pitchers, and fielders and all the rest of it. I never witnessed but one scientific game of ball before to-day, and that was a game of cricket. It was played on the same ground we have been occupying to-day at Hoboken, between a famous English eleven and the St. George Club of New York. I was then a reporter connected with the *Tribune*, and was detailed to report the cricket match. I didn't know anything about the game, and couldn't have told whether a wicket was the man with a hat or the one who got batted. It was a very hot day, and cricket is a slow game, so I looked around for a shady place to take a nap. I soon came to anchor under a tree and went fast to sleep. Newspaper men don't often get a day in the country, and when they do they like to enjoy themselves. I was trying then to catch up with the sleep I had lost the week before. When I awoke, the game was finished and everybody going home. I found one of the judges and obtained from him the names of the players, and who won the game. Next morning I had a brilliant report in the *Tribune*. There was a glowing description of the Elysian Fields, and of the Hudson River as seen from the Palisades, and a highly original interview with one of the Englishmen as to his opinion of the country and our form of government, winding up with the score of the game and the names of the players, but didn't say a word about the play. In the office that was considered a brilliant report, for which I received many compliments. You see there was no one in the office who knew any more about the game than I did, and among the blind, you know, a squint-eyed person may be king.

But this is digressing. Let me return to my subject, The Press. I said that cricket was a slow game—so different from base ball, where there is so much hitting, and pitching, and running, and catching, and breaking of fingers and battering of shins, and perspiring—for real, genuine interest there's nothing like base ball. And I don't wonder that such live, active fellows as you jewelers enjoy it. There's nothing sleepy or dead about you. That reminds me of a story I heard the other day about two travelers in the trade. They are modest men, and as I do not wish to see them blush in public, I will call them Charley and Sam. These gentlemen were on the road with their samples, when they struck the town of Dexter, Michigan. Of all the dead-alive towns I ever saw, that is the worst. It has been a corpse ever since it was born, and the citizens haven't got life enough in them to bury it. Well, Sam and Charley went to bed and put in a tolerably fair night's sleep, for there wasn't life enough in the town to keep them awake, and there were no pretty girls in the street to flirt with. In the morning they went down to the public wash room and took a wash in the public wash basin, and wiped their faces on the public towel, and while Charley was looking for the public tooth brush, Sam was about to comb his hair with the public comb, when he suddenly called out, "Charley, look here." Charley came up, and Sam held out the comb to him, exclaiming,

"What do you think of that?"

Charley examined the comb a moment, and then exclaimed,

"Well, I m d—d glad to see *something* in this town that's got life in it."

But speaking of the press. We often hear it complained that our newspapers lack vim and life—that they are prosy and dull. This is due entirely to the fact that their editors never play base ball. Instead, they cultivate torpid livers and dyspepsia, which accounts for the bilious tone of their editorials. If they would play base ball a few hours a day, what a relief it would be to their suffering readers. What a glorious sight it would be to see the editors of our city papers pitted against each other in a game of base ball. Imagine Whitelaw Reid, of the *Tribune*, for instance, as catcher, with Jim Bennett, of the *Herald*, as pitcher. Dana, of the *Sun*, would put in good work at the bat, while Carl Schurz, of the *Evening Post*, with his long, precarious legs, that make him look like the afternoon shadow of a hairpin, would do excellent fielding. Dan Hopkinson, of THE JEWELERS' CIRCULAR, would make an excellent short stop, while George William Curtis, Joe Howard, John Russell Young, Park Godwin, John Senior, and the other bright and shining lights of the profession, could find employment in various parts of the field, or stand guard over the editorial inspiration contained in the beer kegs under the trees. One day's sport of this kind on the base ball ground would infuse more life and vigor into their editorial columns, than all the brandy and soda or cheap champagne Delmonico can furnish in a month.

But I did intend to say something about the influence of the press in contributing to make base ball so popular a game, but as base ball is pretty well able to take care of itself, I will omit that. Nevertheless, I entirely agree with one of our famous Generals, that the press is a power in the country, and wields a great influence for good or evil. I refer to General Schenck, our late Minister to England, who is popularly supposed to have taught Queen Victoria and all her subjects how to play draw poker. I see some of you gentlemen straighten up at the mention of draw poker, evidently under the impression that I am going to give you some points regarding that game, but I assure you I am not—in that respect I am like the Heathen Chinee, for that is a game I do not understand. Well, some of the papers at one time attacked Gen. Schenck very bitterly, and kept firing hot shot into him for some time, but he did not take any notice of it. Someone asked him one day why he did not reply to these attacks. He replied "it's no use—they are too powerful for me. I am waiting till they find another victim, then they'll drop me. But as for trying to stop their talking, that's impossible. You might as well buck a bob-tailed flush against four aces as to buck against the press."

I might occupy your time for an hour or two talking about the press, its mission, its power, etc., but it's too hot, and you know as much about that part of it as I do. Thanking you for the enjoyment I have had to-day, and for your patience in listening to what I did say, and congratulating you for having escaped what I might have said, I take my seat.

On the trip down the river, the bands treated the party to numerous selections of music, and several singing parties held forth in various parts of the boat. The trip and the day were most enjoyable throughout.

Upon arriving at the dock in New York it was found that the obliging Capt. Allen, of the *Massachusetts*, had held his steamer for the party. After bidding good-bye to those who desired to leave for Providence, the line again formed and marched to the Astor House, where the parade was dismissed, and thus ended the fourth annual entertainment of the two clubs.

Officers of the New England Manufacturing Jewelers' Association: Alfred S. Potter, President; Dutee Wilcox, 1st Vice-President; W. H. Luther, 2d Vice President; John A. McCloy, Secretary; Ralph S. Hamilton, Jr., Treasurer; I. N. Potter, Chief Aid.

Officers of the New York Jewelers' Club: C. D. Marsh, President; Frank Bliss, Vice-President; J. G. Fuller, Treasurer; C. W. Cooley, Secretary; E. A. Bliss, Marshal; E. Untermeyer, Geo. Fenn, Aids.

The success of the entertainment reflects great credit upon the various committees, all of whom worked indefatigably to secure the comfort of the party. As the base ball clubs are now a tie on games, it is suggested that the playing of the Clubs be dispensed with in the future, as such a small number can participate in the play. It is thought that if the social features of Jewelers' Day are brought more prominently forward, and a programme arranged in which ladies can participate, it will be more acceptable to the majority. The presence of ladies would tend to keep in subjection the few who always take advantage of such occasions to demonstrate that when free from restraint they are out of their element when in the company of gentlemen. It is probable that next year an entertainment of a different nature will be provided, to which the gentlemen can bring their wives and lady friends.

Clocks and Watches.

ANCIENT AND MODERN FASHIONS IN TIMEPIECES.

WHAT a fascination there is about the ticking of a clock! How persistent it is, and how unsympathetic; the monotony of its ceaseless refrain seems at times almost remorseful. There is a companionship in it, too, but it is the companionship of sorrow, never of joy; of quiet endurance, never of jubilant ecstasy. Who ever heard the ticking of the clock in the delight of a reunion? Then it may "tick on unheeded." It is in the trial moments of life that clocks assert themselves; in the moments when "heart-throbs make up life" that the voice of the timepiece is heard. Who has not sympathized with little Paul sitting upon the stairs at Dr. Blimber's, listening to the great clock in the hall, with its monotonous "How is my little friend? How is my little friend?" Who has not realized the intrusion of the clock in moments of grief? It will be heard. When the sails of our beloved are set for the eternal shores, when we count the moments and implore for yet another, only one, as the sand drops in the glass, who has not heard the ticking of the clock? And when memory conjures up the scene, and every detail repeats itself upon the agonized brain and heart, is the memory of that ticking ever absent? The clock is like a living thing. All inventions are embodied thoughts, but the clock is like an imprisoned soul, as though the longing, doubtings, fearings of countless generations had fossilized within it the dreary monotone of endless ticking. No wonder superstition has clung to it. No marvel that so often, when in the tales of murder or of doom, the listener is strung up to the highest pitch, the narrator will say, "And at that moment the clock stopped." So in the popular account of a death how often we hear, "And as he died—the clock stopped."

The ancients were almost enviable in that they had them not. For them, luxurious as they were, no clock adorned their tripods, no watch played its part in the réportoire of a lady's possessions. But perhaps their methods of gauging time were yet more impressive than our own, for the clock of modern invention may vary, but the great timepiece in the heavens never varies, but casts its shadows as regardless of human hearts, and interests, and cries, as any horloge of any age. If we seek for the origin of any invention, clouded as all inventions are in mystery, we invariably turn to the unclouded country of the east, and there among the splendor and luxury of the Babylonians we discover the first indication of the ancestry of clocks. This was the perpendicular staff or pillar which was so placed, that at sunset it cast a shadow equal to twelve feet, and time was computed by the length of the shadow. So supper-time was called the hour of a ten-foot shadow, and the hour of the bath, in later records, was the time of a shadow six feet long. Any very accurate measurement of time was, of course, impossible under this method, but we see in the "gnomon," as it was called, the first indication of the sun-dial, referred to in Kings, when Isaiah, by supplication, brought the shadow back upon the dial. From Babylon to Greece transition was easy, and in Grecian history we read of the Polos, which was the foreshadowing of the later sun-dial, and which was like a shallow basin, in the center of which an upright staff was fixed, the days and hours being marked upon the basin with lines. Little as there is in either of these methods akin to our own, there was equally little in the water clock, as it is called, which was certainly in common use in Greece in the days of Aristophanes, for he computed the time consumed in a law case by reference to it.

It is a little difficult to recognize exactly what class of timepiece is intended when reference is made therein by ancient historians, for the word horloge covers them all, or, rather, the Greek word from which horology is derived, is used for sun-dial, water clock, sun glass, or wooden clock indiscriminately. The water clock was a curious contrivance, and a very uncertain one, and was the first of which we have any record as measuring time by mechanical means. Some writers think that it was in use in China, Chaldea and Egypt before the general knowledge of the sun-dial, but whether that was the case or not, it was very ingenious in its way. It consisted of a hollow ball, flattened a little at the top to the shape of a poppy head, from whence it derived its Greek name. There was an opening at the top where the water was poured in, and this was kept closed with a stopper, so that the water was not liable to be spilled over, and various small holes on the opposite side allowed it to trickle out as if through a filter. Time was computed by the gradual diminution of the water in the vessel. The rachestones must have been of stone, but later on, after the invention of glass, transparent walls were used, and the water was supposed to run dry every hour. No reliance, however, could be placed upon it, for the flow of the water fluctuated under climatic and atmospheric conditions, and the Greeks and Romans can hardly have been "punctual to the minute" if they relied upon the clepsyda, as the water clock was called. It seems likely that these mechanical clocks were in use in the houses or court of the houses, while in all public places, squares, or on monumental buildings, sun-dials were universally used. In luxurious families a slave was kept on purpose to watch the sun-dial and water clock and to report the time, and we all remember the stupid Tremalchio, who had a timepiece in his room and a slave beside it, whose duty it was to tell him each time an hour had elapsed. A wonderful water clock is on record some centuries later, when Haroun Ali Raschid sent Charlemagne a striking clock regulated by water, in which, as twelve hours were completed, twelve doors on the face or dial opened, and twelve men on horseback rode out and returned, closing the doors behind them.

After water clocks come sand glasses, existing in our midst as egg timers, and still known as hour glasses, although they seldom exceed three or four minutes in operation. These were in greater favor in western Europe than water clocks ever became, and the best time indicator of which we have definite knowledge is the candle clock of King Alfred, and his ingenious adaptation of transparent horn to keep the draughts from burning his candles unevenly.

The time of the invention of wheel clocks moved by weights is still more uncertain than that of water clocks and sun-dials. Some enthusiasts are found to assert that 220 years before Christ such a clock was made—in the time of Archimedes—but there is no evidence to support such a belief. The first unquestionable fact that can be stated upon the subject, is that Pope Sylvester II. did construct a wheel clock with weights at Magdeburg in 996, and it is just possible that this was only a revival of an earlier invention, and that Boethius was the originator of the mechanical wheel clock in A. D. 510. One thing, however, is certain, namely, that clocks were in ordinary use in the monasteries of Europe in the eleventh century, and no doubt the monks, who had plenty of leisure and ample means for the cultivation of experimental science, perfected them, and in a large measure contributed to the perfection of their machinery as we know it. In 1370 a clock was made in France which was considered a marvel of accurate time keeping, and which may have had a pendulum, but we cannot find positive evidence of the discovery of the use of the pendulum until the days of Galileo, although ancient astronomers are said to have used them in computing the duration of eclipses. From the date of Galileo's discovery to recent times, constant improvements have been made in the science of horology, until it has reached what we may call perfection.

The great contest of watches, or more properly of clocks, between Hayghens and Dr. Hooke in the seventeenth century is a matter of history, as are also the discoveries to which they gave rise in regard to the eliptical shape of the earth; but dismissing such deeply scientific problems, we will content ourselves with a glance at the introduction of the first watch or portable clock. Edward VI. appears to have been the first Englishman to wear a watch, and this consisted of "onne larum or watch of iron, the case being likewise of iron gilt, with two plumettes of lead;" that is to say, it was driven by weights. This is supposed to have been received by the King as a present from Nuremberg, and was playfully called a Nuremberg animated egg. The word watch was derived from an Anglo-Saxon word meaning to wake. The first portable timepiece of which we have any record, was that of the Chinese pocket dial mounted upon the head of a cane or carried by a chain round the neck. An Italian sonnet written by Gaspar Viconti in 1490, makes mention of watches, and Shakespeare refers to one in "Twelfth Night," when he makes Malvolio say: "I frown a while, and perchance wind up my watch." Queen Elizabeth had a watch in shape exactly like a duck, with chased feathers, the lower part of which opened, and the face or dial was of silver, ornamented with a gilt design. The outer case was of brass, and that in its turn was covered with black leather ornamented with silver studs. Queen Mary of Scots gave a curious token of her affection to her faithful maid of honor, Mary Seaton, in the shape of a watch in the form of a skull, the dial occupying the place of the palate, and the works that of the brains. The hours were marked in Roman letters. A bell in the hollow of the skull received the works, and a hammer struck the hours. Striking watches were uncommon, and in the time of Louis XI. a stolen watch was discovered in possession of the thief by its striking. Guy Fawkes and his associates had a watch when they intended to blow up the Houses of Parliament, "to try conclusions for the long and short burnings of the fusee." All these early watches had but one hand, and required winding up twice a day, until, in 1550, springs were substituted for weights.

Very few persons estimate the amount of work there is in a watch of modern manufacture. Nearly a thousand processes are in use in completing them. There are fifteen distinctly different kinds, and as many as 150 varieties of finish, number of jewels, construction of balance, etc., and independent of cases and their varieties. Women are largely employed in the work of watchmaking, especially in Switzerland; but since the year 1850 the whole process has undergone immense change by the substitution of machinery for handwork, which originated with Mr. Dennison and Edward Howard, of Boston, who established the first manufactory of watches at Roxbury, Mass., whence it was moved, in 1854, to Waltham, on the Charles River. Each separate portion of the watch is made on a machine specially constructed for the purpose, and the gauges employed are so accurate that the one-seventeen-hundredth part of an inch can be measured. Some of the portions used in making a watch are so minute that it takes 150,000 of them to weigh one pound.

It is quite unnecessary to enumerate the marvelous clocks which have a world-wide celebrity, the Strasburg clock, for example, or that at Berne, the many old cathedral clocks in England, that, for instance, in Exeter, which retains the striking part made in 1300, while the great clock in Canterbury Cathedral is nearly 600 years old. But it is of interest to know that two clocks have been exhibited in this country within the last two years, which were made, we believe, at Columbus, Ohio, and one of which is an exact reproduction of the world-renowned clock of Strasburg Cathedral. When we come to a consideration of modern clocks we find a variety, limited only by length of purse, and purpose for which they are intended, from the little timepiece costing less than a dollar, suitable for shipboard and traveling, to the exquisite horologe in marble and gold, with its cameos and statuettes costing its hundreds of dollars. Musical and chiming clocks play an important part in modern households as surely as they are losing favor in church steeples. They were invented in Germany, and we read of them in 1580. As adapted to rooms, they are sometimes exceeding sweet in tone, and sometimes a very great nuisance. However, chime clocks are favorites in many homes, and what is known as the Westminster chime is as popular as the cuckoo clock of German origin was a while ago. Clocks are, of course, adapted in style to the rooms for which they are intended, and certainly no room is complete without one. It is becoming more and more usual to increase their number, and as everyone nowadays carries a watch of some sort or other, so every room, however humble, has its clock. In France notably, and in England usually, it is the fashion to have mantel-shelf sets, including the clock and candelabra of the same style, and very handsome such sets often are. For dining rooms they would be in marble or bronze, or dark carved woods; in the drawing rooms, of ormolu or gilt, beautifully decorated, very often with medallions painted by hand, and frequently covered by glass shades. Very handsome stands are made in Dresden china, the value of the clock depending, after a certain moderate sum for the works, entirely upon the material and workmanship of the case.

The latest improvements in horology have been mainly in the adaptation of electricity to the working of the mechanism. Until quite recently, difficulties of various kinds have baffled the inventors, but it seems now that there is a prospect of electrical clocks, that is, clocks wound by electricity, coming into general use. The French some time ago introduced the invisible stem winder, which obviated the necessity of the use of any key, upon much the same principle as the stem winding watches, which are now universally liked, and by an ingenious use of electricity, a clock is now made to repeat in the same manner as a repeater watch, by simple pressure upon a ball attached to the works by an electric band. Quite recently an inventor has perfected three methods of setting the machinery of a clock in motion by means of electricity, which are known respectively as the papillomone, asteroriome, and commutator escapement methods, in each of which electricity is the motive power, which, acting upon the pendulum, impels the machinery to keep in motion as long as the electric current is supplied. The little batteries which furnish the electricity, and which send the current through the coils of the electro-magnet, are concealed in a drawer fitting into the base of the clock, and are stated to contain sufficient carbon to last for two years, during which time the clock will require no attention and will not stop. If the inventor is correct in his statements, he has more nearly discovered the secret of perpetual motion than anybody else, for if a clock can go for two years without stopping, who, in these days of gigantic enterprise, will stop short of making one that shall never stop? We are at least justified in expecting that that will be the next thing, and while invention is busy, what a comfort it would be if we should discover that "noiseless" clocks and automatic watches were as possible as noiseless sewing machines! Among other novelties in the line of clocks we hear of the calendar clock, which keeps the correct date always in view, regularly producing a new one as it passes the old card out of view, and in connection with it a new case for a clock, which, in obedience to the popular call for metamorphoses, ceases to be a case and becomes a stand for the clock at the earliest possible notice With this we have little sympathy, but we confess to an immense admiration for some of the latest fashions in the stands of clocks. In one two female figures in gilt uphold high above their heads a bronze globe, which forms the clock, while upon it, perched as lightly as a fairy, a laughing cupid points with dimpled finger to the hour. So much depends upon the case of a clock to-day, that individual taste alone can select a fitting one.

We have made but a passing allusion to the great historical clocks of Europe, but must not omit to mention a curious controversy between the townsfolk of Beauvais, in France, and those of the famous German towns, with regard to the respective merits of their celebrated clocks. The townsmen of Beauvais claimed that besides recording the calendar days of the week, month, year, zodiacal signs, eclipses, phases of the moon, etc., their clock indicated events occurring not oftener than once in 400 years; for example, in three centuries out of four the last year leaps its bissextile, and the clock leaps from Feb. 28th to the 1st of March, a movement occurring once only in 400 years. A Strasburger, not to be outdone, claimed that his town's clock not only did all that the Beauvais clock could accomplish, but in addition to them contained an ecclesiastical computator, and gave all its indications, golden numbers, solar cycles, etc., and wound up by asserting that "the Beauvais clock makes a change every four centuries, but ask an astronomer what is meant by the precession of the equinoxes. He will tell you that it is a movement of the stars describing a complete revolution around the earth in the space of 25,000 to 26,000 years. In our Strasburg clock there is this movement, which receives only one revolution in 25,000 years. As this whole thing," adds the apologist of the Strasburg clock, "can be measured and indicated, it is unnecessary to await its accomplishment." Well, we are glad of that.

Patent Reports.

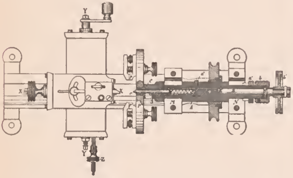
WATCHMAKERS' LATHE.—David L. Petitpierre, Couvet, Neufchatel, Switzerland. Filed Jan. 25, 1882.

Claim.—1. In a watchmakers' lathe, the tubular shaft *A*, plate

P, and pin *C*, in combination with the pin disk *B*, B^2, and nuts a' b, substantially as and for the purposes specified.

2. The plate P', in combination with the cap r', secured thereto, the pins a^4 b^4 in the cap, and the dogs q' upon the plate P', substantially as and for the purpose specified.

3. The plate P', in combination with the cap r', pins a^4 b^4, dogs q', and push pieces s', substantially as and for the purposes specified.



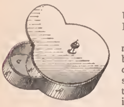
4. The strap *U*, support *T*, spindle *W*, and boring or sinking tool, in combination with the screw *R*, passing through such support, and the shoe *S* upon the strap *U*, substantially as and for the purposes specified.

5. In the manufacture of pillar plates for watches, the several plates P' P^2 P^3, etc., adapted to hold the pillar plate during the several operations, each provided with a cap to receive the pillar plate, pins to position the pillar plate, and dogs to hold it within the cap, the caps and pins so placed that the pillar plate is brought to its proper position successively upon the respective plates, to bring the center to be bored central with the axis of the plate to which it is held, as specified.

Jewelry Stock.—Carl F. Heckmann, Plainville, Mass., assignor to Joseph T. Bacon & Co., same place. Filed Mar. 10, 1882.

Claim.—1. As a new manufacture for the ornamentation of jewelry, sheet metal stock embossed to represent the interlaced strands of a braid composed of parallel threads or wires, and provided with quadrangular perforations at alternate spaces between the represented strands, whereby, when applied to an article of jewelry, a contrasting surface may be shown at the quadrangular perforations, thus serving to imitate an article of jewelry covered with openly-braided strands of parallel threads or wires, substantially as described.

2. As a new article of manufacture, a bar pin covered with the above-described embossed and perforated imitation braid stock, substantially as described.



Alcohol Vessel for Watchmakers' Use.—George P. Reed, Melrose, Mass. Filed Jan. 25, 1882.

Claim.—In an alcohol vessel for watchmakers' use, a larger compartment, in combination with a smaller communicating compartment, and a cover common to both, said cover being arranged to uncover the the smaller compartment without uncovering the other, substantially as set forth.

Watch Pendant.—Ezra C. Fitch, New York, N. Y. Filed Feb. 15, 1882.

Claim.—1. A watch pendant bow or ring formed with flat stiffening webs or flanges extending around its inner circumference on either side of the crown, substantially as and for the purpose set forth.

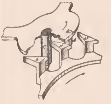
2. A watch pendant ring formed with webs or wings extending from its inner circumference above the crown, and across, or nearly across, the interior of the ring, forming stops to prevent the movement of the chain swivel against the crown, substantially as herein set forth.

3. A watch pendant bow or ring formed with a flange or projection at or near its socketed end or ends, adapted to underlie the edge of the crown when the ring is placed in its parallel position, and thereby form a stock or lock to hold the crown in its retracted position, substantially as and for the purpose set forth.

4. A watch pendant ring formed with the flanges *f f* extending around each half of the ring, circumscribing the crown and separated above the crown at or near the middle of the ring, substantially as and for the purposes set forth.

5. A watch pendant ring formed with a plain part at or near its middle opposite its cleft portion, with flanges extending around the interior of the ring from said plain portion to or near the cleft, substantially as herein shown and described.

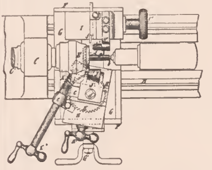
6. A watch pendant ring formed with flanges projecting interiorly therefrom in a parallel plane therewith, and solid or integral with the substance of the ring, substantially as herein shown and described.



Watch Escapement.—Albert Heberle, Ueberlingen, Germany, Filed Jan. 12, 1882.

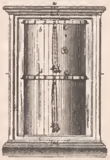
Claim.—In an escapement, the triangular impulse and escapement teeth elevated above the surface of the escapement wheel, in combination with the balance having a grooved arbor, and the impulse pin *d*, substantially as specified.

Machine for Forming Snaps on Watch Covers.—Jacques Laurent, Philadelphia, Pa. Filed Feb. 9, 1882.



Claim.—1. The combination, with a chuck and spindle for holding and rotating a cover, of a compound rest carrying a roller for turning in the lip or rim of the cover, and a roller having a shoulder and a tapered portion of reduced diameter for upsetting and beveling such turned-in portion, said rest being organized so that said rollers can be separately applied to the cover, substantially as herein described.

2. The combination, with a chuck and spindle for holding and rotating a cover, of the rest *G*, the supplemental rests *H I*, the worm wheel *K* and worm K', the roller *J*, and the roller I^2, all arranged and operating substantially as and for the purpose herein described.



Show Case for Watch Chains.—Egerton A. Bliss, Jersey City, N. J. Filed Jan. 23, 1882.

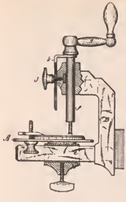
Claim.—A show case for watch chains, consisting of an upright casing having glass panels, and of an interior cylinder, *B*, covered with velvet, turning in bearings of the top and bottom of the casing, and being provided with one or more circumferential bands, *C*, having suspension devices for the watch chains, substantially as set forth.

Clock Dial.—Joseph R. Payson, Jr., Chicago, Ill. Filed Jan. 30, 1882.

Claim.—1. A supplemental clock dial phosphorescently illuminated and adapted to be attached to an ordinary clock dial, substantially as described.

2. The combination, with a clock dial, of a phosphorescently illuminated supplemental dial having a common center with the clock dial, substantially as described.

3. The combination, with a clock dial, of a phosphorescently illuminated supplemental dial having a common center with the clock dial, and arranged within a circle having a common center with the clock dial, but not extending beyond the key-holes, substantially as described.



JEWELING TOOL.—William B. Atkinson, Franklin, Ky., assignor of one-half to William R. Jackson, same place. Filed Mar. 7, 1882.

Claim.—In a jeweling tool for hand use, the combination of the bracket *B*, the drill rod *f*, journaled in the bracket, and the slotted and perforated gauge *k* and thumb screw *j*, with a bed plate *A*, adjustably supported on an arm of the bracket, and having movable clamps, substantially as shown and described.

CATCH FOR JEWELRY.—Philip A. Leimbach, New York, N. Y. Filed Apr. 13, 1882.

Brief.—The ends of the finger piece are fastened to the rotating guard latch on opposite sides of the hooked catch.

Claim.—The combination of the hook-shaped catch *C*, having stops *e* and *f* projecting from its surface, the rotating guard latch *D*, arranged in the hooked catch, and a yoke-shaped finger piece *g*, secured to the guard latch on opposite sides of the hooked catch, substantially as described.

ATTACHMENT FOR WATCH CHAINS.—Albert Uebele, Gmünd, Würtemberg, Germany. Filed June 3, 1881. Patented in Germany Feb. 12, 1881, No. 15,335; in France May 14, 1881, No. 142,853, and in Belgium May 21, 1881, No. 54,695.

Brief.—One-half the medallion contains a stamp of any desired design and the other half an ink pad. When opened to a certain extent the parts may be separated so as to permit the part containing the stamp to be readily manipulated.

Claim.—1. An attachment for a watch chain, consisting of a charm or locket having the two parts detachably connected together, one being provided with a suitable stamp and another with an ink pad, substantially as specified.

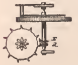
2. In combination with the halves of a locket, the pintle at one edge of one of said halves, and the barrel at the corresponding edge of the other half adapted to set upon said pintle, and the segmental ribs adapted to engage suitable grooves in the respective halves, to hold the parts together and permit them to be separated when desired, substantially as specified.

ORNAMENTAL CHAIN.—Henry Knickmann, East New York, N. Y. Filed Apr. 4, 1882.

Brief.—The wires are twisted and bent into the grooves in the heads. The caps cover the heads and present a finished appearance.

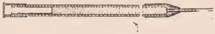
Claim.—The combination, substantially as hereinbefore described, with the rings and the transverse wires for connecting said rings, of heads for retaining said wires, and of caps for covering the heads and the wires.

CLOCK ESCAPEMENT.—Christian Reinhardt, New Haven, Conn. Filed Jan. 25, 1882.



Claim.—In a clock movement, the combination of the escapement wheel, the balance wheel arranged on an axis at right angles to the axis of the escapement wheel, with a collet *d*, arranged on the balance wheel shaft, constructed with a notch and with an incline from the under side to the notch in one direction, the second collet, *E*, constructed from a thin disk of metal, with a notch *f*, forming a horn-like projection, *i*, the said projection bent up to form the impulse incline in the opposite direction, substantially as described.

WATCH OILER.—William W. Martin, Salem, Oreg. Filed Jan. 25, 1882.



Claim.—A watch oiler formed of the fountain *A* and hair-tube *B*, substantially as shown and described.

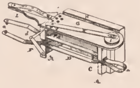
CUFF BUTTON, ETC.—Sanguinet H. Benoist, St. Louis, Mo. Filed Mar. 22, 1882.

Claim.—1. In a removable button or stud for cuffs, etc., the combination of the head *A* and shoe-piece *B B' b*, sliding in the inner face of the head to and from the end thereof, substantially as and for the purpose set forth.

2. In a removable button or stud for cuffs, etc., the combination of head *A*, with grooves *a'* and orifice b^2, and the sliding shoe-piece *B B' b*, with spring catch *b'*, constructed and operating substantially as set forth.

3. The shoe-piece *B B' b b'* for cuff buttons, formed of a single plate of metal folded together substantially as shown and described.

WATCHMAKERS' COMBINATION TOOL.—William H. Lamb, San Francisco, Cal. Filed Oct. 8, 1881.



Claim.—1. The frame *A*, having the slots *B* and *C* formed in its ends, as shown, in combination with the spring arms *D*, having inclines *b* and *d*, substantially as and for the purpose herein described.

2. The parallel arms *D*, having the sockets *e e* to receive the pivots of a wheel, and having the converging inclines *b* and *d* for adjusting the distance between the arms, in combination with frame *A*, having slots *B* and *C*, substantially as herein described.

3. The hinged or pivoted swinging plate *G*, having grooves *i*, the bar *H*, having corresponding grooves oppositely arranged to grooves *i*, the frame *A*, having perforations *I'*, and the spring bar *K*, with its locking pin *J*, the whole constructed to act in combination, as set forth.

4. In combination with the frame *A*, the perforated arm *L*, perforated spring arm *m*, and perforated and arched spring arm *n*, arranged for operation substantially as described.

5. A tool consisting of the frame *A*, slotted, and having the arms *D*, with their inclines and the sockets *e*, together with the pivoted clamping plate *G*, with its locking pin, and the perforated arms *L m n*, substantially as herein described.

BRACELET.—Henry N. Pervear, Pawtucket, R. I. Filed Sept. 16, 1881.

Brief.—The central plate is rigidly secured through its entire length to the band portion of the bracelet.

Claim.—1. The improved band bracelet herein described, consisting of a strip *A*, of elastic material, and a box member, *B*, rigidly secured throughout its length to the exterior of the central portion of said strip, and projecting above the same.

2 The strip or band *A*, having elastic end portions, combined with the box member *B*, rigidly secured throughout to the band, between its ends, substantially as shown and described.

ORNAMENTAL CHAIN.—Benedict B. Lederer, Providence, R. I. Filed Jan. 23, 1882.

Brief.—A tube has notches cut therein to receive the connecting link.

Claim.—1. As a new article of manufacture, a chain made up in part or whole of pieces of tube, having notches cut into the sides thereof, placed transversely to the chain and secured together along the sides of the tubes, as described.

2. In an ornamental chain, the combination, with the tubular links *E E*, placed transversely to the line of the chain, and having notches cut into the sides thereof, of the rings *F F*, arranged to connect the tubular links together, as described.

A Stroll through a Balance Spring Factory.

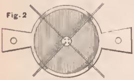
G. BOLEV, IN *Deutsche Uhrmacher Zeitung*.

Continued from page 175.

IN OUR last number we witnessed the drawing and rolling of the wire for halance springs, and ascertained that exact tables are used to give them the proper height and thickness. It has happened lately that in order to give a second quality spring the appearance of a first class one, this proportion was entirely disregarded, and smaller coils were given to a high and thin spring; this trick is utterly objectionable, however, as every good regulator knows to his cost.

We now enter the workrooms of the winders (*plieuses*, girls who roll the springs, to give the wire the spiral shape). From sixteen to twenty girls are seated at different tables in this well lighted and very clean room; a gas flame, above which is a strong bluing plate, burns before each two. A sheet of white paper is spread before each girl; she, moreover, has several spring barrels, tweezers, and small pieces of leather on her bench part. A small frame is fixed to each working place, in which hangs the spool with the rolled steel wire, and a gauge, by which the length of each spring is determined. Each working girl, finally, has a brass block before her, upon which she lays the forms for cooling. Thus equipped, she is ready for work. She seizes the end of the steel wire upon the spool, with the tweezers, and breaks off the pieces according to the gauge fastened to the workbench; she then takes the form (a spring barrel, of the height of the balance spring, with perforated cover—see Figs. 2, 3, 4 and 5), and inserts an arbor with handle, provided with 2, 3, 4, 5, 6 slots, according to the quality of the spring. The barrel has an equal number of slots. The girl takes one of the pieces broken off, cleans it well with the leather, and inserts it through a slot in the barrel, next into one of the arbor.

Fig. 2



With cover removed.

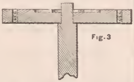
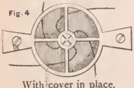


Fig. 3

Cross section.

Fig. 4



With cover in place.

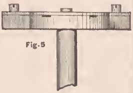


Fig. 5

Side view.

When the necessary number of pieces has been placed in, she seizes the handle, and winds the spring until they form a compact plate and fill the entire barrel. The cover is next removed, any accidental unevenness pressed flat with any ivory staff, and the open barrel is placed upon the bluing plate, until the springs have the desired color, when it is placed upon the brass block. The girl meanwhile fills a second form, and while this undergoes the necessary operation, upon the plate, the first is emptied by striking it a gentle tap. If the steel is good, and has been treated carefully in every respect, and the winder has wound it with due care, *i. e.*, uniformly, without forcing, the springs will issue with uniformity from the form; however, should it show irregularities, they must pass into another room, into the hands of the redresser (*redresseuses*). A good eye, great manual dexterity, and chiefly, an unlimited amount of patience, are necessary for this work, which virtue is possessed more by females than by males, and, therefore, it is exclusively done by them. It is self-evident that a spring which at once issues exact from the form is better than one which has to be redressed, wherefore manufacturers make great sacrifices in the drawing as well as in the rolling of the wire. Beside being a better article, the difference in cost is also an essential factor, redressing amounting to nearly one-half of the total cost.

The tools of a redresser are very few and simple. A small piece of white pasteboard, a good tweezers, a bone stick, and a finger from a kid glove are all the tools necessary; not much, and yet sufficient for diligent and skilful hands to earn from three to four francs per day. These working girls are mostly of good citizens' families, and no girl is excluded from good society because she seeks to earn her bread in an honest manner. This correct principle materially contributes to the national wealth of Switzerland. Work is honorable there.

Continuing our stroll, we find several girls occupied in another room. One of them "calibers," that is, she breaks the ends of the springs according to an exact gauge, suitable for the dimensions of the spring, and assorts them into different boxes, because when they come from the forms, they do not always open with an exact uniformity. These boxes are passed to the next girl (*peseuse*, weigher), who weighs the springs. She empties the box on a piece of white paper, upon which the weights are placed, and with these, weighs the springs piece by piece. The weight (Fig. 6) consists of a small plate of brass, into which a thin rod is fastened, provided with a hook at a certain height; it is prolonged 10 mm. (0.39 inch). The gram is the unit of weight, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ gr. are placed upon it as fractions. For weighing a spring, the outer end (as shown in Fig. 7), is seized with the tweeezers, while the inner one is suspended on the hook, the weight is raised up, and the first coil of the spring must be even with the prolongation of the rod; if this sinks, the spring is too weak for the weight, and a smaller one is placed upon, and the reverse. When the springs have been assorted exactly according to size and strength, and placed into boxes, they pass to the packing girls. She places one-half or one dozen springs between two sheets of oiled paper, closes the pack, and marks it with the number of size and strength, to be finally delivered to the storehouse. Enough of operations, you will say.

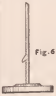


Fig. 6

Fig. 7

I will finally say a few words on the quality of springs. This, above all, is conditioned by the number of coils; the quality increases with their number. For instance, Bréguet springs are the closest wound; only two of them are inserted into the form; wherefore the space between two blades is equal to the thickness of one. Of the first quality, three are wound together, and the space is that of two blades; four springs come together for a second quality, and the space consequently is that of three blades, and so on. Beside the narrowness of the winding, of course, other conditions are necessary for first-class springs, and the most expert and skilful girls are occupied in their manufacture. The steel is the same by all grades, however, and if a watchmaker prefers wide springs, he takes the second quality, otherwise the first.

The great quantity of numbers of the different sizes of springs, may be seen from the fact that about 25 sizes are necessary for watches. Each size number has on an average 5 entire thickness numbers, each of which is subdivided into four quarters, which, therefore, for the first quality springs would be $25 \times 5 \times 4 = 500$ numbers, and for four qualities, $4 \times 500 = 2{,}000$ numbers. To this must still be added the springs for traveling watches, manometers, micrometers, and for other technical purposes, from which it will be seen how great an exactness, order and punctuality is necessary in their manufacture.

* * * As a curiosity, I would add the calculation of the value to which steel can attain. For instance, one gross assorted springs from No. 2 to 6 weighs 80 centigrams, of an average value of 12 marks. Therefore 1 kilo. steel worked into such springs would have a value of

$$\frac{12{,}100 \text{ cgr. } 1{,}000 \text{ kil.}}{80} = 15{,}000 \text{ marks.}$$

If we consider that flat springs are manufactured for watches in rings, or other such abnormities, which barely weigh the one-fourth part of the above, and the piece is readily paid with three marks, because the manufacturers succeed but seldom in drawing so fine a wire, the above sum augments very much; therefore, one gross springs No. 2 | 0 weighs 20 cgr., its average value about 438 m., and we have

$$\frac{438,100,000}{20} = 2,190,000 \text{ marks.}$$

Although this is an assumed value, because if such small springs could be manufactured, the piece no longer would come to 3 m. The value calculated in the first example, however, is an entirely normal one. If the piece number per kilo. is calculated, the two examples may be regarded as true, because for the current sort, about 180,000 pieces may be manufactured, per kilo., and 720,000 pieces of the fine ones to the kilo.

As far as this consumption is concerned, Bahni Bros. have manufactured, taking all sorts together, 15,300 gross springs in 1881. But there are at least three factories, equally large, and it may safely be supposed that Switzerland during the last year, manufactured 45,900 gross, or 6,609,600 springs. It may well be asked what becomes of them. And yet, we are told, the consumption augments from year to year.

[THE END].

The Lever Escapement.

BY THOS. CHARLES SCOTCHFORD.

[*Continued from page* 188.]

IF WE have given the radius of the escape wheel, the number of teeth in the wheel, and the number of teeth engaged in action, we can easily tell the measure of the two chords of the escape wheel's circle in proportion to the given radius of the wheel, for by plane trigonometry, the chord of any arc is equal to twice the sine of half that arc. I will give one example, which will suffice, because although it is a truism of the theory, yet it is no use in practice in pallet making. Given: the radius of the wheel, say 1 inch, the number of teeth in the wheel, 15; the number of teeth outside of the pallets, 4. Required: the length of the outside chord of the wheel in proportion to the wheel's radius. Since there are 15 teeth and 15 spaces, divide 360° of the circle by 15 gives 24° for each space, and as 4 teeth or 3 spaces is the number engaged, multiply 24° by 3 gives 72° for the outside. Now half the angle of 72° is 36°. Look in the trigonometrical tables for the natural sine of 36°, it is .58779; the chord of 72° is twice this sine, so multiply it by 2 gives 1.17558 inches for the length as required.

I will give another example how to find the radii of the wheel and pallets, by having some parts given, when I come to speak of the lever and roller, for they may both be done by the same rule.

Fig. 4 is rather intricate, but by a careful perusal the reader will understand the pallets when produced within their own circle; this is very essential, because in practice it is necessary to know the distances of the pallets from their axis, so as to make a distance gauge to test them. By comparing this figure with fig. 3, it will be seen that the lines of the pallet's surfaces $A\ a$ and $B\ b$ are alike in both figures. If, then, we describe a circle, and produce the short pallet plane A a to $S\ P$, the part $S\ P$ without the escape wheel's circle will be the plane of the short pallet when it has arced round its 12° out of the wheel; and producing the long pallet plane $b\ B$ to E, we find the two chords $A\ P$ and $b\ E$ are equal and equidistant from the center, as shown by the perpendicular $C\ e$ and $C\ e$. The two chords are seen to intersect at i, a small way below the center of the long pallet face. Now the angle formed by the intersection of the two chords $A\ P$ and $b\ E$ is equal to an angle at the circumference of the the circle subtended by the sum of the arcs $A\ b$ and $E\ P$. To prove it, draw $b\ d$ parallel to $A\ P$, then the whole angle $E\ b\ d$ is equal to the sum of the arc $A\ b$ and $E\ P$, because we shall have added the area $d\ P$ (equal to $A\ b$) to the arc $E\ P$. This whole angle $E\ b\ d$ at the circumference is equal to an angle at the center of half the arc $E\ d$. If we draw $C\ G$ to the middle of the arc $E\ d$, the angle $E\ b\ d$ at the circumference is equal to the angle $E\ C\ G$ at the center: this is an angle of 60°, which is the sum of the two angles of 36° and 24° of the wheel's central angles, or of the pallet's inscribed angles.

In fig. 5 we have a representation of the arcs and angles as they appear when sketched as if in action. Mark off the two sectoral lines of arcs of 12° of the escape wheel on *both* sides the line of centers $W\ C$, and find the pallet center as shown in fig. 2. From this centre describe sufficient portions of two concentric circles, and draw the sectoral lines of the arcs of 12° of those concentric circles as shown in fig. 3, and between the sectoral lines and concentric circles draw the lines of the plane surfaces of the pallets as shown in this fig. 5.

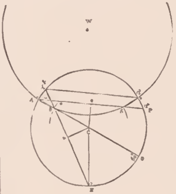


FIG. 4.

We will now pause in the demonstration to draw the reader's attention to the pith of the subject, and remark on the practice. I cannot do more than remark on the practice, for every pair of pallets will minutely vary with every variation in angle, or thickness of the wheel's teeth, or depths, or different arcs of motion of the pallets. Observe, that in theory, when the two pallets are made correctly proportionate to the escape wheel's arc toward and away from the lines of centers $W\ C$, the escape wheel of power acts through equal spaces over equal pallet faces, those faces being equidistant from the center of their own circle; but as each pallet is alternately brought up into the wheel, there is a difference of 12° between the angles formed in the wheel, the long pallet being 12° greater angle than the short pallet. Now in practice the wheel never acts through its full 12° in impulse over the pallet face; there is about 2° of the wheel's arc lost through the thickness of the tooth's point, and having depths, so as to stop the train and escapement pieces, and let the roller and balance continue on, thus converting the continuous motion of the wheel and pallets into an intermittent one. Therefore, when delineating pallets correctly to an arc of 10° of the wheel out of its 12°, an allowance of 1° must be made inside and 1° outside of each pallet, making the inner chord of the wheel 50° instead of 48°, or 25° on each side the line of centers; and making the outside chord of the wheel 70° instead of 72°, or 35° on each side the line of centers; and drawing two secants to these arcs of 10°, similar to what they are drawn to the full arc of 12° in fig. 5, will give the proper position for the pallet hole, which will he *minutely* further back from the wheel than those in fig. 5. When the arc of the wheel is 10° out of the 12°, as we are now supposing, the pallet arc should also be 10°, exclusive of the depth, andthen the sectors of the wheel and pallets will be similar and proportionable. It is wrong to make the sectors dissimilar, such as by making the pallet's arc 6° or 8°, etc., when the wheel's arc is 10°. It is customary to do so, because short arcs of impulse and long arcs of vibration refine the errors most, and also with smaller arcs we may have heavier balances moving through these lesser spaces, as well as their being less liable to "set" with short arc; but it is utterly impossi-

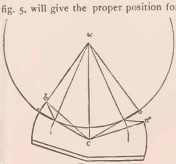


FIG. 5.

ble, when we have dissimilar sectors of the wheel and pallets, for the angles formed in those dissimilar sectors to be proportionate to the shortening and lengthening of the pallet arms. When the pallet's sector is formed by an arc of 6° or 9°, etc., the number of teeth in the wheel should be altered to make the arcs 6° or 9°, etc., and then they will all come right, similar to the way shown in the demonstration.

I do not imagine that wheels and pallets will ever be made alike with geometrical precision. Angular shapes and actional mechanism are two of the most difficult things to be made well, without expecting perfection in them ; so that it may not be worth while to be so scrupulous about the sectors and arcs of the wheel and pallets being similar, so long as they do not deviate too much.

There is one thing worth mentioning about large sizes of wheels and pallets to the same number of wheel's teeth as we have been demonstrating, viz., 4 teeth. By very careful measurement that I find, providing the wheel goes through an arc of 10° out of its 12°, the distance of the pallet and pinion line of centers is 1.15+ parts, making the wheel's radius the measuring unit 1, or fully $\frac{1}{7}$ of the wheel's radius between the periphery of the wheel and the pallet hole. Now to keep the wheel's two arcs equal, and the pallet faces equal, and their distances proportionable, the distance between the two centres of the pinion and pallet holes must be 1.15+ parts of every size, making each respective wheel the measure 1. In small sizes it will be impossible to make the hole too close to the wheel, but with large sizes the hole may be made much too close to the wheel ; and this has always been encouraged in the trade, because the impacts are more effective the nearer the pallet nibs are down to the line of centers of the lever and roller ; but to make the two arcs of motion in as near equal times as practicable, it is wrong to make the pallet hole much too near the wheel, for they ought all to be proportionable ; therefore, the safest way in large sizes, such as what we call 14 size, or larger (and sometimes with 10 and 12 sizes), when the hole is closer to the wheel than it ought to be, the hole should be a trifle nearest to the long pallet, so that when the wheel's tooth stands on the top of the long pallet, an imaginary circle will include both the pallets and point of the wheel's tooth. Conceive the concentric pallets in fig. 5 cut away at the top point of the long pallet, and inside of the short pallet, so that the points of the wheel's teeth fill up the vacuum made by the cutting away, and you have the plan.

Fig. 6 is a tool invented by me, to measure angles, to know whether real pallets were made agreeable to any sketched design. It is instructive, and I should not now like to be without it. But watch pallets are too small to be *accurately measured*, the proof of which is to measure the same thing several times. This tool is to measure the

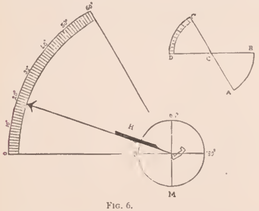


FIG. 6.

angle formed by a chord and diameter, such as the plane of the pallet produced, and the diameter of the pallet circle. The small cross-line figure shows the principle of the tool. It is seen that the opposite angles of the cross lines are equal. Let the line *C A* represent the face of a pallet, or part of the chord of a circle, and the line *C B* a hand representing part of the diameter of a circle ; then, assuming the intersection of the cross lines is the center of the instrument, if we close *B* to *A*, we shall also close *D* to *G*, and in closing *D* to *G* we shall measure off on the instrument the same number of degrees included between the chord and diameter, or between the pallet face and the hand. The way I proceeded to make the tool is this : Procure an octant or sextant that is of no use for nautical purposes, and clear off the glasses, leaving only the arc and the arm ; take out the axis of the sextant, and turn a large deep hole in it quite straight ; make a little brass mill (*M*), with a plain pipe to nicely fit and turn round in the hole; catch the center of the mill extremely light, and draw very fine cross lines at right angles on the surface of the mill ; in one of these lines place a pin, upon which the pallets are placed with the angular point of the pallets at the intersection of the cross lines. On the arm of the sextant fasten a long straight hand (*H*), and twist round the mill until the hand just eclipses the fine line on the mill. If now you move round the sextant arm, it will also move the hand until the hand and the long pallet face become parallel, and the degrees on the sextant arc will show *double* the angle.* In measuring the short pallet, turn the pallets over, and place the face of the pallet parallel with the hand, and move round the arm of the sextant until the hand just eclipses the fine line on the mill; the degrees on the sextant's arc will show *double* the angle. For convenience of measuring different sized pallets, the pin upon which the pallets are placed is made to slide to and fro by a small dovetail placed on the underside of the mill; also I have made the hand to slide to and fro on the sextant's arm, because the mill is more readily taken out of the sextant. An angle marked on the tool can be measured to a few minutes of a degree; but, in measuring the pallets, it requires wonderful close inspection to bring the angular point of the pallets up to the center of the cross lines, and then there is a difficulty in telling when the hand and pallet face is dead parallel. These difficulties combined always make a small difference in several measurements of the same pallets ; still it is gratifying and useful to obtain an approximation, so as to make patterns or gauges, for without some such means we could not prove that the pallets were very near what we would wish them to be. The reader will see that this tool is not one for common use in making the pallets, because the pallets must be finished before they can be tried.

(*To be continued.*)

Hardening and Tempering Steel Tools, etc.

WHEN a variety of steel has been selected that possesses the requisite properties, that is to say, fiber and elasticity for springs, body and tenacity for circular cutters, gravers, etc, it must be "prepared;" in other words, it must be made so that it can be worked with ease, for steel that is badly prepared will resist both the file, the graver and the drill. It can never be turned perfectly round, and will harden unevenly.

The commonest, and, at the same time, best method, consists in heating the metal to a dull red heat, burying it in hot ashes and allowing it to cool slowly.

Steel raised to a red heat in contact with air loses a portion of its carbon, so that it is better to place the metal in a vessel of burnt clay; this is introduced into a fire which must not be too bright at first, and, when the vessel has attained a red heat, the fire is checked and left until the whole is quite cold.

In order to soften steel by annealing with a view to work it, engineers entirely cover the metal with dry powdered wood charcoal, or dry iron filings or turnings in a cast iron box or pot in a crucible, luting up all the openings, so as to protect it from the direct action of the fire and from the air. The vessel is then put in a dull fire,

* The degrees marked on the sextant's arc are only half degrees of 360° to the circle; so if it measured 40° by the sextant, it really is only 20° out of the 360°.

the heat being gradually raised until the whole has acquired the requisite temperature, which is known by observing the color (see table); this degree of heat is maintained for about ten minutes and the fire quenched, after which it must be allowed to gradually die out. Frequently the cooling is not complete for a day or two, and even more when the crucible is of large dimensions.

The metal will become softer according as the cooling is the more slowly effected. It is generally heated to 800° or 900° C. (1500° or 1600°F.), a cherry-red heat. When the steel is associated with brass, as in the case of a compensation balance, it is not safe to exceed 600° C. (1000° F.).

It will be useful here to give the following table, compiled by Pouillet, of the temperature, as indicated by the air thermometer, corresponding to various colors of a heated body:

Incipient red heat corresponds to	525°C.	(980°F.)
Dull red " " "	700°C.	(1290°F.)
Incipient cherry-red heat corresponds to	800°C.	(1470°F.)
Cherry-red " " "	900°C.	(1650°F.)
Clear cherry-red " " "	1000°C.	(1830°F.)
Deep orange " " "	1100°C.	(2010°F.)
Clear orange " " "	1200°C.	(2190°F.)
White " " "	1300°C.	(2370°F.)
Bright white " " "	1400°C.	(2550°F.)
Dazzling white " "	1500-1600°C.	(2730-2910°F.)

Annealing or softening in water.—Instead of allowing a piece of steel to cool slowly, it may be thrown into water when heated to a temperature just below that at which it would harden. In this case the metal will not harden, but, on the contrary, it will become very soft. A single operation suffices for certain varieties of steel, but with others it must be repeated.

The only difficulty consists in fixing upon the precise moment at which the metal has the requisite tint (a purplish yellow or dull red), and this is more especially felt when dealing with small pieces; experience can alone guide the workman in this matter.

A skilful workman recommends the employment of water containing one-fifth of its weight of gum arabic. He also recommends that the metal be wiped over with an oiled rag, then held in the fire, and as soon as the oil is converted into a thick smoke and is on the point of igniting, to immerse in water.

Hammering Steel.—Watchmakers, who are called upon to manipulate exceedingly small pieces of steel, can somewhat increase the body and homogeneity of the metal by a cold hammering. After annealing, the object is hammered with light, uniform blows, again annealed, and the same operation is repeated one or more times, according to the degree of malleability already acquired by the metal. Steel thus prepared has more body; the particles composing it are more closely pressed together; it files and turns well, can be heated more evenly, and is not distorted or only very slightly in hardening, providing the requisite precautions are taken.

The hammer and anvil.—It is important that in these operations the surfaces of the hammer and anvil employed be perfectly smooth and even polished. If they are at all rough or cracked, if they are uneven or have a grainy surface, a flaw will be produced in the body of the steel or a crack on its surface.

To clean rough steel.—The black coating, known as "scale," which covers the surface of the metal after it has been in the fire, will rapidly spoil gravers and files, and, in addition to this, it leaves behind in them excessively hard particles that will become embedded in the steel itself after a clean surface has been exposed. It is then essential, in order to ensure good and rapid workmanship, to previously remove this crust from the surface.

This can be done in two ways: by using a rapidly-revolving grindstone, which instantaneously removes the oxide, at the same time smoothing the surface of the steel; or by leaving it for a sufficent length of time in dilute acid, by which the superficial oxide is dissolved.

Sulphuric acid is usually preferred; in addition to the cleaning, it is said to produce an effect somewhat similar to annealing. On withdrawal from the acid, the steel must be thoroughly washed with water and wiped dry with care.

Ordinary mode of preparing steel.—When the metal has been annealed by one of the methods indicated above, its preparation is completed by the "pickling" in acid, after which it is hammered cold between an anvil and hammer (as before described). When the metal has been worked, it is heated to a bluish tint, and after cooling slowly is ready for the hardening.

M. Covillot's mode.—This author adopts a method whereby he obtains steel that is very soft to work and perfectly free from hard grains or "pins" of cast iron, which are so often to be met with in steel, causing it to crack in consequence of their inability to spread under the hammer.

Take some garlic, the younger the better, mix it with sufficient good walnut-oil to cover the garlic and form into a paste; then place it in an earthenware pot on the fire. When beginning to boil, heat the steel to dull redness and plunge into the boiling paste. Withdraw it with a quantity of oil and garlic adhering; again heat to redness and plunge into the paste. This operation may be repeated two or three times. Then heat the steel, while enclosed in an iron tube or box placed on the fire, and allow the whole to cool. Finally, the steel may be finished by setting it to *cook* (if we may use such an expression) for ten or twelve hours in the composition of garlic and nut-oil.

This last operation may be performed by setting the boiling solution over an oil-lamp, after depressing the wick in such a manner that the paste may be kept just simmering.

M. Covillot employed the same mixture for hardening the objects; but then, of course, it must be cold.

HARDENING.

It is well known that by the operation of hardening, which consists in heating a piece of steel to a red heat and immediately chilling it, the hardness is very materially increased.

Hardening increases the dimensions of the object. A steel collar adjusted to fit a cylinder will slide on more easily after hardening.

Rolled steel is more liable to be distorted in the hardening than metal which has been forged or hammer-hardened. As a general rule, when steel—especially cast steel—has been carefully annealed, cold-hammered, and, after working, heated to a blue temper and slowly cooled, it will not be distorted in the hardening, providing the heating is skilfully conducted, and if, at the moment of introducing the object vertically into the bath, the heat is evenly distributed throughout. Some practical men affirm that the mere presence of an oily layer on the surface of the water will check the tendency to distortion.

A workman frequently pretends that he has some exceptionally good solution for hardening, of which a great mystery is often made; but it is very generally admitted by those who are well-informed that these so-called secrets are a delusion and in no sense superior to pure water. There is a certain amount of truth on both sides, and the former class are somewhat justified by experiments with the various solutions enumerated below. We may, however, lay down the three following conditions as essential to the successful conduct of the operation of hardening:—(1) *The steel must previously be carefully prepared and worked;* metal that has been skilfully hammered cold or below a red heat, for instance, will harden better than when not so treated; but if hammered too much or carelessly, it will crack; (2) *The method of heating* should be such that the heat is evenly distributed throughout the object; if, on immersion, its temperature is not uniform, the degree of hardness will vary; (3) *The skill of the workman* must enable him to detect the exact degree of heat the variety of steel can withstand, and this must on no account be exceeded, for in that case the steel will lose tenacity, will be more or less *burnt*, etc. In the case of irregular-shaped articles, considerable skill is also often needed to ensure that the several parts of the mass shall be cooled at, approximately, the same rate.

Methods of hardening.—The baths used for hardening may be classed under three heads: *Tough*, *Hard*, and *Glass-hard*. It must be understood, however, that these classes may be made to merge more or less into one another, by varying the degree of temper. The following receipts are drawn from various sources, and the reader is recommended to select the one which he finds on trial to be best adapted to his requirements, for, as Prof. Akerman has pointed out, there are very many conditions exceedingly difficult of calculation that influence hardening, and hence it follows that a workman accustomed to hardening often considers that only one method, which he has been in the habit of employing, can be used for a certain purpose, while another equally skilful workman can only attain the same result by a method essentially different.

I. *Tough.*—Tallow; tepid water; oil; resin; sealing wax; lead; beeswax; a solution of 3 to 4 parts (by weight) of gum arabic in 100 parts of water; 1 part soft soap in 100 parts water; cold water with a layer of oil over it, the thickness of which varies with the degree of hardness required; 10 parts mutton suet, 5 parts resin, 2 parts sal-ammoniac, and 35 parts olive oil.

II. *Hard.*—Cold water, water containing various salts, such as sal-ammoniac and sea-salt; a solution of 5 parts sea-salt and 1 part sal-ammoniac in 20 parts of water; 4 parts sulphuric acid, 50 parts sea-salt, 10 parts alcohol, and 1,000 parts water (all by weight); 4 parts sulphuric acid, 1 part nitric acid, 1 part pyroligneous acid in 1,000 parts water (to be used very cold).

III. *Glass-hard.*—Mercury; nitric acid; opium; any cyanide.

As a rule it is well to employ tallow for the hardening of small objects in which hardness without brittleness is needed. Oil renders the surface harder than the interior, and soapy water has the same effect. Saline solutions generally give great hardness. Very minute drills may be hardened by simply whisking them about in the air after heating the blade to redness, and small objects may be hardened by pressing between two cold surfaces, as those of the hammer and anvil.

If hardened in nitric acid, opium, or mercury, the hardness of steel is so great that it will easily cut glass. But such steel is brittle and all the more delicate according as the precise temperature necessary (which is not very high) has been exceeded. For it must always be borne in mind that steel which has been heated too highly has deteriorated in quality and will remain brittle.

Precautions to be observed in hardening.—In the case of delicate pieces it is necessary to avoid the use of the blow-pipe, as the current of air causes the surface to scale, and, as is well known, the metal being unevenly heated will be distorted in the hardening, and will not be uniformly hardened.

It is better to enclose the article between two pieces of ignited charcoal, or in a metal tube, or to bring it in contact with a sufficiently hot piece of metal, etc. An excellent plan is to heat the article in a bath of hot lead, or of lead and tin in proportions dependent on the temperature required. The heating if thus exceedingly uniform, and, if operating in a dark room, the temperature can be accurately judged.

When it is required to harden an object without discoloring the surface or destroying the polish, it may be placed in a tube, and completely surrounded with powdered wood charcoal or, preferably, animal charcoal. The whole after being heated is plunged into water without the steel being in any way exposed to the air. The powder must be heaped up as a precaution against access of air. On being taken from the water, the steel is at once placed in alcohol, and if at all dull it will generally be only necessary to rub the surface with a little rouge.

It is essential that the animal charcoal be previously heated in order to expel moisture, as otherwise it would adhere to the surface and produce marks and even irregularity in the hardness.

As a rule the object must be immersed in the cooling liquid vertically in the direction of its greatest length, and if of unequal thickness the stout portion should touch the surface first, so that the metal may cool more uniformly. In hardening large masses of steel, various devices are resorted to in order to ensure uniformity in the cooling,* but space prevents us from entering more fully into this interesting question.

The vessel must be of such a depth that the object will not reach the bottom until quite cold. It is liable to distortion if introduced sideways, or if the vessel is too shallow.

The method described above for protecting the surface from the action of the fire should be adopted when hardening delicate or complicated articles; but in the case of drills, for instance, a simple coating of one of the following preparations is sufficient.

When an object if hardened in a saline solution, it is well to cover it with a paste composed of water, salt and flour (some use yeast and salt for this purpose), or a thin clay. This precaution prevents any blistering or oxidation of the surface. If it be desired to avoid oxidation, and, at the same time, to restore to the steel the carbon it has lost owing to the action of the fire, it must be rolled, while still wet, in another paste, containing powdered horn or leather, or some such calcined animal matter. Delicate parts can also be protected by a layer of beeswax and olive oil made hot.

In hardening small drills, very good results are obtained by enclosing the blade in a pellet formed of prussiate of potash, lard and castile soap, and cooling in beeswax. Or the surface may be protected by a layer of soft soap.

Steel as forged, that is with the thin scale on, is less liable to break in hardening than if previously brightened, for the scale causes it to cool, and, therefore, contract more slowly. At the same time, it should be borne in mind that, when the surface is bright, the hardness will be somewhat greater.

It will be well to warn the beginner that, if an object is not entirely immersed in the cooling liquid, it should never be held still, but rapidly moved up and down, as otherwise there is a liability to crack at that part which was level with the surface.

As a watchmaker only uses steels of the best quality, he should, in hardening, never exceed a cherry-red heat, and cherry-red comprizes three distinct tints; incipient cherry-red, cherry-red, and clear cherry-red. The second of these should not be exceeded in hardening cast steel, and the third should be taken as an extreme limit in the case of shear steel.

Ice cold water should never be employed, but the extreme chill should be first taken off. Indeed it is found that frosty weather interferes materially with the operation of hardening.

Some workmen maintain that the hardening is done better if the water has been long used for the purpose without renewal.

(*To be continued.*)

* Ede. *Management of Steel.* London. 1873.

Sight.

WHAT THE OPTICIAN SHOULD KNOW ABOUT OPTICS.

Continued from page 180.

AS THE series of articles we are publishing on the above subject are slowly covering that department of sight which is of practical importance to the optician, we will be happy to answer inquiries from our readers about difficulties they are meeting in properly fitting spectacles. Or will venture to make suggestions about any difficult case they have met with, providing they carefully describe the case.

The practical questions are, *first:* What is the matter with the person who applies for glasses? *Second,* Does he require glasses, and if so, what kind of glasses?

If the applicant for glasses be under twelve years of age, the parents think the child near-sighted, or the child begins to look cross-eyed. Occasionally the complaint comes from the child that it pains his eyes to read—this is, however, rarely the cause. The only complaint may be that he squints his eyelids together when he looks at anything, and perhaps the further discovery that the child sees indistinctly at a distance.

Place the child twenty feet away from the test letters given in the June number; if he cannot read the last line, but at fourteen inches he can read the fine print, we at once infer that he is near-sighted. The optician, however, can only be sure of his conclusion by proving that convex lenses make the vision worse, and concave glasses *decidedly* improve it. Finding that concave glasses decidedly improve vision, he will commence with weak concave glasses, and gradually measure the number till the best vision possible has been obtained. He should give the weakest glasses with which this amount of vision can be obtained. Where the glasses are strong, the weakest glasses with which best vision can be obtained may make the eyes ache, in which case we must be content with less acuteness of distant vision and weaker glasses. Only when one is so near-sighted that he cannot see his special work at the required distance, should you give him concave glasses for near work. It is always best where one can get along without them. In near sight always give the weakest glasses which will possibly answer the purpose.

It may be found that although the distant letters are not read and the fine print can be read, the person is excessively far-sighted, and that convex glasses improve the vision; this appears contrary to reason, but it is a fact To relieve a young person in this condition from the tired feelings he has in his eyes, the strongest convex glasses should be given through which it is possible for him to see with well at a distance.

If a young person who has tired feelings in his eyes, or has a tendency to look cross-eyed, reads with ease the distant letters and also the fine print, you should place convex glasses before his eyes;* if they are normal, any glass of higher than No. 36 will make the vision quite indistinct. If stronger glasses don't blur the distant vision, he is far-sighted. The strongest convex glass through which he can possibly see distinctly at a distance, will relieve the tired feeling in the head, or will cure the cross eye if the nerve has not already become permanently shortened.

If neither convex or concave glasses improve the distant vision, the attention should be called to the radiating lines given in our visual tests; if these lines at five and ten feet do not all appear equally dark, he is "astigmatic," and by having a cylindrical lens ground for his special case, his visual imperfection may still be corrected by the use of glasses. You will find in the June number the cut of a cylindrical and common spherical lens. The acuteness of vision in high degree of far-sightedness as well as near-sightedness, is usually greatly reduced below the normal standard, even after the defect has been perfectly corrected. It will be remembered that near-sighted persons should always have the weakest glasses possible, while far sighted persons require the *strongest* glasses through which they can see at a distance.

Accommodation, (the ability of the eye to change its focus for objects at different distances).—It is this faculty, which, owing to its imperfections, requires more lenses to assist it in producing distinct vision, than all other visual imperfections. In childhood or youth, as the result of disease or poor health, the muscle becomes too weak to produce the required changes in the form of the lens. This form of disease gives rise to weak eyes; you are unable to detect any visual defect by the directions given above. Glasses in these cases, where weak accommodation is the only cause of the weak eyes, generally do no good. Other young persons who strain their eyes hard, stretch the ball slightly, thus producing myopia or short-sightedness; this stretching powers frequently imparts a spasmodic contraction to the celliary muscle; these cases all become slightly near-sighted after a time. At first they are pleased with convex glasses to observe near objects, and like concave glasses to observe distant objects. This peculiarity gradually vanishes, and they finally only require concave glasses for distant vision. Both of the above cases are more benefitted by rest than by glasses.

There is a long chapter of difficulties which arise in these weakened eyes dependent upon the relations of the muscular power necessary to converge both eyes at one point, and the muscular energy necessary to focus both eyes upon the same point. It being difficult to increase the focusing power to any great extent without changing the direction of the eyes. These difficulties are usually compensated for by the use of simple concave or convex glasses. Prisms of glass for the correction of this trouble are of more theoretical than practical value.

Presbyopia is the universal trouble which opticians have to treat. As the fortieth year approaches, the lens of the human eye begins to stiffen from age. The eye-ball may also shrink slightly. The muscle which produces the change in the form of the lens retains its power, but the lens having lost its *elasticity*, the muscle finds it impossible to change the thickness of the lens sufficiently to cause distinct images of near objects to be formed upon the retina. The trouble first shows itself by requiring the paper which is being read to be held farther away. It is found particularly difficult to read nights. If the elderly person finds no other means of relief, he will read with a candle in his hand, which he holds between his eyes and the paper he is reading, thus unconsciously counteracting the diffusion of the retinal images, caused by inability to accommodate, by making his pupils small with the light from a bright candle flame. Seven out of every ten cases an optician meets are of this nature.

The lens in a majority of cases degenerates so regularly with advancing years, that it was formerly attempted to number the glasses which these persons use by their age. The glass for a person *forty* years of age was No. 40, etc.

The fine print on our test card (page 144) estimates in a majority of cases about the number of glass a presbyopic person will require, providing there is no complication and too strong glasses have not already been used.

However, in presbyopia, the weakest pair of convex glasses with which a person can read his daily newspaper at fourteen inches, is the glass he must have.

The wearing of glasses for distant vision should be delayed as long as possible, and then commence with the weakest glass which will answer the purpose.

A presbyopic person should begin by using glasses only by lamp light; later he will be obliged to take his night glasses for day glasses, and a slightly stronger pair for night work. The person who follows this rule retains a much more satisfactory range of accommodation than he who takes a strong enough glass for his night work, and uses the same for day work. He loses his accommodation more rapidly because he fails to keep it exercised. Persons whose occupation requires them to look alternately in the distance and near by—as a bookseller who looks up at the shelf to see the book, and then turns to his note book—find it impossible to change their glasses continually. One device for overcoming this difficulty is a fine steel spectacle with the upper half of the lens so flattened that he looks over the spectacles when looking at a distance, and through the lenses when observing objects near by.

As the case advances, and the man requires glasses for distant vision, one of these methods may be adopted to meet the requirements of his occupation.

One will prefer to have two pairs of eye-glasses with "hooks," or a cord about his neck, and will change from one pair to the other, as occasion requires. Another will choose to wear a light pair of spectacles for distant vision, when he wants to see a near object he will put on a light pair of eye-glasses over his spectacles, the sum of both lenses being the lens he requires for near vision.

Another prefers two glasses in one frame, with a cut through the middle, the upper being the weaker, and is for distant vision, while the lower is his reading lens. My experience with glasses where two focuses are ground on the same piece of glass, has not been in their favor, where there is considerable difference in their strength, the edge between them acts as a prism, and is very unpleasant, displacing the floor and showing the colors of the spectrum. The following table shows the *usual* decline of accommodation with age.

If other visual imperfections exist with presbyopia, or the lens has become hardened as the result of disease, and not from the effects of age alone, or too strong glasses have been used early, the below table will not give the glass required for a given age:

48—$\frac{1}{60}$
50—$\frac{1}{40}$
55—$\frac{1}{30}$ to $\frac{1}{28}$
58—$\frac{1}{22}$ to $\frac{1}{20}$
60—$\frac{1}{18}$ to $\frac{1}{16}$
62—$\frac{1}{14}$ to $\frac{1}{12}$
70—$\frac{1}{10}$ to $\frac{1}{7.5}$
75—$\frac{1}{8}$ to $\frac{1}{6.5}$
80—$\frac{1}{7}$ to $\frac{1}{4.5}$

If a man sixty years of age can read distant visual test through convex 10, we know that he is about right when he chooses No. 6 to read with. This glass represents the sum of his presbyopia and far-sight. *Farsighted persons become early presbyopic. Always give the weakest glass with which one can read comfortably.*

(*To be continued.*)

Greenwich Observatory.

The annual visitation of the Royal Observatory was held on the 3d. ult., when the report of this Astronomer Royal, was presented to the Board of visitors. The report contained the usual account of the present state of the Observatory, divided under nine heads.

The new library, a building 55 feet long and 18 feet broad, was erected at the end of last year, but it is only now ready for the reception of books. It is proposed to transfer to the new building, which is close to the Magnetic Observatory, the sections magnetism and meteorology, as well as books in other sections, and manuscripts from the record room, to which references is seldom made. Sufficient space will thus be gained for the proper arrangement of books in the two rooms forming the old library, which is more conveniently placed for the use of the Astronomical Department.

A subsidence of the ground having taken place last summer in the garden south of the transit-circle, close to one of the supposed sites of the well dug by Flamsteed, for observation of stars in day time, an excavation was made, but no trace of the well could be discovered. Of the transit of Venus instruments, two transits, three altazimuths, five 6-inch equatoreals, two photoheliograph mountings, nine clocks, and one transit of Venus model have been sent to Mr. Stone, at Oxford for use in the forthcoming transit of Venus, and three transits, an altazimuth, a photoheliograph, and two clocks are at the Cape of Good Hope, where they will be available for the transit of Venus. A photoheliograph is mounted at the Royal Observatory for daily use, and another is at South Kensington, and the telescopic part of another (without mounting) is in India. There are also three transit of Venus models. The "Naylor" equatoreal, which is in use here for observation of comets and other occasional phenomena, has been moved to a more convenient position in the lower part of the south ground, at a much greater distance from the dip instrument. This equatoreal will also be available for the coming transit of Venus. Two four-inch telescopes on tripod stands have been lent to Captain Wharton, R. N., for observation of transit of Venus during his cruise in the Straits of Magellan. The portable transit with axis view has been lent to Captain Mackinlay, R. A., for practice at Woolwich, in preparation for the transit of Venus.

Astronomical Observations.—No alteration has been made in the subject of observations, which continue to be, as in past years, the sun, moon, planets, and fundamental stars, with other stars from a working catalogue of about 2,500 stars. Special attention is given to the observation of long groups of clock-stars and of stars by reflection. About 1,000 stars were observed in 1881.

Spectroscopic and Photographic Observations.—During the twelve months ending 1882, May 20, the sun's chromosphere has been examined with the half-prism spectroscope on 36 days, and on every occasion prominences were seen. One day a detailed examination of the whole spectrum of the chromosphere was made at 24 points of the sun's limb. Several prominences have shown great changes in the course of two or three minutes, and large displacements or contortions of the bright lines, indicating very rapid motions of approach or recession, have been noted. In particular, a prominence examined in 1882, May 12, was observed to rise through a space of about 30″ in less than two minutes, being at the rate of about 110 miles a second, whilst the *C* line showed a displacement towards the red gradually increasing from 1¼ to 11.4 tenth-metres, corresponding to a motion of recession increasing in two minutes from 36 to 330 miles a second. Thirteen sun spots have been examined on 20 days with reference to the broadening of the lines in their spectra. The strong black lines or bands in the part of the spectrum between *b and F*, first noticed in the spectrum of a spot on 1880, November 27, have been gradually observed to be present in the spectra of spot during the last twelve months, besides several fine lines in the same region of the spectrum to which there is nothing corresponding in the solar spectrum.

In the year ending 1882, May 20, photographs of the sun have been taken on 200 days, and of these 352 have been selected for preservation. Since the end of last August photographs have been taken on Sundays as well as on week days. There were only two days out of 200 on which the sun's disk was observed to be free from spots and faculæ, the mean of the daily areas for each in 1881 being nearly double of the corresponding quantities for 1880, and the increase is still continuing, though with well marked fluctuations. A very remarkable outbreak of spots occured in April last.

Magnetical Observations.—On four days during the year, viz., September 12 and 13, and April 16 and 19, magnetic storms have occurred. Those of April were of more marked character than any that have taken place since the storms of 1872, and it is a significant fact that exceptionally large spots made their appearance on the sun shortly before, viz., on April 11 and 17. Smaller magnetic movements are now also much more frequent, the traces exhibiting a marked contrast to their general appearance some two or three years ago.

Meteorological Observations.—The mean temperature of the year 1881 was 48.7°, being 0.6° lower than the average of the preceding 40 years. The highest air temperature was 97.1° on July 16, and the lowest 12.7° on January 17. The mean temperature was below the average, 6.7° in January and 4.8° in October, and above the the average 5.9° in November. In other months the temperature in general differed little from the average. On four days in July the temperature rose above 90°.

The mean daily motion of the air in 1881 was 291 miles, being 12 miles greater than the average. In January and September the mean daily motion was 70 miles and 72 miles below the average, respectively. The greatest daily motion was 999 miles, on October 14, the day of the great storm; and the least 59 miles, on May 25. A velocity of 61 miles an hour was recorded on October 14, and one of 58 miles an hour on April 29, these being both greater than any recorded in previous years. The greatest pressure was 53 lbs. on the square foot on October 14; pressures of 46, 47, 47 and 48 lbs. were also registered during the same gale. On April 29, a pressure of 49½ lbs. was recorded at a time when the hourly velocity was 50 miles; the pressures corresponding to the maximum velocity of 58 miles an hour were not registered, the cord of the pressure pencil having slipped off the pulley.

The number of hours of bright sunshine recorded by Campbell's sunshine instrument during 1881, was 1, 301, which is more than 100 hours above the average of the four preceding years.

Chronometers and Time Signals.—The number of chronometers now being tested at the Observatory is 214, 168 of which (120 box-chronometers, 23 pocket-chronometers, and 25 deck-watches) belong to the Government, and are being rated after repair previous to being issued to the Navy. The remaining 46 are for the annual competitive trial, and of these 18 are fitted with Airy's supplementary compensation. In additions to the above, six chronometers have been placed on trial for the Mauritius Observatory, and five chronometers have been tested for the Japanese Government.

There has been only one case of accidental failure in the automatic drop of the Greenwich time ball. On four days the ball was not raised on account of the violence of the wind. The Deal ball has been dropped automatically at 1^h on every day throughout the year, with the exception of fifteen days, on which there was either failure in the telegraph connection or interruption from telegraph signals continuing up to 1^h, and of one day when the current was too weak to release the trigger without the attendant's assistance. On three days high wind made it imprudent to raise the ball. The Westminster clock has continued to perform well, its errors having been under 1^s on 40 per cent. of the days of observation between 1^s and 2^s on 44 per cent., between 2^s and 3^s on 14, per cent., and between 3^s and 4^s on 2 per cent. Time-signals, originating in the Observatory, are distributed at 10^h a.m., and 1^h p.m., to all parts of the country by the pots office telegraph.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

Ninety-eighth Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

GAUGE FOR MEASURING SHEET BRASS—TURNING ON THE BOW LATHE —HOW TO POLISH THE NOTCH IN LEVER FORK.

Secretary of Horological Club:

Will some of you please answer me a few questions? First, what kind of gauge is used to measure sheet brass? I want to make some of the tools mentioned in THE CIRCULAR, but don't know what is meant by Nos. 8, 10 and 16, etc. brass, and the hardware men don't seem to know any more about it than I do; how shall I describe it in ordering, and how can I get *hard* brass and of what thickness? Second, in making a balance staff on a bow lathe or turns, which end do you work on, the right-hand end or the other? Third, what is the best way of polishing the notch in the end of a watch lever? I have a good deal of trouble with this kind of work to get a good polish. I hope you won't consider these questions silly, and put me off by referring me to back numbers, etc. As I am very anxious to learn all I can about our trade, and THE CIRCULAR is about all the way I have, as my instructor doesn't pay much attention to me or his business either. APPRENTICE.

Mr. McFuzee said that "Apprentice" could buy in any shop a *wire gauge*, on which he will find notches for measuring the size of wire, the thickness of sheet metal, and all other objects whose size is to be ascertained. No. 8 brass would of course be of that thickness which would just go in the notch marked "8." There are several gauges, the most prominent of which are the Brown & Sharpe American gauge, the Stubbs gauge, and the Birmingham or English gauge. The first is most used in this country, and the handiest form is that of a flat round plate, two inches in diameter, with notches in its periphery. There are also many different kinds of calipers, verniers, etc., suitable for various purposes, and preferred by many workmen. In ordering wires or sheet metals, always specify the number, and also what gauge you use, in order to get what you want, as the different gauges differ considerably. Hard brass can be ordered from the dealers in metals in almost any city, and of any thickness required. In turning on a bow lathe, work on the right-hand end. To polish the notch in the lever fork use bell metal slips, filed thin, with straight flat faces. First get a smooth dead surface with fine oilstone dust, then polish with crocus. But be careful not to get the notch *too wide* for the ruby pin—or you had better left it unpolished.

NEW WATCH ESCAPEMENT—A. PLUMBAGO, ESQ.

Secretary of Horological Club:

Saunier's articles on "Preservation of Health and Eyesight of Workmen" is a very good one, and if all workmen would heed it, there would be a great deal more enjoyment of this world.

I have been very much interested in the articles headed "A review of Different Escapements," and, as the last article closes it, I will give you a review of another movement, such as I have never read about, and never saw but one, and that one is in my possession. It is a patent lever, as far as the barrel, center and third wheels are concerned. The fourth wheel is of the usual size, but this watch has it made into the escape wheel of thirty teeth. The pallets correspond to the large-sized wheel. The regular balance wheel, as in other watches, contains the roller and hairspring, but it has teeth cut on the periphery of the wheel; these teeth engage into a pinion, which carries another balance wheel of usual make. The watch cannot be stopped by holding the balance, only so long as you do hold it, for the moment you let go it starts again. It is not affected by the motion of the body or railroad cars. The very first click of the ratchet starts it, and it beats the true second. If anyone of your honorable body know anything of such a watch, who invented it, etc., I would be pleased to know.

Some time ago I wrote you concerning the "Standards of Time," and I am very much pleased to know that something is being done in that line, and your article suits me about just as well as the one having four standards in the United States. I am not particular, but would like to see more uniformity in our time.

I really would like to know what all that nonsense about Horological Schools and Watch Factories of A. Plumbago means—whether it is a burlesque on some person, or just our editor's dreams.

I can assure those writers on "Watch Mainspringing" and "Sight," that their labors are not in vain, for I find something in each of them that is worth knowing, and hope they will not weary in well doing.

E. Y. D.

Mr. Uhrmacher said that this watch must indeed be a curiosity. As he understood the description, the first balance was actuated by the lever in the usual manner. Then this balance, by means of teeth upon its periphery, which geared into pinion leaves on a second balance staff, produced the vibration of the second balance, carried by this pinion-staff. The effect of this arrangement would, of course, be to greatly lengthen the period of vibration—increasing it from the ordinary one-fifth second to "the true second," as stated by Mr. D Such vibrations would require more motive force to produce them and keep them up, and that is obtained by omitting the usual escape wheel, and attaching the escapement directly to the fourth wheel, near to the source of power, the mainspring. The mechanical effect of the arrangement would therefore seem to be, merely, that the second balance would give more momentum to the first. But he could not see how any advantage could be gained, after considering the friction and loss of power entailed by the use of two balance staffs with their pivots, etc., and the friction between the first balance and the pinions of the second. Mr. D. does not say whether this device keeps as good time as ordinary lever watches, or any time at all.

As regards not being stopped by holding the balance, that is a minor matter, and most watches can be made to do that. But he thought it must be a mistake about it not being "affected" by the motion of the body, etc., for it would seem as if this arrangement would be more liable to be *affected* than the ordinary ones, although it might not be actually stopped. He was unable to name the inventor, or give the other information asked by Mr. D. about the watch.

We are not in the secrets of the editorial department of THE CIRCULAR, and, with reference to Aristarchius Plumbago, Esq., Mr. D. has the privilege of "guessing," the same as all the rest of us.

HOW A "BOTCH" BECAME A WORKMAN.

Secretary of Horological Club:

I was so very much pleased with your answer to Mr. Morehouse, in No. 4 of your valuable journal, that I at once sat down to write a letter to you, but when I had completed it, I burned it, thinking there was not anything in it that would be interesting to you nor to any of the readers of THE CIRCULAR. To-day it entered my mind that I was wrong, and that perhaps you would be glad to hear something of what I had to write about. You spoke in that answer about that manner you have favored to get rid of the botches, and I hope that you will see the fruits of your work. What I am going to tell you about is what good you have done me. You ought to see some result of your work, and it is not right of us who learn, to keep quiet and not say anything of the good you are doing us. At least, the teacher must see that we really follow him, and that we listen to him. That is why I write this letter to you. I am going to tell you how I learned the trade, and to make it complete I will begin with the beginning.

I was born in a small village in "the land of the midnight sun," as you call it here. I mean Norway. My father was the only watchmaker there. He had learned the trade by himself, and as he had no interest in watchmaking, he didn't get further than being able to clean a watch. In my childhood, sometimes I helped my father in cleaning clocks. I felt interested in it, and after having ended my school days I began regularly to work. When I had been working a year or so I couldn't learn any more from my father, and then he got some journeymen now and then, from whom I should learn, but to get information from them was no easy task. I had to flatter them and to pay them, and what was the value of their teaching? Their idea was the more holes you bush in a watch the better it is fixed, no matter if it needed bushing or not. Every new watch you had to bush before you sent it out in the world; if you did not then your colleague would say, "the watch was not adjusted." These were the good watchmakers in my country. I would be no "botcher," and to avoid this I had to follow the rules I had got, and I tell you I have damaged more than one gearing, and destroyed more than one watch in my apprenticeship. I think you understand it. I hammered, and I bent, and I filed, and I don't know what I did not—in short, I would be no "botcher," but I think I was a *butcher*, as "Excelsior" calls that kind of working men.

Well, I began to see that I had not found the right way to reach my object, namely, to be a good watchmaker, and I thought there must be books on the subject, and finally a publisher I wrote to sent me some prices of a German book on watchmaking. I really felt happy to see that there were books about the subject, but at the same time I was disappointed by not having any in my own language. Never mind, I thought, I will see the drawings if I can't understand the words, and I bought three of them. Now, when I had got the books and looked at the drawings, I couldn't let the book alone without knowing what was written in it. I began to study German. I bought a dictionary and took some lessons in German, and in that manner I got the meaning out of the book. At that time I thought that to be something extra, and more than worth the money. I finally heard of the book of H. Sievert. I wrote for it at once, and that was just the book I wanted. That was something I understood. I really can't tell you how glad I was after having got that book. I have the author to thank for what I know about the trade to-day. I don't think there was any book more needed in the trade than his, to teach watchmaking from the very beginning. All other books I know of are written only to advanced workmen. The information in that book is within the reach of the "botches," and is just what they need.

But I have been discouraged more than once. I have been really tired of life. Everything was dark to me. I was a "botcher," and I wished to be a good watchmaker—but how? That was the question. The work of Sievert guided me the right way to the object, but that wasn't enough. I wanted more instruction, but where should I get it?

That winter I subscribed to The Jewelers' Circular, which I had seen advertized in a German paper. It came just in right time. I understood the articles, and that gave me courage. But what pleased me most was the real American literature from "Excelsior." They are the best articles ever published. I am afraid there are lots of people who do not understand what a good opportunity they have to learn here in America. Do you know what effect Excelsior's articles had on me? I changed my mind about coming to America. Instead of thinking it was a land full of "botches," where you could learn nothing, I now concluded to take my father's advice and come to America. In April the same year I landed here in New York. You have very little literature of your own, but you may be proud of what you have got. One need not read more of "Excelsior" than the introduction in his book to be convinced that this is a man who possesses a strange ability in teaching watchmaking, and really understands how to do it. I would advise Mr. Hopkinson to put that introduction into The Circular as an advertisement for the book. If I had seen that I would have bought the book long before I did do it. I have read it over and over again. There is something in it I can't explain. I feel as if it was said exactly to me; as if Mr. Excelsior had known me. I can't explain to you my feeling toward Excelsior on reading that.

For instance, when he says: "Let no one feel discouraged because he has never had proper instructions in the trade. If he really desires to be a good workman, there can scarcely be any training more severe and improving than patient study and practice," etc.

I understand from this that I am not the only one who has been discouraged, and these words from Excelsior give me courage, and I will not longer grieve at not having had instructions, but I will follow Excelsior's hints, and do *the best I can*, and I hope to succeed; I hope to attain the object of my wishes, namely, to be a good watchmaker. Yes, Excelsior has, there in his introduction, given me courage enough to say that I *must* succeed for there is no royal way, he says, and not any trade secrets, either. "*Nothing whatever* will suffice but good thorough work." Th.

Mr. Isochronal said that our friend from the "land of the midnight sun," was now pursuing the true course to become a good workman, viz.: To seize every opportunity to inform himself, and to determine never to do work in any but *the best* way. One who will follow that rule, and always execute his jobs as well as he can, will find himself all the time improving, while the man who shirks his work, and is satified with having it half done, will be constantly falling back No matter what opportunities he may have had to learn the trade, he cannot be a good workman unless he *does his work well.* The botch is not necessarily a man who does not *know how* to work, and is therefore compelled to butcher it, but it is any man who *does* butcher his work, whether he knows better or not. And, conversely, the good workman is he who does his work well. The practice of doing one's best is the surest, if not the only sure way to improve. Let our friend keep up his courage and persevere in this course, and he need not fear that anyone will call him "butcher." He is not the only one, by a great many, who has been assisted by The Circular in learning the trade, and the watchmakers of America endorse his estimate of the value of Excelsior's writings, which appeared only in The Circular, together with special treatises by numerous other experts, to be found in every number, and rendering it invaluable to the workman and student of horology.

IMPROVED POLISHING POWDER HOLDER.

Secretary of Horological Club:

Some time ago I submitted to the Club a patent polishing powder holder, afterward to be presented to Excelsior. I have since produced an improved article, one of which I send you by mail. If you please, submit this one to the Club, and after that send it to Excelsior, with compliments. I desire that he should have one of the best made. I have engaged Levy, Dreyfus & Co., as sole agents for this most useful article to watchmakers and engravers.

Yours resp'y, H. B. Weiland.

Mr. Uhrmacher described and exhibited the new form of block or holder for polishing powder, which in some respects seems to be superior to the previous form, and a very convenient article for the purpose of keeping the powders from dust and dirt, while convenient to use when wanted.

As Mr. Weiland's agents will undoubtedly push the sale of them vigorously, our readers will soon have a chance to see and appreciate them for themselves.

Mr. Uhrmacher promised to send the sample to Excelsior, who is probably the recipient of more such tokens of esteem, in the shape of new tools and devices, than any other man in the country, and values highly any improvement showing ingenuity and adaptability to its uses.

HOW TO MEASURE THE "PITCH DIAMETER" OF A WHEEL.

Secretary of Horological Club:

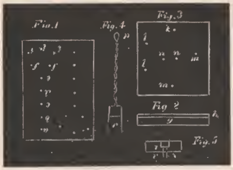
Will you please to tell me the right way to measure a wheel or pinion to find the correct pitch diameter? F. Smith.

Mr. Horologer said that a detailed answer to Mr. Smith's inquiry would require far more space than is allowed for the entire Proceedings of the honorable body in The Circular. Mr. S. should obtain the back numbers of The Circular for the years 1880 and 1881, where he will find a series of articles on gearings, by Excelsior, which not only treat the subject fully and thoroughly, but are altogether the best practical treatise thereon which he had ever met with, in any language. Among the many other points explained, are the different ways of finding the "geometrical diameters" of wheels and pinions, both by calculation and measurement. In supplying a new wheel, when it is to be exactly like the old one, we may measure the outside diameter, provided the shape and thickness of the teeth are *exactly the same* as those of the old wheel. If that is not the case, then allowance must be made for the length of the points or curved portions of the teeth, outside of the "pitch circle," which last is the true diameter of the wheel. In most modern wheels, the flanks of the teeth are straight inside of the pitch circle, so that the point where the straight and the curved portions of the teeth meet is the position of the pitch circle. This can sometimes be seen plainly enough to be measured directly, but generally a system of calculation is employed in connection with outside measurement, and for making them Mr. S. cannot do better than to study Excelsior's series of articles on Gearings, from which he will obtain a thorough knowledge of the entire subject.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

IN MY last I gave a few hints in regard to making screws, and I have since devoted my attention to the correction of some bad habits, common among even good workmen, in regard to screws for watches. First and foremost, watchmakers, as a rule, are slovenly in the manner of keeping such screws as they use for jobbing—throwing big and little, English, Swiss and American, all into a hodge-podge box together, and when one is wanted, the old farce of a needle in a hay-stack is enacted over again, going through the medley mass with the tweezers very much as a hen would try to find a live worm in a dry sand heap; the screw may be there, but the chances are ten to one that it will not be found. A box of screws should be assorted to size and kind. We will say Swiss screws should be assorted into about eight small boxes, and all of these small boxes put into one large one, and labled "Swiss screws;" the boxes may all be of paper, and the cover of the one containing them all is a good place to empty one of the small boxes when you are looking for a screw. Let the division be made as follows: four boxes for cock and bridge screws, assorted by size of the outside diameter of the screw, measuring each screw, and putting it into its box by actual measure; it will save time and temper. The other four boxes to contain jewel, dial, case and stem-winding screws. English screws can be assorted into about four small boxes, viz., cock, bridge, beveled-headed, for retaining or maintaining click springs, etc., and a box of miscellaneous screws. American screws are getting to be a *bad crowd* for the number of the kinds, each factory adding to the list every year; it will take ten boxes for this list. Cock and plate screws of extra size for worn or stripped holes, are made in the American factories, but our material men either mix them with the *assorted* screws, or don't bother their heads about them. Extra size screws should be kept carefully by themselves, as no one wants to enlarge a hole by forcing too large a screw into it; wait until a large one is needed. In taking all watches apart, screws should be kept in such a manner that each individual screw should go back to its place. Most watchmakers do it with Swiss watches, but English and American should also be treated in the same manner. I presume many of my readers use a similar method, but for the learner I beg their indulgence. Most workmen content themselves with a paper box cover, which they puncture with holes, generally in the order shown in Fig. 1. The writer changed the plan a little, substituting wood with a brass top for the paper box lid. A good size is

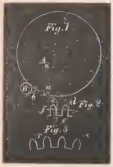


$1\frac{1}{2} \times 2\frac{1}{4}$, with two sets of holes for different sized screws, drilled as shown at Fig. 1, *a*, *b*, *c*, *d*, *e*, representing holes for the bridges in the following order: balance bridge, pallet staff, scape wheel, fourth wheel, third wheel; *f*, *f*, center wheel bridge; *i*, *i*, barrel bridge, (which sometimes has three screws). The brass should be about No. 24, and the wood some hard species, and $\frac{3}{16}$ thick; a transverse section is shown at Fig. 2; *h* represents the brass, *g* the wood. Fig. 3 shows a plan for a screw holder for American or English; *k* shows the place for the cock screw; *l*, *l*, the balance bridge; *m*, *m*, the pillar screws; *n*, potance screw, if necessary to remove it—some watches have two potance screws. Such screw holders are very convenient, and admit of bushing off the screw heads when in the block. Such a system admits of no mistakes in placing the screws where they belong. The simple process of polishing and blueing a screw head, the writer has often seen bungled to what one would think an impossible extent. A screw with the head finished simply with the burnish file, will never take an even and fine blue tint. To get a good, even color, the entire head must be ground and polished; in hardening, a scale is formed, which must be entirely removed before even a good polish can be obtained. With the ordinary screw head tool, the best way is to harden the screw by heating and dropping into oil. Take a piece of binding wire and twist it so as to form a loop, as shown at *p*, Fig. 4; the screw is inserted in the loop, and held in the lamp until red hot, when it is plunged into oil—water will do, but oil makes a tougher temper, and oil serves a double purpose, as will be seen. At *r* is shown a portion of a convenient little handle—suppose we take the handle in our hand, and insert the screw to be hardened into the loop *p*, and when red hot, plunge it as described above; a little oil will cling to the screw and also fill in the loop; if we now hold the screw in the lamp until the oil catches fire, and then hold it away until the oil burns off, we shall have a screw of a perfect spring temper. Put the screw into your screw-head tool, and with a strip of 00 emery paper glued on a piece of thin board (like a buff) brighten up the head, grinding the face of the screw enough to remove the scale mentioned before; a fine file is a little quicker, but the emery paper must be used to obliterate the file marks. A strip of hard wood and Vienna lime, or diamantine, with alcohol, gives almost an instantaneous polish. A piece of engraver's boxwood about an inch wide and three or four inches long, using the end of the grain of the wood to do the polishing—that is, to hold the diamantine and alcohol, stands a good deal of use before it gets worn out of shape. The above process makes a good, fair screw head, but a fine screw should be finished dead flat, and polished with a triangle on a tin lap, as described in a former article. To blue a screw nicely, it should be done very slowly, and the necessary heat should be continued for at least three hours; but for an ordinary job, a plate of brass $\frac{1}{16}$ of an inch thick, with four or five holes of different sizes, answers well enough; the plate should be about one inch in diameter, and hard-soldered to a piece of brass wire about $\frac{1}{8}$ of an inch in diameter, which should be inserted into a handle. When the screw is inserted in the hole of the right size, move the plate back and forth quickly over the blaze of the lamp, so as to heat the plate slowly and equally, and this motion also gives the oxygen of the air free access to the screw head, which is essential for a good color. An American lathe answers a good purpose for a screw-head tool, but if your chucks are not hardened it would be well not to use it for this purpose, as the threads of the screws cut the chucks badly, and even if your chucks are hardened, my advice is to stick to your old screw-head tool if you have one. In putting in new screws, especially in Swiss watches, if the hand is too high, or protrudes from the countersink, it should be filed off so as to be just even with the bridge; some screws are very hard, in fact, file destroyers; such should be treated as described for tempering, that is, put them in the wire loop and burn off some oil; then repolish and blue as directed. But if you keep a good assortment of screws, and assort them as directed, you can generally get one to exactly fit. Sometimes it is necessary to set the barrel bridge a trifle closer to the center pinion; in this case the screws are the most difficult customers to deal with, as no matter how much you shift the steady pins, the screws bring the bridge back to the old place. This is a job easily and quickly done, if one goes at it right. Remove your mainspring from the barrel, leave off male stop wheel—remove all the train except the center wheel; now your barrel and center are in a condition to try the depths. Make an estimate how much it is necessary to move the bridge forward; if but a little, bend the steady as shown at *t*, Fig. 5—this would do no good without changing the hole; at *u* is shown a section of the hole, if now, with a file, you remove a portion of the hole to correspond, as shown at the dotted line *x*, without producing a recess at *v*, the bridge will be thrown forward enough if your depth needs only a slight change; but the screws will have to be thrown over, which will require special tools, the description of which, although very simple, would exceed our space in this number; and besides, the steady pins, if in a fine watch, should not be bent, but new ones inserted. All this matter, as well as a description of a case of tool drawers, will engage our attention in next number.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

IN PUTTING in new pinions in repair, it is essential, if your watch is a fine one, to be extra careful in the selection, for I venture to say that we have, in our average material, more imperfections in pinions than in almost any of the parts of watches furnished to the trade. Indeed, it is extremely difficult to determine even if a serious error exists in the spacing of the leaves of a pinion; we can judge of the shape or form of the leaf, but to detect an error amounting to several minutes of a degree by the eye alone is impossible; and yet such an error may and probably will cause a stoppage of the watch, when the calipers show the pinion to be of the right size, and the puzzled workman alters the depth to correct an actual defect of the pinion in spacing. We will suppose a pinion to be nearly correct when in the form of pinion wire, but the rapid and careless manner in which the leaves are ground and polished, stand a number of chances to one of destroying all such accuracy. Nor is it to be wondered at when we take into account the mere pittance which the actual maker gets for our cheapest material. For repairs, get the best pinions you possibly can (surely they are cheap enough), and if you could test them you would find them inaccurate enough, even the very best. A friend of mine constructed very carefully a machine which he calls an *Errorometer*, for the want of a better name; with this machine one can test the truth of a wheel or pinion, in the round, the accuracy of spacing; and it can also be applied to escapements, showing the impulse angle to the balance, the impulse lock and drop angles to the pallets. With this instrument many errors in an escapement are detected, and the real cause of bad motion chased down to the real source. The writer has the inventor's permission to give description and cuts of the instrument, and will do so subsequently. Many rules for the selection of pinions have been given, but to my recollection I have never seen in print, for watchmakers' use, a proper or complete mathematical expose of the elements involved. Everybody, I suppose, knows what is meant by the term pitch circle, but it can do no harm to explain it again, and in this case it is essential, as it would be necessary in order to follow completely the explanation. A pitch circle is a line defining the true or pitch diameter of a wheel. At Fig. 1 is shown a wheel and pinion of the relative pitch diameter of 8 to 1; the full clear circles represent the pitch circles, and the dotted lines at *a*, *b*, the real diameter of wheel and pinion, measured from the extreme lengths of the teeth or leaves of the pinion. We will assume our wheel and pinion to be (8 to 1) the wheel, ½ an inch pitch diameter, and the pinion ⅛ of ½, consequently $\frac{1}{16}$ of an inch; now the teeth of the wheel must extend beyond this line a little as shown at *a*, and the leaves also beyond the pitch circle of the pinion as shown at *b*. Now comes the question of how much. Experience—or usage, the practical result, generally, of experience—says we should make the proportions of the teeth of wheels as follows. For convenience we will make our mathematical calculations to correspond to our assumed sizes, and carry out two methods of arriving at the same results; first, we will assume that we measure all our parts to $\frac{1}{10000}$ of an inch, and construct the parts accordingly. This, undoubtedly, is the true method, but, unfortunately, measuring tools of sufficient accuracy are very expensive or troublesome to make; but I insist, and so must all others who wish to get the *very best* results, that such results are only to be obtained by actual measurements with accurate measuring tools; consequently, let us all insist on having such tools. And let our tool makers understand that we need them and will buy them if they are only put upon the market. To go on with our calculations: to get the circumference of our wheel, we multiply our diameter $\frac{5000}{10000} \times 3.1416 = \frac{15708}{10000}$; as we are to have 80 teeth in our wheel, we divide this by $80 \div 15708 = \frac{157}{10000}$; consequently $\frac{157}{10000}$ is the space occupied in the divisions of 80 teeth on the pitch circle. To get at how much the teeth should protrude beyond this line, we divide these spaces into 10 parts each, letting the tooth be $\frac{7}{10}$ long, 3 of these parts protruding beyond the line *f*, Fig. 2, which represents the pitch circle, 4 parts inside. In actual measurement the entire length of the tooth would be ($\frac{7}{10}$ of $\frac{157}{10000}$) $\frac{109}{10000}$. The space between the teeth is $\frac{54}{100}$ of the *true pitch*, (which is the term applied to each of the 80 spaces under consideration), consequently would measure $\frac{84}{10000}$. The tooth on the pitch line would measure $\frac{73}{10000}$. The pinion leaves are got in the same way. The pinion would measure $\frac{625}{10000}$ pitch diameter, to which we must add what the leaves protrude outside of the pitch circle, which would be $\frac{47}{10000}$; as this space extends on both sides of the pinion, the extreme diameter of the pinion would he $\frac{719}{10000}$; of the wheel, $\frac{5094}{10000}$. The other method of arriving at the diameter of a pinion is only an explanation of the old "rule of thumb" method of finding pinion diameters, by taking a given number of the teeth of the wheel, working into it as a measure in your calipers. We give below the calculations for estimating the diameter; it will certainly have this effect on the reader who takes the trouble to follow and understand it, and that is to give a definite idea of the exact size required, and such rules as, for an 8-leaf pinion take so many teeth and all the space—will assume a more exact form, and he will be able to get (if he is so minded) an exact measure of the pinion required, expressed in so many teeth and parts of teeth of the wheel to be matched. In the first case, we will assume it is a 64-toothed wheel we wish to match with an 8-leaf pinion. Now the circumference of our wheel is divided in 64 equal parts—it in reality makes no difference in regard to the size of our wheel, as we assume it to be divided into 64 parts, and those parts again into 10, to enable us to get at the proportions of the teeth. It will be necessary to recapitulate a portion of the formula given above, in order to explain how we obtain the exact diameter of our wheel in this case, not expressed in decimals of an inch, but in the value of the teeth of our wheel in hand; if the wheel is large, of course the spaces are in proportion. As said above, the wheel is divided into 64 spaces, and each space into 10 parts; or, in other words, 640 spaces; now, 640 divided by 3.1416, gives 203.6, or, expressed in words, the pitch diameter of our wheel is twenty and thirty-six one hundredths, teeth spaces in diameter; one-eighth of this is the pitch diameter of our pinion; now, $203.6 \div 8 = 25.4$, or a trifle over 2½ teeth; to this must be added the parts of the leaves which extend outside of the pitch circle of the pinion, which are 3 tenths on each side, making 6 tenths in all. Our pinion diameter (expressed in tooth spaces) stands $2.54 + .6 = 3.14$, or a trifle over 3 full teeth spaces. At Fig. 3 is shown a segment of a wheel with four teeth; the reader will see that from the dotted line *r* to *s*, three full spaces are contained; hence we have an explanation of the old rule, "for an 8-leaved pinion, take in your calipers 3 full teeth and all the next space." The rule given above applies to wheels of any number of teeth, and also to pinions of any number of leaves, and if once impressed on the memory it is impossible to make an error. We read in works on the trains of clocks and watches, instructions like this: "Take so many teeth and certain proportions of a tooth, if the wheel is to *lead*, or the reverse." This means, if the wheel, through the pinion it encounters, is to drive or propel the train, let the pinion be practically a trifle smaller than theory would dictate, and if the pinion is to propel let the reverse be the case. The explanation of this course is, that the wheel carries or holds the pinion further in its circuit, and, consequently, lets the first contact occur on or near the line of centers. A word more on measuring tools and have done with this for the present. What is wanted is a tool which will measure from one pivot hole to another, and give exactly the size of both wheel and pinion needed.



The Great Diamonds of the World.

Continued from Page 186.

III.

JOHN LAW AND THE FRENCH PURCHASE.

"Even after refuting the calumnies of his enemies, Pitt knew little rest until he was quit of his costly jewel. He was constantly haunted by a morbid fear of losing or being robbed of it, so that it was with great difficulty he could ever be induced to exhibit it even to his most intimate friends. The German traveler, Offenbach, when visiting England in 1712, anxious to see all the sights of the metropolis, made several vain attempts to get a view of the gem, which had already become famous throughout the west. While it remained in his possession the ex-Governor never slept two nights running under the same roof. He moved about capriciously or in disguise, and never gave previous notice of his arrival to, or departure from, town.

"At last he was relieved of further anxiety by the negotiations, in consequence of which the Pitt became the Regent, passing from its English owner into the hands of the Duke of Orleans, Regent of France, in 1717. After being cut in the form of an almost faultless brilliant, a model of the diamond was taken, which is now in the British Museum, and on the silver frame is engraved the legend: 'This is the model of Gov. Pitt's diamond, weight 136½ karats; was sold to Louis XV., of France, A. D. 1717.' This model, or rather a duplicate without the frame, had been sent to Paris and submitted to the famous Scotch financier John Law, at that time at the height of his power in France. Law took the stone first to the Regent, and then to the Duc de Saint Simon, (Saint Simon, who seems to have known nothing of its early history, asserts that it was stolen by a person employed in the Indian diamond fields, who brought it to Europe. After showing it to the King of England and several other English noblemen, he took it to Paris, where he submitted it to Law. Then follow the particulars of the negotiations with the French Regent, as stated in the text,) who gives a full account of the affair in his 'Memoirs.' Saint Simon agreed with Law that France ought to possess a gem which up to that time was incomparably the finest ever seen in Europe. Yielding to their combined efforts the Regent at last consented to purchase it for £135,000, (but on this point the authorities are at variance with each other. Board says the figure was 2,250,000f.; Jeffries, £125,000; others, £130,000,) including £5,000 for the negotiations, a euphemistic expression, which, translated into plain language, meant a bribe for Law. Money, however, was just then so scarce that the interest alone was paid on the amount, jewels being given as security for the principal until it was paid off. This price, great as it may appear to be, was even then regarded as much below its real value, and in the inventory of the French crown jewels, drawn up in 1791, it is valued at 12,000,000f., or £480,000."

IV.

HELP IT GAVE NAPOLEON AFTER BRUMAIRE.

"The year after the preparation of this inventory, which was made by a commission of the most experienced jewelers in Paris, the whole of the French Regalia disappeared, and with it the Pitt, now the Regent, which stood at the head of the list. The remarkable circumstances attending this famous robbery of the Garde-Meuble are thus related by M. Breton, editor of the *Gazette des Tribuneaux:*

"'The inventory of the crown diamonds, made in 1791, in virtue of a decree of the Constituent Assembly, had scarcely been completed in the month of August, 1792, at the time of the last public exhibition, which took place on the first Tuesday of every month. After the sanguinary events of Aug. 10 to Sept. 2, this rich treasury was naturally closed to the public, and the Paris Commune, as representing the State property, put its seals on the cabinets in which had been placed the crown, the sceptre and other ornaments of the coronation service. The golden shrine, bequeathed by Cardinal Richelieu to Louis VIII., with all the accompanying diamonds and rubies, and the famous golden vase, weighing 106 marks, besides a vast quantity of other vases in agate, amethyst, and rock crystal. On the morning of Sept. 17, Sergent and the two other Commissioners of the Commune perceived that during the night robbers had made their way in by scaling the colonnade from the side of the Place Louis XV., and through a window looking in that direction, having thus got access to the vast halls of the Garde-Meuble, they had broken the seals without forcing the locks, carried off the priceless treasures contained in the cabinets, and disappeared without leaving any other traces of their presence. Several persons were arrested, but released after a protracted inquiry. An anonymous letter, addressed to the Commune, stated that some of the objects were in a ditch in the Allée des Veuves, Champs Elysées. Sergent at once proceeded with his colleagues to the spot, which had been very carefully indicated. Here he found, among other things, the famous Regent diamond and the no less famous agate-onyx cup, known by the name of the Abbé Suger's Chalice, which was afterwards placed in the cabinet of antiques in the National Library.

"'Notwithstanding the investigations made at the time and subsequently, it remained uncertain whether this robbery had a political object, or whether it was simply the act of ordinary criminals, undertaken at a time when the guardians of the public security were in a state of complete disorganization. Some said that the proceeds of these treasures were intended to maintain the army of the emigrants. Others, on the contrary, pretended that Pethion and Manual had used them to obtain the evacuation of Champagne by giving up the whole to the King of Prussia. Some even went so far as to assert that the keepers themselves had broken open the cabinets, and Sergent, of whom we have above spoken, was nick-named Agate in consequence of the mysterious way in which he had found the agate-onyx cup. But none of these more or less absurd surmises ever received any judicial confirmation.

"'Nevertheless, there was one circumstance of which I was witness, jointly with the others present at the sitting of the special criminal court of Paris, when Bourgeois and others, accused of having forged notes on the Bank of France, were put upon their trial in 1804. One of the accused, who had assumed the name of Baba, had at first denied all the charges brought against him, but during the proceedings he made a complete confession, and explained the ingenious devices employed by the forgers. "It is not the first time," he added "that my revelations have been useful to society, and if I am now condemned I will implore the Emperor's pardon. But for me Napoleon would never have mounted the throne; to me alone is due the success of the Marengo campaign. I was one of the robbers of the Garde-Meuble. I had assisted my associates to bury in the Allée des Veuves the Regent and the other easily recognized objects, by which they might have been betrayed. On the promise of a free pardon—a promise which was faithfully kept—I disclosed the hiding place. Here the Regent was recovered, and you are aware, gentlemen, that this magnificent diamond was pledged by the First Consul to the Dutch Government, in order to raise the money of which he stood in the greatest need after the eighteenth Brumaire."

"'The criminals were all condemned to the galleys except Bourgeois and Baba, who were sent to the prison of Bicetre, where they died. I do not know whether Baba made any further revelations beyond what I have reported, and which may also be read in the *Journal de Paris* of that date.'

"Since its recovery and redemption from the Dutch Government, the Regent seems to have remained in the French Treasury to the present time. The first Emperor is known to have worn it in the pommel of his sword, and Barbot tells us expressly that it was publicly shown among the crown jewelry at the Paris exhibition in 1855. Still, it is remarkable that this brilliant does not figure in the inventory of the State jewels drawn up by order of Napoleon in 1810, nor apparently in any of the subsequent official reports on the crown jewels. This circumstance, however it is to be explained, has doubtless lent some coloring to the many conflicting statements regarding its subsequent vicissitudes. Kluge asserts that after its recovery in 1792 it was pledged, not to the Dutch Government, but to Treskow, a merchant in Berlin. He also refers to the highly improbable report that after the battle of Waterloo, where the Prussians found it in the Emperor's State carriage, it was carried off to the Prussian Treasury. If it really was taken to Berlin on that occasion, it was subsequently restored to the French Government, for Ersch and Gruber, writing in 1833, distinctly state that at that time it was 'the first diamond in the French Treasury.' Barbot also justly regards it as the most conspicuous gem in the now disused crown of France. This crown, which also contains eight other diamonds, weighing from 19 to 28 karats, is thus by far the richest in the world.

"The form of the Regent is somewhat round, an inch broad, 1⅛ of an inch long, and ¾ of an inch thick. It was reduced in cutting from 410 to 136⅞ karats, and has been estimated to be worth £480,000."

THE EUGENIE.

WORN IN A NECKLACE BY EUGENIE, IN A HAIRPIN BY CATHERINE.

"A perfect brilliant of 51 karats, of an oval shape, blunt at one end, and very beautifully cut, this diamond was set as the center of a hair-pin belonging to the Empress Catherine II. of Russia. When Potemkin became her favorite, she made him a present of it as a proof of her esteem, and to reward him for the great services he had rendered to his country. This man, unlike her other favorites, was endowed with more than mere personal attractions. He had great natural abilities and presence of mind. Catherine bestowed upon Potemkin for his services, both military and diplomatic, the surname of Taurisschesky. [This name was taken from the Khersonesus Taurica, (Crimea,) which was added by Potemkin to the Russian Empire.] It was at this time that he received from Catherine a magnificent palace called (conformably to this name) the Tauria, together with the diamond now known as the Eugénie. The Emperor Napoleon III., on the occasion of his wedding, bought this stone from a grand-niece of Potemkin, the princess Colorado (who was, at the same time, the heiress of all the jewels belonging to the Russian Prince,) and gave it to his wife.

"The Empress of the French re-named the stone Eugénie, and it is from her Majesty's own lips that we received our information. During the whole of her reign the Empress wore this gem as a center stone of a diamond necklace, which, after the Franco-German war, was sold to the notorious Gaikwar of Baroda for a lac and a half of rupees, (£15,000.) This was the man who attempted to destroy the British Resident, Col. Phayre, by administering diamond powder to him, for which he was tried by a jury of three Englishmen and three natives. He was defended by Sergent Ballantyne. The judges could not agree, and the Gaikwar was discharged. He was, however, after the trial deposed for his misgovernment, and since then the Eugénie, together with many other large diamonds purchased by him, has disappeared. He is supposed to have hidden them away, in the hope of some day raising money on them for the purposes of an attempt to recover his possessions."

(*Concluded.*)

Gold and Silver—their Elaboration.

(*Continued from Page* 179)

BEFORE entering into the minutiæ of the elaboration of the noble metals, we wish to preface them with a sort of general synopsis; our last number treated of gold and its combinations of importance to the jeweler and goldsmith; we open with silver this month, under the heading of

SILVER CONSIDERED CHEMICALLY.

As well known, pure silver is distinguished by its white color, and similar to gold, its crystals belong to the tesselar system. In opposition to the insonorous gold, silver possesses a clear tone, and is also of greater solidity, ranking behind copper, however; in order to better resist wear and tear, it must be alloyed with other metals, whereby its hardness is considerably increased. With regard to ductility, silver is only excelled by gold, but on account of its greater hardness, it may be drawn into thinner wire. This great ductility, however, only belongs to the pure metal, and its properties are much more altered by the presence of other metals than those of gold. Very small quantities of iron, cobalt, or nickel lessen its ductility to an extraordinary degree, but augment its hardness correspondingly. The specific weight of pure silver varies according to the treatment to which it was submitted, and we add the following table:

	Specific weight.
Melted and slowly cooled	10 566
" " poured into water	9.632
" " left to cool in crucible	9 982—10.474
" " cast into ingots	10.105
Hammered	10 447—10.622
Rolled	10.557
Drawn into wire	10.491

Silver melts at about 1,000° C., and can be volatilized in the greatest heat capable of being produced in a porcelain furnace; before the oxyhydrogen blowpipe it volatilizes with ease. Silver is cast without much difficulty, not contracting greatly upon cooling; its dilatibility between 0° and 100° C., amounts to 0.001,991.

The deportment of silver, when cooled in different manners, is very peculiar; if melted silver is cast while very hot, a vitreous ingot will be the result; it burnishes with difficulty, and its color inclines to grey; but if left to cool sufficiently in the crucible until a thin crust begins to form upon the surface, soft and lustrous ingots will be obtained—a peculiarity that should be remembered when casting articles. A very peculiar appearance of melted silver is that of splattering, that is, if it is melted by an unlimited admission of air, and quickly cast into the mold, in which it is rapidly cooled, for instance, a mold with thick walls; it will be observed that the mass, on the point of solidifying, suddenly exhibits an appearance similar to boiling, and bubbles up as if vapors were about to escape therefrom. Small blisters, of a very close resemblance to volcanic craters, and produced by scattering, will be seen upon the surface of larger quantities. The cause of this splattering lies in a peculiar conduct of the silver toward oxygen. At the fusing point its affinity toward this gas becomes so great that a part of the metal combines therewith and argentic oxide is produced, dissolving in the silver. Now, when the temperature of the fused metal sinks below a certain point, said affinity to oxygen at once ceases, the liberated gas escapes and causes the ebullition-like bubbling of the metal, called splattering or scattering. In order to prevent this very disagreeable occurrence, when casting small silver articles, it is necessary to exclude the air, done by strewing culinary salt upon the surface; it quickly fuses, swims upon the metal, and prevents the admission of air.

While gold is only attacked by free chlorine and sulphuretted hydrogen, silver is subject to chemical influences to a far higher degree. When touched by the hand, it loses its luster, a thin film of chloride of silver is produced upon the metal; silver articles that laid for a long time in the earth are coated with a heavy layer of such chloride, and become very vitreous. As already mentioned, silver is very sensitive to sulphuretted hydrogen; it is sufficient to stir an egg with a silver spoon, to see the effect of the formation of black sulphuret of silver. By boiling the finest pulverized (chemically precipitated) silver with hydrochloric acid, it is converted into chloride of silver. Of the acids, silver is attacked especially by sulphuric and nitric acids. The former in a cold condition does not affect it, but a concentrated hot sulphuric acid dissolves it with ease. One part thereof is decomposed, and escapes as sulphurous acid, (that is, that gas of a stifling odor emitted by burning sulphur.)

Silver is very energetically attacked by chromic acid; if a drop of a solution of bichromate of potash is placed upon it, and a drop of sulphuric acid is added thereto, the chromic acid is liberated, and a red spot produced at once, consisting of chromate of silver. This peculiarity may be used for distinguishing silver from silver-like metals.

Nitric acid, in its highest concentrated state, has no effect upon silver, which passes in contact with the concentrated acid into the so-called passive condition. By moderately concentrated nitric acid, however, it is very energetically influenced even at common temperature; a great quantity of colorless gas, nitric oxide, evolves from the fluid, which, when it comes into contact with air, absorbs oxygen, and forms thick, heavy, brown fumes of hyposulphuric acid. These fumes operate in a very injurious manner upon the respiratory organs; and in order to be protected against them, it is necessary to either undertake the dissolving of silver in the open air, or under a draught chimney with a strong current of air.

Silver behaves totally indifferent toward alkalies, caustic potash and caustic soda, even when fused together with them; wherefore chemists use utensils of chemically pure silver for certain researches in which corrosive alkalies are employed.

The above-specified solubility properties only belong to pure silver, or such with a percentage of copper; alloys of gold and silver are not entirely dissolved in nitric acid; they are either treated with nitro-muriatic acid, in which gold dissolves, while the silver is converted into a chloride, or the alloy is boiled with concentrated sulphuric acid, whereby the gold remains unchanged, but the silver is dissolved.

If nitric acid, containing muriatic acid, is employed for dissolving silver, a thing often occurring with commercial nitric acid, it will be noticed that at the commencement of the operation, cheese-like flakes that afterward disappear, are formed. This is due to the fact that as soon as the acid has dissolved a little silver, it is suddenly changed into a chloride by the muriatic acid, which at once precipitates in flakes. But chloride of silver is soluble in a solution of nitrate of silver, and for this reason the flakes disappear again.

We will see by the production of pure silver, that a nitric acid, containing muriatic acid, may be used without injury for dissolving silver.

PRODUCTION OF CHEMICALLY PURE SILVER.

For the manufacture of the many preparations employed for the purposes of the trades working in metals, chemically pure silver is necessary, which, however, does not occur in commerce, and must be prepared for the purpose. The so-called fine silver of commerce is not pure, but always contains small quantities of copper.

Pieces of old silver are generally employed for the manufacture of fine silver, and are dissolved in diluted nitric acid; if the silver contained gold, this will precipitate to the bottom of the vessel in form of a brown powder. If large quantities of silver are to be dissolved, it is better to effect the solution by boiling with concentrated sulphuric acid, being cheaper than the nitric; if, however, only a few kilograms of silver are to be treated, the latter acid is to be preferred, on account of the more commodious process. An excess of acid is to be avoided when preparing the solution, as it would operate disturbingly upon the subsequent operations. The crude silver solution is strongly diluted with distilled water, and may be elaborated in various manners.

A copper plate is dipped into the solution; it is encrusted at once with a grey powder, to be separated by gently striking the plate, when a new incrustation ensues, etc., while the fluid assumes a handsome sky-blue color. By the copper, the solution of the nitrate of silver is decomposed in such a manner that metallic silver precipitates in powder and copper is dissolved; the nitrate of copper colors the fluid blue.

When the silver has entirely separated it is filtered off from the copper solution, washed with distilled water, and dried. It may be known that the fluid no longer contains silver, by remaining clear when a drop of muriatic acid is added; if a white, cheesy precipitate ensues thereby, silver is still in the solution. Care must be taken by this method of producing pure silver, that the fluid contains but little free acid; if too much, the copper is dissolved, with a development of brown fumes, while no silver separates. The washing of the pulverized silver with distilled water must be continued, until the escaping fluid, upon an addition of ammonia, does not show a blue color by looking through a quantity of t'e fluid; all the copper is only then removed. In order to shorten the tedious process of washing, the water employed for the purpose can be used boiling hot, and a few drops of muriatic acid are added. To obtain perfectly pure silver, muriatic acid is added to the silver solution as long as a heavy white precipitate ensues. The supernatant fluid no longer contains silver, and is thrown away. The precipitate, coloring first violet by exposure to light, and grey afterwards, is placed upon a filter and washed with hot water, until this, when mixed with ammonia, shows no sign of coloring blue.

The chloride of silver in its wet condition is placed into a porcelain basin, and poured over with a fluid, consisting of three parts water and one part muriatic acid, and strips of sheet zinc are then inserted and pressed into the chloride by a glass rod. The mass colors grey at once, the chloride being reduced into a metallic state by the zinc; the latter changes hereby in chloride of zinc, which dissolves in the fluid. After a few hours, during which time the fluid is repeatedly and thoroughly stirred, the decomposition is ended; the pulverized silver, collected upon a filter, washed with hot distilled water, until several drops of the escaping fluid, evaporated upon a sheet of platinum, no longer leaves a trace of solid residue.

The thus obtained silver, in a dry condition, is a steel grey powder, which, examined by a strong magnifying glass, consists of cube crystals; it assumes a metallic luster, when rubbed with the burnisher; by melting under a cover of borax, it is obtained in a chemically pure condition, with the properties of the common silver, and in this state it is used for chemists' utensils, etc.

SILVER PREPARATIONS.

Similar to the terchloride of gold, being the initial point for the production of all gold preparations, nitrate of silver is the starting point for the numerous silver combinations used in the different branches of industry; and for this reason we will commence with a description of its manufacture.

Nitrate of silver, also called *lapis infernalis*, is obtained by dissolving chemically pure silver in nitric acid, and evaporating the solution to crystalization. A chemically pure preparation may also be produced from ordinary copper-containing fine silver, in the following manner: The silver, as above said, is dissolved in diluted nitric acid, avoiding an excess of free acid as much as possible. The clear solution, without permitting it to boil, is evaporated to dryness in a porcelain basin, whereby a pale blue crystal mass remains. The fire is now increased under the basin until the mass melts, and heated until fumes of hyponitric acid begin to escape, and the previously colorless melted matter commences to become grey. This appearance is due to the fact that the nitrate of copper begins to decompose, and copper is separated from the fluid. The nitrate of silver only decomposes at a higher temperature than that of copper, and upon this property is based this method for the production of the pure nitrate of silver. In order to ascertain whether all nitrate of copper is decomposed, the surface of the fused mass is touched with the end of a glass rod; a drop, at once solidifying, will adhere thereto. The rod is dipped into a vessel containing a few drops of distilled water, in which the salt mass is dissolved. The solution is poured upon a small, previously prepared filter, and ammonia is added to the escaping fluid until the precipitate forming at first has disappeared again. If the fluid remains colorless, all the nitrate of copper has been decomposed; if blue, that state has not arrived yet, and the heating, while constantly stirring the fused mass, is continued for some time longer, when a new sample is taken. If the test with ammonia has proven the absence of nitrate of copper, the melted mass is permitted to solidify, or cast in bronce molds. A crystalline mass is obtained in this manner, which is colored grey by the black oxide of copper mixed with the white nitrate of silver, it is the so-called

Grey nitrate of silver.—By dissolving this kind, the oxide of copper deposits in the vessels in shape of a black powder. To obtain the nitrate of silver free from copper, the fused mass is permitted to solidify, dissolved in warm water, and the solution is filtered off from the oxide of copper, evaporated to crystalization, and the residue is melted and cast into bars, of a white crystalline structure.

White nitrate of silver.—The pure nitrate of silver consists of white crystals, coloring rapidly grey and black upon exposure to light, this salt sharing the peculiarity of almost all silver combinations, of being decomposed by light; this preparation, therefore, is generally kept in a dark place, or in bottles of black glass. For this reason, the solutions of the silver salts produce black spots upon the skin, linen, paper, etc. Nitrate of silver is very easily soluble, even in cold water, and rubbed upon the skin acts as an exceedingly powerful corrosive, causing violent pain. It is used for galvanic silvering, in photography, and for many other purposes.

Chloride of silver.—The manufacture of this preparation was stated above, when specifying that of chemically pure silver: To a solution of silver in nitric acid (or sulphuric acid), muriatic acid is added as long as a heavy, white precipitate of a cheese-like appearance arises. This is washed with hot water and dried; if the preparation is desired in a pure white condition, the precipitating, washing, and drying must be done by artificial light. The thus obtained pure chloride of silver is a white, heavy powder, dissolving with facility in ammonia.

Sulphuret of silver.—Silver combines very easily with sulphur into a sulphuret, and this preparation may be produced in various manners, for instance, by conducting a current of sulphuretted hydrogen into a solution of nitrate of silver, whereby a black, pulverized precipitate forms, consisting of sulphuret of silver. This may also be prepared in a more simple manner by directly fusing together silver and sulphur, mixing 4 parts pure pulverized silver and 1 part pulverized stick sulphur, and throwing the mixture in small portions into a glowing crucible. The sulphur quickly combines with the silver into an easily fusible mass.

Pure sulphuret of silver is of a lead grey color with a metallic luster, melts in red heat, and may be worked like a metal under the hammer. The peculiar production called niello or tula work, is manufactured by the use of sulphuret of silver. This is generally not used pure, but consists of a mixture of sulphur combinations of silver, copper and lead.

Cyanide of silver.—Cyanide of silver is one of the most important silver preparations of the metal trades, and is largely employed in galvano-metallurgy and for galvanic silvering. It is produced by adding a cyanide of potassium solution, as long as a white precipitate occurs, to a solution of nitrate of silver, feebly acidulated with nitric acid. The commercial cyanide of potassium sometimes contains chloride of potassium and yellow prussiate of potash, and such an impure fluid must not be employed, as it would not give a cyanide of silver a sufficient purity. Carbonate of potash, which sometimes occurs in commercial cyanide of potassium, is of no influence.

Pure cyanide of silver consists of a white, heavy powder, dissolving in a cyanide of potassium solution and muriatic acid; in the latter the solution is effected in such a manner that chloride of silver arises and hydrocyanic acid is liberated. As is common with most cyanide combinations, cyanide of silver possesses the property of forming double salts with the cyanides of potash.

There are several other combinations, which we omit, as they are not much used in the trades, and we next come to

CASTING METALS.

Alloys are always produced by fusing metals together, and are either directly cast into ingots, or bars, to be afterward elaborated with the hammer, rollers, wire bend, etc.

The manufacture of alloys from the noble metals has always to be done in such a manner that the latter is first fused by itself, heating it beyond its fusing point, when the base metal is added in small pieces. It is quickly reduced to a state of fusion by the overheated metal, and the intimate mixture of the two is promoted by stirring with a baked clay rod, or still hetter, a wooden stick; such a stick is preferable for the reason that gas commences to develop quickly when inserted into the molten metal, and such a gas formation materially assists in producing the intimate mixture of both metals

If silver is to be alloyed with the baser metals, it must be remembered that the silver, as explained above, has the property of absorbing large quantities of oxygen by melting in air. If a base metal, for instance, copper, is brought together with silver, saturated with oxygen, such copper withdraws the oxygen from the silver, becomes converted into protoxide of copper, and as such dissolves in the alloy. Copper alloys containing such protoxide in solution, differ with regard to their physical properties, especially ductility and density, very essentially from those free from such protoxide. If, therefore, copper alloys are to be produced, the surface of the melting silver must be protected against the absorption of oxygen, either done by throwing salt upon the metal or throwing pieces of glass into the crucible; the glass melts rapidly and swims upon the metal.

If a noble metal is to be alloyed with easily calcining metals, for instance, zinc or bismuth, it is well to wrap them in paper and to throw them into the crucible; the paper burns when in contact with the fusing gold or silver, and the metals come into contact therewith in an uncalcined condition.

The vessels used for melting such alloys are also worth being mentioned. The fusing may be done in Hessian crucibles, which are of an excellent quality; but they have the defect that grains of metal will adhere to their rough sides, only to be removed with difficulty, and certain losses will be experienced at every melting. Although these temporarily lost quantities of metal are finally collected again, nevertheless, a certain inexactness in the composition of the alloy will always result, of importance especially in the working of small smeltings. It is commendable, therefore, when melting the noble metals, to use the so-called graphite, also called plumbago or black lead crucibles, the smooth surface of which does not permit the adhering of metallic grains. It is sometimes objected that such crucibles are quickly destroyed, and liable to crack when placed into the fire. This may be avoided very easily by sharply drying them before use, and heating them strongly before placing them into the fire for operation.

The sudden cracking of crucibles is caused by their being placed into the fire, and heating the outer strata very suddenly; it is well known that clay is a bad conductor of heat, which cannot progress with sufficient promptitude toward the interior to heat the whole crucible uniformly; the inevitable consequence is the bursting. It occurs sometimes that a crucible, after it has stood for a time in the fire, suddenly bursts. This is caused by little interior cavities that had collected humidity, which is changed into vapor by the heat, and, finally, it obtains such a tension that it bursts the crucible.

(*To be continued.*)

Paul Brocot, of Paris, Dead.

ONE OF the most energetic and celebrated of French watchmakers, Paul Brocot, died about the last of April, in Paris, quite unexpectedly. His death is mourned the more, as he was only in the 36th year of his age, and, consequently, had the best years of his life still before him. In spite of his youth, he was one of the most devoted of adherents of the Paris School of Watchmakers, and a member of the *Chambre Syndicale*, having been Secretary of the latter institution for a long time.

Paul Brocot was a finished scholar; he was endowed with great love for all fine arts, and an excellent draughtsman, as a great number of his artistic creations will testify. In his character he combined a daring, venturesome spirit, with an extreme consciousness. French horology loses in him, as it did in the death of his excellent father, Achille Brocot, whose worthy successor he was, one of its brightest ornaments, and leaves a void not easily filled

Commercial Intelligence.

S. H. Zenner, Syracuse, N. Y., assigned and is trying to settle at 25 per cent.

C. L. Thiery & Son, Boston, Mass., have gone into insolvency.

DeYoung & Bro., Phila., Pa., succeeded by Charles DeYoung.

Haslett, G. W. & Bro., have been succeeded by Geo. W. Haslett alone.

A. W. Murphy, has sold out his store at Henderson, Tex., to Otto Winterhalter. Murphy still continues his store at Tyler, Tex.

D, Davidsburg, Wilkesbarre, Pa., has been sold out under judgments entered in favor of Seligman Trier as Trustee for $6,090, and individually $6,775. Sale realizing $9,803.

Geo. Wolf, Louisville, Ky., has taken T. J. Pottinger into partnership and firm is now Geo. Wolf & Co.

E. E. Barrows & Co., and Thos. W, Short & Co., of North Attleboro, have consolidated and formed new firm of Barrows, Thompson & Short.

Lincoln, Tifft & Co., of N. Y. City, and J. T. Bacon & Co., Plainville, Mass., same concern, is now known as the Lincoln & Bacon Manufacturing Co.

F. P. Slocum & Co., of Bradford, Pa., and Bolivar, N. Y. (branch store), have assigned.

Edwards & Clark, of Buffalo, N. Y., have asssigned, giving preferences to Edwards' wife for $1,393, D. Clark's wife for $2,000. Liabilities stated at $12,000 and assets at $20,000.

Armsheimer & Gaertner, 83 Nassau St., N. Y., succeeded by Charles Armsheimer.

Sigmund Stern, 51 Maiden Lane, N. Y., succeeded by Stern & Young.

Booz & Thomas, of Phila., Pa., succeeded by Booz & Co.

Brainard & Steele dissolved by mutual consent, Brainard retiring. John W. Steele continues the business.

J. W. Myers, Brownsville, Ky., reported dead.

Joseph Eckart, Clinton, La., gone to Lake Charles.

W. H. Ruggles, Petosky, Mich., reported dead.

Bailey & Palmer, Fulton, Mo., succeeded by A. L. Palmer.

W. Rosell, Higginsville, Mo., succeeded by J. C. Tucker.

Zundt & Kinel, Louisville, Ky., assigned, liabilities about $10,000, assets said to be about $4,000. Creditors chiefly in New York and Boston. *Reported by* D. L. SAFFORD.

The Wisconsin Retail Jewelers' Association.

WE HAVE received from W. H. Thorp, the courteous Secretary of the Wisconsin Retail Jewelers, Protective Association, a detailed report of the proceedings of the second annual meeting, held at Waukesha, July 12th and 13th. While we are udern obligation to Mr. Thorp, for the pains he has taken to furnish us this report, we regret that it reached us too late for publication in this issue of THE CIRCULAR, our large edition compelling us to go to press at an early day in order to serve our subscribers promptly. We wish, however, that the Secretaries of other Associations would follow the example of Mr. Thorp, and send us full reports of their meetings immediately on their occurrence. From the report we summarize the following facts:

The meeting was not numerously attended, but was interesting and pleasant. A resolution was adopted relative to peddlers and auctioneers, and another endorsing the Guild Stamp. The following named officers were elected for the ensuing year: President, C. A. Estberg, Waukesha; First Vice-President, Theo. Schelle, Milwaukee; Second Vice-President, H. G. Van Wagener, Monroe; Secretary and Treasurer, W. H. Thorp, Beaver Dam. Oskosh was selected as the next place of meeting. Several essays were read by different individuals, and an address was delivered by Louis Hoefer on the desirability of establishing a Horological School and the adoption of the Metric system of measurement. His ideas on this subject have heretofore been printed in our columns. W. N. Boynton also addressed the convention. The membership of the Association now embraces 127 retail dealers, and the Treasurer's report shows the receipts last year to have been $137.44 and the expenses $136.66. Mr. Boynton, devoted himself in his address to defending his action in engineering the adoption of the Guild Stamp, and in misrepresenting the facts in the matter and the position of THE CIRCULAR relative thereto. We shall print his remarks in full, as furnished by Mr. Thorp, in our next issue, and comment upon them and the situation as we see it. Mr. Boynton is doubtless sincere in defending his position, as we certainly are in ours, and we regret that he should have stooped to personalities in his remarks, which are neither dignified nor augmentative. We have endeavored to treat the subject of the Guild Stamp from the standpoint of the best interest of the retail trade, and shall maintain that position regardless of personalities or scurrility that may be launched at us. The social features of the gathering were very pleasant and highly enjoyed by the members and their wives in attendance. An evening session was held at the residence of C. A. Estberg, by invitation, and a pleasant entertainment was provided by the courteous host and his wife, to whom a vote of thanks was tendered.

Sandoz's Method.

FOR PRODUCING ISOCHRONISM IN FLAT AND BREGUET SPRINGS.

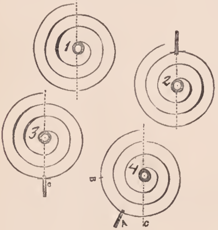
Isochronism, from the Greek, meaning equal time, is the property possessed by the pendulum and balance spring to accomplish their arcs of vibration of different amplitudes in the same space of time. In a pendulum, the only condition required is that its length be such as to make the center of gravity move according to its cycloid curve; but in the balance spring, the means change with the forms effected by the spring. In the spherical or conical springs, the extreme curves constructed after the mathematical rules discovered by Prof. Philipps, of the Polytechnic School of Paris, will produce an isochronism very nearly perfect. In the flat spring, these curves cannot exist, therefore other means must be resorted to. I shall now give the results of several years of experiment and study which can be embodied in the two following theorems:

1. In the flat spring, every point has theoretically a point where the vibrations are isochronal. 2. That point of isochronism is determined by the relative position of the two points connecting the balance spring with the collet and stud, called points d'attache.

These two propositions form the base of isochronism in the flat spring; therefore the idea generally accredited among watchmakers that the isochronal properties of a flat spring depend on its length is incorrect, since the 10th, as well as the 20th, coil of the spring is able to produce isochronism, the only limit being such sizes of springs that would perfect the perfect freedom of its action.

Freedom of action being necessary for the isochronal properties of the spring to develop themselves, the spring must be beht to the center according to fig. 2—the first coil being to near, or the curve too flat, so that even a minute part of the spring could touch the collet, would hinder the isochronism. Next, the srping must be pinned perfectly tight in the collet and stud, and move freely between the regulator pins.

These conditions fulfilled, the watch is run 3, 6, or 12 hours with just strength enough to keep it going, the result is compared with a regulator, and set down. Next, the watch is fully wound up, and after a space of time equal to the first trial, the result is again set down. Most generally, the watch will run slower in the short vibrations than in the wide ones, and consequently lose time in the pocket in the last twelve hours of its running. Having set down as a principle that every coil has an isochronal point, we have now to determine that point, remembering that as a general rule. Every increase of length of the spring over that point, will cause the watch to gain in the shortest vibrations, and every decrease back of that point, will cause it to gain in the wide vibrations. This rule is correct only for certain limits, as I am going to explain. Supposing that a balance spring of 15 coils is perfectly isochronal with the two points d'attache just opposite each other, as shown in fig. 3, the 14th and 16th coil, as well as the 15th, will produce the isochronism very nearly at the same point. Suppose that we increase gradually the length of that balance spring of 15 coils, pinned up so that the two points of d'attache are firmitively opposite each other—so that its length will now be 15½ coils—the two points d'attache are now in the position shown in fig. 4, or what is called pinned to the half coil. The result will be that the balance spring will cause the watch to gain in the short vibrations, in the same proportions that it has been



gaining in increasing the length of the first half. That change will continue until we reach the same point on the 16th, coil that we started from on the 15th, the two pins opposite each other; at that point we shall have again the isochronism. The same operation is applicable to the 14th coil, with the same results.

Now it is immaterial whether we take half the coil to the center or to the outside of the spring, because both of these operations will produce the same results, viz., the change of the relative places of the points d'attache of the spring. Therefore the artist has his choice, and is guided by the size of the spring and the weight of the balance; for taking half a coil to the center of the spring will not much affect the rate of the watch, but taken outside, the difference will be great. On the other hand a very short cut to the center will greatly affect the isochronism, and at the outside, a full half coil will generally produce from 15 to 25 seconds difference in 24 hours. If then the watchmaker would produce the greatest possible changes of isochronism in a watch, the change of position of the two points d'attache of the spring of one coil around, will give him the two highest degrees of gaining and losing in the short vibrations.

It follows from the following pages that if a watch loses in the last running (short vibration), the first thing to do is to increase the length of the balance spring from the outside; if the result is better, but not yet good, give still more length, if the result is worse, it shows that you are too far on the coil. Take back the whole length that you had given in the first operation, and draw more length, so as to affect the spring the other way, or if your spring is already small, or your balance pretty heavy, cut to the center, so as to come around to the required positions.

Some springs cannot produce the isochronism; this comes from a defect in making the spring, or a want of homogeneity in the metal; the only remedy is a new spring.

In the Bréguet spring the isochronism is produced in the same manner as the flat springings, but great care must be taken in making the curve, for if it is not made in conformity to the principles of Philipps, the isochronism will be disturbed.

For instance, in fig. 4, the spring being pinned in *A*; and the watch losing 7 seconds in the last 12 hours (short vibrations), I first increase the length of the balance spring to the point *B*, but as I am already on the ground belonging to the losing action, the result will be an increased loss of time in the last running; I then go back to the point *A*, and moreover pin the spring to *C*, and then I shall approximate isochronism. However, in most cases, the increase of length will make the watch gain in its last running.

Adjustments to positions.—This adjustment is known but to few watchmakers, and they make it a regular business; it requires of the operator considerable manual skill and reflective powers. The great principle is to equalize the frictions, so that the pivots will offer to the action of the spring the same resistance in the four positions generally required, viz., dial up, XII. up, cock up, and III, up. After having inspected and corrected the train, so that the motive power is transmitted uniformly to the balance, the pivots and jewels of the lever should be polished and shortened so as to have very little friction; next, the lever should be poised as nearly perfect as possible; and the slot also in the fork where the ruby-pin acts should be polished, and the balance jewels ought to be made short enough to have the holes square, rounded inside, and perfectly polished, the balance pivots well hurnished, and their ends half rounded, and the balance poised very carefully. The English method of throwing the balance out of poise. to obtain the same rate in different positions, is not accepted generally, and is considered a bad practice by the most eminent watchmakers. The balance spring is put in its position without the balance, and bent so that the collet of the cock jewel will have the same centers. The watch being now in good running order, is put on trial for 12 or 24 hours, and the rate in each position carefully noted. If there is any difference in the running with the cock up or dial up, making the ends of the pivots even and equally well polished, will remove the discrepancy. If the watch loses with XII. up, which is generally the case, and the friction on the balance jewels being reduced as much as possible, the remedy is to increase the friction when the watch is either dial or cock up. This is done by throwing the balance spring a little out of the center of the cock jewel, thereby adding to the friction on the pivot end, a lateral pressure against the balance jewels. If the watch is well regulated with XII. up, and loses with III. up, throw the spring a little toward the figure III.; this operation lifts up the balance when the watch is in losing position, and diminishes the friction of the pivots in the particular case. Making the ends of the pivots perfectly flat, has a tendency to make the gain with dial or cock up. The sound of that watch must be clear in all positions, else it indicates a friction, as for instance, rough jewels or pivots, safety pin rubbing against the roller, etc.

Diamond Cutters in New York.

FIVE years ago two diamond cutters dressed and polished all the stones that came in the rough to this market. In the main only the finished diamonds were imported. But it was found that the work of cutting and polishing diamonds was often done carelessly in Europe, and that American workmen could better satisfy the critical taste of American buyers of precious stones. So marked was the difference between the imported diamonds and those cut and polished here, that a demand for the stones of American finish was created, and within five years, five or six more diamond cutters have established themselves in New York. They dress and polish perhaps one-twentieth of all the diamonds sold in this city, and the excellence of their work is recognized.

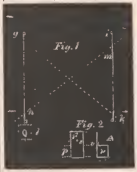
The stones are imported, as a rule, from South Africa, and although many of the African diamonds are off color, it is said that as large and as fine stones are found there as in the old mines of the East Indies and Brazil. The stones come here in the rough, uneven in shape, and lacking wholly the luster and the sparkle which attach to the very idea of a diamond. The first process is what is called cleaving. By this process the irregularities of shape are chipped off, and the general form of the diamond is secured, but without any of the angles which separate the faces. The pieces chipped off, if of suitable color and without flaws, are used for making what are called rose diamonds. Then the faces of the diamond are cut by the rubbing together of two of these stones, and after this process the stones look like irregular pebbles of ground glass. They are entirely without luster or beauty. The polishing concludes the process. Each face of the diamond is in turn exposed to the surface of an iron wheel revolving 2,000 times a minute, and, by means of oil and diamond dust, the stone is polished and given its wonderful brilliancy.

A large part of the work of the diamond finishers in this city is repolishing the stones cut in Europe, to satisfy the more particular judgment of American buyers. On account of this extra pains which is taken with the work here, the diamonds of American polish command somewhat higher prices. An idea of the business in cutting diamonds in this city may be had from the statement that last year nearly 5,000 karats in the rough were cut and polished here. Wages for labor here are from twice to three times what is paid in Europe for the same kind of work. The labor adds $10 a karat to the value of the uncut diamond. The loss in weight from cutting is over one-half. This so adds to the value of a diamond that a stone of one karat, costing in the rough, for instance, $40, would sell for about $110 when cut and polished. The value, however, does not depend alone upon the weight of the stone, but is affected also by the presence of blemishes or impurity of color.

Correct Local Time and How to Obtain it.

WE POINTED out in our last number the change in the apparent time in the different seasons of the year, and called the reader's attention to imaginary fixed points in the heavens, which correspond to the poles of the earth; but there is a fact in connection with this which is not generally known outside of professional astronomers, and it is this—the position in the heavens to which the axis or poles of this earth seem to point, is constantly changing—like as we see in a spinning top—the top turns rapidly on its point, while the pin by which it is spun projects upward and gyrates slowly in a circle. So the poles of the earth seem to describe a circle in the heavens, the radius of which subtends an angle of about 23½ degrees; the period required for the complete revolution is about 25,000 years. These points have but a small effect on matters of immediate local time, and are here mentioned only as curious factors which combine to change the starting points from which we reckon time. Very near the position assigned in the heavens as corresponding to the north pole of the earth, is a conspicuous star known to almost every person as the north star, and to astronomers as *polaris*. The old Greeks called it Cynosyre; the Romans Cynosura; the Hebrews and other eastern nations knew it under the name of Alrucabah. As far back as the time of the old Chaldeans—the time of Abraham of the Bible, Polaris was not the north star, but a star in the tail of the dragon, now called *Alpha Dragonis*. Although this star could not at that time have been as near the true pole as our north star is now. A few lines above I compared the change in the apparent position of the poles to a spinning top; the reader must not think that the comparison is in all phases similar, as a top is attached to the floor or table on which it spins; the earth, being free to revolve, both poles changing relatively the same; but as nine-tenths of the human family see the position of the north pole, it is generally the only one considered. Polaris is now about 1½ degrees from the true pole, and this dicrepancy is constantly diminishing, and will continue to do so for the next 200 years, when Polaris will be at its nearest approach (A. D. 2,095), when it will be less than half a degree (26 minutes 30 seconds) distant. The problem which is of the most importance to our present theme is, how to find the absolute position in the heavens of the true pole, and so establish a local meridian at the place at which we are located, so that by determining the passage of the sun or some star across this meridian, we get at the local time to a degree of accuracy proportionate to the perfection of our instrument. With a good telescope mounted as an equatorial, time to the fraction of a second can be ascertained; but by very simple means, an inexpensive apparatus, local time to within five seconds can be determined; this may seem in this day as if it was a little loose, or in other words, not accurate enough; neither is it for astronomical purposes, but for all ordinary purposes this is quite accurate enough, as it is an extreme error. Suppose your clock

loses or gains three seconds a day—you take an observation and set your clock to-day; two weeks from to-day we take another observation, and find our clock 42 seconds out of the way; so on we can ascertain the average gain or loss after a definite time, and alter the going rate accordingly. I shall say nothing about the method of using a telescopic transit instrument, as full instructions come with each instrument. I shall first point out how to determine when Polaris is exactly north, and then describe a simple arrangement for meridian purposes. Hardly any person but knows and can point out the group of stars known as the big dipper; these stars form a portion of the constellation *Ursa Major*, or the Great Bear, and in the month of July, at 9 or 10 o'clock in the evening, are west of Polaris. In the accompanying cut the dipper is shown as it would appear in May or June at 9 or 10 o'clock in the evening. Polaris is shown at *a*, the stars forming the dipper at the top of the cut. The two stars forming the front of the bowl of the dipper shown at *e f*, (*e* is called *Merak; f, Dubhe*), are known as the pointers, as they perpetually point to the north star. The second star in the handle of the dipper, and shown at *b*, is called *Alioth*, and when a plumb line will pass through it and Polaris, that is when Alioth is exactly over or under Polaris, and a plumb line will seem to pass through, or over, both stars, Polaris is due north. Now for our cheap transit instrument. A substantial brick or stone wall standing north and south is the first essential; into this drive four strong iron pins, letting them project five or six inches; the arrangement is



shown at Fig. 2, where *g, h, i, k*, represent the strong iron pins, which should be of ½ inch square iron, sharpened at one end for driving into the mortar; these pins should protrude as near at right angles to the wall as possible, and the square faces of the pins as near perpendicular and horizontal as practicable; the pin *g* is supposed to be at the north; from this pin we suspend a plumb bob, by the line *m*. At *l* is shown the plumb-bob, and the dotted lines represent a box of tin, to prevent the wind from blowing it about; this box is quite unnecessary if a still morning or any time in the day is selected, as all that is necessary is to have the line *m* exactly perpendicular. On the pins *h* and *k* should be two slides formed of tin or sheet brass bent around to fit the pins; the slides are shown in Fig. 3; the metal should be about one inch wide, and bent around as shown at *A*, with two rivets at *v*. At *s, r*, are two small holes, one exactly over the other; and the idea is that the slide on *h* is moved back and forth until the plumb line *m* hangs exactly opposite the holes *s, r*, (the flat face of the slides should face outward in the direction of the arrows). As soon as the slide on *h* is in the right position, it should be secured, (soft solder and an alcohol lamp does the work). The plumb-bob can now be dispensed with, as the line *m* extends from a fine file notch in *g* to the hole *s*, in the slide on *h*. The reader sees that a fine thread stretched from a notch in *g* to the hole *s*, must always be exactly perpendicular; this thread should be of 100 or 150 Coats' cotton, dipped in linseed oil and dried. Now, for our meridian, we have a slide on *k*, precisely like the one above described; we watch on a clear night, until, on looking through the hole *r*, in the slide on *k*, (moving it back and forth until the stars are hid by the line *m*), until the line *m* passes over Polaris and Alioth in the dipper. This will be quite late at night this time of year, but is the most favorable, as it brings Alioth under Polaris. To complete our instrument; fasten now the slide on *k*, and arrange another fine plumb line extending from *i* to *k*; to do this, suspend a plumb line from a slide on *i*, moving it back and forth until the fine line visits the holes *s, r*, in the slide on *k*. Make this last mentioned slide (on *i*) fast, and you have no further need of the plumb bob, as a line stretched from the notch in *g* to the hole *s*, in the slide on the pin *h*, and another from *i*, (like conditions observed) to *k*, present two lines perfectly perpendicular, and exactly on the plane of the meridian. The manner of getting time is for sun observations (which are most convenient), procure a copy of the American Nautical Almanac, of John Bliss & Co., 128 Front street, New York City, (or their own individual almanac—just as good, but cheaper), and with two or three thicknesses of dark glass, (old ambrotype glass is good), to protect the eye, look through the hole *r* in the slide on *h*, at the sun, and note the exact time when the sun seems to commence to cross the line extending from *i* to *k*, and also the time the line seems to pass off the sun's disc. A good pocket watch is correct enough; set it to seconds to correspond to your regulator. Half the time occupied in the sun's passage represents the center of the sun's disc.

Foreign Gossip.

—A blowpipe has been patented in Germany by a firm in Berlin, in which the air passes through a valve into an India rubber bag contained within the tube, serving as a regulator of the issuing air, when intermittent blowing is necessary. The valve prevents the return of the air.

—In view of the many demands for admission, the Central Commission of the Swiss National Exposition of Zurich has decided to occupy 30,000 square meters (35,880 sq. yards), in place of 26,000, and to demand a new subsidy. It has also concluded to establish an official document, to be called the *Journal de l'Exposition*, for the promulgation of official decrees, etc.

—The first American patent was issued to one Samuel Dopkins, for an improved method for the production of potash and pearl ash, and dated 1790. The patent is written on a sheet of parchment, signed by George Washington, and countersigned by Attorney General E. Randolph. The attest to the delivery to the patentee is Thos. Jefferson, United States seal attached. So, at least, says a Leipsic (Germany) paper.

A Rare Diamond.—Mr. V. Wright, of London, has obtained possession of a ring which has reposed for centuries in the treasure vault of the emperor of Hindoostan. It contains one of the few engraved diamonds, and to judge by the work, the task of engraving must have consumed many years. It appears to have been done by a Persian artist, and represents a device that, in interlaced letters, expresses the ejaculation, "O, Ali!" The work appears to date from the twelfth century.

Musical Watch.—Mr. Charles Benge, watchmaker of St. Croix, will exhibit a watch at the state fair, at Zurich, a chef-d'ouvre of its kind. It shows hours, minutes and one-fifth seconds, also contains a miniature musical works with two tunes. It will play at the end of every hour, if not sooner set into motion by means of a push button, and the pieces may be varied according to will. The revolution is entirely noiseless. The cylinder contains 260 pins, and the *claviatura* of 30 very sonorous metal plates.

—A golden chalice, valued, until last month, at from 3,000 to 4,000 marks, has been sold by the parish Catholic Church at Carlshrue to Baron Rothschild, of Frankfort, for 160,000 marks. Recent repairs to the church edifice, causing an expenditure of several hundred thousand marks, brought the parish into need; hence the sale, permission having been obtained from the See of Freiburg and the Grand Duke, whose ancestor, Carl Friedrich, presented the chalice to the church. As a specimen of work it is very interesting, being of gothic shape, finely enameled, and richly ornamented with precious stones. On its base it bears a cross in brilliants and the Metternich coat of arms, with an inscription bearing the date 1608.

Curious Clock.—A native prince of Upper India is said to possess and jealously guard, as the rarest treasure of his luxurious palace, one of the most astonishing things ever heard of in the way of a timepiece. In front of the clock's dial is a gong, swung upon poles, and near it is a pile of artificial human limbs. The pile is made up of the full number of parts of twelve in seeming confusion. Whenever the hands of the clock indicate the hour of one, out from the pile crawls just the number of parts needed to form the body of one man, part joining itself to part with quick metallic click, and when completed, the figure springs up, strikes one blow that sends the sound pealing through every room and corridor of that stately palace. This done, he returns to the pile and falls to pieces again. At two o'clock, two men arise and do likewise; and so on through all the hours, the number of figures being the same as that of the hour, till at noon and midnight, the entire heap springs up, and marching to the gong, one after the other each strikes his blow, and then falls to pieces.

Marco Polo.—A statue of Marco Polo, recently found in Canton, China, has been presented to Venice, the native place of this celebrated traveler. The figure is carved of wood, life-size, and gilt. It represents the great Venetian in a sitting posture; his dress is Chinese, except the hat and cloak, both of European origin. The full beard framing the face of the traveler, is colored dark blue, and of a peculiar shape, while the traits of the face betoken no similarity to the Mongolian types. Opposite to the large, red arm chair, upon which he is seated, is placed a porcelain dish, for the reception of odors and incenses, with which he was revered in the temples of Canton, in common with the patron saints of China. A Chinese inscription is at the base of the statue.

Mosaic.—Mosaic art may be traced to Indian origin; it was known in Rome before the days of the republic. The art was much improved under the empire, not merely by the introduction of marbles of several colors, but by the invention of artificial stones, called Italian emetti, which may be made of every variety of tint. When the pictures were introduced into churches they were made of mosaic, but the process was perfected during the last and the present century. The minute and numerous pieces of colored squares are placed upon a copper ground by a cement of gum mastic and other materials; they are then ground to a perfect level and polished. The Church of St. Lawrence, in Florence, contains the family tomb of the Medici, and is greatly admired by artists, on account of precious marbles, jaspers, agates, malachites, etc., with which the walls are embellished as mosaic.

Thieves Caught.—The thieves who perpetrated the great diamond robbery lately in London, by stealing a mail bag with diamonds to the value of £80,000, in November of last year, were lately caught in Berlin. One of the thieves, who did not understand German, made the acquaintance of a hair-dresser, and told him that he intended to sell about £20,000 worth of diamonds to a Berlin dealer in jewels. He became invisible for a long time, and during this time the police informed the barber that the foreigner was a member of the gang. It happened one evening that the barber saw him "unter den Linden," and the Englishman told him that he intended to start for St. Petersburg in the morning. In consequence of the cool and circumspect deportment of the barber, who had notified the police of the occurrence, the whole gang were taken prisoners at the railroad depot. Articles amounting to over 60,000 M. were found in their possession, and it is hoped that the other part of the "swag" is contained in their baggage which was sent ahead to Russia. A reward of 30,000 M has been offered for the discovery of the thieves and recovery of the goods.

Compensated Balance.—A correspondent in a European paper complains thusly: "I have been waiting to see if anyone in the trade would answer this query. I also have bought a compensation balance watch, and the same kind of experience has led me to make the inquiry. The result is that I learn that the 'compensation balance' is simply a trade deceit. The title leads ignorant outsiders to imagine that a watch with a compensation balance is compensated and adjusted. The trade says: 'How can you expect it? Look at the expense.' But outsiders cannot be expected to understand all this until it is explained. A fairly-made anchor watch will keep a fairly-regular rate, either losing or gaining with such regularity that the owner knows what he is about; but when the watch has a compensation balance stuck in without being compensated, it being a delicate and sensitive piece of mechanism, the watch is seldom alike two days together. Sometimes its timekeeping quality is marvelous for a day or two; then, without just cause or provocation, it goes all wrong and deceives its owner into the loss of a railroad train, or some other calamity. If I had been acquainted with the difference beforehand, I should have managed to add a few more dollars, and bought a regulated watch. But as it is, I have been saddled with a nuisance, I cannot afford to throw it away, etc."

Workshop Notes.

—Burnishers, to be kept in good condition, should have their surfaces prepared, from time to time, by passing over a buffstick charged with polishing rouge or very fine emery, and other kinds on an emery stick, more or less fine, to the required roughness.

Case-Hardening Iron.—If you desire to harden to any considerable depth, put the article into a crucible with cyanide, cover over, and heat altogether, then plunge into water. This process will harden perfectly to the depth of one or two inches.

To Clean Brass Articles.—In a stoneware vessel make a mixture of 1 part common muriatic acid, and ½ part sulphuric acid, dip the articles into it, rinse, and rub with sawdust. Should the brass be greasy, it should first be dipped into a solution of potash or soda in warm water.

Tempering Steel.—A preparation is used for the purpose, consisting of ½ teaspoonful wheat flour, 1 do. salt, 2 do. water. The steel to be hardened is to be heated sufficiently, dipped into this mixture, to be coated therewith, then raised to red glow, and thrown into cold soft water.

Writing on Silver.—To write on silver, the tracing of which will never fade, take burnt lead and pulverize it; incorporate it with sulphur and vinegar to the consistency of paint, and write with it on silver plate. Let it dry, then hold it to the fire so as to heat the work a little, and it is complete.

New Blowpipe —A blowpipe has been patented in Germany in which the air is blown into the mouthpiece, passes through a valve into a caoutchouc bag, which is inclosed in the tube, and serves as regulatnr of the issuing air, in the case of intermittent blowing. The valve prevents the return of the air forced in.

Plating Paper Mache.—Objects manufactured from vegetable pulp are covered with a metallic layer in the following manner· The object to be covered is first impregnated with a watery extract of linseed. It is then treated with nitrate of silver and sulphuret of hydrogen, and finally covered with metal by the galvanic process.

To Whiten Iron.—To render iron as white and as beautiful as silver, take ammoniacal salt in powder, and mix it with an equal quantity of quicklime. Dissolve in cold water and mix well. When done, immerse the red-heated article in this bath, and it will become as white as silver. Have a care not to burn the article by overheating.

Cementing Silver.—I once wanted to cement a silver plate on a presentation clock. I tried everything I knew, and everything that others told me of; but all to no purpose. I finally succeeded by first glueing a piece of paper on to the marble, and then glueing the silver on to the paper. It has remained on ever since, and shows no signs of moving.

New Bronze —10 parts diamond fuchsine and 5 parts Hoffman's mythe violet are dissolved in water or sand bath in 100 parts alcohol, of 95 per cent.; then add 5 parts benzoic acid, and boil from 5 to 10 minutes, until it has assumed a brilliant bronze color. This varnish adheres firmly to all articles, possesses a beautiful gloss, and is very durable.

Tempering Case Springs.—Draw the temper from the spring, and fit it properly in its place in the watch; then take it out and temper it hard in rain-water, (the addition of a little table salt to the water will be an improvement); after which place it in a small sheet iron ladle or cup, and barely cover it with linseed oil, then hold the ladle over a lighted lamp until the oil ignites; let it burn until the oil is nearly, not quite, consumed; then re-cover with oil, and burn as before; and so a third time, at the end of which plunge it again into water. Main and balance springs may in like manner be tempered by the same process; first draw the temper, and properly coil and clamp to keep it in position, and then proceed the same as with case springs.

Length of Lever.—You may easily ascertain whether or not the lever is of proper length, by measuring from the guard point to the pallet staff, and then comparing with the roller table; the diameter of the table should always be just half the length measured on the lever. The rule will work both ways, and may be useful in cases where a new roller table has to be supplied.

To Blue Steel.—In order to blue steel pieces evenly, the following will give satisfactory results: First blue the object without any special regard to uniformity of color. If it proves to be imperfect, take a piece of deadwood that does not crumble too easily, or of clean pith, and whiten the surface with rouge without letting it be too dry. Small pieces thus prepared, if cleaned and blued with care, will assume a very uniform tint.

Lever Pallets.—The clear space between the pallets should correspond with the outside measure, on the points of three teeth of the scape wheel. The usual mode of measuring for new pallets is to set the wheel as close as possible to free itself when in motion. It can be arranged in the depthing tool, after which the measurement between the pivot holes of the two pieces, on the pillar plate, will show you exactly what is required.

Silvering Copper and Brass.—Mix 3 parts of chloride of silver with 20 parts finely pulverized cream of tartar, and 15 parts culinary salt. Add water in sufficient quantity, and stir until the mixture forms a paste, with which cover the surface to be silvered by means of blotting paper. The surface is then rubbed with a rag and powdered lime, washed, and rubbed with a piece of soft cloth. The deposited film is extremely thin.

Gold Dials.—In order to restore the color to a gold or gilt dial, dip it for a few seconds in the following mixture: Half an ounce of cyanide of potassium is dissolved in a quart of hot water, and two ounces of strong ammonia, mixed with half an ounce of spirits of wine, are added to the solution. On removal from this bath, the dial is immediately immersed in warm water; then brush with soap rinse, and dry in hot boxwood dust. Or it may be simply immersed in dilute nitric acid, but in this case any painted figures will be entirely destroyed.

Non-Corrosive Soldering Fluid.—A non-corrosive soldering fluid is prepared in the following manner: Small pieces of zinc are immersed into muriatic acid to saturation, which can be known by the cessation of the ebullition; the zinc, also, being added after this point, remains undissolved; add about one-third the volume of spirits of ammonia, and dilute with a like quantity of rain water. If the acid is gently heated at the time of adding the zinc, the dissolving will progress much more rapidly. This fluid causes no rust on iron or steel, and is even excellent for tinning.

Hardening Pinions.—"Which is the best way to temper pinions and other steel parts?" I wish to inform the interrogator that I have used petroleum for several years with the most excellent results. The steel parts to be tempered are first heated upon charcoal, in the customary manner, then annointed with ordinary washing soap, heated cherry red, and quickly immersed in petroleum, without anticipating that the latter might ignite. Steel articles heated in this manner do not whatever warp, no matter how thin, and remain almost entirely white.—B. Morjossy, *Deutsche Uhrm. Ztg.*

To Prepare Chalk.—Pulverize your chalk thoroughly, and then mix it with clean rain water, in the proportion of two pounds to the gallon. Stir well, and then let it stand about two minutes. In this time the gritty matter will have settled to the bottom. Pour the water into another vessel slowly, so as not to stir up the settlings. Let stand until entirely settled, and then pour off as before. The settlings in the second vessel will be the prepared chalk, ready for use as soon as dried. Spanish whiting, treated in the same way, makes a very good cleaning or polishing powder. Some operatives add a little crocus, and we think it an improvement; it gives the powder a nice color at least, and therefore adds to its importance in the eyes of the uninitiated.

Artificial Onyx.—Mr. A. Dreher lately patented the following process for converting ordinary agate into onyx: The prepared stones are first placed into nitric acid, in order to extract the compounds of iron and other metals, and then dried and calcined to remove the remnants of nitric acid. They are next soaked in a solution of 220 grams of caustic potash or soda, in 1 liter of water, until saturated, and washed with water. The alkali is removed from the outer surface of the stones by placing them again in nitric acid, and washing, after which they are dried and thoroughly calcined. The stones thus treated are completely bleached and white, while their outsides are rendered porous, so that they can absorb coloring solution, which gradually shades off into white, as in the natural onyx. They are finally engraved, giving colored reliefs on a white ground.

Soft Alloys.—This alloy will adhere so firmly to metallic, glass, and porcelain surfaces, that it can be used as a solder, and is invaluable when the articles to be soldered are of such a nature that they cannot bear a high degree of temperature. It consists of finely pulverized copper or copper dust, and is obtained by precipitating copper from sulphate, by means of metallic zinc. Twenty, thirty, or thirty-six parts of this copper dust, according to the hardness desired, are placed in a cast iron or porcelain-lined mortar, and well mixed with some sulphuric acid having a specific gravity of 1.85. Add to the paste thus formed, 70 parts (by weight) of mercury, constantly stirring. When thoroughly mixed, the amalgam must be carefully rinsed in warm water to remove the acid, then laid aside to cool. In 10 or 12 hours it will be hard enough to scratch tin. When it is to be used, it should be heated to a temperature of 37.5° C., when it becomes as soft as wax by kneading it in an iron mortar. In this ductile state, it can be spread upon any surface, to which, as it cools and hardens, it adheres very tenaciously.

Notes on alloys.—Mr. Güthier, in his work on "Metal Alloys," gives a few suggestions on the subject of fusing the metals: 1. The melting pot should be red hot, (a white heat is better), and those metals first placed in which require the most heat to fuse them; 2. Place the metals into the melting pot in strict order, following exactly the different fusing points from the highest degree of temperature required, down to the lowest, in regular order, and being especially careful to refrain from adding the next metals until those already in the pot are completely melted; 3. When the metals fused together in the crucible require very different temperatures to melt them, a layer of charcoal should be placed upon them, or if there is much tin in the alloy, a layer of sand should be used; 4. The molten mass should be vigorously stirred with a stick, and even while pouring it into another vessel, the stirring should not be relaxed; 5. Another hint is to use a little old alloy in making new, if there is any on hand, and the concluding word of caution is to make sure that the melting pots are absolutely clean, and free from any traces of former operations.

—The employment of essences in cleaning watches is rapidly growing in favor among watchmakers. They are to be obtained at many of the material dealers', together with full instructions in regard to their use. The objects are left in the solution for a few minutes, in order to allow all adhering matter to dissolve; but they must not remain too long, as certain qualities of benzine, etc., are apt to leave stains. Dry the pieces on removing them, and finish by passing over a fine brush that has been charged with chalk, and subsequently rubbed on a hard crust of burnt bone. This will produce a brilliant surface on either gilding or polished brass.

The following composition, the ingredients of which can be obtained at any drug store, has been strongly recommended: 90 parts by weight of refined petroleum, and 25 parts by weight of sulphuric ether. The objects are immersed for several minutes; indeed, they may remain for a longer period without danger, and on removal from the bath are found to be clean and bright. It must not be forgotten that many of these essences are liable to ignite with the mere proximity of a lamp.

Watch Cleaning.—A few watchmakers clean by what is called the chemical process, to remove discoloration from watch movements. It is as follows: Remove the screws and all steel parts, then dampen with a solution of oxalic acid and water. Let it remain a few minutes, after which immerse in a solution made of one pound cyanuret potassia to one gallon of rain-water. Let remain a few minutes, and then rinse well with clean water, after which you may dry in sawdust, or with a brush and prepared chalk, as it suits your convenience. It gives the work an excellent appearance.

Cleaning a Watch.—The best process is to simply blow your breath on the plate or bridge to be cleaned, and then to use your brush with a little prepared chalk. The wheels and bridges should be held between the thumb and finger in a piece of soft paper while undergoing the process; otherwise the oil from the skin will prevent their becoming clean. The pinions may be cleaned by sinking them several times into a piece of pith, and the holes by turning a nicely shaped piece of pegwood into them, first dry, and afterward oiled a very little with watch oil. With jeweled holes, you must be careful not to break them.

Galvanic Gilding.—A correspondent inquires how to obtain a pure ground and color on articles gilt by galvanism, to which H. Bush, Hull, responds: The gold solution, effected by the nitro-muriatic acid, after all the gold has dissolved in the glass retort, is poured into a porcelain evaporating dish, and evaporated above an alcohol or benzine flame; to render the acid entirely harmless, however, a little distilled water is added to the residue, after completed evaporation, and the operation repeated. The residue is chloride of gold, which, together with a quantity of cyanide of potassium (about fourfold the weight of the gold employed), is dissolved in boiling water, and filtered after cooling; the gilding fluid is ready.

In order to obtain a clear ground and color of the gilding, cleanliness in the process of preparing the fluid, as well as of the article to be operated upon, is unconditionally necessary; the zinc strip, also, must be kept very clean. The mat ground of the gilding is changed into a lustrous one by scratch-brushing the article after removing it from the bath, with a brush consisting of brass or German silver wire, or glass fibers, using beer. The article is next rinsed in warm water, and dried in sawdust.

Another one answers to the same question: After having evaporated the dissolved gold to a proper consistency, add the point of a knife full of bicarbonate of soda, and a clear and handsome gilding will be obtained.

—We give a few condensed rules to be remembered by the workman when regulating a watch to positions commensurate to its motion, or the experience or estimation of the workman:

1. Make the balance pivots flatter or rounder.

2. Let the balance jewel holes have only the necessary thickness of the hole.

3. Make the balance pivots weaker, according to circumstances, and insert new and smaller jewel holes in the place of the old ones.

4. Center the balance spring truly, or, according to circumstances, fasten and lay it thus that by the hanging of the watch, the spring operates in such a manner upon the balance as to raise it, whereby the friction within the jewel holes is lessened.

5. Change the balance spring with another one of the same strength, but with more or less coils.

6. Change the fastening point of both, so that the balance spring is lengthened or shortened, and the points of fastening stand at a different angle to each side.

7. In a watch with Bréguet spring, make the outer curve longer or shorter.

8. Put in another balance of a larger or smaller diameter or weight.

9. In a cylinder watch, give the balance a point of gravity.

Keep these rules uppermost in your mind, when engaged in regulating, and always remember at the same time that the operation offers many difficulties, only to be conquered by a prolonged experience, observation, and a careful study.

Trade Gossip.

The newest canes for gentlemen have hammered copper heads.

Silk guards are being worn in connection with fobs as a protection against theft.

Large oval-topped folding Japanese fans three-fourths of a yard long are put in front of fireplaces of country houses.

Mr. William Trier, of the firm of Trier Bros., has recently returned from Europe with a line of novelties in jewelry for the fall trade.

Hamlin & Race's jewelry store, at Beloit, Wis., was recently entered by burglars, and robbed of some $4,000 worth of diamonds and jewelry.

The machinery and tools formerly owned by Mr. Bowman, of Lancaster, Pa., have been purchased by J. P. Stevens & Co., of Atlanta.

Mr. William Edge, manufacturer of novelties in woven fabric chain, has removed from Newark, and established a factory in John street, this city.

I. M. Miller, of the firm of Miller Bros., sailed for Europe in the *Germanic*, and is now sojourning in Scotland, beside " the banks and braes o' bonne Doone."

Mr. William S. Hedges, of the firm of William S. Hedges & Co., diamond merchants, is now in Europe on his semi-annual visit in search of goods for the fall trade.

At a forced sale in a town in Pennsylvania, a clock over 100 years old sold for fifteen cents. The neighbors did not want to bid against the unfortunate old lady who owned it.

The failure of C. L. Thiery & Son, watch case manufacturers, at Boston, is reported. The liabilities are $28,000. There are said to be no assets for the unsecured creditors.

The New York Dial Company, recently established in this city, was burned out July 8. They were, fortunately, fully insured, and have removed to Brooklyn, where they have resumed business.

Frasse & Co. have issued a catalogue of machinery, fine tools and supplies for jewelers, silversmiths and engravers. This is intended for the large manufacturers, and not for the general trade.

W. Evans, a jeweler doing business at 859 Broadway, committed suicide by shooting himself. The deceased was a member of the Seventh Regiment, and had long been suffering from mental troubles.

We are pained to announce the death of Mrs. Mary Marx, the mother of Kossuth, Adolphus, Jacob and Monroe Marx, constituting the firm of Kossuth Marx & Co. She died at her home in Syracuse, N. Y., July 18.

B. H. Knapp, of Messrs. Wheeler, Parsons & Hayes, is fishing in the mountain lakes of Orange county. Mr. Knapp handles a bass rod with such exquisite skill, that it is a real pleasure for a fish to be caught by him.

Dale & Kimball, manufacturers of American silk watch guards, present a large and attractive stock in all goods; also a large and comprehensive assortment of eye-glass guards, especially designed for the jobbing trade.

Morris I. Goldsmith, of Philadelphia, presents a very complete line of watchmakers' and jewelers' tools and materials, of which he makes an exclusive specialty. He deals in everything of the kind required by the trade.

Mr. James Emory, a jeweler of Bucksport, Me., has achieved a high reputation as a marine painter. His pictures command a very high price in Boston. Some of his works are regarded by connoisseurs as having few equals.

Attention is directed to a page of novelties in watch charms—knives, etc.—in this issue of The Circular. These goods have become exceedingly popular, and are among the most successful novelties introduced this season.

Sigmund Stern, who has for many years made a specialty of gold rings, has formed a co-partnership with J. H. Young, under the firm name of Stern & Young. They will now extend their business, and do a general jobbing trade in watches and jewelry.

W. S. Ginnel, only son of Henry Ginnel, is now in Europe, purchasing goods for his father's account. Young Mr. Ginnel, who has but just attained his majority, has developed a special adaptability for business, having sent home goods that demonstrate his good judgment and excellent taste. His father is delighted with his purchases, and justly proud of his son's liking for the business with which the name of Ginnel has been so prominently and honorably connected for so many years.

A joint resolution has passed the House of Representatives, asking the President to call an international conference to fix on and recommend for universal adoption, a common prime meridian, to be used in the reckoning of longitude, and in the regulation of time throughout the world.

Norman McLeod, a young Scotchman, was recently arraigned in court to answer to a charge of obtaining goods under false pretenses The complainants were several jewelers, who, it is alleged, were victimized by McLeod's operations, each in small amounts, but reaching a total of about $3,000.

The Jewelers' Amateur Athletic Club, composed of young men in the trade over 17 years of age, has secured a club house at 128 East 59th street. An impression has gone abroad that the Club received members at 15 years of age. This is a mistake, as all candidates for admission must be at least 17 years old.

The Dueber Watch Case Manufacturing Co., are driving at high pressure speed in order to keep up with their orders. They are 3,590 cases ahead of the corresponding six months of last year, and have not stopped a single day since January excepting the 4th and 5th of July. They have recently imported a number of very fine workmen from Switzerland.

It used to be considered a wonderful thing to engrave the Lord's Prayer on a three-cent piece. At the last meeting of the San Francisco Microscopical Society, the President exhibited an engraving upon a glass plate of the Lord's Prayer so minutely executed, that on the same scale nine copies of the entire Bible could be introduced within the space of a square inch.

Just now there is quite a run upon classic styles in jewelry, especially in ear rings. The most popular are large gold hoop in yellow gold, exquisitely engraved in intricate antique designs, such as the reproduction of the styles of the days of Cleopatra. But modern ladies are not at all content with chaste simplicity, and the loops must be heavily studded with jewels.

The latest Paris novelty in ornaments are *bijoux de chasse*, consisting of brooches made of the tip of a stag's horn ornamented with a light foliage of silver surrounding the head of a horse or stag, also in silver; from the brooch hangs a chain of pieces of horn. linked with silver, to the end of which are suspended all sorts of sporting emblems in silver, in horn and silver.

The old and well-known house of Saxton, Smith & Co., have removed from No. 15 Maiden Lane to No. 14 John street, being the premises formerly occupied by Alfred H. Smith & Co. The offices have been refitted, and afford greater facilities for business than before, having good light, and all the conveniences necessary for the transaction of a large volume of business.

Sneak thieves have been abundant in New York and Brooklyn lately, and numerous retailers have suffered small losses by them. In one instance the thief had a hook in the end of a cane, and while his accomplice engaged the attention of the dealer, he reached over the counter and abstracted two watches from the work bench. He was captured and identified by several of his victims.

He was a traveler for a Maiden Lane jewelry firm, and she was some other fellow's best girl. They met at Coney Island, and were enjoying a dip in the bay. When her lover he met her, upset her, and wet her all over with salt ocean spray, this damsel she thought it right rough, and called her companion a muff; but her lover he caught her and taught her that water, like women, is unstable stuff.

Daniel E. Kimball, a salesman and designer in the employ of N. M. Shepard, of this city, suddenly disappeared taking with him several thousand dollars worth of diamonds and watches. said to have been attained on memorandum from several manufacturing houses, and a quantity of goods belonging to his employer. From information in possession of the police, it is believed that Kimball has fled to Europe.

Henry C. Haskell has issued an elegant illustrated catalogue of rings, that is an evidence of his remarkably good taste. It is printed on gilt-edged cards, which are held in a neat Russia leather cover by a silk cord passing through eyelets. It is one of the neatest advertisements we have seen, being not only attractive in appearance, but giving an excellent representation of the many desirable styles of rings he offers to the trade.

Sunflower jewelry is still popular. The use of the topaz with fine frosted gold gives us a good sunflower, while an amethyst does duty for a pansy, and pearls and topazes can be worked up for the daisy. The very white shade that silver can now be made to take is useful in making flowers into jewelry. There is no new way of setting diamonds except in flowers. The single stones of value are very simply mounted, silver being the best setting, and are worn close to the ear.

The Egyptian necklet, worn by the Wilde sect, is a delicate and beautiful piece of workmanship, and is made of gold linked tablets, each outlined with figures from antique bas reliefs. The chain is fastened in front by a clasp representing a sphinx's head backed by a pyramid.

At the annual meeting of the New York Jewelers' Club, held at their rooms July 11, the following named gentlemen were chosen officers for the ensuing year: B. W. Ellison, President; J. B. Bowden, Vice-President; S. P. Howard, second Vice-President; C. W. Cooley, Secretary: J. G. Fuller, Treasurer. The last two gentlemen were re-elected. while Messrs. Marsh and Bliss, former President and Vice-President, positively declining a re-election. J. B. Bowden has notified the Club since his election that it will be impossible for him to serve.

Mr. C. Rosswog, of this city, is spending a brief vacation at Richfield Springs. For the past ten years he has devoted his undivided attention to business, not having taken a single day off during that time. He has certainly earned a protracted vacation now. Notwithstanding Mr. Rosswog's example, we should like to see a law passed to prevent our business men wearing themselves out by too close attention to business. An annual vacation should be made compulsory, and applied to the heads of firms as well as the clerks and office boys.

A letter from Des Moines, Iowa, to the Chicago *Journal*, dated June 26, says: "Observers of the cyclone cloud at Grinnell say it was luminous with electric fire, and there was a continuous report from electric explosions like torpedoes. If there was no electric disturbance, how is to be explained the fact that the mainsprings of watches were hroken in extraordinary numbers all along the track of the storm for thirty miles wide? In this city alone, nearly thirty watches were taken to jewelers on Monday, with mainsprings broken on Saturday night."

T. H. Foster, of Montgomery, Ala., was recently arrested, charged with theft. He sent a package by express to Puiladelphia, and reported at police headquarters that he had been robbed on his way home of several watches. He said he had been knocked down, but bore no marks. This, with some previous transaction of his, caused the express agent to telegraph for a return of the package, which was found, on examination, to contain the identical articles of which Foster claimed to have been robbed. Foster then confessed. The watches, six in number, belonged to citizens of the town, and were consigned for sale as old gold to a firm in Philadelphia.

At a great London jeweler's is exhibited a head ornament representing a bat almost the size of life, with outspread wings and fiery eyes, composed of a cluster of rubies. This extraordinary object is to be worn in front of a superb tiara of brilliants, by the Duchess of Fernand Nunez, at the royal gala fêtes at Madrid. The bat is regarded with great reverence among the tenants and servitors of the house of Fernand Nunez, as the emblem of that ancient ducal family. The ladies of the family wear, on state occasions, this lugubrious image as a sign of their rank, and the last Duchess is said to have appeared at court with a black velvet train richly embroidered with figures of the bat in gold and precious stones.

There is now an odd fancy about ear rings. Two of a kind are no longer scrupulously held to be a pair, but odd stones are worn as a pair. You will see a pink pearl on one ear and a black one on the other, or you will see a diamond in one ear and a clear white pearl on the other. A Turkish grandee who was in this country some years ago, commented upon the poverty of design in the ear rings of American women. He said that the ear ring, as a feature of personal decoration, did not seem to be appreciated; that the odalisques in the harems wore the most beautiful ear rings of any women in the world, and that what was better, they designed them, there being no more exquisite taste in jewelry than that of the Sultana.

A. L. Titcomb, of San Francisco, known in Newburyport, Mass., his old home, as "Squire" Titcomb, recently invited a number of his Newburyport friends, ladies and gentlemen, to accompany him on a fishing excursion. A very pleasant party was arranged, and sailed down the river on a nice comfortable yacht. But the fishing wasn't first rate—rather, there was plenty of fishing, but no fish. It was finally determined that there was a Jonah aboard, and on the first ballot Mr. Pierson, of the Howard Watch Co., was elected to be the Jonah of the occasion. Preparations were made to throw him overboard at once, and leave him to the blandishments of the mermaids and sea urchins, but he begged off, and was finally released on promising to give them a "good time"—which is his stock in trade —on some future occasion. The party enjoyed the sail very much, and, notwithstanding the entire absence of fish, returned in high spirits. Mr. Titcomb says the next time he goes fishing, it will be for grizzly bears in the mountains of California.

J. P Stevens, the enterprising jeweler of Atlanta, some time since put in some machinery and engaged in the manufacture of watches. The business grew on his hands, until recently he was induced to organize a small stock company for the manufacture of watches, and to enlarge the facilities for so doing. It is not intended to make watches for the general trade, but the entire product of the factory will be handled by J. P. Stevens & Co., in their home trade. Three grades of watches only will be made, and these for home consumption. This new industry in the south will give employment to quite a numher of women and a few skilled workmen. Mr. Stevens is recognized as one of the leading business men of the state, and his public spirit has been demonstrated frequently.

According to the census of 1880, the city of Newark has 1,299 manufacturing establishments, employing a capital of $24,000,000, and the products amount to $66,000,000 annually, made out of $43.000,000 worth of raw material. The leather industry leads the list. There are 59 factories where curried and tanned leather is produced—32 of the former and 27 of the latter—and the capital invested is $3,500.000. The celluloid enterprises represent $1,209.000; drugs and chemicals, $1,600,000; jewelry, $2,500,000, and machinery, $1,245,000. The classification of 29,232 persons employed in all the 1,299 factories is interesting. There are 21,441 males above sixteen years of age; 5,205 females above fifteen, and 2,585 children—and the total amount of wages paid out in 1880 was $12,800,000.

The second volume of D. L. Safford's Confidential Reference Book of the Jewelry Trade, has just been issued. It is a great improvement on former issues, both in the form of compilation and accuracy. The work embraces the names of some 15,000 wholesale and retail dealers in this country, with their business addresses, commercial standing, etc. It is revised and corrected to the date of publication, which was July 1. The work has ample margins for the insertion of special references or new data that may be obtained by the publisher. It is altogether a creditable and valuable directory for the jewelry trade. This book is not sold by subscription, but is loaned to the customers of the agency, and in order to obtain a copy one must become an annual subscriber to the agency.

Frederick Marquand, formerly a well-known jeweler of this city, died July 14, in Southport, Conn, where he has lived for the last few years. He began business as a jeweler, and the firm of Marquand & Co., at No. 181 Broadway, at one time was the most noted jewelry house in the city. In 1852 Mr. Marquand retired, and was succeeded by Ball, Black & Co., the members of which firm had been clerks employed by him. Since then Mr. Marquand has traveled a great deal, and has passed many winters in the south. During his life he made many gifts to educational and benevolent objects, always on the condition no publicity should be given to them. He leaves an adopted daughter, the wife of Elbert B. Monroe, and a brother and sister, Henry G. Marquand of this city, and Mrs. Asa G. Trask.

The manufacturers of the American lever buttons, having exhausted the English language in sounding the well-deserved praises of their goods, have resorted to Latin to complete their labors. Both the Howards now devote their leisure time to reading Cicero's orations in the original. The elder Howard was accosted by a friend in the Lane the other day, with the customary morning greeting, and the response was "*frigidus dies est quum sinistum.*" The friend asked him if he had had 'em long, and Howard replied, "it is a cold day when we get left," thus giving a translation of his former remark and satisfactory evidence of his sanity at the same time. "Japonesque" is a newly coined word employed to describe a new style of finish recently introduced in the American lever sleeve buttons. When buyers visit the city, they must not be surprised if they are greeted in four languages and an esthetic plague.

Messrs. Alfred H. Smith & Co, the well-known diamond merchants, are now comfortably settled in their new business home, 182 Broadway, corner of John street. This building has been rebuilt inside, and now contains the most comfortable and handsome offices in the city. The offices occupied by Alfred H. Smith & Co., are the ones in which Robbins & Appleton, agents for the American Watch Co., did business for so many years, but they have been completely remodeled, large new windows set into the walls, giving to the offices nearly as much light as is found in the street. This is especially necessary in conducting a diamond business. The offices are not only beautifully, but artistically decorated, and provided with every possible convenience. They are richly finished in mahogany, and private offices are provided for the exclusive use of customers. The arrangement of the suite of offices is evidence of the good taste and judgment of Messrs. Smith. The efforts put forth by them to supply their patrons with comfortable and pleasant surroundings, will, no doubt, be fully appreciated hy the trade.

THE

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THE

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Mr. Boynton and the Guild Stamp.

IN OUR issue of last month, we printed a brief synopsis of the proceedings of the Wisconsin Retail Jewelers' Protective Association. In this issue we give a more extended report of the proceedings, for the sole purpose of giving W. N. Boynton the full benefit of the remarks he made on that occasion, for the alleged purpose of defending the Guild stamp contract, but in reality for the purpose of attacking THE CIRCULAR and its editor personally. To personalities we never reply; our individuality is absorbed by THE CIRCULAR, and we are only interested in maintaining the standard of the paper, and in advocating whatever is for the best interests of the trade. If THE CIRCULAR makes mistakes, we shall be glad to be convinced of its errors by such arguments as gentlemen employ, but personal vituperation is not argument, nor is it gentlemanly. In commenting upon Mr. Boynton's remarks, made before a public body, we are at liberty to criticise his manner as well as his statements, for it is impossible to ignore one if the other is to be noticed, but we shall endeavor to confine our remarks to the one point at issue, viz., "Is the Guild stamp contract in the interests of retail dealers?"

It will be observed that Mr. Boynton's address is of the spread-eagle order, bombastic and high-flown, characteristics that might be acceptable in a Fourth of July oration, but hardly suitable for a gathering of business men engaged in a special calling, and anxious to obtain information relative to their special business. As to the Guild stamp, he says, in substance: "*I* am the inventor of this scheme; *I* engineered it through the various associations; *I* made the contract with the company that is to make our goods; *I* am your benefactor and friend, and this stamp that *I* invented, engineered and contracted for, is to be your salvation; it is a good thing for all of you, and whoever says to the contrary is your enemy." He will not admit that there is opportunity for an honest difference of opinion, but whosoever opposes his pet scheme, or is antagonistic to his "mule," as he designates the Guild stamp, must be opposed to the best interests of the retail dealers. We are perfectly willing to admit that Mr. Boynton is the progenitor of the "mule" he lays claim to, and cheerfully accord him all the honor such distinction affords him. Nevertheless, we maintain that his mongrel offspring is not as virtuous as he claims, nor is it calculated to benefit retail dealers. Let us rehearse the facts in brief.

The National Guild has adopted what it denominates a Guild stamp, and several state associations have approved of it. A contract has been entered into with a western company to manufacture silver-plated flat ware bearing this stamp, and that company has given bonds that the goods so stamped shall possess an intrinsic value ten per cent. in excess of the best triple plate now in the market; also, that goods so stamped shall be sold only to members in good standing, of some state association that is affiliated with the National Guild. Our objections to this have been repeatedly stated, and are in no wise refuted by Mr. Boynton's bombastic and egotistical statement that he is right and we are wrong. They may be briefly summed up. First, there are a number of plated ware manufacturers, better known than the company with which this exclusive contract has been made, that are entirely shut out from competition in the manufacture of Guild stamp goods. These manufacturers have spent large sums of money and many years time in developing plated ware goods, and bringing them to their present high standard of artistic excellence; their goods are known throughout the whole civilized world, and have contributed no little to the profits of the retail dealers of the country. The contract entered into by the Racine company and assumed by the Rockford company, denies to older manufacturers the opportunity of making any goods bearing the Guild stamp. A monopoly is thus created in favor of one company, and monopolies are always opposed to the interests of dealers. When the Guild stamp was adopted, a standard of requirements should have been agreed upon, and then any manufacturer who pleased permitted to make the goods on complying with those requirements. By this means competition would have been introduced, and abuses that a monopoly is liable to create, would have been provided against. We do not mean to insinuate that the Rockford company will intentionally do any wrongful act, but, having the exclusive control of a special line of goods, it is but natural that they should make the most of their special privilege. Then the contract includes but one line of plated ware, *i. e.*, flat goods. No other class of plated ware is to bear this magic symbol, but may be purchased of any manufacturer, as, indeed, may other styles of flat goods. The dealer, therefore, who handles the Guild-stamped goods, will carry a line of plated ware from various manufacturers and of various qualities of plate; if he makes a specialty of his stamped goods, he necessarily depreciates his other stock as to quality, and so will be more apt to injure than improve his sales. While representing the stamped goods to possess especial excellence, he will, by contrast, be casting discredit upon his other goods, standard in quality, of splendid reputation, and which he has heretofore represented to be the best. Manufacturers will not submit to have their goods discriminated against, and if the Guild-stamped goods ever do come into the market, and are pushed at the expense of goods not so stamped, the manufacturers will be apt to revolt, and refuse to sell to any dealer who handles the stamped goods. This would be a natural course for them to pursue if the stamped goods ever become formidable. In such an event, the dealers would be greatly embarrassed. It may be taken for granted that the manufacturers who have made the reputation of American silver-plated goods are not going to be driven from the market with their wares, or calmly see their trade broken down by an exclusive contract, that is calculated to confer a monopoly of the business upon a single company. We do not apprehend any such result, but if it does not come, it will be due to the good sense of the dealers themselves; the manipulators of the associations have done all in their power to pave the way for such a condition of things, and if Mr. Boynton wants the credit for such bungling, he is welcome to it.

The condition of the contract that secures the handling of stamped goods to members of associations, is another attempted monopoly that is calculated to engender bitter rivalry and contentions between dealers. In the Wisconsin Association, for instance, there are 127 retail dealers, or about one-half of the whole number of dealers in the state. These 127 dealers, it is proposed, shall have exclusive control of a line of goods that, it is promised, is to become excessively popular. Should such popularity ever, by any possibility, come to these goods, those other dealers not in the association will be arrayed against the 127, and a competition will result that will be injurious to all. The manufacturers generally will sustain the non-members, and there will be a cutting of prices and other illegitimate practices that cannot but injure all concerned. The Guild stamp contract is well calculated to array dealers against each other, to precipitate excessive local competition between them, and to bring about a state of demoralization and discord within the trade. All this because Mr. Boynton has a pet "mule" that he is determined to ride rough shod over the best interests of the retail dealers.

In the remarks of Mr. Boynton, which will be found elsewhere, he says: "Mr. Shurley will bear me out in the statement that for three years our Guild stamp committee had tried to get Eastern manufacturers interested in our Guild stamp, all their efforts proving futile. They seemed to ignore the idea, thinking the scheme beneath their notice. They in fact deemed the western retail jewelers too small fry to demand their attention. This snubbing we got came not alone from the silver plate companies, but also from the manufacturers of rolled plate goods." Mr. Shurley tacitly if not actively endorsed this statement. Had there been a question of veracity between these two individuals, it would be one of those instances where "you pays your money and you takes your choice." But, unfortunately for them, they affirm a statement that is unqualifiedly false, as will be seen from the letters herein given from the plated ware manufacturers:

New York, Aug. 15th, 1882.

Editor Jewelers' Circular:

We have never had any proposition from, or correspondence with "The Jewelers' Guild," regarding the use of a Guild stamp.

Yours respectfully, Gorham Mfg. Co., Edwd. Holbrook, Agt.

Rogers & Bro., 690 Broadway, New York.

Editor Jewelers' Circular:

We were never asked by anyone to make Guild-stamped goods.

Signed, Rogers & Bro.

Meriden Britannia Co., Meriden, Conn.

Editor Jewelers' Circular:

We have no record of any correspondence regarding Guild-stamped goods. Signed, Meriden Britannia Co.

Meriden Britannia Co., 46 East 14th street, New York City.

Editor Jewelers' Circular:

We do not find that we have either received or replied to any communication from the Jewelers' Guild relating to making Guild-stamped goods. Meriden Britannia Co., Signed, J. Miles.

Simpson, Hall, Miller & Co., Wallingford, Conn., and 36 East 14th street, New York City.

Editor Jewelers' Circular:

We have had no correspondence with any member of the so-called Jewelers' Guild, relative to making Guild-stamped goods for the members of the trade societies. In fact, we have not been approached on the subject by anyone.

Signed, Simpson, Hall, Miller & Co.

Office of the Middletown Plate Co., Middletown, Conn.

Editor Jewelers' Circular:

Were never applied to by anyone to make Guild-stamped goods. We think there will be no better brand found or made than the

Middletown Plate Co., G. H. Hulbert, Treasurer.

Brown & Bros., 80 and 82 Chambers street, N. Y.

Editor Jewelers' Circular:

We have had no correspondence with any parties relative to making Guild-stamped goods. Signed, Brown & Bros.

Holmes, Booth & Haydens, 49 Chambers street, N. Y.

Editor Jewelers' Circular:

We have had no correspondence with the U. S. Guild or any of its officers, regarding the manufacture of silver plated flat ware

Signed, S. H. Willard.

Office of Wilcox Silver Plate Co., Meriden, Conn.

Editor Jewelers' Circular:

No application was ever made to us to furnish Guild-stamped goods to members of the Jewelers' Guild.

Signed, Samuel Dodd, Treasurer.

The Derby Silver Plate Co., Birmingham, Conn.

Editor Jewelers' Circular:

In reply to yours of recent date, we have never received any communication from the so-called Jewelers' Guild; in fact, we have been unable to get any definite information about the association, although our agent in Chicago has repeatedly made inquiries.

Derby Silver Plate Co., Signed, C. A. Burr, Secretary.

Office of Hall, Elton & Co., Wallingford, Conn.

Editor Jewelers' Circular:

Don't remember any proposal for us to make Guild-stamped goods.

Signed, R. H. Coles, Treasurer.

Rogers, Smith & Co., Meriden, Conn.

Editor Jewelers' Circular:

We have never had any correspondence with the Jewelers' Guild of Chicago on the Guild stamp question.

Signed, Rogers, Smith & Co.

Silver-Plated Flat Ware Association.

Editor Jewelers' Circular:

At a meeting of the Silver-Plated Flat Ware Association, the question was asked if any Guild folks had applied for goods stamped with the Guild stamp, and no member had ever received any such application. Signed, G. C. White, Jr., Secretary.

The above letters clearly demonstrate that Messrs. Boynton and Shurley have deliberately misled the National Guild and the state associations in this matter. Having proven the falsity of their statements regarding the eastern plated-ware houses, we leave it to discerning readers to decide how much confidence they can place in their statements regarding the rolled plate manufacturers. The old maxim, *falsus in uno, falsus in omnibus*, applies to them, and renders further evidence unnecessary. As to the motives which have led these individuals to thus deceive the retail jewelers of the west, they can be inferred from the remark of Mr. Boynton, that he is willing to back this hybrid offspring with every nickel he has got. If he were the "*paid advocate*" of the manufacturers of the Guild-stamped goods, he could scarcely represent their interests in a more audacious manner.

We have no apprehension that such a condition of things as we have referred to will come about, for we do not imagine that sufficient Guild stamped goods will ever be made under the present contract, to warrant other manufacturers or dealers outside the associations in taking any notice of them. But the making of such a contract was well calculated to produce just such results.

Years before Mr. Boynton became interested as a professional organizer of state associations, The Jewelers' Circular advocated the formation of associations of retail dealers to resist the encroachments that were being made on their legitimate business by the retailing jobbers and manufacturers of bogus goods. Our zeal in the interests of retail dealers is not of recent birth, nor has it been lukewarm at any time. Neither have we sought to trade on the associations, or make a profit out of our relations to them. Our position as editor of THE CIRCULAR was secured some time before the birth of any of them, and we did not solicit their endorsement to enable us to mount the editorial chair. We notice, however, that since Mr. Boynton became a professional organizer and champion, he has assumed the title of "assistant editor" of an alleged trade journal. A noted temperance advocate once remarked that some persons lived *for* temperance, others *by* it, so some persons like to advocate the interests of a special calling, while others make their living by doing so. Mr. Boynton alleges that THE CIRCULAR charged the associations with being knaves. To warrant such a statement, he must have had a copy of our paper before him from which to quote, and, with the proof in his hand, he deliberately makes a statement that he must have known was false, and as malicious as false. We never made any such statement or insinuation. We have said, however, that we thought the associations were being used by schemers and designing knaves to advance their own interests. If any remarks we may have made suit Mr. Boynton's position, he is at liberty to make the application, but we protest against his trying to fit the cap on the head of any association, or misrepresenting us to them.

Fictitious Jobbers.

THERE ARE a great many retail dealers in various parts of the country who claim to be jobbers without having the slightest legitimate right to be so considered. Their object in so representing themselves is to get the discounts that manufacturers are in the habit of giving to jobbers. They do not pretend to carry a jobbing stock for the purpose of supplying other retail dealers, but their whole business is that of a retailer. By their fictitious claim of being jobbers, they obtain goods at lower prices than can the retailers who buy from jobbers, and are therefore in a position to cut the retail prices and carry on a successful competition against their neighbors. Certain manufacturers encourage this practice, which is so disastrous in its results. Especially is this true of some of the eastern manufacturers, who do not hesitate to send their agents out among the retailers, and sell them goods at jobbers' discounts. These manufacturers care nothing how they demoralize the trade, provided they can dispose of a few dollars worth of their own goods. The tendency of this practice is to undermine the legitimate retail dealers, who cannot stand against a competitor who sells by retail at jobbers' prices, and that is just what this class of fictitious jobbers do who buy from the manufacturers and get the trade discounts. During the past year there was a considerable increase in the number of small failures, and we have no doubt many of them were brought about by the cutting of prices by their competitors who are fortunate to buy their goods at jobbers' prices. If one man obtains his stock 25 per cent. cheaper than another, the latter will stand no chance with him in competition for the retail trade. He must either sell at a positive loss or go to the wall. It has got so now that every city of 15,000 or 20,000 inhabitants claims its jobber in jewelry, or, rather, possesses a retailer who enjoys the privilege of buying his goods direct from the manufacturers at jobbers' prices. This is one reason why the retail trade is demoralized and so many retailers come to grief.

Manufacturers owe to themselves, to the jobbers, and to the legitimate retail trade, to put an end to this pernicious practice. When John Smith, of Hobbs' Hollow, claims to be a jobber, and entitled to the jobbers' discount, he should be required to bring some other evidence of that fact besides a printed card. He should be required to give some account as to what retailers he supplies with goods, the amount of stock he carries, and some guarantee that he will not sell at retail. Manufacturers have a right to know all about their customers, and it is a duty they owe to them all that they should make such inquiries and exact such guarantees. Carelessness or indifference in this respect has already filled the country with a lot of fictitious jobbers who do a retail trade at the expense of the legitimate jobbers and retailers. How can it be expected that these latter can meet their paper promptly and pay their indebtedness dollar for dollar, if their creditors put a club in the hands of their competitors to beat their brains out with?

These retailing jobbers are guerillas in the trade, whose competition is unfair and irresistible. Manufacturers are under obligations to protect legitimate jobbers and retailers, and to this end should refuse to sell to these alleged jobbers who sell at retail. The retailers and jobbers have a right to demand this protection. Their complaints now are frequent and loud, and if the manufacturers do not listen to them they will take pains before long to enforce their demands for fair play.

Benefits of the Jewelers' League.

THE limitation of membership in the Jewelers' League being originally fixed at 2,500, and that limitation being now nearly reached, those who feel the deepest interest in it have been considering the means whereby its usefulness within the trade may be extended, and itself strengthened thereby. In the Constitution it is provided that "The objects of this League are to bring about a better acquaintance of the several persons engaged in the jewelry and kindred trades, and the adoption and maintenance of such plans as shall tend to the mutual benefit and protection of its members." The limitation of the number of members who should enjoy the benefits provided by the life insurance methods adopted, does not prevent the formation of other classes, to be operated by the same or other methods. A committee of Eighteen was appointed some time since to consider this subject, and they, in conjunction with President Woglom, have given a great amount of time to obtaining information regarding the oldest and most substantial benefit societies in this country, as well as collecting the opinions of the best life insurance actuaries. It is ascertained that the plan of life insurance that is the most economical and equitable, is that which is denominated the "graded and aging" plan. Experience has shown that the plan that taxes the young and the old members equally for the same benefits, is inequitable and unjust, compelling the younger members to pay more than their share, while the older ones pay less than they are entitled to. To be entirely equitable, each member should pay for the insurance he obtains in accordance with the risk the society assumes. In fire insurance the premium charged is graded according to the hazard, and if the hazard is increased after the insurance has been written, the rate of premium is increased to correspond. The same rule should hold in life insurance. A man at 60 years of age is a less desirable risk than one at 30, because his expectancy of life is not so great, and his prospect for paying premiums is less. Therefore, he should be rated according to the hazard. All the regular life insurance companies make such distinction in their premium rates, but with the addition that they charge the younger members about three times the actual cost of insurance to provide for their old age. In assessment companies, no premiums being collected in advance, and a desire manifested to furnish life insurance at actual cost, members are assessed when losses occur, and, at such times, are expected to pay proportionately to what it has cost the society to maintain their insurance. The committee of the League has gone very carefully over this whole subject, and, it is probable, will recommend the establishment of other classes that will offer opportunities for all persons identified with the trade to enjoy its benefits. It is proposed that the present membership be classed as Section A, and all contracts heretofore made faithfully carried out. In addition, another class is suggested, to be known as Section B, to which all persons identified with the trade, between the ages of 21 and 55 years, will be eligible. Membership fees to be graded according to age, and assessments made on the same plan. In one Masonic benefit society that has been very successful and long lived, the mortuary assessments for each $1,000 of benefit are as follows:

Members	between	21	and	30	pay at	each death	.81
"	"	31	"	40	"	"	.90
"	"	41	"	50	"	"	1.15
"	"	51	"	55	"	"	1.64

By such gradation each member pays for what he gets, viz., insurance upon his life for what it actually costs to carry it at his age. If this plan is adopted by the League, it will undoubtedly become very popular, for it approaches more nearly to equity in each case than where members of all ages pay the same rate of assessment. It also advances the age at which members may be received from 45 to 55, which will admit a large number who are now excluded. This is unquestionably the correct principle of benefit insurance—or life insurance that is conducted for the exclusive benefits of the members, with no expensive officers to support from profits, or a large and extravagant corps of agents to compensate for soliciting members. No better evidence can be given of the solicitude of the officers of the League for its welfare than the labor they have bestowed upon the research necessary for them to obtain the experience of kindred organizations. Every man who is not wealthy needs life insurance, and does not want to be taxed for it more than it costs. The League furnishes just such insurance, and we cordially commend it to every member of the trade, both for its beneficence and for the integrity and good business sense that characterize its management.

Another Call on Retail Dealers.

WE HAVE received a circular, although not intended for us or for publication, of which the following is a copy. It is sufficiently eloquent to speak for itself.

CONFIDENTIAL.

CINCINNATI, Aug. 3d, 1882.

This paper is for your perusal, and is to be treated as strictly confidential. You are invited to join in this enterprise. If you decline, please return it.

An opportunity is offered to you, through an organization to be formed of retail jewelers, whereby a line of the very best quality of American watches, suited to your trade, can be obtained on terms so favorable, that it is believed that every retail dealer who can make it convenient to do so, will desire to participate.

But one retail dealer in cities and towns of medium size, and under, is wanted in this organization; in larger cities, more than one, unless a single dealer or firm shall arrange for the exclusive agency.

Every agent will have exclusive control of the goods, and his right to this control for the place in which he is located, will be for himself, his heirs and assigns, forever.

He will receive jobber's discount, so that his advantage over the retail trade through the United States will be not less than fifteen per cent., added to the advantage, which is hard to properly estimate, of having the exclusive agency in perpetuity.

To attain these advantages, each purchaser, in cities of medium size and under, will be required to pay into the co-operative treasury five hundred dollars, the price of a single privilege or agency, which money will be received as a loan, to be returned. It is estimated that it will be returned within one year, the average will be less than that time, and should any part remain unpaid over that time, which is not probable, interest will be paid at the rate of six per cent. per annum. The entire management of the money and property will be under the control of a board chosen by the association.

It has been demonstrated that, by the plan proposed, all the money paid in can be returned, and the party making said loan, in addition to the advantages enumerated, become the owner of an interest in said company of a further sum of more than one thousand dollars in the second year, paying regular dividends, and constantly increasing in value.

Goods will be furnished within four months. No opportunity is again likely to occur offering similar advantages. For obvious reasons, details cannot be given in this paper.

PLEASE ANSWER.

1. As the preferred dealer in your city, for this agency, will you agree to meet the other retail dealers invited, at an early day, in Cincinnati, when notified of the date of said proposed meeting?

2. Will you subscribe the five hundred dollars required for a single agency, as proposed, provided that you are satisfied that the advantages promised can be realized?

A fine opportunity is presented for investment, beyond securing the agency of your own city, and you should come prepared to avail yourself of it, if you can spare the money temporarily.

Please reply promptly. Address,

HARRY R. SMITH & Co., Jewelers, Cincinnati, Ohio.

Can it be that our esteemed friend, Aristarchius Plumbago, has broken loose again? He departed for Cincinnati some months since, with his head filled with a grand visionary watch-making scheme—can this be the outcome of it? Has he abandoned his own resounding patronymic and assumed an alias? Alas! if the above emanates from him, we fear that massive intellect he was so proud of has gone further astray than we ever thought it would.

JEWELERS are in the habit of sending packages of valuables to their customers in all parts of the country by express. These packages are insured by an insurance company, but the express company does not admit responsibility for them beyond $50, unless the value is marked on the outside, in which case the express charge is made to correspond to the value. Recently several valuable packages have been lost while in charge of the express company, and there is reason to believe that the fact that the goods are insured induces carelessness on the part of the employés of the express company. The payment, by the insurance company, of the value of the goods, does not make good their loss, either to the seller or his customer. The latter is subjected to annoyance from the non-receipt of goods he has ordered and relies upon, while the seller must duplicate the order after the lapse of considerable time. Such a loss is vexatious in many respects, and when the express company manifests a reluctance to institute a search for the missing articles, it becomes a question whether or not the trade cannot be better served by another method. The government long ago assumed the transportation, through the mails, of valuable packages, under registration stamps. A receipt is given for such package by the postmaster receiving it, and it is especially watched over during its transmission, every person into whose custody it passes being required to receipt for it. If it is lost, the special agents of the department are employed to hunt it up, and so vigilant are they known to be, and so perfect are the safeguards thrown around registered packages, that it is very seldom one is lost. Of course, the government is not responsible for the value of the registered packages, but it guarantees extraordinary care and watchfulness. Merchants in other branches of trade employ the mails very extensively in the transmission of goods, and we are confident that the present postal facilities afford quite as much safety for valuable packages as do the express companies, and the postal authorities certainly are not so entirely indifferent to losses.

THERE SEEMS to be a necessity for the trade in New York to establish some place as a sort of headquarters for buyers and for themselves. It has been suggested that an exchange should be organized, similar to those maintained in other trades, where members can meet daily to exchange views regarding their business, the general situation of affairs, discuss the news, and meet such buyers as are in the city. Many favor a plan of this kind, but there are others who do not for various reasons. A more recent suggestion is for a social club, where members and their friends can dine or lunch together whenever they please. Such a club need not involve much expense as an experiment, and later, if found to be advantageous, the idea could be elaborated, proper rooms secured and fitted up, and such conveniences provided as may be deemed necessary. But as a commencement, arrangements could be made with some of the well-known caterers in the vicinity of Maiden Lane, to set aside a room especially for jewelers and their friends at lunch and dinner time, and to serve them exclusively. To such accommodations buyers in the city could be invited, and thus enabled to escape the horde of eastern drummers that render their lives miserable while they are in the city. We know of such arrangements existing now in other trades, and they are found to be very convenient. Members dropping in to lunch or dinner are always sure of finding congenial companions, and to pick up information of use to them. There is a demand in the trade for some sort of headquarters, and we believe that a movement having that object in view would meet with immediate and liberal encouragement.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box* 3,444. *P. O., New York*, or the office of THE CIRCULAR.

The regular monthly meeting of the Executive Committee was held for the first time in the new office of the League, No. 61 Nassau street, on Friday evening, August 4th. The Committee has displayed excellent judgment in the selection of the office, and commendable economy in its furnishing; the members may now feel that they sit under their own "vine and fig-tree," and will always be welcomed there in pursuance of the business of the League.

At the regular meeting the following named gentlemen were admitted to membership:

Emil Alter, Newark, N. J.; Christian Blancard, N. Y. City; Henry V. Berson, Brownsville, Tenn.; John P. S. Brown, Philadelphia, Pa ; Francis S. Clark, Paris, Edgar Co., Ill.; George H. Cook, Springfield, Ill.; Frank S. Dame, Keene, N. H.; George H. Daniels, Whitney's Point, N. Y.; Junius H. Davis, Herman Diesinger, Philadelphia, Pa.; Clarence W. Edwards, Chicago, Ill.; Wm. Fischer, Charleston, S. C.; J. Henry Gereke, Philadelphia, Pa.; Fred. Grossenbacher, Cleveland, O.; Leonard L. Grear, Passaic, N. J.; William Haines, Philadelphia, Pa.; Daniel B. Hamaker, Staunton, Va.; Mathew F. Hamilton, Philadelphia, Pa.; Ole Hansen, Elgin, Ill.; John E. Hill, Biddeford, Maine; William B. Hill, Toronto, Canada; Chas E. Jennings, No. Attleboro, Mass.; Joseph B. Koester, Omaha, Neb.; Peter Kramer, Goshen, N. Y.; William F. Ladd, Jr., New York City; Elias Linz, Sherman, Texas; Frank Mauser, New York City; Emanuel Nilsson, Chicago, Ill.; H. Frank Payton, Povidence, R. I.; Harlan P. Proctor, Grinnell, Iowa; George W. Reeves, Newark, N. J.; John M. Reister, Louisville, Ky.; Henry Roloff, New York City; John S. Rutan, Newark, N. J.; Charles Schlag, New York City; Adolph F. Seelen, Moberly, Mo.; Edwin G. Seymour, Syracuse, N. Y.; Charles A. Scherzinger, Francis R. Simmons, Thomas J. Skidmore, New York City; Charles L. Tuthill, Waltham, Mass.; Gustave Walter, New York City; Edward B. White, Fredrickton, N. B.; E. A. Young, Providence, R. I.

One application was rejected and eleven were tabled for investigation; three requests for change of beneficiary in regular form were granted.

One member requested to have his name dropped from the roll, but a reference to the books showed him to be in arrears for the last assessment, and his request was refused; unless he discharges his obligation to the widow of the fellow member with whom he contracted to pay two dollars, his name must be dishonorably dropped from the roll.

Assessments Nos. 16 and 17, total, four dollars, were ordered, in consequence of the deaths of Hiram Sweet, of Atchison, Kansas, and William N. Evans, of New York City, notice of which has since been sent to the members.

Mrs. Claribell Sweet, widow and beneficiary of Hiram Sweet, has been paid $3,680.30, making a total of $38,117.80 benefits paid to widows and orphans of deceased members of the League.

The Committee has resolved to recommend the adoption of such rules as shall permit the payment of losses by suicide, only in cases of those who have been members in good standing for three years or more.

At the dinner given during the day of entertainment extended by the New York Jewelers' Club to the New England Manufacturing Jewelers' Association, the "Jewelers' League" was responded to in graceful language by Robert A. Johnson, of the Executive Committee, followed by commendatory remarks as to the efficiency of the officers by Thomas W. Manchester, of the New England Association. The League views with kindly interest all gatherings in social intercourse of those who are perhaps keen competitors in business; they serve "to bring about a better acquaintance of the several persons engaged in the jewelry and kindred trades" (Const. Art. I.), and lead them to discover and to appreciate in their competitors, estimable qualities which are apt to be overlooked in the activities and rivalries of business life.

Bennett W. Ellison, an old and esteemed member of the League, was recently elected President of the New York Jewelers' Club, which reminds us that the roll of membership contains the names of several other Presidents, prominent among them, James D. Yerrington, of the Hiddenite Mining Co., Robert A. Johnson, of the Celluloid Show Case Co., Charles E. Bulkley, of the Whiting Manufacturing Co., and Ethel C. Hine, of the New York Jewelers' Association.

William G. Blair, with Hamrich & Son, Philadelphia, recommended six applicants for membership at the July meeting.

The Committee of Eighteen has held one session since the last number of THE JEWELERS' CIRCULAR, receiving reports from its sub-committees; when these reports are all in, the full Committee will then doubtless be in readiness to formulate its suggestions in time to send to the membership about November 1st next.

Since the July number of THE JEWELERS' CIRCULAR was issued, one more firm has made formal assignment to the President of the League, of their interest in the unexpended balance of the Chicago fire fund, now in the custody of Enos Richardson and Henry Randel, Trustees. The complete list of those who have become patrons of the League by directing their share of the fund to be paid to the League, is as follows:

J. A. Abry, (now C. L. Abry); H. F. Barrows; Albert Berger & Co.; Victor Bishop, (now Victor Bishop & Co.); A. Bernhard & Co.; Philip Bissinger; Bliss & Dean; Erhard Bissinger; Th. Bloch & Bros., (now Bloch Bros.); F. F. Braillard; Brainerd, Goddard & Steele, (now Brainerd & Steele); Estate of Paul A. Brez.; John D. Brez; Brooklyn Watch Case Factory; Brown, Cook & Co., and Maas, Groeschel & Co., (now Cook, Groeschel & Co.); D. Bruhl, (now D. & M. Bruhl); Bruno & Son, (now C. Bruno & Son); Buckenham, Cole & Hall, (now E. G. Buckenham); T. B. Bynner & Co.; Samuel W. Chamberlain; H. A. & G. M. Church; William Cohen, (now Cohen & Co.); Colby & Johnson; Cooper, Fellows & Co.; Cox & Sedgwick; H. E. Droz; E. C. Dunning & Co.; Estates of L. Durr & Bro.; Earle & Franklin; Samuel Eichberg; Eisenmann Bros.; A. Errico, (now Errico Bros.); Joseph Fahys; Fellows & Co.; M. Fox & Co.; Charles Francke & Co., (now C. J. Francke); Freund, Goldsmith & Co., (now Max Freund & Co.); Julien Gallet; Giles, Wales & Co.; Henry Ginnel; Hayward & Briggs; Henle Bros.; Hessels & Ludeke; Wm. S. Hicks; Hodenpyl, Tunison & Shiebler, (now Hodenpyl, Tunison & Co.); John E. Hyde's Sons; Jacobs & Pratt; J. W. Johnson; L. & M. Kahn; Ketcham Bros & Co.; (now Ketcham & McDougall); R. Kipling & Son; F. Kroeber; Julius Levin; S. M. Lewis, (now S. M. Lewis & Co.); Lincoln, Tifft & Co.; Albert Lorsch; Estate of George A. Mathewson; H. D. Merritt; J. B. Matthewson & Co.; Rachel Merrill, two-thirds of the interest of the firm of Merrill, Fitch & Allin; Miller Bros.; J. M. Morrow; Nordmann Bros.; E. Obermeyer & Bro., (now H. Obermeyer); Palmer & Capron; Geo. W. Platt, (now Jas. W. Todd); J. W. Pooler & Co., (Courvoisier, Wilcox & Co.); Geo. W. Pratt & Co.; J. W. Richardson & Co.; Stephen Richardson & Co.; E. Ira Richards & Co.; John A. Riley & Co.; P. E. Robinson; Saltzmann & Co.; Robert Schell & Co.; J. E. Spencer & Co.; J. T. Scott & Co.; Sillcocks & Cooley; Smith & Hedges, (now Wm. S. Hedges & Co., and Alfred H. Smith & Co.); Herman Sonntag; E. & D. H. Stites, (now E. Stites' Sons and D. H. Stites & Son); L. Strasburger & Co.; Geo. O. Street & Son; Sussfeld, Lorsch & Co., (now Sussfeld, Lorsch & Nordlinger); Vulcanite Jewelry Co.; A. Wallach & Co.; Wheeler, Parsons & Co., (now Wheeler, Parsons & Hayes); Whiting Mfg. Co., D. H. Wickham and Wood & Hughes.

The Trustees of the fund do not appear to regard that economy in their defence of the friendly suit which the President was led to expect by their promise to agree upon counsel in a merely technical defence, for the summons and complaint having been served upon them as co-defendants in the case, they have each employed separate counsel, the expenses of both of whom it is expected will be paid out of the fund. Several weeks time will now be required in compliance with the law which requires that subscribers who cannot be personally reached shall be advertised for. The case will probably reach court and referee early in the coming winter. That part of the fund which has been donated to the League is, however, ticking away at interest as well in the custody of the holders of it, as if it were in the treasury of the League, to whom it now belongs: it is only a question of time, caused by the Trustees declining to surrender the portion in question without litigation.

Gold Alloys.

FOR THE manufacture of gold ware, the gold is alloyed either with copper alone, and, commensurate with the proportion quantities of both metals, an alloy of more or less reddish color is the result; or else the copper is alloyed with silver, and a mixture of a paler shade is obtained thereby. In some cases, both copper and silver are employed for producing an alloy.

The three groups of gold alloys, upon the peculiar individual properties, of which we will treat at some future time, are much more compact than the pure gold, but soon become too hard by the mechanical working (hammering and rolling), and must repeatedly be annealed during the process of treating them, in order to restore the necessary degree of softness.

Although the present legal standard is that by which the percentage of fineness is expressed in decimals, (thousandths), it was formerly customary in the old world, to express the standard in "marks and grains," and we add the following, as it might, here and there, be of use, also for the sake of curiosity: 1 Cologenese mark=½ Colognese pound=24 karats, at 12 grains=288 grains=233.8555 grams.

The following was legal in Austria: ½ Vienna pound, at 24 karats =288 grains=280.644 grams.

Twenty and 18-karat gold consisted therefore of 20 or 18 weight parts gold, and 4 or 6 weight parts copper, or silver, or both.

The following table gives the proportion of grains and karats in thousandths:

Grains—	1000ths.	Grains—	1000ths.
1	3.47	7	24.31
2	6.95	8	27.78
3	10.42	9	31.25
4	13 98	10	34.73
5	17 36	11	38.19
6	20 84	12	41.67

Karats—	1000ths.	Karats—	1000ths.
1	41.667	13	541.667
2	83.334	14	583.333
3	125.001	15	624.555
4	166 667	16	666.667
5	208.333	17	707.333
6	250.000	18	750.000
7	291.666	19	791.666
8	333.333	20	833.333
9	374.999	21	874.999
10	416.667	22	916.666
11	458.630	23	958.333
12	500.000	24	1,000.000

COIN GOLD.

The "fine" percentage of gold coin has been established upon equal terms by "Coin Congresses" of the civilized countries, yet many coins, chiefly intended for commerce, are still in circulation, of different fineness; we annex the following table:

	1000ths fine.
German Empire gold coins, Australian 8-florin pieces, Italian, French, Belgian, Swiss, Spanish, Chinese	900
English sovereigns	916
Dutch ducats	982
Austrian "	986
Hungarian "	989

Coins alloyed with copper, in spite of their 10 per cent. of alloy, are nevertheless subject to strong wear, and it has been proposed to compose coin gold of gold, copper and zinc, as this alloy, owing to its superior hardness, resists wear and tear far better than that simply alloyed with copper; at present, however, only gold-copper alloy is employed.

GOLDSMITH'S GOLD.

For the purpose of the manufacture of gold ware, certain mixture proportions have been established by law in the different countries of Europe, in such a manner that gold articles must have a certain percentage fine, without further provision of the alloying metal to be employed. Articles of definite weight can only be sold after they have officially been stamped as to their fineness, and their quality is rendered visible to the purchaser. Articles of a small weight are exempted from such stamping. They differ greatly in the different countries, and we add the fineness:

		1000ths.
England		750
France, Belgium, Mailan, Venice,	Gold No. 1	920
	" " 2	840
	" " 3	750
Austria,	Gold No. 1	326
	" " 2	545
	" " 3	767

Gold ware (so-called by flattery), manufactured of a low standard, is very insignificant in appearance, and stands far behind many other alloys that contain no gold whatever; many European manufacturers cease at present to produce gold ware of a low standard; a city called Pforzheim (a German Providence) at one time stood in evil repute about its gold. Such manufacture has ceased, however, and according to the official report of the World's Fair of Vienna, the average of the gold ware exhibited was 562.5 thousandths, or equal to 13½ karats.

COLOR OF GOLD ALLOYS.

We have mentioned above that the color of the alloy depends from the admixed gold; it is tinged red by copper, and white by silver; by mixing these two, a color arises, sometimes whitish, at other, reddish, and produces a color very much liked—the "red gold," 583 thousandths fine=14 parts—silver 1 part, copper 9 parts.

The following is an exhibit of the composition of several alloys of different colors, and at present worked almost universally:

Gold, fine, percentage.	Gold.	Silver.	Copper.	Color.
583	14	6	4	yellow
583	14	3	7	redder
583	14	1	9	very red
666	16	4⅔	3⅓	yellow
666	16	1⅜	6⅜	red
750	18	3½	2½	yellow
750	18	2½	3½	red

For ordinary ornaments, generally made of pressed pieces, of very thin plate, an alloy is often employed called Nurnberg gold, and consisting of 89 copper, 5.5 gold, and 5.5 silver.

ORNAMENTAL GOLD ALLOYS.

The cadmium metal possesses the property of giving the gold a pronounced green color; an addition of steel gives a gold of grey, by certain mixture proportions, blue color; palladium gives a brown, so that by the employment of these alloys, the goldsmith is placed in the position of manufacturing gold ornaments without the use of enamels or other colorants, which are especially handsome, if an underlay of an entirely pure yellow or white color, pure gold or silver, is taken as a backing of the colored gold.

Many gold alloys are specially distinguished by certain properties, which make them suitable for certain purposes, which we will mention farther on.

GREEN GOLD ALLOYS.

	Gold.	Silver.	Copper.	Cadmium.
No. I	2.6	1	..	...
" II	75.0	16.6	..	8.4
" III	74.6	11.4	9.7	4.3
" IV	75.0	12.5	..	12.5

Alloy No. I is very pale green, with color little pronounced; No. II is stronger colored, while the color protrudes by the copper-containing alloy No. III, in a very peculiar manner; No. IV, on account of its high percentage of cadmium, is rather brittle, a circumstance to be remembered when working it. It also belongs to the easily combustible metals, a fact to be remembered when smelting. The most practical way is to first compose the mixture of the other metals—first fusing the gold, next silver, finally copper; now strew charcoal powder upon the fused mixture, and quickly add the cadmium; having stirred well with a wooden rod, the crucible is lifted from the fire, and somewhat cooled before being cast.

YELLOW ALLOYS.

	Gold.	Silver.	Copper.
No. I	1	2	..
" II	4	3	1
" III	14.7	7	6
" IV	14.7	9	4

Alloy I is pale yellow; Nos. II, III, and IV, are of a sated color, that is, high gold yellow.

RED ALLOYS.

	Gold.	Silver.	Copper.
No. I	3	1	1
" II	10	1	4
" III	1	..	1
" IV	1	..	2

Nos. I and II are pale red, inclining into rose red; III and IV, high red.

BLUE, GREY AND BROWN ALLOYS.

	Gold.	Silver.	Copper.	Steel.	Palladium.
No. I	1—3	..	..	1	..
" II	30	3	..	2	..
" III	4	..	..	1	..
" IV	29	11	..	..	..
" V	18	11	1.3	..	6

Alloy No. I shows a perceptible blue color; Nos. II, III, IV, are bluish grey to pure grey; No. V is brownish red, and very solid; as this alloy only causes little friction, and does not oxidize, it is frequently employed for bushing pivot holes in watches, in place of perforated jewels.

PEN GOLD.

Gold of 666.6 thousandths fine (16-karat), in proportion of 16 gold, 2⅔ silver, 5⅓ copper; or, 16 gold, 2 silver, 6 copper, alloyed, gives a very elastic mixture—pen or spring gold—rolled into thin plates, and hammered for the production of small springs. The alloys of gold with the above-stated metals are the most current ones, although several others are used for technical purposes, unnecessary to mention here.

ALLOYS WITH OTHER METALS.

With the exception of the gold alloys, to be described below, and used for soldering, and gold amalgam, there are others which are entirely useless for the goldsmith; since we have made it our task, however, to treat at length of its alloys, we hastily mention them: Eleven parts gold and 1 part bismuth is of a green color, but so brittle it cannot be worked. Alloys of gold and antimony are white, extraordinarily vitreous and fractious; gold containing $\frac{1}{2000}$ of antimony loses its ductility; lead, of itself, is a very ductile metal, but operates like antimony; an alloy of 11 parts gold and 1 part lead is pale yellow, fine grained, and glass hard. An alloy of 11 parts gold and 1 part tin is of pale green color, and also very brittle.

Gold-iron alloys are distinguished by their great solidity, ductility and hardness; its colors vary according to the different quantity proportions. An alloy of equal parts gold and iron is grey; of 11 parts gold and 1 part iron, yellowish grey; one of 1 part gold and 4 parts iron, of a silver white color.

Zinc-copper-gold alloys are distinguished by their handsome color and greater solidity than copper-gold alloys by themselves, also more vitreous, and easily cracks by hammering or rolling. Such alloys are specially recommended as alloys.

The so-called shakdo of Japanese ware barely deserves the name of gold, consisting of 90 parts copper and 10 parts gold. The shakdo goods are of a black blue color, which is imparted to the article by boiling it in a solution of sulphate of copper, verdigris, and alum.

An alloy produced by fusing together 90 to 100 parts copper, 5 to 7.5 aluminum, and 2.5 gold, cannot, by its color, be distinguished from gold, and this alloy would be excellent for the manufacture of imitation gold articles to be galvanically gilt.

GOLD SOLDERS.

For soldering gold ware, either the ordinary gold alloys, of a lower fusing point than the article requiring to be soldered, are used, or the fusing point is lowered by an addition of zinc. In order to have the place soldered as little visible as possible, solder must be used agreeing as much as possible with the article to be soldered. If gold articles are to be soldered that are intended to be enameled afterward, no easily-flowing solder must be used, since the articles have to be strongly heated for the process, and easily-flowing solder would fuse too quickly. A special solder, the so-called enamel solder, that is sufficiently hard-fusible, must be used to withstand the heat. The following gold solders are intended for the different standards, with which they agree in color as closely as possible.

	Gold of thsndths.	Gold.	Thsndths.	Silver.	Copper.	Zinc.
Hard solder	750	9	(750)	2	1	..
Soft "	750	12	(750)	7	3	..
Solder	583	3	(583)	2	1	..
"	583	2	(583)	½	½	..
" less than	583	1	(1,000)	2	1	..
" "	583	1	(1,000)	2	..	..
" "	583	1	(1,000)	..	2	..
" easily flowing	...	11.94	(1,000)	54.74	28.17	5.01
" " for yellow gold		10	(583)	5	..	1

GOLD AMALGAM.

The alloys of the metals with mercury are called amalgams, which is of special importance for purposes of fire gilding. Its production, on account of being very poisonous, must take place in all cases in a draught furnace, and the following is the process: The gold to be amalgamated is reduced to a state of thin sheet or wire, cut into small pieces, and placed into a crucible set in the furnace. When the gold has arrived at a feeble glow heat, a second crucible is placed into the furnace, containing 8 times by weight of mercury, of gold employed. As soon as the mercury begins to boil, the gold is quickly thrown in and rapidly stirred with an iron rod, in order to promote the solution of the gold. When this is dissolved, the crucible is withdrawn from the fire, and its contents poured into cold water, to prevent a crystalization by a speedy cooling. The amalgam, containing an excess of mercury, is placed into a buskin bag, and strongly pressed, whereby the mercury exudes through its pores. The freed mercury always contains a certain proportion of gold, and is stored for future use. The amalgam produced in this manner, if correctly prepared, represents a pale yellow mass, of the consistency of butter, and generally contains 33 parts gold and 67 parts mercury.

Celebrated Horologists.

ADOLPH LANGE, OF GLASSHUTTE.

INCITED by the flourishing of the organization of the watch industry among a mountain population like that of the Jura, Switzerland, and the Black Forest, whose inhabitants had formerly lived in woe and misery, and by their new vocation were raising themselves to a comparative state of prosperity, the governments of Prussia and Saxony contemplated making a similar trial with the poor population of the mountainous districts of Silesia and the Lausitz. These districts were exclusively inhabited by the poorest weavers, among whom the well-named "weaver's misery" was at home, and appeared to be indestructible; sometimes, as in the years of forty, their need and misery became so great that they cried aloud for succor, that they implored heaven-born charity of kindly-disposed fellow men in more blessed situations in life, for mercy and alleviation of their over-great misery.

At that time, in 1845, a man submitted a definite plan to the Saxonian government, specifying in what manner the foundation of such a watch industry for the suppression of woe and starvation in the "Erz Gebirge," might be conducted to a successful issue. As stated, the idea had been favorably entertained before by the Governments, but the right man was wanting for the undertaking. He must not alone be a good watchmaker, but also be endowed with the talent of teacher and organizer; he must understand how to deal with a people like that of these districts, which, by prolonged misery and woe, had become distrustful, bodily enfeebled, mentally withered, and dull of apprehension; he must understand how to infuse new hopes, confidence and activity.

Such a man had apparently offered himself, and everything promised that he would discharge these onerous functions. His name was Adolph Lange, born in Dresden in 1815, the son of a gunsmith. His childhood had been unhappy, owing to the unfriendly relations of his paternal home; poverty had limited the field of his education, and when he entered his instructor's shop, only then the talents with which nature had gifted him, began to develop. The boy quickly collected his capacities; he saw a destiny before himself, and retained it in his eye. Applied mechanics contains a subtle, occult spirit that causes many a man to devote himself to its study, in order to lure him into phantasmagorial longing, to waste himself in infruitious nothings. Not so with Lange; he was practical; his nature demanded definite metes and bounds—it required the practical fruits of mental exertions. He suppressed the proclivities of visionary phantasy, and steeled his inclinations while learning—not alone his occupation of watchmaker, but also those sciences by the aid of which he might befit himself for higher performances.

He went to Paris, after serving his time. It is unnecessary to follow him step by step, since it is less our purpose to write an every-day biography, than to show what a man *can* do. After acquiring all the branches of higher horology—chronometry, astronomical clocks, etc.—he returned to Dresden, and married his former instructor's daughter. He soon became famed as one of the first watchmakers of the day, and obtained orders far and near.

Such was the man who had proposed himself to the Governments for the undertaking. Most honorably had he shown his capacity, and his character, his life, his energy, offered safe guarantees that he would be the man for conducting the undertaking to a successful issue, and breathe the breath of life into the plan. He proposed to manufacture only good watches, and the very first step would be a horological school, in which to educate the suitable forces that should furnish the first skilled heads and hands.

Assisted by the Government, Lange erected this school at Glasshütte, until then, one of the most impoverished towns in the Saxonian Erz Gebirge, toward the end of the year 1845. He himself became its teacher. But it was not so easy to find a few smart, intelligent boys in the place that were willing to become his pupils, or whose parents were willing to acquiesce. They deemed that beside weaving and straw plaiting, such as had been pursued since ages bygone, nothing could be remunerative. With incredulity they listened to the representation of the, to them, stranger, who endeavored to explain to them the future prospects of such an industry in their remote valley. Ignorance is enemical to all innovation; accustomed misery resists every endeavor to alleviate it.

Finally, Lange succeeded in collecting a few dozens of sickly and weakly boys in a small house, in which he had established his school and shop. They had to learn the making of the parts of a watch movement from A to Z, to put them together, and to regulate the ready movement. Much patience was necessary, but Lange possessed it, and not all the many difficulties could cool his ardor, with which he had gone to work and pursued his plan. It did not require years before the first watches were sent from Glasshütte, of excellent, fine workmanship, constructed according to the latest scientific principles, and, above all, manufactured by those ignorant, sickly boys, his first pupils. It may rightfully be said that they became the fathers of the watch manufacture of Glasshütte—men who gradually convalesced both in body and soul, who acquired self-knowledge, executed their work with ambition, and were enabled to support their wives and children with honor, while several established in busines for themselves.

But the beneficent influence of the humane watchmaker from Dresden, in years, became more and more visible in the town and vicinity of the Saxonian Erz Gebirge. His first pupils became teachers for other children when the factory manufacture was undertaken. Lange procured machinery and perfected tools; he obtained both the best and most perfect for his workshops, and invented and constructed others himself. Five years after the establishment of the factory, a fly wheel turned the finest parts of a watch, its pivots, pinions, etc. He was the first to construct the depthing theoretically correct, simple, and without show of artifice. The good fame of these watches has maintained itself to this day. In 1879, there were 160 people in Glasshütte that lived from this industry, occupying journeymen and apprentices. Of course, the main business, on a far larger scale, has remained in the hands of Lange & Sons.

The man who produced all this work, was permitted to witness its growth and flourishing for thirty years. He died December 5, 1875, heartily mourned by the entire town. The government of Saxony, which always watched his endeavors with pleasure, honored his memory by establishing the well-known horological school at the place, which had been the great desire of his life.

When we see the rapidity and correctness to-day, by aid of divided labor, to make a watch, the perfection of which once the deepest study and the most painstaking artistic skill were not able to produce, the thinking mind will at once perceive the extraordinary technical development, and the assistance human labor has received at the hand of science. The watch is also an indicator of the science of our times. Its perfections, as it were, shows the progress of work, and also expresses its increase in value. Time, once so cheap, has become of much value. And as the hands of a clock, indispensable to-day in every house, accomplish their course in a mysterious manner, thus also courses civilized humanity, from progress to progress, higher and higher, to the ideal which draws it onward, upward.

Gold.

AN ELEMENTARY body, the most beautiful and the most valuable of all the ordinary metals. In the unalloyed state it has a pure yellow color, and when reduced to extremely thin leaves, appears green by transmitted light. It is the most malleable and ductile of all the metals, but its tenacity is low.

Gold resembles platinum, silver, iron, etc., in being capable of welding, that is to say, two pieces of the metal can be united without previous fusion. Indeed, by the application of great pressure it can be made to weld when cold.

It is insoluble except in aqua regia (a mixture of 1 part nitric acid and 4 parts hydrochloric acid), alcaline persulphides and selenic acid. Chlorine, phosphorus, and a few other substances can be made to combine with it by the aid of heat.

It is as preservative, that is applied in layers termed "gilding," that gold is principally used in watchwork. Owing to its softness the metal is not used in a pure state, but usually alloyed with copper. The principal alloys in use in this country are:—

22 parts (karats) gold, 2 parts (karats) copper, for coin, wedding rings.

18 parts gold, 6 parts copper, for high classed jewelry, watch-cases.

15 parts gold, 9 parts copper, for ordinary jewelry.

12 parts gold, 12 parts copper; and 9 parts gold, 15 parts copper, for common jewelry.

Alloys of gold with silver and copper have been employed in making watch wheels; they wear well and will take a beautiful polish, which is maintained for a longer time than in the case of brass wheels.

Chronometer balance-springs and the suspension-springs for astronomical clocks have also been made of gold-copper or gold-silver alloys rolled and hardened. If carefully prepared, they maintain their elasticity unimpaired for a long period, and there is no liability to rust.

The dilatation for a given change of temperature is, however, greater than that of steel, so that a greater compensating effect becomes necessary, but this inconvenience is partially compensated for by its inoxidizability and the fact that it is not liable to become magnetic.

Hardening and Tempering Steel Tools, etc.

(*Continued from Page* 210.)

TEMPERING.

HARDENED steel is extremely fragile, but its tenacity may be restored by *tempering*, that is to say, by heating it to a degree dependent on the amount by which its original softness has to be restored. The color of the metallic surface will gradually change as the temperature rises, each tint corresponding approximately to the degree of heat given in the following table (Stodart):—

1.	Very pale straw yellow.	220°C. (430°F.)	Tools for metal.
2.	A shade darker yellow..	235°C. (450°F.)	
3.	Darker straw yellow. ..	245°C. (470°F.)	Tools for wood and screw taps, etc.
4.	Still darker straw yellow	255°C. (490°F.)	
5.	Brown yellow.........	260°C. (500°F.)	Hatchets, chipping chisels, and other percussive tools, saws, etc.
6.	Yellow, tinged slightly with purple....	270°C. (520°F.)	
7.	Light purple..........	275°C. (530°F.)	
8.	Dark purple...........	290°C. (550°F.)	Springs.
9.	Dark blue............	300°C. (570°F.)	
10.	Paler blue............	310°C. (590°F.)	Too soft for the above purposes.
11.	Still paler blue........	320°C. (610°F.)	
12.	Still paler blue, with tinge of green...........	335°C. (630°F.)	

It will facilitate the precise determination of these points if it be remembered that—

An alloy of 1 part lead and 1 part tin (by weight)	melts at	196°C. (385°F.)
Metallic tin " "	"	230°C. (446°F.)
An alloy of 2 parts lead and 1 part tin	"	240°C. (465°F.)
Metallic bismuth " "	"	270°C. (520°F.)
An alloy of 5 parts lead and 1 part tin	"	290°C. (550°F.)
Metallic cadmium " "	"	310°C. (590°F.)
Metallic lead " "	"	320°C. (608°F.)

Before proceeding to temper an object, at least one of its faces must be smoothed with pumice stone, oilstone dust, or emery paper, and the surface must be left perfectly clean, care being taken to avoid contact with the fingers, as otherwise it will be difficult to ensure the requisite tint being obtained.

Tempered to any shade between Nos. 1 and 6 the steel will, if previously well hardened, be left too hard to be worked by a file or graver; heated beyond No. 10, it can no longer be much bent without distortion.

When the quality and the degree ofhardness of steel differ, the temper corresponding to a given tint will also vary. As a rule, hardened cast steel, tempered to No. 8, will be found as soft as natural steel, which has been let down to No. 9, or even to No. 10.

A piece of steel can be let down to the same tint several times in succession without altering its properties.

If a good and uniform color is desired, the steel must be highly polished, as the oxidation of rough parts will render the tint irregular. The rouge employed must not be too dry, and, if the burnisher is used, care should be taken that it acts on the entire surface. Metal of a bad quality, which will not take an even polish, can rarely be nicely blued.

When the object is finely *smoothed* with a uniform white surface, very good results may be obtained; but in such cases the cleaning must be carefully conducted, as the presence of minute greasy particles will always render the color irregular, and may even entirely prevent its appearance.

A uniform color can only be obtained by heating the object in such a manner that its temperature is raised evenly throughout.

The tempering may be performed by placing an object on the *blueing tray*, a thin metallic plate often covered with a thick layer of fine brass filings, which should be renewed for each operation; or on a thick piece of metal previously heated to a sufficient degree; on an ignited peat covered with a layer of white ash; in a bath of molten metal, the temperature of which corresponds to the requisite degree of heat, or the object may be laid on the surface of such a bath, etc. Some watchmakers when letting down a piece of steel immerse it in water to check the action; but by so doing they produce an exactly contrary effect. If a piece of steel be cooled suddenly in water as soon as it assumes any given color it will be *softer* than if left to cool in the open air.

At one of the blue tints steel possesses its *maximum elasticity*. The exact shade varies with the different qualities of steel.

If a hardened and tempered spring has lost its initial elasticity, this may be restored or even improved upon by gently hammer-hardening, and after whitening with emery, again tempering to the proper blue tint.

A very convenient way for tempering a number of small articles at a time, heating them with absolute uniformity, is to place them in a small vessel with sufficient tallow or cold oil to cover them; the whole is then heated to the requisite degree, which may be determined by a thermometer or by observing the smoke. When smoke is first seen to rise, the temper corresponds to No. 2 in the table. Smoke more abundant and darker corresponds to No. 5. Black smoke still thicker, No. 7. Oil or tallow takes fire with lighted paper presented to it, No. 9. After this the oil takes fire of itself and continues to burn. If the whole of the oil is allowed to burn away, the lowest temper in the table is reached.

It is often convenient to simply smear an article with oil or tallow, and hold it over a flame or piece of hot iron. The temper can then be judged in the manner thus explained.

With a view to combine the two operations of hardening and tempering, M. Caron suggested that the temperature of the water used for hardening be heated to a pre-determined degree. Thus the requisite temper may be given to gun-lock springs by heating the water in which they are harnened to 55° C. (130° F.).

TO WHITEN AND BLUE STEEL.

Some makers of watch hands and balance-springs, when they are not satisfied with the color assumed by an object in tempering, immerse it in an acid bath, which whitens it, after which the blueing operation is repeated.

We have seen watchmakers whiten small pieces of steel with a piece of pith moistened with dilute sulphuric acid, but the method cannot be recommended.

Others fix fine steel work, a watch hand for example, with wax on a plate, and whiten it by means of pith and polishing rouge, or a small stiff brush charged with the same material. It is then detached by heating, and cleaned in hot alcohol.

These methods, if judiciously employed, are of great service, but it is important to remember always to thoroughly wash after the use of acid, and then to allow the object to remain for a few minutes in alcohol.

Sulphuric acid does not whiten well. It often leaves dark shades on the surface. Hydrochloric acid gives better results.

To blue steel uniformly.—In order to secure a uniform color in tempering or blueing, it is essential that the smoothing and polishing should have been very evenly done. The surface must be perfectly clean, for otherwise parts that are greasy, or on which the rouge has remained too long, or has been too dry, will not exhibit the same tint as the rest. The heat must be uniformly distributed. This is why, when blueing screws in a perforated blueing pan, it is customary to lightly strike the handle, for the vibration and the perpetual change in the contacts ensures their receiving the heat more evenly. A similar purpose is served by placing the pieces in brass filings. Steel must not be tempered while only in contact with bodies that are bad conductors of heat, stone, either in powder or block, for example; because, as we have already observed, the distribution of heat would occur unevenly throughout the metal.

Watchmakers secure a uniform tint more easily by using an iron or copper polisher than one of any other metal.

To blue small steel pieces evenly.—If the foregoing precautions are carefully observed, the following methods will give satisfactory results:—

First blue the object without any special regard to uniformity of color. If it proves to be imperfect, take a piece of dead wood that does not crumble too easily, or of clean pith, and whiten the surface with rouge without letting it be too dry. Small pieces thus prepared, if cleaned and blued with care, will assume a very uniform tint.

A clever mechanic assures us that he easily obtains a similar result by rubbing the surface, after it has been well smoothed, with the end of a stick that has been partly burnt in the fire.

To blue a clock hand or a spring.—To blue a piece of steel that is of some length, a clock hand for example, clockmakers place it either on an ignited peat, with a hole in the center for the socket, and white over its surface, as this indicates a degree of heat that is approximately uniform, or on a curved blueing tray perforated with holes large enough to admit the socket. The center will become violet or blue sooner than the rest, and as soon as it assumes the requisite tint, the hand must be removed, holding it with a tweezers by the socket, or by the aid of a large-sized arbor passed through it; the lower side of the hand is then placed on the edge of the peat or blueing tray, and removed by gradually sliding it off towards the point, more or less slowly according to the progress made with the coloring; with a little practice, the workman will soon be enabled to secure a uniform blue throughout the length, and even, if necessary, to retouch parts that have not assumed a sufficiently deep tint.

Instead of a blueing tray, a small mass of iron, with a slightly rounded surface and heated to a suitable temperature, can be employed; but the color must not form too rapidly, and this is liable to occur if the temperature of the mass is excessive. Nor should this temperature be unevenly distributed.

A spring after being whitened can be blued in the same way. Having fixed one end, it is stretched by a weight attached to the other end, and the hot iron is then passed along it at such a speed that a uniform color is secured. Of course the hot iron might be fixed and the spring passed over it. A lamp may be used, but its employment involves more attention and dexterity.

Blueing as an indication of temper.—When the color assumed by a piece of steel does not require to be preserved, and it is only necessary to temper the object at a certain temperature, the means best adapted to expedite the operation will naturally be sought. Thus in factories, large numbers are tempered at once in a bath of tallow, oil, etc. The workman, in judging temper by color, as before stated, must have enough experience to enable him to determine, for a given sample of steel, what are the successive colors as well as the temperature of the bath, etc. His success is certain; but it depends on the experience, and, therefore, on the sense of sight of the operator, and, we should again add, on the knowledge he possesses of the qualities of the steel he is using.

Concluded.

Gilding.

Cold gilding without the aid of mercury.—Prepare the gold in fine powder, as explained in the following paragraph, or procure it from the dealers in chemical products, who manufacture it of various tints. Make a mixture of this powder with pure rock salt and cream of tartar (bitartrate of potash), pulverized in the same manner as described in speaking of silver-plating, and take the same precautions in its application.

The gold surface will present a dull appearance; acid cannot be used to improve its color when operating, for example, on a wheel with attached pinion, but the same result may be attained by a very simple method. Rub the object after plating with cream of tartar, mixed with a large proportion of water; then immediately wash in an abundance of warm water at not less than 40° C. (104° F.); soap it thoroughly so as to neutralize any acid that may remain, and finally pass through alcohol to dissolve any remaining soap.

The surface will be still further improved by rubbing with a very hard piece of pith, such as is occasionally met with.

Mr. Robert, in describing the above method, adds:—"In this manner I have gilded cocks, domes, compensation balance-weights, and even their brass rims. When skilfully and expeditiously performed, the pinion need not be discolored; but, if it is at any time slightly marked, it may be restored by at once rubbing the surface with a soft stick and fine rouge."

Preparation of the gold powder.—As already observed, this can be obtained of any desired color from the dealers in chemical products, but the following method is given for the benefit of any one who desires to prepare it for himself:—

Place some gold in thin leaves in a dish, and add a little honey, thoroughly intermixing the two by the aid of a glass rod flattened at one end; then place the paste so obtained in a glass of water containing a little alcohol, washing it and allowing the powder to settle. Decant the liquid and again wash the residue, repeating the operation until a fine brilliant powder is obtained. This powder is mixed as required with rock salt and powdered cream of tartar in the manner already described.

Second method.—Dissolve one part by weight (say about 10 grains) of pure gold, rolled very thin, in aqua regia contained in a porcelain dish, which may be gently heated on a sand-bath, and evaporate the acid until it assumes a blood-red color. Add about 30 parts, by weight, of warm distilled water, in which 4 parts of crystallized cyanide of potassium have been previously dissolved; thoroughly stir the mixture with a glass rod, and filter it through a glass funnel.

Third method.—Roseleur recommends the following solution for gilding by simple immersion. Distilled water, 17 pints; pyrophosphate of soda (in crystals), 28 ounces; hydrocyanic acid, $\frac{1}{3}$ ounce; crystallized perchloride of gold, $\frac{2}{3}$ ounce. The hydrophosphate is added, in small quantities at a time, to 16 pints of water, in a porcelain vessel, stirring with a glass rod and applying gentle heat; then filter and cool. The gold salt is dissolved in a small amount of water, filter and add to the cold solution of pyrophosphate; lastly, add the hydrocyanic acid and the solution, heated to the boiling point, is ready for use.

The articles to be dipped must be thoroughly cleansed and passed through a very dilute solution of nitrate of binoxide of mercury: they must be constantly agitated while in the bath and the best coating is obtained by dipping the articles in a nearly exhausted solution of the same kind immediately after the mercury solution.

Electro gilding.—But the method most usually adopted is that in which a battery is employed. It is, however, impossible, within the limits of this work, to explain the precautions that are necessary in conducting the process, managing the battery, etc., and the reader must be referred to works on electro-metallurgy* for these details.

To prepare the pieces to be plated.—After the surface has been stoned, boil the object for a few minutes in a solution of soda or potash, and rinse in clean water.

Roseleur, in the articles already referred to, gives very full instructions, of which the following is an outline. The reader who desires to obtain more complete information can consult the works mentioned below.

Attach the pieces to a cork and brush with a clean brush charged with water and pumice-stone powder and thoroughly rinse. Place them in a solution consisting of: water $2\frac{1}{4}$ gal., nitrate of binoxide of mercury, $\frac{1}{14}$ oz.; sulphuric acid, $\frac{1}{4}$ oz. Then rinse again.

Graining.—Mix thoroughly, with the application of a moderate heat, silver powder, 1 ounce; pure common salt, finely powdered, 13 ounces; cream of tartar, 4 to 5 ounces. Make a thin paste of this mixture with water and spread with a spatula on the pieces: having mounted them on a cork to which a rotatory motion is given, rub them

* Gore: "The art of electro-metallurgy" (Longmans); A. Walls: "Electro-metallurgy practically considered" (Crosby, Lockwood and Co.); J. Napier: "Electro-metallurgy;" Roseleur: "Practical instructions to Electroplaters, etc.," in Vols. VI. and VII. of *The Watchmaker, Jeweler and Silversmith.*

in all directions with a brush with close bristles, adding fresh paste from time to time. When the desired grain is obtained, wash and scratch-brush with revolving wire brushes. Three of these are often usedof varying degrees of hardness and a decoction of liquorice, weak size or stale beer is liberally applied to the surface.

Resist.—This is a composition for covering steel parts in order to protect them from the action of the acids, etc., in the various processes of cleaning, graining and gilding. It consists of yellow wax, 2 ounces; clear resin, 3⅓ ounces; very fine red sealing-wax, 1½ ounces; finest rouge, 1 ounce. Melt the resin and sealing-wax in a porcelain dish, the add the yellow wax, and, when the whole is thoroughly liquid, gradually add the rouge, stirring with a glass rod. The parts to be coated are slightly heated and covered with the mixture.

To remove the resist after the gilding process is completed place the pieces in warm oil or turpentine, then in a very hot soapy or alkaline solution and lastly in fresh water.

When prepared as above explained the object may be gilt by one of the preceding methods: of course a hot solution cannot be resorted to when the resist has been applied.

To clean objects that are of gold or gilt.—The following method is equally applicable to pieces that are gilt, such as cocks, domes, etc., the frames and parts of time-pieces and to either gold or gilt jewelry.

To about a tumbler of water add 20 drops of strong ammonia. Immerse the object several times in this mixture and brush it with a soft brush; as soon as the operation appears to be completed (which experience will soon enable the workman to ascertain), wash in pure water, then in alcohol, and dry with a fine linen rag. The original brilliancy of the gilding will then be restored.

When the coating is thin and has been galvanically deposited only very soft brushes must be used.

Gilders instead of dipping in alcohol and drying with a linen rag usually immerse the pieces in fine wood sawdust, leaving them long enough to become thoroughly dry; after this treatment they merely require to be shaken and lightly rubbed with a fine brush.

The sawdust must be perfectly dry; indeed it is a good plan to slightly warm it by placing the wooden box containing it for a few minutes on a hot oven or stove in the winter and exposing it to a hot sun in the summer.

Instead of ammonia, alum is sometimes boiled in water and the objects dipped two or three times in this solution, subsequently brushing as in the previous case.

To restore the dead surface of gold or gilt objects.—Place them for two or three minutes in chlorine water, rinse in clean water, soap them and finally dry in sawdust. It is advisable that parts that are polished be prevented from actual contact with the liquid as it would produce a somewhat deadened surface.

To clean gold jewelry after soldering.—Particles of binding wire are often left adhering to the surface of jewelry after soldering, and, on dipping the object into the dipping liquid, a layer of oxide may be formed. This can be removed without detriment to the polished surfaces by plunging the object for a few seconds in nitric acid.

ACIDS AND SALTS.

The watchmaker has occasion to employ a few acids and salts. He should never forget the advice already given to keep them away from his work-bench, and always to well wash a piece of metal that has been in contact with them.

Acids.—Nitric acid, either in a concentrated or dilute form, will dissolve iron, steel, copper, lead, silver, zinc, brass, nickel, mercury, German silver. It does not dissolve tin, but reduces it to a white powder, known as metastannic acid. Hence if an attempt be made to dissolve bronze, which contains tin, this metal is deposited, and the copper and zinc pass into solution.

Sulphuric acid will dissolve iron, steel, copper, tin, silver, zinc, brass, nickel, mercury, German silver.

Hydrochloric acid will dissolve iron, steel, copper (slowly), tin (slowly), zinc, brass (slowly), nickel, German silver (slowly).

Aqua regia, a mixture of about 2 parts hydrochloric and 1 part nitric acid will dissolve all the above named metals, and in addition, gold and platinum, although, separately, neither acid will attack these metals.

Hydrofluoric acid attacks and dissolves all metals except platinum, lead, and silver with violent effervescence. It is also used for etching on glass or enamel. It is usually preserved in gutta-percha bottles, and is of such a dangerous nature that no use should be made of it without a good knowledge of its properties.

Acids are rarely employed pure by watchmakers; they are diluted with water. Nitric acid of commerce has a density of about 1.4 (38° on Baumé's hydrometer). If this density is reduced by the addition of water, to 1.16 (20° Baumé), we obtain the acid most commonly employed. For cleaning metallic surfaces prior to soldering, etc.; for giving a grained surface to brass, and for whitening blue steel, special proportions are found most convenient which the reader can best determine experimentally for himself, remembering that the action of the acid should neither be too quick nor too slow. When once he has ascertained the best proportion, he can always recover it by the aid of the hydrometer.

Salts.—Borax serves as a flux in soldering gold, silver, platinum, etc.; also for the same purpose in brazing; it is met with in crystals or as a powder.

Sal-ammoniac (also called *chloride of ammonium*) is used for soldering tin, either as a powder or made into a paste, with sweet oil, or with water, or mixed with resin.

Alum dissolved in water may occasionally be used in place of nitric acid for cleaning surfaces that have been soldered; it attacks iron and steel more energetically than copper, zinc, or brass. This fact is often taken advantage of for removing broken screws, etc.; from brass plates. All other steel parts are removed and the plate placed in a solution of alum, when the steel screw is gradually eaten away by being converted into rust.

In 100 parts of cold water only 9 parts of alum will dissolve, but if the water be boiled it will take up 75 parts. Its action will then be proportionately more energetic when boiling.

A Simple Barometer.

A CORRESPONDENT of *The English Mechanic* thus describes a simple barometer: Take a glass tube about 7 in. long, and about ⅔ in. internal diameter, and draw out one end before the blowpipe to a point, leaving a very small orifice, about $\frac{1}{100}$ to $\frac{1}{80}$ of an inch diameter. This end of the tube should not be quite sharp, but somewhat rounded. A cork is prepared to fit tightly the wide end of the tube, and if the cork is made of cork, its sides and upper ends should be greased or coated with parafine, the lower end being left uncoated. A rubber cork would answer better. The tube should now be about half filled with distilled water, although the exact height is of no consequence, and the cork firmly inserted. The tube should be suspended with the point downward near the window, and it should never be shaken. When the barometric pressure is low, indicating rain, a drop of water will appear at the orifice, and hang to the lower end of the tube. When the barometric pressure rises, the drop will disappear, and a bubble of air may sometimes be seen in the act of entering by the narrow opening. If more than one drop is extruded, of course they will fall, but one drop will always remain suspended.

I have had a tube of this description hanging in my laboratory, says the writer, for two years, and I find its indications for rain and dry weather most unerring. The only error arises from extremely sudden rise of temperature, which will sometimes force a drop of water out by expansion, although the barometric pressure is high; but in that case the drop soon dries up; in the other case it hangs persistently, and will in many instances indicate the approach of rain thirty hours before the appearance of the storm. Before rain the drop does not dry up, because then the atmosphere is saturated with moisture. The sensitiveness of this weather-glass depends upon the difference of tension between the surrounding atmosphere, and the air within the tube, the latter expanding or contracting according as the barometric pressure is low or high.

Repairing Stem-Winding Watches.

BY HERMANN GROSCH.

WHEN the plate has been placed into the case and the case screws drawn on, the first thing to be inspected is whether the winding arbor, upon which sits the button, and, within the watch, the pinion and maintaining power moves entirely free. The holes do not concur with each other, at times, or the staff is drawn aside by the small bridge, within which the inner pivot moves, and thereby cramped in its free motion. This may be produced by various causes: the case button is sometimes forced to one side either by the closing of the dust cap, or outer cover, or bezel, or the holes are not truly placed one above the other, or the hole in the little bridge is too high, too low, oblique, or drilled to one side. In the first case, the closing of the case must be made entirely free, and the repairer has to be certain that the stronger places of the case cannot press upon the case button; if he noticed that the latter is not correct, he may relieve it by a strong but careful pressure upon the closed case, with the dust cap in place, in order to support the rim.

Naturally, this operation can succeed only toward the side of the cover; it would be useless in the direction of the case rim. If not successful with this remedy, and the fault exists toward the side, it becomes necessary to chamfer the hole somewhat from within outward toward the offending side, until the arbor is in its correct position, and free. It is of no consequence, even if the hole is a little wider in one place, it may be left to fit at the upper part. Should the deviation be of any magnitude, and decidedly caused by the hole in the small bridge, a new one would have to be made; but if, in spite of an apparently correct concurrence of the holes, the arbor is not freed, then the hole in the bridge is most probably oblique, its direction does not concur with that of the arbor, and it will have to be assisted from behind with a sharp, specially-ground chamfer, to make it free; the rubbing pivots of the arbor must be well polished.

The crown wheel, as well as the ratchet of the barrel arbor, must move entirely free. Care has to be taken that none of them rub with its entire surface upon the brass, and small flat countersinks are turned in for this purpose, with only a raise at the ho'e, and about the center of the wheel, upon which the friction takes place.

One thing may occasion difficulties at times—when the pinion depthing into the crown wheel is too deep or shallow; if too deep, the fault is easily corrected; it often suffices to countersink the bridge of the crown wheel at this place; in order not to change its position to the ratchet, an underlay, say of a piece of paper, is made, so that the graver attacks the place opposite to the depthing a little more freely; although the wheel will assume a slightly oblique position to the bridge, yet it is barely perceptible if a medium is not exceeded. Should the pinion leaves have too long a rounding, for no purpose, and touch the bottom of the crown wheel teeth, they may be shortened.

If it becomes necessary to set the depthing deeper, the matter becomes somewhat more difficult, even impossible at times, without making a new and stronger pinion. A repairer who has not the means at his command to make a new pinion, and who is compelled to place a shallow depthing deeper, may try first whether it is possible to displace the movement in the case; if the arbor is fitted into the button hole, ends are easily obtained; it becomes more difficult, however, when it is fitted to the plate. In order to place the depthing lower, seek to move the entire movement a little toward the dial plate side, either by raising the rim upon which the plate rests, if it can be done without damaging the case, or by soldering several small thin strips upon this rim, upon which the plate may lay; it suffices sometimes, to place two pieces in the vicinity of the case button; if not enough, a little may be added all around, so as not to give the movement a noticeable oblique position. If the repairer does not wish to solder anything to the case, four or five holes may be drilled into the circumference of the plate, immediately under the rim upon which it lays, into which pins are fitted; they are filed down as far as is deemed to be sufficient to raise the plate. In case of need, also two flat-headed screws might serve; they are fitted in from the dial plate side into the plate, and their heads would serve as points of support for the case rim, near the rim in the vicinity of the button. It is only necessary to screw them in more or less deep, to alter the depthing. Difficulties might be encountered by raising the plate, when pressing the bezel upon the dial plate, it might refuse to close, but a remedy is easily applied by grinding down the circumference of the dial plate with an emery buffstick, or removing a little from the interior of the bezel.

Above specified corrections, however, are only in case the depthing is not too shallow; it is well to thoroughly satisfy yourself first if such a correction is likely to be successful, in order not to run into the contrary danger of provoking additional difficulties. If the winding arbor is entirely fastened to the plate, no other remedy will remain but to make a new pinion if the crown wheel cannot be taken down.

If it is possible to place the crown wheel deeper, be it either for the purpose of making the depthing deeper, or for any other cause, first compare its face position to the ratchet, if still sufficient shake remains between the crown wheel on the one side, and the barrel arbor and center wheel on the other hand. If all this is very scant, the lower side of the bridge may be filed level, but very carefully, so that the crown wheel comes to stand a little lower toward the pinion side, without altering its position to the other parts.

Other defects to be removed will be quite frequently found, and a stroke with the file, given with care and skill, will, at times, effect wonders. For instance, the smoothing of the tooth corners of the crown wheel, that was left as it came from the factory. We would pressingly advise the repairer to seek and master the principles of depthing.

The wheel for regulating the hands, as well as the minute work, must be carefully inspected, to find possible impingements and frictions of an injurious nature; the parts of the maintaining power must move completely free, and the spring that acts within the notch of the small hand setting wheel, upon the arbor, must in no respect be pinched, the spring itself not touch the plate, and the lower springing part is to be nicely rounded; nor must its outer end reach down to the bottom of the notch, whereby the necessary liberty would be taken from the wheel. This wheel is apt to rub against the bridge, or, when pressed in, it may be driven so far that its teeth rub in front on the plate, and work like a cutter; all these are defects to be removed, and the rubbing parts must all be nicely smoothed. The intermediate wheels of the minute work demand especial attention, in regard to the complete freedom of their motions and the good proportions of their depthings; they are a disagreeable encumbrance to the movement, and it must never be forgotten that any carelessness may easily promote disturbances in the rate of the watch. An unsuitable proportion between the brass minute wheel and the steel wheel can quickly attack the former and make it useless, especially if it was fitted on badly, or upon too short an arbor; I would call the repairer's attention to the fact that by too great a play, it can very easily come above or below the other wheel, and occasion disturbances. Sound sense alone will tell that this wheel must have a pretty good strength, in order to sufficiently resist the power effects it has to suffer by the setting of the hands without breaking the teeth. This defect may also be corrected by "lanternizing" the canon pinion (of course, only at the place occupied by the minute hand), or making the friction of the center staff in the center wheel as soft as possible, without leaving it too loose, at the same time, whereby disagreeable disturbances might occur in the minute work.

By watches in which the button is pulled out to move the hands, it must be ascertained that the pivot end does not leave its hole. If it is caused by too great a going back of the arbor, it may be corrected by two pins being drilled in from either side, with protruding ends, to prevent the withdrawing. If, however, this withdrawing is not more than actually necessary for the play of the several parts required for setting the hands, a new small bridge with a higher shoulder will have to be made. By the return of the parts to their normal position, the little wheel will cramp at times upon the winding arbor; at other times, the arm wedges itself between the notch of the pusher and screw, so that only by additional assistance with the hand, the setting of the hands can be effected; it occurs but seldom, yet I thought it necessary to mention as one of the probabilities.

Watches with maintaining power equally demand the undivided attention of the skilful artist, in order to place it into such a condition that it will satisfy all the demands of his customers. The pusher must perform freely, and oppose no hindrance whatever to the return of the spring, thus that the latter permits the maintaining power to assume its place with all freedom; the teeth of the latter must fit well, and completely seize into each other, going down to the bottom. Its spring, if too strong, offers too much resistance to the hand —encumbers the setting of the hands, and breaks easily; if too weak, it may give rise to disturbances in the minute work, the push button being with facility driven by it, while the watch is worn in the pocket. The latter is prevented by soldering a small shell, with a slit for the finger nail, in which the pusher passes without protruding. Investigate that the spring does not raise up when pressed in; if it does, locate a small bridge or a screw with a broad head over it; the latter may be recommended for all cases.

The motion of the pusher must be limited by some firm resistance, to prevent the spring from being broken by too strong a pressure; also the teeth of both wheels entering into action must be very pointed, and with tapering rounding, so that by pressing in, the points cannot press one upon the other, and cause a breaking of the spring. The mentioned casualities are prevented in watches constructed according to Lange's system, of Glasshütte, as well as in most English ones, whose winding contrivance is placed under the dial.

It only remains to mention what parts require oil, on account of their friction. The ignorance of many watchmakers on this question, as well as of new workmen who undertake repairing, is actually a cause of wonderment. Of course, every apprentice is drilled in the maxim that it is injurious to apply oil to pinions, which is very correct, as long as the pinions of a watch are concerned, in which both parts consist of different metals, such as steel and brass, and many watchmakers stick to this axiom. They are taught afterward that the cylinder escapement, which is also a certain sort of depthing with prolonged friction, owing both to the great friction as well as velocity with which it works, cannot dispense with oil, even when using a brass escape wheel, and it becomes intensified if both wheel and cylinder consist of steel. But how does it happen that most of them cannot reason sufficiently that the depthings, in which both parts are of steel, moved with great violence, and required to surmount considerable resistance, are not governed by the same consideration and conditions of the cylinder escapement, with regard to friction, and still more so when considering the pressure they are called upon to resist? Watches are frequently seen that were cleaned, and in which, as no oil was applied to places that unconditionally demand it, wear and rust have ensued in a grave manner, and are the unavoidable consequences of this disregard of the commonest rules, that would not have been infringed upon by a little attempt of studying the question.

We next will enumerate the different parts that require oil, and hope that all watchmakers reading these lines will not forget to apply the element of life, necessary for their preservation, to stem-winding watches that pass through their hands. Two sorts of frictions have to be distinguished in this mechanism: hard and easy; the latter needs no oil. Those parts requiring oil under all circumstances are the winding pinion, its arbor and crown wheel; whether the pinion has been fastened to the plate with steel or brass, or into the gold case button, is of no consequence; oil is as indispensable here as at the pinions of the wheel work. It is self-apparent also that the inner pivot of the arbor must be oiled, also the maintaining power of watches provided with one, and the end of the spring fitting into the notch.

We would remark right here that we do not for this purpose employ the fine oil, applied to wheel pivots, but a mixture of white, or so-called virgin wax and oil, both of which substances are heated and well-mixed in a deep watch crystal, assuming the consistency of butter, that may be applied with a knife. The oil alone is too thin fluid to lubricate these parts in a thorough manner; it would spread to the other parts, and the entire movement would soon reek with oil.

The depthing of the pinion into the crown wheel must equally be provided with some, touching all leaves therewith, so that it is spread uniformly from the commencement. If this depthing works without oil, it will very shortly show both rust and wear, according to the friction and hardness of steel, so that a depthing, provided with the necessary lubricator, may last as long as the watch, while, without oil, it may become completely useless from wear after six months.

That part on which the crown wheel lies demands oil, also the sink in the bridge, as well as the wheel itself, spreading it somewhat, otherwise some accidental unevenness or hollow might prevent it from spreading.

The teeth upon the circumference of the crown wheel, seizing into the ratchet, need not be oiled, because no hard friction exists at this place; yet it is not by any means hurtful. Oil will generally be spread from the barrel bridge to these two wheels after a time, where it is applied between the cap and ratchet; a very slight moistening is also profitable for the click spring.

By watches in which the pendant button is partly drawn out, it must not be forgotten to oil the end of the pusher, where it touches the spring, it being a very hard spring; while no oil must be placed under the pusher and its screw, these frictions are only easy, and of no duration; the oil would thicken and impede the free motion of these parts.

We next come to the steel center wheel or wheels, retained by screws with shoulder; they also demand oil, not at their teeth, but at their holes; next, unconditionally, the center wheel in the minute work. It should never be omitted even in ordinary watches to give a drop of oil upon its pin. It is a friction of steel upon steel, which frequently has effected a rusting of the pinion, so that the pin has screwed out and broken the dial plate. Always see that the pin protrudes a little beyond the pinion face. Finally must be mentioned the center staff, upon which the canon pinion is placed; it is the same whether the friction occurs upon this or the center wheel, a little lubricator is indispensable, without it the friction can easily become too hard or too soft. Also in ordinary watches in which the setting of the hands occurs with the key, a little oil should always be applied to the center staff.

Views of Correspondents.

This department of The Circular is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

TRAVELING OPTICIANS.

To the Editor of the Jewelers' Circular:

I wish to call attention to a trick that is being practiced in this state by some unscrupulous adventurer. A man goes about among the farming population selling spectacles. He has a cheap article, worth about 25 cents, which he represents to be of the best quality, and for which he charges $2.50 a pair. He represents that they are the same goods as I keep, and that if the purchaser ever wants to change them he has but to step into my store and ask for another pair. Without positively asserting that he is my agent, he leaves that impression, and, as I have been located here twenty years, and am well known throughout the country, the swindler has done quite a thriving business. A day or two since an old lady came into my store with a pair of these cheap spectacles for which she had paid $2.50, and which she wished to exchange for a stronger pair. She said she bought them of my agent, and I had hard work to convince her that I had no agents. When I offered a pair like hers for 25 cents she became convinced that she had been swindled, but, as my name had been used in the transaction, she went away only half convinced that I was not a party to the fraud. Probably this adventurer will turn up somewhere else, and I warn dealers to be on the lookout for him, and have him arrested, if possible. It is a contemptible fraud, but in these degenerate days it seems as though men would stoop to almost anything. VICTIM.

Ohio, Aug. 20, 1882.

THE DISADVANTAGE OF GUILD STAMPED GOODS.

To the Editor of the Jewelers' Circular :

I am a member of the retail jeweler's association of this state, and have taken much interest in the organization here and in other states. When they were first started, I had great faith in associated co-operation being able to correct some of the abuses from which we retailers suffered. The associations did a good thing in putting an end to jobbers sending catalogues and price lists to outsiders, but beyond this I fail to see that anything has been done by them to advance the interests or promote the welfare of the retail dealers. Much has been said about the Guild stamp and the goods that are to be made bearing it. I have yet to learn that there is any demand in the trade for such goods. A contract has been entered into for a supply of flat ware that, it is promised, shall be ten per cent. better in quality than any similar goods now in the market. Of course, if they are better in quality they will be higher in price, and the public does not demand high-priced goods. I venture to say that if I should place a set of spoons bearing the Guild stamp beside a set made by any of the reputable manufacturers, and explain the difference to a customer, he would not pay me 25 cents more for the Guild stamped goods. The plated ware we now have is good enough; if customers want a better article they will buy silver goods. I have been well pleased at the position of THE CIRCULAR on this subject. The state associations are not, I am sorry to say, representative of the retail trade. Look at the last meeting of the Wisconsin association. A gentleman who was present says that out of 230 alleged members whose names they keep on their rolls, but 35 came forward to pay their dues for the present year. For 35 retail dealers to assume to speak for the trade in Wisconsin, is of a piece with the presumption of the legendary three tailors of Tooley street, who commenced their proclamation, "We, the people of England." There has been manifested a waning interest both in the National Guild and the state associations, since two or three men came forward as the manipulators of all of them. One of these manipulators claims to be the editor of an alleged trade journal, is the organizer of a watchmakers' and jewelers' benevolent institution, and some time since conceived the brilliant idea, in his back office, of organizing a watch company, to be run by contributions to be generously forwarded by retail dealers. All these enterprises were failures, and it is not surprising that such management should kill off the state associations and the National Guild. I have made up my mind that the Guild stamp is being crowded down the throats of the associations by these few interested parties for selfish purposes, and I do not propose to commit myself to it. I am satisfied with the goods furnished me by the regular manufacturers, with their treatment of me, and the profit I make on their wares. I see no reason for trying to pull them down in order to build up men in whom I have no confidence. It is to be regretted that the retail dealers did not assert themselves, and take command of their own organizations, instead of trusting to the leadership of men they did not know. For my part, I am done training to their fifing, and shall not attend any more meetings of the association. I know a number who feel just as I do about it, and the probability is that the Illinois Association will dwindle away like that of Wisconsin.

Ill. A DISGUSTED DEALER.

THOSE PESTIFEROUS DRUMMERS.

To the Editor of the Jewelers' Circular :

I was recently in New York City buying goods, and if every buyer who goes there passes through the martyrdom that I did, I am surprised that they ever endure it a second time. Thinking to facilitate my business, I put up at the Astor House, but no sooner had I registered my name than I was besieged by a lot of drummers, who were apparently on the watch for victims, and importuned to examine their samples. They even followed me to my room, and waylaid me as I passed to the dining room. They accosted me in the street, pursued me into the stores of merchants with whom I had business, took me on the wing whenever I appeared, and fairly worried me sick. I had read what THE CIRCULAR has said about the drummers from Providence and Attleboro, but supposed you had exaggerated about it. I can bear witness, however, that there was no exaggeration; on the contrary, you undershot the mark, for these drummers are the greatest nuisances I ever had to encounter.

Why do not the New York dealers take measures to protect their customers from this annoyance? Of course, they have no jurisdiction over the hotels or the public streets, but they might have a board of trade, or an exchange, or something of the kind, where we could meet them, and to which the drummers would be denied admission. Combined action on their part would soon drive these fellows to the wall, and give us country buyers peace. Why some of them have more cheek than an army mule. Everyone that spoke to me asked me to drink, and when I refused, would offer me a cigar. Six of them asked me to lunch, two to dinner, three wanted to take me to the theatre, and one kindly offered to "show me the elephant" in the evening. Having already seen "Jumbo" in Philadelphia, I had no desire to study natural history, and so declined his invitation and all the others. I think all this is a disgrace to the trade. These chaps must spend lots of money in this way, and I would like to know who furnishes it. Of course, if their employers do, it is made up out of us retailers on the price of their goods, and I object to having involuntary contributions levied on me for the sake of paying the expense attendant upon patronizing bar rooms and "elephant seeing." I pay my own bills, and regard it as an affront for these cheeky fellows to offer to buy drinks and lunches for me, to say nothing of more questionable propositions. I appeal to the trade in New York to combine together and put down this evil. As long as they tolerate it, it is a reflection upon them all. A COUNTRY JOBBER.

GIVE THE GUILD STAMP A CHANCE.

To the Editor of the Jewelers' Circular:

Taking it for granted that you desire to give the widest scope possible to the discussion of the Guild stamp, from the opening remark you made in noticing my article in the July number, I make bold to intrude once more, not with any idea of entering into a dispute with you, but to endeavor to correct some of the wrong impressions you appear to hold, and may convey to your readers who are not situated so as to fully understand the subject.

It pleases me to have you acknowledge that the associations have done much good, and I am glad THE CIRCULAR is doing so much to co-operate with them, and while some of the evils or abuses have been partially corrected, THE CIRCULAR must acknowledge that some still exist, one of which is the sale of staple goods of certain kinds as a side issue, by merchants who sell at prices too low for us to compete with, one of these articles being silver plated flat ware.

By the way, how many of the evils or abuses were corrected by THE CIRCULAR's exposing their effects on the trade, or by denouncing the jobbers, till the associations took hold of the matter? Out west here, where associations exist, very few illustrated catalogues are found in the hands of outside dealers, but in those states where no associations have been formed, the evil of illustrated catalogues indiscriminately distributed is still heard and complained of.

But to return. I can't understand how the originators of the Guild stamp, being retailers, can be considered schemers and adventurers, unless you can show that they are receiving a large bonus from the company who is to furnish the Guild-stamped goods, or shall succeed in crushing out large and well-known eastern manufacturers, thus enabling them to sell large amounts of Guild-stamped goods at enormous profits, an event that is simply impossible.

You still hold to the idea that the older and better known manufacturers were ignored entirely, when such is not the case. The eastern companies would have nothing to do with the Guild stamp except under impossible conditions, and the Racine—now the Rockford—would not touch it unless they had the exclusive use of it for a limited time, a condition that was readily granted in order to get the idea started. Like a human being, the Guild stamp is a creature that could not come into existence full grown all at once, but was conceived first, and after birth has to creep before it can walk. From your stand, it would have died at birth, and no one would ever know whether it was a creation for good or evil, but from our stand, it will have a chance to show whether there is any use for it in this world.

You state that "the quality of Guild stamp goods could be regulated quite as well if made by a dozen manufacturers," and a little further on state that there are but a small number of retailers who are members of the associations. If such is the case, do you think it likely that a dozen manufacturers would care to bother with the stamp? Now, isn't our way best after all, for now there is a chance to see if there is any call for such goods? If there is, then the older and better-known manufacturers will care to make them, and as the two little years given to the Rockford Company will not last forever, at the end of that time they can have the right to do so.

The sale of these goods being limited to the number of the associations is where the benefit comes in. Anyone can try and sell the other goods, but Guild-stamped goods are the one article that we can have the exclusive sale of, knowing full well that they are the best in the market, and cannot be procured by outside merchants who will sell them at cost, as a side issue to draw custom for other goods on which they will make a good profit.

The associations were gotten up for the benefit and protection of all in the retail trade, and all any retailer will have to do to get the Guild-stamped goods, will be to join some state association, and he can then have the privilege of selling goods that are sure to be what he recommends them, the best grade of goods in the market, while now he does not know that the goods he sells are all they claim to be, a member at the meeting of the Wisconsin association the other day stating he had stripped the silver from a dozen knives of a well-known brand, and found instead of twelve pennyweights, there was only seven pennyweights of silver on them, a thing that will never happen with Guild-stamped goods, for they are guaranteed under penalty, and if not up to grade the manufacturers are liable.

I notice another correspondent, Western Dealer, sides with you, claiming that the stamp on flat ware amounts to nothing, and he will have none of it, but in the next breath wishes it might be applied to rolled-plate goods. As I remarked before, the stamp must creep before it can walk, and it is creeping now; and if it is encouraged, it will get past the creeping stage and will walk, so if he wishes to see it used on rolled-plate goods, he wants to give it a good send-off, and do his best to educate the public to demand Guild-stamped goods.

I do not wish to encroach upon your valuable space, or weary you with my ideas, but I consider this subject of vital importance, and I hope to see the time come when every retail jeweler in the country will take hold of the work, join the associations and use Guild-stamped goods, turning his back on all lines of goods that are not the best, for there is no credit in supplying customers with inferior goods of any kind whatever.

W. H. T.

Practical Treatise on the Adjustment of a Cylinder Watch.

[Translated for THE JEWELERS' CIRCULAR from the 2d-prize essay of Vincent Lauer.]

Continued from page 91.

CHAPTER X.

THE BALANCE AND ITS SPRING.

WHEN THE spring has been fastened, it is straightened to be concentric and flat; especially the former manipulation appears to be unknown to many watchmakers, and yet it is very necessary since an omission hinders the balance in its activity, and a constant pressure is exerted upon its pivots. The balance spring must occupy its place as free as possible, without any cramping or pinching from any side, whatever. The dressing round and flat is easily done by either mounting the collet with spring upon the cylinder itself, or placing it into a turning arbor, and permitting it to revolve in a rounding tool, paying heed whether the several coils move uniform from within to without, or the reverse, according to the motion imparted. If the spring runs round, the collet must occupy the center. When bending the spring in the vicinity of the collet, carefully avoid getting corners; it must have one uniform, regular curve from the point of fastening to the concentric windings. Also take notice, when dressing round, that is has no sideward motion.

If the collet hole is higher or deeper than that of the cock, the balance spring on the collet is bent in a suitable direction. The spring is taken down again from the cylinder, and the outer end is bent in such a manner that when it is fastened in the cock, the outer part lies free between the curb pins at the place where the regulator is moved. The center of the collet must then come exactly above that of the jewel hole. If the outer curve has to be bent larger, do it gradually, without leaving a noticeable sharpness or elbow in the spring.

The fastening in the cock is the same as that in the collet, the pin here is permitted to protrude somewhat upon the two sides, and must be flattened at the side where it presses against the balance spring. If the cock sits farther to the outside, than the circle of the curb pins, bend the spring at once from the cock by a small curve inward, and then again towards the outside, until the curve corresponds with the curb pins.

Next, the drop is to be regulated; it is done by mounting the balance spring in such a manner that the cock stands upon the marked place of the balance, if it has been indicated. By watches in which this trouble has not been taken, and that contains no true spot from the factory, the place must be sought, at which the beats of the motions occur uniformly in regular intervals. That place is then to be marked, which the cock is to occupy, in order to avoid future trouble. The movement is set into motion by one pressure upon the arms of the center wheel, listening whether the motion is accompanied or not by any strange noise; if the latter occurs, investigate where and why it is. If, however, the work has been done according to preceding directions, the motion will sound clear.

A noisy motion generally proceeds from a faulty polish of the cylinder faces, or pivots, or jewel holes, also from unduly large jewel holes; from rubbing of the scape wheel in the small notch, or of the tooth, by having too sharp a point, or bur at the heels; from badly polished and steep lifting faces, etc.; the repairer's ingenuity must try to discover the cause, to correct it. It is also very advisable to proceed at once with the regulating of the watch; when the dial plate with the seconds hand has been mounted, and the time is set by a correctly going clock, the difference by which the balance spring is to be altered, is soon found. If the watch goes too slow, shorten the spring; in a reverse case, lengthen it. It is better to do it now than when the movement has been cleaned.

At conclusion, a few statements about choosing a new balance spring will not be out of place.

First choose it by the customary weighing, then break sufficient from within to fasten it upon the collet, when it is seized by the outer end, raised, and the balance permitted to vibrate, counting the vibrations, as already specified. It is seized at different places, until such a one is found that causes the balance to vibrate 300 times per minute; it is next to be examined whether it has the appropriate number of coils, and its size corresponds to the space The subsequent proceedings have been given heretofore. I would only remark not to break any more than is necessary from the interior end of the spring; no more free space must be at the collet than there is between the separate blades of the balance spring. By this method, it will not happen that several springs, one after the other, have to be fastened upon the collet, in order to find the right one; it is the most difficult of all work, and much useless vexation will be saved.

CHAPTER XI.

FINISHING THE SEVERAL PARTS.

After the movement has been adjusted from the spring barrel down to the balance spring, it is taken down again; the screws are to be placed in their order into the holes of a small specially prepared table, in order to prevent mixing. If new ones were inserted, or if some were damaged by screwing in or out, they are to be ground, polished, and blued in color corresponding with the others. Many watchmakers commit the error of hardening the screws before polishing and blueing them; this is not advisable, the screws remain far too hard in this manner, and easily break in consequence. It is better to make them whitish blue, immediately after hardening; they will retain sufficient hardness to be polished; such a screw will not break easily, if it should occur, and it were not possible to extract this piece with the well known horse shoe screwdriver, the screw hole must be drilled out, while, if it had happened with a very hard screw, no other means stands at disposal than to punch it out. The place under treatment is easily injured by this, however, and an extra thick screw must be put in, because the old thread was removed also.

Polishing the screws is done by a composition file and steel rod; also the sharp corners of the cut are to be chamfered somewhat, so as not to be injured by a future placing in of the screwdriver. A fine file is used for the purpose, having no cut on one side; the corners are filed down a little, and polished with the uncut side. No screw must protrude except it be in an old style watch, purposely intended, neither the head, nor the shank, the latter of which is to be rounded.

When the screws have been polished, they are laid in clean ether or benzine, in order to dissolve all fatty adherences, and cleaned carefully with a clean rag and pith. In order to obtain a uniform color, it is necessary that the polish be equally handsome at all places; it must also be perfectly dried everywhere, since the least adhering filth causes spots. For blueing, an old spring barrel is used to most advantage, in one bottom several holes are drilled, while the other remains solid; a long wire is fastened to it, to serve as handle. The screw is inserted into one of the holes and the drum is gradually heated over a flame until a suitable color is obtained.

The bridges and potances are thoroughly inspected, in order to remove any adhering beer, the lower sharp corners are broken with a fine file, and the faces are ground in case they should be unsightly. The bur also is to be removed from the barrel; should such be between the teeth, a scratch-brush is used for removing it, to be used only upon the lower side of the barrel to above, in order not to injure the gilding. If the arms of the wheels are incorrect, assist them by filing, and grind the lower face. If the polished wheels are tarnished, they are polished with a fine buffstick with very fine red. If a new wheel was inserted, or the polish of one of them is damaged, it is to be polished in the following manner. The wheel is first ground with a fine slate and oil, a little finely scratched slate and oil is given upon a good flat tin file. The wheel is placed upon a cork, and ground, while constantly and slowly turning it, until flat. The excess of grinding material is next wiped off, and clean oil is again placed upon the file, and the wheel is again ground with this diluted sediment, whereby a brightness is imparted to the wheel. Being satisfied that all scratches are ground off, the wheel is thoroughly washed with soap, placed into alcohol, and dried again finally. The polishing is done with the sword file, so named on account of its sword shape. It is best sharpened upon a fine emery stone, moistened with a little oil. The cork is covered with a piece of clean, smooth paper, or a soft rag, the wheel is laid upon this, and carefully polished, whereby the wheel is slowly turned, as previously said by grinding.

The operation of polishing demands a little practice. The main thing is cleanliness. The file must be cleaned repeatedly, and stopped as soon as it betrays a little roughness. If the sharpness of the wheel has suffered by an incorrect guidance of the file, grinding must be undertaken again. It is otherwise, if the wheels of the watch in question are gilt; in this case, it is best to regild the new or damaged wheels; the process is contained in every one of our professional papers and books.

But should it be impossible or incovenient to gild a new wheel, recourse is had by grinding it mat, to be done as follows: When the wheel has been ground flat with a stone, a little oilstone powder is rubbed upon an iron grinding file, plentifully mixed with oil, crushed fine, and the wheel ground therewith, under slow, circular motion moving it round. When the entire face is matted, the wheel is well washed with soap, placed into alcohol, and dried by padding it with a cloth or pith. The wheels of the minute work are ground with slate and oil upon the turning too'; the stone is next held to them very steady and provided plentifully with oil, whereby the wheels receive a handsome round grinding.

If new stopwork parts have been inserted into the watch, or if their polish has been injured, it is best assist them with an emery stone, as may often be seen in very fine watches. Ruined or rusted pinion faces are to be repolished if the corners of its leaves have been injured, while riveting the wheel, it is to be set in order by turning.

CHAPTER XII.

CLEANING THE PARTS.

There are several methods for cleaning the parts of a watch. It is either washed with soap, or laid into sulphuric ether, or benzine in order to remove the oil. Although the first mentioned manner of cleaning is the best, it is, according to my knowledge, not used as much as the latter. The reason must mainly be sought in the fact that a little more time is consumed in the operation, which difference, however, is not significant, and is richly rewarded by the thorough cleanness obtained thereby. The following is the manipulation necessary for the operation: All the parts of a movement having been taken down. they are placed into a small box, saucer, or something of the kind; a vessel with hot water is prepared, and all parts are thoroughly brushed with soap foam; the washed pieces are then laid into a second saucer and pure water is poured over them in order to remove the soap. The parts are next immersed in alcohol, singly dried with a soft cloth. Only a few strokes with a soft and dry brush are required to give a handsome luster to the gilding.

The other two methods are simpler; the parts are laid into the fluid employed, benzine being best; they are dried and brushed in the same manner as by the first method. Alcohol and ether dissolve resins, wherefore lacked in jewels, the anchor, etc., can only be immersed for a few seconds. Chalk must not be used for cleaning; an agent is only needed to keep the brush dry, the same effect is obtained by rubbing the brush across a piece of white paper, or thoroughly stale wheat bread. Every part is brushed, the pivot holes and oil sinks are well cleaned with a pegwood, and covered with a glass bill. The brush and pegwood are also used for cleaning the wheels and pinions; the spaces between the leaves are well cleaned with the latter, also the interior of the cylinder. Special care must be paid toward leaving no pieces of bristle in the riveting of the wheels, an accident often occuring by the scapewheel. The pivots are cleaned with pith, or decayed willow wood. The balance spring is laid upon a clean piece of paper, and dried with a brush, care being necessary in the manipulation not to bend it.

(*Concluded.*)

Sight.

WHAT THE OPTICIAN SHOULD KNOW ABOUT OPTICS.

Continued from Page 212.

ASTIGMATISM.

THE cornea of the human eye should be a section of a nearly spherical surface. It sometimes happens that it is of a decidedly ovoid form, which necessitates the curve in one meridian being considerably sharper than the meridian which is at right angles to it. The cornea being a portion of a lens system which casts a distinct image of observed objects upon the retina, it is readily seen that this irregularity in the curvature of its surface will distort the true proportions of the observed objects.

Rays of light will be more strongly acted upon in the meridian of the *sharpest corneal curve* than in the meridian of the flat corneal curve, thus, the sharp curve of the cornea, being in the vertical meridian, a pin-hole in a card through which light comes to us, will appear *vertically oval*, and will only appear *nearly* round when the observed opening is made sufficiently oval in the horizontal meridian to correspond with its magnified diameter in the vertical meridian. I find many who were supposed to be afflicted with *disease of the optic nerve—imperfect entrance of optic nerve** *amaurosis*, amblyopia, etc., are suffering from the optical effects of a faulty cornea, usually causing regular astigmatism.

The irregularities in our crystalline lens is the commonest cause of what is known as irregular astigmatism, an optical defect which is not correctible, which we all have to a greater or less extent, and without which we would all be able to see the moons of Jupiter with our naked eye.

Mechanics are frequently found who can never file anything square; an opening or piece of metal which is square, appears longer in one direction than the other, and it is not till the piece of metal is longer in the direction of the flat corneal curve that it appears square. Artists, students and all classes who use their eyes constantly, frequently suffer from this defect.

Failing to receive any benefit from simple spherical lenses, they supposed their eyes are diseased. These individuals make the lives of opticians uncomfortable by their everlasting grumbling over their unsuccessful efforts to obtain satisfactory glasses. They dislike to look at striped goods, particularly when the abnormal curve lies in any of the quadrants between the vertical and horizontal meridians. It is particularly difficult for them to read in the evening, and they are constantly remarking how poorly they see without a very strong light.

The diagnosis of astigmatism is usually readily made if one is suspecting it. It almost invariably reduces the acuteness of distant vision. The last line of letters given in the June number, are not seen at twenty feet, or if seen are imperfectly seen.

At the most distant point at which these letters are seen distinctly, the *radiating lines*† should all appear equally dark. If the vertical curve of the cornea is the sharpest, the horizontal lines will appear magnified and blacker until the vertical curve becomes so sharp that the magnification of the horizontal lines blur them. The vertical lines will then retain their natural thickness, and are the most distinct, but are never magnified under these circumstances. It is only when the horizontal curve of the cornea is the sharp one, that the vertical lines may be magnified. A given meridian of the cornea being abnormally flat, the rays of light falling on this meridian, will be united behind the retina, consequently lines, the thickness of which is estimated by this meridian, are indistinct.

The flat corneal curve being in the horizontal meridian, the horizontal lines will be the blackest because their thickness is estimated by the *sharper vertical curve* of the cornea.

Persons who can read the last line of letters (June number), and to whom the radiating lines all appear equally dark, and who still have weak vision caused by astigmatism, are very rare. Persons who are quite far-sighted are obliged to accommodate strongly for distant objects, and do not show their astigmatism till the unusual amount of accommodation is forcibly dispensed with by giving convex glasses, which neutralize their far-sightedness. They are thus prevented from compensating for the faulty structure of their corneas by changing the form of their lenses. I have observed one case (and I think the only one observed) where, owing to inflammation, the rods and cones of the retina were displaced in one direction, so that the horizontal dimensions of an object were particularly small; a cylindrical lens with the axis vertical, greatly improved the vision, and was of most decided relief to the person.

The fact that at the most distant point at which the last line of letters (June number) can be read, the radiating lines do not look equally black, is good reason for supposing that reduced acuteness of vision or weak vision is caused by faulty corneal curves (astigmatism). The defect is corrected in the following manner: Where the vertical curve of the cornea is too sharp, a piece of glass ground upon the convex surface of a cylinder is placed before the eye with the axis upon which it is ground placed horizontal—this axis may be revolved from horizontal to vertical from right to left; when its axis stands at right angles to the sharpest corneal curve, the vision will become distinct, and it will be blurred till the cylindrical lens occupies this position.

When the horizontal curve is too flat, a piece of glass ground on a concave section of a cylinder, with its axis vertical, will correct the defect. Other visual imperfections may be corrected at the same time by grinding on the other side of the cylindrical lens the requisite spherical lens.

How these radiating lines appear to an astigmatic person, may be readily seen by pressing upon the upper part of the eye-balls with the little fingers, sufficiently to slightly increase the vertical curve of the cornea.

[We cordially invite correspondence on the subject of which these articles treat. Persons knowing of difficult cases, are requested to forward particulars, and their inquiries will be answered by Dr. Bucklin.]—Ed.

(To be continued.)

*The above condition was really given by an opthalmoscopist. If such a condition exists there is nothing known about it.

† See June number.

The Pennsylvania Retail Jewelers' League.

THE regular quarterly meeting of the Retail Jewelers' League of Pennsylvania was held at Lesvar's Hall, 9th and Spring Garden streets, on the evening of Aug. 2d. Owing to the hot and sultry weather, the attendance was not as large as was anticipated. Quite a number of letters and postals were received from members outside of the city, containing the assurance of hearty co operation, and best wishes for the success of the League.

Mr. Jas. Ladomus was in the chair. The minutes of the last meeting were read and adopted as recorded

Mr. Bedishimer, as Chairman of the Executive Committee, read the By-laws as they had been framed by that body, and they were passed upon, article by article, until after several amendments they were adopted as a whole as amended. The next business before the League was the nomination of officers, to be elected at the annual meeting in November.

Mr. G. I. Wilson, of Reading, was unanimously nominated as President, and many flattering remarks were showered upon the gentleman, who was present.

For Vice-Presidents—three to be elected—the following names were proposed: W. Haines, George Childs, W. W. Whitehead, S. C. Herzberg, C. R. Smith, C. L. Levy, Philadelphia; R. M. Barnitz, York, Pa.

For Treasurer, John C. Kelly, Mr. Smith, of Smith & Dreer, Philadelphia.

For Secretary, Lewis Breitinger.

Executive Committee, five to be elected: I. Bedishimer, W. Haines, I. Herzberg, Charles Smith, D. M. Hamrich, I. R. Alexander, Geo. Childs, H. M. Cromwell, A. H. Kennedy, C. L. Levy, Philadelphia; Stephen D. Engle, Hazleton; W. H. Mortimer, Pottsville.

Eighteen new names were added to the list of members. The city is very well represented in the membership of the League, whilst the jewelers in the state have answered the call very sparingly. Small as the attendance was, the members present were very enthusiastic in their remarks about the ultimate success of the League, and the Executive Committee was ordered to issue another circular, urging those who have not yet joined to do so as early as possible. This circular is to contain also the names of all those that have sent in their initiation fee, or have signed the roll of membership, so as to induce the timid ones, by the strength of those names, to come over into our camp.

No other business being before the League, the meeting adjourned at 10:30 o'clock, to meet again at the annual meeting, Nov. 1st.

The initiation fee is one dollar, which should be sent, with name and P. O. address, plainly written, to Lewis Breitinger, Secretary and Treasurer, 37 North 9th street, Philadelphia, Pa.

Patent Reports.

MOUNTING MOTHER-OF-PEARL AND SIMILAR SUBSTANCES ON METAL.—Charles P. Fest, Philadelphia, Pa., assignor to George P. Farmer, Montclair, N. J. Filed April 29, 1882.

Claim.—1. An ornamental face-plate for jewelry, etc., provided with an irregular-shaped cavity, *a*, in combination with a metal filling, *b*, in said cavity, and a metal back or button, *B*, as and for the purpose described.

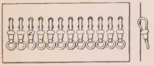
2. In an ornamental face-plate for jewelry, etc., an inlaid substance, *c*, of less thickness than the substance of the face-plate, *A*, whereby a cavity, *a*, is produced, as and for the purpose described.

3. In an ornamental face-plate for jewelry, etc., two or more cavities, *d*, formed in the under surface of said face-plate, *A*, in combination with metal fillings, and a metal back or button, *B*, substantially as and for the purpose described.

GLASS IMITATION STONE FOR JEWELRY.—James F. Sprague and Francis J. Kipling, Providence, R. I. Filed Jan. 27, 1882.

Claim.—The method of forming a glass imitation stone and adapting the same to fit the metallic rim or setting, which consists in first bending the glass plate to the form of a cylindrical segment and then acid-etching the edges of the curved front surface, substantially as described.

CARD FOR CHAIN SWIVELS.—Charles A. Kenney, North Attleboro, Mass., assignor to Oscar M. Draper, same place. Filed May 22, 1882.

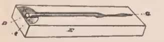


Brief.—Each swivel can be readily secured to the card and removed therefrom without affecting the others.

Claim.—A sample card for chain swivels, provided with two rows of holes placed close together, so as to allow the loops to swing in the holes, as and for the purpose described.

WATCH OILER AND HOLDER.—Ferdinand Gundorph, Portland, Oreg. Filed May 10, 1882.

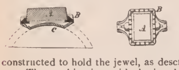
Claim.—1. In combination with the tube *A*, with its capillary extension *B* and head *D*, the holder *E*, having channels *F* and *G*, and the enlarged space *H*, forming a continuation of the channels, substantially as and for the purpose herein described.



2. A holder or case for the capillary tube *A B*, consisting of the channels *F* and *G*, corresponding with the two parts of the tube, and the enlarged extension or continuation *H* of said channels, substantially as and for the purpose herein described.

SETTING FOR JEWELS.—Harvey Huestis, Providence, R. I., assignor to Hutchison & Huestis, same place. Filed May 31, 1882.

Brief.—The jewel seat is formed of a stamped frame, the border of which is divided into blocks, which are bent over the beveled edges of the jewel.



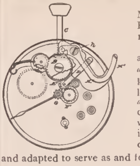
Claim.—1. A frame for setting jewels, consisting of the rim *e*, on which the jewel rests, and a border formed into blocks *g g* and corners *f f*, constructed to hold the jewel, as described.

2. The combination, with the jewel *A*, of the frame *B*, having the rim *e*, the divided blocks *g g*, and the beveled corners *f f*, and the back plate *C*, constructed as described.

PROCESS OF MANUFACTURING GEM SETTINGS.—Thomas W. Feeley, Providence, R. I. Filed Jan. 28, 1882.

Brief.—Two settings are made at the same time with the soldering hitherto required for one.

Claim.—The improved process of constructing gem settings herein described, consisting in soldering double-end prongs *D D* to slotted rings *C C*, by flowing solder upon the projections *c c* of said prongs into contact with said prongs and rings at the places of their engagement, and sawing asunder the double setting so formed and finishing each part into a single gem setting, substantially as specified.



STEM HAND SETTING AND WINDING MECHANISM FOR WATCHES.—Abraham Bitner, Lancaster, Pa. Filed Nov. 16, 1881.

Claim.—The tilting bar *D*, fulcrumed at *b*, as shown, having inclined surface *d*, and a yoke in which is journaled the pinion *E*, and the curved lever *H H'*, pivoted at *h* and acting upon the incline *d* to throw the pinion *E* in either of two directions at will, combined with the winding wheel *B*, stem *C*, the said pinion *E*, minute wheel *F*, pinion *G*, and center staff, the whole being arranged and adapted to serve as and for the purposes set forth.

DEVICE FOR CARRYING AND EXHIBITING FINGER RINGS.—Robert D. Baker, Buffalo, N. Y. Filed April 25, 1882.

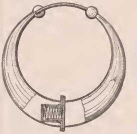
Claim.—1. In a device for carrying and exhibiting finger rings, a sheet of flexible material provided with projecting supports adapted to hold rings, substantially as set forth.

2. The flexible sheet *A*, provided with supports *B*, adapted to hold rings, and having a suitable fastening device, whereby the package can be secured when the sheet is rolled up, substantially as set forth.

3. The flexible sheet *A*, provided with projecting supports *B*, secured to a portion of said sheet, and having its portion which is not occupied by said supports adapted to be folded over said supports, substantially as set forth.

EAR RING.—George Krementz, Newark, N. J. Filed June 30, 1881.

Claim.—1. The sleeve *F*, having transverse slots *G G*, the plate *C*, having aperture *H*, with two opposite notches *J*, the end plate *C'*, having sleeve *K*, with studs *L*, and the spring *M*, in combination with the segmental parts *A A'*, as and for the purpose specified.



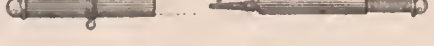
2. In a hoop ear ring, the combination, with the segmental or analogous parts *A* and *A'*, pivoted to each other to swing out of the plane of the ring they form, of the ear wire *D*, fastened to the end of one segmental part and fitting in a notch in the end of the other, substantially as herein shown and described, and for the purpose set forth.

CHARM FOR WATCH CHAINS.—Charles R. Harris, Attleboro, Mass. Filed April 24, 1882.

Claim.—The improved charm hereinbefore described, consisting of a case or shell *A*, having an opening a^2, in one of its faces, a sliding plate *B*, guides for said plate, a spring *C*, for moving the plate to close the opening, and a figure or object *D*, mounted on a spring *E*, so as to swing forward in the arc of a circle, substantially as set forth.

COMBINED WATCH CHAIN BAR AND PENCIL.—Leroy W. Fairchild, New York, N. Y. Filed May 18, 1882. Original No. 219,081, dated Sept. 2, 1879.

Claim.—1. In combination with a hollow holding case or bar, a



detachable extension case, constructed in telescopic sections, and adapted to be extended by the operation of withdrawing the extension case from its holding case, and retracted by returning it thereto without further manipulation, substantially as described.

2. A detachable extension case B, having its exterior sliding section arranged to operate the point e, in combination with a hollow holding case or bar A, the said parts being arranged to operate substantially as described, whereby the inner case B is extended by withdrawing it from the outer case and is contracted by shoving it into said outer case.

BRACELET.—Shubael Cottle, New York, N. Y. Filed May 16, 1882.

Brief.—The body portion is composed of spiral convolutions of strips bent into half-round shape in cross-section, and preferably combined with an internal spring.

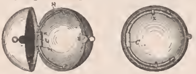
Claim.—1. A bracelet or its equivalent, having its body portion composed of spirally-wound convolutions of thin semi tubular strips of sheet metal, with the convex side outward, as and for the purpose described.

2. A bracelet or its equivalent composed of a circular or oval spring wound into one or more convolutions, combined with an external casing composed of strips of half-round or concave sheet metal, wound in spiral convolutions about the said spring, with their convex sides outward, substantially as shown and described.

3. The method of making spirally-wound flexible bracelets or their equivalents, which consists in taking plated strips and forming them into semi-tubular or half-round shape, then winding these spirally upon a wire of base metal, then winding this wire and its spiral strips into larger convolutions for the wrist, and then dissolving the baser metals away and finishing the bracelet, substantially as described.

COVER FOR EAR JEWELS.—George W. Washburn, West New Brighton, N. Y. Filed May 16, 1882.

Brief.—The spring and hinge are wholly concealed from view.



Claim.—In a self-closing cover for ear jewels, a spring of wire held at both its ends in one half-cover, in combination with a hinge-piece attached to the other half-cover and terminating in a pintle-socket, which embraces said spring at mid-length, said spring and hinge-piece being wholly inclosed and concealed, substantially as herein specified, for the purposes set forth.

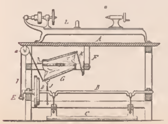
SAFETY CATCH FOR BREASTPINS.—Adolph Luthy, New York, N. Y., assignor to himself and George W. Royce, same place. Filed March 7, 1882.

Brief.—The safety hook is provided with a projecting heel, whereby the pin is thrown clear of the hook when it is desired to release the pin from engagement therewith.

Claim.—A locking device for a breastpin, consisting of a hook-shaped catch C, an angular safety hook D, having an outwardly-extending spur d, an inwardly-projecting hook d', a lever arm e, and a projecting heel e', the arm e being at right angles to the arm that carries the hook d', whereby it comes in contact with the pin and throws the latter out when said hook is withdrawn from the catch, substantially as described.

JEWELER'S WORK BENCH.—Milton H. Knapp, Adrian, Mch. Filed May 14, 1881. Renewed Jan. 14, 1882.

Claim.—A work bench A, provided with a crank shaft B, operated by a treadle C, in combination with the bellows G, crank arm E, frame F, pulley a, belt I, springs J K, and pulley D, substantially as set forth.



MANUFACTURE OF WATCH CASES.—John C. Dueber, Newport, Ky. Filed Nov. 25, 1881.

Claim.—The method of manufacturing the centers and also the snap rings of Louis XIV. watch cases, which consists in forming said centers, and similarly said snap rings, to the largest diameter of the hinge parts, and then milling away the surplus metal between the projections, substantially as set forth.

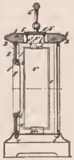
COMBINED CHAIN BAR AND PENCIL.—William S. Hicks, New York, N. Y. Filed May 17, 1882.

Claim.—1. A chain bar consisting of the open-ended tube A, and a detachable pencil or other implement case B, arranged to fit therein and project at each end thereof, substantially as shown and described.

2. In combination with the open-ended tube A, the detachable case B, of greater length when closed than the tube A, the said parts being constructed and arranged for use substantially as shown and described.

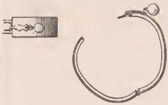
CLOCK CASE.—Henry J. Davies, Brooklyn, N. Y. Filed Jan. 31, 1882.

Claim.—1. The combination, with the side plate e, having an opening surrounded by lips e', of the panel D, of plush or fabric, applied to the inner side thereof, the back plate e^2, placed behind said panel, and clips e^3, secured to the side e and overlapping said plate e^2, to clamp the said panel between it and the lips e', substantially as specified.



2. The combination of the frame a, the sheet-metal covering b for said frame, overlapping the upper and lower inner edges thereof, and the panel C, of plush or fabric, with its back plate b^2, both fitted within said frame and between the upper and lower inner edges of said covering, substantially as specified.

BRACELET.—John B Van Houten, Newark, N. J. Filed Aug. 2, 1881.

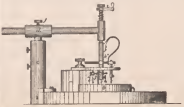


Claim.—1., The combination, in a bracelet with one section provided with a spring clip, of the lever pivoted upon said section, and engaging at one end with said spring clip, having a normal tendency to hold, and holding the other end of said lever in engagement with said section, substantially as and for the purposes set forth and shown.

2. The combination, in a bracelet, with the spring clip a and lever d, lying in close engagement with the body of the bracelet, of the hand piece linked to the said lever, substantially as and for the purposes set forth and shown.

APPARATUS FOR APPLYING COLOR TO WATCH DIALS.—Thomas F. Proctor, Waltham, Mass. Filed June 8, 1882.

Claim.—1. In a machine for coloring watch dials and similar articles, the combination of the following elements, namely: a bed plate to sustain the article being operated upon, and mechanism to hold a color or pigment scraping tool and guide it in a definite path over the said article, substantially as described.



2. The bed plate, standard and tool-actuating shaft mounted thereon, combined with the scraping tool connected with the said shaft, as and for the purpose described.

3. The bed plate and tool-carrying shaft movable toward and from the said bed plate, combined with the spring by which the said shaft is nor-

mally retained in the position most remote from the said bed plate, substantially as described.

4. The bed plate, tool-actuating shaft, and tool-carrying arm movable radially relative to the said shaft, combined with the pattern surface by which the said radial movement is governed, substantially as described.

5. The combination of the bed plate and scraping tool and mechanism to move it in a definite path over the said bed plate, the said tool being also movable toward and from the surface being acted upon, whereby its pressure on the said surface is governed by the operator, substantially as described.

6. The combination of the bed plate, reciprocating tool-carriage, and actuating shaft therefor, substantially as described.

Methods for Cleaning Watches.

[R. D. IN *Allg. Journ. d. Uhrm.*]

THE different methods for cleaning watches have repeatedly been debated in the columns of this journal, without, however, being treated in as exhaustive a manner as is demanded by so important a subject. Much truth, and much not quite so, was often found mixed together, and much prejudice shown for obsolete and antiquated methods, among others, the good, old, pre-Adamitic soaproot.

The method once in vogue for cleaning the old verge movements, by which the object was kept in the left hand with a piece of paper or cleaning rag, while the right, armed with a brush, previously rubbed over chalk, etc., belabored it in a thorough manner, has doubtlessly seen its last days. No watchmaker will dream to-day of treating a cylinder or anchor watch in such a manner, if he has any regard for the appearance of the watch, beside more time is consumed in this than the other, for more thoroughly cleaning methods.

The main question that is likely to occur, will be, which is the better method, that of washing with brush and soap, or that by which the parts are immersed in benzine? Before we proceed with an explanation, it is necessary that we should acquaint ourselves for one moment with the properties of agents brought into requisition, that is, as far as they are used as auxiliaries in the manipulation.

Benzine possesses a great affinity for the fat oils, be they of animal, vegetable, or mineral origin, next, to aid volatilizing very rapidly. It operates in the same manner with cloth, when employed for cleaning it, as with watches: it carries away the oil adhering to a substance, in its evaporation. On the other hand, it repels water or hydrous stuffs, such as vinegar, diluted sulphuric acid, etc., also alcohol and shellac.

Sulphuric ether, also called naphtha, is somewhat dearer than benzine, and, as far as the union with oil is concerned, and evaporation, its effects are still more pronounced. It does not unite with water, but with alcohol or shellac. (Petroleum ether is related to benzine, dearer, and highly inflammable.) Benzine is the best suited for general use.

Soap is the medium between water and oil—two uncombinable ingredients. For the watchmaker, the quality of the soap increases with its foaming properties. Its effects are augmented by the heat of the water, in which it is dissolved, as well as by the friction of the wet brush.

We next pass to the description of the two cleaning methods, in which several modifications will be found; however, we state several manipulations common to both.

Cleaning, as well as repairing a watch, commences with its being taken down. If the old oil is strongly dried up, it is necessary before taking down, to moisten all pivot holes with plenty oil, in order to soften the old, and make it more suitable for quicker removal. Again, by any one of the two methods, the coarsest impurities should be removed with a brush or pegwood, especially fibres wrapped around pinions, dust particles between the wheel teeth, etc. The smaller steel parts, such as cylinder or anchor scapewheel, minute work, regulator, balance spring, setting square, winding wheels, etc., are to be laid into a small, large mouthed vial, provided with a ground stopper, into which sufficient sulphuric ether is poured to cover the parts. Not alone is a more intense operation upon the different parts effected by this, but also the dissolving filthiness is not capable, by the use of the benzine method, to pollute and darken it, whereby the purity of the gilding would be affected. These small parts are in no manner suited for washing, because they can only with difficulty be held by the soapy hand. After they have lain for a few minutes in sulphuric ether, they are taken out simply, and each dried with a clean cloth. Long tweezers are used for taking them out, a fine clean brush must be at hand, to assist in drying. It is also necessary by any one of the two operations to spread a piece of white, smooth, flat paper upon the bench, and as well a clean cleaning cloth, that does not defibrate.

Whether we wash the remaining parts of a watch with soap, or lay them into benzine—they must all be completely taken apart, especially the cap jewels, the small caps of the barrel bridge, and the long dial-plate screws; the short ones are to be located in place, and need not be removed; this has reference especially to washing. The articles, washed with the brush, soap and warm water, are well rinsed in cold, and shaken, to remove the larger part of water, and then immersed in alcohol. The washing must not be continued too long, so that neither the water cools, nor the alcohol volatilizes. A cup may serve as receptacle for the latter, and in order to prevent the larger parts from injuring the smaller, the former are washed first. When all have been washed, they are singly taken out of the alcohol, and dried with the cleaning cloth. Angular steel parts, such as pinions and cylinders, are subsequently assisted with a brush, in order to get them as clean as possible. Alcohol still contained in the holes, is removed by tapping the article slightly on the bench, holding it by the tweezers, or the plate itself, and it is to be wiped again.

When benzine is employed, the articles are also laid into a small vial with tightly fitting cover, the former of which contains sufficiently of the fluid to well cover it. When taking them out proceed in the same manner as by alcohol. It is next necessary to remove any fibers of the cloth with the brush, and to go into the oil and other sinks with the pegwood; although this is merely done for greater security in the washing method, it is very necessary, when using benzine, especially in the surrounding of the jewels, and also to clean these, as well as the corners of all the countersinkings. The filth particles are better removed by washing than by the influence of the benzine. If in the latter case the watch were to be put together, without adequate subsequent cleaning with the pegwood, the pivot ends would dig up the filth particles and take them along, whereby the oil would very shortly become dirty again, and exert an influence upon the duration and regularity of the rate; considering all these and several other reasons, the washing method is undoubtedly the most preferable for costly and fine watches, on account of its thoroughness. The soap acts chemically, the brush mechanically; the gilding becomes clearer, receives more fire. It is entirely wrong, however, either by the one or the other method, to pass the buff stick over gilt articles, or packing them in sawdust, or heating, after cleaning is finished; it is useless, and consumes more time. The method of cleaning with benzine suffices for ordinary purposes; by washing, the process is more incommodious and time consuming; warm water must always be on hand, although the brushes are kept clean. The steel parts may be immersed in benzine or sulphuric ether for days, even if only mat ground, these fluids protecting them against rust. Alcohol, however, if it be bad, used several times, and mixed with water, no longer has the power of carrying off all the water. If attention is not paid to this, the steel parts may become rusty, especially if not well brushed, upon being taken out. The degree of dilution of alcohol with water is easily known with a little practice; the fluid, after it has been used, is poured back into the original bottle, and, ordinarily, every watchmaker uses sufficient alcohol, to have always a good article on hand.

A specially contrived box or vial, provided with a small faucet, to let off the impurities introduced by dirty watch parts, is still wanting in the trade. Benzine, according to the quality of the work, may be used as often as four times. But it must never be forgotten not to lay into sulphuric ether or alcohol any parts containing shellac, for instance, anchor balances, anchors, shellacked cap jewels, etc. It is needless to anticipate a rusting of the steel parts, after having treated them in benzine or sulphuric ether, and utterly impossible to ruin the gilding by any one method.

Benvenuto Cellini.

FOUR hundred years passed by before the prophecies and expectations uttered by Bishop Bernward (1008), who was the first to recognize the grand future of the art of goldsmithing, were fulfilled in a manner little forseen by him. In order to understand the epoch of which we are about to speak, it is necessary to examine history somewhat.

The crusades instilled into christendom an ardor for a creed, from which emanated the romantic spirit both in church and knighthood, with its ecstatic, beautifying, ideal desires. As evidence of this religious sway and romantic spirit, arose the gothic churches, the gigantically-constructed domes, within the halls of which all artists could compete, and exhibit their masterpieces wrought for the glory of God—be it in painting, architecture, carving, sculpture, bronze casting, or in the adornment of altars with works of gold or silver. Knights and priests had seen in the Byzantine Empire and the cities of the conquering Turks, the artistic works in arms and coat-of-mails, emanating from Oriental workmanship, and brought them home as patterns worthy of being imitated. In the cities, the citizens had, after ceaseless strife, obtained independence and power in guilds and armed unions; the single trades and guilds followed their vocation with ambition; commerce and trade enriched the citizens. And that spirit of romance also passed from the church and knighthood over to them, and was impressed even into their daily work. A thrifty life was visible everywhere, in which a high, exalted sense of duty mingled with a truly humane, merry and happy sensuality, giving an additional zest to life. Science was rejuvenated in their contact with the Orient, with the country of the ancient Greeks; it called into the graves of antiquity, and listened to the echo of its voice. The antique was studied again, and the spirit of the middle age threw itself on to its maternal bosom, to eagerly draw sustenance from its blessed abundance. Powerfully strove with the whole the individual genius, and with its inventions, for instance, the art of printing and copper plate engraving, produced a renaissance, a revolution within the domains of literature, art and study, which, by fresh discoveries and inventions, should open the doors to humanity, disclosing new and boundless fields and purposes.

Italy, with its rich and mighty cities, was the first to initiate this marvelous elevation. Upon the soil, on which antiquity had left a thousand and one traces and mementoes, the spirit of humanity rejuvenated quickest, promoted by the contact with its honored ancient culture. Simultaneously, many sons of the soil had grown into eminent masters of their art since the fifteenth century, and their co-operation caused the immense, ever-increasing influence upon those paths which they, as individuals, had been the first to open and to tread. Bellini and Leonardo da Vinci, Perrugino and Michael Angelo, Peruzzi, Titian, Giorgone, Bartolomeo, Raphael, Del Sarto, Correggio, Caravaggio, inscribed their names in the stellar world of immortality, and behind them, in sombre array, became visible the forms of a second race of heroes—Volterra, Bassano, Salviati, Vasari, Tintoretto, and a host of others, whose fame was destined to fill the 16th century.

And commensurate with this spiritual growth, also the goldsmiths' art strove manfully, as an art, to assume its appropriate position. Personal adornment was common; it charmed the eye of the patrician, while it educated his taste, and caused him to ever exact something more beautiful, more perfect, more pure and elevated from the goldsmith.

In such an epoch was born that man, who stands as a phenomenon in the art world, who might be called the Phidias of Italy, and, reaching over an interval of two thousand years, might shake hands, as a worthy confrere, with the great Greek. It is Benvenuto Cellini, the goldsmith from Florence, the proud, artistic city, where he was born at a time when his great countryman, Christopher Columbus, had discovered the new country.

His father, a piper, destined him to become a musician. Young Benvenuto was bound to learn the flute. But the father at an early day recognized the son's aptness for everything mechanical, and had sense enough to place no obstacles in his way, except that he had to learn the flute. He was articled with a master goldsmith, Antonio Sandro, of Florence, and after a few months, excelled his capable master. He was of a very rowdy nature, however, always giving way to his passions, and was soon forced to flee from his native city. He went to Rome, and astonished the Pope with his skill. He still wrought in smaller works, adornments, leaves, flowers, masks, medals, which, although betraying his fertility of conception and dexterity, yet caused him little to be expected as a future creator of such masterpieces. He was still a goldsmith, and happy to be one, because this guild was highly esteemed in Italy, and its members were often thrown into the company of the princes and nobility. He did not remain in Rome, but went to France, and entered Paris with the proud knowledge that a goldsmith was an artist everywhere. Already had the most excellent sculptors and architects, a Donaltello, Bruneschi, Ghiberti, Verrochio, Pollajuolo, emanated from the goldsmith's atélier, had constructed immortal works, and young Benvenuto was ambitious of imitating them, yea, when he remembered Michael Angelo, who still constructed his works of gigantic proportions, he resolved to excel his patterns.

A large number of gold and silver figures, partly life size, were constructed by his hand, the last one of which, a sample of his skill, was a model colossus, the head of which, constructed separately, became a wonder and a marvel to the people.

Gold and honors, offered by Francis I., of France, could not tempt him to remain in his service. In his boundless ambition, he dreamed to find in Italy, the chosen country of art, in the beautiful Florence of the Medicis, his recognition as the greatest artist of his age, because he entertained that proud opinion of himself. He showed it by everything his skilful hand fashioned and worked, small as well as large, and he obtained this courted recognition, in spite of all the cabals and artifices of his enemies in Italy, who waged a relentless war against him, and the doubts of the Duke Cosmus I., of Medici, into whose services he had entered since 1546. The doubts of this ruler were directed especially against his inability for the execution of the bronze statue of Perseus, with the head of Medusa, as Cosmus had ordered and Benvenuto executed in model. The latter, wounded in his self-vanity, desired to show that he understood how to make it, although it was declared to be an impossibility by all art connoisseurs. How he executed his work is at large described by him, with his great self vanity, peculiar to him, in his romantic, adventurous autobiography, which also must be accounted to the great works of Cellini as a literary fact of characteristic peculiarity.

Benvenuto first made a clay model of his Perseus, burned it, and covered it with wax, giving it the exact shape of the statue. He next coated the wax with a sort of earth, and burned this second coating, whereby the wax melted and ran out, leaving room for the reception of the metal between the two layers. The casting itself was to take place in a pit dug in the immediate vicinity of the furnace in his shop. Everything was carefully prepared. But the resinous pitch fire shot up in a gigantic flame in the furnace, the shop caught fire, and a part of the roof was consumed. Rain and storm raging outside, moderated the intensity of the furnace. The metals would not fuse, in spite of his endeavors. He was seized by despair, and thrown into the sick bed, leaving his workmen to continue alone the work of smelting. They were unable, and sent word to the master that Perseus was irredeemably lost.

Cellini, in high fever, sprang from his bed, rushed to the shop and furnace, in which the metal has become solid. He sent to the neighbors for dry oak wood, closed the hole of his roof with carpets and tapestry, threw metal into the smelting, and finally saw the mass at the point of fusion. Suddenly, at the moment of intensest expectation, the furnace cracked with a noise of thunder. Cellini heeded it not—because the metal was in fusion. To sustain and accelerate it, he rushed into the kitchen, fetched all his copper and tinware, over two hundred pieces, and threw them into the seething mass. Thus the casting was conducted to a successful issue, and better, even, than he anticipated. When the bright bronze statue (it is seen to-day standing in the market place of Florence, covered with a beautiful patina, the admiration of the world), was unveiled to the people, they raised a deafening cry of applause, which recompensed the artist for all his losses and vexations. "The people," he says, "did not cease to pin sonnets on my door, giving it the appearance of a day of festivity."

When presenting himself, the Duke said with great friendship: "My dear Benvenuto, you have satisfied me and the whole people, but I will requite your merits in a manner little suspected by you." The Duke kept his promise in a not very princely manner and munificence, only paying 3,000 gold florins, in irregular monthly payments, with which the artist, who had demanded 10,000 scudi, was not satisfied by any means.

Cellini lived until 1570, and created the most admirable chefs d'œuvre of his time. His funeral attested the great respect in which he was held by the people, although, as a man, he had continually lived in quarrel and strife.

Of his chased works in gold and silver, comparatively little has been preserved that can directly be traced to him; many works of art are ascribed to him wrongly on account of his celebrity. Several of his drawings are in existence. One genuine piece of his works exists—a gold salt cellar, which includes all the merits and peculiarities of the jewelers' art of the 16th century. It is said to be in the Belvidere of Vienna.

He also worked with the pen, not alone his highly interesting biography, but also poems and scientific treatises. Especially to be mentioned are the two treatises on the goldsmith's and sculptor's art, in which he gives full details. They treat on jewels, their settings, niello, filigree, enamel, chased work, etc.; on bronze casting and sculpture.

Time.

Local and Greenwich time.—Greenwich time, often called "railway" time, is now universally used in this country; but it may be convenient for reference that a few words of explanation be here given as to the difference between it and the local time of any given place, as well as the manner in which either may be ascertained from the other. The reader who is desirous of obtaining further information in regard to time must be referred to works on Astronomy.

The earth revolves once in 24 hours, so that each of the 360 meridians or degrees of longitude passes over the zenith or point in the heavens above Greenwich or any given place in this period. In 24 hours there are 24×60 or 1,440 minutes, so that the interval between the passage of one meridian and the next will be $\frac{1440}{360}$ or 4 minutes.

A degree of longitude measures 69 miles on the earth's surface at the equator, and is divided, like an hour, into 60 minutes, and each minute into 60 seconds. Thus:—

1 degree of longitude	corresponds to	4 minutes of time.
1 minute	" "	4 seconds "
1 second	" "	$\frac{1}{15}$th sec. "
		or 0.066 " "

Thus it happens that, at a town 1 degree to the east of Greenwich, the sun will be visible 4 minutes sooner, and if to the west 4 minutes later than at that place. The "local" time, therefore, at the first town will be 4 minutes in advance of Greenwich, and, at the second, 4 minutes behind the Greenwich time.

To ascertain the difference between the local time at two places.—The meridian of Greenwich is always to be taken as a starting point.

Find by means of a map or the index to an atlas, what is the longitude of the places, and consider each place separately in its relation to Greenwich. Convert each degree of longitude into 4 minutes of time, each minute into 4 seconds of time, and each second of longitude into $\frac{1}{15}$th second of time. Adding together these three conversions from one place, we have the difference between its time and that of Greenwich: an advance if it is to the east, and a retardation if it is to the west. Repeat the operation with regard to the second place. If both are to the east or both to the west of Greenwich the difference in local time will be given by subtracting the less from the greater; if one is to the east and the other to the west, the difference is given by adding together the two local times.

Example.—What is the local time at Dublin, Edinburgh, and St. Petersburg: also find the difference between that of Dublin and each of the other towns.

Their longitudes are:—

Dublin	6° 20′ west of Greenwich.
Edinburgh . . .	3° 11′ " " "
St. Petersburg .	30° 19′ east " "

Converting these into time, we find—

Longitude of Dublin corresponds to 6×4 min. $+ 20 \times 4$ sec., or 25 min. 20 sec.

Longitude of Edinburgh corresponds to 3×4 min. $+ 11 \times 4$ sec., or 12 min. 44 sec.

Longitude of St. Petersburg corresponds to 30×4 min. $+ 19 \times 4$ sec., or 121 min. 16 sec.

Dublin and Edinburgh are both west of Greenwich; the difference in their local time is, then, obtained by *subtracting* 12 min. 44 sec. from 25 min. 20 sec., the result being 12 min. 36. sec.

Dublin and St. Petersburg are, however, respectively to the west and east of Greenwich, so that their local times differ by an amount equal to the *sum* of their local times, which are 25 min. 20 sec., and 121 min. 16 sec. The difference is, then, 2 hours 26min. 36 sec.

To ascertain true time.—Greenwich time signals are becoming daily more and more extensively distributed throughout the kingdom, so that in most large towns true time can be obtained without difficulty; and, in the smaller towns, the railway companies generally telegraph time to their stations at least once a week. But such sources of information are not sufficient, and it is obviously of the first importance that every watchmaker should have at hand a certain means of controlling his regulator as often as may be requisite. Astronomers ascertain noon, that is to say the time of the sun's crossing the meridian of the place, by means of the transit instrument, a large telescope that is set so that it can only rotate in the plane of the meridian; but such a method would obviously be unsuitable for the use of watchmakers, if only on the ground of expense.

Two plane reflectors and a plate of glass arranged to form an equilateral prism, the two reflecting surfaces being turned inwards, are so placed that the light of the sun falling on the plate of glass is partly reflected and partly transmitted so as to be reflected by the two reflectors successively; and then again to pass through the glass to be received in the eye of the observer. It may be shown that, if the angle between the incident rays and the plate be exactly 60° in this instrument, the two images thus produced will exactly coincide; but if it differ by even a very slight amount they appear distinct. If, therefore, the instrument be so placed that the sun's light falls at this angle at the instant of crossing the meridian, this instant can always be ascertained by merely observing when only one image is visible. Knowing local noon, true Greenwich noon can easily be calculated from it by the aid of tables. The necessary observation is extremely simple, and its correctness depends solely on the accuracy with which the instrument is adjusted, and on the care with which the reading is taken. True time can be determined to within a second by this means.

RED WATCH HANDS.—To make red watch hands, mix 1 oz. carmine, 1 oz. muriate of silver, and ½ oz. tinner's japan, in an earthen vessel, and hold over a spirit lamp until formed into a paste. Apply this to the watch hand and then lay it on a copper plate, face side up, and heat the plate sufficiently to produce the color desired.

Proceedings of the Horological Club.

A Distinguished Body of Watch and Clock Makers.

Ninety-ninth Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the Circular for the next month.

This session of the Club happened to be on one of the hot evenings of the season. But few of the members attended, and they were very tardy, so that it was not till a late hour that the Chairman succeeded in bracing up the honorable gentlemen sufficiently to undertake the business of the session. The first letter read was upon

FROSTING WATCH MOVEMENTS.

Secretary of Horological Club:

Will you be so kind as to inquire of your members for a good recipe for frosting watch movements? Find enclosed a stamp, and if there is any charge we will gladly make it all right, if the recipe is good. Our frosting solution does not work to suit us exactly. Please let us hear soon. Yours respectfully, D. &. W.

Mr. McFuzee said that the gentlemen probably depended upon an acid solution to etch a dead or frosted surface on the movement. He did not regard that as a satisfactory method, but always used what is termed a scratch brush, on the lathe, to produce the surface by the blows from the ends of the wires. This if carefully used, would soon result in a very uniformly indented surface, which was then to be gilt as usual. He advised the gentlemen to get a scratch brush, and use it in place of the acid, and he thought they would be satisfied with the quality of the frosting. The only care is to have the wires strike the surface as squarely as possible, and to move the work so as to produce a uniform effect over the whole face of the piece.

As regards a charge, none is ever made for any information furnished by the Club, but we are always pleased to assist our readers to the extent of our power, only requesting that they will return the favor by furnishing, for the benefit of the other readers of our Proceedings, occasional descriptions of new tools and attachments, methods of working, or improvements in some line, which they think a little superior to those commonly used. This is very easily done, and if generally followed, would soon show an accumulation of new and valuable ideas which would astonish those who had contributed to it, and be of inestimable value to them and all the rest of the trade —without any special loss or trouble to themselves.

FACE-JEWELED MOVEMENTS DENOUNCED.

Secretary of Horological Club:

Allow me to call the attention of your honorable body to an outrageous fraud perpetrated by the watch manufacturing companies upon the trade and the public. I refer to the practice of making up cheap movements with the top pivots' holes jeweled, while the bottom pivots run in brass holes. This is a mistake mechanically, for the friction on the two ends of the pieces is unequal—one pivot of a piece running in a jewel, while the other end of the same piece runs in brass—being a positive damage and detriment to the watch. The oil, of course, does not stay the same in the two holes or materials, and this, together with the fact that such jewels are generally cheap and poor, often soft, poorly set, out of level, poor holes, no polish, and hardly even smooth, etc., make a category of faults and imperfections which should cause every good workman to denounce such movements.

But worst of all is the moral aspect of the matter. The very purpose of this construction is to make the movements look better than they really are—to put a false and deceptive face upon them, and give dishonest dealers a chance to sell them for what they appear to be, instead of what they are. It is directly encouraging and teaching fraud in the trade, by facilitating imposition upon the purchasers of watches, who only know by what they see, and trust to the honesty of the dealer to find the reality equal to the appearance. We all know that our trade is infested by a large class of dealers who do not hesitate to avail themselves of every such opportunity to turn an honest (!) penny, but the watch companies should be in better business than aiding and abetting such petty swindling operations. They are like the counterfeiting gangs whose province is to *manufacture* the spurious coin, and who then give to the crowd of smaller rascals the privilege of committing their little swindles, and making a few dollars by passing the stuff off.

Again, it gives the clothing dealers, drug and book stores, corner groceries, junk shops, and Peter Funk operators outside of the trade, the power to undersell the regular dealers, by offering to buyers better prices than the honest dealer can make, because he has to charge the price of a full-jeweled movement when he sells one, while the Peter Funk will deliver a face-jeweled fraud in place of what the customer thinks he is getting. Then when the watch repairer comes to tell him that there are no jewels on the inside, he is sure to believe that the watchmaker took them out and stole them.

In evey possible way it is an injury to the legitimate trade. It enables irresponsible and ignorant hucksters outside to undersell the trade, and cultivates trickery and rascality within the trade itself. It is nothing less than an outrage upon every dealer who transacts a respectable and honest business, and every one of them should denounce such "swindling stock," and the companies which persist in making them for the benefit of swindlers.

Hoping you will give this subject an airing, I am,

Yours indignantly, S. R. S.

Mr. Uhrmacher agreed that there was a great deal of truth in Mr. S.'s strictures. Face-jeweling did undoubtedly offer opportunities, for those who were inclined that way, to deceive their customers, and there could be no excuse for it except the fact that it made the movements look more valuable than was really the case—which is the very thing complained of. The good name of our business has suffered greatly by the frequency of such frauds upon purchasers, and the well-known fact that many movements are so made that buyers cannot ascertain their value by inspection, but are forced to depend entirely on the word of the seller, gives rise to suspicions and want of confidence, even where there is not the slightest cause for it. The innocent suffer with the guilty, by the loss of the respect of the public.

He knew that there was a wide spread feeling of dissatisfaction among the higher and most honorable classes of our trade, regarding such movements. But dealers should remember that they had the remedy in their own hands, and if they would refuse to keep that class of goods, the companies would soon stop making them. Should any company still persist in furnishing them for the tricksters in and out of the trade, they should be wholly ignored and avoided by dealers when making purchases, except in cases where a movement of their make was specifically called for, and no other would be accepted—which would seldom occur. General and concerted action by the trade could bring about almost any change or reform desired by them, for no concern or line of business which lives upon the patronage and good will of the trade could afford to go counter to its known wishes.

The speaker by this time was overcome by the heat, and sank back into his chair in a disorganized condition. It was then discovered that the steady dropping of perspiration from his nose and chin during his remarks, had worn a hole through the valuable carpet which covered the floor. The janitor was busily engaged in attending to the wants of the other suffering members—moistening their parched throats with cooling liquids administered through glass tubes, and supplying them with fresh air by means of a large bellows. In order to avert the untimely extinction of the Club, and also to prevent further damage to the carpet, the Chairman, gasping for breath, then declared the meeting adjourned.

Wisconsin Retail Jewelers' Protective Association.

THE Second Annual Meeting of the Association was held at Waukesha, July 12. The following report was received too late for our August issue:

The meeting was called to order by the Secretary, President Manning being absent, as were also Vice-Presidents Merrill and Tousley. On motion of C. A. Estberg, H. J. Smith, of Beloit, was chosen President *pro tem.*

The committee appointed at the last meeting to confer with the legislature in regard to traveling auctions, reported that they believed it was not necessary to bring the matter before the legislature at all, but that each municipality could regulate such concerns, and would recommend that a committee be appointed to bring the matter in due form for concerted action all over the state. Report accepted and committee discharged.

The following resolution was then offered and adopted:

Whereas, It is a well-known fact that traveling auctions and peddlers are a great source of annoyance and cause great demoralization to all branches of trade, therefore, be it

Resolved, That a committee of three be appointed to devise some method, if possible, whereby they may be regulated or abated.

A general discussion ensued, the members all agreeing that something ought to be done in the matter, for under the present state of affairs, while business men paid taxes, auctions and peddlers could enter a locality and take the cream of the trade, and only pay a small license for the privilege. The committee was instructed to take immediate action in the matter. The chair then appointed S. G. Rosenkrans and Theo. Schelle, of Milwaukee, and H. G. Van Wagener, of Monroe, as such committee.

W. N. Boynton was then called for, and delivered the following address:

Mr. President and Gentlemen of the Convention:

Of all classes of mankind on the face of the earth, those whom I most admire, love and respect, are the skilful, artistic, patient, toiling watchmakers and jewelers of our land, the fellow-craftsmen of my chosen avocation; and, my friends, I cannot express the real pleasure I experience in meeting with you to-day, to renew the brief, but to me, pleasant acquaintance made eighteen months ago at your Milwaukee convention. I see many faces here I then saw for the first time; I see many more I never saw before this occasion, yet in the new faces, as in the old, I read a welcome, not only to me, but to those noble and determined men, Shurley, Pierce and Wilcox, whose well wielded pens, and ably-edited journals, so earnestly advocate our cause—and last, though far from being least, *one* who to most of you is yet to be known—one who appears amongst us like a new comet in the heavens, with a wave of light for us to admire. This gentleman bears the name of Louis Hoefer, and whose home, I am proud to say, is Iowa. He appears here by invitation of your officers, to deliver an address on the science of horology, and of the necessity of establishing a horological school for the benefit of ourselves, our apprentices and our children that are to follow us. A school for the culture of science and art as connected with the watchmaker, the jeweler and the engraver. May the wisdom of man and the goodness of God grant him success, for then the excuse of the botch will no longer exist, the stigma of tinker will take its flight, and our calling command the respect of mankind.

But I will leave Mr. Hoefer to exhibit his own hobby of horology, "The science of making the best of time." I am glad he has so good a hobby—and I hope, my friends, that all of you have hobbies, that you may have some sympathy with me, for, gentlemen, I have two. My hobby number one, is our uniform schedule of prices for bench work—a hobby that is being rode by all good mechanics and sound thinking men. They see wisdom, pleasure and profit in it. They see the wisdom of the move in securing the confidence of our patrons, who, when charged abroad the price they have been schooled to pay at home, feel that they have been justly dealt with, and think kindly of all watchmakers and jewelers as a whole—a fact we most assuredly desire. They see pleasure in it, for this schedule is the sure stepping stone to harmony, prosperity, friendship and good will, and allows each to build up a creditable reputation as a mechanic, as he can then give the full force of his thought to the work before him, instead of racking his brain to study up unkind epithets to hurl at his competitor, in an effort to show the would-be customer why he charges more, or the other man less. And this, let me tell you, my friends, is the prime cause of all the unkind feelings so often existing among local jewelers. This weakness is at once seen and taken advantage of by the good people—God save the mark—who, with cunningly-contrived stories, goad them on to madness and desperation. Then commences a foolish and insane cutting of prices; our skilled labor is placed on a par with the man that breaks rocks in our street, or saws wood at our back door; our goods become wasted upon a thankless people, our lives trifled away, and we die a gloomy, sour, dyspeptic death, leaving our wives and little children in poverty and want. But with this uniform price for work, we meet as friends, and concoct schemes for opening the world as our oyster, instead of attacking the good name, mechanical skill, and business qualifications of each other. They see profit in this schedule of prices, for it kills jealousy—that green-eyed monster that robs us of our earnings and the happiness of life. With jealousy dead and buried, we shake hands in friendship over its grave. A new day has dawned—the sun of prosperity lifts its head and smiles upon us for the first time. We speak kindly of one another, and strive to protect each other's good name. The people gain confidence in our integrity, our trade is increased and our coffers are filled. In the name of common sense, wisdom, justice and right, shall we not all adopt this schedule, and no longer be the unpaid asses of a people who run from store to store with lies upon their lips, hoping to get us by the ears and cheapen the price of labor? Shall we not all adopt this schedule and forever break the petty, jealous, bickering bonds of serfdom, the jingling chains of unrequited servitude? These, gentlemen, are some of the good points in my hobby number one.

My hobby number two is a mule—that uncouth mule—the "Guild stamp," so "void of beauty," as claimed by Mr. Hopkinson; yet this mule was most honestly and nobly begot. It was sired by the state of Iowa, borne by the state of Illinois, and foaled in the state of Wisconsin; and, my friends, this mule is destined to do for us what the common mule did for our country during the rebellion. It saved our government, it pawed slavery, oppression, robbery and political wrong to death, and kicked universal liberty and equal rights high into the heavens, to be forever fixed among the shining stars of our country's flag.

Gentlemen, I believe my mule to be a virtuous beast, pure and good as all men know mules to be, and I feel confident will prove kind, gentle and helpful to its friends, though it may kick against the present interests of some of those "Eastern concerns of capital and reputation," as dubbed by THE JEWELERS' CIRCULAR, who have for years sought every possible outlet for their goods, with great injury and injustice to the legitimate retail jewelry trade, and any kicking this mule has done or may do, is purely in self-defence, and, gentlemen, I am here with my wife and boy, who will join me in backing this mule with every nickel we have got.

This mule is to-day in the hands of the Rockford Silver Plate Co., who hold a two years' contract for halter-breaking him with silver-plated flat ware—backed with a cash capital of $100,000, owned by the best business men in that most enterprising city, who own and control property, cash and credits exceeding three millions of money—gained as soldiers gained their laurels—by wisdom, courage and determination, and those men stand ready to harness this mule with a full line of rolled-plate and solid goods, whenever your Guild Executive Committee think best to so direct. When that time comes, gentlemen, you will find that this mule, the "Guild stamp" will have the strength, force and character to pull us out of the mud of despondency, poverty and want, brought about by an unjust competition with houses whom we deem have no right to retail our goods. And, gentlemen, I am fully determined this move shall be made if manufacturers continue to permit jobbers of watches and jewelry, etc., to sell indiscriminately at wholesale, and after all classes of dealers are supplied, then enter the commercial arena as retailers, holding from ten to thirty-three and one-third per cent. over us by way of jobbers' discounts. Using these discounts as margins, they can and do effectually drive us from the retail field. Is this not an unjust discrimination? Is it not a most palpable wrong, permitted by the manufacturers and perpetrated by the jobbers upon the rights of retailers? Is this not oppression equal to that which drove the American Colonies into rebellion? It is truthfully said, "Oppression makes the determined great and the timid slaves." Is there a human form within these walls whose soul is so wanting in manhood, whose timid heart so quakes with fear, that he would not buckle his armor on, grasp his shield emblazoned with the Guild stamp—defy, fight, and, if need be, die for his rights? Gentlemen, I am not rich, neither am I a pauper, but the little I have I am willing and ready to sacrifice on the altar of justice and right. If our oppressors want war they shall have it, and learn that determined poverty hath power to sting the heel of the oppressive rich. If they wish peace and prosperity, they must protect our rights. I have no desire to root out the jobber. I am willing to patronize him and protect his rightful interests as a jobber, but he must cease to retail or sell to the illegitimate trade.

Gentlemen, I deeply regret the unhappy circumstances that barred me from meeting with you last February, at Janesville. It was my intention to have done so, but the sudden illness of one of my men, forced me to forego that pleasure—more—that duty, for I felt it my duty to do so, that I might fully explain the nature and details of the contract we made with the Racine Silver Plate Co., for bringing out our Guild stamp on flat ware. I have been assured by Mr. Van

Wagener, of Monroe, that had I been at your convention, and acquainted you with the facts as they existed, not a single voice would have been raised against a full and complete ratification of all our acts, and, my friends, I hope it is not yet too late. Mr. Shurley will bear me out in the statement that for three years our Guild stamp committee had tried to get eastern manufacturers interested in our Guild stamp, all their efforts proving futile. They seemed to ignore the idea, thinking the scheme beneath their notice. They in fact deemed the western retail jeweler too small fry to demand their attention. This snubbing we got came not alone from the silver plate companies, but also from manufacturers of rolled-plate goods. Our only known recourse was the Racine Silver Plate Co., the only available parties we could find who would give us the bonds as to quality and protection, a bond of $1,000, to be forfeited in case any of the goods stamped with our Guild stamp should prove to possess a less quantity of silver than claimed for them, which is ten per cent. in excess of the best triple-plated goods to-day in market. They gave us another bond of $1,000 to be forfeited in case they sold any of these Guild-stamped goods to other than parties who were members in good standing in some state association connected with the United States Guild. These bonds have been countersigned and legally endorsed by the Rockford Silver Plate Co., as successors to the Racine Silver Plate Co.

Gentlemen, Mr. Hopkinson has very unkindly accused us of gross incapacity in entering into this arrangement. I ask you, my friends, wherein we have displayed any great error? Have we in any way compromised the manhood, the rights, or liberties of any member of our several state associations? Are not all left free to use their own pleasure, whether they handle these goods or not? And if you handle them, the fact does in no way bar you from handling all other lines and outside brands. Could we have left you more free? We bound the Racine Silver Plate Company under bonds of $1,000 not to sell any of these Guild-stamped goods to anyone whose name did not appear upon their roster as a member in good standing, of some state association in connection with the United States Guild. Could we have given you better protection? True, we gave the Racine Silver Plate Co. the exclusive right to use this stamp on their goods for two years, a very short time indeed, when you consider that it will take fully one year to really bring these goods before the consumers; and again, it required many dollars outlay on the part of the company before they could test the value of this stamp, or judge its success, as the scheme was without a comparison. We could promise them no trade, but left all, as you have already seen, free to handle or let alone. Instead of feeling that we displayed the incapacity claimed by Mr. Hopkinson, I wonder that we did so well with so little to offer, and I hope, gentlemen, that you will agree with me, and will endorse our acts in full, The Jewelers' Circular to the contrary, notwithstanding.

Mr. Hopkinson accuses us in his May number of displaying utter incapacity. In his July number, in his reply to Mr. Thorp's article, he accuses us of being designing knaves. I hardly know whether to attribute this gentleman's spleen to the outcroppings of the egotism of an editor, or the self-interest of a paid advocate of "Eastern concerns of capital and reputation." In either event, his language is as unjust as it is untruthful and uncalled for. One thing is certain, I can assure him, that the life and success of this Guild stamp does not depend wholly upon the approval of The Jewelers' Circular, but rather upon the good sense of the retailers individually, who will act unitedly in giving this stamp force and honest character in the estimation of all consumers, for in this the retailers' interests are mutual, and it is in the use of this stamp that we will be more firmly bound together, for self-interest is the strongest cord that was ever drawn, and makes the firmest knot that was ever tied.

At the conclusion of W. N. Boynton's address, S. G. Rosenkrans, of Milwaukee, offered the following resolution, which was unanimously adopted.

Resolved, That in the action of W. N. Boynton, of establishing the Guild stamp with the Rockford Silver Plate Co., and in his efforts to protect the members of this association, this association is under great obligation, and returns its thanks, and congratulates him on his success in his many efforts.

Mr. Louis Hoefer, of Keokuk, Iowa, then followed with an able address on the desirability of establishing a horological school, and the adoption of the metric system of measurements. [We have heretofore given and endorsed his views, so that it is unnecessary to repeat them.]

At a previous meeting suggestions had been made that if anyone could offer anything new in the way of tools, specimens of work, or new methods of doing repairs, they would do well to bring them out. C. A. Estberg, of Waukesha, offered a coffin-plate for inspection, bearing the following inscription: "The Retailing Jobber. Born in Iniquity, Died in Agony. May his remains be consigned to Oblivion forever."

Louis Hoefer exhibited a metric gauge, a screw-head finishing tool, and a new hollowed-out tweezer.

H. Anderson, of Chicago, exhibited a set of his new jeweling tool, both for hand and lathe use.

S. B. Boynton, of Milwaukee, presented for inspection his manner of repairing a broken Swiss center pinion, a new and simple contrivance for setting a roller jewel, and a new device to be used in hard-soldering gold and silver spectacles, whereby they can be held together in good shape to be repaired, with no danger of the solder flowing and fastening the contiguous parts together, it being simply a thin scale of mica placed between the parts and then screwed together, which thoroughly prevents the solder adhering when it is not wanted. All the articles were examined with interest, and the explanation listened to with attention. Several examples of silver-plated spoons bearing the Guild stamp were also placed on exhibition by G. B. Kelly, of the Rockford Silver Plate Co., and most of the members present gave him orders for a line of the goods.

C. A. Estberg then extended an invitation to the convention to hold its evening session at his residence, which was accepted.

The evening session was held at the residence of C. A. Estberg, according to previous arrangement, the meeting being presided over by President *pro tem.*, H. J. Smith, of Beloit.

The Secretary's report being called for, it was presented, showing the present membership to be 127. Of those who had requested their names erased from the books, six had neglected to pay up dues in arrears, so the Secretary was instructed to notify said parties that unless the arrears were settled, their names could not be erased, it being customary for all similar organizations to honorably release all retiring members only on their being clear of the books.

The Treasurer's report showed the receipts to have been $137.44, and the expenses $136.66.

The election of officers for the ensuing year resulted as follows: President, C. A. Estberg, Waukesha; 1st Vice-President, Theo. Schelle, Milwaukee; 2d Vice-President, H. G. Van Wagener, Monroe; Secretary and Treasurer, W. H. Thorp, Beaver Dam; Executive Committee, H. J. Smith, Beloit, C. L. Wilde, Milwaukee, and O. R. Ryan, Reedsburg.

Oshkosh was selected as a desirable place for next meeting. Several short essays were read and ordered printed in the proceedings. A recess was then taken, when refreshments, furnished by the host and hostess, were passed around and partaken of by the members and their wives, and a general good time enjoyed.

A vote of thanks was tendered to Mr. and Mrs. C. A. Estberg, for their efforts made to render the occasion so enjoyable, and the convention adjourned.

The convention re-convened Thursday morning, President Estberg in the chair. A general and friendly discussion ensued in regard to the ways and means of correcting the evils and abuses in the trade, and as to the best manner of promoting a more social and friendly state of feeling among the different members of the craft.

The following resolutions were offered and adopted.

Resolved, That we fully appreciate the necessity of establishing a horological school and the adoption of the metric system of measurements, and ask that the committee appointed by the United States Guild take the necessary steps tending to establish the same, which will be fully endorsed and sustained by us to the best of our ability.

Resolved, That the thanks of this convention are hereby extended to Louis Hoefer, for his able horological address, and unselfish interest taken in the welfare of the retail jewelers.

After a vote of thanks to the proprietor of the Mansion House for the free use of his parlors to meet in, the convention adjourned to meet at Oshkosh, the second Wednesday in February, 1883.

The Lever Escapement.

BY THOS. CHARLES SCOTCHFORD.

[*Continued from page* 208.]

Fig. 7 is a distance gauge I invented from fig. 4, which can be used as a guide in making the steels and fittings; also it would be a severe test of sameness of the pallets after they are finished, but they must

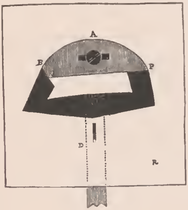


FIG. 7.

be made to work freely and easily to their respective wheels whether they strictly stand the test or not. The gauge is made by filing out a steel piece of the shape *S B A P*, so as to fit both pallet faces at the point of intersection of the chords, as shown in fig. 4. The point of intersection at *S* in this figure is nearly half-way up the long pallet face, because these are a correct theoretical pair of pallets. When the intersection is at a different point, a different shaped steel piece must be made. The steel piece has a slit cut in it, to move the piece to and fro sideways, and is screwed (when set) to a brass plate (*R*); a dovetailed (*D*) is made to slide underneath the plate *R*, and there is a pin(*n*) protruding up through the plate, upon which pin (*n*) the pallets are placed, and pushed up by the dovetail *D* until they show whether they fit the steel piece *S B A P*. Gauges are made for pallets by filing out solid pieces of steel to fit the pallets—counterparts of them. To persons out of the business it would appear that if the pallets were made to them there would be nothing more to do than to put the same sort of wheels and they would act properly together; but it is a delusion which is easily dispelled by trying them, and then it will be found that the real work has got to be done by repeated alterations. There certainly is nothing better than solid gauges, but in actional things like pallets they are only useful for what is termed "roughings." If the wheels vary in size, or slope of the teeth, or thickness of the tooth's point, it is then best to work to the wheel right throughout the make, for it must come to the wheel and depth tool at last whatever be the plans.

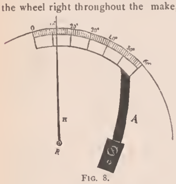


FIG. 8.

Fig. 8 is an arc of a circle fastened to an arm (*A*), and the arm screwed to the body of the depthing tool; the center of the circle of the arc must pass through *R*, the runner of the depth tool, so that a hand (*H*) placed on the staff will show the number of degrees any article moves through; but it wants practice, and is difficult, to try things with edges like pallets, because if the staff is very tight in the depth tool the hand will sometimes stick, and then jump forward, and if the staff is well free in the tool, the hand will acquire a momentum and show a greater apparent arc. I have put a spot of sealing-wax on the end of the hand so as to guide it; however, the arc can be told to a portion of a degree, whether the escape wheel is moved backwards or forwards, it is the same. For a few running sizes, if the wheel and pallets are very nearly alike, there is no need to try them, for they will all very nearly make the same arc; but pallets will often make about the same arc by the impulse faces, and yet leave room to obtain a somewhat deeper depth, and it is surprising how the whole arc, from drop to drop, increases by an apparent trifle deeper depth. It is from this cause that some persons, planting the pallet depth deeper, can have the guard pin brought out to the roller edge simultaneous with the wheel's drop, while others, planting lighter pallet depths, must have run to the bankings. Also it is from this cause that watches will sometimes "set" on the impulse face of a pallet, although the angles of such pallets are not very great, because, by increasing the pallet depth, the whole arc, from drop to drop, being increased, the balance spring is more wound up before the wheel leaves the pallet face.

We will now proceed with the theory, and to do so in an enlightened manner we must take a more extended view of the wheel and pallets than their general applicability to rapid motions of watch works. In fig. 9 we have a series of pallets, or chords of the circle, to an arc of 12° of the escape wheel, and 12° of each pair of pallets. I have only sketched three pairs of pallets, because the lines and circles become very complex when the figure is completed.

To construct this series:—Describe a circle, *P W T*, to represent the escape wheel; begin from *P* and mark off the wheel's arcs of 12°, from 0 to 12°, 24°, 36°, 48°, etc., round towards *T*, and produce each radius of the wheel to meet the secant, as described in fig. 2, and at the meeting points (*a b c*) will be the several pallet centres from which the concentric circles are described. Begin at *P*, and mark off the arcs from 0 to 24°, 48°, 72°, 96°, etc., round towards *W*, and draw the chords from the angular meeting points of all the chords to these several numbers

On the outer circles of each pair of pallets mark off arcs of 12° of each respective circle, and draw the planes of all the short pallets, produced to cut the long pallet faces, and all meeting in the point *P*.

To explain the three pairs of pallets marked *A B C*, these pallets being respectively made to 3, 4, 5 teeth of the escape wheel:—Take the smallest pallets marked *A*, the angle formed at the wheel's center on each side the line joining the wheel and pallet centers is 24° (as marked on the wheel's circumference), the corresponding angles to these pallets is marked *A* 48° in the escape wheel. Take the next sized pallets marked *B*, the angle formed at the wheel's center on each side the line of centers is 36°, the corresponding angle to these pallets is marked *B* 72° in the escape wheel. Take the largest size pallets, marked *C*, the angle formed at the wheel's center on each side the line of centers is 48°, the corresponding angle to these pallets is marked *C* 96° in the escape wheel, showing the angles both at the wheel's center and circumference are always alike, because it is a property of the circle that when the angles are alike, those whose vertex is at the circle's circumference always stand on a base of double the arc to what they do when the vertex is at the circle's center. The short pallets also cut the wheel's circumference at double the arc of 12°, whether drawn from each respective circle, or all drawn from the same point *P*.

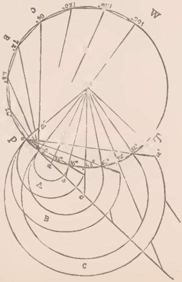


FIG. 9.

This fig. 9 shows the peculiar and proper uses of these pallets in contradistinction to wheels and pinions. They are adapted for increasing or decreasing of space in transferring motion from one axis to another; for while the wheel constantly moves through the same space of 12° of it scircle, the spaces of 12° on the circles of each pair of the pallets is different, the space of the pallets *A* being less than *B*, and the space of *B* less than *C*, etc.; and as the spaces of the arcs are smaller, so will the times of the arcs be shorter. But when we fasten a lever on the pallets, and cause the lever, by the aid of the roller, to turn a poised weight on a third axis, the character of the thing is altered, which we will see to soon.

Apart from the action of the pin and notch, and guard pin actions, the uses of the lever may be thus enumerated:—Firstly, for readiness of equalization, poising, and banking. Secondly we are enabled to use such pallets as will work well on their two opposite sort of lockings. Suppose we were bound to use the large pallets (C) to obtain a sufficiently great arc, we could not obtain so equal a draught on the two lockings; the lever enables us to obtain this greater arc while using the smaller pallets, and we find we can get two good lockings on the smaller pallets. Thirdly, there is another use of the leverage made to the smaller pallets, which is, the escape wheel is thereby easier unlocked; but to prove it is so, we must first prove the ratio of weight to power to equilibrate; this being the case, the best thing to do is to show the theory of equilibrium with two different sizes of pallets, that by comparison we may see the advantage of the leverage to the smallest pallets.

The pallets made to five teeth of the wheel would not suit well for a detached escapement like those made to four teeth of the wheel, because we could not obtain an easy draught on the outside locking; but apart from this question, there is the other cogent reason of advantage in unlocking the smallest pallets.

In respect to the power to be applied at the escape wheel pinion, instead of at the escape wheel's arm, those powers are inversely as the radii. If a pinion is $\frac{1}{5}$ of the escape wheel, the power at the pinion must be five times as strong as at the wheel's edge to press with the same energy against the pallet face, the effective size of the pinion being the radius of its pitch circle when in contact with the fourth wheel. The pitch circles are found by dividing the distance between the centers of the fourth wheel and escape pinion into as many parts as there are teeth in the wheel and pinion together; thus, if there are 60 teeth in the fourth wheel, and 6 in the escape pinion, their sum is 66; if we divide the line of centers into 66 parts, 60 of those parts will be the effective radius of the wheel, and 6 of those parts the effective radius of the pinion; or 10 parts for the wheel and 1 part for the pinion will do as well, if we divide the whole distance into 11 parts instead of 66 parts, for 11 times 6 is 66. I have often heard the inquiry, What should be the size and weight of the balance? The question would be easily answered if the mass were poised around the pallet axis and turned immediately by the wheel and pallets, as in theory it ought to be. Neglecting for a moment the inertia of the body of the pallets and arms of the balance, it is very easy to understand that such a size, weight, and velocity of balance is proportionate to the size, power, and velocity of the escape wheel, for the sizes are equal, the arcs are equally 12° each, and the power and weight are equal. As to the time of the arcs, it is impossible to say what they would be unless an experiment could be made; but whatever be the time, it is quite certain that the time would be longer and shorter when the sizes of the set of pieces were larger and smaller. Hence as the sizes increase, the slower should be the beats, if the power and weight is to be proportional; but every size can be made to pass through their arcs in the same time, if the power is disproportioned to the weight; thus, if the power is equal to 120 grains, while the weight in the ring is still 100 grains. If we double the radius of the balance, what weight should we then put in the ring, so that the same power of 100 grains will give to this double-sized balanced mass the same angular velocity? Answer, 25 grains. Because the inertia to rotation varies as the square of the radius of gyration*—viz., double the radius, four times the inertia, and so the weight should only be one-fourth what it was in a half-sized ring. This law is thus expressed:—The weights are in the inverse ratio of the squares of the diameters. Let the weight of the small balance (a) be 100 grains and its diameter 5 units, the square of 5 is 25. Let the weight of the large balance, double a, be 25 grains, and its diameter 10 units, the square of 10 is 100. Therefore the weights of 100 and 25 grains are in the inverse ratio of 25 and 100, the squares of the diameters. The moment of inertia is the product obtained by multiplying the weight by the square of the radius of gyration. The radius of a being 1, its square 1, multiplied by 100 grains weight, gives 100 as the moment of inertia. The radius of double a being 2, its square 4, multiplied by 25 grains weight gives 100 as the moment of inertia—both the same.

We have here a solution of a proportionate balance; but in the lever watch, the balance being transferred to the third axis, and turned by various sized rollers, and the full vibrations begotten by additions of the impulses, brings in a different order of things, and we must rely upon the teaching of experience more than on either pure or practical theory. Firstly, we have no means of applying proportionate balances such as described. Secondly, we may exchange power or weight for time; that is with the same power and same escapement pieces we may put a heavier balance, and the time of passing through the impulse arc will be longer, and the balance's velocity at the discharge will be less, and reversely with lighter balances. In respect to the size of a roller to its lever, rather small rollers are necessary, as before stated, to move the lever slowly to unlock the pallet, and prevent the edges of the pallet striking the back of the wheel's teeth. To show the varying effects between the moments of force and inertia by varying the size of the roller to its lever, or varying the size of both lever and roller, is a difficult task, because various problems arise concerning them, and also it is impossible to treat the subject with anything like perspicuity unless we first divest ourselves of all consideration of the inertia and frictions of the train and escapement, and of winding the balance spring during the impulse. The frictions and inertia of the pieces alter the character of the thing, and are sometimes of almost as much importance as the consideration of the lever powers themselves. However, the subject must be entered into.

(*To be continued.*)

* The center of gyration is a point somewhere in a mass, at which point, if all the mass were collected, it would give the same resistance to the communication of rotary motion as the whole body itself does, supposing that in both cases the same force of impulse is given at the same distance from the axis; and the distance of this point from the axis is called the radius of gyration. But the reader will see that this point will vary as the mass is differently disposed, both within and without the distance from the axis at which the impulse is given. The steel of the roller and pendulum collet must also be considered as belonging to the balance *within the impulse point;* so that I know no way in which the center of gyration could be found. The nearest approach is that of a plane ring: the rule given to find the center of gyration of a plane ring is, as the square root of one-half the sum of the squares of the two radii forming the ring.

Obituary.

Mr. Josiah G. Bachelder, who died on the 10th inst., at his home in Longwood, was the senior member of the firm of Palmer, Bachelder & Co., one of the oldest houses in the jewelry business in Boston. Born at Portsmuoth, N. H., in 1814, he came to Boston at the age of seventeen, and entered the employ of John B. Jones, the predecessor in the jewelry business of the firms of Jones, Low & Ball, and Shreve, Crump & Low.

In 1836 the deceased left the employ of Mr. Jones, and entered business on his own account as a member of the firm of Davis, Palmer & Co. His associates were Hon. Thos. A. Davis and Julius A. Palmer (the father of Jacob P. Palmer, of the present firm of Palmer, Bachelder & Co.) and under the names of Palmers & Bachelders, and Palmer, Bachelder & Co., the firm has continued until the present time, a period of nearly fifty years. For some years past, although visiting the store daily, the deceased had been prevented by ill-health from any active participation in the business.

Honorable, upright and courteous in all his relations, both in his dealings with those in his employ and with his brethren in the trade, his death will be sincerely regretted, particularly among the older members of the jewelry trade in New England, whose confidence and respect he won by nearly half a century of honorable business intercourse.

Mr. Bachelder well illustrated in his daily life the Christianity he professed, and he leaves behind him a character and honorable reputation worthy of imitation. The deceased leaves a widow and daughter to mourn his loss.

Mr. G. H. Howland, of the firm of Ripley, Howland & Co., of Boston, died Aug. 7th. Mr. Howland was a gentlemen of high standing in the trade, an estimable man in every respect, and much beloved by a large circle of acquaintances. He had been in his usual health during the spring and summer, and was spending his vacation with his family, a wife and two daughters, at Kennebunkport, Me. On Monday, Aug. 7th, having been out driving in the afternoon, he returned to his hotel. A few minutes after supper, while sitting in the parlor, he suddenly became unconscious, and in spite of all effort to restore him, he died about 9 P. M. The deceased commenced the jewelry business in 1855, with W. A. Bates, of the present firm, they having succeeded John H. Sweet, who, no doubt, is remembered by some of the older men in the trade. In 1867 the firm of Ripley, Howland & Co. was formed, by the consolidation of the two firms, Howland & Bates, and Ripley & Crosby.

Cylinder and Pinion Measure.

[BY VINCENT LAUER, IN *Allg. Journ. d. Uhrm.*]

THE GAUGE represented in fig. 1, serves for the purpose of determining the different lengths of pivots and shoulders of cylinders. Part *a* is a metal tube, upon which pieces *b* and *c* are fastened; the upper jaw *e* of the tongs is fastened to *b*; in tube *a* is found a steel bolt, that may be moved up and down by screw *m*; to this bolt is fastened lower jaw *d* of the tongs, which, consequently, also moves at the same time; tube *a* is provided with a slot, in order to be enabled to fasten the bolt and part of tongs. Screw *m* is retained in its place by a pin in the upper part *b*.

A piece of steel is inserted in the lower part of the bolt, this passes through part *c*, and ends with pivot *i*. The pivot moves with the bolt and part *d*, and must be placed thus, that when the tongs are closed, it is closed exactly with the lower small shoulder of piece *c*. When opened, the pivot will protrude the same distance as that of both parts of tongs.

Screw *g* is for the purpose of affixing screw *m*, after ascertaining the measure, to prevent it from becoming displaced accidentally.

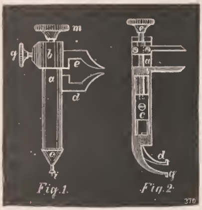


Fig. 1. Fig. 2.

The use of this measure is simple: Pivot *i* is placed into the jewel hole of the cylinder, and screwed out sufficiently, while the small shoulder of part *c* comes almost to stand under the scape wheel. The tongs will indicate the length of the interior plane of the small plug down to the end of the lower pivot.

In order to find the height for the balance, the pivot is screwed out still further, until the shoulder stands beyond the bridge of the scape wheel; with the present width of tongs is measured from the lower pivot end, and where the other part of tongs indicate, the shoulder for the balance is turned. The total height of the cylinder is measured above the two bridges.

Fig. 2 shows a height gauge that may be of assistance when turning a pinion. The arrangement of the little instrument may be learned from the cut. Parts *a* and *b* are of steel, and connected by piece *c*, where part *b* may be moved within a slide. The placement is done by means of screw *e*, which reaches into the upper part of *a*. This gauge is constructed thus, that the distance of both the tong parts amounts to exactly the quantity as the outer ends of the small shoulder *d* and *c* stand above each other. This gauge is for the purpose of measuring the height between the plate and bridge, in order to turn the pivot shoulders accordingly. The lower small shoulder is placed into the sink of the plate, and the gauge is sufficiently opened, until the upper shoulder stands on the inner surface, or on the jewel. The opening of the tongs now indicate the distance between both pivot shoulders. It may also easily be measured by the third wheel pinion, how high the wheel must be placed; the fourth wheel pinion is placed in, the gauge is inserted in the sink, and the other shoulder is set at the height the wheel is intended to be.

From the upper wheel face to the lower pivot shoulder is measured with this opening.

Steeple Clocks.

A CORRESPONDENT asks whether the Graham escapement is the best for steeple clocks, to which Mr. Sievert answers in the *Deutsche Uhrm. Ztg.*, as follows: The question requires a greater space for a full answer than is allotted to me in the columns of this journal, and I must confine my remarks to the most necessary. The Graham movement is suitable for steeple clocks only under certain conditions, and if not complied with, the result of the rate may be more unreliable than with the ordinary anchor with recoil. As known, steeple clocks suffer much from the variable condition of the oil, partly on account of the ever changing temperature, and partly because the oil is exposed to the influence of dust and an increased quantity of air. The consequence is a constant variation of amplitude with an unequal duration of oscillation. The inequality is not whatever counteracted by the knife suspension, a little by a spring, most, however, by a good recoil. No good results, therefore, would ever be obtained by combining a pure Graham movement with a knife suspension, and also that of a spring alone would not satisfy by a pendulum which at times makes largely increased oscillations. Within definite narrow limits, the pendulum oscillation is from aforesaid reasons difficult to be preserved, and the more so, because an inequality of the moving power must still be added, either by reason of the changing consistency of the oil, or that the motion of the hands does not always consume the same quantity of power. Although this latter defect is removed at present by the introduction of constant power, or by the use of the so-called remontoirs (automatic winding of a small weight or spring in small periods, thus, that the main weight only operates indirectly with a determined quantity of power upon the rate).

To sum up, the Graham movement requires only a small lifting, a small wheel, and a determined highly equable quantity of power. A constant transmission of power is indispensable with steeple clocks with minute hand. But since a constant power can never be perfectly attained by a Graham escapement, on account of the oil, and also the scape pivots, and the friction of the lifting planes cause the general result to be uncertain, it is commendable by steeple clocks to use a modification of such an escapement, which has been employed to advantage by artisans. The escapement, instead of the customary circular repose planes, is made with a small quantity of rise. The thereby produced trifling recoil is suited to counteract the retarding operation of the more extended oscillations. Of course, the quantity of the recoil must be established by experiments. It depends upon the amplitude and other causes. As unnecessary and doubtful as such an arrangement would be in room clocks, having this more under care for regulating, it answers very well for steeple clocks. The writer of this has the care of a clock, the maximum of which is 1 minute per week, and at times did not need to be corrected in three months. It is provided with a so called remontoir, the scape wheel has 100 to 110 mm diameter.

H. SIEVERT.

Simple and Compound Pendulums.

[BY ERASMUS GEORGI.]

THE PENDULUM is a body suspended on a thread or rod, in a manner suitable for making oscillations from its point of suspension.

Two kinds of pendulums are distinguished: the *simple* and the *compound*. The former is only an imaginary one, because it is assumed that the thread carrying the bob is without weight, wherefore the entire weight is concentrated in one point, the vibrating body, a thing practically impossible. The compound pendulum, on the other hand, has more or less weight in its different parts, and all pendulnms employed belong to this class.

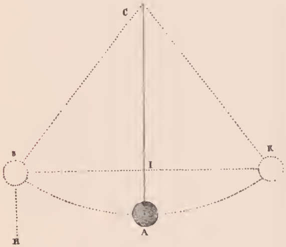


FIG. 1.

Fig. 1 shows us a simple pendulum. *C* is the point of suspension, *C A* the thread carrying the vibrating body *A*. This body *A* can describe a more or less large arc about its point of suspension; *B A K* is such an arc. The motion of the pendulum is caused by the ponderance of the body *A*; if *A* is deviated as far as *B* and then abandoned, it would fall in the direction *B H* vertical to the earth; but, being retained by the thread *C A*, and thus in a uniformly equal distance from *C*, its fall can only occur in the line *B A*. When arrived at *A*, the body has acquired such an impetus, which is equal to that it would have acquired by a vertical fall from *I* to *A*, and in consequence of this velocity the body rises again from *A* to *K*, in a length of time equal to that consumed in making the half oscillation from *B* to *A*. The body after arriving at *K*, cannot remain in a state of repose, but falls again to *A*, in order to rise as high as *B*. These oscillations will be continued in this manner, until an external force stops them. It is commonly accepted that the specific weight of the vibrating body does not materially influence the duration of the oscillations, and would not whatever if it were to make them *in vacuo*. Endeavors to prove this assertion have, until now, been unsuccessful.

The more or less large oscillation arcs of the pendulum are not isochronous. Greater aics consume more time in being accomplished than smaller ones—a fact not alone proven mathematically, but also by experience. These inequalities of duration are of little moment, and of no importance for the measurement of time in civil life. But higher horology was forced to apply means, in the manufacture of clocks for scientific purposes, to make the oscillations isochronous, or, at least, as nearly as possible.

Experience has taught that two pendulums of an equal length, in accordance with the different geographical latitudes under which they oscillate, do not accomplish their arcs in an equal time, but are slower under the equator, and faster when approaching the poles. The cause is not explained with as great a certainty as is supposed. The theory generally taught is that the earth under the equator is thicker, with other words, that its diameter is greater, than that through the poles; consequently, the nearer we are to the equator, the farther we are also from the earth's center, consequently from its center of gravity; and consequently bodies are attracted less under the equator, and consume more time in falling. But experience has taught that the more ponderous the bob, the slower its oscillations, and it agrees with the known experience that longer pendulums oscillate slower than short ones, because the longer the pendulum rod, with that much greater force must the bob at its end operate, according to the laws of the lever. Moreover, it has not yet been proven beyond doubt, that the inhabitants under the equator are farther from the center than those under the poles, in fact, the views of Jacques Cassini appear to be confirmed lately by different degree measurements, that the earth is not flattened, but elongated at the poles.

However, this much is accepted generally that under equal geographical latitudes, also pendulums of equal length will oscillate in the same time, and it has been established:—

1. That the oscillations of the pendulum are accomplished in periods standing in equal ratio with the square roots of their lengths; and,

2. The lengths of the pendulums are to each other as the square of the time of their vibrations; whence follows:

1. That the number of oscillations in a given time stand in inverse ratio to the square root of the pendulum lengths; and,

2. That the lengths stand in inverse ratio to the square of oscillations, wherefore a pendulum making twice as many oscillations as another one in a given time, must be only one fourth as long.

If, therefore, the time is stated in which a pendulum makes its oscillations, and also its length, the length of another pendulum, the oscillation time of which is only given, may be ascertained therefrom. If the length has been given, the number of oscillations may also be ascertained. Jürgensen gives the following example: It is known that a pendulum of 440½ lines in length, makes one oscillation per second, or 3600 per hour. If, now, we wish to ascertain the number of oscillations of another pendulum of 10 inches, or 120 lines in length, we must say: The oscillations of the large pendulum, or 3600, stand to those of the small pendulum, or to x, as the square root of the length of the small pendulum to the square root of the large one; that is:

$$\sqrt{120} : \sqrt{440\tfrac{1}{2}} = 3600 : x.$$

The square root of 120 is $= 10.95$, and that of $440\frac{1}{2} = 20.99$, therefore,

$$10.95 : 20.99 = 3600 : x,$$

$$\text{and } x = \frac{3600 \times 20.99}{10.95} = 6091$$

Wherefore a pendulum of 10 inches, or 120 lines, makes 6901 oscillations in one hour.

To find the length of a pendulum, if its oscillations are given, the above rule is also followed; the length of the known pendulum stands to that of the unknown, or x, as the square root of the oscillations of the unknown pendulum to that of the oscillations of the known. Let us suppose, with regard to the unknown pendulum that the number of oscillations be 7200 in one hour, and we will have the following proportion

$$440\tfrac{1}{2} : x = 7200^2 : 3600^2$$
$$\text{or } 72^2 : 36^2 = 440\tfrac{1}{2} : x$$
$$\text{or } 2^2 : 1^2 = 440\tfrac{1}{2} : x$$
$$\text{or } 4 : 1 = 440\tfrac{1}{2} : x$$

$$\text{and } x = \frac{440\frac{1}{2} \times 1}{4} = 110\tfrac{1}{8} \text{ lines.}$$

A pendulum of 110⅛ lines, therefore, makes 7200 oscillations per hour. It will he seen that it is not difficult by this method to find either length or vibration number.

In the simple pendulum, the entire weight is supposed to be in the oscillating body. In the compound one, however, we have different parts, more or less heavy, according to their size and specific weight of the parts, of which the pendulum is composed. Yet the entire vibrating weight may be considered as united in one single point, called the center of oscillation. The number of oscillations of the simple pendulum is equal to that of the oscillations of the compound one, in which the distance of the oscillating center from the point of suspension is equal to the length of the simple pendulum. The oscillation center of the pendulum can be ascertained, with great difficulties, however, especially if the single parts composing the pendulum are irregular in shape. But these calculations are of no value to the watchmaker, and we will not waste time by explaining them. We simply wish to say that the center of oscillation approaches to the point of suspension with the increasing lightness of the rod, and weight of the bob. The pendulum is resisted by air, also has to overcome a friction in its point of suspension, wherefore these two resistances must be reduced to a minimum, since they continuously strive to lessen the oscillating arc, and finally to stop its motion. The greater the friction and the less capable the pendulum to surmount the resistance offered by the air, the greater must be the external power to restitute the loss of power.

BERTHOUD'S METHOD FOR REGULATING THE PENDULUM.

Berthoud constructed an ingenious contrivance for regulating the length of a pendulum if, a little attempt at the screw hole carrying the bob, makes the pendulum either too long or too short. He fastened with two screws to the foot of the screw a brass part (see fig. 2), the upper part *A* of which embraces the thickness of the bob; axis *L* is cylindric, and perforated with a hole from one end to the other, into which the end of the pendulum enters free and without shake; this end is cylindric and is ended by a thread, upon which move nuts *M* and counter nut *N*. A cylindric cross piece *O*, slides free and without shake over cylinder *L*, and may be fastened at a proper place by screw *P*. It will be seen that when this cylinder is raised or lowered, the oscillation center will be changed at the same time. Attention is paid only to the divisions upon the cylinder, in order to effect the regulating in a very precise manner. Nut *M* is only used when arrived at one of the ends of the cylinder, without having obtained the requisite precision.

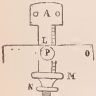


FIG. 2.

JURGENSEN'S AXIOM OF THE PENDULUM SUSPENSION.

The pendulum can be suspended in a two-fold manner, either with a spring, or with a knife edge. Experience has taught that the latter is preferable on account of destroying the pendulum motion less than the spring suspension*, and for this reason, the knife edge has been preferred by several artists. Moreover, it is feared that so thin a blade as the suspension spring, would elongate somewhat by the heavy weight of the bob, especially if this weight, through the oscillations of the pendulum, operates upon the spring with a considerably increased power.

The following is a good manner of suspending: Fig. 3. shows the

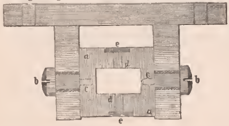


FIG. 3.

bearer (support), supporting the knife. This piece is of cast brass, very strong, and fastened to the clock case.† It may be countersunk into the wood, and fastened by several screws; *a a* is an exceedingly solid and strong square frame, supported upon two pivots, at the ends of two screws, *b b*. This frame is revolvable around its pivots, not without important friction, however. The two grooves *d d* are destined to support the pendulum knife, as shown in fig. 4, in which *d* is the groove. The same cut shows the upper part of the pendulum rod, to which the knife is fastened. Pieces *e e*, fig. 3, are fastened upon the frame *a a*, to prevent the dislocation of the knife.


FIG. 4.

In order to reduce the friction to a minimum, and to make it constant, the following rules must be observed:

1. That the knife be made of excellent steel, and suitable to take a high degree of hardness.

2. That the grooves be also made of good steel. It would be still better to set scales of hard jewel, such as the Oriental sapphire, into the frame, and to work grooves into them.

3. That the angle of the knife be 90°, and a little rounded, or blunted.

4. That the knife rest squarely with all its points in the groove, for which purpose it is important that the angle of the knife be perfectly parallel to the groove; it is equally important to have the angle of the knife as well as the groove highly polished.

5. That both the knife and groove be of sufficient length, and proportioned to the weight of the pendulum. One of twice the weight of another one requires twice as long a knife. An increased length does not augment the friction, but prevents the different parts of the knife and groove from wearing each other.

If the above specified rules are adhered to, the friction will be very trifling and constant. Yet the spring suspension is preferred by many artists, and the evil consequences engendered by wear, need not be feared. The former suspension is liable to much wear, and thus becomes the source of many errors and irregularities. This is the reason why Jürgensen was afraid to employ it in astronomical clocks, and preferred the spring whenever the greatest precision was required. The following was the manner in which Jürgensen suspended his pendulums, and of the excellence of which he satisfied himself by experience.

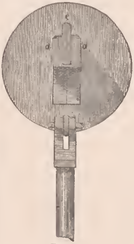


FIG. 5.

Figs. 5 and 6 show the support *A a a* carrying the spring and pendulum. This support is of metal, very strong and solid, nearly three and a half inches in diameter, and fastened in a hole drilled into the ceiling of the clock case. A nut *C* fastens the bearer, and screw *d*, (fig. 6), which passes through the plate, and can be screwed into the wood of the case, prevents this support from turning, when fixed in its place. In part *a a* of the support is a vertical slot, the breadth of which is about two lines, and its depth one inch. Into this slot, the sides of which are perfectly parallel, head *e* of the suspension spring is forcibly driven in. The spring must be of good steel, nearly the thickness of a card, and have the temper of a main spring, that is, be annealed light blue. The spring head is formed of two small

*Berthoud, in his *Essai sur l'horologerie*, published his experiment on suspensions, in which he found that a pendulum with spring suspension contends with ⅙ more resistance than one with a knife, and from this and other reasons, he held that the knife edge should be preferred.

†This bearer may also be fastened to a bridge carrying the clock movement, and this bridge, with its circumference may rest upon a solid wall; but this means, good as it otherwise is, does not permit the transport of the clock case. As much depends upon it, I repeat that not sufficient attention can be bestowed on the solidity of the suspension, because an error in this direction suffices to produce an irregular rate.

copper plates, riveted with several pins upon the upper part of the

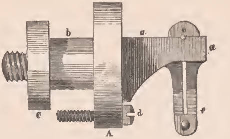


Fig. 6.

spring. This head has a drilled hole of about ⅔ to 1 line diameter, through which pin *e* is driven, for the purpose of supporting the spring in the support slot, as is shown in fig. 6. Two small brass plates are also riveted at the lower end of the spring, through which a hole is drilled to accommodate a pin, which passes both through the plates and spring blade. This is shaped as indicated by *f* in fig. 6, broader above than below. It is opened by a longitudinal slot, two lines in breadth, whereby the spring may be opened at will without increasing its power. In the seconds pendulums executed by Jürgensen, the spring head is 10 lines upon each side of the square, and the spring close to the head of the same breadth, while its lower part is nearly 7½ lines broad; the distance of the lower plates from the upper is 12 or 13 lines. Fig. 7 shows the hook *a*, seen from one side, it is fastened by a screw upon the pendulum rod *b*, and executed in such a manner that it may be suspended from the lower pin of the suspension spring, as is shown in fig. 5.

Fig. 7.

THE MOST SUITABLE MANNER TO LESSEN THE RESISTANCE OF THE AIR.

The resistance offered to a body in motion is proportional to its dimension and the square of its velocity. One body moving with the same velocity of another one, and the surface of which is only half of that of the other one, suffers a resistance amounting to only one-half of that borne by the larger body. The velocity and weight of the pendulum determine the magnitude of its motion, and by them is overcome the resistance of the air. If we suppose the velocity of two pendulums, only weight can alter the moving power, and the greater the relative weight, the more power must be present to conquer the resistance of the air. Hence follows: That for a pendulum a body of great specific weight must be employed and, that the resisting surface of the body must be made as small as possible. Since the spherical form, of all others, is that which decreases most the surface of a body, taking the mass as such, it appears to be especially adaptable for the vibrating body of the pendulum. Since, however, its motion only occurs in two directions, consequently the air offers resistance only upon two sides of pendulum, it is easily seen that the lentil shape is more suitable than the spherical, and is most employed for this reason.

When both friction and resistance of air have been reduced to the smallest possible magnitude, much has been attained for the perfection of a pendulum; still, there is another great hindrance to a correct rate to be overcome; the variations of temperature, which, by lengthening or shortening the pendulum rod, according to heat or cold, causes the latter to oscillate in unequal times. We will presently endeavor to explain the influence of the temperature upon metals, and also the manner to counteract this effect upon the pendulum.

COMPENSATION.

In order to enable a clock to measure time with great precision, it is necessary that the pendulum, its regulator, remain unalterably of one length. This condition is easily deduced from the above-explained properties.

All metals expand with the increase of temperature, and contract with a decrease of the latter; this expansion and contraction does not occur alike in all metals, however. And by this diversity in their expansion it is in our power to annul, to compensate their influences, and we call a compensation pendulum such a one, the oscillating center of which is not altered by the variations of the temperature, owing to the manner in which it is constructed.

From the freezing to the boiling point, for 1 inch in length, iron expands by 0.0146, brass 0.0226, zinc 0.0352 lines; mercury 0.2172 But it must be stated that metals have not always exactly the same degree of expansion. Brass, for instance, expands more or less, in accordance with the greater or smaller percentage of zinc alloyed with the copper. It is said that iron expands according to its state of purity. This holds good with all metals, and it will consequently be seen that it is necessary to test and correct the compensation by actual trials. However, metals lengthen or shorten only in proportion with their length. A metallic rod, three feet in length, and one line in breadth and thickness, does not, by an equal degree of heat, expand more than another one of the same length, but of double or triple its thickness; but the greater thickness longest resists the influence of the change of temperature.

If the degree of expansion of a rod of given length is known, it is easy to ascertain the degree of expansion of another one differing in length. If the length of one rod is taken at 40 inches, and the length of another one at 50 inches, and if the expansion of the former amounts to 0.55 lines, then the expansion degree of that 50 inches is found in the following proportion:

$$40 : 5 = 0.55''' : x;$$

$$x = \frac{50 \times 0.55}{40} = \frac{5 \times 0.55}{4} = 0.6875 \text{ line.}$$

The alteration produced by a change of temperature in the pendulum length, however, is not sufficiently large to materially injure the precision of a clock, and the pendulums used for ordinary clocks require no compensation. They may also dispense with it for the reason that they are exposed only to a very little altered temperature. Astronomical clocks, however, that must be of a great precision, also demand a very exact compensation. It has been found that a clock regulated in the cold of winter in central Europe, loses 20 seconds and more per day, while one regulated in the heat of summer, gains as much in winter.

(*To be continued.*)

The Present Methods of Galvano-Metallurgy.

IN AN address lately delivered by Henry Bouilhet, of the firm of Christofle, Paris, he made the following interesting remarks on galvano-metallurgy, and lately republished in the *Lumière Electrique*, whence we cull and condense them. After M. Bouilhet had sketched a short review on the history of galvano-metallurgy, he endeavored to give a lucid representation of the present significance of galvanic silvering.

A single factory, that of Christofle, annually deposits more than 6,000 kilograms (13,227.600 pounds); since the year 1842, the age of the factory, more than 169,000 kg. silver have been used. The thickness of the galvanic coating averages that 3 g. silver come to 1 cube centimeter. Bouilhet estimated the amount of silver annually used for galvanic purposes, 25,000 kg. for Paris, and Europe and America about 125,000 kg. (1 kilogram = 2.205 pounds) of a value of about $32,000 annually.

The speaker next entered into a description of the decorative effects to be obtained in galvano-metallurgy with green or red gold. These coatings are produced by mixing silver or copper to the gold bath. He said that it was extremely difficult to determine a coating beforehand with such nicety that the desired effects were obtained at once. He next gave an empyrical process for the production of such baths: An electric current is passed through an ordinary brown bath containing 5 to 6 grams gold to 1 liter, using as positive electrode a plate of pure silver. As soon as the metal precipitating at the negative pole has assumed the desired green color, the current is interrupted, the silver electrode replaced by one of green gold, and the bath can now be used for further gilding.

To obtain red gold, the like process is used, with the only difference of using copper instead of silver.

If the composition of such a bath is chemically analyzed, also the deposits, the surprising results will be found that the proportion of the constituents in the bath is the reverse of that of those in the deposit. Thus, green red gold is composed of ⅔ gold and ⅓ silver, but the bath, from which it has been deposited, consists of ⅓ gold and ⅔ silver.

Bouilhet next gives a process for the production of a partial galvanic coating upon a metallic body. The sketch exclusively to be executed in silver or gold, is applied in white lead upon the object to be coated. The remaining parts of the surface is then coated with a varnish that is neither attacked in acids nor alkalies, and the object thus prepared is brought into a bath of very dilute nitric acid, at the positive pole of the battery, the current of which is conducted through the bath. The lead salt is dissolved thereby, and the metal attacked at these places. When the effect of the acid has progressed sufficiently, the object is taken out, rinsed, and at once immersed as negative electrode into a very weak galvanic silver or gold bath. A deposit of the corresponding metal will ensue, which, owing to the rough eaten surface effected by the acid, adheres very tenaciously. When these deepenings have been filed out, the process is interrupted, the varnish removed, and the article is polished by hand, for the purpose of smoothing the deposit, which is apt to be raised a little, level with the surface.

Lenoir published a process in 1858, for the production of raised designs. It consisted in rendering sensitive the interior of a cast, and using it as negative electrode, while a meshwork of platinum wire, which approaches as near as possible to the negative electrode, was used as positive. This process, however, has proven itself to be useless in practice, partly on account of the difficulty of perfecting the positive electrode, partly because it requires a proportionately large capital for platinum wire, for depositing 1 kg. copper for 120 to 140 frs. wire for one month. For this reason, Lenoir's method has been replaced by one of Gaston Planté, in the Christofle's factory. In place of the platinum netting, a lead electrode is used, which may be made conformable with far greater ease to comply itself to the different undulations of the negative electrode. It is perforated with many holes, in order to permit the fluid to circulate freely. The lead is very quickly covered with a slight layer of oxide, and thus becomes the source of a development of oxygen, and is no farther attacked. Such development of oxygen is very important for the regularity of the renewal of the fluid, which will exhaust with time.

Nickelization and galvanic imitation of articles in nickel is done in ammoniacal baths, upon the practical composition of which there has been much dispute. Bouilhet designates as a main condition for the handsome appearance and good adhesiveness of the coating, that the bath be neutral, or very nearly so, and maintained in such an order during the operation; otherwise the coating becomes grey and fracturous. The presence of potash or soda in a neutral ammoniacal bath is not injurious whatever, although the best nickel bath is a neutral bisulphate of ammonia bath.

Bouilhet thinks that the great extension of nickelization during the last few years is less to be ascribed to an improved composition of the baths, than to the adoption of the Gramme machine, as a better, more constant, and much cheaper source of electricity, compared to other machines used until then. Their factory used since 1871, after many unsatisfactory trials with others, a Gramme machine that, by 300 turns per minute, hourly deposits 600 grains silver in four parallel branch conduits, passing through as many baths. Since the adoption of these machines, also the price of galvanic depositing has lowered much. By the use of a galvanic battery, the cost for depositing 1 kg. silver was 3.87 frs., while with the Gramme machine, calculating all working expenses, and everything included, it costs but 94 centimes per 1 kg. silver.

Coloring Gold.

THE following directions for coloring gold alloys are given by Herr E. Schlosser, of Vienna:

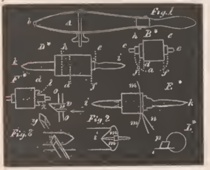
Gold alloys, particularly those containing copper, acquire through repeated heatings during their manufacture, an unseemly brown or brownish black color, caused by the oxide of copper, to remove which they are boiled or pickled in very dilute sulphuric or hydrochloric acid, according to the color they are to have. If we have an alloy containing only gold and copper, either sulphuric or hydrochloric acid is employed, for gold is not attacked by either of them, while the oxide of copper dissolves so easily that after the pickling, the articles have the color of pure gold, for the surface is covered with a thin film of gold. If the alloy consists solely of gold and silver, the liquid employed is nitric acid, and the articles are left in it a very short time; the acid dissolves a small quantity of silver, and the articles acquire the color of gold. If the alloy contains both copper and silver, besides the gold, the method of pickling can be varied to suit the color it is desired to give to it. If, for instance, it is put in sulphuric acid, the copper alone is dissolved, and the color obtained is that of an alloy of gold and silver, for the surface consists of the two. If nitric acid were used, both copper and silver would be dissolved, and in this case the color obtained would be that of pure gold. The articles are gently heated and allowed to cool again before boiling. The object of the heating is to destroy any grease or dust that adheres to it. If they are soldered with soft solder, they cannot, of course, be heated, and must be cleansed from grease and dust by first putting them in a strong lye, then washing with water and putting them in the acid. The acids are used dilute, usually in the proportion of one part of concentrated acid to forty parts of water. The articles are laid side by side in a porcelain or earthenware dish, and the dilute acid poured over them. From time to time one is taken out to see if it is yellow enough. When the proper color has been reached they are washed in clean water and dried. While this pickling is merely to bring out the color of the gold, the coloring of gold has for its object the imparting to inferior goods of the appearance of fine gold. Different mixtures can be employed for coloring gold, two of which are given below as giving very good results. Mix together two parts of saltpeter, one part of table salt, and six parts of alum, with six and a half parts of water, and warm the mixture in a porcelain vessel. As soon as it begins to rise, add one part of hydrochloric acid, and bring the contents of the vessel to a boil, stirring in the meantime with a glass rod. The articles to be colored, suspended on hooks made of strong platinum wire, or of glass, are first dipped in sulphuric acid, and then put in the slowly cooking solution last described, and moved to and fro in it. In about three minutes they are taken out and dipped into a large vessel of water, so as to see what color they are. If the desired shade is not yet attained, they are dipped in again as often as necessary until they do have it. In the subsequent dippings they are only left in the liquid for one minute. Articles colored in this way have a light yellow color, but matted appearance. They are repeatedly washed in water to remove the last trace of the liquid, and then dried in soft sawdust that has been warmed. Instead of drying in sawdust, they can be dipped in hot water the last time, and left in there a few seconds, and when taken out the water that hangs on them will evaporate almost instantly. The second method of coloring gold alloys is by means of a mixture of 115 parts of white table salt and 230 parts of nitric acid, with enough water added to dissolve the salt. This is boiled down to a dry mass of salt. The salt is put in a porcelain dish, and 172 parts of fuming hydrochloric acid poured over it and heated to boiling. As soon as the suffocating odor of chlorine is perceived, the articles to be colored are dipped in, and the first time they are left eight minutes in the liquid. In other respects the treatment is the same as above described. Articles polished previously do not require polishing again. Care must be taken not to inhale the dangerous gas; the operation must be conducted under a draught or out of doors.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

FEW JOBS which come to hand are more dreaded by the young watchmaker than scape wheel pinions, and scape wheel pivots; especially the short pinions in cylinder escape wheels. For such jobs there is no lathe which presents so many advantages as the wax chuck.

I say this with all due defference to the split chucks of the American lathe, which is undoubtedly quicker. For my own work I use an American for roughing down, and getting the lengths; but use my wax chuck (in the American) to finish with. I will give the *modus operandi* as I proceed with this lathe; and then give cuts and description of a chuck for lathes of the Bottum style. The most difficult matter to get at in short pinions is, exact measurements in regard to height, if you have such an instrument as we have described in a former article for getting heights, you are all right; if not, the next plan is to take the measurements from the old pinion. This can be done with the ordinary pinion callipers shown at fig. 1; *A*, representing the callipers, and *i*, the old pinion. The first and essential measure is from shoulder to shoulder as embraced by the dotted line *a*, in diagram *B**, these shoulders of course run against the faces of the jewels. The shoulder shown at *d*, represents the seat of the escape wheel. The space—or length from shoulder to shoulder should be measured very accurately; also the height from the lower shoulder at *c*, to the seat *d*, where the scape wheel goes, as this determines the the height of the scape wheel. All pinions of any pretense to finish, have one end of the leaves faced or flat, and polished; this end should be selected for the lower one shown at *e*. The distance which the shoulder *e*, protrudes below the face *f* is not essential, only the leaves should extend low enough to always present an acting surface to the full face of the teeth of the wheel which engages it. We will assume that our pinion to be turned in is shown at diagram *D**; we first establish the position of the lower shoulder on the line *e*, by putting the pinion into a split chuck with the end *i* protruding, a groove or ring is turned in, only deep enough to fully identify the position of the shoulder *c*. The pinion should now be notched or marked with an edge file to locate the plan of the upper shoulder *h*, and the seat of the scape wheel on the line *d*. The pinion is again placed in the split chuck, and the face *d*, and shoulder *h*, roughed out; but in this roughing out let the exact height of the shoulder *h*, and face *d*, be correctly established. The pinion may have to be removed from the split chuck several times before these measurements are exactly correct. The pinion after this roughing out process should present the appearance shown magnified at diagram *E**. Next comes the finishing in the wax chuck. At fig. 2 is shown the pinion in the wax; here comes another case where experience and judgemnt is required to determine the amount of wax to be used; the cut shows about the right proportion. The wax should first be applied to the chuck, and while hot the pinion pressed in, so the end *i* goes perfectly to the bottom of the hollow cone. The wax should not extend up on the pinion further than to the dotted line *m*, diagram *E**. The centering is done with the finger held against the end *k*. The form of the wax can be modified to a considerable extent, by the position of the flame of the lamp; if it is held well back under the chuck, so as to heat the chuck, and let the chuck heat the wax, while a rapid motion is given to the lathe, the centrifugal force will cause the wax to form a mass of larger diameter and less extent in the direction of the axis; while on the other hand, if the heat is applied to the pinion, and a slow motion, the wax will extend further up on the pinion.

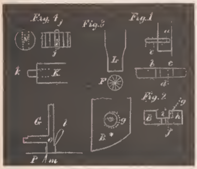


The lower end of the pinion shown at *i*, should be inserted in the wax first, and the pinion brought true with the tip of the finger, managing the heat so as to form the globule of wax of the right shape. Few pinions such as we buy are perfectly true in the round, this can be remedied to a certain extent by holding a piece of peg-wood sharpened wedge-shaped, as shown at *n*; the end of the peg-wood should just touch the edge of the pinion leaves, so as to turn up the pinion from the outside. The process of turning is quite as simple as for a staff, except more caution is to be used—the idea is, to *go very slow* until you know exactly how to do the work. If you notice those persons who complain that they are always breaking their work out of the wax, you will soon discover the secret of their trouble; it is in not having patience enough, and getting spasmodic in turning; and a dull graver is another trouble. In holding a graver to turn, the rule should be, to let it always present an oblique edge as shown in fig. 3; and the best test of the correctness of angles—the evenness of the cutting—is that your chip will be cut in a perfect spiral; although in fine turning the outside of the spiral will not be larger than a fine hair. I have seen such spirals 3 and 4 inches long and still so firm that one end touched to the gas jet, or alcohol lamp, would burn with bright scintellations until all was consumed; presenting all the phenomena which a mainspring does if burned in oxygen gas. This turning with an oblique edge of a graver does not give sharp angles or corners readily, but still with judicious management the cutting can be done quite up to the angle (of the graver — one thing must be avoided and that is, letting the graver get to cutting in a groove of any extent. I mean by this, suppose you are turning a square shoulder and holding the graver as shown in fig. 3, almost as soon as a corner is established, the graver fits the angle and instead of turning a small narrow chip the graver cuts on two faces, and if force enough is applied to make it cut, the pinion leaves are bent, and the whole job broken out of the wax. More trouble comes in turning angles than in any part of pinion work, there can be a great deal done by changing the angle at which the graver is applied. And now for (I suppose, about the thirteenth time, I say, keep your graver sharp. If you see any disposition of the leaves to round and gloss on the edge, sharpen your graver to a perfect angle, and catching a slight chip on some cylindrical position of the pinion, (say at *x*, diagram F*,) carry the cutting forward toward the angle. Facing off the flat or nearly flat seat of the scape wheel, the graver is best held as shown at *y*, diagram *F**. If the graver is held in this way, it is less risky than if held in line to the axis of the lathe. But in the final turning and in the under cutting especially, as shown at *i*, diagram *F**, the graver should be applied as shown at *r*. In making the under cut at *i*, be sure your lathe spindle is entirely free from end shake; let your tool be rest set at right angles to the lathe axis, and high enough so the cutting angle of the graver will correspond to the lathe center. Diagram *L** shows the position of the parts on a section at right angles to the axis of the lathe; *r* shows the graver; *o o* the tool rest. In diagram *F**, the position is also shown, and the arrow *v* shows the direction in which the graver is advanced. The cutting angle of the graver should be a trifle more acute than for ordinary use, and in advancing it, the extreme angle should have constant hold of the solid round or cylindrical part of the pinion (as said above); this prevents chattering. This portion of the work should be done with a firm hand and done as quick as it possibly can be; and not endanger the wax. The portion of the pinion from *d* to *f* should be exactly of the diameter of socket of the scape wheel, and its extent in the direction of its axis a trifle more; so that on riveting it (the pinion) will swell and fit the socket firmly. After the top portion of the pinion is turned, reverse it in the wax, letting the top pivot go to the bottom of the hollow cone at *i*, Fig. 2. The turning of the bottom pivot is so much like all pivots, that it is unnecessary to describe, as I spoke particularly of marking definitely for height the shoulder *c*, diagram *D*.* The lower face *f* we obtained polished with the pinion and needs no further finishing, but you should not destroy the polishby setting it on a rusty old steel riveting stake, a bell metal stake should be used and kept polished. To rivet on the wheel a polished faced punch should be used, and two or three taps with a light hammer does the work. In this, as in all jobs of lathe work, accuracy of measurement is the basis; if your work is only true in all respects, it will go together with great facility. I shall have to defer until next number the description of a chuck exclusively for wax work lathes.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

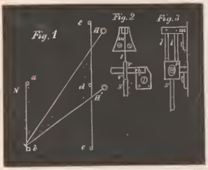
I SHALL have to commence this article with an apology, and I detest apologies; because in nine cases out of ten they indicate gross stupidity or carelessness. In this article I promised in last month's number to give a cut and description of a first-class tool box; a mistake in the cut renders it imperative to put it off until next month. In regard to shifting the great wheel bridge: After the old steady pins are cut off and filed smooth with the bridge, the bridge should be put into place and the two ends secured to the plate with two hand vises, or hand vise and slide tongs. The mainspring and stop work should have been removed so the depth can be tried, and after the bridge is in a satisfactory position screw holes should be drilled in the bridge, by drilling up through plate holes into the bridge. A drill for this purpose should be turned of the exact size to fit the hole, (not too tight of course) then flattened and pointed with a file. The hole should be drilled as deep as possible in the bridge without coming through. A piece of pin wire filed as near cylindrical as possible (*i. e.* with only a very little taper) should be made for a steady pin, it should fit tight when inserted as shown at *a*, fig. 1. If you used oil (which is safest) in drilling, stick out the hole with a piece of pegwood, dipping the peg in alcohol for the last two cleanings. The use of all this is to take advantage of the property which brass has of adhering or welding if the surfaces rubbed together are perfectly clean and bright. The details of this job are worth giving—file your pin until it goes into the hole tight, but will not go to the bottom without forcing; (see at *a*, fig. 1.)—a steady pin should be filed and burnished. Insert your pin as at *a*, and mark it at the dotted lines; these lines correspond to to the ones at *l c* in the enlarged view of the pin below: next lay your pin in your filing block, and with the thick edge of the knife you use to remove dial and plate pins, cut a slight groove by revolving the wire; the line *c* represents the depth to which the pin will go into the bridge; next cut a deeper groove at *b*, this represents the length of the steady pin; next with a sharp pivot file reduce the pin a little from *d* to *b*. Now if your pin is all right and bright, and not been handled, and is inserted into the hole in the bridge and revolved, it will be found to adhere firmly in the hole and twist off at the cut made at *b*. Allow me here to call attention to the use of pivot files for bench use—for many purposes they are invaluable, cutting smooth either brass or steel—another fact is not generally known, a file can be used for brass until it has lost its sharp keen tooth and still, strange as it may seem, will be no way deteriorated for steel, but rather improved. A pivot file for bench use should be mounted firmly in a strong wooden handle, not too large, but proportionate. Some persons may think I am devoting too much time to trifles, to such I would say, the ocean is made up of drops of water; but each one is perfect in itself. After the steady pins are in, put the bridge into position and see how much the screw holes in the bridge are carried over; next, with a small round file, file the hole in the bridge so that a new screw will go freely through the bridge into screw hole in the plate. At fig. 2 is a transverse section of a bridge shown at *B*; the dotted lines at *f* shows the point to which the hole is supposed to be filed over. Now for getting the countersink for the head thrown over. At *B** is shown a plan of one end of the bridge, *i* shows the countersink and screw hole. Take some instrument, a thick edged knife blade is about the best, and bevel off the corner as shown at *g*, fig. 2 and *B**; this beveling should be done so as to bring the screw hole



in the plate in the center of the new countersink. The countersink should be made with a rose drill shaped as shown at fig. 3, in which *L* is a vertical elevation, and *F* an end view. These drills are turned up of steel wire, and about 20 sizes will constitute a set; the end is filed into an uneven number of teeth (11 to 17) according to the size. Such a drill, or flat bottom countersinks as some call them, will catch into the bevel made by the knife and quickly cut a new recess for the screw head as shown at the dotted lines *n*, fig. 2. Such a set of drills are also useful in jewel setting frequently, and for putting in English plate jewels are invaluable. Another job in repairs which everybody has to do, and few do nicely, might as well be discussed here; *i. e.*, teeth in main wheels. This should be done so as to almost defy detection. About three sizes of drills are necessary for different sized barrels; after carefully filing the remains of the old tooth, not entirely off, but just leave enough to give locationand form to the position held by the former tooth, take a fine prick punch and center the tooth to drill for a new one. At fig. 4 is shown an enlarged elevation of the edge of a main wheel; the lines at *j* show the location of the old tooth, *i* the prick-punch mark; this should be slightly enlarged by a 4-square pointed countersink, so as to establish an accurate location for the drill to commence, and it is well to look after the drill starts to cut and see if it is started exactly right. Drill through the rim of the barrel; next select a piece of hard brass wire whose diameter is as shown at *N*, fig. 4; next turn a pin on this which will exactly fit the hole drilled, let the shoulder be square as shown at *K*. To produce this pin rapidly, it is well to drill a hole into the end of a piece of steel wire with one of your three drills, which you should turn up and keep especially for this job. Drill three pieces of steel wire with your three drills and cut the end drilled into a saw teeth; harden these hollow drills. Suppose we have the pin *k* turned nearly small enough, and it should be so turned, for if you attempt to cut the wire downfrom the full size in this way the pin will be both two small and untrue. As said, when the pin *k* is almost to size, apply the hollow drill and instantly it is just right without any measurement; the piece of brass wire for the tooth should be now filed flat as shown at the dotted lines in *N* and *K*. The pin *k* is cut to the right length so the shoulder comes up to the barrel and the pin extends through the rim of the barrel. It should now be soft soldered in and the part extending beyond the other teeth cut off with the cutting pliers. The tooth should now be imperfectly rounded up, and the top of the added tooth cut smooth and even with the upper surface of the barrel. This is best done with a knife, the same knife as recommended above. The manner of using it is illustrated at *G**. *P* is a solid block or stake of some kind, but if a hardened steel stake is used a piece of sheet brass or zinc should be interposed for the knife to cut through upon, to keep it from dulling. The diagram *G* shows a section of a barrel and *o* the tooth to be cut; *l* the position of the knife. The cut should be made at once, pressing the edge against the upper surface of the barrel. A very little practice will enable one to cut off the part of the added tooth which projects above the barrel perfectly even with the other teeth, and the only way in which a tooth in a frosted barrel could be noticed would be by its being bright; and even this can be remedied by making a few indentations to represent frosting with the point of a dull and pointed prick punch. By using an eye-glass the few that is necessary can soon be put ou. The part of the tooth which extends below can be cut off by applying the knife as shown at the dotted lines *m*, turning the barrel over. If more than one tooth is to be added, the same course is to be pursued; using the faintest trace of the broken teeth for a guide to center and drill by. In soldering, the solder should be applied on the inside of the barrel, but the soldering fluid should be applied both inside and outside, and generally the solder will flow through even if the joint seems air and water tight; butif no trace of the solder can be seen on the outside, a very small piece of solder can be applied at the base of the new tooth on the lower side with plenty of soldering fluid and reheated. A solution of cyanide of potassium is one of the best things to annul the effects of soldering fluid; even after this brush off with chalk and alcohol, for soldering fluid is a nasty necessity.

Correct Local Time and How to Obtain it.

AFTER THE perpendicular lines are in position as described in last article, we shall have to give some more details of the manner of using. One thing I forgot to mention in regard to setting the eye piece to exactly correspond with Polaris. If a lantern or lamp is arranged so as to illuminate the fine, white thread at the mouth of the arrangement, it will greatly facilitate its being seen and consequently determining when it corresponds to the north star. The degree of illumination is a matter to be determined by actual experiment; the light should be strong enough so the line is visible, but not detract from the star; or in other words let the line be so illuminated that the eye will readily see both it and the star at once without effort. Another feature in the lines is, the southern line will have to be carried higher than shown in the diagram in last articles, in order to take the sun in midsummer. The southern line should be about $6\frac{1}{2}$ or 7 feet long. Fig. 1. will explain the idea: *H* representing the altitude of the sun on the 22d of June, and *H'* the sun on the 25th of December. It is a very simple matter to extend the line upward from the pin *d* to *c*; any plumb line suspended from above *d*, but passing the appertures in the slide made fast to *c*, must be in the plane of the meridian. To make a little calculation and see how near we can come to true time with one allowidly rude instrument. Measuring diagonally as we must in setting our lines and in getting an observation, (if the lines are four feet apart in parallel), we get obliquely a distance from line to line of (say) five feet, or what would be equivalent to a circle ten feet in diameter, thirty feet (in round numbers) in circumference; consequently inches will represent degrees and $\frac{1}{60}$ of an inch minutes of a degree.



Now it will be seen that if we have no errors to exceed $\frac{1}{60}$ of an inch in our arrangement, (and an error to this extent would betray gross carelessness), that we can observe to one minute of a degree which is equal to 4 seconds of time. I can confidentially say, that with firm wires 6 feet apart, carefully arranged as directed, no error should occur to exceed 2 seconds of time. In using the instrument with the sun, a little experience will be necessary to judge exactly when the disc of the sun seems to touch the wire or plumb line. Undoubtedly it would be the best for a beginner to use some of the fixed stars or planets; only to the novice few of the fixed stars are known; but for those who will take the trouble to learn it is much the best way. We have for the next few months no planets passing the meridian until late, or rather early in the morning; and the same is true of Polaris, it is not exactly north until about 2 o'clock in September; but the reader can procure a copy of the American Nautical almanac, and in the back part he will find many useful instructions. This almanac gives the meridian passage of planets to minutes and tenths of a minute (6 seconds); and R. A. (right ascension) to $\frac{1}{100}$ of a second, which admits of calculation for meridian passage to fraction of a second. The next question to be considered in this series, is the different kinds of time keepers to be used for regulation. First and foremost stands the Astronomical clock; we have several kinds of these in use, varying principally in the escapements and method of compensation. Next in favor are marine or box chronometers. We shall proceed to consider these two classes in their order. An astronomical clock, or regulator as they are more frequently called, should accurately be constructed and jeweled at least in the pallets. Accuracy of construction in a regulator is of great *eminent* importance, if I may be permitted to use the word in this sense. Starting with the proposition that all attempts to isochronize the vibrations of the pendulum, have practically up to the present time been to a certain extent failures; it behooves us to ensure in every way the constancy of the arc of vibration. This would seem at first thought to be simple enough, and so it would if that a perfectly constant force could be applied to a pendulum so suspended and constructed that the center of oscillation and point of suspension should always be at the same distance apart. It might well be added here, that, as far as theory goes, a pendulum ball suspended in a vacuum, if without friction at the point of suspension, and once set in motion, would continue to vibrate forever. But it is well known, unfortunately, that we have frictions (unequal at that) to contend with. It is best first to analyze the disturbing influences, and then consider the best means in our power for correcting them. As hinted above the first thing to be considered is perfect construction of the train. This can only be accomplished by the use of the most perfect tools in the hands of the most skilful workman; and it would be a species of hardihood for any ordinary workman, with any tools in his reach, to attempt a fine clock with any hopes of attaining any great degree of accuracy. However, to any person who may have an ambition in this direction, I would say: if you wish to construct a clock running with a weight; buy your train and plates, and content yourself with making the pendulum and ball—with perhaps the weight. The pendulum complete of a fine clock is quite half the expense, excluding the case. Trains with plates, or we may say, movements, can be got made in either New York, Philadelphia, or Boston. Any dead beat escapement with jeweled pallets will answer; and if the holes to the scape wheel and pallet staff are jeweled, so much the better; but this is not of vital importance. It is better to take the maker's form of escapement (if dead beat), than to have one made of a pattern the workman is not used to. In regard to heat and cold compensation, all things considered, a mercury ball is probably the best. I do not give this advice *ex cathedra*, for I know of excellent results from other methods of compensation; but I think that out of 100 competing clocks, equally well made, that the mercurial ball would show the highest average. About 15 pounds of quicksilver is heavy enough for a ball, and should be divided into two glass vessels; such vessels can be had of any material dealer in all our large cities. Tubes of the Howard style are about the best, as they are longer and admit of a higher column of mercury. There is a feature of compensating for our climate which is seldom taken into account, and that is, the temperature of the air in a room at different heights from the floor. This is especially noticeable in cold weather, a thermometer which would mark 75 degrees at 6 feet from the floor, would show only 60 one foot from the floor. For this reason it is well to let our column of mercury stand about $9\frac{1}{4}$ inches high in the glasses, although theoretically this height would over compensate.

A few little suggestions and novelties in the details of construction may not be amiss.

To commence with the suspension; this spring should not be thicker than is absolutely safe; and the thickness should be alike from end. By safe, I mean capable of sustaining 5 or 6 times the weight imposed upon it. To guard against accidental breaking of the suspension and consequent destruction of mercury glasses, at Figs. 2 and 3 is shown the plan of a safety guard in connection with a suspension spring. Fig. 2 is an elevation of the device seen at right angles to the plane of the pendulum's motion *m* is the ordinary suspension stud; *l* suspension spring; *s*, top of pendulum rod; *r* piece att op of pendulum rod, and also serves to hold lower end of suspension springs. The feature of this device is, that plate *r*, is pierced with a hole shown at *n*, fig. 3, and at *n*, fig. 2, is shown a projecting finger which is attached to a piece firmly screwed to the movement plate. Now in all ordinary vibrations of the pendulum, the hole in the plate *r* swings back and forth over the finger *n*, and does not touch it, but let the suspension spring break, then the hole in *r* catches on the finger *n*, and no damage is done except to suspension spring. The frame work which surrounds and holds the glass mercury vessels, is a matter of taste and skill, and needs no especial description; but methods of fine adjustment are very desirable and will be described in my next, as well as an electric independent pendulum, which has several things to recommend it; among these are a constant motive power and consequently always the same arc of vibration.

Foreign Gossip.

QUERY.—A watchmaker, correspondent in the *Revue Chronométrique*, in search of knowledge, asks what a *time ball* is. Will somebody rise and explain?

LITERARY.—Mr. C. Saunier, Paris, beside issuing a most excellent journal, the *Revue Chronométrique*, is publishing at present, "The art of measuring time—History of horology," *ad seriatim*, in said journal.

POOR IRELAND.—On the veracity of the *Journ. Suisse d'Horlo.*, we publish the following: An Irishman lately saw a clock with dial showing both Greenwich and Dublin time, the latter of which was twenty minutes in retard to the former. He asked the reason, which was explained to him. "Twinty minutes behind Greenwich time, is it? Sure, an' it's another bloody piece of injustice on poor ould Ireland, be jabers."

FRENCH TRADE MARKS.—The Paris *Chambre de Commerce* is about to take steps for preventing the wholesale French trade mark robbery in foreign countries, and to protect home interests. In England and Belgium, for instance, certain unscrupulous manufacturers label or stamp their wares with the word "Paris," and sell them in France. The Chamber has decided that it will appear as a party in law against any importer who shall thus mark his goods.

EXPOSITION OF ELECTRICITY IN RUSSIA.—The French journal *Electricité* announces that the example of Paris will not be followed alone in London, but also in St. Petersburg, which intends to hold its Exposition of Electricity. It will be under the auspices of the Electro-technical Society, which, for several years past, has issued a very interesting journal, containing a large number of original articles; it is not yet known whether the affair will be national or international.

THE WORLD MOVES.—Some time last year we published a short item on the probabilities of an exposition in Shanghai, China. Our China exchange, the *North China Herald*, lately contained an interesting leader bearing on the question. It reviewed the field, dwelling among other things, on the many advantages that would accrue to Chinese commerce, arts—in fact, to every branch of Chinese industry. It is not unlikely, by any means, that something of the kind may occur within one or two years.

—An ingenious method of obtaining mirror-like designs on glass has been devised by Leclerc. The glass, having been silvered by the chemical process, is coated with a thin and uniform layer of sensitive bitumen, and this is exposed under a transparency, the next step being to wash away the unaltered bitumen with oil of turpentine, so as to leave the bituminous design on the silvered glass. The application of moderately strong nitric acid removes the silver, excepting where it has been protected by the bitumen, so that the metallic design shows like a mirror from the reverse side of the glass. The plate may be backed by paint or any other suitable material.

A TRAVELING EXPOSITION.—An English company has been formed for the purpose of organizing a floating commercial exposition. A steamer of 3,000 tons, the *Viceroy*, has been fitted up in London, and is about to take on board a great variety of products of English exhibitors. It will make the tour of the world, and stop in the principal ports of different countries.

The purpose of this novel enterprise is to place the specialties of the manufacture of London, Birmingham, Manchester, and other vast centers of industry, under the eyes of foreign purchasers, and thereby save them the trouble and expense of visiting England.

The *Viceroy*, whose entire interior has been fitted up into exposition rooms, will pass Gibraltar, cross the Mediterranean, the Suez Canal, visit Ceylon, India, Australia, Fiji Islands, Tasmania, the Cape of Good Hope, Madeira, etc. It is presumed that this floating exposition will meet with scarcely less success than an international one.

VAUCANSON AND THE ACADEMY.—Jacques de Vaucanson, born in 1709, at Grenoble, France, was, perhaps, the greatest mechanician of his age; he constructed many marvelous automatons, which excited the wonder and admiration of Europe. For the tragedy of Cleopatra, he made an adder, which appeared to be alive, and had the peculiar snake-like motion, it hissed, and pierced the queen's breast.

Vaucanson, after much trouble, was admitted to the Académie des Sciences; the *savans* reproached him for not being a geometrician. Vaucanson responded:

"Never fear, gentlemen; if a geometrician is all you want, I'll go and make you one."

REMARKABLE DISCOVERY.—A remarkable discovery, the result of which may be of importance, has been made by Mr. Spring. In 1850, Faraday discovered that two pieces of ice, strongly pressed together, very quickly adhered and formed a homogenous mass, although he considered this property as a peculiarity simply belonging to ice, and his theory is still explained thus in mathematical and philosophical classes. But Mr. Spring has found out recently that the most diverse body behaves in a similar manner, when submitted to the same process. He took fine powders and submitted them, in a steel mould, to pressures varying from 2,000 to 7,000 atmospheres; under these conditions, the iron filing was transformed into a solid block, not showing the least traces of granular structure, when examined by the microscope. At 5,000 atmospheres, lead became fluid, and zinc gave blocks of a crystalline structure. This discovery may perhaps be used for molding metal without reducing it to fusion.

THE ZURICH NATIONAL EXPOSITION.—We have abstained until now from mentioning the Swiss National Exposition, to be held at Zürich, in 1883, although our readers may have read notices thereof in the daily press. The Committee on Horology is composed of the following gentlemen: For the Canton of Neuchatel, Messrs. Favre-Perret, Jules Jurgensen (both of Locle), Ch. E. Jacot and Paul Perret (both of Chaux-de-Fonds); for the Canton of Geneva, Messrs. Alexis Favre, J. Rambal and Cingria; for the Canton of Berne, Messrs. Brönnimann (Bienne), and E. Francillon (St. Imier); for the Canton of Vaud, M. Pignet (Orient de l'Orbe); finally, for the rest of Switzerland, M. Thommon (Waldenbourg), for the county of Basle. The presidency has been confided to M. Jurgensen, and the functions of secretary to M. Brönnimann. It was decided at this meeting to take astronomical clocks from group XIII (horology), and to insert them into group XXXII (instruments of precision and scientific apparatus; applications of electricity), also to divide horology into five classes: Horology of precision, civil horology, current horology, materials and detached piece, and steeple horology, and to declare horological schools out of competition, by arranging their works and demonstration models into group XIII, and into group XXX (education, instruction, literature and sciences), their designs and theoretical pieces.

Collections will be admitted, but the recompenses only attach to individualities. Moreover, the Committee has decided, on the proposition of one of its members, that no recompense would be awarded to group XIII; it admits, in effect, that a national exposition does not, like an international one, give rise to a strife, and that there should be neither conquerors nor conquered, but that an exposition of this kind should, above all, simply show the industrial and commercial resources, when a country concentrates all its forces into one effort. That horology is not the only industry in this case; in effect, two other great industries, that of machinery and silk, have already renounced all ideas of recompense, and group XXX, mentioned above, has equally been declared out of "order."

However, the Committee has decided to consult the exhibitors before formulating its final decision, which will be done at a later sitting.

The group of bijoutèrie has demanded to exhibit with horology, which the Committee entertained with unanimity.

Since the sitting of March 10, the Committee of Experts has been completed by three new members: Messrs. Aug. Jaccard (Lausanne), Marc Glaser (Geneva), and Dubail (Porrentruy).

Workshop Notes.

To Remove Rust.—If you immerse the articles in kerosene oil, and let them remain for some time, the rust will become so much loosened that it will come off easily.

Diamond Files.—Shape your file of brass, and charge with diamond dust, as in case of the mill. Grade the dust in accordance with the coarse or fine character of the file desired.

Cleaning-pith.—The stalk of the common mullen makes the best pith for cleaning pivots. The best time when to gather it, is winter, when the stalk is dry. Some use cork instead of pith, but it is inferior.

To Frost Watch Plates.—Watch plates are frosted by means of fine brass wire scratch brushes, fixed in a lathe, and made to revolve at great speed, the end of the wire brushes striking the plate, producing a beautiful frosted appearance.

To Case-harden Iron.—If you desire to harden to any considerable depth, put the article into a crucible with cyanide of potash, cover over, and heat altogether, then plunge into water. This process will harden perfectly to the depth of one or two inches.

To Draw Temper.—If you wish to draw the temper from part of a small steel article, hold the part from which you wish to draw the temper with a pair of tweezers, and with your blowpipe direct the flame upon them—not the article—till sufficient heat is communicated to the article to produce the desired effect.

To Temper Clicks, Ratchets, etc.—Clicks, ratchets, or other steel articles, requiring a similar degree of hardness, should be tempered in mercurial ointment. The process consists in simply heating to a cherry red and plunging into the ointment. No other mode will combine toughness and hardness to such an extent.

To Temper Gravers.—Gravers and other instruments larger than drills may be tempered in quicksilver, or you may take lead instead of quicksilver. Cut down into the lead, say half an inch, then, having heated your instrument to a light cherry red, press it firmly into the cut. The lead will melt around it, and an excellent temper will be imparted.

Restoring Watch Dials.—If the dial plate is painted, clean the face off with spirits of wine, or anything else that will render the dial perfectly clean; then heat it to a bright red, and plunge it into a strong solution of cyanide of potassium, then wash in soap and water and dry in box dust. Repeat if not a good color. India ink, ground with gum water, will do for the figures.

To Blue Screws Evenly.—Take an old watch barrel and drill as many holes into its head as you desire to blue screws at a time. Fill it about one-fourth full of brass or iron filings, put in the head, and thus fit a wire long enough to bend over for a handle, into the arbor holes—head of the barrel upward. Brighten the heads of your screws, set them point downward into the holes already drilled, and expose the bottom of the barrel to your lamp till the screws assume the color you wish.

Jeweling.—In using the broaches, press but lightly upon the jewel hole, and turn the broach rapidly with your fingers. For polishing, use a bone or ivory point lighly coated with the finest diamond dust and oil, and, while using it with the one hand, accompany the motion with a slight, oscillating motion of the other hand, in which the jewel is held. This will ensure a more even polish to the hole, with less liability to press the jewel out of its place in the plate, than if held firm and steady.

To Temper Drills.—Select none but the finest and best steel for your drills. In making them, never heat higher than a cherry red, and always hammer till nearly cold. Do all your hammering in one way, for if, after you have flattened out your piece, you attempt to hammer it back to a square or round, you will ruin it. When your drill is in proper shape, heat it to a cherry red and thrust it into a piece of resin or into mercury. Some use a solution of cyanuret of potassia and rain water for tempering their drills, but the resin or mercury will give better results.

Making Pivot Files.—Dress up a piece of wood file fashion, about an inch broad, and glue a piece of fine emery paper upon it. Shape your file then, as you wish it, of the best cast steel, and before tempering, pass your emery piece several times heavily across it, diagonally. Temper by heating to a cherry red and plunging it into linseed oil. Old worn pivot files may be dressed over and made new by this process. At first thought, one would be led to regard them too slightly cut to work well, but not so. They dress a pivot more rapidly than any other file.

To Make a Diamond Mill.—Make a brass chuck or wheel, suitable for use on a foot lathe, with a flat, even surface or face about 1½ or 2 inches in diameter; then place a number of the coarsest pieces of your diamond dust on different parts of its face, and with smooth-faced steel hammer drive the pieces of dust all evenly into the brass to nearly or quite level with the surface. Your mill, thus prepared, is now used for making pallet jewels, or for grinding stone and glass of any kind. For polishing, use a bone or boxwood chuck or wheel, of similar form to your mill, and coat it lightly with the finest grade of your diamond dust and oil; with this, a beautiful polish may be given to the hardest stone.

Diamond Broaches.—Make your broaches of brass the size and shape you desire; then, having oiled them slightly, roll their points into fine diamond dust till entirely covered. Hold them then on the face of your anvil, and tap with a light hammer till the grains disappear from the brass. Great caution will be necessary in this operation. Do not tap heavy enough to flatten the broach. Very light blows are all that will be required; the grains will be driven in much sooner than one would imagine. Some roll the broach between two small pieces of steel to imbed the diamond dust. It is a very good way, but rather more wasteful of the dust. Broaches made in this way are made for dressing out jewels.

Drawing Temper.—The following method is said to be excellent for drawing the temper from delicate steel pieces without springing them: Place the articles from which you desire to draw the temper into a common iron clock key. Fill around it with brass or iron filings, and then plug up the hole with a steel, iron or brass plug made to fit closely. Take the handle of the key with your pliers, and hold its pipe into the blaze of a lamp till nearly hot, then let it cool gradually. When sufficiently cold to handle, remove the plug, and you will find the article with its temper fully drawn, but in all other respects as it was before.

You will understand the reason for having the article thus plugged up, while passing it through the heating and cooling process, when you know that springing always results from the action of changeable currents of atmosphere. The temper may be drawn from cylinders, staffs, pinions, or any other delicate pieces by this mode, with perfect safety.

Other Methods for Tempering Springs.—Having fitted the case according to your liking, temper it hard by heating and plunging into water. Next polish the small end so that you may be able to see when the color changes. Lay it on a piece of copper or brass plate, and hold it over your lamp, with the blaze directly under the largest part of your spring. Watch the polished part of the steel closely, and when you see it turn blue, remove the plate from the lamp, letting all cool gradually together. When cold enough to handle, polish the end of the spring again, place it on the plate, and hold it over the lamp as before. The third bluing of the polished end will leave the spring in proper temper. Any steel article to which you desire to give a spring temper may be treated in the same way.

Another process, said to be good, is to temper the spring as in the first instance, then put it into a small iron ladle, cover it with linseed oil, and hold over a lamp till the oil takes fire. Remove the ladle, but let the oil continue to burn until nearly all consumed, then blow out, re-cover with oil, and hold over the lamp as before. The third burning out of the oil will leave the spring in the right temper.

Trade Gossip.

Serpent bracelets are still fashionable.

Quite a number of buyers from Chicago and St. Louis are in town.

In jewelry there are a number of bold designs, almost barbaric in tone, so glaring is the expression.

About the only thing a city man can find to take in the country is a long walk or a turn at the grindstone.

When ten-cent pieces again become fashionable as articles of jewelry, every man can wear a dime-and-pin.

Mr. Samuel Swartchild, of Messrs. Kearney & Swartchild, recently returned from a protracted business trip in Europe.

E. Faber presents a large and attractive line of gold pens, pencil cases, tooth picks, etc., that cannot fail to compel attention.

It is rumored that Louis W. Levy, of the firm of Levy, Dreyfus & Co, is soon to be married to Miss Annie Kubil, of this city.

H. J. King has been elected first Vice-President of the New York Jewelers' Club, in place of J. B. Bowden, who positively declined to serve.

Goldsmith, Stern & Co., is the name of a new firm who have just established themselves in the manufacturing jewelry business at 5 Maiden Lane.

"What if we were all kings?" asks a scientist. Our friend Buell says that if ever he holds such a hand, he'll raise the other fellow's ante till he can't rest.

James W. Todd, a well known jeweler of this city, is a member of the American rifle team, and was selected as one of the team to compete with the Canadians.

Link & Conklin's patent bracelet is rapidly growing in popularity. They may be found in the stock of the principal jobbing houses through-out the country.

A diamond, said to be worth $7,000, was recently found in the bed of a creek, near Danbury, N. C. Several alleged diamonds have been found in that locality.

Mr. A. Wettnauer, of the house of J. Eugene Robert, the well-known watch importer, arrived in the steamer *Laurent* from a very successful business trip in Europe.

Day & Clark, manufacturing jewelers of Newark, have opened a very neat and attractive office at 192 Broadway, where a full line of rich goods of their own manufacture may be found.

The old and well-known firm of Wittich & Kinsel, of Columbus, Ga., has been dissolved by mutual consent, Mr. Kinsel retiring. Mr. A. Wittich will continue the business of the late firm.

A Denver jeweler was recently struck by lightning, and says he distinctly remembers the sensation. When a Jerseyman gets hit in the same way, he forgets everything except "settemup again."

E. G. Webster & Bro. have just issued an illustrated catalogue, showing the various styles of electro-plated goods manufactured by them, copies of which will be forwarded to dealers on application.

It is reported that a new watch company, with a capital of $100,000, is about to start business in Indiana. This will give the four managers $25,000 each a year, for one year, or $50,000 a year for six months.

The many friends of Mr. James Hedges, of the house of Wm. S. Hedges & Co., will be pained to learn that he has been quite ill since his return from Europe, and has been ordered to the seaside by his physicians.

Bawo & Dotter, one of the most extensive importers of Bisque goods, Minton, Royal Worcester and Dresden ware in this country, offer an extensive assortment of these goods in all the varieties of artistic decoration.

James Hope, a bookkeeper in the employ of Cragg & Co., jewelers, Brooklyn, is reported to have absconded with $600 or $700 of the firm's money. The detectives overhauled him at Niagara Falls and brought him back to town.

The New York creditors of Benjamin Bradley, wholesale dealer in watches and clocks, at Nos. 21 and 23 Federal street, Boston, have received notice of his failure. He has been in business over twenty-five years, and a short time ago was supposed to be worth $150,000. He owns considerable real estate, which is assessed at $24,000, and mortgaged for $17,500.

The bank cashiers who are now languishing in prison have plenty of time to ponder over the fact that they must have been very poor arithmeticians, as they are now furnishing frightful examples for certain clerks in jewelry houses.

Bernard Pol, of Bangor, Me., has had on exhibition a very fine specimen of green tourmaline of rare beauty and perfection. It was found at Mount Mica, and has been cut by Samuel Reynolds, the well-known lapidary of Boston.

Lodwick & Nolting, who recently opened a wholesale jewelry establishment in Cincinnati, have stocked up with a full line of new and desirable goods, selected with great care and especial regard to the requirements of all classes of buyers.

Noterman & Jonas, the well known jewelers of Cincinnati, present an attractive line of goods known as ophir diamonds, tastefully mounted in numerous designs. These goods are meeting with quite a ready sale, and are rapidly growing in public favor.

C. A. Estberg & Son, of Waukesha, well-known jewelers, who enjoy a high reputation in their vicinity, have just completed and moved into a new store. They have fitted it up in an attractive manner for the display of a full line of desirable jewelry.

John A. Awalt has opened an establishment in Cincinnati, Ohio, for the purpose of conducting a general jobbing business, also the manufacture of a patent regulator for watches, a description of which will be found in his card in this issue of The Circular.

Messrs. Frohme & Mansfield, the well-known jewelers of St. Paul, Minn., are now comfortably settled in their new business home. They present to the good people of that enterprising city, a carefully and well-selected stock of jewelry that cannot fail to attract critical buyers.

There has been a large number of cheap jewelry buyers in the city during the past month. They made extensive purchases of soft solder goods, which, if they succeed in selling, will give to the women of the rural districts, the most *gilty* appearance of any class to be found anywhere.

The Gotham Manufacturing Company's branch store in Chicago is proving of great convenience to the smaller class of dealers in the great west who visit New York but seldom. A full line of their goods can be found, and selections made quite as satisfactorily as at their stores in this city.

W. S. Ginnel, son of Mr. Henry Ginnel, recently returned from Europe, after a very successful business trip. Mr. Ginnel visited the principal marts of trade in the old world, and made some very advantageous purchases for the old house, of which he and Mr. Simmons are soon to become members.

John Wilson's Sons have recently issued a very neat and admirably designed catalogue of fancy bronze goods, etc. It is handsomely printed on fine tinted paper, and in the best style of the typographical art. The work is designed by Mr. Reed, a gentleman who knows how to handle type to the best advantage.

Messrs. Hagstoz & Thorpe, the well-known watch case manufacturers of Philadelphia, have one of the most comfortable and attractive offices in this city. Their new branch office at No. 14 John street, has been fitted up with every requisite for the display of goods and the convenience of their customers.

A jeweler has long dunned a lady of fashion for the amount of his big bill, but in vain. When he rings the bell the footman says politely but firmly, "Sir, the Countess receives only on Tuesdays." "I don't care when she receives," thunders the irate and long-suffering creditor, "what I want to know is the day that she pays on."

The noiseless clock introduced by Mr. F. Kroeber, illustrations of which appear in his advertisement on page 5 of this journal, are among the latest horological novelties presented this season, and will doubtless become universally popular. They are handsomely mounted in a variety of tasteful designs and are accurate and reliable time-keepers.

The prevailing style of dog for this season will not not be changed to any marked degree. The window brush dog continues to continue in favor among young women who have been crossed in love and have the dyspepsia. A favorite style of dog has a princess nose, and is trimmed with an ostrich plume tail tightly curled over the polonaise. The Prince Albert cutaway dog is not used in warm weather. City dogs that undertake to depopulate the country fields of the ornate and festive bull will be gored. Shaggy dogs will be worn with the hair bouffant around the neck, plain about the waist and polonaise, a pompadour tail and their necks adorned with a gold or silver collar.

D. L. Safford's new reference book, on page 25, State of Illinois, gives the town of "Champaign, Champaign Co. Pop. 5,103," with the names of four jewelers. If "Pop. 5,103" has any figurative reference to the number of times Champaign has been "pop'd" during the year among the four jewelers, there's a field for John B. Gough in that section.

B. F. Norris, of the firm of B. F. Norris & Co., of Chicago, one of the most enterprising and successful firms in that city, whose mammoth establishment excites the wonder and admiration of all visitors, owns a beautiful country seat at Geneva Lake, where he occasionally retires for recreation and rest from the anxiety and care of his extensive business.

The Dueber Watch Case Mfg. Co. are now producing 4,200 gold and silver watch cases a week. In the August number of THE CIRCULAR we stated that their production of cases for the first six months of this year was 3,000 more than for the production of the corresponding six months of last year. The increase should have been stated as 13,000 instead of 3,000.

Some very fine specimens of trilobites, one of an extinct family of crustacea, found in the earliest fossiliferous strata, and claimed by geologists to be the oldest specimens of created life, have been discovered at Trenton Falls, N. J., and are mounted to be worn as scarf pins, watch charms, ear rings, etc., and they highly prized by those who appreciate their scientific importance.

Messrs. Lapp & Flershem, of Chicago, universally known as the Busiest House in America, have recently added a Material and General Supply Department, complete in every detail, and under the management of practical salesmen thoroughly familiar with the requirements of buyers. They are thus enabled to fill intelligently and promptly all orders committed to their charge.

Certain cheap jewelry manufacturers of Providence, seem to have been making a raid on the primary departments of public schools, in order to obtain drummers to represent them in New York. These adolescent youths may be seen in swarms about the Astor House, chewing toothpicks or smoking cheap cigarettes, while watching for an opportunity to make themselves personally offensive to buyers.

John Raber, who has for several years been employed as chief bookkeeper by Benjamin Allen & Co., of Chicago, recently disappeared suddenly with a large amount of money belonging to the firm. He sailed for England in the steamer *Nevada*, but his arrival was anticipated by a cable dispatch, and when Mr. Raber landed he was taken into custody by a detective. He was booked under an assumed name.

A royal commission has been examining into the guilds of London to see if they are making proper use of their enormous funds. The guilds admit the possession of property yielding $3,750,000 per annum. The sums spent by the companies in dinners is said to amount to nearly $365,000 per annum, the Goldsmiths' Company alone being reported to have spent $300,000 in that way within ten years.

The watch company mania has attacked Lexington, Ky. It would not surprise us if every town of 20,000 inhabitants started a watch company in the next five years. But of all the starters, how many will pass under the wire at the end of the race? It is sad to see this disease spreading to such an alarming extent, when it would be so easy to furnish its projectors and propagators comfortable quarters in an insane asylum at one-hundredth part the cost.

A decision has been rendered by Judge Lowell in one of the United States Courts to the effect that coins with holes in them are in no wise fraudulent so long as they are full weight. Even plugging them with base metal does not impair their value provided no silver is lost. Coins with holes in them are nevertheless open to the suspicion that the silver has been punched out. As it is inconvenient to weigh them, their withdrawal from circulation would be a good thing.

The following incident is said to have recently occurred in a town not 100 miles from this city. An old farmer had just returned from town, and for the first time in his life possesses a watch, which he "bought in the Bowery, and the man sed it was a stunner for timekeeping." Turning to his son, he says, "Come here, Jed, and see the inside of the thing. There, that thing," pointing to the regulator, "the man sed, made it go just as yer wanted it ter, but what do yer s'pose that F and S means on that piece that's marked off? Hanged if I can make it out." "Let's see, dad," says Jed, "I'll bet I know; it's ter regerlate the thing, and tells yer when ter do it. F is for forenoon and S is for 'sarftnoon." The old farmer gazed at his son with admiration, and says, "There, ma, didn't I allus tell you Jed was a born watchmaker?"

M. Knepfly, Jr., of Messrs. J. Knepfly & Son, the well-known jewelers of Dallas, Texas, has been in town making extensive purchases. Mr. Knepfly is a thoroughly practical and skilful workman in all the branches of the horological and goldsmith's art, and possesses exquisite taste in the selection of goods. The good people of Dallas will find at their establishment a well-selected stock of the most desirable and artistic goods made in this market.

Some idea of the extent of the American Watch Company's factory at Waltham, Mass., may be formed from a statement of its dimensions: The buildings cover an area of 48,374 feet; the frontage on the street is 754 feet; length of main building, 646 feet; aggregate length of twelve wings, 1,137 feet; length of benches, 3.87 miles; length of shafting 3.93 miles. The machinery is driven by an engine of 100 horse power. Nearly 1,800 persons are employed in the factory.

The customs officers, upon searching the steamer *St. Laurent*, recently arrived from Havre, found in the baggage of D. Chalumeau, a passenger, 225 scarf pins, 96 gold rings, 13 gold watch chains, 43 breastpins, 24 diamond settings, 3 diamonds, 30 cameos, 213 unset pieces of jewelry, and a quantity of other jewelry. The goods were taken to the seizure room, and the United States District Attorney has began suit in the District Court for the confiscation of the property.

Phillip Bissenger & Co., the well-known diamond importers, have in their possession one of the most exquisite diamond necklaces ever seen in this country. It is composed of 38 large graduated and well-matched stones, weighing in the aggregate 156 karats, and is valued at $50,000. The stones have been selected after years of search in all the markets of the world, in order to obtain those of the right color and brilliancy, and of a size to graduate regularly. The firm has also a very select display of highly artistic diamond goods.

G. N. Joyce, of this city, has made an assignment to Parmenas Castner, giving the following preferences: Elinor Joyce, $6,054; George G. Joyce, his father, $5,344.69; Martha Joyce, $6,925.93. A statement was recently presented to his creditors, showing liabilities $33,000 and assets about $20,000. Mr. Joyce offered to compromise at twenty-five cents on the dollar. The immediate cause of the failure was a suit in the Marine Court for about $1,900, brought by a sister, who had an additional claim for $4,000. It is also claimed that he suffered heavy losses through the alleged dishonesty of an employee.

For the last six weeks Maiden Lane has been all rooted up, first by gangs of men laying the electric light wires, and next by gangs laying the steam heating pipes. Great complaint is made of the intolerable delay in completing the work, especially that controlled by the steam heating company. Their principal ambition seems to be to make the streets impassible, and having done so, to leave them in that condition as long as possible. Property owners and occupants of buildings apparently have no rights these corporations are bound to respect.

A curious set of silver, which once belonged to Charles Fechter, the actor, is displayed for sale in the window of a Bowery jeweler. It was bought by the present owner in a Philadelphia pawnshop, where it had been left by an actress. The set consists of 135 pieces of solid silver, and originally cost $1,000. There are three dozen knives, including dinner and tea knives, fish knife, game knife, and pie knives; gravy ladles and soup ladles; three dozen forks; a dozen table spoons, a dozen dessert spoons, mustard spoon, sugar spoons, salt spoons, tea strainer and sugar sprinkler. The set was made in Paris, and is contained in a handsome case. From the same pawnbroker two of Fechter's watches were bought, and a silver mug which was presented to Fechter in Boston. The latter was bought by William Warren, the actor, and first presented to Joseph Jefferson, the actor.

The wife of the great French naturalist, M. Geoffroy Ste. Hilaire, once lost a handsome diamond necklace, and the house was in an uproar in consequence of the vanished bauble. Incidentally the naturalist mentioned that a favorite baboon, which he kept upstairs, had been playing for some days past with a necklace precisely similar to the one described. He was indignantly asked why he had not taken the necklace from the animal. "I thought that it belonged to him," calmly made answer M. Geoffroy Ste. Hilaire. The naturalist had lived so long with animals, he had become so thoroughly absorbed in their habits and idiosyncracies, that he could see no kind of incongruity in a monkey possessing a diamond necklace. Thus Fransham, the Norwich polytheist, when somebody left him a legacy of £25, proposed to buy a pony with the money. It was notorious that he could not ride, and he was asked what he wanted a horse for. "To walk about with and talk to," was his reply.

In proportion to the number of inhabitants, there are more diamonds bought and worn in Denver than in the east or in San Francisco. The people who buy diamonds do not do so from hoarding up scanty earnings. If they are not able to buy them easily they do without. Then again, very little shoddy jewelry is worn. People do not ape what they cannot afford; and when they can afford they must have only the best quality—solid gold and the purest gems. It is not an uncommon thing to see a lady in silk purchasing jewelry at one counter, while at another is the cowboy in buckskin buying a diamond pin or a gold watch, or the lucky miner in California "duck" selecting a set of jewels for his temporary inamorata. Some of the jewelry stores in Denver carry very large stocks of the finest goods made in the market.

The J. P. Stevens Watch Co., of Atlanta, Ga., have recently moved into their new factory, where they have every facility for the manufacture of watches. This company has purchased some $10,000 worth of machinery in addition to their original plant, and are now working twenty-five hands. We learn that the Waltham Watch Tool Company are making for them fine automatic roughing out, and jeweling lathes, pivot polishers, etc. C. T. Sloan & Co., of Newark, are also at work on their jeweling quills, epicycloidal machine, upright drilling machines, punches, etc. Bliss & Williams, of Brooklyn, have the contract for their power press. A fine wheel-cutting engine, made by Sloan & Co., is a marvel of mechanical precision. Their screw machines and nickel-finishing machine, recently purchased are also said to be of the latest improved model. Altogether, the new company starts out under the most favorable auspices.

The failure of Edwards & Clark, of Buffalo, has excited unenviable comment for the many peculiar features attending it. A meeting of creditors was recently held in this city, and the usual compromise of fifty cents on the dollar was proposed. The creditors refused to accept the offer, but determined to take matters into their own hands, and wind up the business. All the claims have been assigned to Baldwin, Sexton & Peterson, who will take such proceedings as they deem wise and proper. The success attending the efforts of Mr. Hastings in the settlement of the case of Julius Walker, of Buffalo, has convinced creditors that it is unwise to compromise for a trifle with debtors who fail through either incompetency or from a worse cause. Messrs. Sullivan & Cromwell, the well-known lawyers of this city, are entitled to much credit for services rendered in the Walker case. A little more backbone on the part of creditors in settling bankrupt estates, will be greatly to the advantage of the trade in general.

J. J. D. Trenor, of this city, has patented an invention by which the time of two distinct places, at whatever distance situated, can be simultaneously marked on the face of a watch or other timepiece without interfering with the fixed time which it is desired to keep, or necessitating the moving of the hands of the piece. This invention consists in two supplemental movable rims, working independently of the fixed dial and of each other. The inner rim is divided into hour sections, the outer one into minutes. Two tiny wheels, projecting slightly from the metal bezel which holds the crystal in position, enable the wearer to bring the hour and minute at which he wishes to set these movable dials exactly opposite the hour or fraction of hour and minute respectively then and there indicated hy the hands of the fixed dial. By this simple device two different times are kept at the option of the wearer. The convenience of such an arrangement to the traveling public is self-evident. These supplemental dials may also be used for the recording of engagements, as either hour or minute chronographs, and for a variety of other purposes which will readily suggest themselves to the reader.

An assignment for the benefit of creditors by Isaac, Samuel J., and Jacob A. Steinau, composing the firm of Steinau Brothers & Co., of No. 441 Broadway, dealers in jewelry and fancy goods, to Max Scheuer, has come at last. The property of the individual assignors is directed to be applied to the discharge of their individual debts, and if any surplus remains it is to go to the satisfaction of the co-partnership liabilities. The firm claim that their failure is due to the dishonesty of a bookkeeper, who was recently convicted of forging checks to the amount of $180, but the firm claims that the amount was greater. The liabilities of the firm are about $54,000, of which over $25,000 is for borrowed money, and is all preferred. It is thought that the assets are about $37,000. *Bradstreet's* reports state that Isaac and Samuel J. Steinau were formerly in business in Cincinnati in the firm of C. J. Steinau & Brother, and came to New York in August, 1879, claiming a capital of $18,000. J. A. Steinau was admitted in June, 1880, and the firm then claimed a capital of $25,000. Its rating was withdrawn over a month ago. The reputation of the Steinaus was thoroughly established before this recent transaction.

He was a very nice and a very fresh young man, making his first trip for a Providence cheap jewelry house. He was on a steamboat going from St. Louis to New Orleans, and was decidedly under the influence of bad whisky. He persisted in singing at the top of his voice, and it was the poorest kind of singing. After a brief pause he removed his hat and said: "Now I'm going to sing something sad." "Hadn't you as soon wait until we get to Vicksburg?" inquired a passenger. "Wh—what f'r?" gasped the young man. "Because, Iv'e got a young mule on the lower deck, and if he gets an idea that he can sing as good as you do, he'll never be worth a nickel to bray." There was no more singing.

The American Watch Co., of Waltham, Mass., have just completed and forwarded to the headquarters of the United States Signal Service Bureau at Washington, a large, novel and very finely-constructed clock for the use of the service. The case is made of brass, of sufficient height to allow the swing of a pendulum one meter in length. The case is made perfectly air-tight, and has been constructed in such a manner that the air can be exhausted and the movement run in a vacuum, thus avoiding the variations incident to atmospheric changes. A very ingenious electrical attachment has been affixed to the movement, whereby the clock is wound as it runs, thus overcoming the variations usual when the mainspring is fully wound or partly spent. The manner in which this is accomplished is by alternately breaking and closing an electric circuit, and using the motion thus obtained, and the power of the electrical current in re-winding the spring, by means of a worm and other mechanism, which is so graduated as to motion that the winding keeps exact pace with the running. The slightest variation from this is shown on a delicate indicator attached thereto. The train is jeweled, and will consequently be but very little affected by the friction incident to such a complicated piece of machinery. Another of these clocks is in process of construction, and is intended for use at Wesleyan University, Middletown, Ct.

One of the most amusing places to visit when business is dull is a meeting of the creditors of one of the firms that have suspended payment. If you are one of the creditors, you have the honor to receive an invitation to attend the meeting. It is generally neatly printed; and in it they request the pleasure of your company, at such a day and hour, at Safford's office. Perhaps you swear a little when you read it, which is naughty. If too good to do that, you swear mentally (but we have heard some swear openly, and call the firm bad names); and, at last, you decide to accept the invitation. On arriving at the meeting, you find a mixed assemblage, about half smoking, and most of them in the best humor; but there are a few sour creditors, who have old-fogy notions of right and wrong. One of the creditors, perhaps only on paper, jumps up and says, "I nominate Mr. Jones as chairman." If it is a "crooked" failure, it is generally a friend of the firm's. The motion is seconded and carried. Everything is "carried" at a meeting. A motion is never negatived. Meeting organized. Hats come off. Some one moves that a statement of liabilities and assets be read. Motion seconded and carried. Statement generally reads something like this: "Liabilities about $80,000; stock on hand, about $12,000; present value, about $9,000; bills receivable and open account, $23,000; bills bad, $9,000." Firm offers thirty cents at six, twelve and eighteen months. Up jumps one of the old-fogy creditors, and wishes to ask Mr. Smith, one of the firm, what he meant by stating to him, a month ago, that he had $50,000 stock, and only owed $20,000. Mr. Smith replies, in a bland voice, that "the gentleman who last spoke must have misunderstood the tenor of his remarks at the time he mentions." Irate old creditor says he "rather thinks he did not, and is ready to go on the stand and swear to it." Up jumps another old fogy, and "wants to know how his books stood on December 31." Mr. Smith replies that his books were not "balanced." Old fogy wants to know why they were not balanced. Mr. Smith replies because they could not make them "balance." (Laughter.) Then Young America jumps up and says "he does not see that talking will mend matters. Time is valuable, and he cannot afford to lose any more of it at this meeting, as he has several more to attend to to-day. (Laughter.) The firm, no doubt, needed more capital to conduct their business properly, and took this means to obtain it. (Laughter.) No doubt, if they settled with them on these terms, the firm could take a larger store in a better location (Laughter), and most of the creditors could sell them more goods than they did before (Laughter), and get worse 'bit' next time. (Laughter.) Therefore, I move the offer be accepted." The chairman states that the motion is before the meeting. Motion carried. Young America—"I move we adjourn." Carried. Young America —"And I move an amendment, 'to the Astor House,' to drink everybody's health, the firm's included."

THE

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THE

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A National Standard of Value.

THE CONTROVERSY brought about by the adoption by the National Guild and several state associations, of what is called the Guild stamp, to be affixed to certain classes of goods, demonstrates what we have long claimed, the necessity for a national standard of value for wrought gold and silver goods. The adoption of the so-called Guild stamp is an abortive attempt to secure a better class of goods than is now manufactured, of the quality of which the stamp itself shall be evidence. Our readers are familiar with our objections to the manner in which this stamp has been handled by the manipulators of the Guild, as well as the arguments adduced in its favor. Our objections are, briefly: 1.—The contract entered into with a single manufacturer, to the exclusion of all others, for the manufacture of flat plated-ware bearing the Guild stamp, is in the nature of a monopoly, and, consequently, opposed to the interests of the retail dealers; 2.—The veteran manufacturers of plated ware, to whom the trade is indebted for all new styles and patterns in this line of goods, were not consulted regarding the stamp, nor invited to adopt it; 3.—In consequence there can be no competition between manufacturers in the production of such goods, and the best and newest goods made will not bear this stamp; 4.—The handling of Guild-stamped goods is reserved to members of state associations, which includes but a very small proportion of the retail dealers of the country; 5.—By thus attempting to give a few dealers the entire control of a certain class of goods, dissensions among dealers will be fostered, unhealthy competition engendered, and demoralization encouraged; 6.—In case of such competition, the excluded manufacturers will array themselves upon the side of the excluded dealers, and a war of prices result, to the disadvantage of the entire trade.

It is absurd to suppose that the old manufacturers and the veteran dealers who are debarred from making or handling Guild stamp goods, will abandon the field without a struggle, and, in case the struggle does come between members and anti-members of the associations, the associations will inevitably go to the wall, for it is contrary to the spirit of the times to attempt to coerce men—dealers cannot be forced either to join associations or to handle goods they do not care for, to the exclusion of goods of standard quality, world-wide reputation, and that are profitable to carry. In short, we look upon the attempt to force upon the trade a double monopoly as unwise, tyrannical, and opposed to the interests of dealers. The men who have been instrumental in foisting this stamp upon the state associations, boldly declare their purpose to compel all retail dealers to join ther associations or be ruined in their business. Such a programme is an insult to the intelligence of the American people, who are not in the habit of being dragooned into pursuing a course to which they are not inclined.

As we have not hesitated to denounce the proposed Guild-stamp outrage, we are asked to indicate what we would recommend in its place, that will remedy the evils resulting from debased and fraudulent goods that the trade and the public are suffering from. This is fair, and we have no objection to reiterating what we have so often advocated in these columns. Admitting that the retail trade is suffering greatly from having thrust upon it debased goods of all kinds, having far less intrinsic value than is represented, we would have, if it were in our power, a national law enacted by Congress, fixing standards of quality upon wrought gold and silver goods, and providing severe penalties for the manufacture and sale of goods that possessed a less intrinsic value than they were represented to possess. In the matter of gold goods, such a law should first designate what is pure gold. Following the English standard, and adopting twenty-four karats as representing pure gold, the law should permit of alloys down to twelve karats; but when gold is debased below twelve karats, it should no longer be recognized as gold, but declared to be base metal with a gold alloy. Goods manufactured under such a law should be sold for just what they are, whether eighteen or twelve karats fine. Every manufacturer, jobber or dealer selling any articles of wrought gold, should be compelled to give a bill of sale, enumerating each article, and specifying its quality under the local standard adopted, as, for instance, "1 doz. chains, 12-k.; ½ doz. lockets, 14-k.; ¼ doz. watch cases, 4 oz., 16k-.," etc. Such a bill of sale should be held to be, *prima facie*, a guarantee by the seller that the goods were of the quality designated. In any prosecution for fraud, such a bill should be accepted by any court as a binding certificate of quality. A national law on the subject should provide severe penalties for any misrepresentation as to quality, including the confiscation of all fraudulent goods, and fines and imprisonment of the offender. If it should go to the extent of awarding to the informer a proportion of the fine recovered, it would have a tendency to put a large number of detectives on the track of the manufacturers of fraudulent goods, and soon drive them from the field. Similar provision could be made for the manufacture of silver and plated ware. The great point to be made is to have a fixed standard of value for all gold and silver goods declared by the national government, and heavy penalties provided for violations of the law. It is a matter of secondary importance as to how those standards shall be determined; that is a mere matter of detail that could be arranged satisfactorily between the practical men of the trade and a committee of Congress.

The advantages of a national law fixing the standard of value would be manifold, chiefest of which would lie in the fact that all goods would then be placed on the market and sold for just what they are. There would be no possibility of unscrupulous manufacturers or dealers selling four or six karat goods for twelve or fourteen karats, as is too frequently done now, whereby retailers and the public are equally swindled. In the present state of the law this can be done, and the victim has no redress. As an instance in point —a gentleman some time since bought at an auction room in this city, a watch, the case of which the auctioneer guaranteed to be gold. The purchaser showed it to a watchmaker, who declared it to be bogus. The gentleman brought suit against the auctioneer for swindling. The case was assayed, and the quality found to be four karats. Thereupon the judge decided that, as there was gold in the case, it was not a fraud to represent it as being a gold case, and the swindler escaped punishment, while the victim had to pocket his loss. Had there been a national law fixing standards of value, and making misrepresentations punishable as misdemeanors, the auctioneer who made a living selling such bogus goods would now be in the state prison. A few unscrupulous manufacturers have succeeded in putting upon the market large quantities of goods, made in imitation of desirable articles of excellent quality, that possess little or no intrinsic value, but which are sold by misrepresentation at fictitious prices. Comparatively few dealers are competent to detect debased goods without the application of tests that would destroy them. Many retailers are graduates from the watchmaker's bench, and, while competent watchmakers, have not been educated to judge of jewelry. In making their purchases they are governed largely by the representations of commercial travelers, and many of these are possessed of an elasticity of conscience that permits of any exaggeration or misrepresentation.

Another great advantage from having a national standard of value would be found in the fact that outsiders would not be able to compete with the legitimate dealers. Hardware merchants and notion dealers now handle cheap inferior goods, attractively made, but possessing little or no actual value. As they are not called upon to guarantee these goods, they sell them without any prejudice to their reputations, whereas a regular dealer, supposed to carry nothing but legitimate goods, would ruin his reputation if he handled such trash. Whatever he sells is popularly accepted as genuine, and if it does not give satisfaction, his reputation suffers. When outside merchants can buy nothing but goods of a recognized standard value, they cease to become dangerous rivals. Their advantage over regular dealers now lies in the fact that they sell cheap goods without a guarantee, and can dispose of four-karat jewelry as fourteen karat, without knowledge on their part, and without reproach in case of detection. If they could only buy goods of standard quality, and were required to give a legal certificate when selling, specifying the exact character of the goods, they would have no advantage over legitimate dealers, and would abandon the business when their margin of profit was legally restricted. The public would soon be educated to the advantages of such a law, and would naturally look to the regular dealers to protect them in accordance with its provisions. If there was a law in force at present requiring that all goods less than twelve karats fine should be bought and sold as brass, who believes there would be any demand whatever for such trash? The demand is kept alive through the specious representations of unscrupulous persons that brass is gold, and there is no law to punish the fraud. It is true that this trade, carried on by outsiders, has inflicted great injury upon retail dealers, but when the outsiders are prohibited from handling bogus goods, and are compelled to buy those of standard quality or go without, wherein lies their advantage over the legitimate trade? If a retail dealer in any community cannot hold his own, under equal conditions, against the outside pirates, then he had better sell out and let the more enterprising outsiders control the trade. All the complaints we have received from dealers about the outside merchants who handle cheap jewelry, have had reference to the unequal conditions—the lack of responsibility of the outsiders, and their ability to sell "skin" goods for genuine. Make the conditions equal, and if the retail dealer cannot control the trade, then he had better make room for someone who can. Dealers can take it for granted that manufacturers are going to find a market for their goods, and if they cannot find it within the trade, they will go to outsiders for it. Also, manufacturers will sell to those customers who buy the most liberally and pay the most promptly, and if hardware merchants and notion dealers comply with these conditions, they will get goods in spite of all the protests of all the retail dealers in christendom. These are the inevitable laws of trade and commerce, of supply and demand. Unless retail dealers have energy and enterprise enough to build up and control a business, it is useless for them to ask the manufacturers to bolster them up by refusing to sell to others who want their goods, and are willing to pay for them. Let the dealers unite to secure a national law that will deprive the outsiders of the fraudulent advantages they now have, and they need fear no competition at their hands. When goods are uniform in quality, design and construction, the retail dealers will have no one to blame if their stocks are not sought for in preference to those to be found in the hardware stores and the gents' furnishing goods houses. Reputation counts for something, which is the reason why a sick person consults a legitimate physician instead of a quack.

A national law providing standards of quality of wrought gold, silver and plated goods is what we would substitute for the abortive Guild stamp that so much is being said about. We do not pretend to dictate what should be the provisions of such a law, but simply to indicate its general purpose. The National Guild once adopted a resolution favoring this idea, but, becoming infatuated with this stamp business, took no steps to secure the necessary legislation. If the several state associations would unite upon some feasible plan for petitioning Congress to pass such a law, their efforts would meet the approval and hearty endorsement of every honorable man in the trade. If they will take hold of this matter and prosecute it earnestly and vigorously, they will give ample demonstration of the wisdom that called them into existence, and prove their right to live. They can do this if they elect to do so. They have the nucleus of an organization that, with such an object in view, would enroll every dealer in the land under its standard, and make of it a power whose influence and demands could not be ignored. We suggest to the members of these associations that they set aside their self-constituted managers and directors, take the management of their affairs into their own hands, appoint committees to secure petitions to Congress for the enactment of such a law as we have indicated, and bring their personal influence to bear on individual members of Congress to secure the result desired. Such a movement would give these associations standing in their several states, while their endeavors to create a monopoly for the so-called Guild stamp can only serve to place them on a level with other aggressive trades unions, and ultimately bring them into contempt.

As to the power of Congress to pass such a law there can be no question. The constitution empowers that body to regulate commerce between the states, and the integrity of manufactures of all kinds is an essential factor in such commerce, which Congress has the undoubted power to regulate. It has already prescribed a standard of weights and measures, by which all sales of all articles, of whatsoever nature, are gauged; every bushel of wheat, every yard of cloth, and every gallon of whisky is sold in accordance with the standard of measurement prescribed by Congress. In all nations, in all ages, laws have been enacted to control the quality of goods made of gold and silver. The United States to-day, of all civilized nations, is without any laws bearing upon the subject. It is time the deficiency was supplied for the protection not only of the public, but of the trade itself, which is by far the greatest sufferer from the acts of swindlers and sharpers.

Modern Commercial Travelers.

RETAIL dealers in the country frequently comment on the fact that the class of men now on the road as commercial travelers, is, as a rule, far inferior to what it used to be. In the days gone by the travelers were men of more than average intelligence, of sterling integrity, agreeable in manners, and in every way desirable acquaintances. They visited the retail trade regularly with their samples, treated their customers with courtesy, never offensively importuned them to buy goods, but conducted themselves as the worthy representatives of the responsible firms who sent them out. The dealers always welcomed these travelers heartily and cheerfully, esteeming it a pleasure to introduce them to their family circles, and to extend to them every social courtesy their limited time would admit of their accepting. The coming of travelers of this stamp was usually announced a few days in advance, by letter and was looked forward to by the dealer as a pleasant event in anticipation. But the character of the commercial traveler has, as a rule, sadly deteriorated. Some of the older houses, it is true, still employ first-class men, of good business standing and excellent character, but the majority of the travelers of to-day are a sad falling off from those of fifteen or twenty years ago. They are mostly young men of limited education and experience, who are employed because they work cheaply. They are frivolous, trifling fellows, impertinent in their address and offensive in their manners. They know just enough about the business to tell the prices of the goods in their sample cases, but are incapable of maintaining an intelligent conversation ten minutes at a time on topics not personal to themselves. Their discourse is generally well seasoned with barroom slang and profanity, while their breath is odorous of bad cigars and worse whisky. They enter the store of a dealer with a swagger, as if they were doing an act of great condescension in showing him their samples, but once having opened their cases, are as importunate to sell as a Fulton market fishmonger. Often they attempt to dictate to the dealer as to the goods he should keep in stock, criticise those he has, and generally condemn all that were not purchased of the house represented by the officious traveler. If the dealer declines to purchase, the adolescent traveler not unfrequently assumes a dictatorial tone that is highly offensive. So objectionable has this class of travelers made themselves, that dealers slip out of the back doors of their stores to avoid them, and will even absent themselves from business a day or two rather than meet them. It is these travelers who, after selling to all the dealers in a town, will pass on to the gents' furnishing goods stores, the barbers, apothecaries and other outsiders, and sell them the same goods they sold to the regular dealers, and at the same trade prices. Not unfrequently they pay their hotel bills with cheap jewelry; in fact, cover the town with it to the fullest extent possible, and to the injury, of course, of the trade of the regular dealer.

The decadence in character of the commercial travelers was coincident with the depreciation of the quality of the goods they handle. The better class of travelers could not conscientiously carry about a stock of goods that they know to be debased in quality, and represent them to be of a better character. Nor could the manufacturers of goods of this kind afford to employ the best travelers; the great competition engendered by too many manufacturers, induced them to sell at such a small margin of profit, that they had to "skin" down not only the quality of their goods, but of their employees, and the cheap and offensive drummer was the result. It used to be that a house would put on the road its very best men, whose familiarity with the business and the requirements of the trade, and whose reputations for honest dealing were second to none. These men were gentlemen as well as business men, and they commanded the respect and confidence of the dealers. But these men have been, to a great extent, driven out by young, cheap and blatant striplings, self-conceited, pompous, overbearing and intolerable, who are making the term commercial traveler a stench in the nostrils of retail dealers. It would seem as though a certain class of cheap jewelry manufacturers in the east had ransacked all the kindergartens, nurseries and baby farms in New England, to secure a sufficient number of male children to represent them as commercial travelers. When these callow youths make themselves offensive to dealers, a hint to their employers, like the following, sent by an outraged dealer recently to a firm of cheap goods manufacturers, might be effective. It was a postal card, and read as follows: "Gentlemen:—Your Mr. —— called on me yesterday. He is an impudent, offensive blackguard. If he comes this way again it will give me great pleasure to kick him out of the store." If dealers would send more letters of this character, it might have a tendency to weed out some of the most offensive drummers in the trade.

There are still many high-minded, intelligent, and thoroughly trustworthy travelers on the road, but they are few in number compared to the whole. They represent the old and best known firms, that eschew cheap jewelry and all cheap John tricks, but make goods of the same quality to-day as they did years ago. These travelers are representatives of their houses, have the confidence of their employers, and are in every way deserving of the confidence of the dealers. We wish there were more of their class. There is a broad line of demarkation between them and the others we have described. The one is a commercial traveler in the best sense of the term, while the other is simply a drummer for orders. No one recognizes the distinction between the two more keenly than the commercial traveler, who refuses to be classed among the drummers or to associate with them. The sooner these impertinent and offensive young drummers can be squelched, the better it will be for the trade.

Incipient Watch Companies.

DURING the past few months we have had occasion to chronicle in every issue of THE CIRCULAR the surprising intelligence that a new watch company has been started. Usually, the locality selected for these enterprises is some western city or village that is anxious to get up a "boom" to entice persons to locate within their borders. The west is full of places of from 10,000 to 20,000 inhabitants, the residents of which are inflated with the idea that it is eventually to be the great metropolis of the west. We all remember when Jay Cooke drew his isothermal line around the Northern Pacific Railroad, and made Duluth the focal point whence radiated the trade and commerce of the universe, while that city was designated as "the commercial metropolis of the unsalted seas." Duluth, like the frog in the fable that was envious of the size of the ox, fed upon wind till the inevitable explosion resulted, and the remains of the luckless frog were scattered over several adjoining counties. Duluth suffered similarly from a diet of wind. But, undeterred by these frightful examples, numerous other western cities have adopted a similar diet, and, between their twinges of colic, are clamoring for capitalists to locate among them, and for enterprising manufacturers to come and buy their corner lots and water privileges at fabulous prices. This is the origin of so many watch companies on paper. The subject is usually broached by some one who has been a workman or salesman in some of the old companies, and hopes by filling the minds of the visionary property owners in prospective commercial emporiums, to make a good thing for himself. Among those who have a superficial knowledge of our great watch industries, there is a belief that there are immense business opportunities in the manufacture of cheap watches—in fact, that there are "millions in it." It is true that there is a steady demand for standard watch movements of cheap grade; a demand in excess of the supply. But it is because these movements *are* standard, excellent timekeepers, although of moderate cost, that there is such a demand. That this demand is not met by the manufacturers is due to the fact that the watches are too good for the money, and that there is not sufficient profit in their manufacture to warrant their production beyond the absolute requirements of the regular customers of the respective companies making them. Of the companies making desirable cheap movements, no one of them could afford to confine their production to the cheap movements alone, and any company that attempts to manufacture cheap watches exclusively, is sure to come to grief. The profit on watches under the most favorable conditions is small compared to the capital invested in the necessary factory, machinery, and the commercial part of the enterprise. Almost any other manufacturing business is quite as profitable, and the risks infinitely less. But it is assumed by these visionary organizers of companies, that $50,000 will equip a factory for the exclusive manufacture of cheap watches, and so they strike some of the prospective metropolises and talk up the matter with the inhabitants, who are crying for industrial enterprises. Before the factory is built, however, the men who are expected to furnish the capital. generally ascertain that $50,000 would go but a short distance in watchmaking, and that even if they had a lot made up, they must be sold so low in competition with other movements of established reputations, that there is no margin for profits. So the "castle in Spain" fades out like the vision of a dream, and the much talked of watch company becomes simply a reminiscence. We have watched the rise, progress and collapse of many such schemes, and the indications are that we shall see the end of many more that are born in the brain of some cranky visionary, and disappear without leaving sufficient tangible evidence behind for the sheriffs to levy an execution upon.

It costs a great many hundreds of thousands of dollars to establish a watch factory, to buy all the necessary special machinery, to pay for labor, and to carry an immense stock of movements to supply the orders of the trade as they come in. In the competition that has existed between successful companies to produce good watches that could be sold at a low price, the price has been reduced far below the actual value of the movement. That is to say, the watches are too good for the money received for them, and, as a consequence, the manufacturers cannot afford to make them in sufficient quantities to supply the demand that comes from all over the world. They make enough to satisfy their regular customers who buy their whole line of watches, including in every order some of every grade, from the cheapest to the most costly movements. It may be said that the cheap standard movements are put out more as an advertisement by the companies than in the hope of profit, precisely as dry goods merchants sometimes sell at retail staple goods at cost, for the sake of attracting attention to their other wares. Recently there have been numerous announcements of the formation of new watch companies. None that we have seen have the first element about them that is calculated to make them successful. They are visionary in the extreme, and will probably never progress beyond the organization on paper. It is one thing to get up a scheme for a great manufacturing enterprise, and another to put it into practical working shape. We advise dealers, many of whom are importuned to take stock in these bastard concerns, to have nothing to do with them. If you do, you are as sure to lose your money as though you entrusted it to the tender mercy of some banco steerer.

Aristarchius Plumbago and his Watch Companies.

IN MY LAST letter to THE CIRCULAR, I notified your readers that I was about to start for Cincinnati as the guest of a wealthy gentleman of that city, whom I had interested in the watch industry. It was my purpose to spend a month or two at his palatial residence, induce him to furnish the capital for starting a watch company, and to personally take charge of the expenditure of the money. I called upon the gentleman and sent in my card. He appeared in the library to meet me, but did not seem to recognize me, at which I was considerably surprised. I thought he had greatly changed in appearance in the few weeks that had intervened since I conversed with him on the cars. But I introduced myself, and endeavored to recall to his mind the points of our conversation regarding a Cincinnati watch company. He did not remember it; he was sure he never had any such conversation or ever met me before. In fact, he convinced me that I had been imposed upon by some unconverted heathen, who had used his name in introducing himself to me. This was embarrassing, decidedly, for I had come all the way from Chicago, expecting to be the guest of this man, who now repudiated the acquaintance. I was out of funds, and fearful of venturing to test the hospitality of a hotel. I gently suggested that he might assume responsibility for the invitation given me by his perfidious representative, but he emphatically declined, intimating that he thought I was as much of an impostor as the person I claimed had deceived me. Alas! how we are misjudged in this world, and our best motives made to weigh against us. When the servant closed the door behind me with rather more vigor than I thought was necessary, I had no alternative but to go to a hotel. My personal appearance was not calculated to excite distrust, and being unknown, I might hope to obtain accommodations for at least a week before my financial condition would be discovered. In this I was successful, and was soon comfortably settled in very desirable apartments.

But the idea of establishing a watch company in Cincinnati was still alive in my brain, notwithstanding the serious rebuff I had received. With a view to enlisting co-operation, I called upon several of the local dealers in reference to the affair, but did not meet with that encouragement I had hoped for. In short, they flatly refused to lend me the use of either their money or their influence to establish a watch company in that city. But I met at the hotel a Mr. Moth, of Taro, in Egypt, who at once fell in with my ideas. Mr. Moth was formerly connected with a watch company that was once located at Little Breeches, on the Miami Canal, in which enterprise he lost much money belonging to other people, but gained a valuable experience for himself. Having a thorough knowledge of and experience in the business, he gave me some new light relative to the immense profits to be derived from the manufacture of watch movements. From a careful data prepared by him, I am in a position to demonstrate that it costs less per pound to manufacture watch movements of any grade, than it does ten-penny nails, and that they sell in the market for fifty times as much. Now, if ten-penny nails can be and are manufactured at a profit, what a bonanza there is in the manufacture of watch movements. After carefully studying Mr. Moth's somewhat abstruse calculations, I became more enthusiastic than ever regarding the establishment of watch companies. I invited Mr. Moth to walk into my parlor, and an attentive waiter soon produced glasses and a liquid sample of the products of the Blue Grass regions of Kentucky. We spent a delightful evening discussing the subject, and when Mr. Moth finally fell asleep under the table, and I put my boots in bed and set myself outside the door to be blacked, we had resolved not only to organize one watch company, but two! six!! a dozen!!! fifty!!!! if we could find the necessary endorsement and proper encouragement from public-spirited individuals in different growing localities. To make the matter short, Mr. Moth and I formed ourselves into a Society for Promoting the Formation of Industrial Enterprises, and the Founding of Horological Schools and Manufacturing Establishments. Our plan is to visit the various growing and thriving cities of the country, the ambition of all of which is to become manufacturing centers, and to induce the property owners thereof to become identified with us in establishing a watch factory in their midst. Our plan is to fill the minds of leading citizens full of the idea of the profits to be realized from the manufacture of cheap watch movements—that illustration I have given about the ten-penny nails seems plausible, and makes many converts. After getting the citizens interested, we get them to subscribe to the stock of the company. Then we get a donation of land from some person who has just laid out an addition to the town, and wants to sell lots. We make him believe that the location of the factory there will bring all of his lots into the market at once. Then we mortgage the land to eastern capitalists, ostensibly for the purpose of raising the means to build the factory; with the money in hand we start east to buy machinery and employ hands; we go and have a good time; when we run short of funds, we assess the stockholders and obtain a fresh supply. Moth succeeded in working up a racket of this kind in Kentucky, and I was equally fortunate in a city in Iowa. I have two other projects under way in other localities, and Moth is not idle. I observe by THE CIRCULAR that you have noted the fact that these watch companies were to be established, but you probably did not realize that they were the fruit of the gigantic intellect of your old friend Aristarchius Plumbago. I find more profit in organizing watch companies than I ever realized from all my great philanthropic and humanitarian projects, to which I devoted so many years of my life. I now feel buoyant and hopeful. We have three watch companies already organized on paper, and Moth and I have derived goodly profits therefrom. We are now incubating on two more, and they will probably break through their shells in the course of the next month. I have no doubt but now and at last I am on the road to fortune and fame. Congratulate me. Yours, hopefully,

ARISTARCHIUS PLUMBAGO.

P. S.—I find Moth of the greatest assistance to me. It was an immense advantage to him to have failed in the business of making watches before I met him. He has a knowledge of the details of the business, and is able to talk technicalities to our stockholders to their confusion and amazement. When they get curious as to what we are doing with their money, he talks technicality at them. I regret that in my youth I did not fail successfully in some legitimate enterprise—the experience would have been invaluable to me. I have not always been a success as a professional philanthropist and humanitarian, but the public is not familiar with my efforts in these directions, and so, like Rip Van Winkle's drinks, they don't count. I should have been a great manufacturer or merchant, that I might have failed gigantically and dramatically in the immediate eyes of the public. Moth says this is the only thing I lack to secure me a wonderful business career. Regretfully yours,

ARISTARCHIUS P.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

A regular meeting of the Executive Committee was held in the rooms of the League, No. 64 Nassau street, New York City, on Friday evening, Sept. 1st, at which two applications were referred for investigation, three were rejected, and the following were admitted to membership:

Rufus C. Justus, Baltimore, Md.; Michael B. Allebach, Danville, Penn.; Robt. B. Barlow, Chicago, Ill.; Geo. W. Biggs, Pittsburg, Pa.; Frank Bowman, New York City; Chas. W. Bank, Indianapolis, Ind.; Chas. W. Chabot, F. L. Amedée Cramer, Chas. S. Crossman, New York City; Oscar F. Engwall, Chicago, Ill.; Louis E. Fay, New York City; Samuel W. Fitzgerald, Harrisburg, Pa.; Carlton J. Horton, Chicago, Ill.; James J. F. Houghton, East Toronto, Canada; Chas. M. Hyatt, Scranton, Pa.; Joseph Jacobs, St. Joseph, Mo; Nicholas B. Jeter, Butler, Mo.; Chas. L. Johnson, Chicago, Ill.; James P. Johnston, John W. Johnson, New York City; Edwin F. Kent, Providence, R. I.; Thomas H. Lavender, Newark, N. J.; Jonas R. Laws, Boston, Mass.; Geo. J. Leach, St. Louis, Mo.; D. D. Manchester, North Attleboro, Mass.; J. Mandeville, New York City; John McCready, Providence, R. I.; Arthur A. Mermod, St. Louis, Mo.; Anthon H. Michelson, Chicago, Ill.; Wm. Muller, Ernst J. Munch, New York City; Walter W. Newhall, Columbus, Ohio; Thos. J. Pairpoint, New Bedford, Mass.; Augustus Rhoads, Lancaster, Pa.; Paul Reidel, New York City; Frank Road, Washington, Kansas; E. Ernest Robine, New York City; Geo. C. Schafus, Brooklyn, N. Y.; John Schaub, Chicago, Ill.; F. Scholl, Brooklyn, N. Y.; James E. Searing, Lionel Solomon, New York City; Abraham Steindler, Leavenworth, Kansas; W. C. Stoddard, Fairhaven, Mass.; Samuel C. Tappin, Troy, N. Y.; William H. Welch, Demopolis, Ala.; Scott Taylor, Oswego, Kansas; Henry Ten Broeck, New York City; Jacob Wahlen, Pittsburg, Pa.

A total of 49 members added at that meeting, making the membership 2,130.

Several of the candidates were those who have deferred their applications for several years for no better reason than the habit of procrastinating in such matters, intending at all times to become members, but hazarding to their families the consequences of their neglect; there are very many others in the trade who have not yet applied, whom we desire to warn of the dangers of postponement; the League is limited in membership to 2,500, and when the limit is reached no more members can be accepted except as vacancies occur in the membership caused by death, resignation, or other causes. The death rate will be undoubtedly very low for many years to come, and those who apply for admission after the limit of 2,500 is reached, must take their places on a list of applicants in rotation, as provided in Sec. 2, Article II., of the Constitution; probably the tenth man on such list will be deprived of the benefits of the League for a year or more before his application will be reached, and the next few on the list must wait several years. Those who desire to join before the limit is reached, should do so within the current year, the earlier the better; *there is at present room but for 370 more members*, and, as has been said of the olden time political office holders, "few die and none resign." The entire loss of membership in the League since it was founded in 1877, has been but 53, of which 16 were by death, and only 37 in consequence of non-payment of assessments. Such a record is probably unprecedented in the history of assessment or mutual benefit societies.

Secretary Sexton has provided a register in the office of the League, whereon may be entered the names of members from out of New York City, who may visit the office from time to time, and where they will always be heartily welcomed by the clerk in charge. The office work necessary to the business of the League, has required the employing of two assistants, who, not until now, have suitable office room; these clerks are paid by the Secretary, out of the amount to which he is entitled by the Constitution for his services, and have heretofore been paid by him whether the fees sufficed or not; an office was not engaged sooner because the Secretary's pay would not suffice for the employment of an attendant, and the Executive Committee did not feel warranted in incurring obligations for the Secretary to pay.

The Committee of Eighteen has held four sessions since our last report, and is carefully and deliberately developing its work.

Do not be desirous to have things done quickly; do not look at small advantages. Desire to have things done quickly prevents their being done thoroughly. Looking at small advantages prevents great affairs from being accomplished.—*Confucius.*

The Committee is composed of the following officers and ex-officers: Chairman, Henry Hayes, Samuel W. Saxton, James P. Snow, John D. Lyon, Joseph B. Bowden, David Dodd, Milton P. Bagg, Henry K. Dyer, William C. Kimball, Robert A. Johnson, George W. Shiebler, James D. Yerrington, Augustus K. Sloan, Henry J. King, George C. White, Jr., Henry C. Ostrander, Clement B. Bishop, Stedman H. Hale. This Committee, judging from the material composing it, will recommend wise and well-digested methods for adoption by the League in furtherance of its beneficent purposes.

Several members, when remitting for the recent double assessment, embraced the opportunity to comment briefly on the payment of losses to the beneficiaries of members who commit suicide. These comments were welcomed, as indicative of the interest felt by the membership in all the doings of the League, and giving encouragement to the Executive Committee in its labor; the watchful, critical eye of the member keeps the Committee careful in its deliberations. We append some of the comments:

"Pay the widow and orphans, whether the father dies by suicide or not. They should not suffer on his account."

"Willingly paid to get such men out of the League."

"I see no reason why these assessments should not be paid. The length of time they were members of the League certainly does away with any idea of its being pre-arranged."

"We cannot be too careful in selecting sound members both in mind and body."

"I sincerely trust the League will never decline to pay a death claim on account of suicide; make it as cheerful for the beneficiary and friends as a due regard for the interests of the League will permit. Such, I believe, was the spirit in which the League was founded, and I see no reason why it should change its policy now."

"Suicide! it is a crime. It should not be encouraged."

"Shoot the cranks!"

"I pay it cheerfully, but would like to have same legislation for future cases. I look upon the League as the best institution of the kind in the world; that is saying a great deal for a Hoosier, but I belong to two others, and I think that this is safer than either," of which compliment the League must necessarily raise its metaphorical hat in acknowledgement.

"They are both paid under protest. I don't think they are entitled to the benefits of the League, both being suicides."

"The boys think that two suicides in succession is crowding the mourners, and that the Committee cannot alter or change the by-laws any too quick. A clause on that subject would surely deter many from self-destruction."

"We are not dead yet, and don't know what may cause our death any more than the time. There might be a limit to the time such losses will be paid. For instance, they might say, no death from suicide under one year from date of admission will be paid. But to exclude them altogether would be too bad. I give you this as my view of the matter, and if the opinion of the other members is asked, I think you will find the majority will give you the same answer."

"I do not think that cases of the last kind (suicide) should be settled. As I understand the Constitution, the taking of a man's own life is certainly premeditated, and not from sickness or accident," finally,

"I wish to express myself in favor of paying to the proper persons the loss we sustain in case of suicide, as well as any other mode of death. Our object is to benefit the widow, children or creditors, and a loss to them was no less a loss because the death was from suicide."

The Committee of Eighteen have under advisement this matter of suicide, and will doubtless arrive at a wise conclusion with reference to it; the by-laws by which the League is now controlled, provide for no other course than to pay without cavil for such losses. By the new penal code, which goes into effect on December 1st next, in this state, every person attempting suicide is declared to be guilty of a felony, and is punishable by imprisonment in a state prison not exceeding two years, or by a fine not exceeding one thousand dollars, or both. The League Constitution provides that any member adjudged, in the prescribed manner of trial, to be guilty of felony, shall be expelled; therefore, under the present League laws, after December 1st next, (when an attempted suicide becomes under the new code a felony) any member attempting suicide must be expelled. In common law this offence was a misdemeanor, and, therefore, even now subjects the member attempting suicide to expulsion, but the new code raises it to the grade of felony. Curiously, however, almost drolly, in the seriousness with which it is stated, the code goes on to say, "although suicide is deemed a grave public wrong, yet from the impossibility *of reaching the successful perpetrator*, no forfeiture is imposed."

General Jack's Diamond.

PRETTY MUCH everybody has heard of General Jack's penchant for diamonds, and a great many of us know the man himself, a sturdy character, sound and firm on his feet as a horse-block. A florid face, rather hard, a square chin, determined lips closing over white teeth, cold gray eyes looking right at you from under a hedge of eyebrow sandy in color, dusted with gray, a large straight nose, broad and fleshy—you've seen the man. Dressy in his way, but not as gentlemen dress, and wearing rings upon his fat white fingers, and a big diamond in his expansive shirt-front. His voice is deep and stern, rather hoarse, too, and harsh; its volume is tremendous when it comes freighted with a crash of oaths. General Jack is self-made; began as driver of a pair of mules on a canal route, then took the lion-car of Herr Broscher's menagerie, became finally ring-master to a circus, owner of his own circus, keeper of a livery stable, millionnaire, art patron, political leader. His wife was on the stage once, and a charming creature she is; and General Jack is universally known and liked by the profession—but it is about General Jack's diamond we are going to tell you.

"First thing I ever bought," says General Jack, "when I got to be ring master, after I was properly fitted out in the clothes department, was a diamond, and I've been buying 'em ever since. I'ts a weakness, and I've paid for it. Tiffany's people always send for me when they've got in anything new, and the Amsterdammers know me."

It is said that those who want to come it over General Jack—no easy thing to do—always approach him on his diamond side. He takes it as a compliment to be asked to show his collection, and does show it. But he is a good judge of character for all. The story goes that some thieves conspired to rob him by profiting by his pleasure in showing his treasures. There were three of them—nobby English fellows—who came over expressly to do the job, and thoroughly posted. They made his acquaintance at a down-town hotel where he is often to be found, and in due course procured the invitation to see his diamonds. They claimed to be sporting men, ardent turfites, but connoisseurs in such things. They came to Jack's house one forenoon, in a coach, and he received them alone, opened his safe, displayed all his treasures, went into their history, etc. "This," he said, "is my Golconda specimen—not very large, but remarkable for its brilliancy and pure water. This is my Brazilian—it is a bit off color, a suspicion of a canary tinge—" whack! smack! thwack! "You would, would you?" and with three successive blows of his fat white fist, his three English visitors were knocked down and put *hors de combat*. It was a mere suspicion on his part—something he saw in the men's faces, read it in their eyes—but it saved his diamonds. He summoned aid, locked the safe, secured the men, and found them fully armed—pistols, burglar tools, handcuffs, rope, gag, chloroform, red pepper. He disarmed them, bundled them into the coach, and gave them twenty-four hours to leave the country "As you came here on my invitation, I won't *cache* you, but—git!" And he still preserves the gag, the handcuffs and the Cayenne among his trophies.

One day General Jack had a visitor, a man of forty years, with grizzled hair and a stoop in his shoulders—a pallid face, somewhat bloated from long indulgence in liquors. "You don't know me General Jack?" said the man.

The General was puzzled a good deal. "Hombre, I've seen you somewhere. Stop—I have it! Good Lord, Cary, what have you done to yourself!"

"Its fifteen years ago, General," said Cary, apologetically.

"Only fifteen! Zounds! You were a handsome young fellow then; I thought you were a genius. And your wife was lovely."

"Don't mention the past— she's a wreck, six children to care for; and I am—what you see. I want you to do something for me, before the black dog devours me."

"Hombre, it's the drink that does it."

"I want you to save me from the drink, General."

"This man," (the General says, when he tells the story)—"this man, Mark Cary, was what you might truly call one of these here geniuses. When I knowed him—and loved him, too, as everybody had to do—he was editing a neat little paper in a Virginia town and happy as a June bug. One of your Apolloses—tall, square, a step like a spring-board, blue eyes full of fire, Hyperean curls like—a man, every inch. The things he couldn't do with the dumb-bells weren't worth trying—he could beat my best man at the square leap—sat a horse like a Center or a Comanchy—and put a pen in his hand, or call on him for a speech, and, by zounds, you couldn't mate him nowhere. I used to get him to write my bills and advertisements for me—he'd been a treasure in that line if he'd only take wages. As for poetry—well, I'm no judge, but if he couldn't pump all these here centenniallers, I'm Dutch! His wife was just the sweetest little lady ever you see, and could pour out tea like an angel. And now here he was, gone to seed.

"How came it, Cary?"

It was the war, poverty, sickness, long struggles in adversity, long lassitude and loss of spirits, chagrin, all that turned in.

"I think I'm gone, General, but Margaret wont hear a word of it. She told me to come to see you and ask you to help me."

"Where is the little woman, Mark?"

He named a wretched tenement-house. General Jack drummed on the table with his fat fingers a moment. "Not in want, I hope, Cary?" said he at last.

"Not quite, General; but the times are hard, I can't get away, and there's no telling how long it will be before that comes, too."

"Come, let's go and see her," said the General, and Cary, without a word, led the way to his poor lodgings.

The General does not say much about the interview that ensued, but I know from other sources that the wife and children had a good supper that night.

"Come to my office—down-town, here's the number—to-morrow at 11, Mark, and I'll talk with you. Madam, I'll see you again," and the General withdrew.

"See here, Mark," said the General next day, "you're broke down. The little woman can't do anything with you, and your own backbone's turned into injan rubber. You ain't worth a d—n!"

"That is the conclusion that I am coming to myself, General," said Cary, with pathetic sincerity.

"I know better!" cried Jack, vehemently pounding the table with his fist; "I mean to take you in hand now, and make a man of you!"

"I wish to heaven you would!" cried Cary.

"I mean to! You're the very fellow I've been looking for this year and more. You're honest and capable—you know all about geology, minerology and that sort of thing, don't you?—if you don't you can learn—stop! Listen! You are up to my diamond passion—well, there's where I want you! I want a man—an honest man—a capable man—to go to South Africa for me, and find me the biggest diamond there—a dozen of them, if you're so minded! Will you go? Stop! I'll take care of the little woman if you do, and provide for her if you don't come back. The sea voyage will give a chance to taper off, drop the drink, build yourself up and all that; when you get there you'll be all right again, and then you can use your brains in finding me that diamond. I'll pay you good wages, and all you find is mine. Is it a bargain? Strike hands on it if it is!"

"If Margaret says yes, I'll go, General! And God bless you anyhow!"

"Come home to lunch with me then, and we'll ask her—she'll likely be there."

Not only she, but all the children were there, and in the newest of clothes, for Mr. Jack had been at work too, and Mrs. Cary told her husband, with tears in her eyes, "We need'nt go back to that dream of horror any more."

So it was all settled in a few minutes. Cary's family were to have the cottage on the General's farm and an ample allowance, the eldest boy and girl to go to school, and Cary himself to go after the big diamond. In a week Mark Cary sailed, with a chest full of books in which to study up the subject, and the little woman and her children were happy on the farm—happy, at least, as they could be with Cary away in quest of the big diamond.

How did that quest fare? I must let General Jack tell it in his own way, as he takes the key of his safe from his pocket, preparatory to opening, and stands on the hearth before the grate, warming his stout calves, and emphasizing his narrative with gestures of the key.

"Never was mistaken in a man in all my life, before that! Made all my money by looking in people's faces to see if I could trust 'em or no. And this here Mark Cary—well there's half a million o' diamonds, great and small, in this here chist, let alone bonds, and I'd left him here with the safe open and nobody else in the house, and gone off say to Europe or the Sandwich Islands perfectly easy. But, you see—well, there's such a thing perhaps as tempting people too far. Cary got along splendid at first. He wrote to his wife and me regular all along the voyage, and when he got to the Cape he sent a photograph that we might see how he was spruced up. I could see the old curls was coming back to his hair, and the old fire to his eyes, the old roundness to his cheek—and the little woman was more in love with him than ever. He went up country, and by and by his letters begin to come regular again, and diamonds, too—small ones, but one or two good-sized ones, so that in their sum they might be taken to be worth full as much money as I had put up for him. One day he sends me a real brilliant two-karat fellow and simultaneous draws on me for £500, saying he was going to another place in the hope to find a diamond worth the venture.

"After that no more from Mark Cary. More than a year went by, and not a word did I get from him, nor did his wife no more than me. The little woman was well nigh crazy, and, as I had no good news for her, I did'nt tell her any. I had written in a private way to a correspondent of mine at Natal, and heard what I was afraid of—that Cary had gone to the bad again—and it cut me deep; but I never let on, not even to my own wife. No news—eighteen months and more went by, and not a single word from Cary. I kept out of the little woman's way all I could, for the sight of her would have distressed a politician, let alone a stone wall; but one stormy night she burst in upon my wife and me, as wild as she could be. 'General Jack,' she says, wringing her hands, but never shedding a tear, and turning on me a face I couldn't look at for the pity of it; 'General Jack, I cannot be the pensioner of your bounty any longer! You are the best man that ever lived and I'm the most wretched of women, but that's no reason why I should keep on imposing upon you.' So I says to her, 'What's up?' for I was pretty sure now she had news of Mark, and nothing good. 'Have you heard from Cary?' 'General Jack,' she says solemn like, 'I know my husband is dead! I know that he has been false to you, and it killed him! It's killing me!' I was struck all of a heap. 'Never mind, little woman, never mind!' I was going on to say, when my wife broke in, 'How did you learn all this, Margaret?' she asked. 'In a dream, a dreadful, awful dream!' said the poor creature, and then she broke down, burst out crying, and couldn't say any more. So we sets to work to console her best way we could, but didn't make much headway at it. I told her I would be cruelly hurt if she didn't let me keep my promise to Mark, but her last word was she couldn't, daresn't and wouldn't live on me.

"Just then the front-door bell rang, and when William opened it, the raggedest buzzard of a man broke past him and came rushing into the sitting-room here where we were. He hadn't a whole stitch nor a clean stitch on him, that fellow hadn't; his hair was long and wild and his beard also; his feet bare and his face would a won the premium over a Connecticut hatchet for sharpness. All the same, that little woman knowed him as soon as he stopped at the door, turned white as a sheet, held her two hands together tight, and just sighed between her teeth, 'Mark!' I thought she'd go over, but she was too true grit for that. He never noticed her, nor nothing else. He came straight up to me and kind o' steadied his staggering feet by holding on to the table and looked me in the face and said, cool and calm like, 'General Jack, I've been a thief and a traitor, a sot and a vagabond, for more than a year; but I have lived long enough to make you amends. Here's your diamond; take it quickly, for I'm dying!' and he put a bundle of rags about as big as your two fists in my hand, and went over just like he was shot.

"The little woman gave one cry, half joy, half terror, and had him in her arms next instant, his head in her lap and she smothering him with kisses, while my wife, cool as a statue, turns to William and says, Have some soup made, and the first thing I saw she had the brandy bottle and a spoon and was down on her knees beside him. 'He's just starved to death, General, that's all,' says she. And I wasn't nowhere in that ring, while them women were bringing him round with little doses of beef tea and brandy, kisses and pattings, and calling him all the loving names in the dictionary. By and by he sits up—' Where is it?' says he, and makes me hand that parcel of old rags out of my pocket where I'd slipped it in the hurry of the moment, and unwrap and unwrap until out there shined—but sho! there are some things you cannot describe!"

And at this point in his narrative the General always unlocks his safe and produces his great diamond. "There he is! Biggest diamond in America! Finest jewel in the world! Look at it! That man fetched him for me all the way from Africa by way of Australia, and hadn't a cent in his pocket half the time! Didn't I tell you I never was mistaken in a man's character in my life? Hadn't had a bite to eat from Omaha here, but held on to the diamond and said nothing—only starved!

"Well, he told me all about it—not that I believe all his sentimental trash, though. People with his sort of face are honest because it's their nature. If they get wrong their nature beats and kicks them and pulls their ears till it sets them right again! That's all of it. His story was that he hadn't been at the new place more than a week before he lighted on the big diamond—kicked it up with his toe. He no sooner saw it than he knew it was a fortune for him if he kept it. Then, he says, the devil entered into him and tempted him, and he got on an all-fired rollicking bust, and run away to India to sell the stone to a rich Maharajah there. But, just as he was concluding the bargain he ran away again—he don't say the devil tempted him this time, though. Then he landed in Australia, and kept up his jollification until he hadn't a red left; but all this time he held on to the diamond, because it was mine, not his. So one day he makes up his mind to come home, and works his passage across to California, and then, for fear lest he should be tempted again, or get robbed, begs and borrows his way home. Now, that I call pretty much of a temptation for a poor man to overcome; don't you? Look at the stone—it's worth $80,000 as it's cut, and that Mark Cary didn't know he was going to get a penny for it, outside his wages, as agreed on. But he brought her on, all safe! It isn't every man would do it—but the way I got rich was by looking in men's faces and seeing if they're honest. And I never was wrong in judging a man's character in my life."

General Jack will not tell you, what is nevetheless the fact, that, after his famous diamond was cut, he had it appraised, and paid Mark Cary its value, less the advances made to him and his family. He will not tell you of Cary's fine plantation and his fine prospects —of how he is a temperate man, a good citizen and the best of fathers and husbands—made so by General Jack's ministry. But he will show you the big diamond, if you call upon him, with exquisite pleasure, and relate to you with much gusto such portions of its history as do not reflect too great credit upon himself.

Reckoning Time by the Mohammedans.

WE translate the following from our Alexandria exchanges: It is generally accepted that the Mohammedans exclusively calculate their time by the moon. This is in no respect the case. Of course, the ancient calculation of time by the moon year is affirmed by Mohammed, and sanctified by establishing it by the Koran; but in civil life, as well as in astronomy, the Arabians were forced at a very early day to adopt the more advantageous reckoning—by the sun year.

The Mohammedan era, which, according to the Hedshra (hegira), that is, the flight of Mohammed from Mecca to Medina, dates and commences with the 16th July, 622 A. C., counts by true moon years. As known, the moon moves around the earth from west to east, and with it, around the sun. It uses about 29½ days for its course (exactly 29 days, 12 hours, 44 minutes, 3 seconds), which period is called a synodic month. Twelve such months make 1 moon year, of an exact astronomical duration of 354 days, 8 hours, 48 minutes, 36 seconds.

The civil Mohammedan year consists of 12 months, at 30 and 29 days, and has 354 days. The months are called:

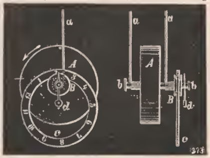
Moharrem........ ....days	30	Redscheb.............days	30
Safer................. "	29	Schaban .... "	29
Rebi el-ewwel......... "	30	Ramadan............. "	30
Rebi el-achir.......... "	29	Schewwal......... .... "	29
Dschumadi el-ewwel.... "	30	Dsu'l-kade........... "	30
Dschumadi el-achir..... "	29	Dsu'l-hedsche .... "	29

The twelve months consequently have 354 days. But to 12 synodic months of the above length, go 354 days, 8 hours, 48 minutes, 36 seconds. If the seconds are left out, which only in 2,400 years amount to 1 day, 30 astronomical years make exactly 10,631 days. Since 30 civil moon years at 354 days give only 10,620 days, 11 additional days must be intercalated in the course of 30 years, to make the civil year concur with the astronomical, or the beginning of the months with the first phase. This intercalation takes place in the 2d, 5th, 7th, 10th, 13th, 15th, 18th, 21st, 24th, 26th and 29th year, thus that the 2d, 5th, 7th, etc. years are interlocatory ones of 355 days. The Mohammedan cycle therefore is of 30 years, and its high degree of exactness shows that it is established upon careful, long-continued observations. The additional day is added to the last month, which thus contains 30 days.

The Arabian week, similar to the Jewish, is of 7 days. Each month commences at the occurrence of the new moon, without any intercalation. The year's beginning (1st day of Moharrem) therefore occurs irregularly, and travels in a period of about 33 of the Christian years backward through all the seasons. A few cloudy days can postpone the commencement of a month, and make the last month several days longer. Although inconveniences on this score are but seldom, as the countries where Islam reigns generally enjoy a clear blue sky, it is actually the case that two parts of the same country count by the difference of 1 day.

Interesting Clepsydras.

THE ATTENTION of antiquarians was called about a year ago to a peculiar clepsydra (water clock) in Bohemia. Investigation has since shown that it is not the only one of the kind. The clock is worthy of attention both on account of its simple construction and historical curiosity. *A* is a drum of sheet brass; it is hollow and shows traces of an interior division into several sections by radial walls. It will be found by shaking that it is partly filled with a fluid, apparently water. This drum is firmly united to an iron or steel axis *b b*, around which two cords *a a* are wrapped, and fastened to an elevated point, for instance, the room ceiling. The thus



suspended drum does not sink suddenly—as might be supposed—but sinks extraordinarily slowly downward, imperceptible to the eye. In order to use this motion for purposes of measuring time, a spur-wheel *B* is fastened upon axis *b*, in which ring *C* is freely suspended. Index *d*—also free—is suspended before the roll, and always maintains its vertical position, and marks the time upon the moving ring. Four such contrivances have been discovered up to date. One was discovered in Brunn, in 1846, and described, without specifying its mechanical arrangement; it is supposed to be about 200 years old, and said to originate from a Jesuit monk; a second one, also of the same age, has been constructed by a Franciscan monk; the third and fourth ones are in Prague.

Wenzel Jamitzer.

PRODIGALITY OF THE MIDDLE AGES—SUMPTUARY LAWS.

THE NATIVE city of Albrecht Dürer—Nuremberg—had, in the 16th century, become the brightest star in the constellation of prominent German cities. Although Augsburg attempted to be a worthy rival, Ulm, Eslingen, Strassburg, Frankfort, essayed to vie with it, nevertheless, Nuremberg sounded the key note. Both Emperor and Empire has tacitly acknowledged it by fixing upon Nuremberg as the seat of the Imperial treasury, and the ancient German royal crown was guarded in its walls since the year 1423. Pope Martin affirmed it by a special bull, confiding to the city "the perpetual care of the paraphernalia of State," and, indeed, they remained there until the German nation was no longer a Roman empire, and these insignia had to be conveyed to a place of safety, to protect them from Napoleon's cupidity. A patriotic professor of Würzburg kept them hidden in his trunk for eight years, and only delivered them in 1815 to the Austrian treasury.

Nuremberg's goldsmiths were especially noted for the wealth of their original and artistic conceptions, united with the highest skill and harmony of execution, with which they wrought perfect works of art. The spirit of Albrecht Dürer hovered for another century in their midst, and many a one showed himself worthy of following his footsteps.

Wenzel Jamitzer was the chief of all.

He was a scientific goldsmith, especially famed for his several inventions in mathematical instruments, and their use; he wrote several excellent treatises on the subject; he was also one of the most famous clock makers of his times, constructing several complicated movements, etc., and other works.

The great prodigality which had become customary among the nobles, and in the different counts, with regard to personal ornamentation, since the day of the crusades, proclaimed the high self-estimation entertained both by knighthood and princedom, and which also passed over to the free, wealthy citizens of the country. "Gold was the word, gold was desired by all." The goldsmith had good customers, and his work was the representation of the period. At first he laid more stress on the solidity of his wares, while gradually, when the people became more refined, he also became more ambitious, stimulated by the growing culture and refined taste, of producing the most admirable masterpieces. Table service proclaimed the wealth of a family, together with gigantic beakers and drinking cups, and overload of ornamentation in attire, necklaces, rings, spangles; the knights were encased in gold and silver armors, beautifully engraven with the most delicate interlacings of arabesques, or inlaid with gold. This prodigality in dishes and personal ornaments was fully sustained by the sumptuousness in eating and drinking.

When Duke Charles the Bold, of Burgundy, in 1473, traveled to the diet at Trier, his suite consisted of 5,000 well armored and mounted men. He himself was dressed in a gold dress, studded with pearls, estimated at $200,000. He invited the Emperor—Charles V.—to St. Maximin, and Hans Sachs, the chronicler of the festivity, says that at the dinner entertainment, all the dishes were of silver, and the beakers and cups were resplendent with jewels and pearls. Four courses were served, the first of which consisted of fourteen, the second twelve, the third ten costly covers; for the fourth, thirty gold vessels were served with spices and confectionery; the largest dish was estimated at about $2,000.

Berlepsch says that Elector Moritz caused four hundred and fifty pounds of silver to be weighed out from his treasury, to be manufactured into dishes, intended for the marriage of his son, the future King August of Poland, with a Princess of Denmark.

King Sigismund of Poland and Sweden, in 1606, presented to his bride a dinner set of pure ducat gold (22.8 karats); the cost of the manufacture alone of the basin with water can (for washing the hands after meals) was valued at $8,000. The attire of the bridal pair represented a value of $700,000; the king wore fine diamonds, estimated at $1,000,000, in his diadem.

The citizens of Paris presented to Charles VI., and his young spouse, Isabella of Bavaria, golden dishes and vessels of a weight of 450 marks, and to the Duchess of Touraine a dinner set 200 marks in weight. So says Froissart.

Berlepsch relates the almost incredible story that toward the end of the 16th century, the prodigality in gold and silver vessels was so great in Spain, that a man called himself poor if he did not possess at least 800 dozen plates and 200 dishes of the noble metals. It is said that many households had as many as 1,200 dozen of heavy plates and 1,000 dishes. The treasures of the recently discovered America was assimilated in this manner in European luxury. According to the chronicles of Sevilla, the Spaniards brought 1,336,000,000 ounces of gold into Spain between the years 1519 and 1617.

Beside goldsmithing, also the working in tin attained its perfection in those wealthy times; a goldsmith, Jean Davet, of Langres, also called Danet, or the Master of the Unicorn, from his stamp, flourished as an engraver of tinware. But as an offset to the luxury of western Europe, all the art pursuits had retrogressed so far in England that the barons had not ever. tinware upon their tables, but drank out of wood or leather vessels, wherefore it was said in irony, that "the English got drunk out of their boot shafts."

The goldsmiths of western Europe, above all, the French, sought to commingle with this taste for luxury in dishes, an excessive indecency, and combined their productions with voluptuous representations, especially their large drinking cups and goblets. Truly wonderful works of their lacivious taste could be found in the court circles of the middle ages. Only to give one instance, Philipp the Good, of Burgundy,caused a female statue of gold to be made,from whose breasts issued the wine at table, and a young girl of enameled gold, in nearly the posture of the Venus of the Capitol; a fountain of the purest wine, caught in a transparent vase, issued from under her modestly folded hands. Other show and drinking vessels were more ingenious and artistic. A bell figure, for instance, held a smaller beaker at a poise, revolving around its axis if it was tipped over to drink therefrom. Else it consisted of a female silver figure, richly enameled, with lower dress seam, jacket and headdress gilt; she held, raised above her head, the drinking cup. A similar beaker of a Würzburg prebendary contained hidden wheels, to be wound up with clock movement; the lady moved from place to place, when set upon the table.

Finally, the extreme was met. The Emperor and the country, the individual princes, knights, nobles and city governments, all resolved to counteract this senseless dissipation and luxury with strict laws. The nobles had generally become impoverished thereby, and they resolved in 1479, at the 28th great tournament held at Würzburg, to adopt a sumptuary law, by which all gold ornament, both in attire and armor, was prohibited; neither the women were excepted. Charles V. issued a law in 1530, under heavy pains and punishments, with provision forbidding the country people from wearing any jewelry whatever; the citizen might wear a gold ring, without jewel, of the value of five or six florins (35 cents apiece)—and their wives, a girdle up to 10 florins; merchants' wives one of 20 florins; their daughters and unmarried ladies, a headdress, at 10 florins; rich city councilors and patricians could sport a ring of 50 florins; noblemen could adorn themselves with a chain of 200 florins, and real knights, up to 400. Counts and gentlemen might expend 500 florins therefor, and their spouses as much as 600. The goldsmiths also were prohibited from employing the noble metals uselessly for articles of ornamentation, nor could they sell valuable articles to persons of low degree.

Of course, these stringent laws fell short of their aim; the goldsmiths had a large noble patronage for their masterpieces, and German art articles were sought everywhere. Wenzel Jamitzer is the most illustrious representative of the art producers of that age. He enjoyed a high renown, and was the court goldsmith for four successive German Emperors: Charles V., Ferdinand I., Maximilian II., and Rudolph II. This circumstance placed him above the sumptuary laws, and unheeded, he manufactured the costliest gold and silver vessels.

His style was especially distinguished by the delicate embellishment of large, tasteful articles with animals, insects, flowers and herbs in silver, of so delicate a construction that when the breath was blown against a blade of grass, it moved. The art collections of Dresden, Berlin, Vienna and other cities pride themselves at the present day on enclosing one or more pieces manufactured by him. We can do no better than describe one piece he wrought for the city of Nuremberg, and which for many years constituted the chiefest ornament upon the gala tables at festivities and receptions. It is of silver, about three feet high, and at its broadest part measures about eighteen inches. In the most ingenious manner does he represent in this construction, Nature as the bountiful giver of everything in excess that man consumes, either prepared in the highest culinary art or in its original shape—and not alone the donor to man, but also to animal, frog, lizard and snake, worm and insect, that appear to glide around the silver leaflets and haulms of the work of art.

A scenery of mountain and forest arises from an admirably represented meadow, the former adorned with flowers, bushes, snow bells, and other plants handsomely executed in enameled colors. Latin inscriptions are worked through the vegetation and among the animals, at the foot of the mountain:

"The heavy bunches of grapes are as little burthensome to the vine, as the fruit is to the green branches."

"Thus is carried the powerful castle by the rocky support of the earth."

"Easy the burthen that a rejoicing heart easily bears."

From among this luxury, Nature, surrounded and enveloped by its creations, arises in the shape of a handsome woman, of antique form, of silver, with hair and dress of gold. She holds a cornucopia with both hands above her head; four small angels' heads adorn it, with two inscriptions.

"Why I, a delicate woman, bear so heavy a load of fruits, or what goddess I am, do you ask?"

"I am the earth, the mother of all, laden with the costly load of fruits engendered by me."

The cornucopia widens into a broad mouth, opening from the leafwork, as it were, and entwined with a hundred forms chased in silver, or cast, such as flower stalks, rose buds, meadow flowers, berries, and haulms. Three winged genii arise from its midst to support the bowl, which surmounts the whole. Inscriptions are again introduced, upon small shields above the genii:

"Glorify ye the Lord with songs of praise, oh grateful spirit of mortals."

"Whatever the fertile earth bears, are but donations divine."

"But we, servants of the Lord, stand mute at the great divine bounty."

The bowl itself is gilt, and interlaced by leafwork in gold and enamel, through which wind snakes and lizards. The interior of the bowl is extraordinarily rich with all the emblems of fertility, and interwoven with animal and ornamental figures in an ideal combination; an excellent relievo, from which, as uppermost ornament, issues a bouquet of bell flowers, lilies, parsley, carrot leaves, and a wealth of bloom in mat silver, so delicate, light and graceful that it expresses the master's highest conception of art.

Wenzel Jamitzer died at the age of 78, on December 15, 1586.

Decline of the Art of Goldsmithing.

ARTISANSHIP, in trades, when compared to many periods of former times, has decayed in general; trade vocations, as a collective whole, have much deteriorated in skill and taste, and abandoned the domain of art to the lately arisen factory and machinery systems; also the art of goldsmithing declined as far as the present era. The past century has not given birth to a master, even approachingly, who could lay claim to an immortal name by reason of his artistic conception and skill.

Upon the advent of the French revolution, all trades became seized by the desire of altering their social positions; skill, artistic embellishment of their work was neglected. The workingman directed his endeavor and struggle to obtain the former, and with it, gave birth to the workingman's problem and workingman's party. To this, his participation in politico-socialistic ideas in theories of a less political, than of a commonwealth equality of state citizenship, corresponded the ever-strengthening desire for the abolition of all class differences. And, here again will we find that the gold trinket characterizes the degradation of social culture down to that level upon which this equalization, this compensation, was to take place. Those formerly debarred from wearing jewelry, either by sumptuary laws or poverty, now craved for it, it being placed nearer to their reach, and purchased that quality that could be furnished by the goldsmith at a low price, without artistic pretensions, and as a cheap bauble. Every servant girl desired to wear jewelry; with her, the main question was its gaudy appearance, not its value, and this addition to her personal charms loudly proclaimed the low grade of her self-vanity. The middle-class citizen, who had retrogressed in wealth, the proud aristocrat, who was gradually impoverishing, but still desirous of retaining the ancient distinctions of his class, were satisfied more with the appearance than the real value of the trinket they wore, let alone its ideal artistic ornamentation. And the goldsmith was called upon to design, to fashion for this new deterioration of the value of social character of modern society, and the question with him no longer could be how much art and skill to lavish on the article simply intended for sake of appearance, than how cheaply he could produce it. Silverware disappeared almost entirely from the household, as well as the full press of snowy linens, once the pride of the housewife. The production of the day proclaimed as well in shape as solidity the generally prevailing decay of taste, and, therewith, artistic skill. Solid silver degraded more and more into sheet silver, and was followed by the manufacture by stamp, to substitute chasing, the character of which had nothing longer in common with silversmithing.

Chemistry, which once had conjured up all the lore of the secret arts, in the manufacture of pure gold, now as diligently strove to sophisticate it, to produce spurious gold and silver that would meet the common wants, to fraudulently substitute gold by some other glitter and gloss, so that the world might array itself in its self-conceit. It furnished to the manufacturer the German silver, Britannia metal, pinchback, and many other such compositions intended to replace the noble metals, and to awe the ignorant with the importance of the wearer. Such substitutes found a market in prodigious quantities at a time when little note was taken of true worth and solidity; when a hollow, false culture, or better said, want of culture, with its scarcity of ideal conceptions, and its low species of self-vanity, ruled the day. Other substitutes, for instance, coffee and wine, ruled the market, also were gotten up. The treasure of a family no longer consisted of silver and gold, but of brass and sheet tin. The silversmith no longer chased silver in self-conceived, artistic convolutions, but delegated the task to the factory manufacturer, with his presses and stamps, as well as to galvano-metallurgy, to produce it by the dozen. Such work, of course, never could, even by the greatest perfection, divest itself of its frosty, stiff, and cold appearance—a certain indefinable want of harmony is inherent in machinery work, that divides it at once from the artistic production. Even the best photograph is not according to nature.

No wonder, therefore, if the art of the goldsmith had a downward tendency. The flood of trinkets with which Paris and other European manufacturing centers deluged the world, and calculated simply to pander to a low, depraved taste—these emanations more than anything else proclaimed the decaying character of taste, and the universal inclination for the superficial, the sham, the contempt for intrinsic worth.

Before closing with this part of our dissertation, we will state that a reformation passed through the different pursuits of art, and especially through that of goldsmithing, about a quarter of a century ago, emanating from Italy and France, and caused by the finds in the grave of buried Pompeii; the admirable, gracious, artistic shape of the articles, at the same time adapted to the purposes intended, again attracted the attention to antique styles, and business found it lucrative to imitate them. Chased silverware of more artistic pretensions was again demanded; bijoutrie factories improved the general style of their articles; engraving and enameling were called in as auxiliaries, to lend it a certain artistic pretense. But a true harmony between this imitated work and the prevailing absence of taste in modern goldsmithing has not yet been established, and our present somewhat improved patterns are in no manner an expression of an increasing popular taste, such as was that of the Renaissance, and its time. Although it may boast of single specimens of a truly artistic conception and execution, yet, as a whole, it is entitled to no praise; it is simply a *child* of the times. The many expositions and world's fairs have glaringly established this as a truth, and a contrast was plainly perceptible to the observer by comparing the old and the new.

We have endeavored in the preceding remarks to show that a well-defined style of the nineteenth century has not yet been formed, and we are now in a transition period. The demands of the day are too great to return to the slow hand labor of the Etruscan, Gothic, Louis. Rococco, or any other style of the past centuries, though first-class artists were in abundance. But the time will come when some poetico-practical Cellini, understanding the needs of the day, shall blend these happy styles with those of machinery, and reduce them to a harmonious whole.

Oxidizing Silverware.

[By A. Wagner, in *Journal d.Goldsch.*]

OXIDATIONS upon silver are always produced by providing the article either all over its surface, or, more frequently, only at different places, with a more or less heavy coating of sulphuret of silver, and this is most practically executed by applying a substance to the silver article, which contains an easily decomposing sulphur combination.

Such a combination we have in the so-called sulphuret of potassium.* It may be produced by mixing sharply dried potash—2 parts, intimately with 1 part pulverized sulphur, and melting the mass in an iron vessel.

If it is desired to coat a silver article entirely with sulphuret of potassium, it must previously be thoroughly cleaned of filth and dust, then rinsed with water, and at once be immersed into the sulphuret solution. The influence commences at once, and the coating adheres with increasing force, according to the dilution of the bath. If this is heated, the coating will be effected in a shorter time. It is of importance, however, not to accelerate the progress unduly, else the coating will only adhere loosely, and is easily removed by wiping, and as a general fact, such sulphuret coating, at best, does not adhere very firmly. We have satisfied ourselves that a far better adhering coating can be produced by exposing the silver article to the prolonged action of an atmosphere of moist sulphuretted hydrogen gas.

When the article has become sufficiently coated with sulphuret of silver, it is withdrawn from the bath, quickly rinsed, and then dried; if the process was conducted correctly, it must be colored to a uniform grey. The article may he embellished in a suitable manner with ornamentations in the color of pure silver, effected either in a mechanical or a chemical way.

. The layer of sulphuret of silver can be removed either by the graver, so that the lower stratum is brought to appear, or the chemical process is pursued. By this, the drawings, to appear upon the article, intended to be bright, are traced upon the oxidation with goose quills, dipped into moderately strong nitric acid. The sulphuret of silver is by this acid changed into a sulphate of silver, and this is dissolved when the drawing is completed, by dipping the article into boiling water, and leaving it therein for a short time, because sulphate of silver only dissolves with difficulty in water.

It is not easy to obtain entirely faultless sketches in this manner; especially the edges are not always of a sufficient sharpness. Sharper sketches are obtained by coating those places of the silver intended to remain bright, with asphaltum varnish, and when this has dried, to immerse the article into the sulphuret of potassium bath. When this has sufficiently operated upon the article, it is rinsed, and the asphaltum varnish removed by immersing the article into benzol.

We have also made several very satisfactory tests by producing the sketching direct upon the article, in such a manner that we made a very highly concentrated solution of sulphuret of potassium in water, and thickening it with so much mucilaginous gum solution, that it could be used for writing and drawing. The drawings upon the bright silver were executed with the pen and hrush, and the article left to itself for twenty-four hours, then sufficiently heated that the dried gum either cracked off itself, or could be separated by gently tapping the article. If the solution was correctly thickened with the gum solution, the edges of the drawing are of an excellent sharpness, and these dark grey sketches upon the bright silver ground are of a very agreeable effect.

In place of the solution of the sulphuret of potassium, sulphuret of ammonia may be used with equal effect, by leaving it exposed to the light until it has turned yellow. But the sulphuret of ammonium very easily parts with sulphur when exposed to air, and the work with potassium is a cleaner one, and its use to be preferred to the former.

The handsome bluish grey to black color, characteristic to sulphuret of silver, is obtained upon the bright silver by the sulphuring bath; if the alloy contains much copper, the color will become different, more inclined to black, and less handsome. If, therefore, it is intended to obtain oxidations simply produced by sulphuret of silver, it is necessary to glow the article for some time in open air, in order to oxidize the copper of the alloy to a proportionately great depth, and to remove this copper oxide twice or three times with boiling in pickle.

If the color of the oxidation is desired to be very dark, approaching velvet black, the article, before it is immersed into the sulphuret of potassium bath, is dipped into a solution of hyponitrate of mercury. It will quickly assume a pretty white color, metallic mercury being separated upon its surface, which unites with the silver to a silver amalgam. The solution of hyponitrate of mercury is produced by dissolving metallic mercury in cold nitric acid, leaving a little mercury in excess, and storing this solution in a well-closed flask, upon the bottom of which lies a little mercury.

If next the article is brought into the sulphuret of potassium bath, a heavier layer of a combination of sulphuret of mercury and sulphuret of silver arises, which is of a velvet black color.

The silver oxidation may also be heightened by chemical agents; if, for instance, the oxidized article is dipped into a fluid consisting of 10 parts sulphate of copper, 5 parts sal ammonia, and 100 parts vinegar, the bright places of the silver assume a brown tone. Very handsome colored drawings may be produced in this manner by a skilful manipulation of the different processes. If, for instance, ornaments are sketched with ashphaltum varnish upon a bright silver surface, oxidized in the sulphuring bath, next removing the ashphaltum layer, dipping the article into the solution of hyponitrate of mercury, oxidizing again, black sketches upon a blue-grey ground are obtained. If then certain places of the silver are brightened, and the article is dipped into the copper solution, these bright places will then become oxidized brown, etc.

Attention must always be paid not to destroy the already perfected oxidations, and such places are always to be coated with asphaltum varnish.

* It is also called liver of sulphur.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the wri er's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

THE BOGUS OPTICAL GOODS PEDDLERS.

To the Editor of the Jewelers' Circular:

I was glad to notice in a recent issue of your valuable paper, an article exposing the tricks of the peddlers who go about the country swindling credulous persons with cheap and bogus spectacles and eye-glasses. Recently one of these chaps came to our place, and, notwithstanding I exposed him in the local papers, he did a thriving business. His stories were so plausible, and as he claimed that I was jealous of him, my warning passed unheeded until the injury was done. He had with him a machine by means of which he said he could ascertain what particular style of glasses each person required. It was a handsome looking affair, and when a victim looked through it, he pushed in a slide here and turned a screw there, and finally succeeded in deluding the person into the belief that he had obtained the required focus. Then he would triumphantly produce a pair of magnifying spectacles for short sighted persons, and persuade them that they were precisely what they required. If the victim had no particular trouble, but only a sort of blurred vision, he generally palmed off a pair of plain glasses. These various kinds he uniformly charged $4 a pair for, of precisely the kind that can be bought by the bushel for 20 or 25 cents a pair. Buyers soon found, however, that their glasses injured their eyes by straining them, as they inevitably would do, having been ignorantly and recklessly selected. Selecting glasses is one of the most delicate things a conscientious jeweler has to do, and if he has any regard for the comfort and welfare of his patrons or his own reputation, he will spare no pains in fitting them exactly. I never expect to suit a person's sight at the first trial. I first ascertain as nearly as possible the kind they need, and then fit them with several pairs to take home and try under favorable conditions, warning them to be extremely careful about straining the eyes with any of them. A jeweler's store is not usually a good place for a purchaser to test glasses—the light is not suitable nor other conditions favorable. The best way is to let them try them at home under the conditions in which they are most likely to use them. In this way I generally succeed in suiting my customers.

There is another class of these same swindlers who are quite as bad as the peddlers. These are the quack eye-doctors who go from place to place, stopping at the hotels and advertising to cure all diseases of the eyes. They talk an alleged medical jargon in a learned manner, and usually succeed in selling the same cheap spectacles at fabulous prices. These swindlers, who tamper ignorantly with the sensitive organs of the human body, should be made amenable to the law, for they do an immense amount of injury. When I have found them announced in this place, I have secured the co-operations of our best physicians to warn the public against them. By doing so, I have succeeded in driving them away, and for several years none have come to this town. Yet there are thousands of persons who like to be humbugged, and will pay a charlatan for a worthless article, five times what they would pay a reputable townsman for something of value. I am glad you have taken notice of these swindlers, and wish all the daily and weekly papers in the land would copy your articles.

SPECTACLES.

STATE ASSOCIATIONS AND "SKIN" GOODS.

To the Editor of the Jewelers' Circular:

I think you are going altogether too far in denouncing the state associations of retail dealers for adopting the Guild stamp. I belong to one of them, and I am in favor of the stamp. I do not think it will do us much good to have these goods of better quality than any others, but under the arrangement made, it gives us members the exclusive right to sell them, and that is what I want to see. I hope to see the day when our associations will take the same stand as the trades unions, fix prices on our goods, and make war on every dealer who does not join the association. If we stand by one another we can dictate our own terms to the jobbers and the public, and that is what I want to see. If there are any dealers who are too mean spirited to stand by us, then I say let us drive them out of the business. The time is coming when every trade has got to protect itself, and I think the state associations should be made the means of protecting the retail dealers. "United we stand, divided we fall," but rather than fall, I believe in crushing out those dealers who do not join with us. If they are not for us they are against us, and self-protection demands that we drive them out of the business if possible. I have suffered much from the tricks of the jobbers, and now I am for combining against them.

You make a great palaver about manufacturers debasing the quality of their goods. This is all nonsense. The goods made to-day are just as attractive looking as those made years ago, and the public will pay just as much for them. If there is less gold in them, that leaves a greater margin of profit for the dealer. If I buy goods that are represented 14-k I sell them as such; if they are only 10-k goods, why they don't cost me so much, and my profit is greater. I don't see where my conscience need be worried on the subject; the goods are represented 14-k, and that is sufficient for me. If anybody's conscience wants to make a fuss about it, it should be the manufacturers'. We dealers have a hard time making a living at best, and if we can save a little something in the quality of the goods, I think we are entitled to it. I find this is the way of the world, and I don't believe you can change it. I don't stand up for dishonest practices, but I claim that I have the right to sell goods for what they are represented to be. If they are not up to the representations, that is'nt my fault. Nobody is injured by the transaction; the public can't tell 10-k goods from 14-k, and are just as well satisfied with the former. As long as customers don't know the difference there is no harm done. For my part, I am glad to see manufacturers reducing the quality of their goods, provided they keep them stamped the same; I find I can buy them for less money and sell them for the same old prices. I am free to say that I have made more money handling cheap goods in the last three years than I did in the five years before, and I stand by what has money in it. This I believe is the sentiment of the retail trade in general, and all your lectures on trade morality are thrown away. There may be a few old fogies left who believe in the old style of doing business—best quality of goods and small profits—but I belong to the new generation, and want to make money as fast as I can. The outside dealers in jewelry hurt our trade considerably, and I hope to see the associations put all those manufacturers and jobbers in the black list whose goods are found anywhere outside of the retail stores. Let the dealers refuse to buy of them and they will soon quit selling to the fancy goods dealers, the hardware men, the milliners and druggists. When the associations get a little stronger they will put the screws on tighter, and that is what I want to see.

HOOSIER.

["Hoosier" is evidently one of those "high-toned" fellows, like Baldwin the defaulting bank cashier of Newark, whose elastic conscience permitted him to swindle widows and orphans out of several hundred thousand dollars. The man who cannot see dishonesty in selling 10-k jewelry for 14-k, would not see anything disreputable in making and circulating counterfeit coin. It is useless to waste words on him. But if many members of the state associations agree with him as to the uses those organizations should be put to, the respectable portion of the trade should know it—Editor JEWELERS' CIRCULAR.]

Music Boxes.

"There is a great demand for music boxes from China," said a Broadway dealer. "The Chinese are passionately fond of them, and at a festival a Chinaman who can afford it carries a music box in each pocket."

"What music do they like best?"

"All Chinese music. They will have no other. The sweetest strains from 'Trovatore,' 'Mignon,' and 'Faust' are as 'sweet bells jangled out of tune' to a Chinaman. We have to employ men who can reduce the Chinese music to written notes, and from this as 'copy' the music box is made. We have to make up a different set of tunes for every country. If we should send boxes to France that played 'Nellie Gray,' 'Way Down on the Suwanee River,' 'When You and I were Young, Maggie,' or 'Sweet By and By,' we should get them back quick enough.

"National airs are the first tunes chosen, then the popular tunes, and then selections from famous operas. Scotch tunes, except 'Auld Lang Syne' and 'Bonnie Doon,' are difficult to render effectively by a music box, and they are rarely used. The great expense in the manufacture of music boxes arises from the necessity of changing the tunes, discarding those that are tiresome and substituting the latest and most popular. But sit down while we talk."

The writer took a seat, and the strains of "Farandale" from "Olivette" floated from beneath the chair.

"Have a cigar?" He turned a cigar stand, and there came out of it the air of the drinking song Giroflé-Girofla."

"This is a picture of our Swiss factory."

As the album was opened there came out of it an air from "Fra Diavolo."

"Will you take a pinch of snuff?"

As the lid was raised there was a whisper of "Should Auld Acquaintance be Forgot?"

"We have a customer who has a music box attachment to his front door, and his visitors are always greeted by a tune. A music box can be concealed in a very small compass, and one of the reigning demands is for articles that contain them so as to create pleasant surprises. Dolls, clocks, and books are provided with them. Nearly all of the music boxes are made in Sainte Croix or Geneva in Switzerland.

"The principle of manufacture is simple. The different parts comprise a brass roller, studded with fine points of the hardest steel, a steel comb the teeth of which give the sounds, a spring to give the revolving motion to the cylinder, and a fly wheel or fan to regulate the revolving motion. The music has first to be arranged by a thorough artist. The cylinder which comes from the machine shop is then placed in the hands of a woman, who, with the aid of the music and a very ingenious machine, marks the places on the cylinder where the points are to be inserted. Another person drills all the little holes, and another inserts the points. The cylinder is then filled with molten cement, and then placed on the lathe and revolved quickly. The cement adheres to the inside surface, and thus holds the points. A hole is left in the center of the cylinder for the axis. The points are then filed down so as to be of equal length. The comb is tuned by a tuner, who first files the teeth, without excessive care, to give them the proper flexibility, and then files them near the base to lower the tones, and near the point to sharpen the tones. The operation of fastening the cylinder and the comb to the bed plate requires much accuracy, so that the points of the cylinder and the comb will exactly meet. A woman following the music then bends the points on the cylinder slightly forward in order to secure more strength, but more especially to make the chords drop simultaneously and cause the runs or roulades to be played evenly.

"Size in music boxes increases both their volumes and their richness in tone. A cylinder ten inches long can be made to play six, eight, ten, or twelve airs well, but it will play six or eight airs better and with more sweetness and harmony of sound than it can be made to play a greater number. The reason of this is that more points on the cylinder and more teeth in the comb can be used for each air if there are fewer airs. The space between the teeth decreases with the number of airs. If the cylinder is increased in diameter the airs may be prolonged."

"How long does a music box last?"

"It is like a watch. It will last a lifetime if it is good to begin with and is treated with care. Most owners of music boxes object to using them except for company. The fact is, a music box should be used every day, just as a watch should be wound up every day.

The Luneburg Silverware.

TO BE MENTIONED as an interesting set of copies of the celebrated Lüneburg (Germany) city council silverware, are those executed by two local firms. The fortunes of this treasure are sufficiently known. In the course of the year melted together to one-sixth of its bulk, it was still sufficiently important to constitute the chief attraction for the occasional tourist who came to inspect the sights of the old, reduced, hanseatic city. And it was a picture calculated to forcibly transport the sight-seer back into the old, proud, hanseatic times, as the old bailiff, himself appearing to be an heirloom bequeathed by the past centuries, opened a secret closet in the dark council chamber, in the dark-brown wainscotting, and after having removed ponderous iron bars and doors, drew forth from an arched niche the treasure trove one after the other, and handed them to the visitor. And with the glittering luster lights of the old silverware, imagination might have peopled the moldy old room with the ancient venerable forms of the burgomasters and their assistant councilors, who, to the perpetual remembrance of the discharge of their functions, had donated the single pieces of this service. But, alas! romance is a little honored guest in these, our practical days; in order to liquidate commonwealth debts, the modern fathers of the city listened only with too great an avidity to the sonorous offers made them by foreign antiquaries for their "silver things." And little was wanting to let these masterpieces of ancient silversmithing wander the same road of the reliquies and monstrances of our Rhenish churches in the first half of this century. But, happily, the State interposed at a right time, and without bartering, became possessor of the Lüneburg treasure, for the respectable sum of nearly a quarter million dollars. It also bound itself when the art treasure was incorporated into the art collection museum, in Berlin, to return a galvanic reproduction of those pieces with which it was possible, to the city of Lüneburg. After many trials, these reproductions have most worthily been executed by the firms of D. Vollgold & Sohn, and Sy & Wagner. The pieces are entirely worked in the "deception style."—[*Ext. from German letter.*

The Sweating and Freezing of Show Windows.

DURING the winter season, especially when the gas is burning during the greater part of the day, many a storekeeper will have been at his wits' ends, to devise a plan for the disagreeable sweating of the windows; it is the source of much trouble, and the many hitherto employed means were useless until now. We believe to be sustained in our assertion that no remedy has been followed with as satisfactory a result as the one specified below. Since the inventor obtained a patent upon the process, it might interest the readers to find out what it is.

The invention consists of a fluid composition that prevents the dampening and sweating of windows. It is composed of 63 per cent. alcohol, glycerine, and a little essential oil (in a few cases, amber dissolved in alcohol, adequate to the condition of the atmosphere). The proportions used by the inventor, Mr. Corn. Kerby, of Camperwell, are as follows: About ½ pound glycerine to 4½ liters alcohol, and a little essential oil. The quantity of the glycerine varies according to its quality.

By the composition of the above specified ingredients, the essential oil is dissolved by the alcohol, and the fluid united with the glycerine. It may be done at ordinary temperature, and it is not whatever necessary to expose the mixture to heat. This is applied to the inside of the window. The pane is either rubbed with a clean linen cloth, or else the fluid mass is applied with a camel's hair brush or "some sich," and the blind appearance of the glass, owing to overheating, is entirely overcome.—[*Diamant.*

Gold and Silver—their Elaboration.

(*Continued from Page 220.*)

SILVER ALLOYS.

SILVER IS most generally alloyed with copper; the so-called silver coins and ware of commerce do not consist of silver, but of an alloy of silver and copper, and the laws regulating them are different in different countries, similar to those of gold.

The continent regulates its alloys at present by the decimal system, while England, conservative in everything, still sticks to the old division into 16 parts. The following is a list of the legal standards of the different countries:

	Parts.	Per cent. fine.	Thousandths.
Prussia, Hanover, Saxony, Brunswick, Hamburg, Bremen	12	....	=750
Austria, Bavaria, Hessen and Frankfort.	13	...	=812
England	14	14.4	=925
France, Belgium, } either	15	3.6	=950
Venice, Mailan. } or	12	14.4	=800

PROPERTIES OF SILVER-COPPER ALLOYS.

With the decrease of the percentage fine of the alloys also decreases its color, inclining finally into red, and the appearance of such alloys, rich in copper, is not a handsome one by any means Regardless from this fact, such base alloys must never be employed for cooking utensils or table ware, because they do not resist the acids, and enter into highly dangerous combinations with them, wherefore great caution is required. Even 13 parts silver is not insensible against acetic acid, and when immersed into vinegar for 24 hours, it loses sensibly in weight; while copper may be proven in the acid.

With regard to its physical properties, silver alloyed with copper materially differs in many respects from pure silver; it is harder, and better resists wear than the latter, fuses at a lower degree, and complies better with the mold; in order to prevent the formation of blisters in the casting, it is well to add a small amount of zinc (1 part zinc to 100 or 128 parts silver).

Cast pieces of copper-silver alloy easily fracture, especially in heat, showing an angular fracture; the structure changes by mechanical working and becomes very fine grained, whereby it increases in hardness, by continued drawing and rolling, to that of good wrought iron.

During working, especially in consequence of repeated annealing, articles of such an alloy first become gray, and finally black, caused by the conversion of the copper lying nearest to the surface into oxide of copper; wherefore it is necessary to subject the ready pieces to an adequate treatment with such fluid that effect the solution of the oxide of copper; the article then consists upon its surface of a richer silver alloy and by prolonged treatment of pure silver.

SILVER-NICKEL ALLOYS.

In place of copper, especially in France, alloys are employed that, together with copper and silver, also contain nickel, and in many cases zinc. These alloys, which, with regard to their composition, have a certain resemblance to German silver, are harder than those of copper, and far cheaper; with regard to their appearance, they are equal to 12 parts silver; the known French fabricates being called by the names of their manufacturers, argent Ruolz and argent Fontenay belong to this class. Their composition is represented in the following figures:

Copper	37 to 42	30 to 40	45 to 55
Silver	33	40	20
Nickel	25 to 30	20 to 30	25 to 35

In order to make these alloys easier fusible, more thin fluid in heat, and thereby more suitable for casting, they are heated in a mixture of bone ashes, sand, borax, and charcoal, whereby they absorb a little phosphor, and receive thereby the required properties. It would be simpler to merely add a small amount of phosphor copper in its manufacture.

If zinc is still added to this alloy, an actual German silver is obtained to which silver has been added, and it may also be produced by directly fusing German silver and adding silver. Alloys of this kind are of the following composition:

	Silver.	Copper.	Nickel.	Zinc.
No. 1.	33	41.8	8.6	16 3
2.	34	42	8	16
3.	40	44.6	4.6	10.8
4.	37.5	37.5	12.5	12.5

Alloys 1 and 2 are especially adapted for wire and sheets. The silver contents must, without injuring the beauty of these alloys, not be decreased under 25 per cent., because with a low percentage fine, they assume a disagreeable yellow color after a while.

SILVER-COPPER-ZINC ALLOYS.

Alloys from these three metals have a handsome white color, and possess a clearer ring than pure copper alloys; the following ones give very satisfactory results:

	Copper.	Silver.	Zinc.	Tin.
1	5	90	5	..
2	10	80	10	..
3	7.2	83.5	9.3	.
4	86.9	4.7	8.4	..
5	71.4	4.7	9.6	14.2

Alloys 1, 2 and 3 are used for the manufacture of utensils and objects of art; those of 4 and 5 are, in England, especially for the production of leaf metal and silver bronze manufacture.

SILVER-CADMIUM-COPPER ALLOYS.

The silver-cadmium alloys possess a pure white lustrous color and are ductile to a high degree, very adaptable for wire drawing, fuse at a lower heat than copper alloys, and are deserving, therefore, the attention of the silversmith. Compositions very useful for plating, and for the purpose of wire manufacture are as follows:

	Silver.	Copper.	Cadmium.
1	980	15	5
2	950	15	35
3	900	18	82
4	800	20	180
5	660	25	309
6	667	50	284
7	500	50	450

The universal adoption of these very handsome alloys is unhappily opposed by the high price of cadmium, and the alloys of 5 and 7, rich in this metal, are very costly.

OTHER SILVER ALLOYS.

When aluminum first became known, high hopes and expectations were set on the adaptability of this metal for technical purposes; but, although more than twenty years have elapsed, such expectations have not yet been realized; the cause may be partly sought in the fact of the high price of the aluminum, and partly in the singular behavior of its alloys in the manufacture and working.

The most important of the silver-aluminum alloys is the so-called tiers-argent, consisting of ⅓ silver and ⅔ aluminum; it costs 90 francs per kilogram (2.205 pounds) in France, and is chiefly worked in Parisian factories; the alloy is harder than silver, but easier to engrave.

Another aluminum alloy is the composition of 109 parts aluminum and 5 parts silver; it is very elastic and hard, and is often used for fruit knife blades and watch springs; the alloy of equal parts silver and aluminum possesses the hardness of bronze.

If the endeavor is ever successful to manufacture aluminum in a cheaper manner than the present, when it can be obtained only with the costly sodium metal, this handsome metal will doubtlessly be employed for many purposes and alloys; but such a thing is impossible for the present, for reasons mentioned.

It is said that an alloy exists in England composed of 49 parts copper, 49 parts silver, and 2 parts arsenic, reputed to be very white and pliable; we doubt it, however, especially since arsenic is a body that even in small quantities makes metals very brittle. Such an alloy would also be entirely unfit to be worked into dinner service consisting of one half copper, and mixed with arsenic, it would be rendered very susceptible to the influence of chemical agents, and therefore entirely unsuitable to household utensils.

SILVER-PLATINUM ALLOYS.

Alloys of this nature are but little in use, partly owing to the high price of the platinum (being seven times as dear as silver), and also partly on account of the difficult fusion of the metal mixture. With regard to their nature and physical properties, these alloys are distinguished by their constancy, density, and toughness, and an alloy consisting of 3 parts silver, 4 parts platinum and 1 part copper makes a very suitable metal for almost indestructible pens.

PLATINUM-SILVER BRONZES

are, according to the statements of the manufacturer, Mr. Héhenis, unchangeable, and the following numbers represents the mixture proportions of the platinum bronzes:

	Nickel.	Platinum.	Tin.	Silver.	Copper.	Brass.
1	100	1	10	..	..	..
2	100	1	20	2	..	..
3	100	0.5	15	..	..	..
4	100	20	20	..	..	..
5	1	2	..	1	5	2
6	60	10	..	..	..	120

Alloy 1 is said to be well suited for table ware, 2 for bells, 3 for articles *de luxe*, 4 for telescopes, although owing to its great specific weight it appears not to answer for the purpose. Nos. 5 and 6 are of a gold like appearance.

THE GIN-SCHI-BU-ICHI.

This alloy, composed by the Japanese artists, consists of 30 to 50 per cent. silver, and 70 or 50 per cent. copper; it is then colored a peculiar grey by pickling the ready articles, using a bath of sulphate of copper, verdigris, and alum, and is used for arms, tobacco pipes, etc. For soldering it, a solder consisting of 10 silver, 5 brass, and 3 zinc is used.

SILVER-SOLDER ALLOYS.

The silver-solder, in accordance with their composition, are distinguished by several very valuable properties, and are used not alone for soldering silver, but also other metals, especially steel and cast iron, and small objects of brass and bronze.

The point of fusion of these solders may be changed at option by varying the proportions of the alloy, and in the following we give the most important compositions used in practice.

HARD SOLDERS.

Silver 4 and copper 1 gives the most difficult fusing solder; a composition of silver 20, copper 1, brass 9; or, silver 28, copper 2, brass 10, is still very hard fusing, to a less degree than the former one, however.

SOFT SOLDERS,

For soldering light articles, and also for re-soldering of ready objects, are composed of: silver 2, brass 1; or, silver 3, copper 2, zinc 1; or, silver 10, brass 10, zinc 1; or 12-part silver 7, and zinc 1.

A very easily fusing, but also vitreous solder, especially for low-graded articles, is composed of: silver 5, brass 6, zinc 2. Other silver solders, also much used by machinists and opticians for soldering steel, cast iron, and brass, consists of silver 3, copper 1; or, silver 11, copper 39. The solders for the noble metals are used either in form of clippings or fine powder. The clippings are produced by casting the solder into thin rods; these are drawn to thin wires upon the wire bench, and then passing the wires through polished rollers. Strips of very thin plates of the thickness of straw are obtained hereby, which are cut with the shears into clippings of the required length.

The powder of the solder alloys is produced very practically by casting rods from the alloy, one of which at a time, is fastened into the turning lathe, a vessel placed under the rod, a file is pressed upon the rod, while a small current of water issues from a can set a little higher, and flows along the file.

By a rapid revolution of the rod in the turning tool, it is quickly reduced to a fine powder by the action of the file, and is conducted into the receptacle placed underneath. The vessel is afterwards placed into a warm place, to evaporate the water, the soldering powder being left.

SOLDERING.

The process of soldering consists in uniting two pieces of metal into one, by the employment of heat, and it may be done in such a manner that the suitably fitted-together pieces of metal are heated to such a degree that they come into fusion at their edges and melt together into one piece.

Although this kind of soldering is the most practical, but owing to the difficulty of fusion of the metals, it can only be executed in exceptional cases; a metal mixture is generally employed, the solder which is introduced between the edges of the pieces to be united and melted, whereby the pieces combine into one.

But the metallic pieces cannot be directly joined one to the other; although the solder would melt, yet it would not adhere to the pieces. The cause of this is, that only perfectly polished metals can be united by solder to each other. The faces of the metals to be united, even if previously filed clean, upon heating, becomes covered with an oxide layer, and this, no matter how thin it may be, prevents the union of the parts. The solders themselves, as will be seen by their component parts, are simply alloys, containing a large quantity of base metals, which also have the property, upon heating, of oxidizing strongly, and thus preventing the joining of the parts.

In order to execute soldering in a correct manner, some agent of a suitable condition must be employed together with the solder, serving for the purpose of removing the oxide forming during soldering, and such bodies are designated as

SOLDERING AGENTS.

The metal trade is acquainted with a large number of soldering agents, and it depends upon the nature of the metals to be soldered, what agent is suitable for the purpose. We can only debate those used with advantage for soldering gold and silver articles. Those chiefly employed by gold and silver workers are: Soldering fluid, phosphoric acid, borax, and phosphate of soda; chloride of zinc is also employed in certain cases. As was explained above, the action of the soldering agents is a chemical one, and it is necessary to know their properties and actions, in order to use them with good result. We will therefore examine their chemical properties a little closer.

BORAX.

The borax occurring in commerce consists of colorless crystals, generally covered with a white dust, soluble in cold, easier so in hot water, and of a feebly salt taste. In the language of the chemist, borax is a biborate of soda, that is, it is a salt, a combination of a base (here soda) with a body called acid, (here boracic acid). But there is twice as much boracic acid present here as necessary to form a salt, wherefore the chemist calls it an acid salt: acid borate of soda, or biborate of soda. Its composition, therefore, may be represented in the following manner: Soda+boracic acid+boracic acid+water. Borax also contains water, as without it, it could not retain its crystalline form. If for the present we pay no attention to the water, and imagine that we unite the borax in its melted condition with an oxide, the oxide will unite with the excess of boracic acid, and the newly arisen salt will combine with the borate of soda into a double salt. If, for instance, we have oxide of copper before us, the following occurs at fusion: Oxide of copper+borate of soda+boracic acid=Boracic soda+borate of copper. Fused borax forms a mass resembling glass, therefore totally excluding the air from those surfaces or articles upon which it melts. If, for instance, we heat two pieces of silver between which we have inserted a corresponding amount of borax and solder, to such a temperature that solder and borax are fused, the following occurs: By the fusion of the borax, the excess of boracic acid begins to operate upon the oxide layer with which the pieces of silver and the solder itself is covered, and dissolves it, whereby perfectly pure metallic faces come into contact with each other;

the tough-fluid condition of the molten borax prevents the admission of air to the heated metallic parts, and combine intimately with the solder.

In a similar manner with the borax operates the phosphoric acid, soldering fluid, and the phosphate of soda, and we will consider these agents further on. If commercial borax is directly employed for soldering, it distends very much upon heating, and this is often very disagreeable in the work. In order to obviate this difficulty, it is merely necessary to dehydrate the borax before use, or to calcine it, and for soldering finer articles, such calcined borax is universally used.

Dehydrating is done by heating the commercial borax in a bright iron pan above glowing coals; the salt very quickly melts to a clear fluid, which, when heat is increased, begins to puff out aqueous vapors and to distend. After a while the borax has changed into a loose spongy mass, while largely increasing its bulk, which is finely pulverized, while yet in a hot state, and preserved in well-stoppered bottles. A close preservation is necessary, since the borax absorbs humidity again from the air.

Although the greater part of the water is expelled by this calcination, yet a certain quantity is retained by the salt with such a pertinacity that it only surrenders it at glow-heat, and the now anhydrated borax fuses to a colorless glass, which for the sake of distinction is called melted borax.

The substance in this state is of importance to the worker in the noble metals, for the production of enamel, and it may also be employed for soldering. For the latter purpose however, calcined borax suffices completely; at the moment of the fusing of the solder, for which a glow heat is always necessary, the calcined always passes into an anhydrate fused borax.

MILLER'S SOLDERING FLUID.

This soldering fluid consists of a solution of phosphoric acid in water, to which strong alcohol has been added. If the places to be soldered are moistened with this fluid, and then heated, a small quantity of phosphoric acid will remain after the evaporation of the fluid, and which unites with the oxide present; the newly arisen combination is fused with stronger heat, and acts as an air excluding body.

With regard to its chemical effectiveness, this soldering fluid acts entirely in the same manner as the free boracic acid in the borax.

In place of this fluid, also phosphate of ammonia, a salt soluble in water, can be used. This salt decomposes in the glow-heat in such a manner that ammonia escapes, and phosphoric acid remains, operating in the above manner.

PHOSPHATE OF SODA.

This salt, easily to be had in commerce, similar to borax, in a melted condition takes up metallic oxides, consequently it acts like borax. Since it is very thin-fluid in heat, it is especially useful in cases when soldering with very hard solders are necessary. The crystallized commercial phosphate of soda also contains water of crystallization, and this has a disturbing influence when soldering; consequently the crystals are exposed to the air, when they will lose their water, by becoming air slaked, and fall into a delicate white powder, which is immediately used for soldering.

CHLORIDE OF ZINC.

This soldering medium is produced by filling a vessel about one third its height with zinc cuttings; strong muriatic acid is next poured over them, and, after the development of gases has ceased, more is poured over; this acid is added until all zinc is dissolved. A strip of zinc is placed into this solution, and left therein for several hours, for the purpose of separating any copper or tin accidentally contained therein; the fluid may be used either in this state, or be concentrated by evaporation. The chloride of zinc also operates by soldering in dissolving the oxide layer with which the metals are coated. It is not much employed for soldering the noble metals—chiefly zinc and sheet tin.

SOLDERING.

Larger articles, for instance, silver table service, etc., are first mechanically prepared in such a manner that the places to be soldered fit to each other as exactly as possible; next, the places are moistened with water, dusted with the calcined borax powder, and the solder is laid upon the places to be soldered. If necessary, the pieces are wrapped together first with binding wire. The melting of the solder upon large pieces was formerly performed by exposing the article in a draught furnace with glowing coals, which were also laid around the soldering places; the fire was then fanned to the temperature necessary for melting the solder; the article is then withdrawn, the seams are inspected, an excess of solder is scraped off, and places deficient thereof are soldered again. This method, owing to the great consumption of combustibles, together with being very time-consuming, is falling very much into disuse, and replaced by another in which the places of the article to be soldered, by the use of a very hot flame, are rapidly heated to the fusion of the metal.

Smaller gold and silver articles, are, without exception, soldered by means ot the blow-pipe; and it is a remarkable fact that the same old routine is gone through with as in the days when no gas was known, and the goldsmith only knew the tallow dip as the universal source of light and heat, going no further than an oil lamp. By the employment of appropriate apparatus, the work of soldering progresses easily and with dispatch, and apparatus should not be wanting in any factory in order to save the lungs of the workman.

WHITE PICKLING OF SILVER ARTICLES.

Larger articles, having a smooth surface, before being boiled in the pickle, are subjected to a mechanical elaboration, which might be called scouring, and the treatment consists in scouring the object with sand, which operation imparts them a certain metallic luster. It is necessary, however, to have a sand of a very uniform condition and most delicate grain. River sand is best suited for the purpose, but it contains at times fine particles of quartz, that are apt to mar the surface by scratching, an injury with difficulty corrected by the burnishing steel.

In order to obtain a very uniform sand, it is best to wash it, by filling the sand into a tub, pouring much water over it, strongly stirring; after waiting for about a minute the fluid is quickly decanted into another vessel, and left to clarify. All the coarser particles of sand will remain in the original vessel by this washing, and in the second a sand is obtained, forming a very delicate powder.

Articles possessing no large, smooth surface, and which are pressed, chased, or engraven, cannot be submitted to the scouring process, but are cleansed in a chemical way, and there are several methods to execute this operation. It will be easily comprehended what is to be done by considering the surtace of the article to be cleansed. As already mentioned, it is colored grey or blackish by the oxide of copper, and from a previous touching it with the hands; small spots may be visible in many places, consisting of chloride of silver or sulphuret of silver; the article is covered with filth and grease beside, from contact with the hands. The question now occurs on removing such oxide of copper, silver combinations, and the grease from the articles.

WHITE PICKLING IN THE SULPHURIC ACID BATH.

The oxide of copper is dissolved by dilute sulphuric acid; any silver combinations also are decomposed thereby, wherefore, a bath of dilute sulphuric acid of the proportions of 40 parts water and 1 part acid is very frequently employed for the purpose. This acid bath is produced by pouring the acid in a very thin stream into the water, continually stirring the latter. The water must not by any means be poured into the acid, because the combination of both bodies becomes so powerful that much heat is set free, the mixture begins to boil, and may be thrown out of the vessel; persons in the neighborhood may be seriously injured by the hot fluid.

The article is next immersed into the acid bath, and boiled for about 10 or 15 minutes before it is perfectly white; the reason why so much time is necessary to effect cleansing is because the article is covered with sweat and grease from the hands, which hinders the effect of the acid.

We have found that it is very practical to modify the process of white pickling, when using sulphuric acid, in the following manner: The article to be treated, and which need not be scoured previously, is immersed into a strong caustic lye, left in it for a few minutes without touching it with the hands, rinsed in water, and at once dipped into the dilute, boiling sulphuric acid. By the influence of the caustic lye, not alone all the grease adhering to the article is dissolved, but also all the chloride and sulphuret of silver is converted into oxide of silver; by immersing it next into sulphuric acid, this begins at once to become effective, and in a few minutes all the oxide film lying on the surface has been dissolved, the article showing the purest silver color.

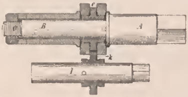
The pickled article, when sufficiently white, is rinsed several times and then dried; if many small articles were treated in the bath, the fluid is poured off and they are rinsed repeatedly with cold water, to remove the last traces of acid.

(*To be continued.*)

Patent Reports.

Machine for Ornamenting Jewelers' Stock.—James W. Cameron, Providence, R. I. Filed Nov. 11, 1881.

Claim.—1. In a machine for rolling jewelers' stock, the roller die having in its opposite sides the annular recesses extending toward its axis such a distance from a line near its periphery that the



clamping collars will impinge only against narrow marginal surfaces of said roller die, as shown and described, and for the purpose set forth.

2. The roller die, having hollow cylindrical hubs projecting from the ends or sides thereof, in combination with the collars seated upon said hubs, substantially as described.

3. A roller die having hollow hubs, upon which are fitted clamping collars, the hubs and die being bored for mounting upon a supporting arbor.

Dial for Watches and Clocks.—John J. D. Trenor, New York, N. Y. Filed May 9, 1881.

Claim.—1. In combination with the ordinary fixed dial and hands of a timepiece, two supplemental independently-adjustable dials, one having on its face the divisions of minutes and the other of hours, substantially as and for the purpose described.

2. In combination with the ordinary fixed dial and hands of a timepiece, two supplemental independently-adjustable dials, one bearing on its face the divisions of minutes and the other of hours, with means for adjusting the same with reference to said hands, without moving the latter, substantially as described.

3. In combination with the plate 4, the supplemental independently-adjustable dials 8 and 11, substantially as described.

4. In combination with the plate 4, the supplemental independently-adjustable dials 8 and 11, provided with annular racks and shafts provided with pinions and wheels, substantially as described.

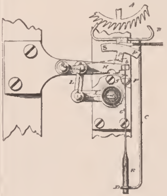
Manufacture of Plated Jewelry.—Theodore W. Foster, Providence, R. I. Filed May 19, 1882.

Claim.—The improved method of manufacturing articles of jewelry from plated stock, which consists in, first, cutting out a front

plate slightly larger than the interior space of the rim or bezel; second, in striking the stock of the front plate thinner at its edges from an area corresponding to the interior space of the rim or bezel and trimming off the surplus thinned stock; third, in soldering the plate with thinned edges to the rim or bezel; and, fourth, in burnishing the thinned edge to a rounded corner, whereby the gold at the front of the plate is made to extend over and cover the thinned edge of the base metal and conceal it from view, substantially as described.

Clock Movement.—Hiram Camp, New Haven, Conn., assignor to the New Haven Clock Company, same place. Filed May 1, 1882.

Claim.—1. In a pendulum clock movement, a lever hung to the frame, one arm extending over the stud which forms the center of



vibration of the pendulum, the pendulum rod extended through the said stud and hung to the arm of said lever above, with mechanism, substantially such as described, around and concentric with the center shaft, to operate said lever to raise and lower the pendulum, substantially as described.

2. In a pendulum clock movement, a lever hung to the frame, one arm extending over the stud which forms the center of vibration of the pendulum, the pendulum rod extended through said stud and hung to the arm of the said lever above, a second lever hung to the frame and substantially parallel with the pendulum lever, a connection from said second lever to the first at a point nearer its fulcrum than the point where the pendulum rod is hung, substantially as described.

3. The combination of the lever *I*, arranged in a bearing on the frame concentric with and surrounding the center shaft, the lever *H*, hung to the frame, its one end extending over the stud *F*, which forms the center of vibration of the pendulum the pendulum rod hung to said end of the lever *H*, and a connection, *L*, between the said two levers, substantially as described.

Diamond Setting for Ear Rings, etc.—Leon P. Jeanne, New York, N. Y. Filed June 17, 1882.

Brief.—The platinum of the setting reflects the light on the stone, while the gold covering on the outer sides of the cramps give the appearance of a gold setting.

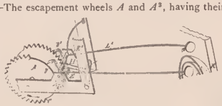
Claim.—1. A diamond setting made, substantially as herein shown and described, of platinum, with a gold covering on the outer surfaces or sides of the cramps, as set forth.

2. The combination, with a diamond setting made of platinum, of tapering gold coverings on the outer surfaces or sides of the cramps, substantially as herein shown and described, and for the purpose set forth.

3. The combination, with a diamond setting provided with a transverse aperture in one cramp, of a loop passed through this aperture, and of an ear wire to which this loop is attached, substantially as herein shown and described, and for the purpose set forth.

Clock Alarm.—Orson H. Woodworth, Columbia City, Ind. Filed Mar. 20, 1882.

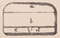
Claim.—The escapement wheels *A* and A^2, having their teeth cut



away on a portion of their peripheries in combination with verges *D* and D^2, shafts *E* and E^2, support *H*, and pivot *T*, substantially as described and set forth.

Jewel Case.—Jean Marie Douarin, Paris, France. Filed Nov. 16, 1881. Patented in France May 8, 1879.

Claim.—1. The combination, in a jewel case, of a shell composed of two pieces of sheet metal stamped into shape, and each having



integral with it a portion of the hinge of the case, one piece forming the bottom and the lower portions of the sides of the case, and the other piece forming the lid and the upper portions of said sides, and a cartouche made of sheet metal stamped into shape, and projecting above the portions of the sides of the shell which are formed integral with the bottom, substantially as herein described.

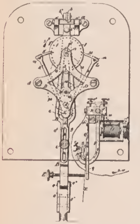
2. A cartouche for a jewel case, made of sheet metal stamped into shape, and adapted to support the jewel at all parts and to retain it in place, substantially as herein described.

Electric Clock.—Carl Gullberg, Jersey City, N. J. Filed Aug. 22, 1881.

Claim.—1. The combination of the clock train arbors *F'*, *G*, *H*, and the arbor *K* of the stop and feed lever *L*, all arranged in the center line of the pendulum angle of oscillation, within a slot or opening, *c*, through the upper part, *B*, of the pendulum, substantially as specified.

2. In combination with the pendulum and with the second wheel *F*, having pins *f* secured to its circular surface, the bifurcated stop and feed lever *L*, provided with pawls *M N*, constructed as described, said lever receiving its motion directly from the pendulum, substantially as specified.

3. In combination with the wheel *F*, having pins *f* upon its surface, and with the pendulum having slot *c'*, the bifurcated lever *L*, having feed pawls *M N* and slot *h*, and also provided with an adjustable pin securable in the said slot, and working in the slot *c'* of the pendulum, substantially as and for the purpose set forth.



4. In combination with the gimbal a^2, the pendulum provided with the pivoted supporting edge-plate *b*, a pivotal point, b^2, below the said gimbal, a slotted bar, *B*, straddling the train arbors below the said joint, and a weighted rod, *C*, arranged to hook on to the lower end of the said bar *B*, all constructed substantially as and for the purpose set forth.

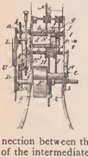
5. The combination of the clock pendulum, the adjustable contact-screw *E*, secured to the said pendulum, the impulsion spring *Q*, having uniform working surface, without pawl, and being secured in an upright position at a distance from the pendulum's center line of oscillation, as shown, and the adjustable lever *P*, of the electro-magnetic armature, said lever being pivoted in pendant position between the said spring and magnet, parallel with the spring and pendulum, to make and break the circuit by respective contact and release from contact with the said spring, substantially as herein shown and described.

6. In combination with the spring *Q*, actuated by the pendulum, and the armature *n*, actuated by the electro-magnet, the suspension lever *P*, carrying a pivoted sliding pawl, *S*, having two toes, *s v*, for making and breaking circuit contact with the said spring, substantially as and for the purpose set forth.

7. In combination with the spring *Q*, actuated by the pendulum, and the armature *n*, actuated by the electro-magnet, the suspension lever *P*, with curved lower end going through a slot, *q*, in the said spring, and the lever pawl *S*, pivoted to the recurved end *p* of the lever *P*, and provided with two toes, *s v*, of different length, and adjusting top screw *T*, substantially as and for the purpose specified.

Winding Attachment for Clocks.—Fredk. W. Letmate, Washington, D. C. Filed Sept. 1, 1881.

Claim.—1. In a timekeeper, the combination of a time movement provided with a mainspring and balance, a winding movement provided with a mainspring adapted to drive the same one week or longer, and automatic stop devices, substantially as shown, operated by the time movement and engaging with the winding-train, whereby the winding movement is caused to wind the mainspring of the time movement at frequent intervals, and stand at rest during the intermediate periods.



2. In a timekeeper, the combination of the following elements: a time movement driven by a spring and governed by a balance, a winding movement propelled by a spring and adapted to run a week or more by a single winding, a connection between the winding arbor of the time movement and one of the intermediate wheels and stop devices, substantially as shown, actuated by the time movement, and operating upon the winding movement to permit its action at stated intervals only.

3. In a timekeeper, the combination of a time movement provided with a mainspring and balance, a winding train coupled to the winding arbor of the time movement, and provided with a spring, whereby it may be driven to wind the time movement for a week or more, a stop lever acting in connection with the gear-train of the winding movement, and a rotary shaft provided with an arm to trip said lever, and actuated by the time movement, as shown.

4. The combination, in a timekeeper, of the following elements: a winding train containing a driving spring and a sufficient number of gear wheels to run down steadily under the action of the spring, a time movement provided with a balance and a mainspring, a connection between the winding train and the winding arbor of the time movement, and stop devices connecting with the time movement and the winding train to permit the movement of the latter at stated intervals.

5. In combination with the time movement and its spring, the winding train connected at its middle with the time movement, and at one end with the driving spring *F*, the lever *S*, operating intermittently from the time movement, and the stops *b*, *d* and *e*, applied to the winding train, as described and shown.

6. In a stop device for a winding train, the combination of the wheel provided with the stud *e*, the wheel *I*, provided with the studs *d* and *f*, and a device, substantially as shown, for elevating and then releasing the lever.

7. In combination with the time movement and the winding train, substantially as shown, automatic starting devices such as shown, connected with the winding train, whereby the winding of the spring of the winding train is caused to insure the starting of the movement.

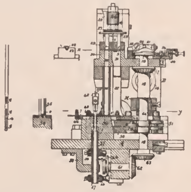
8. In combination with the time movement, the winding train, the stop mechanism for the time movement, and the starting devices therefor, connected with and operated by the stop devices of the winding train, substantially as described and shown.

9. In combination with the winding movement and the intermediate detent mechanism, the starting lever moved in one direction by the detent mechanism, and in another direction by the winding stop of the winding train.

10. In combination with the balance *D*, the lever *U*, capable of movement in two directions, as described, the lever *W*, and stud *T*, applied to the winding stop.

Machine for Making Ornamental Chains—Julius Kinder, Brooklyn, N. Y., assignor of one-half to Frederick W. Gesswein, same place. Filed Dec. 1, 1881.

Claim.—1. The combination, with a reciprocating feeding plate supporting and carrying a pivoted clamping arm provided with a



jaw that co-acts with a **V**-shaped groove in the feeding-plate, of a rotating cam, as 19, provided with an irregular surface, as 24, substantially as described.

2. In a device for feeding a continuous metal strip to the action of cutters, the combination, with a reciprocating feeding plate, as 20, of a pivoted clamping arm, as 21, supported and carried by said plate in its reciprocations, and rotating cam, as 19, for operating said plate and arm, substantially as described.

3. The combination, with the reciprocating feeding plate, as 20, carrying the pivoted clamping arm, as 21, provided with the clamping jaw, of the rotating cam, as 19, for operating both jaw and plate, substantially as described.

4. The combination, with a reciprocating feeding plate, as 20, carrying and supporting a pivoted clamping arm, as 21, and a rotating cam, as 19, for operating said plate and arm, of a plunger, as 4, whereby the links are fed to a feeding guide and channel way, as 35, substantially as described.

5. In a machine for making chain, the combination, with the needle 7, of reciprocating link bending or doubling jaws, as 48, 49, substantially as described.

6. In a machine for making chain, the combination, with the needle-pointed tools 1, of reciprocating link bending or doubling jaws, as 48, 49, substantially as described.

7. In a machine for making chain, the combination, with the feeding pin 8, primary bending tool 43, needle 7, and needle-pointed tools 1, of reciprocating bending or doubling jaws, as 48, 49, substantially as described.

8. The combination, with reciprocating bending or doubling jaws, as 48, 49, of means for operating them to partially bend a link, and then dwell and hold it while a new link is entered into its bent ends, and then to complete the bending, substantially as described.

9. The combination, with a supporting table having a central aperture and a hollow reciprocating spindle, as 37, forming a continuation of said aperture, of two needle-pointed tools, as 1, carried by said spindle, substantially as described.

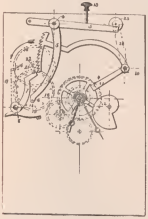
10. The combination, with the hollow reciprocating spindle 37, carrying needle-pointed tools 1, of the bending tool 43, substantially as described.

11. The combination, with the guide 35, having a projection, 71, provided with a groove for the guidance of the links, of a link bending or doubling jaw, as 49, also having a groove that co-acts with the former groove to form a continuous channel way for the link passing from said guide to the central aperture in the table, substantially as described.

12. The combination, with the slide 44, provided with studs 6, of the carriage 46 and needle 7, substantially as described.

REPEATING CLOCK.—Joseph Antoine Jean Redier, Paris, France. Filed Mar. 22, 1882. Patented in France Aug. 21, 1880.

Claim.—1. The shifting axis 10, carrying at one end an arm, 11, and at the other end an arm, 27, and which is actuated by a vertical arm, 26, as above described, and for the purposes set forth.



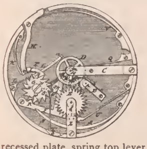
2. The movable axis 24, or its equivalent, carrying at one end a button, 29, for operating the same, and at the other end a cone, 25, which depresses the lever, 3, thereby liberating the rack, 9, conjointly with a vertical arm, 26, which imparts its motion to the shifting axis 10, as above described, and for the purposes set forth.

3. The combination of the lever 3, arm 5, pawl or arm 7, rack 9, and arm 11, which cause the clock to strike the hours and half-hours, with the upper axis 24, cone 25, arm 26, shiftable axis 10, and arm 27, for causing the same to strike once for every five minutes elapsed, as above described and set forth.

4. The combination of the button 29, shaft or axis 24, cone 25, arm 26, shiftable axis 10, and arm 27 with a striking apparatus, and whereby, by pressing upon the button, a clock may be made to strike once for every five minutes elapsed.

CHRONOGRAPH.—William E. Huguenin, Locle, Switzerland. Filed Jan. 16, 1882. Patented in France Sept. 1, 1880.

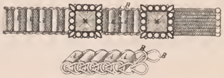
Claim.—1. In a stop watch, the combination of the centrally-pivoted quarter-second wheel *D*, the finger *X*, secured to the top of said wheel *D*, the spring *Y*, and the fixed bridge *B* and movable bridge *C*, substantially as described.



2. The wheel *D*, finger *X*, spring *Y*, and bridges *B* and *C*, in combination with the spur wheel *E*, cams *c* and *h*, check pawl *U*, and the arbors of wheels *D E*, moving the quarter second and minute hands in opposite directions, substantially as described.

3. The combination of ratchet wheel *G*, pawl *I*, lever *H*, spring *K*, recessed plate, spring top lever *L*, pin *a*, wheel *D*, heel *P*, projection *R*, double shifting lever *F*, lever *M*, arm *O*, finger *X*, spring *Y*, and bridge *C*, substantially as described.

ORNAMENTAL CHAIN.—Walter Ballou, North Attleboro, Mass. Filed July 3, 1882.



Claim.—As a new article of manufacture, a chain made up of a number of pieces of tubular wire united together by loops of wire passing through the tubular wire, and through the ends of the adjoining loop, as described.

New Silvering Process for Iron and Steel.

PIERRE DE VILLIERS, of Saint-Leonhardt (England), in his researches on metallic alloys, has been led to the discovery of a new silvering process for iron and steel. He uses for the purpose an alloy of 80 parts tin, 18 parts lead, and 2 parts silver, or of 90 parts tin, 9 parts lead, and 1 part silver. The tin is melted first, and when the fusion is lustrous white, the lead is added in grains; the mixture is then well stirred with a fir rod. The partly smelted silver is next added, and the mixture strongly stirred. The fire is then increased for a short time, until the surface of the smelting assumes a light yellow color, when it is again well stirred, and the alloy cast into bars.

If, in the manufacture of an article, the choice is left between iron and steel, the latter, of the best quality, is to be preferred, and the subsequent process is then executed in the following manner: The article, for instance, a knife blade, is dipped into a solution of muriatic or sulphuric acid (1 to 10 parts acid to 100 parts distilled or rain water). When withdrawn from the acid bath, the article is at once rinsed in pure water, next dried, and strongly rubbed with a piece of soft leather. It is next exposed in a muffle to a temperature of from 70° to 80° C.

These operations are for the purpose of preparing the iron or steel for the reception of the alloy, by covering the metallic surface with many microscopic holes, or making it porous. These holes are sometimes differently large in iron of an indifferent condition, and even faulty places appear sometimes, rendering the process of silvering difficult. With steel, however, the process proceeds with great uniformity.

The object, heated to 50° or 60° C., is next dipped into a bath of the afore-mentioned alloy, that has been melted by a gentle fire in a crucible either of graphite or fire-proof clay. The bath must be completely fluid, and is stirred with a rod of fir or poplar, while its surface must have a handsome white silver color. Under these conditions, the metal prepared in the above-described manner, quickly absorbs the alloy, which penetrates into the porous surface. For a knife blade, an immersion of two minutes suffices, in order to perfect the coating. Larger articles must be exposed as long as five minutes. After withdrawing from the bath, the article is dipped into cold water, or treated in a manner commensurate with its hardness, if it is necessary. If exposed too long in water, the article becomes brittle sometimes, but this defect is prevented with a little practice. Next, it is only necessary to dry, and then to polish the article, without the use of heat.

The thus treated articles have then a silverlike appearance, and a similar ring; they resist oxidation by air. In order to protect them against the influence of acid fluids, such as vinegar, etc., they are dipped into a bath of 60 parts mercury, 39 parts tin, and 1 part silver. They are next dipped into fused silver, or provided with such a coating in a galvanic way to produce the silver appearance. Polishing is in tenor with the nature of the articles. It is said that such a silver coating is very durable, and even bears a gentle filing, while the actual cost is trifling.

Should this method be as good in practice as it reads in theory, such a silvering would be preferable to nickeling in many cases; it is well known that a nickel coating has very indifferent powers of resistance, and articles so treated lose their handsome appearance in a short time, by a repeated handling.

Foreign Designs.

WE HEREWITH present a series of designs reproduced from Die Perle, of Vienna. While these would not be desirable, in all respects, to manufacture for this country, the designs nevertheless contain some forms of beauty that might be utilized in combination with ideas of our own designers. They present a study of what is regarded as attractive artistic work among foreign workmen.

Simple and Compound Pendulums.

[BY ERASMUS GEORGI.]

Continued from page 259.

JURGENSEN'S COMPENSATED PENDULUM.

It will be seen by the preceding that compensation is obtained by constructing the pendulum rod of two metals of very different expansions, and combining them thus that the influence of the temperature upon the one equalizes this influence upon the other metal, whereby the vibrating body, the pendulum bob, or, to express it with more exactness, the center of oscillation, is sought to be retained at all times at truly the same distance.

The following described pendulum has been employed by Jürgensen in one of his astronomical clocks:

Fig. 8 represents the compensated pendulum; *a a* are two iron rods, firmly united at their ends with two brass pieces *b b* and *c c*, and retained by sufficiently strong pins; *d* and *d* are two zinc rods, fastened to the two pieces of brass *b b* and *e e*. The two rods *a a* pass through the piece *e e*, and the passage holes through this piece are large enough to permit the free motion of the rods. The center rod, the upper end of which bears the suspension contrivance, is of iron, and passes free through the upper brass piece *b b*. The lower end of this rod enters into a brass tube, represented for plainer inspection in Fig. 9. This tube is, with its lower end, fastened with a screw upon the brass piece *e e*, Fig. 8. The center rod reaches in this tube almost down to the piece *e e*—*i. e.*, at about ½ inch distance from *e e*, and is fastened in the center of the tube with a nail *m*, Fig. 9. This nail has a milled head, and passes through the holes drilled also in the rod, at once through both tube and rod.

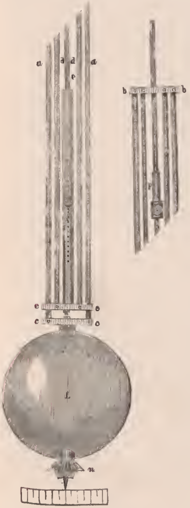


FIG. 8.

Bob *L*, which may be raised or lowered by screw *n*, is carried by a strong pin at *c c*, which as well passes through *c c* as through the rod of the bob. The rod also might be fastened to *c c* by means of a screw, which would be the same thing; *p*, Fig. 8, is a small weight, which may be slid up or down the center rod according to desire.* It is easy now to comprehend the effects of this pendulum. By supposing that heat influences the pendulum, it is plain that the piece *e e* presses down from the point of suspension of the pendulum—removes; because the center rod as well as the brass tube elongates in heat. The zinc rods fastened upon the piece *e e* and upon *b b*, equally elongate with the heat, and, by power of their greater extension, effect that the piece *b b* rises far more than *e e* has descended; but the elongation of both the rods *a a*, and the bar passing through the bob, cause the piece *c c* and the bob *L* to descend. Its upper part rises through the effect of the heat, because the lower rim, bracing upon screw *n*, cannot descend, whereby the extension of the bob occurs in an upward direction. The contrary result occurs in cold weather.

FIG. 9.

If we now accept that the sum of the extension of both zinc rods and bob is equal to that of the extension of the center rod and the two rods *a a*, it is self apparent that the center point of oscillation of the pendulum, during the influence of the heat, will retain the same distance from the pendulum suspension, and that the compensation is as exact as it is during cold weather, with the contrary effects.

The following dimensions are those suited for an exact compensation:

	Inches.	Lines.
Entire length of center iron rod, inclusive the suspension spring	35	..
Length of each iron rod *a a*, from one pin to the other	23	6
Length of the bar passing through the bob from *c c* down to screw supporting the bob	7	6
Length of zinc rod from one pin to the other	22	3
Distance from the point of support of bob near the screw to oscillation center, very nearly	5	3

The following calculation will prove the correctness of the assumed dimensions: If we add the length of the center rod to that of the rods *a a*, also that of the bar passing through the bob, we will have $35+3+7\frac{1}{2}=65\frac{1}{2}$ inches; by adding the 5 inches 3 lines of the bob from the screw to the oscillation center with the length of the zinc rods, we then have $22\frac{1}{4}+5\frac{1}{4}=27\frac{1}{2}$ inches; the extension of which is to compensate $65\frac{1}{2}$ inches of iron.

We know that the expansion of iron is.... ... 0.001220, or $\frac{1}{81}$
That of zinc........ .... 0.002941, or $\frac{1}{34}$
And that of lead.......................... 0.002848, or $\frac{1}{351}$

But the rods are of zinc, and the interior of the bob consists of lead, and we must find the mean extension of these two metals by calculation, according to the proportion of the zinc, which here is 22 inches 3 lines, and of the part of the bob which enters into the calculation of the compensation, amounting to 5 inches 3 lines, and we will obtain as mean figure of both extensions $\frac{1}{342}$, which fraction may serve as basis for the calculation of the compensation. To find this, if the proportion of the dimensions is correct, we say: The extension of the iron is $\frac{1}{819}$, and that of zinc and lead $\frac{1}{342}$; consequently, the extension of the zinc and lead to that of iron is proportioned like 819 to 342, which gives us the following proportion:

$$819 : 342 = 65\frac{1}{2} : x.$$

$$x = \frac{342 \times 65\frac{1}{2}}{819} = 27\frac{32}{91} \text{ inches}$$

It will therefore be seen that between the indicated dimensions(where the sum of the length of the zinc and the $5\frac{1}{4}$ inches of the bob makes in all $27\frac{1}{2}$ inches), and those obtained by calculations, the difference only amounts to $\frac{1}{4}$ inch, which is so trifling as to be well left out of count. Moreover, the influence of $\frac{1}{4}$ inch more of zinc effects on the pendulum. according to the specified linear expansion by a change of temperature of 40 degrees, a contraction of 0.0025 or $\frac{1}{10000}$ line. We know as well by calculation as by experience that $\frac{2}{10}$ line of a change effects an alteration of 1 second in 24 hours in the rate of a clock, consequently, the change of 0.0025 or of $\frac{25}{10000}$ line of the pendulum length will produce only ¼ second in 24 hours, at so great a change as 40 degrees.

It is in place here to render an account of the brass tube, which I have used on the compensated pendulum, and of the advantage offered by this tube, in order to obtain a very close compensation.

* This weight has nothing to do with the compensation; its purpose is to enable the astronomer to regulate the clock either to mean or stellar time, of which mention will be made farther on. We owe this excellent idea to Huyghens, the inventor of pendulum clocks; he inserted it in his *Horologium oscillatorium* (*Opera varia, Lugduni*, 1724, *tom.* I., *pag.* 46).

This tube is not whatever concerned in the calculation of the pendulum, and the rod has been supported in its entire length to the piece *e e*. It will be seen that the compensation would have been entirely too feeble, if the tube, or even only a part thereof, had taken a part in the extension, because, since brass has a greater extension than iron, in this case the zinc rods would not have the required length for a thorough compensation. Wherefore, in order to make use of the brass tube, the zinc rods must necessarily have more length than is specified above for a pendulum without tube, and stated to be 22 inches 3 lines. The following are the dimensions of a compensated pendulum with brass tubes:

	Inches.	Lines.
The bob, of 7 inches diameter, and for which may very closely be approximated as	5	3
Zinc rods, each one	24	..
Iron rods, *a a*, each one	24	9
Center rod, inclusive of suspension spring	35	..
Brass tube	12	..
Bar passing through the bob	7	6

But since the central iron rod is fastened in the middle of the length of the brass tube, viz., at a distance of 6 inches from the screw, then the lengths serving as basis for the calculation of the correct specified dimensions, will be of 29 inches iron and 6 inches brass=35 inches for the total length of the central rod, in which the suspension spring is also included.

In order to verify the correctness of these dimensions by calculation, we say: The entire length of the rods and bar passing through the bob, and causing the oscillation center of the pendulum to descend, is 29 inches+24 inches 9 lines+7 inches 6 lines=61 inches 3 lines iron, and the length of the part of brass tube 6 inches. The zinc rods, causing the oscillation center to ascend, are 24 inches in length, and the part of the bob that produces this same effect, is 5 inches 3 lines lead, making in all 29 inches 3 lines zinc and lead. If the extension of 61 inches 3 lines iron, and 6 inches brass are equal to the extension of 24 inches zinc and 5 inches 3 lines lead, then the compensation must be correct, and the assumed dimensions are suitable.

PERRON'S COMPENSATED PENDULUM.

A B, Fig, 11, is the pendulum rod; *C D* is a plate composed of steel and copper, and fastened to the rod by means of a screw with milled head *E*. The rod passes through the bob, which has free play therein; it is retained by the ends of the bi-metallic plate, by means of two runners *F G*, to which two straps *H I* are fastened with hinges, which support bob *K* in its center by means of a screw with washer, in order to permit the straps free motion by change of temperature as well at the runners as in the center of the disc.

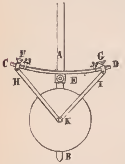


Fig. 11.

Plate *C D* must be manufactured of cold hammered brass, and three times as strong as steel; this latter must be hardened and blued, after which it is riveted with a great number of very close standing pins to the brass, in such a manner that they form, as near as possible, *one* body.

The brass is chosen of such a thickness for the reason that it shall command the steel, and, in tenor with temperature, bend according to the most different degrees. The plate may be straight or bent back, as is shown in the figure. It the plate is straight by a mean temperature of 10 degrees, it will assume a convex form when subjected in an oven to a heat of 27 degrees; as the expansion of the brass is far greater than that of steel, and is retained by the steel plate, which elongates less, the compound plate must bend accordingly. If next it is exposed to a temperature of zero, both plates will shorten by the effect of the cold; since, however, the brass shortens far more than the steel, the compound plate will become concave. It will be seen that the two metals, if separated from each other, would elongate or contract in straight lines, and that, if of equal strength, the steel plate would prevent the contraction of the brass.

If the pendulum is suspended with its bi-metallic plate, and the clock regulated at zero temperature, then, if it is subjected to a temperature of 27 degrees, the rod of the pendulum will be elongated by $\frac{78}{360}$ lines, and the clock loses from 20 to 25 seconds in 24 hours. The bi-metallic plate must be larger than necessary, and if the runners *F G*, introduced at both ends, lift the disc by $\frac{90}{360}$ to $\frac{100}{360}$ line, then the plate is too long; the runners are then made to approach the center of the plate, and retained at the points 2 2; the test is repeated, and if elongation still occurs, the runners are approached to points 3 3. If at this position a new test gives $\frac{78}{360}$ line, the bi-metallic plate will be correct to accomplish the effects of the compensation, because it lifts the disc by so much as it is lowered by the elongation of the rod; hence follows, that the oscillation center of the pendulum will always be at an equal distance from the point of suspension.

Fig. 12 shows a portion of the bi-metallic plate of one-half the natural size for a bob of about 20 lines diameter. The two dotted lines show the passage of the pins by which the plate is united; that of steel is above.

Fig. 12

COMPENSATION PENDULUM OF THE GREAT WESTMINSTER CLOCK.

The old gridiron pendulum of nine alternating rods of brass and steel, is here composed of one of less rods from zinc and iron.

Fig. 13 is a sectional view of this pendulum. The iron rod passing from above to below, ends in a screw with nut *N*, in order to adjust the length of the pendulum, after this had been obtained by calculation as closely as possible. Upon this nut stands a collar *M*, somewhat movable upon the rod, but incapable of turning around it, owing to a pin passing through the rod. In a countersink or a ring-form groove above in this collar is fitted a zinc tube of 10 feet 6 inches in length, and about ½ thick, composed of three tubes, drawn out together, and forming only one tube, because it must be stated that no dependence can be placed on cast zinc, and the drawn metal must be resorted to. Above, at this tube, or hollow column, is fitted another collar with a ring-form groove, as at *M*, below. The object of these grooves is to retain the zinc column in its place without touching the inner rod, because such a contact might produce friction, by which their relative motion, in consequence of extension and contraction, would be disturbed. Around the collar *C* is screwed a wide iron tube, which also does not touch the zinc, and its lower end sits loosely upon collar *M*; it has another own collar *D* around its exterior, upon which sits the pendulum bob. The iron tube has a number of large holes on each side, to enable the air to reach the zinc tube.

Fig. 13.

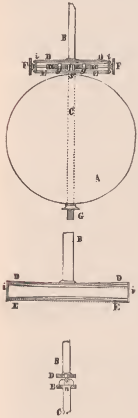
Before this arrangement was made, it was found that the compensation only occurred one or two days after the change of temperature, to which the iron rod and tube were exposed, but against which the zinc tube was closed.

The lower part of the bob is, by the pendulum in question, removed by 14 feet 11 inches from the upper part of the spring *A*, and the bob itself, with its dome-form surmounting, is 18 inches high by 12 inches in diameter. Since this is a so-called two-second pendulum, its center of oscillation lies 13 feet from the upper end *A*, wherefore very nearly to the center of gravity of the pendulum, and higher than general above the bob's center of gravity, on account of the great weight of the compensation tubes. The entire pendulum weighs 682 pounds. These same proportions should also hold good for smaller pendulums, because the zinc tube and the iron tube are nearly always ⅔ of the length of the main rod. The compensating effect apparently is the following:

Both the iron rod and the tube cause the bob to descend, when they expand, and the zinc rod draws upward. Since the proportion of the iron to the zinc is as 0.41 : 1, it will be found that the oscillating center remains at the same height, and experience has confirmed the calculation.

COMPENSATION PENDULUM OF DUCHEMIN.

Fig. 14 shows a longitudinal section of the pendulum; Fig. 15 shows it in half natural size, and without its regulating screws; Fig. 16 is a cross section. The same parts in the three figures are designated by the same letters. *A*, the bob; *B*, the upper rod fastened to the compensator; *C*, the lower rod, carrying the bob; *D D*, *E E*, compensation plates, consisting of two-thirds copper and one-third steel. The dotted lines, Fig. 15, exhibit the bendings they assume in consequence of their expansion; *n n*, large, horizontal regulating screw, provided with nuts to the right and left, and carrying two slides *g g*, which serve as screw nuts, one of which is drilled out to the right, the other to the left side. *F F*, milled heads, fastened at the ends of regulating screw *n n*: *G*, nut, in order to regulate the length of the pendulum.



FIGS. 14, 15, 16.

The two bi-metallic horizontal plates *D D*, *E E*, are fastened at their ends by means of two plates *i i* by 4 screws, which keep them spread sufficiently from each other, in order to permit the two slides *g g* and the regulating screws *n n* to rest upon the under plate *E E*, without touching the upper plate *D D*. Rod *B* is screwed into the plate *D D* of the compensator, and rod *C*, carrying the bob, passes free in *S* through the lower plate *E E*, and is at *L* hooked to the center of the regulating screw.

The compensator is constructed in such a manner that the copper of the bi-metallic plates is turned to within, so that the expansion of this compensator produces a disfigurement, as is indicated by dotted lines, Fig. 15. It will be seen that it has lost its parallelism by its expansion, and that the bob receives its position to plate *E E* by a double and mutual influence of the two expanded plates of the compensator.

If the regulating screw *n n* is caused to operate by one of its buttons *F*, the slides *g g* approach or remove the ends of the compensator, according as the screw is turned to the right or left, when it is desired to find the true point of compensation; this operation occurs without disturbing the pendulum, because the slides glide over a plane and horizontal surface, if the temperature is a mean one. Thus it will be seen that the weight of the bob, suspended by rod *C* upon the screw *n n*, presses this screw upon the slides *g g*, and this is braced upon the upper face of the bi-metallic plate *E E;* that this plate is connected with the upper plate *D D*, through the two thin steel plates *i i*, and, finally, that the upper plate is fastened to the rod *B* of the pendulum. The ends of the regulating screw *n n* pass free through plates *i i*, with the exception of one end, which is retained by an incision, that confines it to the same point, when it is turned. The inventor has adopted every precaution that the compensation should suffer no injuries from the motions to which it might be exposed by the changes of temperature.

The point where the ascending and descending motion of the compensator is most pronounced, in consequence of the changes of temperature, is toward the end of the bi-metallic plate *E E*, near the rod *C*, in *S*. If the slides *g g* are made to approach to this point, the bob would have the maximum of its ascending or descending motion, if rods *B C* remain unchanged in their position; but since, by an even temperature, in which the compensator is found, a change in the length of the rod occurs, that is, in the length of the pendulum, this difference must be compensated by some point in the motion of the compensator upon the bi-metallic plate *E E;* this point must be sought with the slides, by moving them by means of the regulating screw *n n*, and directing them toward the center of the compensator, if the clock retards in consequence of heat, or toward the ends, if it accelerates; these operations are undertaken when the pendulum has undergone the temperature tests, that is, after it has been subjected to various temperatures.

Another compensation pendulum of Duchemin is represented in Fig. 17. The frame, of which only the lower part is given, is as ordinarily fastened upon brass cross pieces.

As known, an ordinary compensation pendulum of zinc and steel rods gives an absolute compensation, if the zinc rods stand in correct proportions to the steel rods, and if homogeneity exists between the rods of the two metals; if, however, a certain quantity of natural compensation occurs in the rate of a clock, artificial compensation will produce false effects, even if the compensation rods comply with all theoretical demands. The length of the zinc rods, therefore, must be at disposition to be altered at option. The apparatus affixed to Duchemin's pendulum, is calculated for this purpose, and the observer will have it at his command to effect an absolute compensation himself, without calling in the assistance of the watchmaker.

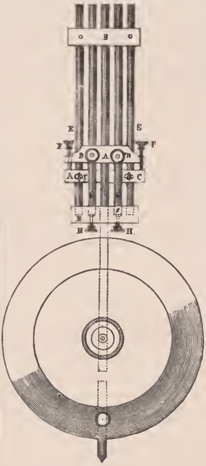


FIG. 17.

The apparatus, Fig. 17, intended for this purpose, consists of two brass cross pieces, *A A*, containing five holes, removed as far from each other as those of the ordinary cross pieces *B B;* next, of a turning screw *C C* and *D D*, by which the apparatus is fastened to a point of the pendulum rod. The lower cross piece *A* is retained by the turning screws *C C* to the two steel rods *E E*. If, next, everything is in such condition, then the lower ends of the two zinc rods *G G* will not touch the bottom of the holes at the points 1 2, of the lower cross piece *B*. These lower ends of the zinc may therefore elongate or contract, and are valueless for the compensation, for the reason that the zinc rods are fastened by the pressure of the screws *D D* to the upper cross piece *A*, which again is retained upon the cross piece *A*, which is fastened by thumb screws *C C* to the steel rods *E E*. If, now, the apparatus is desired to be moved to another point of the grid-iron, it is first necessary, in order to secure the same length to the pendulum, to bring the screws *H H* into contact with the lower ends of the zinc rods, and then to loosen the four screws *C C* and *D D*, so that the apparatus may glide upon the frame in any desirable manner. When this is done, the four thumb screws *C C* and *D D* are fastened again, in order to fix the apparatus, when the contact, in which 1 and 2 stands with the screws *H H*, is annulled again, whereby the ends of the zinc rods again become free.

The vertical regulating screws *F F* are intended to move the cross piece *A* higher or lower, in order to lengthen or shorten the zinc rods *G G*, if only a small space is needed to obtain absolute compensation, by taking the precaution of placing the extreme parts of the lower ends of the zinc rods into contact with the upper ends of the vertical screws *H H*, before applying the upper cross piece *A*, in order to maintain the same length of pendulum, and not to disarrange the clock.

(*To be continued.*)

Use of Cement, Wax, Resin, Etc.

THE PRINCIPAL uses to which the watchmaker applies cements is for fixing objects in the lathe, pallet stones in position, as well as locking and unlocking pallets, ruby pins, etc.

The selection of a cement or wax is not a matter of indifference; fine sealing wax causes objects to adhere firmly together, but many of the best workmen prefer refined shellac. Certain kinds of wax are too dry, the consequence being that a false stroke of the graver will often detach the piece; others are thick and soft, and are apt to heat rapidly under the action of the burnisher or polisher, so that the object is displaced. It is only by making a series of trials that the efficacy of the material can be ascertained. Some workers claim that a mixture of sealing wax and shellac gives good results.

Mode of applying Cements.—When employing wax, resin, cement, etc., for uniting two objects, it is important to note that the mode in which it is applied has an important influence on its efficiency. The following observations on this point are due to M. Sibon, and the reader will be able to select those portions that have reference to his work.

When two objects are united by a cement, this will lose much of its value if unskilfully applied, and, in order to use it to the best advantage, the following practical rules should be observed:

1. The surfaces to be united must be quite clean.

2. The less cement, wax, etc., that is interposed between them, the better will they adhere. This is owing to the fact that with a thick layer the object has, at the junction, no more rigidity than that of the cement itself; as a rule, this is more fragile than the material it is employed to unite.

3. There should be perfect contact between the cement and the surfaces. With a view to securing this, the object must be first heated to a point such that the wax or cement cannot solidify without having first had time to effect a perfect union.

This remark is especially applicable when using sealing wax, mixtures of resin, shellac, and similar materials. They will not adhere firmly unless the surfaces have been heated very nearly to the point of fusion of the cement. The sealing of letters offers an example in proof of this assertion. When the seal has been used several times in succession, or has been left too long on the wax so as to become hot, it will adhere and cause some inconvenience if further employed.

With hot melted glue adhesion is best secured by friction or a moderate pressure.

Sealing wax is excellent for uniting metal to glass or stone, providing they are sufficiently heated to melt it; for, if applied to cold surfaces, it will not adhere at all. By heating two pieces of glass or stoneware sufficiently to melt shellac, a small quantity will suffice to make them adhere firmly together; notwithstanding that everyone has seen such joints, very few succeed in making them, for the simple reason that they do not recognize the necessity of heating a delicate piece of glass or china to the point which is essential for securing a good result.

In conclusion, the principal obstacles to adhesion are air and dirt. The first is always present; the second is due to accident or carelessness. All surfaces are covered with a thin layer of air that is very difficult to remove; its influence prevents highly polished metal from being moistened when immersed in water. So long as this layer of air is not displaced, the cement cannot adhere to the surface to which it is applied, because it cannot come into direct contact. The most effective agent for displacing this air is heat. Metals heated to about 75° C. (170° F.) are immediately moistened on being plunged into water, hence it follows that, as regards cements that are applied in a fused state, heat is the best means of bringing them into intimate contact with the surface.

We would add that, in addition to possessing this advantage, the application of heat also renders the surfaces more penetrable to the layer of cement, after the manner of soldering, and makes the interlocking of the molecules more perfect; this explains the greater degree of tenacity of a well-made joint with only a thin layer of cement.

To set in wax in the lathe.—Trace a series of concentric circles on the face of the chuck with a graver point, after turning it true; this will increase the adhesion of the cement. Then the flame of the spirit lamp is held under the rotating chuck, and when this is hot enough, its surface is covered with a layer of shellac or sealing wax, and the object is held against it. Holding it in position with a piece of pegwood supported on the T-rest, the lamp is removed and the lathe kept rotating until the cement sets. The cooling can be hastened by applying a small moist sponge, but it should not set too suddenly.

If the object requires to be very exactly centered, its position must be ensured while the cement is still soft, by means of a long pegwood stick in its central hole. This stick is held in position until the cement sets, steadying it between two fingers close up to the chuck. The slightest eccentricity will be indicated by a motion of the free end of the stick.

If the object is round, and has no central hole, it must be centered by its circumference, holding the pegwood in front, or resting against a corner of a circular elevation or depression, as, for example, the collet of a wheel, or of a cylinder riveted to its balance, etc.

The beginner should make a number of trials; they will enable him both to acquire lightness of touch, and to recognize the proper degree of softness of the cement for centering, as well as its tenacity.

When it is essential that the two faces of the object be strictly parallel, a precaution is necessary; this consists in leaving on the face of the chuck a slightly projecting circular rim with a fine smooth edge, and of a diameter rather less than that of the object. By moving this latter backwards and forwards after applying it to the wax, and pressing it into close contact while cooling, the requisite parallelism will be secured.

To fix a pallet stone, etc., in position.—To fix a pallet stone or an end stone by means of shellac, it is usual to place small pieces of the latter round the stone when in position and apply heat. But very often the lac spreads unevenly or swells up; and this, in addition to being unsightly, is apt to displace the stone. The inconvenience can be avoided as follows: The pallets are held in long sliding tongs, and, taking a piece of shellac, heat it and roll it into a cylinder between the fingers; again heat the extremity and draw it out into a fine thread. This thread will break off, leaving a point at the end of the lac. Now heat the tongs at a little distance from the pallets, testing the degree of heat by touching the tongs with the shellac. When it melts easily, lightly touch the two sides of the notch with it; a very thin layer can thus be spread over them, and the pallet stone can then be placed in position and held until cold enough. The tongs will not lose the heat suddenly, so that the stone can easily be raised or lowered as required. The projecting particles of cement can be removed by a brass wire filed to an angle and forming a scraper.

To fix an end stone, the cap must be held by its edge in the sliding tongs, and shellac carefully applied round the edge of the hollow. It is advisable to hold the cap in a small tool formed of two parallel blades, as when reversed so as to press the stone on a flat surface, the shellac will spread over the end stone, from which it will be removed with difficulty.

Proceedings of the Horological Club.

A Distinguished Body of Watch and Clock Makers.

One hundredth Discussion.—Communicated by the Secretary.

[Notice.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the Circular for the next month.

BOOKS ON WATCHMAKING.

Secretary of Horological Club:

Will some one of the many readers of The Jewelers' Circular inform me where I can obtain a good work on watchmaking for an apprentice just beginning to learn the trade? Mr. H. B. W. speaks of H. Sievert's as being good on watchmaking. Where can I procure it, and how large a work is it?

A Reader of The Jewelers' Circular and an Apprentice.

Mr. Horologer replied that books on watchmaking are not very numerous in the English language. He presumed our correspondent meant works on watch repairing as well as making. Sievert's work is in German, but is being translated, he believed, for publication in The Circular, a part of it having already appeared. Other works are, "Reid's Treatise on Clock and Watch Making," now quite scarce; Sir Edmund Beckett's Treatise; "Excelsior's Practical Treatise on the Balance Spring and the Adjustments of Watches and Chronometers;" Grossmann's "Essay on the Detached Lever," and Saunier's "Modern Horology." He presumed that they could be obtained through the editor of The Circular, who would procure or order them for those who desired They are not exactly suitable for apprentices who are just *beginning* to learn the trade, but those who have a little knowledge of it will derive much instruction from those first mentioned. The two last require considerable study to fully understand, but will well repay the workman who desires to thoroughly master his trade. Saunier's Treatise, especially, is difficult to comprehend in some parts, unless one has some knowledge of mathematics and the student's turn of mind, but when he has once mentally assimilated the whole of Saunier, he may consider himself pretty well posted. It is the best work obtainable on horology, and, although rather expensive ($15), it is worth all it costs. Grossman's work is upon a special subject. Excelsior's Treatise, although relating to difficult work, is remarkably clear and intelligible in expression, and can be understood by any practical workman. Beckett's work is more popular in style, and adapted for those who want a general idea of the subjects of "clocks, watches and bells." Reid's Treatise is still valuable, notwithstanding its age, and much useful information can be derived from it, both practical and theoretical. For the present purposes of our correspondent, the works of Grossmann and Excelsior would be most suitable and useful, to which Saunier's book should be added after a little while.

POLISHING WATCH JEWELS.

Secretary of Horological Club:

If you would inform your readers just how to polish pallet and other jewels, you would confer a favor on nearly all the trade, for it is a very hard job to get jewels fit for very fine work. I cannot find them for sale. J. H. McE.

Mr. Ruby Pin said that jewel polishing was quite a trade by itself, and the process varied with the material of which the jewel was made, and also with the purpose for which it was used, and its form. It would need a series of articles to treat the subject properly, and, therefore, could not be fully explained in our Proceedings. But Mr. McE. will find an article on grinding and polishing pallet jewels in a number of The Circular not very far back, which will obviate the necessity of giving the instructions here a second time. The holes in jewels are polished by fine bone or ivory broaches or pins, made but slightly tapering, supplied with very fine diamond dust and oil, held in the hand and worked about in the hole while the jewel is being rapidly revolved in the lathe. The broach must not be inserted too far, so as to become tight in the hole, or it would split the jewel. It should be carefully worked around to avoid wearing one place upon it, as well as in and out a little in the hole, and inclined slightly from the axis of the lathe spindle, to give the olive-shaped hole which is generally considered preferable to one made truly cylindrical from end to end. As this process enlarges the hole, it cannot be generally adopted with jewels already set, as it would cause looseness of the pivots—and it would be easier to insert new jewels already polished, than new pivots or arbors. The mode of polishing the outsides of the hole and like jewels is similar to that used with pallets.

Mr. McE. can get jewels of the best quality from several houses in this city, whose cards he will find in the advertising pages of The Circular, but they are, of course, much more expensive than the common article. They are not often carried by travelers, because there is so little call for them. But if they cannot supply the desired quality, he can obtain it through the mails from some New York firm.

FINE WATCH WORK.

Secretary of Horological Club:

Seeing in the July number of The Circular an item in reference to a watch having been altered from a key to a pendant winder, and its having been done by W. H. Ludeman, of Nassau street, I would like, through your valuable journal, to add my testimony to the highly satisfactory manner in which he has just finished a like job on a fine Bernard Lavalle watch for me. It was a peculiarly difficult job to do, as the mainspring barrel stood so near the pendant. However, the change was made in a very skilful and workmanlike manner, and to my entire satisfaction. With very great respect,

S. G. Brooks.

Mr. Regulator endorsed the above, having himself inspected a similar job. We are always pleased to record the good work of any workman, and Mr. Ludeman is entitled to great praise for the many conscientious jobs he has done for the trade.

TREATMENT OF RUSTY WATCH.

Secretary of Horological Club:

Please inform us of the best treatment for a watch which has been wet with salt water and quite badly rusted. Yours respectfully,

Workman.

Mr. McFuzce replied that the best treatment he knew of was to soak the movement in good kerosene oil until the rust was loosened sufficiently to remove the steel parts without damage. The after treatment would of course depend upon the pieces and their condition. If the rust was in places where it did no harm, the surfaces could be ground and polished up. But if upon pinion leaves, pivots, hair spring, etc., a very little rust would destroy their usefulness, as their shapes or sizes would be so changed, after the metal had been cleaned and polished, that they might be entirely unfit for their places or purposes. If there was any danger of the rust again breaking out, and particularly if all the marks of the old rust were not thoroughly removed, the parts could be boiled in oil, to fill the surface pores of the metal with the greasy matter, and repel the attack of moisture or dampness. All salty matter should first be removed by washing in hot water, then in alcohol.

PRACTICAL HINTS ON WATCH REPAIRING.

Secretary of Horological Club:

Can I obtain a book on "Practical Hints on Watch Repairing," by Excelsior? I have his "Treatise on the Balance Spring," and like it first class. If he has published such a book, please let me know and the price also. C. G. S.

In reply to this letter, and numerous others previously received, containing the same inquiry, the Secretary said that the treatise spoken of by Mr. S. contained the first series of Practical Hints on Watch Repairing. The second series has not yet been republished in book form. It is understood that this will be done, but when, it is impossible at present to say. Those articles can therefore be obtained only by purchasing the back numbers of The Circular containing them, from some subscriber. All the back numbers up to the last year are disposed of, he believed, so that they cannot now be obtained at the publication office. Any reader of these Proceedings who will sell his set containing them, will please notify the Club, with his price, as there is constant request for them.

POLISHING BLUED AND RUSTY PINIONS.

Secretary of Horological Club:

I have trouble in polishing rusty or blued pinions. I use a wooden roller attached to an American foot lathe, but cannot succeed in reaching the bottom of the pinion between the leaves. I have tried very soft pine, and medium, without success. Will some one who has succeeded kindly tell his experience, as to what kind of wood, and what polishing stuffs to be used. Another thing—I always take a great interest in studying the various treatises contained in THE CIRCULAR, but often feel vexed when letters in the reading cannot be found in the illustrating cuts. C. W.

Mr. Uhrmacher said that wooden rollers should only be used when the discoloration or rusting is very slight, as it would not answer to take off much of the metal, or the shape of the leaves or size of the pinion would be changed. They are principally useful for polishing the points of the leaves. In scouring or polishing the flanks, use boxwood or bell metal slips, with finest oilstone dust, till a clear, smooth gray surface is obtained, then finish with crocus, and lastly with diamantine for the fine polish. Of course, different slips must be used for each, or they must be washed or thoroughly cleaned from the coarser powder before applying the finer one—and the same with the pinion itself. The flanks should be left flat and in radial lines as far as the pitch circle, where the rounding of the points begins, and the points should be of a form corresponding to their position in the train. Consequently but little grinding must be done. If the pinion is much rusted, it should be rejected and a new one fitted in, which is of the proper size and shape. Rules for the selection of pinions will be found in "Excelsior's Practical Hints on Watch Repairing," under the head of "Toothed Gearing," which appeared in THE CIRCULAR in 1879 and 1880. By studying those articles, the necessity of care in the grinding and polishing process will appear, and how the change of form resulting from taking off too much metal affects the action of the pinion. The last three articles are especially useful and instructive, being illustrated with a large number of cuts showing the wheel and pinion in all their positions during action, examples of wrong sizes, depthings, etc.

Sight.

WHAT THE OPTICIAN SHOULD KNOW ABOUT OPTICS.

Continued from Page 245.

CROSS-EYES.

NINETY per cent. of those who are cross-eyed, draw one eye inward for the purpose of producing distinct vision in the straight eye; they give up indistinct vision with both eyes for distinct vision with one eye. No one would ever learn to look cross-eyed permanently if it were possible for them to see distinctly without doing so.

The difficulty arises from a disturbance of the relations which exist between our ability to converge both eyes at a near object, and our ability to focus both eyes for this object. As an object is brought nearer, for every increase of convergence, a corresponding increase in the focusing power is required.

If, owing to a short eye-ball (far-sightedness), or a weakness of the muscles which focus the lenses of the eyes, they cannot focus strong enough (increase the thickness of the lens enough) to see an object ten inches distant distinctly, without converging the eyes for a point five inches distant, then they cannot see either object distinctly; for, when focused for the object ten inches distant, their eyes are converged for a point five inches distant, and, consequently, are not directed at the more distant object for which they are focused. Neither are they focused for the near object at which they are directed.

The object must be seen indistinctly with both eyes when they are both directed at it, or must be seen double, or by fixing one eye on the distant object and converging the other eye for a point five inches distant, the focus in the straight eye will be sufficiently increased to make the vision distinct. The first few attempts to look cross-eyed are unsuccessful, because he sees double, and he gives them up.

If one in the above "fix" should, from imitating another, or from looking at a speck on his nose, learn how to look cross-eyed without seeing double, from that moment he becomes cross-eyed, and whatever he was doing at the time he learned how to look cross-eyed, is universally supposed to have been its cause. If the eyes were normal, one could never become cross-eyed from imitating another. It is only possible to become cross-eyed when one can see distinctly by looking cross-eyed, and cannot see distinctly without doing so.

The cause of this disturbance in the relations between *convergence* and *focusing* in over 70 per cent., is simple hyperopia (far-sightedness.)

After a person has once learned how to obtain distinct vision by looking cross-eyed, he will continue to do so till the muscles which draw the eyes inward undergo organic shortening If, however, before the muscles have shortened, a pair of convex glasses be placed before the eyes, which correct the far-sightedness, the person will find it impossible to see distinctly when he looks cross-eyed, and can only see distinctly by looking straight. By this means we can frequently force a child to unlearn this "trick" of looking cross-eyed.

To illustrate the above I have in mind a case:

Some three years ago Doctor Dumond, of this city, brought his little daughter (aged seven years) to me, saying he had consulted several specialists, and they all claimed that it was absolutely necessary to operate. I found she was far-sighted 1/8, and ordered convex glasses No. 12. She immediately gave up looking cross-eyed, and regained perfectly her vision in the crossed eye, which had been very poor. The use of glasses for the cure of cross-eyes is only to be thought of where the muscle has not become shortened. Any child that is cross-eyed and glasses are found to be of no benefit, should have the eye straightened at once, for the vision in the deviating is usually destroyed, and can only be regained or retained by having the eye straightened. The placing of goggles before the eyes with small holes, through which it is expected to force the eye to see, will rather encourage, and never discourage one from looking cross-eyed.

One can only appreciate the importance of attending to the earliest symptoms of cross-eyes, when he becomes acquainted with a few individuals who, after having lost the vision in one eye through being cross-eyed, was struck with something which destroyed the other eye. I know three persons who are thus sadly afflicted. The above is the usual cause of deviating eyes. There are, however, a few exceptional cases to be mentioned.

(1). The eye may be drawn out of place by the contraction of a muscle resulting from injury or disease.

(2). The paralysis of a muscle is sometimes the cause, in which case they usually see double.

(3). Owing to bad vision, or the absence of *binocular vision*, one eye loses its incentive to fix upon observed objects, and consequently wanders in the direction of an abnormally powerful muscle.

When the *far* point of distinct vision (owing to extreme near-sightedness) is very near, the internal muscles, owing to their continued efforts to direct both eyes at this very near point, become thickened and shortened, thus disp'acing the eyes inward.

Having operated over five hundred cases of cross-eyes, I have come to the conclusion that the simple cutting of a cord to straighten the eye is the most difficult operation I have to perform, and leave the result perfectly satisfactory. Those who think it so easy usually get the eyes to turn out too far or not far enough; they frequently go very wide of the mark. I find it impossible for me to get satisfactory results while my patient is under ether or chloroform.. I have, consequently, abandoned its use entirely, and never, since I gave up its use, have I failed to obtain the desired result at the first attempt. I administer a sufficiently large dose of morphine to allay all nervousness, but not enough to interfere with consciousness. The morphine so deadens the sensibility that they make no complaint regarding pain, and are much better pleased than those to whom I formerly administered ether.

Strabismus (cross-eyes) is a condition which destroys vision just as certain as any form of eye disease. I therefore consider its earliest symptoms worthy of the most serious attention. By covering the straight eye of a person whose squint does not constantly alternate from one eye to the other, you will be astonished to see how soon and to how great an extent the vision becomes reduced from disuse of the eye. After the eye has been straightened, it frequently improves as astonishingly as it failed, but never becomes as perfect as it originally was. Any cross-eye which, when the straight eye is covered, becomes straight, is a curable case. If a child is brought to you, and is just beginning to look cross-eyed, you will probably have to make use of convex glasses, the numbers running from 15 to 10.

These glasses should be placed in a light riding bow frame, which is so adjusted that the child cannot look over or under the glass. If these glasses do not improve the "squint" at once, you should refer the case to some specialist of *known* reputation. Men who display diplomas from New York, stating they are competent oculists, are without exception inexperienced men. The diploma they hold is a cover for their inexperience, which two months' time and money can always obtain in New York.

PRACTICAL HINTS ABOUT INFLAMMATORY AND OTHER DISEASES OF THE EYE.

Weak eyes, tired feelings, headache and nervousness are frequently cured by properly adjusted lenses; improper lenses make trouble worse. If lenses don't relieve the trouble, consult some good oculist, for there may be an organic disease in progress which will completely ruin the eyes if not arrested.

Running eyes in babies is a very dangerous disease; if proper care is not taken the eye-balls frequently burst or turn white.

The white spots (pearls) which come on the inflamed eyes of children, if neglected, leave scars or eat through, and the eye-ball bursts.

A foreign body should not be allowed to remain in the eye; it frequently becomes so deeply buried in the tissue of the cornea that its removal is *very* difficult. Eye-stones do more harm than good; anything that an eye-stone will remove, any intelligent person can invert the lid and pick out. The eye-stone is a foreign body, and inflames the eye.

Cross-eyes when first noticed are prevented, and if taken before the muscle undergoes permanent shortening, are frequently cured by lenses. This cut was taken from life, and the person's eye is now perfectly straight, as the result of glasses.

A red or painful eye, the lids of which do not stick together in the morning, is a dangerous eye.

Do not have a cataract removed till you are sure it is ripe enough. If, with your back toward the window you can count fingers more than one foot away when held against a dark coat, your cataract is not ripe enough to remove with perfect safety. Acquaint yourself with the success of various methods.

Rings seen around the lamp mean glancoma, a very dangerous disease. It should be operated at once by *selerotomy*, which is without danger, and not by *iridectomy*, which is dangerous, unless, after thorough trial of the operation which is without danger, it is found that it does not control the disease.

Correspondence upon the topics treated is solicited.

(*To be continued.*)

The Care of Files.

A NEW FILE should never be used for steel; it is best to employ it for some time at first on brass, taking care not to use it too roughly. If employed for steel at once, or if sharp quick strokes are applied, the cutting edges of the file will chip off, and the hard particles will be embedded in the metal operated upon; the work will thus be bad, and the file itself deteriorated. A file that has been carefully used, and has passed gradually from brass to steel, will last four or five times as long, and will always work well.

Watchmakers often fix files into handles by driving them firmly into round holes in the handles; this practice frequently leads to their being craked, and the following method is preferable:

Take an old worn out file or a piece of iron of the same form as the tail of the file to be fitted; heat it several times to bright redness and drive it, when so heated, into the handle, taking care to maintain it perpendicular. A hole will thus be formed of the required form, in which the file will hold without there being any occasion to apply excessive force in fixing it in position.

When the surface of a file is choked with particles of iron, copper, wood, etc., while the cutting edges are yet good, it can be cleaned as follows: Place the file for a few seconds in a hot lye of potash in water, and on withdrawal, dry it before the fire and brush the surface with a stiff brush.

To renew the cutting edges of files, either of the following methods can be adopted:

1. First clean the file with potash or soda dissolved in water if greasy or resinous substances have to be removed; with hydrochloric acid if it is rusty; and by rubbing with a metallic brush or piece of coke if particles of iron, brass, lead, copper or tin have to be removed. The file is now immersed in a mixture of 1 part nitric acid, 3 parts sulphuric acid, and 7 parts water. As the action of the acids becomes less energetic owing to the combination with iron, the temperature of the mixture must be raised, since rapidity is a condition of success. The time during which the file should remain in this bath varies from 10 seconds to 100 and more, the roughening of fine-cut files being far more rapid than when they are of a coarser cut. On removal from the bath, immerse in lime wash, dry, and then cover them with a mixture of oil and turpentine by means of a brush, after which they are ready for use.

2. After being cleaned, as explained above, the file is supported in a dish full of water, resting on two cross wires, so that all its surface is in contact with the liquid. Now add strong nitric acid in the proportion of 1 part to 8 of the water, mix it thoroughly, and allow it to remain for 25 minutes. Remove the file, and, after washing in water and rubbing with a hard brush, place it again in the bath, to which a second eighth part of acid is now added, and leave it for 50 minutes. Again remove and brush the file, add a sixteenth part of concentrated sulphuric acid, and replace the file in the bath. Then wash successively in pure water and in lime wash (to remove the last traces of acid) and dry. The file will be found to possess both the qualities and the appearance of a new one.

Beaupuy files and burnishers.—Most watchmakers are acquainted with the files and burnishers that M. Beaupuy has introduced for rapidly forming conical pivots, the main characteristic of which is that the corner presented to the pivot is rounded to the desired form and roughed; they do their work rapidly and well, but some skill is necessary in their management. To the instructions which accompany them we would add the following:

They must never be used when quite new on a pivot that is to be employed in a watch; it will be reduced too rapidly. The freshness must be worn off the cutting edges of the teeth by preliminary use.

The pressure must only be applied perpendicularly to the surface of the staff as in making a square-shouldered pivot; the file is held against the flat face without pressure. A lateral force will have the effect of straining the pivot and causing it to break.

The corner of the shoulder must not be brought to correspond with the required point in the notch of the Jacot tool until the entire pivot is nearly of the requisite size. Up to this point the pivot should not pass into the notch for more than three-quarters of its length. It is of course understood that, before using these files, the cone must be shaped as far as possible to correspond with the corner of the file. When only a few strokes of the file remain to be given, it should rest on the entire length of the pivot.

Tools.

TONGS WITH PARALLEL CHEEKS.—When the watchmaker is compelled to seize a cylindric part or uniformly thick plate, he will find that this kind of tongs, if durably and correctly constructed, is of great advantage.

The accompanying cut is so easily comprehended that it was deemed useless to accompany it with a description. The principle is in use in vises, and set into action by force of screw, while the effect with this tongs is produced by the pressure of the hand.

The Lever Escapement.

BY THOS. CHARLES SCOTCHFORD.

Continued from page 255.

THE FIRST thing to understand is the law of rotation of balanced masses impelled by a leverage, such as the radius of a roller. The law is—"A body begins to rotate with an angular velocity in proportion to the moment of the force divided by the moment of inertia."

Let F be the force on the roller pin.
a the distance of the pin from the axis.
M the moment of inertia of the balance.

The angular velocity will be $V = \frac{a \times F}{M}$

By this theory, if a roller is one-fourth lineally of a balance with a force of 10 grains acting at the pin, the balance would begin to rotate with the same velocity as with a roller one-eight lineally of the balance and a force of 20 grains acting at the pin; but as the object here is to show, first the theory, and afterwards the practice of proportioning, therefore, suppose a roller is one-half lineally of the *lever*, the escape wheel and lever being equal sizes, making arcs of say 12°. Let the velocity of the balance at the beginning of rotation be V, the time of passing through the balance's arc T, and the force of the balance at the discharge from the impulse arc F. Take this roller away, and substitute one of half the size, which will be one-fourth of the lever. If we still wish to make the balance begin to rotate with the same angular velocity (V), and pass through the arc in same time (T), and at the discharge have the same force (F), we must double the strength of the power, double the number of teeth in the escape wheel, and halve the arc of the lever, so that the arc of wheel and lever is now only 6° instead of 12°. In this case there is neither an advantage or disadvantage, it is merely an exchange of power for time—*i. e.*, we put double power, and it lasts double time, for it takes twice the time now for the escape wheel to make one revolution, the force of the balance remaining as heretofore. If we suppose this same force of the balance to be reciprocated, the force will be made doubly effective by the half-size roller, but will meet with a double resistance by pull of the double power; so here again there is neither an advantage or disadvantage, it is merely an exchange of time for power—*i. e.*, the same force of the balance will overcome a double resistance by the aid of the half-size roller, but it takes twice the time to do it, because the balance must pass through twice the arc. But suppose, when we halve the size of the roller, and double the strength of the power, we do not double the number of teeth in the wheel, or halve the arc of the lever, but let the power act through the whole 12° of the wheel and lever. In this case the balance would begin to rotate at the same velocity (V), and in an equal time (T) would pass through an equal space; but after this space has been passed through, the balance's velocity will be added to every instant during the remainder of its arc, and at the discharge the velocity and force of the balance will be greater than F. This greater velocity and force being due to altering the roller and power proportionately, without altering the space through which the power acts proportionately, *i. e.*, without altering the arcs of the escape wheel and lever. If we suppose this greater force of the balance reciprocated, and made doubly effective by the half-sized roller, it will easier overcome the double pull of the power as a resistance to its force.

The foregoing examples suppose the pieces destitute of inertia, and that the power is applied at the escape wheel. We will now show the difference between theory and practice. Suppose, according to the lever powers of the machine, an estimated force of 1 ounce in the barrel would press upon the roller pin with a force of 40 grains, and give a balance of 10 grains weight a velocity (V) if motion were possible. Let the radius of the roller from staff to pin be one-half the lever and one-fourth of the balance radii. Now practically it may take say 4 ounces in the barrel *to give these pieces of the train and escapement the velocity they must have to impel the balance at the velocity* (V). The quantity of power to be added to the estimated power depends upon the inertia and frictions of the train and escapement, and will be least when their inertia and frictions are least; consequently, the loss of the balance's velocity in unlocking will be the least also, because the less main power added for the train and escapement, the weaker is the pull of the power on the locking. Let it be granted that the large roller of one-half of the lever is taken away, and one of half the size substituted, which will be only one-fourth of the lever, we do not require a power equal to 8 ounces in the barrel to give the same balance the same velocity (V). We do not have to add power twice for the same inertia and frictions of the same train. The augmentation of power is required for the increased inertia of the balance alone, and if the power is so adapted and allowed to act through the whole arc of 12° of the escape wheel and lever, the balance's motion will be accelerated through a greater space, taking a longer time by the small roller, and eventually the velocity and force of the balance at the discharge from the impulse arc will be the greatest. The sequence is, that if this greater velocity and force of the balance could be reciprocated, and made doubly effective by the half-size roller, it would *very easily* overcome that *much less* than double locking resistance, for the locking resistance is not much increased when the main power in the barrel is not much stronger.

So far appearances favor small rollers when the power is applied somewhat stronger.

But there are several things now to be considered. Firstly, the reciprocated force of the balance itself depends upon the manner in which the balance spring secretes the balance's force and reciprocates the motion. Suppose, by a proper adaptation of power to different sized rollers, we started a number of the same sort of balance at the same velocity, will all the balance springs secrete and reciprocate the balance's force alike? Secondly, suppose they did, and the balance loses less of its velocity and force with the smallest roller, it will have a greater velocity of its own left to go on with, and we cannot say how the running impulsive forces will adapt themselves to the varied velocities of different sized rollers. If there were but a single excursive and reciprocated arc we should then know the smallest roller ought to be the best under the expressed conditions, but as the motion is begotten by additions of the impulses we cannot say the smallest roller positively shall be the best for motion; but its use to unlock slowly, and prevent any arm from overcarrying the lever, is undoubted.

There is another thing we do not know in connection with the subject, viz., how much the winding of different sorts of balance springs during the impulse diminishes the velocity which might have been generated had there been no springs to wind. If the arc is long—as by a small roller and same arc of a lever—the velocity would be diminished most with the small roller and same sort of spring.

Hitherto we have been considering the proportion of the roller to the lever, but it is obvious the roller might be ⅓ or ¼ of the lever, while the actual sizes of both lever and roller vary to any etxent. Theory does not consider the absolute sizes, only the ratios and forces. The law of rotation of balanced masses before enunciated shows that if we were to double the distance of the pin from the axis, the balance would begin to rotate with the same angular velocity by a pressure of one-half the original force on the pin, the question being: Will the angular velocity of the lever increase sufficiently to accord with the enlarged roller to give the balance the same angular velocity, and will the pressure at its end be one-half the original force? It will do so in theory.

Practically, it is not so; for if we double the length of a lever it cannot be made out of less material than a lever half the length, and if it is not made out of less material the rotary inertia of its balanced mass will be increased, and then it will not have the same angular velocity, consequently it cannot give the balance the same velocity without a stronger main power.

If by increasing the size of a roller more material is added to the mass on the balance axis, it will require more than half the original force to give the balance the same angular velocity when the distance of the pin from the axis is doubled.

If the power in the barrel is augmented on account of the increased inertia of the lever and roller so as still to give the balance the same angular velocity, this stronger power in turn becomes a greater resistance to unlock.

Where power is greatly economized by the excellence of the finishing escapement pivoting, and shallow pallet depths, a small increase of the inertia of the eseapement pieces may not be any material consequence, but a long lever and heavy train becomes very bad.

Notwithstanding we have no practical means of applying proportionate balanced weights in connection with the power and spaces of the escapement pieces, yet I believe the best set of proportions are those wcihh move through equal spaces together, or nearly so, and therefore the following cases will exemplify the principle and show the proportions.

If the arc of the pallets is 10° by their impulse faces (exclusive of the depth), the radius of the lever, from staff to ruby pin, should be as near as practicable, equal to the radius of the escape wheel; because when the arc of the wheel is 12° the arc of the lever is 12° also, the wheel and lever being equal sizes. Now, in practice, the wheel's arc will be reduced to about 10°, the other 2° being lost by the drop of the wheel with a certain angle of tooth not very sloping; and as the lever's impulsive arc is also to be 10°, therefore the length of the lever's radius should not be greater than the wheel's radius.

If the arc of the pallets by their impulse faces is reduced to about 8°, while the wheel's arc over those faces is still 10°, the radial length of the lever may be somewhat greater than the radius of the wheel, because the resistance of those lesser angled planes to the force of the escape wheel is not so great. We may have our choice—we can either have a greater weight at the end of the shorter lever when the pallet angle is less, or we may remove a lesser weight further from the pallet axis, which is having a longer lever. It will be necessary to have a longer lever to obtain a sound guard-pin depth, unless it is a double roller escapement.

The reader must understand that the subject we are now engaged on—of varying the lengths of levers to varied angles of the pallets—is only a practical expedient, and ought not to be carried out to a great extent: we must remember that the theory alone is right, and in theory the arcs and angles are not changed, it is only the length of the lever that is changed, to change weight to power, or power to weight.

The only thing a person can do is to be watchful, and if he has less angle on the pallets than he is used to, he may (if he pleases) drill off the guard-pin hole a trifle longer from the staff, and then the full length of lever will be somewhat longer when the angles and arcs of the pallets are less. But the reader who is immediately engaged in planting will know that it is impossible to speak with scrupulous exactness of the lengths of levers, for they will minutely vary with varied sizes of pins and varied arcs of the guard pin, for the length of the lever's notch must be made commensurate thereto.

The escapement, fig. 1, is one of the best practical theories that can be contrived: the roller has an ordinary pin in it, which is as good as is wished for. Strictly speaking, a cylindrical pin is not a proper thing, because there ought not to be the circular front to the pin.

To a given arc of a lever and roller, and a given size of ruby pin, there is but one depth that *that sized pin* should enter the notch, and when the pin enters the notch the proper depth the front of it must be flatted away to pass from the lever notch, or else it will move the lever a good bit towards the banking.

A cylindrical pin cannot enter the notch so deep as it ought to do, and the driving side of the notch will work very minutely towards the front part of the pin, and at the wheel's drop the off side of the notch will be some distance from the side of the pin; this vacuity between the notch and pin is a loss of arc to the roller on each side at the discharge, and also causes some small portion of the lever's arc to be non-effectual immediately after unlocking, for directly after unlocking the lever will drop across the vacant space, which is perhaps 1° of the lever's arc on each side.

The pallets usually are intended to make about 8½° of motion by each impulse face, and about 3° by each unlocking, or 11½ altogether from drop to drop. But pallet depths will minutely vary when the size of the pallets vary. Also lighter depths will suffice with the best of escape wheels and jeweled holes. If a person is a careful planter on good work, and he is satisfied with a depth of 3° on what we *call* a 6 size, he would not plant more than 2° on a 12 size; and, indeed, even 1° would suffice on some clock sizes. So that we see *size* may cause the arcs to vary by the variation in pallet depthing.

I may here remark that large sizes do not require quite so great an arc as small sizes, unless the substance of the guard pins and breadth of the guard pin's arc are increased as the sizes of the escapements increase. As an example, if a certain guard pin's arc would cut out a segment of the roller, which segment measured say 25° on the circle's edge, then a double-sized lever and roller, having a double thickness of guard pin, and cutting out a segment of 25°, would have a double depth of intersection, and withstand double pressure against the roller's edge in setting back the hands. That is to say, that if large sizes make the same arcs as small sizes, the guard pin's depth is the soundest with the largest size.

It is very natural that a person would wish to tell the arc of a balance accurately, to satisfy his own mind perfectly: it is not an easy thing to do. If a balance with three arms is moved one-third of the space of the arms, the arc is 40°; if moved one-fourth of the space of the arms, the arc is 30°; between these limits he must judge of the arc it makes.

I know a way to tell the balance's arc very nearly, but there is a difficulty attending it, viz., that all the balance staffs ought to be the same size. But I will explain it. Many persons are acquainted with a scale of chords, such as is on the universal sector. Now, if a sector were made of between two and three inches radius, having a well-divided scale of chords thereon, and in one center a hole were drilled, in which the balance staff was to be placed, and a plug put in the other center, protruding upwards, so as to set the sector to the radius of the balance, then, having set the sector, it would be easy to note, very nearly, two points limiting the balance's arc, and this distance being taken from the balance's edge by a pair of compasses and applied to the scale of chords, it will tell the arc.

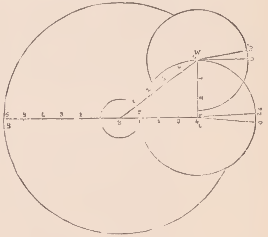


Fig. 10.

In fig. 10 we have a skeleton of the escapement in fig. 1. The proportions of the lever and wheel are shown to be 8½° *of impulse* by the lever to 10° *of impulse* by the escape wheel, the 8½° of the circle of the lever being equivalent to 10° of the circle of the wheel; the velocities of the wheel's driving and lever's working points are thus equal, somewhat similar to what they are in theory. The circle shows that if the lever is twisted round, the notch will reach to the escape wheel hole.

The three axes or staff holes, when joined by right lines, form the right-angled triangle *R W C*, bringing the pallets straight along the lever. If a person had no gauge to throw out for the wheel hole, the way to make it is this:—Determine what size the wheel is to be, and have the pallets made; draw a straight line on a piece of brass (like the line *W C*), and with the wheel and pallets at depth, mark off their length on the line; at the point *C* draw a line (*C R*) at right angles to *W C*, and place the ruby pin central in the notch of a rough lever of as near the intended length as possible, and mark this distance on the line *C R*; then if *R W* be joined, this line will be the length to throw out for the wheel to bring the pallets straight along the lever, as near as possible; or the guard pin may be placed in the center of the roller's crescent, instead of putting the ruby pin in the notch.

In the figure the line *W C* is divided into three parts, the line *C R* into four parts, and the line *R W* into five parts, the radius of the balance (*B R*) being six parts. The use of these numbers is this: that every escapement may be made very nearly alike to a balance, whether the balance measures six parts of a gauge or any other number, so that two or more men, in different places, and with different measures, may all produce very nearly the same proportions. These numbers are to be accounted nominal, and the real numbers found by the rule of three. Thus, suppose a person measured the radius of a balance and found it 30 parts by *his* gauge, the gauge always being an equal part gauge, then say:—

As 6 is to 5 so is 30 to 25. Throw out 25 parts of the gauge for the wheel hole.

As 6 is to 4 so is 30 to 20, the line *R C*, 15 parts for the lever and 5 parts for the roller.

As 6 is to 3 so is 30 to 15, the line *W C* joining the wheel and pallet holes.

The reader will see that the point *P*, at the first division of the line *R C*, is the place of the ruby pin. The full radius of the roller will have to be greater than the length (*R P*), but how much greater must be left to the judgment of the maker, because it depends upon the size of the ruby pin.

It is also evident that the guard pin must he drilled off shorter than the line *C P*, but how much shorter will depend upon the size of both ruby and guard pins; the nearer the two pins can be got in the same perpendicular line the better. Sometimes the ruby pin is flattened, and the roller hammered edgeways, to fit a punch of the shape of the pin, so as to get the ruby and guard pins nearer to the same perpendicular line, and thereby obtain the soundest guard pin depth at the shortest arc possible in a one-pin escapement. In turning down the roller, some persons use the pinion gauge to size them, and drill off the ruby pin hole by judgment; others have countersinks for the size, and on one side of the countersink is a hole, through which the ruby pin hole is to be drilled, or marked for drilling. Any plan is good that will keep them alike.

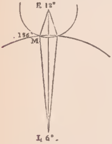


Fig. 11

Fig. 11 is an illustration of the theory of the arcs of the lever and roller when the arcs cut one another, as they would do with a proper sized pin and flattened front to it. The figure shows that the central point of the roller pin is only a point on the arc; magnitude and freedom is not considered. It is customary in the trade to say, that if the radius of the roller from the balance staff to the center of the roller pin is one-third lineally of the entire lever from pallet staff to end of notch, and the arc of the pallets and lever from drop to drop is 12°, the arc of the roller and balance will be 36°. If there is only just freedom in the pin and notch, and no decided loss, it may be 36°; but the correct knowledge of the theoretical arc is only to be obtained by plane trigonometry. In theory the arc would be a trifle more than 36°, but not so practically. I will give one example of the theory in thousandths of an inch, so that the reader may see the nature of the thing. Fig. 11 has its angles 6° of the lever and 18° of the roller on each side of the line of centers *R L*. The measures in the following example are such as would agree with a good size carriage clock escapement.

Given. The length of the lever *M L*, .300, and the angle at *R* 18°, and the angle at *L* 6°. *Required.* The length of the radius of the roller (*R M*) and length of the line of centers *R L*. *Rule.* The sides of triangles are to each other as the sines of the angles opposite those sides.

By the trigonometrical tables, the sine of *R* 18°, the angle opposite the given lever is .30902, and the sine of *L* 6°, the angle opposite the roller is .10453. Therefore the side of the roller (*R M*) is to the side of the lever (*M L*) as .10453 to .30902. Put them into a proportion, putting *X* for the unknown side of the roller (*R M*). Thus, as *X* is to .300, so is .10453 to .30902. Multiplying the two mean terms of .300 and .10453, and dividing the product by the extreme of .30902, we find *X* is .101+, thousandths of an inch. So that the lever being $\frac{300}{1000}$ of an inch, the roller would have to be full $\frac{101}{1000}$ of an inch.

To find the lines of centers, *R L*, we see that the angle at *M*, opposite the side *R L*, is an obtuse angle of 156°; this being so, we must take the sine of the supplement (*i. e.*, 24° is the supplement of 156°, the sum of the two angles being 180°). By the tables, the sine of 24° is .40674, therefore the side of the line of centers (*R L*) is to the side of the lever (*M L*) as .40674 is to .30902. Then as *X* is to .300 so is .40674 to .30902. Multiplying .300 and .40674, and dividing the product by .30902, we find *X* is .394+. Therefore, if the lever is $\frac{300}{1000}$ of an inch *R L*, the line of centers is $\frac{394}{1000}+$ of an inch. The same method of proceeding would find either the radii of the escape wheel, or pallets, or line of their centers, when we have one side and the two opposite angles given; or they may be by drawing, as described, nearer than they can be made.

If the tooth of a wheel is too straight, the pallets will not draw in to the wheel, particularly on the smaller sizes, unless the pallet hole is put nearest to the short pallet sideways, at the cost of a greater sacrifice of the correct principle of the impulse faces. When a tooth is too slanting, the pallets have to be cut away more, to free such teeth at the given depth. A tooth whose angle is about 64° is the best for pallets made to four teeth of a 15-toothed wheel.

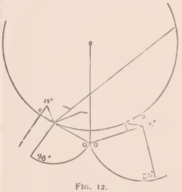


Fig. 12.

Fig. 12 shows the theory of measurement of the angles of the locking planes when connected with radial lines drawn from the pallet's axis. If the lengths of these lines vary, or their inclination varies, the locking shapes must also vary to draw in at the same velocity, provided the angle of the wheel's tooth is the same. Practically, very small deviations produce no sensible variations in the velocity of the draught on the lockings, even when a well-practiced eye can see they are not quite the same.

Fig. 12 shows the manner in which a well-applied angle of tooth meets the locking, at the very edge of the locking; but as the pallets move round on their arc they vary their slope relatively to the wheel, the long pallet becoming, as it were, more cut under, and the short pallet becoming more sloping. The escape wheel also minutely moves round on its arc as the pallets draw in, for it is through this minute movement of the wheel that they do draw in; they cannot move themselves.

When a new wheel is applied to a job watch, it is necessary that the angle of the old wheel's teeth should be looked to, as well as the wheel's size, and thickness of the tooth's point. If a pallet depth is shallow, and a new wheel is put on of a trifle larger size, care should be taken that the new wheel is not more sloping in the teeth than the old one, or else the pallets will be found very hard indeed—it is best to have the new wheel a little straighter in the teeth, if possible. The way some repairers free garnet stone pallets is with a sapphire file, which is only a decent-sized piece of sapphire flattened down in the ordinary way, and shellaced into a brass handle. The sapphire should not be flattened too rough, or it will chip the pallet stones. Ruby or any other stone pallets may be freed by making a small mill, to go in the turns, of tortoise-shell or *vegetable* ivory, and having some diamond powder to rub on the mill. A quarter of a karat of diamond powder should be well mixed with about a dessert-spoonful of sweet oil, and allowed to stand to settle for about two hours; it should then be poured off into another vessel, and allowed to stand a long time —until it settles and leaves the oil clear again. The first settlement will be too sharp to rub on the mill; it is the second settlement that is to be used. Good thick convexing powder from the jeweler's is best, if it can be got, as it is ready to use without the trouble of mixing.

When a watch "sets" on the impulse face of a pallet, the set can be got off by polishing the faces to a less angle; but you must be sure the pallet depth is deep enough to allow of being made shallower and yet be safe, because, by reducing the impulse angles, the wheel will drop shallower; and although the watch will go while it is clean if the pin and notch is not altered, yet if the pallet depth is not quite secure, the wheel may sometimes pitch on the locking edge, and probably stop the watch. If the depth is made too shallow by reducing the angles of the pallets, a trifle larger wheel must be put on.

When the pallet depth is *barely safe*, and the pallets exceedingly full to the wheel, the depth may be made secure by polishing up both lockings a good bit—they must be done a good bit, or it will not be of any use; this will save putting on a new wheel.

When the pallets are unequal, and too shallow on one pallet only, the pallet should be fixed in some sort of clamps, and the clamps made warm, and that stone raised up sufficiently, and the pallets afterwards freed—if they require it. When a pallet depth is too deep, the wheel must be topped. The topping of the wheel does not cause them to be foul outside, although the wheel is then smaller, the wheel being drawn further away altogether by the topping. When a lever is not equalized on the pallets, it mostly happens that the two pins are slight enough to permit the pallets to be so minutely twisted further round on the lever; but if the pins are thick they must be taken out, and the holes drawn whichever way they require. The test of the lever's equalization and length of notch has been explained before.

When a guard-pin depth is too shallow, the pin must be bent minutely inwards to the roller, and the bankings opened a trifle wider. When a guard pin depth is too deep, the edge of the roller may be topped down by a bell metal polisher and sharp stuff. If a screw is placed up *through the runner* of the turns, part of the polisher will work on the screw and part on the roller's edge, so as to keep the edge of the roller square.

When the point of the tooth of an escape wheel is thick, it will sometimes happen that the back part of the teeth have a little polished hollow cut in them; this is caused by there always being a double clip with thick pointed teeth, just as the wheel leaves the impulse face. The way to prevent it is to thickly round off the discharge ends of the pallets, particularly the inside edge of the short pallet, with a polishing mill.

When a watch "sets" on a locking, and you are sure the locking angles would still detach after being made to unlock easier, the outside locking may be made a trifle more sloping, and the inside locking a trifle straighter (not so much cut under); this will also cause the wheel to take a deeper hold of the lockings, which will be no harm if the pallet depth is not too deep already. If the watch is a small one, having a little steel balance, and, consequently, a very weak balance spring, the spring, when it is so very near its rest, has not power to twist round the pieces to extricate the locking from under the wheel's tooth. In such cases the lockings would sometimes have to be so much altered to *completely* prevent a set, that the wheel would remain stationary when it dropped, instead of drawing the pallet inwards, and then the guard pin must trust to the momentum of the balance carrying round the lever sufficiently to free the pin of the roller's edge. Such watches are continually stopping, and never can be altered until the lockings are made to draw in to the wheel. In all such cases it is best to let them set a little, rather than persist in *completely* getting off the set.

Many years ago curved-shaped lockings were often made to pallets. They are more dangerous than straight lined lockings, for even supposing a few cases in which they answered well, they will not do so in general, simply because they require to be made with almost methematical precision to answer well. I know as much about the evils of tampering with the lockings of pallets as falls to the lot of any one man, and could report cases that would shock sensible men. It is utterly impossible to do better than is now done by careful people. Let the reader study fig. 12, and draw some figures with the pallet hole further up or down, right or left, and make two lockings to form acute and obtuse angles with the oblique radii (similar to those in the figure), and he will see how the shape of the lockings would have to vary unless the pallet holes could be accurately kept alike relatively to each sized wheel.

It is a good rule, when a person takes an escapement into his hand, to look first at the escape wheel and pinion, to see that he has not got a full large wheel to the pinion; next, hold up the pallets to the light, to see they have not very great angles on them; then compare the radii of the lever and wheel, and see that the lever is not much longer than the wheel; and finally, see that the roller goes three to four times in the lever, reckoning the roller from balance staff to ruby pin.

If he has got these things, the escapement will do well as regards its pieces, all the rest depending upon properly fitted pivots, proper depths and freedoms, well-uprighted staffs, poising, banking and equalizing, all of which I have essayed to explain as well as my literary attainments would enable me.

(*Concluded.*)

Colored Gems.

THE CLASSIFICATION of the diamond apart from the colored jewels of high price would be little expected by those who had not learned to judge them by chemical composition, rather than by their general characteristics. It is known that diamonds are the hardest substances in the world, the hearts of poets' fair ones alone excepted, and that this durability is shared in a greater or less degree by the ruby, sapphire, emerald, topaz and others of the same family, is generally understood. But that an absolute difference exists in the material of which the latter class is made, from the composition of the diamond, was left for the chemist to discover.

The base of the diamond, as already stated, is pure carbon; of the ruby and emerald group of alumina. This is a substance of the utmost value in agriculture. It is the principal element of all soils capable of producing vegetation. It is found largely in clay and in vegetable mould. It furnishes a vital principle to organic life. From it a new metal, aluminum, has been made, which, when combined with the oxygen of the air we breathe, is transformed into a white rust, just as by exposure to oxygen iron degenerates into a red rust. This white rust is pure alumina. Of this alumina the rubies and emeralds are formed. But the gems are alumina crystallized, and crystallization of alumina, like carbon, is one of those achievements of nature which man has yet to learn. When the alumina, previous to crystallization, is mixed with iron rust theru by is the result; with other foreign substances we obtain the emerald, the white sapphire, the topaz, the amethyst, the indigo sapphire, the beryl, acquamarine and cymophane. To all minerals composed of crystallized alumina modern science has given the name of corundum. Corundum comprehends three varieties—the hyaline, the laminated and the granular. The hyaline corundum is the noble of the family: the others are poor relations.

The primitive form of the crystals of the corundum is the six-sided prism; but the form in which they are most frequently found is the dodecahedron, or double six-sided cone, whose faces are isosceles triangles. Nearly all the hyaline corundums susceptible of being employed in jewelry are brought from Pegu. Their price is very high, and the value of the ruby is not unusually greater than that of the diamond. Between the corundum and the diamond in commerce, however, a great difference exists. Every diamond, no matter how small, has its exact value in proportion to its weight, like gold or silver; while in the case of rubies and other gems the little specimens have hardly any value. Like men they only begin to be appreciated when their weight withdraws them from the common ruck. When a perfect ruby of five karats enters the market a price will be offered for it double that of a perfect diamond of the same weight; and if a ruby reaches the weight of ten karats it will bring triple the price of a diamond of equal weight.

When the corundum is perfectly colorless it possesses a brilliancy so vivid that it may easily pass for a diamond. Its specific gravity is smaller, however; its hardness is much less and it has a double refraction. These are points, however, which none but experts could determine, and it is not improbable that some of the readers of the *Eagle* are cherishing as a true diamond a beautiful gem which an expert would pronounce only a white sapphire.

There are three kinds of rubies—the Oriental ruby, the spinel ruby and the balas ruby. The first is the only true one. The latter differ considerably in composition from the first. The true ruby is composed almost exclusively of alumina; in the latter are only seven-tenths of alumina, the remainder being chiefly magnesia. Their color, moreover, is due partially to the oxide of chromium, a subtance of which the genuine ruby has not a trace. In commerce the balas ruby has much inferior value to the spinel. This is generally of a vivid poppy red color; the balas is of a violet rose, although Pegu has furnished white and white violet spinels, and Sudermania even bluish grey ones It can be seen at once, therefore, how extremely erroneous would be a classification of gems by color or general appearance alone. The primitive form of the spinel ruby is like that of the diamond, eight sided; which distinguishes it at once from the Oriental stone.

The color of the genuine ruby is that of arterial blood, or pigeon's blood, as it is called. It is extremely hard, and, after the sapphire, is the hardest of the corundums, which renders it difficult to understand why the earth so rarely gives it up. Its tint is as beautiful by artificial light as by day, and its powers of refraction so great that ancient belief credited it with power of emitting light. They even supposed that it would shine through clothing with undiminished power.

The largest ruby known is one mentioned by Chardin as having been engraved with the name of Shelk Sephy. Another noble ruby is in possession of the Shah of Persia. Its weight is put at 175 karats. A third, belonging to the King of Usapar, was cut into a hemispherical form, and in 1653 was bought for $13,866. A ruby possessed by Gustavus Adolphus, and presented to the Czarina at the time of his journey to St. Petersburg, was the size of a small hen's egg.

In England the ruby is especially prized, but in this country it is less highly esteemed.

The sapphire derives its name from *Syrias saphilah.* Four varieties of the stone are known to commerce, the Oriental sapphires, the Brazilian sapphire, sapphire of Puy and water sapphire. The first three are corundums and therefore pure sapphires. The last is a colored quartz of little value.

The Oriental sapphire was with the ancients the gem of gems, and was dedicated by the Greeks to Apollo. Originally sapphires came from Arabia, and then from Persia, and nowadays from Arabia and Brazil. The term Oriental is used in a purely commercial and not a geographical sense. There are certain sapphires of a pale color which when examined through a microscope exhibit thread-like shafts directed toward the faces of the six sided prism. These threads are produced by foreign substances or vacuities left between the molecules at the moment of crystallization. The light reflected upon them forms a star of six rays, extremely beautiful and remarkable. Sapphires of this kind are called star sapphires.

A stone of a yellow green tint exhibiting a similar phenomenon is brought from Ceylon, and is known as the cat's eye. Threads of white asbestos are enclosed within it, and the light is reflected from these with intense brightness. When it is cut *en cabochon*, a white band of light is seen floating in its interior, which changes position as the gem passes before the eye.

One famous sapphire was found in Bengal, by a poor man who sold wooden spoons. It was taken to Europe and bought by the house of Raspoli at Rome. Later it became the property of a German prince, who sold it to Perret, a Parisian jeweler, for $31,620. It was absolutely without a blemish and weighed 176 karats.

This stone eventually found its way into the Museum of Natural History at Paris. A beautiful star sapphire is owned in New York, and two magnificent specimens of this jewel in possession of Miss Burdett-Coutts are valued at $139,500. Another in the collection of Mr. Hope, is called the "Marvelous Sapphire," being blue by daylight and amethystine by night. Among the crown jewels of Russia is a magnificent sapphire representing a female figure enveloped in drapery. The stone represents two tints, a circumstance of which the artist has skilfully taken advantage, to make the woman dark and the drapery light. The most remarkable stone of this kind is an engraved sapphire representing a profile of a young Hercules, executed by Cneius. It is in the Strozzi Cabinet at Rome.

There are two varieties of Topaz, the Oriental, composed of alumina nearly pure, and the occidental which contains less than six-tenths of that substance. The topaz originally came from an island in the Red Sea, which was so difficult to find that the mariners named it topaz, from the Greek topazein to guess at. The true topaz is very rare, and when, in addition to the fineness of its quality, it possesses a soft satin like luster is very valuable. It never reaches the value of a ruby, a sapphire, or even an emerald of the same dimensions, however. The false topaz comes from Brazil, Saxony, Mexico and Siberia. A finely polished topaz belonging to the Grand Mogul was purchased at Goa for $50,500. It weighed 157¼ karats, and was beautifully cut.

The Oriental amethyst is a rare substance of magnificient lusterand of a violet color, slightly tinted with red. It is the sacred stone which ornaments the cross and pastoral ring of Catholic Bishops. The true amethyst is very rare, few specimens of it being known to commerce.

Emerald, beryl and aquamarine are, scientifically considered, almost identical, but in commerce the value of the emerald is infinitely greater than that of either of the others. When the emerald is perfectly hyaline it is one of the rarest and most exquisite of gems; when it appears in semi-transparent crystals of a watery green it is quite common. Its color is due to the presence, in combination with alumina, of a rather large quantity of oxide of chromium, eight or nine parts in a hundred. Another rare constituent of the emerald is glucina, a substance hardly found elsewhere. The beryl and the aquamarine have the general composition of the emerald, but the oxide of chromium which distinguishes the last is replaced in them by the oxide of iron. The color remains the same but it is less brilliant and less pure than in the true emerald. The beryl is far more important and valuable than its companion, the aquamarine. Pliny attributes to the emerald the rarest of virtues, and Theophrastus and Herodotus described great masses of it weighing many tons and representing obelisks and colossal statues, but there is good reason to believe that they saw only stone vitrified and colored by artificial processes. The aquamarine has little value as a gem, and yet it possesses a singular property, namely, that of retaining its brilliancy by artificial light. A magnificent blue sapphire which by day is dazzling, by night becomes dull and lifeless, while the cheap aquamarine shines with a brilliancy even more intense. Moral for the cynic.

The finest beryl known is in the possession of Mr. Hope. It weighs more than six ounces and came from the mines of Cangayum in the district of Coimbatoor, in the East Indies. A magnificent beryl surmounts the globe in the royal crown of England. It is perfectly clear and of a lovely color. It is cut in oval form and is 2.1 inches long, 1.5 inches wide and 1.2 in depth. A celebrated aquamarine adorned the tiara of Pope Julius I. It measured 2.1 inches in length and 2.4 in thickness. In 1827 an aquamarine was found in Russia which is valued seriously at $111,600.

The cymophane is composed, like the emerald, of alumina and glucina. It has a lively brilliancy, takes a beautiful polish and has a gay tint. Its celebrity arises, however, from the unique property of displaying blue reflections with a milky light, which seems to float in the interior. Hence its name which signifies floating light. It is known in commerce as Oriental chrysolite, chrysopal and chrysoberyl.

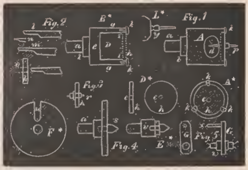
The turquoise is another aluminous stone, but only about half of its bulk is alumina. The blue color which makes it famous is derived from a combination of phosphoric acid, copper, iron and water. It is abundant, and though beautiful is not costly. There are two species of the Oriental turquoise known, as the "old rock" and the "new rock," and an occidental turquoise which is not a turquoise at all. The terms "old" and "new rock" were applied to the turquoise in Persia. The mine which furnishes the former is about three days' journey from Meshed; the source of the latter more recently discovered is five days' journey. and its products of a whitish blue is almost valueless. The occidental turquoise is a fossil ivory produced from the teeth of an extinct race of animals brought accidentally into contact with substances containing copper, which has been absorbed in quantities sufficient to color the entire mass.

A most interesting feature of the group here discussed is their electrical properties. The diamond, together with the emerald beryl and aquamarine possesses positive electricity. The spinel and balas (or fictitious) rubies have no electrical properties at all, while the ruby, sapphire, topaz, amethyst, chryso-beryl, chrysolite, cymophane and cat's eye are retentive of electricity for several hours. Then again the spinel and balas ruby share with the diamond the quality of simple refraction. All the others have it double. Still another peculiarity of the false rubies is that their crystals are identical in form with those of the diamond. The emerald, beryl and aquamarine are fusible, the others infusible. Their specific gravity ranges from 2.67 to 2.75; that of the diamond from 3.4 to 3.6; those of the Oriental aluminous stones from 3.9 to 4.2. The turquoise stands alone in having no electrical properties and no crystals.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

A VERY convenient chuck for any lathe, but especially for lathes of the Bottum type, is shown at Fig. 1. It can be made either of a solid brass rod ⅝ of an inch in thickness, or of a piece of hard brass tube of the size named (⅝ inch), and a piece fitted in, which serves as a plug *e*, with the screw *a* and shoulder *b*, to screw into the spindle of the lathe. At B^* is shown a longitudinal section of the chuck; *c a* shows the plug and screw; *g*, the piece of tube; *h*, the disc which holds the job. If solid brass is used, the end *b a* should be turned up and a screw cut to go in the lathe spindle, and the cavity shown at *L* turned out. At the dotted lines *h*, diagram B^*, is shown the disc; at *i i* is shown a recess turned into the end of the tube; into this recess fits the disc *h* (shown separate at D^*). These discs should be cut out with a universal lathe to exactly the same size, and should have about 50 in a set; this number can be speedily made with a universal lathe exactly the same size, as the tool does not need moving except forward, to cut out the disc. It is supposed these discs will go snugly into the recess at *i i*, so that the screws shown at *k k k*, (with half their heads cut away), are turned half around that the disc *h* is pressed down to the bottom of the recess *i*. The holes in these discs are in a series gradually enlarging from the size of the smallest pinion or cylinder, up to the size of a center pinion. These discs should fit the recess *i* perfectly, and be so that either face could be out. We will suppose we have a cylinder to put



in, and we are to use our new chuck, but we will fit up our discs first. In cutting out the discs with the universal, a small hole should be drilled to center by; these will be nearly in the center, but not exactly; the holes will have to be turned out with a tool shaped as shown at Fig. 2, in which *l* is a view looking down, *m* an edge view, seen horizontally; for small holes the tool will have to be as small as shown at *n*. The tool is used as indicated at the dotted lines *o*, Fig. 2, *h* representing a section of the disc. Have your discs assorted to size, and select one of exactly the size of your cylinder; if no such is to be found, take one that is the next size too small, and with such a tool as shown in Fig. 2, bore it out to exact size; now with lathe wax cement the cylinder in the hole *c*, truing by the end *p*, heating the whole chuck. In this way the sides of the cylinder must run true. The end *r*, Fig. 3, or bottom of the cylinder should be turned first, when the disc should be reversed and the top pivot and place where the balance and hair spring collet goes. At *d*, Fig. 1, is shown a hole cut in the chuck; this hole extends through from side to side, and large enough to admit calipers to measure from end to end. Indeed, as the reader will see, the facility for measurements are among the strong advantages for this system, and for scape wheel pinions it has numerous advantages; and for pivoting third wheel pinions, a very common (and by no means a desirable) job, it is just exactly the tool; only the inside of the chuck must be large enough to admit of the third wheel going into the inside of it. In pivoting fourth wheels (where the second hand goes), the wheel comes on the outside of the disc *h*. In turning in Swiss center pinions, the young beginner experiences many difficulties; indeed, most of our so-called clever workmen do not do the job as well as they might. The blanks, such as we get of the material men, are usually imperfect in several ways; first, all the imperfections of other pinions, and in addition, the hole through which the center square goes is not concentric to the turned up parts of the pinion. The best way to proceed is to use the holes at each end as centers, and the most practical lathe for this job is the turns made into a foot lathe, described in an article some months back; at any rate a lathe with double centers is by far the best, and a wax chuck the awkwardest; for a lathe of the Bottum pattern a back center should be provided—it is not only necessary for this job, but is useful for others, English center pinions, fusee arbors, etc. To go on with the details of the Swiss center pinion: provide two cone centers, one for the back center and one for the spindle; the one for the spindle should have a face plate, as shown at Fig. 4; a piece of large brass wire is turned to fit the screw of the lathe spindle as shown at E^*. A face plate is provided of thick sheet brass (about No. 12) one inch in diameter; this face plate is riveted on the chuck shown at E^*, against the shoulder *t*. A hardened steel cone is screwed into the piece *E*, as shown at *s*,

Fig. 4; these cones can be taken out of the brass chuck and changed so that *s* is either a positive cone or a hollow one, according to the job to be done. A notch is cut in the face plate as shown at *u*; this is to hold the dog pin *x*, Fig. 5. The dog is simply a piece of thick (No. 14) sheet brass, 5/8 of an inch long, 3/16 wide; three or four of such pieces, with different sized holes, will lift any sized pinion, as it is only needed that the lathe wax should fill in around the leaves, and keep the pinion from turning in the hole; at *G*, Fig. 5, is shown the piece of brass, and *x* is the pin which goes into the notch *u*, Fig. 4; the pin *x* is screwed into *G* so that it can be taken out and screwed in the other way when we wish to reverse the job in the lathe. After the pinion is fast in the piece *G*, the hole should be broached out in the pinion to fit the center square, as the piece *G* will hold the pinion securely, and not endanger the leaves. The center square should fit the hole right tight at first, as there are always some dirt and chips left in the hole. Turn the top end of the pinion, first taking the measurements from the old pinion. This system permits the job to be taken out and tried and measured to one's heart's content. The end of the pinion leaves on which the wheel goes should be well undercut, so as to rivet on. The wheel can be trued in the lathe, which is by far the best way, as the cone centers hold it perfectly steady, and free from end or side shake. After the pivots are fitted and cut to the right length, the hole for the center square will need broaching out a little more to get the exact size, and the piece *G* holds the pinion perfectly, so it is better to do it before this piece is detached. For setting wheels no tool equals the ordinary upright staking tool. All center squares for fine watches should be turned, as in many cases the catching of hands in ladies' watches is attributed solely to imperfections in the set square staff or arbor. The blanks obtained of the material men are readily turned up in the bow lathe, but in an American lathe the quickest way is to use a piece of round steel wire of the right size to file the square from. The piece of wire should be hardened and tempered, and then turned to exact sizes. It is unnecessary to let the wire be any longer than is needed, leaving only enough protruding from the chuck to turn the round part and file up for the square. At *L** is shown a piece of wire turned, with a notch turned close to the chuck at *y;* this notch determined the length of the square and enables us to square up better, and with an edge file it is quickly cut off. The top face of the square can be finished by reversing and putting the round part into a smaller chuck, and finishing with a slip of Arkansas stone and a burnish file, or a screw-head tool can be used. If the watch is a very fine one, and the end to be finished dead flat on a cap, the best method will be to proceed as will be directed for finishing English fusee squares, which will be described in my next article. Those persons who use the Bottum lathe can use the 3-screw chuck described in a former article, or a brass chuck shaped a good deal as a wax chuck, except it should be a trifle longer, and have a hole instead of a hollow cone; the hole should be drilled about four diameters deep. The manner of using is to harden and temper your pieces of steel wire as described above, tin one end with soft solder, and solder the wire into the hole in the chuck. The soldering in is effected a good deal as if you were using lathe wax, except it takes a little more heat, and in truing, the finger can be used; and the trick lies in the fact that the solder sets almost instantly, and not like wax hardening slowly; a little practice will do it. Such chucks are very handy for drills.

An Artistic Work.

IN ANTICIPATION of the coming holiday season, the Gorham Manufacturing Company has issued an elegant and unique greeting to the trade, which will be highly appreciated because of its artistic excellence. It is a partial catalogue of some of their latest productions in silver, forming a book about one-half the thickness of the present issue of THE CIRCULAR. The cover is a masterpiece of the engravers' and printers' arts. A broad border of varied design, printed in a light olive green tint, encloses a plum-colored block, in which is engraved examples of the "Fontainebleau" set of silver ware, the combination of white and olive green giving to the pieces the appearance of solid silver. The back cover is similarly illustrated, making a most attractive case for a unique interior. This cover was engraved by Russell & Richardson, of Boston, whose work in this line is conceded to be unexcelled. Elegant illustrations of various patterns and designs in silverware, with descriptions of the same, constitute the contents of this book. To say that these are elegant and artistic in the highest degree, is to accord them only deserved praise. In producing work of this character the Gorham Company has shown extraordinary enterprise, sparing neither time nor money in the production of work which should reflect credit not alone upon their house, but upon the silversmiths' art. A great variety of designs in knives, forks, spoons, coffee and tea sets, crumb and fish knives, napkin rings, soup ladles, and the thousand and one articles going to make up our table appurtenances, are shown by beautifully executed wood engravings and lithographic outline drawings. Too high praise cannot be awarded to the skill with which these engravings have been executed, giving, as they do, a correct representation of the various articles illustrated. This portion of the work was done by Russell & Richardson and John Andrew & Son of Boston, while the outline lithographic work was done by the Forbes Lithographic Company, and Armstrong & Co., of Boston. The letter press, printed by the Riverside Press, is of unusual excellence, and in keeping with the features of the work. "The story of the Fontainebleau" is a description of the luxurious surroundings of the court of Francis I., of France, and gives a pen picture of the sumptuous fétes that were given in those days, and the elegant manner in which they were furnished forth. The name "Fontainebleau" was selected by the Gorham Company to designate their latest production of table silverware. Regarding this, the catalogue says:

The artist who designed the decorations of the set is a Frenchman, and has very few rivals as a workman. He entered upon the task with enthusiasm, and spent many months in the eexcution of it. The difficulties in the way of expressing conceptions on such a commonplace article as a spoon or a fork may be imagined, and when we see it successfully, artistically done, we are not slow to recognize the merit of it. Heretofore, designers have still further limited their field by making every handle alike, which limitation was probably dictated by mechanical difficulties, and has now been set aside in order to make room for the variety and extent of expression which good taste demands. Since there are in every pattern over ninety different articles, such as spoons, knives and forks, for various special purposes, ladles and a host of similar pieces, the artist is required to exercise his fancy and ingenuity to a considerable extent, in order to depict appropriate scenes. He has taken his cue in "The Fontainebleau" from the feast or dinner service, and, as may be seen in the illustration, on the principal pieces he depicts the host and hostess in court dress. On another is the cook with lobster in hand; on another a waiter and soup tureen; another with guitar, typifying music; on another a waiter bearing the roast turkey, and on another a companion bearing a tray of coffee cups, all in the costume of the period. The designing has been done in a truly artistic spirit, and in every detail is faithful to the facts. The execution of the designs is in keeping with their beauty and elegance.

In every respect this holiday greeting to the trade is a credit to the Gorham Company, and to the good taste of Mr. J. F. P. Lawton, Secretary of the Company, who prepared it for publication.

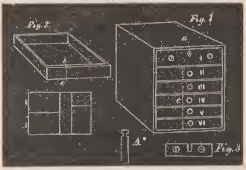
Walking Sticks.

TO BREAK off a branch for defensive purposes, as Crusoe did on finding himself on an unknown island, would be one of the first acts of primitive man. A rude support of this kind would soon be followed by the pilgrim's staff, familiar to us in pictures of the patriarchs; and from these early staves down to the gold-headed cane of our modern dandy, what a variety of walking sticks have been produced, according to the fancy and fashion of the time. When, in 1701, footmen attending gentlemen were forbidden to carry swords, those quarrelsome weapons were usually replaced by a porter's staff, "with a large silver handle," as it was then described. Thirty years later gentlemen of fashion began to discard their swords and to carry large oak sticks, with great heads and ugly faces carved thereon. Before very long a competition arose between long and short walking sticks, some gentlemen liking them as long as leaping poles, as a satirist of the day tells us, while others preferred a yard of varnished cane, "scraped taper, bound at one end with wax thread, and tipt at the other with a neat turned ivory head as big as a silver penny."—*Chambers' Journal.*

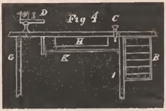
Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

A COMMODIOUS tool box is one of the necessities of a good watchmaker; but a complete set of tools can exist only in imagination, for many of them would have to be invented and made; but we can at least appease our desires by thinking that we have at least as good as our neighbors. I hope I will be pardoned for the digression, and be permitted to do a little lay preaching. The sin against which I wish to preach, I am glad to say, is rapidly on the decline, and the reason for it is, I fancy, that people require better work, both the employers and the public at large. As fine watches become more common, the owners will be educated up to the point which will enable them to detect a quack—botch, on sight. My crusade is against those men who insist that a good workman does not need any, or at least very few tools; to this class I would beg to say—not insultingly, but in all kindness—my friend, you do not know enough of your business to even tell when you see a good job. Again, there is a class of workmen who fancy that it is all in the tools, and are always deploring their poverty, in not being able to procure all the tools they needed, saying that if they only had such and such tools they could do just as good work as any man. Now, this is a species of egotism I have no patience with, for the reason that the workman with few and inferior tools might be driven to subtle make-shifts, still, his job would be in a measure creditable; on the other hand, the man who depended on tools to do the work would be a fraud. As these articles are especially dedicated to apprentices, I may be permitted to give advice as well as instruction—if you are economical even with a small salary, you can soon save up enough to get a good set of tools; if you cannot afford to get an American lathe with attachments worth $300, you can learn to do a good job on a bow lathe. In this description of a tool box I shall leave all lathes out except a Jacot, for reducing pivots, which may be a trifle too close. This tool is far the quickest for such a job—but I do not propose to discuss such matters, and with a few words on tool boxes in a general sense, proceed to a description of a complete one equally useful to a journeyman who is going from shop to shop, or one located in his own place of business. Most workmen have quite a large drawer immediately under their bench, divided into compartments and sliding trays; such a drawer, in my experience, is always full of odds and ends, just such things as one does not want—but if thrown away would be just the thing needed. The way to do is to have boxes or drawers separate from your tool box, where such things are kept and classified, to economize time. But to the tool box. The writer has had several made, which he sold to different parties, and the one he has now is of the size and shape shown at Fig. 1. The sizes given are outside measurements. The outside of the case is made of $\frac{3}{16}$ black walnut, well seasoned and



joined at the corners by an abundant nailing with two-inch brads. I have had boxes dovetailed together; they are more expensive and no better. The drawers are made of yellow poplar, but the front of walnut, of same thickness as the outside ($\frac{3}{16}$). The partings between the drawers should be ¼ inch and extend back the entire depth, and should be of only one piece, so as to present nothing for anything to catch against as the drawer is pulled out. This is a point to insist on, for 99 cabinet makers out of 100 will tell you it is not best to have the parting extend clear back; *I say it is*, and I have tried both ways. The front of the parting pieces should be faced with walnut glued on, and the parting pieces should be glued into grooves cut into the walnut. A good lock is needed on such a box; but one drawer (the top) can be made to lock all the rest by letting a hole be made in the front of all the drawers perpendicularly, as shown at the dotted line *c*, Fig. 1. This hole should be put in when the case is made; there is a piece of No. 14 steel wire, which extends up through from the bottom. The top of this wire terminates in a button, which is formed by filing a notch in each side, as shown at *A**. At Fig. 3 is shown a piece of thick sheet brass with a notch cut in it; this piece is screwed on to the bottom of the front of the top drawer, so that when the wire is pushed up through the holes in the front of all the drawers, the plate will slide over the neck shown at *A**, and hold the wire so it cannot be drawn down while the top drawer is in place. There should be a recess cut in the lower part of the box, so that a small ball turned or filed on the lower end of the No. 14 wire can be grasped with the thumb and finger. The wire should have a place reserved for it in one of the drawers. About as good a way to hold such a case of drawers in place is to put two screws down through the back into the top of the case. Fig. 4 shows the arrangement; *B*, case of



drawers; *C*, bench vise; *D*, lathe; *G* and *F*, supports; *H*, drawer under the bench for material, such as hands, screws, etc., but no tools. *K* is a dust pan to slide out and in. The size of the drawers is as follows, in the order of their numbers:

I, or top drawer	3½ × 9 × 14¼,	outside.
II	2½ × 9 × 14¼,	"
III	2 × 9 × 14¼,	"
IV	2 × 9 × 14¼,	"
V	1½ × 9 × 14¼,	"
VI	1¼ × 9 × 14¼,	"

Size of case outside, entire depth, 15⅝; width, 10⅝; length, 15. The top drawer can have two knobs with the lock in the middle. The lower end of the wire which held the drawers should only come flush with the bottom. The top drawer should be divided into compartments so that the contents are not shifting and getting mixed; this is true of all the drawers, but this one will be more of a catch-all—you will keep your work book, if working piece-work, here, and memorandum book of such addresses as are useful for future reference. As the inside measure of this drawer will be 8½ × 3⅛ × 13½, it can be divided into four compartments; these compartments should be arranged to meet the requirements. A memorandum book 3 × 5 inches will rest edgewise, also an ordinary envelope. One of the divisions can be used for a box of punches (not those for a staking tool), high bottles, etc.; but every tool case should have a division made with a parting of thin wood of just the right size. Leave one compartment in this drawer for future use, and after a year you will know *exactly* what it is needed for. Drawer II will be for depthing tool; a staking tool (let it lie down) should have a couch fitted for it so it lies on its side; the punches are as well kept in a round box, like a wooden match box with a hole 1½ in diameter; the outside diameter, 1¾ inches: depth of hole, 2½; by always putting the punches in top up, the one needed can be seen instantly, and by taking it by the end between the thumb and finger, and give the box a slight roll, it is quickly got. Your Jacot lathe and screw-head tool can go in IV. Broaches arranged in a set with fixed handles, the handles varying with the size of the broach, should lie parallel in a rack, so the desired size is to be found instantly; extra broaches in a long box, and a fixed place for the box. Small files are best kept in an old Faber pencil box, but a rack for two each of square and round should be made in drawer V. It is unnecessary to follow all the divisions and partings, as each person would like to arrange this in some measure to suit himself. But in either III or IV a place should be made for a $5 case of drawing instruments, a solid sketch block, 6½ × 9 inches of Whatman's drawing paper; these blocks are glued together at the edge, but peel apart readily. A slab for India ink, one with a cover. Keuffel & Esser's is about the best (cost, 50 cents). India ink (square gilt) costs 25 cents a stick; solid sketch block, 40 cents; every watchmaker should know how to draw well enough to put any mechanical idea on paper correctly. In such a tool box everything should have a place, economizing the space as much as possible by putting tools up edgewise whenever practicable; but if anything like care is used, such a case of drawers has ample room. *Every night clear your bench.*

Foreign Gossip.

School.—The goldsmith, Mr. Weber, has opened a school in Rue de la Paix for jewelers and goldsmiths, with great success in the undertaking.

Wear of Gold Coin.—The wear of gold coin is observed by an English gold sovereign. The coin lost ¾ grams in 18 years, and ceased to be of legal weight. It is said that 40 per cent. of the 100,000,000 pounds English gold coins, have worn down to below legal standard.

Interesting Relic.—Not a widow, but a ring worn by the first German Emperor, Otto I. (v. Wittelsbach, about 908), is at present in the possession of one of the family of v. Schleinitz. The stone is of oval shape, of a very excellent cut, with the portrait of Otto I. The father of the present possessor was offered $2,500 from an antiquarian for the ring. The gentleman wears it at times at family reunions and festivities.

An Interesting Discovery.—Several very delicate ivory carvings were found at Ninevah lately, and were sent to England. Upon arriving there, they showed signs of crumbling. Prof. Owen concluded that this originated from the loss of albumen in the ivory, and he boiled the articles in an albumen solution. The experiment was highly successful, and the ivory became again as firm and solid as it had undoubtedly been before its burial.

Lantern Watch.—Although a number of folding pocket lanterns exist, there is certainly not one that will compare with the Lilliputian specimen constructed in Paris. It is of the dimension of an average sized watch, the case opens by a pressure upon the knob, and three isinglass walls place themselves together. An oil lamp of the smallest size is situated within the four walls, which, when ignited, furnishes sufficient light to find one's way upon dark stairs and passages.

Costly Parure.—A very novel and costly set of jewels has recently been manufactured by a leading Parisian jeweler for a Russian princess. It is composed of large pink pearls, set in diamonds, alternating with turquoise also set in diamonds. The *parure* comprises the diadem, necklace, bracelets, brooch and ear rings, the latter formed each of a round turquoise set in diamonds, from which depends a large pear-shaped pink pearl. These ear-drops are valued at 30,000 frs.

Death.—We omitted to mention in its time the sad news of the death of Mr. Albert Johann, watch manufacturer, who died at Aaran, Switzerland, on the 16th of June, in his 60th year. Many of our readers of European origin will remember the gentleman. He was one of the foremost Swiss watchmakers, and the author of a manual on horology, as well as of shorter articles on horology, many of which appeared in our columns from time to time. Verily, death is making sad havoc in the ranks of our writers on horology; most of them are in the sere and yellow leaf, and a younger generation does not yet appear to be ready to promulgate their ideas with the pen.

Novel Contrivance.—M. Dardenne's self-winding clock may be considered to have had a fair trial. A specimen clock was fixed at the Gare du Nord terminus, Brussels, last September, due precaution being taken to avoid tampering with it by affixing the government seal. After six months' trial it was found in perfect time with the Observatory clock. The clock is wound by a small anemometer or windmill, which, by a train of multiplying wheels, is continually drawing over a wheel an endless chain, in one loop of which the clock weight is supported. As the loop hangs between the clock and the winding machine, the weight is continually drawing through the clock the slack chain drawn up by the wind motor, and thus a constant motion is maintained. A ratchet wheel prevents the motor from turning the wrong way, and whenever the weight is wound right up to the top, the motion is checked by a friction brake, automatically applied to the anemometer by the raised weight when fully raised, the clock has a sufficient store of energy to go for twenty-four hours.

Spurious Antique Articles.—Dr. Thausing delivered a very interesting lecture before a trades union on "the manufacture of antique objects of art," and said that a thorough acquaintance with the style of the master, great manual dexterity and skill, were necessary for the vocation of the producer of fraudulent works of art, and, therefore, it was very difficult even for a good connoisseur to distinguish the genuine from the fraudulent. "Falsifiers are the aptest scholars of the art historian, and as soon as a peculiarity of a celebrated master has been discovered, they have employed it already for their advantage."

Peter Funk Concerns.—A correspondent in a German watchmaker's paper complains that the gay and festive pawnshop auctions have taken a new departure. A French clock, with very handsome exterior, and tagged with a large label, as once having been the property of the Gran Khan of all the Timbuctoos, or "some sich," but no intestines worth mentioning, is offered. Its handsome exterior—all sham, of course, procures it a large bid—well, the end is better to be imagined than described—smiling countenance when carrying it home; "What a cheap bargain I got!" Sober one when trying to make it tick; disgusted one when it won't tick; wrathful one when pitching it into the ash barrel, accompanied by moral suasion remarks, concerning the vendors safety of soul. Ah! my friend, do not go and do likewise.

The Vision of the Blind.—One of the most eminent of living investigators into the phenomenon of optics, is M. J. Plateau, of the Royal Academy ot Belgium, who, for the past forty years has been so totally blind that he may direct his face to the sun, without being sensible of the least objective clearness. His researches into the phenomenon of light have excited the admiration of his fellow scientists; his experiments on the wonderful soap bubbles are beautiful. M. Plateau has just published a little paper on the sensations which he experiences in his eyes, which is of practical value. He states that he has constantly in his eyes the sensations of light. His field of vision is divided into spaces, of which some are very clear, and others somber or almost black. These spaces are not precisely limited, but run into each other at their borders; but what is remarkable is that their general tints alternate between grey and reddish.

Art Works.—Messrs. Aerni Lecoultre & Lis. Elisée Piguet au Brassus have finished a 20-line remontoir, with 16 hands upon the dial plate. Two show the hours and minutes upon independent little dials, while a small one shows seconds, other ones days, date, month, leap years, phases of the moon. Three large hands are for the service of the chronograph, one for the thermometer, another one indicates the running down of the spring; the watch is provided with an alarm, and has an alarm hand. The repeating work strikes hours, quarters and minutes.

These ingenious mechanisms are situated in three stories above each other, and are with ease set into motion by three trains, whose mainsprings are wound with a single knob. The watch is an anchor escapement, with compensation balance, and flat isochronal balance spring. Its price is 15,000 francs.

The Cannon of the Palais Royal.—"At last has been heard again," says Mr. Cl. Saunier, in his *Revue Chronométrique*, "the famous solar cannon, the deafening detonation of which was wont to indicate true noon to the inhabitants of the Palais Royal of Paris. Owing to a repair of the grounds, it was laid upon its flank, to the great chagrin of the seven annuitants, who might have been seen every day, braced against the balustrade, with watch in hand, the eye on the alert, the key placed over the setting square, intently espying the instant when to act. It was established in 1781, at the same time that the galleries were placed in the garden, calculated to augment the revenues of the Duke of Orleans, its proprietor. They caused all the beautiful sh de trees to disappear, a few of which were contemporaries of Richelieu A caricature of the time, turning the stinginess of the prince t dicule, represents him as a rag picker, seeking for rags—cherch es *loques à terre* (*locataires*)."

Workshop Notes.

Polishing Powder for Gold and Silver.—Rock alum, calcined and finely pulverized, 5 parts; levigated chalk, 1 part. Mix, apply with a dry brush.

Reviving Old Jewelry.—Dissolve sal ammoniac in urine, and put the jewelry into it for a short time; then take it out and rub with chamois leather, and it will appear equal to new.

Frosting Polished Silver.—Cyanide of potassium, 1 oz.; dissolved in ½ pint water. Do not hold the silver in your hands, but use boxwood plyers, and apply the mixture with a brush to the polished surface.

Gold from Gilt Metal.—Take a solution of borax water, apply to the gilt surface, and sprinkle over it some finely pulverized sulphur; make the article red hot, and quench it in water; then scrape off the gold, and recover it by means of lead.

Silver from Waste Product.—Mix your refuse with an equal quantity of wood charcoal, place in a crucible, and submit to a bright red heat, and in a short time a silver button will be found at the bottom. Carbonate of soda is another good flux.

Silver-Frosting Pickle.—Sulphuric acid, 1 dr.; water, 4 oz.; heat the pickle, and immerse the silver therein until frosted as desired; then wash off clean, and dry with a soft linen cloth, or in fine clean sawdust. For whitening only, a smaller proportion of acid may be used.

Silver-Plating Fluid.—Dissolve 1 oz. nitrate of silver, in crystals, in 12 oz. soft water; then dissolve in the water 2 oz. cyanide of potash, shake the whole together, and let it stand until it becomes clear. Have ready some half-ounce vials, and fill half full of Paris white, or fine whiting, and then fill up the bottles with the liquor, and it is ready for use. The whiting does not increase the coating power, it only helps to clean the articles, and save the silver fluid, by half filling the bottles.

Silvering Hooks and Eyes, etc.—The small iron articles are suspended in dilute sulphuric acid until the iron shows a bright clean surface. After rinsing in pure water, they are placed in a bath of a mixed solution of sulphate of zinc, sulphate of copper, and cyanide of potassium, and there remain until they receive a bright coating of brass. Lastly, they are transferred to a bath of nitrate of silver, cyanide of potassium, and sulphate of soda, in which they quickly receive a coating of silver.

Ornamental Designs on Silver.—Select a smooth part of the silver, and sketch on it a monogram, or any other design you choose, with a sharp lead pencil; then place the article in a gold solution, with the battery in good order, and in a short time all the parts not sketched with the lead pencil will be covered with a coat of gold. After cleaning the article, the black lead is easily removed by the fingers, and the silver ornament disclosed. A gold ornament may be produced by reversing the process.

To Frost a Movement.—Sink that part of the movement to be frosted for a short time into a mixture of nitric acid, muriatic acid and table salt, one ounce of each. On removing from the acid, place it in a shallow vessel containing enough sour beer to merely cover it, then, with a fine scratch brush scour thoroughly, letting it remain under the beer during the operation. Next wash off, first in pure water, and then in alcohol. Gild or silver in accordance with any receipt in the plating department.

Dead White on Silver Articles.—Heat the article to a cherry-red, or a dull red heat, and allow it to cool; then place it in a pickle of 5 parts sulphuric acid to 100 parts water, and allow it to remain therein for an hour or two. If the surface is not right rinse it in cold water, and repeat the heating and pickling operation as before. This removes the copper from the *surface* of the article, leaving only *pure* silver. When sufficiently whitened, remove from the pickle, well rinse in pure hot water, and place in warm box sawdust.

To Drill into Hard Steel.—Make your drill oval in form, instead of the usual pointed shape, and temper as hard as it will bear without breaking; then roughen the surface where you desire to drill, with a little diluted muriatic acid, and, instead of oil, use turpentine or kerosene, in which a little gum camphor has been dissolved, with your drill. In operating, keep the pressure on your drill firm and steady; and if the bottom of the hole should chance to become burnished, that the drill will not act, as sometimes happens, again roughen with diluted acid as before; then clean out the hole carefully and proceed again.

Putting in Teeth.—To put in teeth in watch or clock wheels, without dovetailing or soldering them, drill a hole somewhat wider than the tooth, square through the plate, a little below the base of the tooth; cut from the edge of the wheel square down to the hole already drilled; then flatten a piece of wire so as to fit snugly into the cut of the saw, and with a light hammer form a head on it like the head of a pin. When thus prepared, press the wire or pin in possession of the wheel, the head filling the hole drilled through the plate, and the projecting out so as to form the tooth; then with a sharp-pointed graver cut a small groove each side of the pin from the edge of the wheel down to the hole, and with a blow of your hammer spread the face of the pin so as to fill the grooves just cut. Repeat the same operation on the other side of the wheel, and finish off in the usual way. The tooth will be found perfectly riveted in on every side, and as strong as the original one, while in appearance it will be equal to the best dovetailing.

To Make Diamond Dust.—Place a few small pieces of common or cheap diamond on a block of hard, polished steel, in a suitable vessel, and cover it with water to prevent it flying or scattering, then place a flat punch on each piece separately, and strike the punch with a mallet or hammer with sufficient force to crush the diamonds. When reduced sufficiently fine in this way, the dust may be collected and dried for use; after drying, it may be graduated for different purposes by mixing it with a little watch oil; when agitated, the finest particles will float near the surface, while the coarsest pieces will at once sink to the bottom; and thus, by decanting the oil, in which the dust floats, as many grades of fineness as desired may be obtained. The dust may be separated from the oil by pouring on a piece of smooth, clean paper; the paper will absorb the oil, and allow it to filter through, while the dust will remain on the surface. But, to prevent waste, the better way is to leave it in the oil, and use directly therefrom as required, or the oil may be washed out of the dust with alcohol.

To Melt Gold.—Prepare a good fire and heat the ingot in which you wish to cast the gold a little hotter than boiling water; next put the alloy into the crucible, and add a small quantity of pulverized borax, and leave on the fire until melted. Cast this into a clean ingot, and, after breaking the bar into small fragments, return to the pot and re-melt the gold, not adding borax this time, but when the gold looks clear and smooth on the top, add, for every 6 oz. gold, a piece of saltpeter about the size of a pea, and in about a minute pour the gold. Keep up the heat after adding the saltpeter, and, previous to pouring the gold, pour a few drops of gold into the iron ingot. If the stock was clean when you commenced, the gold will roll well. Much depends on the first rolling of the stock; 18-karat should be subjected to a very heavy strain the first and second draughts, which imparts a grain to the stock; light draughts stretch the gold on the surface, and the middle portion, remaining as cast, causes the gold to crack, many good bars having been condemned, while the trouble was in the rolling. After the 18-karat has been rolled to about twice its length, it must be annealed, then rolled to the size you require. Proceed with melting 14-karat, as above described for 18-karat, giving it as heavy strain in the rolls, but not rolling so much before annealing as the 18-karat. The other karats of cheaper grade do not require the use of saltpeter to toughen; instead of which, use a little sal ammoniac, and then proceed as above. When you anneal red gold, do not quench it when red hot, but allow the gold to blacken before quenching, otherwise it will slit or seam. Melt new alloys in every case twice; treat solder the same way, to insure a thorough admixture of the copper with the gold.

Trade Gossip.

Fobs and seals still continue in public favor.

Illuminated silver jewelry is as popular as ever.

Rubies are very fashionable and very expensive.

The taste for silver filigree jewelry is being revived.

Reports from Chicago indicate a rushing fall business.

The demand for open-faced watches is unprecedented.

Coral Jewelry is being revived in England and France.

The blue sapphire is one of the most popular gems worn.

Silver bouquet holders, made to represent a thistle, is the last novelty in this line.

Arabi's autograph is no longer in demand, but the rage for Garnet ornaments is increasing.

The indications are that jewelry will be more extensively worn this season than ever before.

Norwalk, Ohio, is to have a new Howard clock to regulate the affairs of that enterprising town.

Mr. J. F. Saunders, of Messrs. Saunders & Ives, returned from Europe in the *Gallia* Sept. 19th.

There has never been so many beautiful and artistic designs in diamond jewelry as are shown this season.

The French have voted the handsome amount of $90,000 for the observation of the next transit of Venus.

Charles E. Moody, formerly traveler for Messrs. Krementz & Co., is no longer in the employment of that firm

Excessive competition in gold chain is creating considerable demoralization in the trade in San Francisco.

Messrs. Heller & Bardel have purchased the right to manufacture G. W. Washburn's patent ball ear ring cover.

The hammered finish given to silver still retains its popularity, and is introduced in a variety of artistic forms.

Mr. I. M. Miller, of the firm of Miller Bros., recently arrived from Europe in the *Bothnia*, after a brief holiday abroad.

Wm. Canning, a clerk in the employ of Lapp & Flershem, Chicago, is held in $1,000 bonds for alleged thefts of jewelry.

Fine rubies are very scarce, and command high prices. Several beautiful gems are to be seen at Messrs. Taylor & Bro.

Mr. Perret, of the house of Julien Gallet, the well-known watch importer, arrived from Europe in the steamer *Adriatic*.

Parisian gentlemen have taken to wearing gold and silver bracelets, with mottoes, monograms, and other strange and fantastic devices.

Many new and beautiful designs are offered this season in onyx goods. In fact, this style of jewelry is rapidly growing in public favor.

Mr. Thomas Le Boutillier recently arrived from his semi-annual trip to Europe, and brings with him many novelties in clocks, bronzes, and fancy goods.

Chas. D. King, traveler for Messrs. Aikin, Lambert & Co., had a narrow escape from drowning while recently bathing in the surf at Galveston, Texas.

Mr. A. D. G. Hodenpyl, of the firm of Hodenpyl, Tunison & Co., arrived from Europe in the steamer *Amsterdam*, and reports business very dull in Paris.

Mr. A. Bedford, representative of the London house of Messrs. Robbins & Appleton, agents of the American Watch Co., recently arrived from Europe.

During the past month a large number of southern buyers have visited this city and their liberal orders have rejoiced the hearts of manufacturing jewelers.

Bohemian garnets are said to be advancing in price. They are again coming into fashion, and in Europe are used extensively in medium class jewelry.

Messrs. G. C. Shreve & Co., of San Francisco, have attached to their establishment a very neat and well-organized factory, and employ a force of seventy workmen.

Mr. Henry Fera's diamond cutting establishment in John street is a deserved success. He imports many diamonds in the rough, and cuts and polishes them in his own shop.

While the demand for diamonds is moderately active, there is an indication of approaching demoralization in consequence of the large number smuggled into this country by outside parties.

Lissauer & Sondheim offer a fine line of stone rings, lockets and a general assortment of jewelry. Also an extensive stock of watches of all grades and sizes, fitting American cases.

A novelty in bracelets is composed of several circles of gold linked together with stones, whose initials form a wish or a name. The same fancy is produced in dog-collar necklaces.

If anyone knowing the whereabouts of one John A. Postal, a watchmaker, will communicate with Kneeland & Harrison, El Paso, Texas, they will confer a favor on the parties interested.

Mr. G. C. Taylor, of Messrs. Taylor & Bro., importers of diamonds, clocks, bronzes, arrived from Europe in the *Bothnia*, Sept. 6th. The firm present a rich line of goods for the fall trade.

Diamond cutters are scarce, according to a wise contemporary; but in this city they flourish, and ply their vocation by cutting off diamonds from the shirt bosoms of discouraged men.

Messrs. J. P. Stevens & Co. are about to open a branch jewelry store in Macon, Ga., and will display an attractive stock of new goods, that will astonish the good people of that town.

Messrs. John A. Riley & Co., makers of the well-known patent spring bracelet, have introduced their spring attachment in band bracelets, to which the attention of the trade is directed.

We are pained to announce the death of Pierie E. Kullman, of the firm of M. J. Paillard & Co., who died of consumption at Lakeville, Long Island, Sept. 15th, in the 45th year of his age.

The celluloid spectacles and eye-glasses are rapidly growing in public favor. They are light, durable and neat in appearance. The Spencer Optical Co. have made a grand hit with these goods.

Iron watch signs are generally considered the correct emblems for watchmakers' shops. Many new and attractive designs emblematical of the trade are offered by the Excelsior Sign Co., of Chicago.

Mr. N. Taylor, with Messrs. Taylor Bros., of this city, has recently patented a very clever device in separable sleeve and collar buttons, which will doubtless become popular, especially in high class goods.

Mathey Bros. & Mathez have in stock a very attractive line of ladies' watches. Also a full line of Swiss movements to fit American cases. These goods are among the best imported, and give universal satisfaction.

Mr. Joseph Muhr, of Messrs. Muhr's Sons, sailed for Europe in the steamer *Alaska*. Mr. Muhr is an indefatigable worker, and a brief respite from business will, we hope, restore him to his former activity and health.

Messrs. Aikin, Lambert & Co. offer a very attractive display of pencil cases, pencil case watch charms, etc. They have recently introduced a number of new and beautiful designs, especially appropriate for the holiday trade.

The Middletown Plate Co. have recently extended their manufacturing facilities by erecting a new wing to their extensive establishment at Middletown, Conn. Their new catalogue will be ready for distribution early in October.

In watch case decorations the raised gold work introduced by Messrs. Keller & Untermeyer is very popular. They offer a great many new and artistic designs. Just now they are having quite a run on infuriated Texas bulls.

Messrs. Wm. S. Hedges & Co. offer an unusually fine stock of diamonds of all grades and sizes. The senior member of the firm, now in Europe, has been exceedingly fortunate in securing several large parcels of goods of exquisite material.

Messrs. Cowell & Hubbard, of Cleveland, are said to have one of the most beautiful and artistic jewelry stores to be found in the country. It is well stocked with a rich line of elegant goods, and conducted by responsible and courteous gentlemen.

Charles E. Smith & Co.'s jewelry shop, in North Attleboro, Mass., was entered by thieves on the night of Sept. 19, and robbed of (it is estimated) $20,000 worth of stock, including jewelry, gold and silver coins, stones, etc. As usual, no clue to the burglars.

The firm of Giles, Bro. & Co., of Chicago, is dissolved by mutual consent, Mr. W. A. Giles retiring. The business will hereafter be continued under the same general management at the same location, under the old firm name of Giles, Bro. & Co. (incorporated).

L. H. Keller & Co., the well known importers of fine watch materials, tools, etc., have been appointed sole agents for Möebius celebrated watch and clock oils. These oils received the highest award at the Chaux de-Fonds Exhibition, and are highly commended by the best watchmakers in Europe. Attention is directed to the committee's report and the table of analysis of the oils, to be found elsewhere in THE CIRCULAR.

Fancy jewelry continues in general favor. Bonnet strings are fastened by small gilt flies. Draperies are raised by May-bugs, and horse-shoes are placed in flat cravats, which are now worn by women as well as men. Mushrooms are the latest fancy in Parisian ornaments.

An eastern genius claims to have a telescope with which he can see a five-cent piece in forty feet of water. This may be useful for seafaring men, but what we want is an instrument that can find more than twenty-five cents on the dollar in the stock of certain bankrupt jewelers.

Mr. Aug. K. Sloan, of the firm of Carter, Sloan & Co., and wife, have just returned from a very pleasant visit to California. They were most hospitably entertained by their many friends in the trade, and returned with many pleasant memories of a warm-hearted and generous people.

The many friends of Mr. J. E. Boynton, of Jerseyville, the courteous Secretary of the Illinois State Association, will be pained to learn of his recent indisposition, caused by the rupture of a blood vessel. Mr. Boynton is rapidly recovering, and is now able to attend to business as usual.

Messrs. Stern Bros. & Co.'s patent shutter locket has achieved a popularity seldom accorded any article of personal adornment. A glance at their advertisement will convey an intelligent idea of their beauty and practical utility. They are exceedingly appropriate goods for holiday offerings.

J. G. Raine, of Grand Island, Nebraska, is now comfortably settled in his new building, and has opened with a large and well-selected stock of jewelry. Mr. Raine is one of the most enterprising jewelers in Nebraska, and enjoys the confidence and patronage of a large circle of friends.

Mr. Louis Kahn, of Messrs. L. & M. Kahn, returned from Europe in the steamer *Bothnia*, Sept. 6th. Mr. Kahn has, during the past four months, visited the principal business marts of Europe, and has secured a large and attractive stock of watches and diamonds that cannot fail to interest buyers.

Messrs. John Wilson's Sons have recently issued an illustrated catalogue of French clocks and bronzes, etc., showing the various styles and designs in these goods. It is a very neat and useful work, and will doubtless be appreciated by the trade. Copies will be forwarded to dealers on application.

Mr. Theo. Lesperance, one of the most skilful workmen in the trade, has just converted a Jurgensen key winding watch into a modern stem winder. The management of the bridge, and the workmanship and finish of the steel parts reflect great credit upon Mr. Lesperance as a workman of remarkable skill and ability.

The Senate passed the joint resolution introduced by Mr. Flower, authorizing the President to invite delegates from all nations to meet with American delegates in Washington, for the purpose of fixing upon a meridian proper, to be employed as a common zero of longitude, and standard of time reckoning throughout the world.

Messrs. Oppenheimer Bros. & Veith have recently been granted letters patent for an improved combination necklace, pendant and lace pin. Each part can be worn singly or in combination, at the sweet will of the wearer. These goods are very neat and attractive in design, and are especially appropriate for holiday offerings.

Messrs. Moore & Horton have recently added to their extensive stock of artistic jewelry, an attractive line of stone and bangle bracelets, which they offer to the trade at prices which will tempt purchasers. They have also extended their line of rings and pins until they now embrace all the leading and most popular styles to be found in the trade.

At the meeting of the New York Jewelers' Club, held Sept. 12, the following amendment to the By-Laws was adopted: Striking out all of Article 7 which applies to base ball; also an amendment giving the President the power to appoint the Executive Committee instead of having them elected. The club decided not to lease a club room for the present.

In July last a picked nine of the employees of Messrs. S. W. Hale & Co., played a friendly game of base ball with a picked nine from the establishment of Messrs. Baldwin, Sexton & Peterson, and defeated the latter by a score of 23 to 22. In another contest on the diamond field Aug. 26th, the Hale nine won an easy victory by a score of 18 to 7.

Our good old friend, H. F. Piaget, the veteran horologist, is now in the 85th year of his age, and is still working at the bench. His eye is as clear and his nerves as steady as in the palmiest days of his youth. His right hand has not forgot its cunning, for his fame as a skilful workman has not been dimmed in the slightest by his four score years and five.

Louis Pedingham, a clerk in the employ of Messrs. Wheeler, Parsons & Hayes, has been arrested on a charge of robbing his employers while in their employ, of a quantity of gold watches, chains, rings, bracelets, etc., to the value of $1,500. A part of the stolen property is alleged to have been found in the prisoner's rooms in Brooklyn. He pleaded guilty and was held for trial.

The Chicago Watch Case Co., is the name of a new corporation recently established in Chicago for the purpose of manufacturing the patent screw bezel dust proof watch case, in filled and low-karat goods, the company having secured the right to manufacture under the Waltham patent. The Chicago Watch Case Co. will direct their efforts to this class of goods to meet the demands of the popular trade.

On the 28th ult., the wife of Walter E. White, of Providence, presented him with twins—they are just of an age, are both boys, have the same father and mother, and are both brothers. Dealers in diamonds have great difficulty usually in matching gems, but Mr. White finds his matched to order. In twenty-one years from the date of their birth the twins will be eligible for membership in the Jewelers' League.

Congress passed, August 1st, an act allowing manufacturers of designs for such molded decorative articles of pottery or metal as are subject to copyright, to put their copyright mark on the under or rear side of the article. August 3d, an act was passed to the effect that the law upon the registration of trade marks, passed March 3d, 1881, shall not prevent the registry of trade marks rightfully in use at that date.

Mr. G. W. Hardway, of Columbus, Kan., has issued a circular calling upon the watchmakers and jewelers of Kansas to meet at Emporia, Oct. 10th, for the purpose of organizing a state association. It is the duty of every dealer interested in the welfare of the retail trade, to lend their presence on this occasion. Mr. E. Y. Dollenmeyer, of Wilson, Kan., has promised to preside at the coming meeting, with a view to establishing a permanent organization.

Charles Benge, of St. Croix, Switzerland, has just completed a musical watch, which he proposes to exhibit at the coming state fair at Zurich. It shows hours, minutes and one-fifth seconds, and with its miniature musical works plays two tunes at the end of every hour, if not sooner set into motion. The pieces may be varied according to will. The revolution is entirely noiseless. The cylinder contains 260 pins, and the *claviatura* of thirty very sonorous metal plates.

At the eighth Annual meeting of the New York Jewelers' Association, held at their rooms, 694 Broadway, Sept. 12th, the following named gentlemen were elected officers of the Association to serve for the ensuing year: President, Mr. Thos. G. Brown, (Mr. E. C. Hine retiring); Vice-President, Mr. Wm. R. Alling; Treasurer, Mr. Aug. K. Sloan; Executive Committee, Messrs. David C. Dodd, D. F. Appleton, F. S. Douglass, Geo. C. White, Jr., H. B. Dominick; Financial Committee, Messrs. S. W. Hale, L. V. Haff, J. A. Riley, E. C. Fitch, M. Bailey; Membership Committee, Messrs. C. P. Harris, J. D. Lyon, Enos Richardson, W. S. Hedges, C. H. Brahe.

Regarding the origin an formation of the diamond in nature, Dr. A. B. Griffiths says there are only three ways in which the crystals are produced—by fusion, by solution, and by sublimation, and as the diamond has been found in sedimentary rocks, and in an alluvial matrix of sandstone and pebbles, and knowing that sandstone and pebbles are produced by the action of water, and as aqueous or sedimentary strata are often fossiliferous, we may draw an inference that the carbonacous matter of the fossil plants and animals has been dissolved by highly heated water, aided by great pressure existing in the crust of the earth, and that the carbon had subsequently cooled slowly down into the crystalline form of the diamond. In other words, the diamond is the result of the solution process.

A lucrative manufacture of pearls has been established in the Thuringia Forest, the center of the glass-pearl industry, during the past four years. A sudden enormous demand from abroad had sprung up for a new kind of pearls, the so-called "lack-luster" pearls. High prices were offered, but the difficulty was now to make them. A few samples sent to several important houses were passed from manufactory to manufactory; numerous trials were made with acids, etc., yet none proved successful until a workman, accidentally having put one of the original samples in his mouth, felt a tiny hard object on his tongue, and on examining it found it to be a grain of sand. This led to the discovery of the secret. In less than a week hundreds of workmen were making pearls "fully up to sample," by rubbing them with common sand. Not only pearls, but buttons, also, are now being manufactured in the same way, and "wages" have more than doubled since.

It is reported from India that the fragments of Buddha's begging bowl have been found in a Buddhist tope or relic mound at Sopara, in the Bombay Presidency. Old manuscripts describe the burial of these fragments very minutely. In the mound was discovered a small chamber containing a large stone coffer. This contained first a copper casket, which in its turn held one of silver, then came one of stone, next, one of crystal, and finally a small domed golden casket, which enshrined thirteen shreds of earthenware, apparently the long-lost relics. The interstices between the caskets were filled with sweet powders and gold-leaf flowers, jewels of small value and Buddhist symbols being also found. According to a coin discovered the relics are about 1,700 years old.

While one of the Bosnian delegates who waited upon the Emperor Franz Josef at the Hofburg a few weeks ago, was staying in Vienna, the owner of the hotel in which he lodged became a bankrupt. Hearing of his host's mishap, the worthy Beg sought an explanation of the term "bankruptcy," and, having thoroughly mastered its meaning, proceeded, on his return to his native village, to impart his information to his near relatives and close family connections. "This, O my brothers," he observed, "is the true and proper way to become a bankrupt. First, you must hire a shop. Then you write to rich merchants in far-distant cities, inviting them to forward their wares to you for sale, and pledging yourself to pay them within a few months. As soon as you shall have received sufficient merchandise, you must sell it for cash or hide it carefully away. Then must you go to the Judge and say to him, 'Beloved of Allah! I am a bankrupt. Here are five pounds. They are all I have in the world.' The Judge will keep four of the five pounds and proclaim your bankruptcy; the other pound will be divided among those who supplied you with goods. Later on you will remove to another town, and begin this good and easy business over again. Thus may the passing bitterness of insolvency be converted into the abiding sweetness of a comfortable independence. Be chesm! Upon my head be it!"

For some time past the Mayor's Marshal has been closely investigating the manner of conducting the pawnbroker's sales of unredeemed pledges. The Marshal states that he has found that a number of valuable diamonds, watches and other articles are unfairly sold by certain pawnbrokers to their friends, and in many instances, bought in by the pawnbrokers themselves at set prices, subsequently sold at private sale and the price realized, over the amount loaned to the owner, placed to their own credit. He also says that he has not found a single instance, no matter how valuable were the articles, where there was any surplus coming to the owners. Cases of pawnbrokers engaged in this practice have been brought by the Marshal before Mayor Grace, and some are still pending. An examination into charges made against Levy Harris, who keeps a pawnshop at No. 25 Catharine street, was concluded before His Honor recently, and the facts elicited develop a somewhat questionable scheme. It appears that on February 24, 1880, one Max Marx pledged with Harris a set of silverware, and received thereon $30. Before the expiration of a year, being desirous not to lose his property, he called to pay the interest, and was compelled, as he alleges, to disgorge $7.50 for a renewal of the pledge, which was $4.50 above what could rightfully be claimed on them. In June last Mr. Marks called upon the pawnbroker, in company with a friend, for the purpose of redeeming his silverware, and was told that he could not have them, as they had been sold. When asked what sum had been realized on them, Harris refused to tell. Marks then called upon the Mayor's Marshal. The next day another case of the same kind was reported, and he at once set about investigating the character of both sales. He learned from Harris, and the auctioneer, McGrath, admitted on investigation, that the set of silverware and the other lot of jewelry had been "bid in" by the pawnbroker at the sum loaned, and afterward sold by him at private sale for a higher sum; that the articles were sold by the auctioneer in what is known by the trade as a scrap lot, and that the sales had never been advertised as the ordinance in relation to such matters strictly required. The auctioneer, when closely examined by the Marshal, admitted that certain marks on his sale meant that the lots were bought in by the pawnbroker, and that it was customary to sell by scrap lots. Mayor Grace, on the completion of the investigation, informed the auctioneer that he would compel all pawnbrokers, under the penalty of the forfeiture of their licenses, to advertise their sales in accordance with the law, and enforce the provisions that the public shall have full and free inspection of and fair competition in bidding on articles to be sold, so that the highest price may be obtained and the amount realized over the loan refunded to the owners of the pledges. The Mayor also instructed Mr. Harris to recover the lot of silverware belonging to Mr. Marks within one week, or he would consider the question of revokng his license.

The refusal of Switzerland to adopt a general patent law is calculated to excite astonishment everywhere. Only three transatlantic nations are without this evidence of progressive civilization, viz., Switzerland, the Republic of San Marino, and Holland. Switzerland, of all nations, cannot afford to deny her inventive genius the much needed protection. This refusal to adopt a law for the protection of inventors will seriously embarrass the Swiss National Exposition to be held next year at Zurich. Several of the largest watch manufacturers have resolved not to participate in the exhibition, and, doubtless, other important industries will follow their example.

The fork has been made the subject of an interesting monogram published in Italy by Prof. Giovanni Lumbroso. In the ancient world this aid to eating was unknown, and the fashionable and well bred, sought to display as much delicacy as possible in the operation of conveying food to the mouth with the fingers. It was a thousand years ago when the first mention of the *forchetta* was made in Italian literature, and it was then spoken of as an instrument introduced into Venice by a Byzantine princess. It was at first not favorably received, and for two centuries came little into use, either in Italy or the rest of Europe. No mention of a fork was made in the catalogue of table furniture at the wedding of Maria Sforza-Visconti as late as 1493. Still, the fifteenth century saw its use spreading in France, and the sixteenth saw it in Germany. It was not until the seventeenth that it was adopted in England.

For some time past the quaint old Pagan fashion that bracelets should be worn by men as well as by women, has been gaining ground upon the Continent, chiefly, it would seem, in countries where the prevalent creed is Roman Catholicism. The port-bonheur is an old-established institution in the Austrian and Italian cavalry, and, indeed, the majority of Austrian noblemen, being addicted to field sports, are accustomed to wear St. George's medals, set in silver bracelets, upon one or other arm, the subduer of the dragon being generally recognized by equestrians as their patron saint. Archduke Rudolph, the Austrian Crown Prince, wears upon his left wrist a bracelet of chain mail, visible in a photograph taken immediately after his marriage, and representing him arm-in-arm with the Archduchess Stephanie. The late King Victor Emmanuel, a mighty hunter in his day, always wore a massive bracelet containing a medallion of St. Hubert, the same that is now worn in memory of him by his son, Italy's actual sovereign. Austrian naval officers are addicted to the wearing of porte-bonheurs, in which are medals bearing the effigy of St. Peter, while the bracelets of imperial and royal artillery officers are invariably commemmorative of St. Barbara's piety and personal attractions. Rossi and Salvini, the two great Italian tragedians, being also excellent horsemen, have caused broad bands of silver, framing medals of St. George, to be riveted upon their upper right arms. It is believed that this bracelet-wearing fashion has spread to England, and has been adopted by more than one distinguished personage.

The case of the two diamond thieves, Fulton and Watson, was recently tried in Paris, and resulted in the conviction of both the scamps. It was they who, last winter, stole from a jeweler, Mme. Chauvet, in the Rue des Capucines, diamonds to the value of 236,000 francs. The robbery was perpetrated in the following daring fashion: A man calling himself Col. Gaston presented himself in Mme. Chauvet's shop, and requested to be shown some diadem diamonds, necklaces, etc. His manners were so good and his dress so elegantly correct in every respect, that the *merchande* had no hesitation in spreading before her customer her most valuable gems. Of these the swindler made a lavish choice, and asked Mme. Chauvet to place them in a small black hand bag he had brought on purpose. In payment the pretended Colonel offered a check on a foreign bank, which was refused. "Wait a moment," cried the blackleg, "I will get it changed at the bank and bring you notes. Keep the hand bag; I shall be back directly." So saying he disappeared. Almost immediately he had left the shop, a respectably-dressed woman entered and requested to be shown a certain ring in the shop window. While Mme. Chauvet was occupied in getting the ring, the "Colonel's" accomplice succeeded in adroitly substituting an absolutely similar hand-bag for the one left on the counter. This done, she quickly chose her ring and left. When evening came without her customer returning, Mme. Chauvet opened the bag—which she thought was the same one that "the Colonel" had left—and discovered that she had been robbed. When Fulton and Watson were arrested in Belgium for other diamond robberies, several of the stones stolen from Mme. Chauvet were found in their possession. Fulton was sentenced to four, and Watson, the pretended Colonel, to five years' imprisonment.

THE

Jewelers' Circular and Horological Review.

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

The recognized organ of the Trade, and the official representative of the Jewelers' League.

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The Business Outlook.

IT IS USELESS to attempt to disguise the fact that trade for the past few weeks has not been as brisk as it was generally expected it would be. There are various good and sufficient reasons for this disappointment, chief of which is the excited condition of the stock and grain markets. For some time past speculators have been manipulating the markets, keeping them in a feverish and unstable condition, seriously affecting the values interested. When speculation runs wild, conservative business men grow cautious, and there have been indications that the best informed commercial men were apprehensive of a financial stringency following the crazy extravagancies of the Wall street gamblers in stocks and produce. Their operations constitute gambling, plain and simple, but of the most reckless kind. They seldom own any of the stock they buy and sell, but simply bet upon the prices it can be made to sell for. As the large operators in the street manipulate these things to suit themselves, one is quite as safe in betting his money on a game of faro as on the price of stocks in Wall street. But there are, nevertheless, so many persons interested in the stock and produce markets, and these have fluctuated so much of late, that a feeling of insecurity has gone abroad, affecting the general business of the country disastrously. Dealers are afraid to buy goods while things are in an unsettled or threatening condition, and hence the fall orders in certain departments of the jewelry trade has not been as satisfactory as it was anticipated they would be, by those who were most sanguine at the beginning of the year. Then, too, the demand for the export trade has fallen off considerably, owing to the disturbed state of Europe, now, happily, terminated. But while the war in Egypt was in progress, there was constant danger of complications that might involve other nations, and there was, consequently, a lack of confidence on the part of business men, resulting in a reduction of our sales for foreign consumption. Political excitment in a number of the states of the union has also been running high of late, as this is the year when Governors and state officers are to be elected. The nominations have been made amid scenes of excited controversy, and the candidates and their friends are now in the field striving to work up such fervor in their behalf as may be. All these causes tend to disturb the quiet tenor of general business operations, and to interfere with the daily routine of buying and selling. The falling off in orders in the jewelry trade has had a tendency to induce some houses to push their sales unduly, thereby overstocking the retail trade. This is a reprehensible practice at all times. Retail dealers may be relied upon to know the state of their own market, and to voluntarily make their orders equal to the demand; to push them beyond this is to jeopard their solvency, and the result of the insolvency of any one of them is disastrous to the entire trade.

It is not at all probable that the dull season will be of long duration. The causes leading to it have pretty much disappeared, while the abundant harvests that have been gathered, or are now being harvested, hold out a promise of greater activity when the time comes for marketing them. These present an aggregate of values immense in proportions, having a substantial reality about them that is scarcely affected by the speculative efforts of the stock gamblers. Wheat, cotton, corn, rye, oats, potatoes, pork, etc., of which the harvest is prolific, are articles of cash value, and when these begin to pour in from the producers, a vast amount of money will be diverted from the banks to the hands of the people, and will soon find its way into the channels of trade. It has been demonstrated by long experience that a year of good crops is a good year for the jewelry trade, and 1882 is not likely to prove an exception to the rule. Manufacturers and jobbers are sanguine that the holiday trade will be excellent, and have made preparations accordingly. A greater variety of new and desirable goods will be offered to the trade than ever before, embracing new patterns and designs from the best and most costly to the cheap imitations of the same. No effort will be spared by the manufacturers and jobbers to stimulate trade, and retailers are expected to do their share also. It is highly probable that after the dull season already experienced, there will come for the holiday trade a period of unusual activity.

Women as Watchmakers.

THE PRESENT scarcity of skilled watchmakers has induced several correspondents to ask us to set forth the advantages to women of learning the watchmaking trade. There seems to be no reason why a young woman of ordinary intelligence, who is forced by circumstances to earn her own living, should not, by studious application, master the technical and mechanical difficulties of the art, and become a proficient watchmaker. In Switzerland, great numbers of women are employed in the manufacture of parts of watches, and in this country thousands are daily engaged in the various watch factories, mostly in tending machinery. Many, however, are employed at hand work, requiring great dexterity and delicacy of touch, and, by their skill and deftness in manipulating the small, precise parts intrusted to them, earn liberal wages, being mostly employed at piece-work. There is no question but they are capable of learning and doing all the work required to make a watch if properly instructed, but in the large factories it is found to be more economical to teach them a special branch of the art, and keep them employed constantly at that. The time has not yet arrived when it is found to be economy to entrust them with the final finishing work required upon a watch to enable it to fulfil its mission as a trusty timekeeper. Not having been educated up to this point as yet, the experiment has not been tried. But no valid reason can be given why a young woman who can set jewels accurately, or make pinions and wheels with precision, should not be competent to ultimately assemble all the parts of a watch, set them up, and finally regulate them for the market. Indeed, the assembling and setting up is now partly done by women in some of the large factories; it needs but a few more progressive steps in their education to perfect them in the art of regulating. We see no reason why the science of watchmaking should not be thoroughly mastered by women, and the demand for competent labor at the bench supplied by them. The trade is peculiarly adapted to their physical natures, being clean, pleasant, requiring sensitiveness of touch, and steadiness of hand. Experience has demonstrated that they possess these qualifications in an eminent degree; all that is lacking is instruction in the higher branches of the art, which has not yet been accorded them. They would bring to the trade good habits, persistent industry, careful and conscientious labor, qualities that are certainly great requisites, while their skill would depend upon their teaching and their experience. Working-women are proverbially ambitious as a rule, desirous of pleasing their employers and securing advancement in their positions. With fitting opportunities they would unquestionably make good watchmakers. One objection urged to their employment is that young women are supposed to be taught from childhood that the true mission of a woman is matrimony, and that by the time they have partly learned their trade, they are sure to go off and marry someone. This is getting to be less and less the rule, as the number of females in the eastern states is so greatly in excess of males. Young men go off to the west to seek their fortunes, while the girls remain at home. As a consequence of this preponderance of females, young women are gradually realizing that there are not men enough to go around, and that they must depend upon their own exertions for their maintenance, and are, therefore, content to devote themselves to gaining a perfect knowledge of some industry and pursuing it for life, without bothering with the matrimonial idea. Or, if they do marry, they are very apt to wed someone in their own line of business, and so bring to their employer two steady, settled hands that are to be depended upon.

We know that we are touching upon delicate ground in countenancing the employment of women in watchmaking, for the men engaged in the business are, as a rule, opposed to it, fearing that their monopoly of the industry will be interfered with. We never could understand by what authority men claimed a monopoly of labor, or any advantage over women, who are equally born to toil, have equal responsibilities, and equal capacity for labor. Strangely enough, this opposition to the employment of women (and boys) comes from workmen who are fathers of families, having girls and boys of their own to provide for, and who, in their trade organizations, deliberately vote to prohibit their own children from learning a trade and earning an honest living. This opposition to apprentices and women by the trades unions has contributed more than any other one cause to swell the ranks of the grand army of tramps, and the dissolute and criminal classes. We believe in giving to every human being, male or female, an equal chance with every other to earn an honest living, and full opportunity to develop to the highest such intelligence as nature has bestowed upon them. That workman who fears the competition of boys and women is a moral coward, who would begrudge bread to another that he might enjoy his "cakes and ale." There should be no monopoly of labor by any class or any sex, but if there is injustice now done in that respect, it is by the thousands of men who are occupying positions for which women are in every way better qualified. There is no reason why the trade of watchmaking should not be opened up in its fullness to women, and we hope yet to see the day when their sex will be no barrier to their employment at the bench, provided they possess the requisite technical and mechanical skill.

Unwarranted Credit.

THERE is no line of business that is so lavish in extending credit as the jewelry trade. There seems to be an idea prevalent that every person who manifests a desire to sell jewelry should be encouraged, regardless of his business capacity or his adaptability for the jewelry line. It often occurs that one who has been a traveler for a jewelry house, having made many friends by his jovial, offhand manner, conceives the idea of setting up for himself. He has been a popular and successful salesman, is well known to manufacturers and jobbers, and by them is offered unlimited credit, apparently under the belief that because he has been a successful salesman to the trade, he will be equally successful as a dealer. He selects his objective point, opens an office, and is at once loaded down with goods, all obtained upon credit, far beyond the demands of the connection to which he caters. He starts off with a flourish of trumpets, of the hail-fellow-well-met description. For a time all seems smooth sailing, but meantime his paper is maturing, and when it falls due, the popular traveler finds that he is without the means to meet it, asks an extension, and finally, after a weary and impotent struggle, places himself in the hands of his creditors, and another failure is recorded. We could enumerate numerous cases of just this nature, where lavish credit bestowed by the trade upon a "jolly good fellow," who has been a popular traveler, has resulted in ruin to the individual and serious loss to the trade. Something more is required of a merchant than the happy faculty, so essential to a traveler, of making friends in a happy-go-lucky manner; he must have good business qualifications and habits, and persistent economy, qualifications not always found in the modern commercial traveler. He finds, also, a great difference between going out to the trade with his cases of samples, backed by the prestige of a well-known house, to dispose of goods, and working up a profitable trade on his own account in the face of an active competition, including that of his old employers. This class of men, when starting out for themselves, are apt to be exceedingly sanguine as to their ability to make an immedite success, and consent to be overstocked by dealers anxious to work off their goods. They seldom have any capital to commence with, but trust to luck to bring them out all right. It is a great mistake made by manufacturers to encourage men of this stamp to set up business for themselves. A person desiring credit should be required to show that he has a certain amount of capital of his own to risk in a business venture in which they are asked to take chances. If they were asked to advance an amount of cash equal to the value of the goods they sell on credit, they would promptly decline the alliance, but, in the hope of making a profit on their goods, they are perfectly willing to risk them. No man should ask or be given credit unless he has a fair amount of capital of his own as a basis to work upon. It is preposterous for him to suppose that he can make profit enough upon his sales to pay interest upon the value of all his stock and pay his other expenses in addition. Lavish and unwarranted credit is one of the greatest evils in the trade at present, tending to overstock the market with goods, and to keep the jobbing and retail trade in debt beyond what the legitimate demand of their business requires. There are numerous young fledglings now in the field as drummers for eastern jobbers and manufacturers, who use every art to force their goods upon retail dealers. They represent that they may order goods without limit, paying for them whenever convenient; that if they cannot meet their notes when due, they will be cheerfully extended. But the firms these drummers represent want their money when it is due, regardless of the representations of their salesmen, and if it is not forthcoming, they begin to harass the poor retailer, and soon get him into hot water. It is very nice for a dealer to say, "My credit is unlimited; I can get all the goods I want;" but it is far better for him to be able to say, "My stock is all paid for, and I owe no man a dollar." Then he knows the ground on which he stands; he is thoroughly independent, having no man's capital interested in his business but his own. He will then be a careful buyer, and very sure not to get overstocked with unsalable goods. It is very easy under present conditions, to obtain goods on credit, but very much more difficult to work them off for cash, so as to be able to meet maturing indebtedness. One of the most unhealthy features in the trade to-day consists in the unbounded and unwarranted credit given, tending to overstocking retail dealers and embarrassing them with stocks of goods largely in excess of the demand for them. While there is such active competition in the business, it is doubtful if any reform in this direction will be effected, but it is, nevertheless, our duty to call attention to the evil.

W. N. Boynton Posing as a Martyr.

MR. W. N. BOYNTON recently sent us a lengthy communication for publication, ostensibly for the purpose of refuting the charge of falsehood we made against him, but in reality for the purpose of abusing and misrepresenting THE CIRCULAR and its editor. His letter was couched in such objectionable language, and contained so many misstatements and perversions of facts, that we declined to print it. Mr. Boynton has, however, printed the article elsewhere and it is barely possible that some members of the trade may see it. To those we would say that Mr. Boynton has repeatedly stated in public addresses to the state associations and elsewhere, that before the contract for making plated ware bearing the Guild stamp had been awarded to the Racine Company, the eastern manufacturers of plated ware had been solicited to enter into such an agreement, but had refused to do so, thus ignoring the associations as if they were beneath notice. By these statements Mr. Boynton evidently sought to incite a prejudice against the eastern manufacturers. He gave this as a reason why the contract was given to the Racine Company. On appealing to Mr. Shurley, that person endorsed Mr. Boynton's statement. Knowing this assertion to be untrue, we wrote to the eastern manufacturers, and in our September issue printed replies from thirteen of them, each and all of whom denied that they had been invited to make goods bearing the Guild stamp. This sufficed to expose Mr. Boynton as a person who does not scruple to resort to falsehoods when falsehoods are necessary to serve his ends, and we do not see that Mr. Shurley stands in any better light than Mr. Boynton, as he endorsed that individual's misstatements. Until Mr. Boynton succeeds in demolishing the testimony we produced to prove his mendacity, we shall take no further notice of the scurrilous article he has printed, many of the statements contained therein being, as he well knows, utterly without a foundation in truth. THE CIRCULAR has made its record through many years of persistent fighting to maintain the rights of the retail trade, and we do not believe any right-minded, fair man will be prejudiced against it by anything that can be said by Mr. Boynton. His attempt to pose as a martyr in the eyes of the retail trade is simply ridiculous in the face of the testimony we have produced impeaching his veracity, and which we again reprint as follows:

NEW YORK, Aug. 15th, 1882.

Editor Jewelers' Circular:

We have never had any proposition from, or correspondence with "The Jewelers' Guild," regarding the use of a Guild stamp.

Yours respectfully, GORHAM MFG. CO., EDWD. HOLBROOK, Agt.

ROGERS & BRO., 690 Broadway, New York.

Editor Jewelers' Circular:

We were never asked by anyone to make Guild-stamped goods.

Signed, ROGERS & BRO.

MERIDEN BRITANNIA CO., Meriden, Conn.

Editor Jewelers' Circular:

We have no record of any correspondence regarding Guild-stamped goods.

Signed, MERIDEN BRITANNIA CO.

MERIDEN BRITANNIA CO., 46 East 14th street, New York City.

Editor Jewelers' Circular:

We do not find that we have either received or replied to any communication from the Jewelers' Guild relating to making Guild-stamped goods.

Meriden Britannia Co., Signed, J. MILES.

SIMPSON, HALL, MILLER & CO., Wallingford, Conn., and 36 East 14th street, New York City.

Editor Jewelers' Circular:

We have had no correspondence with any member of the so-called Jewelers' Guild, relative to making Guild-stamped goods for the members of the trade societies. In fact, we have not been approached on the subject by anyone. Signed, SIMPSON, HALL, MILLER & CO.

OFFICE OF THE MIDDLETOWN PLATE CO., Middletown, Conn.

Editor Jewelers' Circular:

Were never applied to by anyone to make Guild-stamped goods. We think there will be no better brand found or made than the

MIDDLETOWN PLATE CO., G. H. HULBERT, Treasurer.

BROWN & BROS., 80 and 82 Chambers street, N. Y.

Editor Jewelers' Circular:

We have had no correspondence with any parties relative to making Guild-stamped goods. Signed, BROWN & BROS.

HOLMES, BOOTH & HAYDENS, 49 Chambers street, N. Y.

Editor Jewelers' Circular:

We have had no correspondence with the U. S. Guild or any of its officers, regarding the manufacture of silver plated flat ware.

Signed, S. H. WILLARD.

OFFICE OF WILCOX SILVER PLATE CO., Meriden, Conn.

Editor Jewelers' Circular:

No application was ever made to us to furnish Guild-stamped goods to members of the Jewelers' Guild. Signed, SAMUEL DODD, Treasurer.

THE DERBY SILVER PLATE CO., Birmingham, Conn.

Editor Jewelers' Circular:

In reply to yours of recent date, we have never received any communication from the so-called Jewelers' Guild; in fact, we have been unable to get any definite information about the association, although our agent in Chicago has repeatedly made inquiries.

DERBY SILVER PLATE CO., Signed, C. A. BURR, Secretary.

OFFICE OF HALL, ELTON & CO., Wallingford, Conn.

Editor Jewelers' Circular:

Don't remember any proposal for us to make Guild-stamped goods.

Signed, R. H. COLES, Treasurer.

ROGERS, SMITH & CO., Meriden, Conn.

Editor Jewelers' Circular:

We have never had any correspondence with the Jewelers' Guild of Chicago on the Guild stamp question. Signed, ROGERS, SMITH & CO.

SILVER-PLATED FLAT WARE ASSOCIATION.

Editor Jewelers' Circular:

At a meeting of the Silver-Plated Flat Ware Association, the question was asked if any Guild folks had applied for goods stamped with the Guild stamp, and no member had ever received any such application.

Signed, G. C. WHITE, JR., Secretary.

OFFICE OF E. G. WEBSTER & BRO., 14 MAIDEN LANE, N. Y.

Editor Jewelers' Circular:

We have had no correspondence on the subject of Guild-stamped goods,

Signed, E. G. WEBSTER & BRO.

The question of the desirability of the Guild stamp as manipulated by Mr. Boynton is entirely outside of the personality of Mr. Boynton and the editor of THE CIRCULAR, and while we are perfectly willing to discuss that question, we do not propose to be drawn into an irrelevant war of words with any individual. Mr. Boynton made certain misrepresentations in a public speech which we felt called upon to refute, and have done so most effectually in the above letters.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

The League was founded for the benefit of the jewelry and kindred trades, and any legitimate means which can be utilized for the accomplishment of its purpose should be adopted by the management; if other sections of different and less amounts of benefit are required, they should be encouraged and introduced in the plans of the League; if the present benefit is larger in amount than many of the artizans in the trade desire, and who would enter sections of less amount of benefit, sections should be formed to meet their requirements. Our interviews with members of the Committee of Eighteen, which is composed of all the present officers and ex-officers, develop these sentiments, and they are creditable to the minds and hearts of the managers.

The Committee of Eighteen have been sitting weekly, and patiently discussing the business which the League delegated to them at the annual meeting. By the resolution authorizing its appointment, the Committee is required to place its conclusions and recommendations before the members about November 1st, and we shall therefore be unable to give their report publicity through our columns until the December number of THE JEWELERS' CIRCULAR.

At the regular monthly meeting of the Executive Committee, held on Friday evening, October 6th, at the rooms of the League, Chairman Kimball presiding, the following candidates, showing satisfactory evidence of their fitness for membership, were accepted:

Albert W. Adcock, Chicago, Ill.; Levi E. Bailey, Cornwall, Ontario, Canada; Richard O. Bolt, St. Louis, Mo.; Frank A. Cady, Charleston, S. C.; Kenneth Chisholm, New York City; Harry A. Crawford, Ferdinand Dilsheimer, Philadelphia, Pa.; Robert M. Dutton, Chester Hill, Ohio; Walter W. Eakins, Philadelphia, Pa.; Laurens Erikson, Chicago, Ill; Chas. W. Fritschler, New York City; Frank C. Goold, Boston, Mass.; Joseph S. Gratz, New York City; Chas. B. Guth, Brookville, Pa.; Alexander R. Harper, Wm. F. Harper, Philadelphia, Pa.; George Henry, Lennoxville, Quebec, Canada; Wm. Hinkley, Newark, N. J.; Walter T. Johnson, Macon, Ga.; John A. Jones, New York City; Robert J. Knott, Brooklyn, N. Y.; Edward B. Lamer, New York City; Chas. S. Lane, Friendship, N. Y.; Paul Laval, Louisville, Ky.; Sigmund L. Lederer, Moses Mehrbach, Robt. O'Brien, New York City; James Roberts, Providence, R. I.; J. A. Scharlin, Portland, Oregon; Louis Manheimer, Indianapolis, Ind.; Wm. E. McDonald, Newark, N. J.; Jacob Morris, Judah M. Morris, Albany, N. Y.; Eugene Naegele, Philadelphia, Pa.; Josiah B. Norris, Chicago, Ill.; Jacob Raubert, Bryan, Ohio; Marshall A. Roe, Chicago, Ill.; Hermann C. Schipper, August Schwab, Newark, N. J.; Jno. V. Sears, Herbert E. White, Springfield, Ill.

A total of 41 members, thus making an aggregate membership of 2161, and *leaving places but for* 339 *new members;* at that meeting seven applications were tabled for investigation and three were rejected; 26 members, who, in consequence of neglect to pay assessments Nos. 16 and 17 within the prescribed limit of thirty days, had been dropped from the roll, were re-instated after satisfactory explanations of their dilatoriness. The Executive Committee, however, desire to caution the members against relying upon the leniency of the Committee in this direction, for a delinquent member, however good may be his excuse, may be required to pass another medical examination, and if below the standard of health, will be refused re-admission. No doubtful construction can be put upon the language of the constitution: "Any member who does not remit the amount of his assessment within thirty days from the date of notice shall forfeit his claim to membership, and have his name stricken from the roll."

Our Canadian friends appear to heed the advice given to them by THE JEWELERS' CIRCULAR in our February number, and we are pleased to record the admission of so many new members from the Dominion; George Henry, of Lennoxville, Quebec, is one of the mile-stones along the roll of membership, his certificate being No. 2,200.

Three requests for change of beneficiaries were granted.

We report the first resignation, that of Jacob Salkey, of Chicago, which was accepted, and he was honorably discharged.

The amount in the Benefit Fund, subject to the next loss, is $3,980.50.

The following letter needs no comment:

LOCKPORT, Sept. 15th, 1882.

WM. L. SEXTON, Sec. Jewelers' League.

Dear Sir:—Your esteemed favor of 14th inst. is at hand, with draft for the amount enclosed as stated. I return to you the receipt signed as requested, and I can assure you that the efforts you have taken in my behalf have been duly appreciated.*

With reference to the League of which you have the honor to be the Secretary, words fail to express my appreciation.

May it continue to ever prosper in its meritorious cause of providing a fund for the families of deceased members, which in many instances cannot fail to cause the recipients to ever sing its praises. My own opinion of its merits will continue to be one of the greatest respect for its methods and gratitude for its benefits, and believe me, with great regard, to be, Yours respectfully,

MORRISON W. EVANS.

The Executive Committee has had under advisement since last February, the question of providing medical examiners for the League in the great business centers other than New York City; a sub-committee, with the assistance of the Secretary, has corresponded with many physicians in the several cities, and the following named have accepted the appointments; their appointments have been confirmed by the Executive Committee, and they will hereafter act as examining surgeons for all applicants for membership who reside in or are engaged in business in the respective cities, the fee in each case being limited, as heretofore, to two dollars. It will be well if the members make a note of this for the information of applicants:

City.	*Name.*	*Address.*
Attleboro, Mass.	Edward Sanford.	Attleboro, Mass.
Boston, Mass.	M. P. Wheeler.	744 Dudley St.
Chicago, Ill.	N. B. Delamater.	125 State St.
"	Gilman Smith.	"
Cleveland, O.	E. W. Robertson.	367 Euclid ave.
Louisville, Ky.	S. H. Garvin.	817 Jefferson St.
Newark, N. J.	R. Staehlin.	333 Washington St.
New Orleans, La.	W. R. Mandeville.	125 Canal St.
North Attleboro, Mass.	Jas. R. Foster.	N. Attleboro, Mass.
Philadelphia, Pa.	B. Trautman.	529 North 4th St.
Pittsburgh, Pa.	S. M. Benham.	Pittsburgh, Pa.
Providence, R. I.	Geo. W Carr.	Providence, R. I.
St. Louis, Mo.	S. H. Frazer.	St. Louis, Mo.

Other surgeons will be appointed from time to time, conformably to the requirements of the League.

There was no assessment ordered at the last meeting of the Executive Committee, thus indicating a healthy membership. No matter how little a man in the jewelry or kindred trades may have been otherwise appreciated, nor how little interest may have heretofore been taken in him or his affairs, let him join the League, and immediately and ever thereafter, every comrade will heartily wish him *well.*

THE DUEBER watch case manufacturing company, of Cincinnati, has issued one of the most elegant catalogues it has ever been our pleasure to see. Simply as illustrating the present condition of the arts of engraving and typography, it is worthy of preservation. The cover is a gem of beauty, representing a number of youths who have converted Dueber cases into bicycles, and are executing various evolutions thereon *à la* the bicycle clubs, while their unfortunate rivals come to grief in various manners. An illuminated border surrounds the illustration, while a deep marginal border in gold and

* Secretary Sexton modestly erased this sentence, written in appreciation of his assistance, in the letter before us, but we give it as written.

brown lends additional attractiveness to the first page. On the back cover page is a beautiful bronze statue, with the same marginal border. The work is made up of artistically executed cuts of Dueber cases, illustrating some of their numerous styles of cases, and letter press descriptions of the same. The cuts are elaborate and beautiful specimens of the engraver's art, in which all the details of the finely executed engraving that distinguishes the Dueber case is truthfully brought out. Some of these wood cuts are nearly equal to steel plate engravings in the fineness of their execution. The letter press occupies the left hand pages, facing the cuts, the typography of each page being in an entirely different style from any of its fellows, each being unique and elegant in its arrangement. The work is the result of the artistic taste and labors of Mr. Moore, manager of the Dueber company, and reflects great credit upon his judgment as well as the company he represents. Nothing more elaborate or artistic has been issued to the trade heretofore.

Celebrated Horologists.

EMPEROR CHARLES V. AND TORRIANO.

WHEN THE student reads that the most puissant of monarchs, such as was Charles V., in the 16th century, turns aside from the highway of life, to journey toward the secluded cell of a hermit, he might imagine that in place of dealing with a sober fact of history, he is perusing some entertaining novel. It appears to be improbable that a ruler who was the possessor of so many crowns, would ever condescend to knock for admittance on the door of a monastery deeply buried within the solitudes of a forest, that he would exchange an empire which expands beyond the breath of the ocean, from one hemisphere to the other, and in which the sun never set, for the narrow friar's cell. By examining history, we will find several such instances, unnecessary to enumerate here, nevertheless, the romantic ending of such a brilliant career will always be highly interesting, and that of Charles's omnipotence and abdication is especially fraught with a peculiar interest. It becomes the more so to the watchmaker, since, from love of mechanical arts, he pursued the noble study of horology.

During his imperial career, he felt great pleasure in the mechanical arts, and the possession of watches; he loved to examine, study, and improve them. When, after his meal, he sat longer than ordinarily at the wine table, several of the so-called "Hele's eggs," which were constructed already of a size to be worn in the pocket, laid on the table, around the bottle, and attentively he noted the progress of these little mechanisms, that audibly proclaimed how much of life had elapsed between two given limits. It was to him like an animation of the cold iron, and such a watch movement was well calculated to transport the thinking mind into a deep study. If it was possible to perform such wonder with metal, and to endow this lifeless element with motion, according to man's disposition, and to suit his purposes, was it not possible also to regulate the human mind according to the will and disposition of a ruler? Such thoughts must have occupied his mind when he was Emperor and beheld the schisms and dissensions, both religious and political, which he, alas, with all his pomp and glory, was unable to check.

This fondness for watches being known, the young monarch was presented at his coronation at Bologna with an old time-piece, constructed in the year 1402, by a watchmaker Zeladin. The movement had become damaged in course of time, but the value consisted in its construction, executed with consummate ability, and which Charles well knew how to estimate. The present gave him great joy, and he at once desired to have the damaged parts restored. A skilful artisan was required for this, many of which existed at that time in Italy. A young man by the name of Giovanni, or as he loved to call himself, Juanelo Torriano, a mechanician from Cremona, was requested by the Emperor to repair the costly work. This must have required much time, during which the Emperor grew very fond of Torriano, retaining him in his court, and passing days and nights in his workshop, both occupying their time in constructing mechanical pieces of all kinds.

A watchmaker, therefore, was a person of note in the court of Charles V., an officer living in close proximity to and daily intercourse with the august personage, and in whose society the ruler, heedless of the action of the outside world, forgot all the cares and vexations of his stormy government. After having formed the resolution of bidding farewell to the strife and turmoil of active life, he dismissed all his attendants, retaining only Torriano, who had become aged in his services, as a companion to while away the tedious hours by constructing clocks.

The resolution of abdicating was not the result of a sudden whim, but had been entertained for years. He had arranged with his wife Isabella, who died in 1538, that as soon as political circumstances and the age of their children should permit, both would withdraw into monastic seclusion. The plan was carried into effect Feb. 3, 1547, when the burden of a very stormy reign, full of worry and disappointment, united to corporeal inability, prompted the act. His faithful Juanelo went with him. Together they planned that, when in the privacy of their seclusion, they would pursue the study of the wonders of mechanics.

He retired to the monastery of St. Yuste, in Spain, where he had caused special apartments to be built for himself; here he lived adjoining the workshop of Torriano. Devotional exercises, recreations, and mundane business occupied his days; the afternoon services were to him of special importance, and if the hermit was prevented either by sickness or urgent bnsiness, he invariably sent his regrets to the friar.

To the recreations belonged, beside a good table, the pursuit of music, the culture of flowers, hunting and mechanical works. The powerless Emperor had been miserable as ruler, but was happy as watchmaker. Barely a day passed that he did not at least pass an hour with Torriano, and inspected his work, frequently went to work himself to repair some movement, or to regulate or experiment with others.

Torriano had worked for years on a large piece of mechanism planned by the Emperor, which the latter superintended with all the anxious care and thorough knowledge of a master. It was to be a complicated astronomical time-piece, not alone calculated to simply record the flight of time, but also to show the date, month, year, etc., also the motions of the heavenly bodies. This artistic piece of work was to contain 1800 bronze wheels, and Charles prosecuted the work with all the ardor of passion. He caused to be set in motion whatever part was ready, and assisted in finishing the pieces. When Emperor, he had after all been only a man, but as watchmaker, he deemed himself to be a creator.

The great proclivity of that age was to manufacture automatic figures, and Torriano was a master in planning and manufacturing them, in which also Charles took great delight. Both made an automatic gristmill; next a female figure, dancing to the sound of a tambourine; mounted men, fighting and blowing the bugle, with horses prancing and rearing up on their hind feet; birds, although they did not sing, yet flew around the room as if alive, and other pieces. Of course the monks, who waited on their illustrious *Cofrater*, beheld all these marvels, and accredited them to the inspirations of the Evil One. The pious friar was duly informed of all these doings, and of the productions of these specimens of the black art; Torriano was held to be a wizard who was desecrating the holy interior of the monastery, and the Prior lost no time in communicating his suspicions to Charles; such suspicions were very dangerous at that time under the reign of the fanatical Philipp of Spain and cruel Alba; the Emperor partly allayed his fears by showing him the mechanisms of the figures, and the pious man made the sign of the cross between himself and these emanations from the Common Enemy, and regarded them with mute astonishment. His fears were apparently quieted, the orthodoxy of these wonders being vouched for by the Emperor himself, but the good man never could entirely divest himself of the opinion that the devil was not mixed up more or less with the contrivances, and he ever afterwards gave Torriano a wide birth.

It has been mentioned that Charles had watches lying around his table, and he carried this habit to St. Yuste, where both he and Torriano vainly strove to establish a uniform rate among them. Vain endeavor. Every watch after it had been set in motion, appeared to have a will of its own, independent of that which gave it life, and it showed sooner or later that it measured time in a manner different from others around it, although being its equal in all other respects. They frequently manufactured two trains of the same metal, of the same construction, proportions of size and weight, making them as much alike as possible, even down to the most insignificant pins—and yet, the clocks would materially differ. One was always a little more hasty in devoting the lapse of time than the other, no matter how great had been the care and art of the constructors. If it did not accelerate, it retarded. We can easily imagine what serious conversations they must have had on the subject, and how these failures stimulated them to new exertions, to end as pitiably as the former ones. Bitter must have been the lesson of their disappointment. No watchmaker up to date has yet produced two clocks that preserved uniform rates for a length of time, and what is impossible with the perfected tools of our age, was certainly none the less possible with the crude ones of that of Charles.

The philosophical deductions to be drawn from these fruitless experiments, were not lost upon Charles. Thoughtfully standing before the clocks, so similar to each other in construction, so dissimilar in inclination, he was compelled to acknowledge that he had committed a folly in wasting so much time, money, and blood, with the intention of forcing the whole christian world to think alike in matters of faith. Did not these clocks, the very creations of his hands, teach him the highest lessons of morality—those of religious tolerance and charity! Was not the clock a warning voice to civilized humanity, to formulate the same conclusions with him, Charles V., the mightiest representative and expression of the age? And, perhaps, the ages succeeding him recognized the truth and profitted by the lesson, because commensurate with the improvement of the clock, have kept pace the two most sublime virtues of mankind, tolerance and fellow-love.

And yet, strangest of all, Charles derived no benefit from these wise deductions. When in the plenitude of his power, he held the Pope imprisoned, and prayed in all the churches of his vast domain for the safe deliverance of the spiritual head from bondage; when he promised safe conduct to that "barefooted friar from Eisleben," and dared to do these things, and when in 1528, he stood at Luther's burial place in the church of Wittenberg, he was importuned to have that arch heretic disinterred and burned, he replied, "I do not wage war with the dead, but with the living," he asserted his dignity of manhood; but it was otherwise at St. Yuste. He repented of all these audacious deeds. How is man so full of inexplicable changes and contradictions? Incapable of regulating his own interior clock; sometimes it accelerates, at others it retards.

To return to our clock-maker. The Emperor suffered for years with dyspepsia and rheumatism, and he was finally unable to work on his beloved movements. When he found his end drawing nigh, he woefully gazed upon them, and said to his confidant of many years:

"Juanelo, my clock will soon be run down, and nobody is able to wind it again. All these timepieces will survive me; but when the hand of mine shall point to 'accomplished,' let them all stand. They shall strike the hour to no one after me."

And the hand of his timepiece pointed to "accomplished" soon after. He made arrangements with his father confessor to witness his own burial while yet alive. The ceremony was performed, the high altar, the catafalque in the middle church, and all its aisles were brilliantly illuminated. All the friars were engaged in the services at the altars and choirs, and the servants of the Emperor in deepest mourning.

During the ceremony for the dead, and while the soul-aweing *Miserere* was being sung, Charles stepped from the background to the high altar, delivering a candle to the priest, as a token that he desired to surrender in like manner his soul to his Divine Creator. High above the kneeling mourners, above the catafalque adorned with the insignias of death, above the incense that wafted through space, was suspended the same thought of death, embodied by the brush of Titian; above the high altar hung the picture of Charles V., as he knocks beseechingly at the portals of the celestial mansion, prepared for the blessed.

From this day forward, he began to be seriously sick, and on September 21, 1558, his heart ceased to beat.

Torriano, obeying the last wishes of his illustrious master, caused all the clocks to stand both had constructed together, and there was also mourning in the workshop for the death of their maker.

How to Preserve the Health of Workmen.

A CORRESPONDENT in the *Allg. Journ. d. Uhrm.* debates the important question: What can we watchmakers do to prolong our life equal to that of the average of mankind? And draws many very practical conclusions from the early death of watchmakers and jewelers. He says: It is not possible for us to always choose our calling, corresponding to the demands of sanitary requirements; for instance, we cannot be all hunters or fishermen, but many of us will be forced to adopt more or less the life of an exotic. But we should endeavor, at least, to procure artificially that exercise by which said hunters and fishermen are naturally preserved strong and hearty. It is in the power of everyone to preserve and improve his health, whereby we are rendered at once better fitted for our calling.

The chief complaints, or, if I am allowed to call them so, the watchmakers' complaints, are, headache, cold feet, difficulties of digestion, piles and lung complaints, and all solely arise from the sedentary mode of living, from the insufficiently aired rooms, the air of which is wanting in oxygen, and unfit for being breathed, partly in consequence of being mixed with dust and gases, owing to heating and illumination. To this is to be added the constant study and constant mental occupation with the many trifles, the motion within contracted limits with painful exactness, all of which assists in driving the last iota of humor out of the watchmaker, and incline him to hypochondria and disease.

But, the reader will ask, in what manner can we protect ourselves against these complaints inherent to our vocation? This can be done without much cost, by a little study of the question and a small amount of self-assertion, by following the following advice:

Before all, stop being seated while at work; if you cannot stand all the time, whereby both breast and stomach can have free movement, at least try to counteract the baneful effects by taking a walk before, during, or after working time. An old doctor once said, "Everything would go better if you would walk more." Seek recreation, according to capacity or inclination; try to obtain bodily motion in some shape or other—as turner, as fireman, be a member of a singing club, play wind instruments, and, above all, cease thinking that you may find it in a barroom.

If you devote as much time as possible to walking, not heeding wind or weather, not too warmly dressed, so as to check respiration, breathing long and deep during the exercise, you may be certain of bringing a clear head and warm feet home with you, and an augmented coursing of the blood in general. At least one hour per day should be devoted to this exercise. If it should be the misfortune of someone to be tied during the entire day to the shop or store, he might at least manage to take some exercise in the morning, in order to breathe in fresh vigor for the day. The beginning may be a little hard, yet after a week's continuance of the custom, you will be unable to abandon it again.

While, therefore, this bodily movement is to take place in air as much free from dust as possible, do not neglect to introduce air of a full percentage of oxygen into your working room, by frequent airing, and carefully prevent all dust, smoke, chalk dust, etc., therein (the finer the dust, the more pernicious it is).

Of especial benefit during walking is the deep breathing and retaining the breath. Many a weak-breasted, coughing patient, suffering with ailments of the lungs, has cured himself by exercising deep and regular breathing at the opened window (better yet is the open air), continuing it regularly morning, noon and night, while people and physicians gave him up as an incurable consumptive.

I add the recipe for the benefit of the reader to whom the expression "retention of the breath" is unknown. Place yourself before the open window, raise the arms up high, to free the lung extremities from the weight of the shoulders, and, quietly and deep, draw in as much air as the chest is capable of holding. Now try to retain this air as long as possible within the lungs, before breathing it out again, and perform this latter operation with as much regularity as possible. At first you may succeed in keeping it in only for a few seconds, but finally, with daily practice, you will extend it to 40 seconds.

That the watchmaker also sins against himself by incorrect eating and drinking, is a matter of no wonder, because food wholesome for a blacksmith will kill a tailor. As a matter of course, avoid all heavily digestible food, and more especially strong spirituous liquors. Judicious washings, (better yet bathing) of the body, several times a week, contribute to keep the pores of the skin open, and effect, in union with moderately warm, but not heavy clothing, the necessary exhalation.

The writer can assure the reader of the veracity of these rules by he having adhered to them himself, whereby he effectually cured himself of indigestion, headache, etc., with which he suffered acutely soon after having completed his apprenticeship, and the watchmaker who will observe these rules will prolong and beautify his life, and look at it from the cheerful, rosy side. I therefore say, away with the doctor, the druggist, hypochondria and suffering.[—J. JACOBSEN.

The Jewelry Caskets of Handsome Parisiennes.

[BY E. SCHRIEBER, SUNDAY EDITION OF THE *N. Y. Staats Zeitung*.]

THE LOVE for the lustrous and glittering, by the aid of which Mephisto conquered even the heart of Gretchen, is an heirloom of femininity that has been transmitted from generation to generation. Deep within the womb of the earth repose the colors the eye beholds in the beautiful rainbow. The ruby, emerald, topaz, sapphire and amethyst unite the color scale, which a single pencil of light produces in both the diamond and drop of water, while the opal represents the glories of the Milky Way. He who dares to make a journey upon the racer of memory into the so-called "good old times," will encounter everywhere the spirits of splendor and luxury upon his path. And they exclaim in tones and laughter of mockery: "We are as old as the earth! Fool, thou who opinest that we have not governed perpetually!" The portals of the past open thunderingly, and in nebulous pictures the past and the present defile before his eyes.

Gallic women play with their treasures. Truly, their jewelry caskets harbor rich contents. Cut stones, necklaces, bracelets, fans, amber balls in gold setting, diadems for princesses, all sorts of pins with jewels, and—*honi soit qui mal y pense*—jeweled garters, diamonds, pearls, emeralds, sapphires and amethysts were the general assortment of jewels. The waist belt glitters with gold and gems; its weight proclaims the strength of the generation. Judith, the wife of Louis the Pious, wore a belt weighing three pounds.

Old chronicles speak of Luitgarde, whose long veil, sown over with jewels, was retained upon the head by a diadem in which a precious beryl glittered, to whom its fair wearer ascribed magic influences. Rotonde, whose wondrous beauty was known in all lands, and sung by poets in all tongues, closed her cloak with buttons of jewels; Bertha confined her wayward locks with a golden hair net, and adorned herself with crysoliths. Theotrade preferred pearls to all other gems. The handsome daughters of Charlemagne were merry women, in whose lives madcap adventures were not wanting, and whose blood rolled hot within their veins. The Emperor's Court, sung by bards and described by chroniclers, had no scribe who could rival Brantome, and we have, therefore, little reliable knowledge, especially as Reginald, as son-in-law of the Emperor, can hardly be deemed impartial. But among the noble dames we notice several, with veil closely drawn around the head, and whose cloaks are wanting in gems. They are widows, who, according to the manners of the time, were forbidden from wearing ornaments, and could only dress in two colors—black and white. The mourning colors of the French queens, as late as under Charles IX., were white. Mary Stuart mourned in white for her husband. Only Catharine de Medicis assumed black as the color of deep mourning, and, after the death of Henry II., wore no other.

Already in the twelfth century, dresses were resplendent with rubies and sapphires. The crusaders brought precious toys of genuine pearls and gold threads, from the Orient. The burg-dames, who ornamented therewith their cloaks, essayed to imitate them, and their white taper fingers manufactured masterpieces of gold and pearl lace, the production of which has lately been revived. St. Louis declared in vain against the lavishness of the times. In 1301, the spouse of Philipp the Handsome exclaimed in anger, when she saw the multitude of superbly dressed women, "I believed to be the queen, but I see hundreds." Industry manufactured dresses of gold and silver pearls in the fourteenth century, the surpassing splendor of which, to be seen in preserved specimens, is a cause of marvel to us at this day.

The rosaries of the ladies were of an incredible value. Each one possessed several, exquisitely carved from ivory, or gold beads, and strings of costly jewels. The *luxus* of golden belts had augmented in such a manner that their wearing was forbidden by law in 1420. To prevent fraud, also, the sale of imitated jewels was forbidden. Enamel was introduced into France from the Orient, and at once met with universal success, as something new. Also gold insects, all kinds of animals, monograms, etc., were worn. Every man or woman wore an amulet. Several jewels were said to possess wonderful virtues. A ruby protected the knight against death, and preserved him faithful to his distant beloved ones. The sapphire protected the health and faith of the wife, and only clouded if some danger threatened her. This superstition in jewels and amulets was the natural consequence of a period, when, at times, years of absence separated the lovers, without any tidings from each other meanwhile. They naturally sought the intervention of visible signs. With Isabella of Bavaria commenced a period of splendor for France, unknown to it, notwithstanding all its previous lavishness. It is strange that a German princess opened the doors for the most reckless luxury in France. Gold brocades were manufactured, the yard of which cost from 1,000 to 1,800 francs. Isabella's treasure of jewels was immense. Only one woman could rival her—Agnes Sorel. Isabella and Agnes invented the dresses by which almost the entire bosom was unbared; but they encircled their throats with necklaces formed of many strands of pearls and jewels. Diamonds were universally worn, but pearls were very precious, and could almost not be had. Mary Stuart wore a blue velvet robe on the day of her marriage, which was covered with jewels of an immense value. Her crown alone was worth about 1,800,000 francs. The terrible, handsome Catharine of Medicis loved jewels, but she kept them mostly locked up in her strong box, and, compared to the superbly beautiful Diana of Poitiers, who loved ornaments and dresses, Catharine often appeared earnest and tired out. She needed gold to pay alchemists; she needed gold, to throw it into the lap of astrologers, to read the futurity of her house. The two brothers Rugieri grasped for the jewels, by the assistance of which they pretended to be able only to read the constellations, and to change them into others. In order to find out whether Elizabeth of Austria would be happy with Charles IX., they sought to alter topazes into amethysts.

Let us throw a glance at the bewitchingly handsome and spirituelle Margharetta de Valois, the queen of toilet. She wore almost only gold and silver dresses—a genuine princess from the book of fables. Her crowns and diadems glittered in all colors. A string of jewels hung suspended from her belt down to the hem of her dress.

A glitter and sparkle emanated from Gabrielle d'Estrelles, the beautiful mistress of Henry IV., as if she were enveloped in a dress of flames. The front of her dress was sown over with precious stones. Marie de Medicis wore on the day of baptism of Louis XIII., a dress that was ornamented with 32,000 pearls and 3,000 diamonds. Her jewelry box contained the most varied articles of precious stones. If history has only preserved to us the names of the most noble ladies, it tells at the same time that the women of lesser nobles and citizens were given to the same lavish expenditure, and frequently went beyond their means. The honor of the woman becomes purchasable for gold and ornament, and the specter of that revolution is approaching, that threw diadems and crowns into the dust and broke them. But no one yet noticed the specter, which kept itself occult.

In the marriage contracts of that time, together with the dower, was mentioned the sum for jewelry, which bride and bridegroom received. These sums were always large. Charlotte of the Palatinate, the original spouse of the Duke of Orleans, relates that she received $100,000 of precious stones, which she, not being a lover of jewelry, principally presented to her husband, who was very fond of them, and had a large collection of all kinds of diamonds.

The Tuning-Fork in Horology.

A TUNING-FORK is an instrument familiar to everyone, and we therefore deem a description unnecessary.

The art of horology has for its theme the measurement of time, and when we consider the perfection of astronomical clocks, clocks for civil use, and watches of present construction, we are almost tempted to exclaim that horology has fulfilled its destiny, and nothing further than the correcting and repairing of timepieces remains for the horologist of the present day. This is not so, however, quite an important field remains to be cultivated yet—the measurement of the fraction of a second.

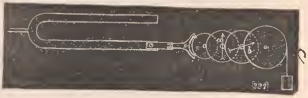
A number of timers and chronographs have been constructed for this purpose, with escapements making ten or more beats per second; but these instruments have for periods of several consecutive hours not rendered the services expected of them, and there are absolutely no means of testing their regularity, and philosophers are mostly compelled to seek other means for measuring time, when engaged, for instance, with Fizeau's method for ascertaining the velocity of light, or Foucault's comparison of this velocity in air and water.

We may be able at some future day, to explain the ingenious methods employed by philosophers for recording the lapse of time. At present, however, we will confine our remarks to the method of counting the vibrations of sounding bodies—the only one of the kind. It may be ascertained from philosophical works how Duhamel made it possible to count the vibrations of metallic rods, by using as time unit for comparison the vibrations of a well pitched tuning-fork.

The apparatus is composed of a tuning-fork, making, for instance, 1,000 vibrations per second, and of a cylinder upon which these vibrations of the tuning-fork are recorded, as we will explain directly. A sheet of paper, coated with lamp black, by having been held over a burning light, is wrapped around the cylinder, the pivots of which are provided with screw-threads, revolving within bridges containing the same cut of thread—therefore performing the functions of screw nuts, whereby every point of the cylinder moves in the shape of a screw-line around its axis. A small piece of a spring is fastened to one extremity of the tuning-fork, ending in a point and discharging the functions of a pencil, this point being capable of slightly tapping upon the cylinder. If, now, the fork is set into vibrating and the cylinder into revolutions, this marking point will make a white screw line consisting entirely of small dots. If a wire or a violin string, also furnished with a marking point, records its vibrations at the same time with those of the fork, the instrument may be arrested after it has been active for one or two minutes, and the duration of the string's vibrations may be estimated in thousandths of seconds, by comparing with the record of the fork. This so-called graphic method may be used for other occurrences, for instance, the effect of artillery, etc. The greatest inconvenience is, that the duration of the experiment is confined to two or three minutes, the vibrations of the fork decreasing, and the screw line upon the cylinder becomes finally blurred and at last illegible.

A celebrated naturalist, Lissajous, has indicated a very ingenious method for prolonging indefinitely the fork's vibrations. Highly interesting as it is, we cannot enter into explanations. It will be found described at length in his own writings. Simple as it is in principle, it is nevertheless too complicated to be applied practically. Starting from this view, we have sought to obtain this prolongation by a watch movement, in other words, we have sought to substitute this force by the pendulum and balance spring. The apparatus, as constructed by us, is constructed like a common watch, of two parts: the train, and an apparatus making isochronal vibrations (the tuning-fork), which receives assistance by means of an escapement. The fork regulates the motion of the train, and the latter imparts it a small impulse at each oscillation, sufficient to cause it to prolong its vibration; beside this, the train is charged with the functions of a counter, by means of indexes placed upon the wheel pivots, revolving above dial plates.

Accompanying figure will elucidate the construction of this instrument. In the model represented by this sketch, index *a* makes one revolution per second, index *b*, one in 10 seconds.



It would appear to be impossible to construct an escapement making 100 or 200 vibrations per second, yet they have been made, without meeting with great difficulties. The tuning-fork used here makes 100 single (50 double) vibrations per second. We have tried others making 200 single ones, and also such an apparatus works without any disturbance whatever, and we deem it certain, that still higher sounding ones, therefore, still quicker vibrating ones, may be made, and be combined suitably with the instrument.

Every watchmaker knows that a clock may be made to go faster or slower by moving the pendulum bob up or down, the same principle is used with the tuning-fork to make it go faster or slower, and to cause its vibrations to be, for instance, one hundred per second. This instrument is a chronoscope, which measures the smallest fractions of a second in exactly the same manner as the clocks record the escape of a half or whole second.

To set it in motion, it is necessary to impart it a trifling blow, either with the finger or some other manipulation. Another analogy with common clocks will be observed: Every clock or chronometer is set in motion by the first impulse the pendulum or balance receives. It will be easily seen how this chronoscopic method can be combined with the graphic; it is sufficient that the train of the instrument imparts motion to a cylinder, upon which the free arm of the regulating tuning-fork records its vibrations. The apparatus complete is a chronograph that may render excellent services by many physical and astronomical experiments. The present one solves the problem of an uninterrupted motion of the dial hands. This instrument finally permits the observation and timing of two bodies in rapid motion, a very desirable property to be used for timing electric telegraph, etc. Such an observation could until now only be taken with much difficulty, and in a very complicated manner.

Working in Precious Stones.

THE PRINCIPAL precious stones used in watches, chronometers and regulator clocks, in their order of hardness, are: diamond, ruby, sapphire, chrysolite.

A watchmaker, although he may not have had any previous experience of jewels, can easily ascertain their relative hardness by rubbing one against the other. The softer will be scratched by those that are harder, and the stones that can be marked by a file may be thrown aside as useless.

Diamond.—We shall make a very brief reference to this stone, as it is not used except for the end-stones for balances of chronometers and high-class watches.

Splinters of diamond are employed for drilling materials of a less degree of hardness, and fragments fixed at the end of a rod are used for turning very hard steel; diamond dust is the principal material used for working precious stones, polishing, etc.

Ruby.—This jewel, of a rich velvety red color, exists in three principal varieties: oriental, spinel and balas rubies, which differ as regards their chemical composition.

From a jeweler's point of view, the value of a ruby is enhanced by its rich color and transparency; but this is not the case in regard to its applications in horology, for which hardness and capability of taking a high polish are mainly necessary.

The specific gravity of the three varieties are: oriental, 4.2; spinel, 3.7; balas, 3.6.

The first of these is the best, since it is the hardest, both taking a better polish in the first instance, and retaining it for a longer period.

In comparison with the other varieties its specific gravity is greater and it possesses a brighter color, but will often be found to be less transparent.

Spinel and balas rubies are frequently met with that are very beautiful to the eye, but their hardness is inferior to that of the sapphire and even of the chrysolite. They must be carefully excluded from all good work, for, either in consequence of the inferior hardness, or of the mode in which the oxide of iron, magnesia, etc., is combined, or of other causes, oil rapidly deteriorates in contact with them, and the moving parts, especially if they are of steel, soon show signs of wear. The rubies themselves also suffer, and it is by no means uncommon, especially in the case of the duplex escapement, to meet with such jewels quite rough and even pitted on their acting surfaces.

False Ruby.—In a certain class of watches, a variety of stones pass for rubies that are known to jewelers as rubicelle, rubace, rock ruby, Brazil, Siberian or Bohemian ruby, rose ruby, etc., the hardness of which is even less than that of rock crystal. Pivot holes made of these imitations of the real ruby are worth less than plain brass settings.

Sapphire.—The color of this stone, sometimes even milky, passes through all the shades of blue. Like the ruby, there are several varieties that differ appreciably in regard to hardness. The hardness of oriental sapphire is equal to that of oriental ruby; both consist of nearly pure alumina, colored by a little oxide of iron; their chemical composition thus being the same, they only differ in regard to color. It is, then, a great mistake on the part of watchmakers to prefer spinel or balas rubies in place of oriental sapphires.

The sapphire is more brittle than the ruby.

The other kinds of sapphire, such as water sapphires, are not true sapphires; they are soft and should never be used in horology. The density of the oriental sapphire is about 4.01, whereas that of other kinds is only 2.58.

Chrysolite.—Under this name lapidaries include a variety of stones of yellow-green, apple-green with shades of yellow, and other colors.

That known as oriental chrysolite, which is the same as the oriental topaz, has a beautiful pale yellow color with shades of apple green; it is the most highly esteemed. This stone has a sufficiently high degree of hardness for use in watchmaking, as it will scratch rock crystal. Its density varies from 3 73 to 3.00.

The other varieties, ordinary chrysolites, come very low in the scale of hardness. They can be scratched by quartz, rock crystal, and even by the file, and are thus of no use for watches.

The methods adopted for working in the precious stones are in great part kept secret by those who practice them; it is, however, well known to watchmakers that jewels are usually worked and polished with powdered diamond, and the following details will afford all the information necessary to enable the reader to make a jewel of any required form. Where not otherwise stated, the information is taken from a work published by N. Dumontier.*

Tools for Working Jewels.—These are all of simple construction, and can be made by any watchmaker, if, indeed, he has not them already to hand.

1. A small lathe arranged to receive chucks, fixed to the bench or in a vise, and driven by a foot-wheel.
2. Two circular laps of copper and one of tin about 2 inches in diameter and ⅛ inch thick; these present a flat face for grinding, smoothing and polishing the stones, and are adapted to the nose of the lathe.
3. A small barrel (that also screws into the nose of the lathe) with six brass covers perforated at the center, on which to cement the jewel holes, when enlarging, smoothing and polishing their holes.
4. A flat steel circular cutter half an inch in diameter, for slitting stones. Also two similar discs, one of copper and the other of tin, of the same size, and having sharp edges, are occasionally useful.
5. Two small laps, one of copper and one of tin, to smooth and polish cylindrical stones. These laps are mounted in place of the T-rest, or in the slide-rest, in such a manner that they can be rotated in a horizontal plane by a bow.
6. Two chucks adapted to the lathe, on which to cement the jewels for drilling, turning and polishing.
7. A number of small broaches, spindles with concave and convex ends, etc., for smoothing and polishing jewel holes, convex and concave surfaces.

Selection of stones.—This is of the first importance. By the aid of a powerful lens or a microscope ascertain that they contain no cracks, air cavities or black specks; avoid stones that are milky, preferring such as are marbled, and in which the directions of crystallization seem to cross one another, as they are the hardest. The hardness may be tested by trying them one against the other, but an experienced workman needs only to note the amount of resistance it offers to the operation of cutting on the lap. The density also affords a valuable means of determining the nature of stones.

To find the axis of crystallization of a stone.—It is well known that jewels differ from glass in that they form crystals of certain definite forms; they are therefore termed "crystalline," whereas glass is "vitreous." If a jewel hole is drilled in any direction other than the axis round which the crystal may be assumed to have been formed, there will be difficulty experienced in the drilling and polishing; the edges of the hole will become rough during the act of rounding them off, and the hardness will appear to be irregular. This point seems, however, to be ignored by the majority of jewel hole makers, although the determination of the most suitable direction presents no difficulty.

Obtain, from any optician, two tourmaline plates cut parallel to their axes of crystallization and with their faces polished. Mount them in a light frame parallel to each other, so that each can rotate independently of the other round the axis through their centers; it is convenient if a light spring tends to bring the plates together so that a stone can be held when placed between them. Or such an arrangement can be bought ready made at most opticians; it is known as a tourmaline polariscope. If this instrument be held up between the eye and a light, and one plate be rotated while the other remains stationary, it will be seen that the light becomes gradually greater or less according to the direction of rotation; and fur-

* *L'art de travailler les Pierres précieuses à l'usage de l'Horlogerie et de l'Optique.* Paris. 1843.

ther, if the plates be good ones, a point will exist at which there is nearly total darkness.

To examine a stone, cut and polish on it two parallel faces approximately at right angles to the axis of crystallization; this can generally be roughly guessed at by inspection. Place it between the plates (when set at their darkest position), and not only will the light be in part restored, but beautiful colored rings will be formed. If they are circular the faces of the stone are at right angles to its axis; if not, incline it till the rings become so, and the axis will then coincide with that of the instrument. In case the rings are not observed at all, the stone must again be cut at right angles to the original direction, and the experiment repeated. If they still do not appear, the stone is unsuitable for drilling, but may be used for pallets, locking stones, ruby pins, etc.

The stones to be examined in this manner must be larger than those commonly met with, and if cylindrical rubies can be obtained they are to be preferred, as it is then only necessary to slice them across their axes.

It should, perhaps, be observed that these precautions can only be taken in making jewel holes for the higher class of clocks, chronometers and watches. The cheaper class must of necessity be cut in such a manner as their figure may suggest.

Making jewel holes.—Having selected twenty or thirty stones of about the same height, cement them to a smooth brass or copper plate, heated to melt the cement. Hold this plate in contact with a revolving copper lap, in which the coarser quality of diamond powder has been imbedded by means of a hard steel block; the lap is moistened with water.

When one side of the stones is true, soften the cement, and, after washing, place them in a vessel containing spirits of wine heated by a lamp. After doing the same to the plate, again cement the stones to it with the trued sides downwards, and grind the other faces until the desired thickness is arrived at. Clean the stones and smooth them on the brass lap charged in a similar manner with a finer quality of powder.

The stones are now ready for drilling. This may be done with diamond powder or with the diamond drill, both of which methods will be explained.

To drill with powder.—In drilling with powder the stone is fixed with sealing wax or shellac on a carrier that is adapted to the tool holder of the slide rest, this carrier being provided with a vertical slide, so that by the screws in three directions the stone can be accurately centered; it is, moreover, so arranged that the stone can be advanced to or from the drill by pressing with the finger axially. Drill a small hole in the center of the chuck, and, after fixing a piece of steel in it that has been hardened and tempered to a grayish color, turn a point on it about twice the length of a pivot, to serve as a drill. This point must be slightly thinned backwards, to prevent it from choking in the hole, and its end should be flat so as to retain the powder.

When the stone is exactly centered, place No. 2 diamond powder on the end of the drill, and press the stone gently against it, constantly releasing it from the drill for an instant at a time. The hole will be perforated in from eight to fifteen minutes, according to its depth, during which interval the powder should be renewed two or three times. Remove the stone and fix it on the barrel-chuck cover so as to turn true in the lathe; then turn out the oil cup with a diamond graver of suitable form. See again that the stone is central, and re-center it if this be found necessary.

To use the diamond drill.—Having centered the stone on the chuck, as explained in the preceding paragraph, set it in rotation and bring a sharp-pointed diamond graver against its center, pressing lightly and resting the handle on the T-rest; a minute central mark is thus made in the stone for maintaining the drill axial. Selecting a diamond drill of convenient diameter, moisten it in the mouth and present it to the mark, applying a gentle pressure, the amount of which can only be ascertained by practice. It is to be observed that a number of stones should, if possible, be drilled at the same time, for the hand is apt to lose the requisite knack if only one or two are perforated at a time.

Smoothing and polishing.—When the hole is made through, remove the stone and invert it on the chuck. The diameter being less than that ultimately required, pass a brass broach charged with No. 3 powder through the hole, giving it a gentle axial motion while the stone revolves, and taking care to avoid pushing it so far forward as to lock in the stone, and holding it very lightly between finger and thumb. When sufficiently smooth, clean with rotten wood or soft bread, and treat it in a similar manner with a copper broach and No. 4 powder. Then again clean and use a tin broach and powder No. 5. Next, taking a small bone cone, smooth the angles of the holes; then use a copper wire with rounded end for smoothing the oil-cup (with powder No. 3); follow as explained for the hole, with the finer degrees. Using a finely pointed pegwood that passes through the hole, *marry* or round off the internal angle between hole and oil-cup (the powder that remains in the hole being sufficient for this purpose) and do the same to the outer circumference of the cup with a copper spindle of somewhat larger diameter.

Round off external angles with a diamond graver, followed by a copper polisher, the end of which is cup-shaped. The flat face of the stone is polished with a small copper disc and No. 4 powder, pressing it lightly with the finger at the same time that a circular movement is given to it; finish with No. 5 powder. Or the stone may be detached and the flat face polished by working on a ground glass plate, a pegwood point being passed into the hole to form a handle.

Re-set the stone, inverting it on the chuck, centering it as before explained. The other side is then polished in the same manner, using such tools as its form may require.

Having thus completed the stone, examine it carefully with a powerful glass, to ascertain that the hole is highly polished and the angles rounded off, etc. It is then ready for setting.

Setting jewel holes.—Whether it be a plate, cock or bouchon in which the stone is to be set, the piece must always be cemented to a chuck and the hole accurately centered. Turn it out to a depth corresponding to the thickness of stone, and make a circular groove round the hole thus made with a round-pointed graver, only leaving a very thin fillet of metal on the inside. The stone should fit easily in the hole, but without play, and should pass in to such a depth that its surface is slightly below that of the plate, etc., when there is an end stone; in other cases it must, of course, often depend on the end shake to be obtained. At the same time it appears desirable that it should always be slightly below.

Clean out the setting and place a small quantity of oil in it to prevent the stone from flying out when made to rotate; or it may be rendered still more safe by a pointed pegwood stick held in the hand. The stone is fixed in position with a small conical burnisher (as, for example, the point of a round broach) very carefully polished so as to avoid all abrading action; if an excess of metal is forced over the surface of the stone, it is removed with a graver. The surface of the brass is finally smoothed with hemp stem or pegwood and tripoli in oil, followed with polishing rouge in spirits of wine.

English jewel setters often do not turn the groove, but leave a projecting edge round the hole, which is pressed on to the stone with a burnisher.

To make end stones.—The details already given will enable any intelligent workman to make end stones. If one of diamond in a brass or steel setting is required, take a small rose-cut stone, turn out a hole in the chuck to receive it, and, after cementing in position, turn off the corners with a diamond graver so as to be able to set it.

For making end stones of ruby, sapphire or chrysolite, flatten a face, using the laps 1, 2 and 3 in succession or a plate of ground glass. Then cement with the flat face towards the chuck, and turn to the requisite form with a diamond graver. Polish with the cup-ended brass and copper spindles, and set, if requisite, in the same manner as a jewel-hole.

To make pallets, unlocking pallets, etc.—This may be done on the lap or by using files of soft steel, copper and tin. In the first case the stones are roughed out while held by the hand, and the required form is given while holding them in a small carrier that fits into the T-rest support, but the forms of such stones are so various that no special details can be here given. The diamond powders of different degrees of fineness are used, as in making jewel holes.

To make semi-cylindrical locking stones, ruby pins, etc.—The stone must first be made approximately cylindrical on the lap No. 1, so that it may be turned with a diamond graver. Drill a hole in a chuck, cement the stone in it and turn it in this manner. When true, and of the requisite length and diameter, round off the outer end and smooth with a cup-ended spindle, then polish with powders 3 and 4 successively. Round off the sharp corner with a cup of rather greater curvature. The cylindrical surface is polished by means of a small lap carried on a vertical spindle in a frame fixed in the T-rest support, and caused to rotate rapidly with a bow, the lathe-head also revolving at the same time. The lap carriage should have a vertical screw adjustment, so that it may be brought just into contact with the stone; it is supplied with the several degrees of powder in turn. Now drill a hole in another chuck of the diameter of this cylinder, fix it in position and finish off the opposite end.

To form the flat face along the axis of the stone, it is cemented to a support in place of the T-rest, and brought against the revolving lap in the lathe; or the same result may be attained by using a brass file.

A small appliance whereby such stones may be cut mechanically has been described by Curzon, and to it the reader is referred.†

To make a duplex roller.—At the present day this operation so rarely has to be done that only a few words can be devoted to its consideration.

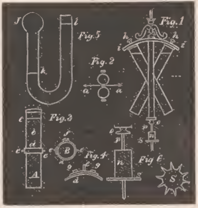
Very pure rubies must be selected, and the hole drilled as before explained; if the drill is too short it must be introduced at opposite ends, and the two holes made to meet. After smoothing the surface, the notch is cut with a thin steel cutter, the roller being cemented to a support that replaces the T-rest. When the steel disc charged with powder No. 4 is revolving very rapidly, advance the roller under it by a screw. The notch is polished by a small copper file of suitable form, and its corners rounded off by a tin one of square section, one edge of which enters the notch.

To mount diamond drills and gravers.—Drill a hole or file a notch in the end of a piece of brass wire to correspond with the fragment of diamond; heat the end in a spirit lamp and lay it on a piece of good sealing-wax or shellac. When this commences to melt, set the diamond in position and leave the whole to cool. Diamond drills are very commonly mounted at the end of a pin that has had its point filed off; mark a point on the end with a graver and drill the hole, which should be very shallow. Holding the pin in a pin-vise with its point projecting about $\frac{1}{16}$ inch, heat the vise in a lamp, and proceed as above explained.

† *Horological Journal*, xxiii. (1880-1), p. 79.

Correct Local Time and How to Obtain it.

MANY THINGS would recommend the use of a half second pendulum (9⅝ inches in round numbers) as the exposure to different strata of atmosphere would be avoided, and jar and trembling would less affect such a pendulum. But the solemn swing of a seconds pendulum impresses the beholder more; it will probably be some time before they are abandoned. I wish to speak of two points before I describe an independent electric pendulum. These points are: first, arrangements to correct heat and cold alterations; second, infinitesimal corrections in rate of going without stopping the pendulum. To obtain the exact height of Mercury by measurement is very difficult, and as every change of volume must be met with a change in rate, it stands one in hand to be very careful about getting the correct height at once; but as this, as said above, is inconvenient, some plan by which the compensating effects can be modified is desirable. We said, in former article, that it was well to start with a column of mercury too high (over compensated), and one reason for this was then pointed out, another reason will now be given; if the mercury (quicksilver) is placed in two glass tubes, placed side by side, as shown in fig. 2, the line of the arc of vibration as indicated by the arrows *a a*. At *A*, fig. 3, is shown one of these tubes separate; around the tube *A* goes a band *d*, with a clamp shown at *f*, so the band can be shifted up or down on the tube; this band has two pins which operate like the trunions of a cannon. The idea is, the tube *A* is filled with mercury up to the line *c* (say), and then the band *d* is moved up and down on *A* until the tube and mercury is poised on the pins *e*. Another adjustment to the pins will be necessary, as shown at fig. 4. This shows one of the pins mounted on a loose segment held by the screws *g*. If these tubes are (approximately) poised on the pins *e*, the tubes can be turned as shown in fig. 1, which will gradually diminish the compensation, until, if placed horizontal, there is scarcely any compensation. By poising the tubes as described, a very sensible change can be made in the compensating power and not greatly alter the rate. At *i i*, fig. 1, is shown the segments which, by means of the screws *h h*, hold the tubes at whatever angle they are placed; these screws work in a graduated slot, and both tubes tilted alike. The reader can make his on calculations by the data below. The relative expansions of steel, mercury, brass and alcohol are given, but it must be borne in mind that the expansion for steel and brass is in length, and the fluids in volume.



Brass	1.0019062
Steel	1.0011899
Alcohol	1.11
Mercury	1.02

While speaking of compensation by mercury, it will be well to describe a method by which a few ounces of mercury can be made to compensate for a lead ball of 15 pounds weight. This is done by using a U-shaped glass tube partly filled with mercury, and partly with alcohol. It should have been mentioned that the table of expansions given above are for 180° F.; that is from 32 to 212. At fig. 5 is shown the device mentioned for compensating a lead or other metal ball. A glass tube of about one-half an inch internal diameter is bent into the form shown, and a bulb blown at *j*; the tube should be about 13 inches long before bending; the bulb *j* and tube *E* is filled with alcohol down to *k*, and with mercury from *k* to *l*. It will be seen that as the heat expands the alcohol in the bulb *j* the mercury is forced down, and consequently rises at *l*. We will suppose that the line *m* is through the center of oscillation; now it is evident that all the weight of mercury moved from *k* to *l*, serves to quicken the vibrations, and a small calculation from the data above given will determine the quantity of alcohol required, and also the weight of mercury for any weight of ball. The plane of the bent tube should be at right angles to the arc of vibration of the pendulum. It would be well if the bent tube was suspended, but not so as to harmonize with the pendulum's motion, but at right angles to it. In regard to adjustment to rate: immediately beneath the stirrup or frame which holds the mercury tubes is a nut *o*, which serves to bring the clock to within a second or two a day. This nut works on a long screw. At fig. 6 is shown the nut *o* referred to above; the screw on which it works is shown at *p*. Also working on this screw is hollow brass weight filled with lead, weighing 3 or 4 ounces; this weight is shown at *n*. On the lower end of this weight, which is cylindrical, is a star wheel, shown at *S*; this wheel has 10 star-shaped teeth as shown. The manner in which this is used is, as the clock is brought very close to time by the nut *o*, we can, without stopping the pendulum, hold something so as to engage one of the points of the star wheel *s* as it swings by and cause it to turn the weight *n*, and either raise or lower, according to the direction in which the pendulum is swinging. Now as the weight or auxiliary ball only weighs about $\frac{1}{80}$ part as much as the ball, and the screw *p* has 20 threads to the inch, consequently one star tooth changes the weight *n* $\frac{1}{200}$ of an inch higher or lower. After one has his clock running down very close, he finds his clock is gaining or losing 3 or 4 seconds a month; it would not be desirable to stop the pendulum to alter the nut *o*, and, besides, it would be the next thing to an impossibility to change it so slightly as to make this slight difference, but with the auxiliary ball *n* and star wheel a fraction of a second a month can be reached. Winter is the best time to test the heat and cold compensation, as the heat can be got any time, but protracted cold can, for a clock, conveniently be had only in winter. There are many fallacies held in regard to pendulums; one is that increasing the weight of a pendulum will make it run slower; this is true only as when the point or position of the added weight is considered; thus, if you had a common mercury ball to regulate, and you find your clock slightly gaining, suppose you add something like a large nail, by laying it on the frame *above* the mercury tubes, your clock will run still faster for the additional weight; but so slight an addition would hardly be noticed, and the probability would be that other disturbing influences would more than make up. I venture to say that not one clock in fifty is put up well enough so as to have so slight a change properly recorded on the dial. All jar and shaking, like the passing of heavy wagons or railway trains, invariably cause a falling off, or induce a losing rate, and the action of the weight, when passing near the pendulum ball, has a disturbing influence, even so far, in some instances, as to stop the clock. The independent pendulum mentioned in this article will have to be deferred until my next, as it is unpleasant to stop in the middle of a description and say, *continued in our next*. Most of our regulator cases are so imperfectly made as to be regular dust traps; all the joints should be perfect, and the door close with the cracks protected with long pile velvet or plush, and should never be opened except when absolutely necessary. The isolated or independent pendulum to be described in our next can be made to beat seconds or half-seconds. If full seconds are chosen, a high case, better made by some show case maker, with metal corners and plate glass sides and front; if a half-second is selected, a nice clear bell glass should be used. The only possible objection which can be urged against such a clock is that a battery has to be kept up, but the expense is very trifling, and such a battery as will be suggested will only have to be renewed once a month; such renewal will cause no interruption to the clock, as the battery consists of three cups, and but one is renewed each month.

A. Huguenin's Registering Chronograph.

THE ACCOMPANYING registering chronograph is a simplified construction of the hitherto known chronograph, and can be produced much cheaper. The entire mechanism is situated beneath the dial plate; fig. 1 shows it *in toto*, while figs. 2 and 3 are details of single parts. Fig. 4 represents the arrangement of the dial plate.

An arbor is inserted at *A*, fig. 1, situated with one of its pivots in the plate of the watch, with the other in bridge *B*. Two small wheels are fastened upon this arbor, one of which seizes steadily into the crown wheel of the train, while the other seizes, or not, into wheel *D*, according to the performance of the chronograph mechanism. Fig. 3 shows the depthing of the wheels *D* and *A*. Wheel *D* is the fourth wheel, and carries the large concentric hand, fig. 4. It is fastened revolvable between bridges *C* and *d*, fig. 2. Bridge *C* may be revolved around screw *o'*, and spring *Q* endeavors to constantly press it against wheel *A*.

A thumb, *X*, is screwed upon wheel *D*, which, at every revolution of the center wheel *E*, provided with 30 teeth, advances by one tooth. The thin spring *I'*, screwed to one side of bridge *B*, braces against thumb *X* as soon as the mechanism is ready for action, whereby a retrogression of the seconds hand is prevented. Wheel *E* is retained in its place by a feeble spring, *U*, and is revolvable around its axis, one part of which rests within the plate, the other within bridge *Z*. Both wheels, *D* and *E*, are provided with little steel hearts, *c c*, at their lower side, upon which hammer *F*, always pressed toward one direction by spring *S*, operates with its two shoulders.

Star *G*, provided with 15 teeth, is retained in its position by the feeble spring *T*, and revolves around a pin screwed into the plate. It is provided on its lower side with four notches, *N N*. At *M*, and sunk into the plate, is a lever, whose one arm, *o*, stands in connection with star *G*, and other arm with the lower part of the bridge *C*. *L* is the stop spring of wheel *D*.

Spring *K* operates upon pusher *H*, which is provided with a small knob protruding beyond the rim of the watch case, while a ratchet hook, *I*, is placed at the other end, upon which spring *V* operates.

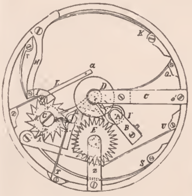


Fig 3.

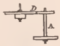


Fig. 4.

The following is the action of the new registering chronograph: If a pressure is exerted upon pusher *H*, by means of the protruding knob, the star *G* progresses by one tooth, shoulder *P* of the ratchet spring *L* falls into one of the notches *N*, and the little pin *a*, at the end of *L*, braces against fourth wheel *D*, and fixes it in its position. Arm *o* of lever *M* rises up out of the not deepened part of star *G*, and bridge *C* is pushed to one side, so that the two wheels *A* and *D* do not seize into each other. Hammer *F* still remains in its original position.

If another pressure is exerted upon pusher *H*, star *G* again advances by one tooth, shoulder *P* of spring *L* abandons the notch *N*, in which it was placed, and pin *a* removes from wheel *D*, whereby the latter is entirely freed. Lever *M* remains in the previously assumed position. Shoulder *R* of hammer *F* drops into one of the notches *N* of the star, and the hammer strikes against the hearts of wheels *D* and *E*, whereby both the seconds and minute hands of the chronograph are brought to zero.

By a third pressure upon pusher *H*, the entire mechanism is placed into the situation represented in fig. 1. Arm *o* of lever *M* drops into one of the notches *N*, bridge *C* is pressed toward wheel *A*, and the two wheels, *D* and *A*, seize into each other. Ratchet spring *L* remains lifted, and hammer *F* is drawn back.

The improvements of the afore-described chronograph therefore consist in the peculiar arrangement, by which the stopping and motion of the mechanism is effected by pusher *H*, ratchet spring *I*, star *G*, hammer *F*, and lever *M*, which either removes the end of the bridge *C* from the center of the plate, or causes it to approach, also hearts *c*, and by which, as soon as the mechanism is ready to act, the small spring *I'* places itself behind the thumb, and prevents the retrogression of the seconds hand, while thumb *X*, at each revolution of its wheel, *D*, (fourth wheel) causes the center wheel, *E*, retained in its place by spring *U*, to progress by one tooth.

Silver Solders: their Uses and Applications.

SOLDERING as applied to silversmith's work is an art which requires great care and practice to perform it neatly and properly. It consists in uniting the various pieces of an article together at their junctions, edges, or surfaces, by fusing an alloy specially prepared for the purpose, and which is more fusible than the metal to be soldered. The solder should in every way be well suited to the particular metal to which it is to be applied, and should possess a powerful chemical affinity to it; if this be not the case, strong, clean, and invisible connections cannot be effected, whilst the progress of the work would be considerably retarded. This is partly the cause of inferior manufactures, and not, as might be frequently supposed, from the want of skill on the part of the workman who makes them.

The best connections are made when the metal and solder agree as nearly as possible in uniformity, that is, as regards fusibility, hardness, and malleability. Experience has proved, more especially in the case of plain and strong work (or work that has to bear a strain in the course of manufacture), that the soldering is more perfect and more tenacious as the point of fusion of the two metals approaches each other; the solder having a greater tendency to form a more perfect alloy with the metal to which it is applied than under any other conditions. The silver or other metal to be operated upon by soldering being partly of a porous nature, the greater the heat required in the fusion of the solder the more closely are the atoms of the two metals brought into direct relationship; thus greater solidity is given to the parts united, and which are then capable of forming the maximum of resistance. It is thus obvious that tin should not be employed in forming solders possessing the characteristics we have just described, for being a very fusible metal it greatly increases the fusibility of its alloys; but when very *easy* solder is required, and this is sometimes the case; especially when zinc has been employed in the preparation of the silver alloy, its addition is a great advantage when it comes to be applied to the work in hand. Solders made with tin are not so malleable and tenacious as those prepared without it, as it imparts a brittleness not usually to be found in those regularly employed by silversmiths; for this reason it is advisable to file it into *dust*, and apply it in that state to the articles in course of manufacture.

The best solders we have found to be those mixed with a little zinc. These may be laminated, rolled or filed into dust; if the latter, it should be finely done, and this is better for every purpose. Too much zinc, however, should not be added under any conditions, as it has a tendency to eat itself away during wear, thus rendering the articles partly useless either for ornamental or domestic purposes earlier than might be anticipated. Solders thus prepared also act with some disadvantage to the workman using them, for they possess the property of evaporating or eating away during the process of soldering, leaving behind scarcely anything to indicate their presence; consequently the workman has to keep on repeating the process until the connection is made perfect, which is always done at the expense of a quantity of solder as well as loss to the workman as regards time.

Solders made from copper and silver only are, generally speaking, too infusible to be applied to all classes of silversmith's work.

Solders are manufactured of all degrees of hardness; the hardest of all being a preparation of silver and copper in various proportions; the next being a composition of silver, copper, and zinc; and the easiest or most fusible being prepared from silver, copper, and tin, or silver, brass, and tin. Arsenic sometimes enters into the composition of silver solders, for promoting a greater degree of fusion; and we have heard of workmen actually refusing to work with any other solder. The employment of arsenic has, however, a tendency to slightly endanger the health of those persons using it in large quantities; and of late its employment has not been persevered in.

In applying solder of whatever composition, it is of the utmost importance that the edges or parts to be united should be chemically clean; and for the purpose of protecting these parts from the action of the air, and oxidation during the soldering process, they are covered by a suitable flux, which not only prevents oxidation, but has also a tendency to remove any portion of it left on the parts of the metal to be united. The flux employed is always borax, and it not only effects the objects just pointed out, but greatly facilitates the flow of the solder into the required places. Silver solder should be silver of a little inferior quality to that about to be worked up. The various degrees of fusibility of the several solders are occasioned by the different proportions of the component parts of the elements which enter into their existence. For instance, a solder in which tin forms a component part will flow or fuse much sooner than one in which copper and silver alone enter into composition, or of one wholly composed of copper, silver, and zinc, or of silver and brass; therefore it must be understood that tin is the best metal for increasing the fusibility of silver solders, and for keeping up their whiteness. Nevertheless it should always be used sparingly, and even then drawbacks will present themselves such as we have already alluded to.

It is our intention to give a list of the various solders which have been usually employed with more or less success, so that the silversmith and the art workman will be enabled to select the one most suitable to the particular branch of his trade; and we contend, from experience in the craft, that success of workmanship mainly depends upon this point.

Hardest Silver Solder.

	oz.	dwts.	grs.
Fine Silver	0	16	0
Shot Copper	0	4	0
	1	0	0

Hardest Silver Solder.

	oz.	dwts.	grs.
Fine Silver	1	0	0
Shot Copper	0	5	0
	1	5	0

Hard Silver Solder.

	oz.	dwts.	grs.
Fine Silver	0	15	0
Brass	0	5	0
	1	0	0

Hard Silver Solder.

	oz.	dwts.	grs.
Fine Silver	1	0	0
Brass	0	6	16
	1	6	16

Easy Silver Solder.

	oz.	dwts.	grs.
Fine Silver	0	13	8
Brass	0	6	16
	1	0	0

Easy Silver Solder.

	oz.	dwts.	grs.
Fine Silver	1	0	0
Brass	0	10	0
	1	10	0

The silver solders here given are not such as we can confidently recommend to the general silversmith, having proved them to be very unsatisfactory in certain classes of work. For example, the first solder, except in the case of plain strong work, would be far too infusible to be generally used by the silversmith; the second, although much more fusible, cannot safely be applied to very fine and delicate wire-work, because the brass in its composition is so uncertain; unless specially prepared by the silversmith, it probably, if purchased from the metal warehouse, contains lead; the latter is injurious, and in process of soldering it burns and eats away, much resembling the application of burnt sawdust to the work. No really effective work can be produced when the above symptoms present themselves. The same remarks apply to No. 3, which is the most fusible, and when free from lead or other base metal it may be classed as a tolerably fair common solder. In the preparation of the solders to which we are alluding, it is preferable to employ, instead of the brass, a composition consisting of a mixture of copper and zinc, in the proportion of two parts of copper to one part of zinc; the operator then knows of what the solder is composed, and if it should turn out bad he will partly know the cause, and be able to supply a remedy.

The solders that we have found to answer our purpose best are composed of the following elements. The first is described again as *hard* solder, but it is not nearly so hard as the one previously described.

Best Hard Silver Solder.

	oz.	dwts.	grs.
Fine Silver	0	16	0
Shot Copper	0	3	12
Spelter	0	0	12
	1	0	0

Best Hard Silver Solder.

	oz.	dwts.	grs.
Fine Silver	1	0	0
Shot Copper	0	4	9
Spelter	0	0	15
	1	5	0

Medium Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	0	15	0
Shot Copper.....	0	4	0
Spelter..........	0	1	0
	1	0	0

Medium Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	5	8
Spelter..........	0	1	8
	1	6	16

Easy Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	0	14	0
Shot Copper. ...	0	4	12
Spelter..........	0	1	12
	1	0	0

Easy Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	6	12
Spelter..........	0	2	4
	1	8	16

Common Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	0	12	12
Shot Copper.....	0	6	0
Spelter..........	0	1	12
	1	0	0

Common Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	9	15
Spelter..........	0	2	9
	1	12	0

The whole of the above-named solders will bleach or whiten properly if applied to silver of the suitable quality for such purposes. We have used copper and spelter in our silver solders, because we have found from experience that the fewer number of times a solder is melted the better it is for all purposes. This result of our experience is in direct opposition to those authors who have professed to treat upon this subject, and who can have had but a small amount of real practical knowledge, for it is argued by them that the oftener a solder is melted the more properly does it become mixed, and, consequently, the more fit is it for the workman's use. To such arguments we are prepared to give a blank denial, and our reasons for so doing we will state further on in this treatise.

There are various other silver solders used by silversmiths; some few of which it will be as well perhaps, while we are on the point, to enumerate:—

Silver Solder for Enamelling.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	5	0
	1	5	0

Silver Solder for Enamelling.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	10	0
	1	10	0

Easy Silver Solder for Filigree Work.

	oz.	dwts.	grs.
Fine Silver......	0	16	0
Shot Copper.....	0	0	12
Composition	0	3	12
	1	0	0

Quick Running Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Composition.....	0	10	0
Pure Tin........	0	2	0
	1	12	0

Silver Solder for Chains.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	10	0
Pure Spelter	0	2	0
	1	12	0

Easy Solder for Chains.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Composition	0	10	0
Pure Spelter	0	2	0
	1	12	0

Common Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	12	0
Pure Spelter.....	0	3	0
	1	15	0

Common Easy Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Composition	0	12	0
Pure Spelter.....	0	3	0
	1	15	0

Silver Solder with Arsenic.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Shot Copper.....	0	3	0
Yellow Arsenic...	0	2	0
	1	5	0

Silver Solder with Arsenic.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Composition	0	6	0
Yellow Arsenic...	0	1	0
	1	7	0

Easy Silver Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Composition	0	5	0
Tinsel	0	5	0
	1	10	0

Common Easy Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Tinsel	0	10	0
Arsenic..........	0	5	0
	1	15	0

Another Common Silver Solder.

	oz.	dwts.	grs.
Fine Silver	1	0	0
Composition	0	15	0
Arsenic..........	0	1	6
	1	16	6

A very Common Solder.

	oz.	dwts.	grs.
Fine Silver......	1	0	0
Composition	1	0	0
White Arsenic...	1	0	0
	3	0	0

The solders here given will be found amply sufficient to select from, for every operation of the silversmith, and will answer the several purposes for which they have been described. When tin and arsenic are employed in the composition of solder, either together or separately, they should be withheld until the more infusible metals with which they are to be united have become melted; the tin or tinsel should then be added, and when this is well melted with the mass, fling on the top the arsenic, let it melt, stir it well together, and pour it out quickly into an ingot mould already prepared for its reception.

When silver and brass, or silver and composition, alone form the component parts of the solder, these metals may be put into the melting-pot together, well fused, stirred, and poured out as before.

Solders into which volatile metals enter, upon repeated meltings, become hard, brittle, and drossy, and are therefore not so good as when the metal has received only one melting; it is for this reason that we have always preferred to manufacture our solders from metals which have not been melted before, or from those which have gone through the process as few a number of times as possible.

The mode of soldering gold and silver is as follows: Take the solder and roll it out thin between the flattening rollers, or file it into dust, according to the kind of work in hand. If filed into dust, it is all the better if done very fine; and if reduced to a flat state, which should be tolerably thin, cut it into little bits, or pallions, which may easily be performed with a pair of hand-shears, length-ways, and afterwards cross-ways. When this is done, take the work which is to be soldered, join it together by means of fine binding-wire (very thin iron wire), or lay it upon the pumice so that the joinings can come close together, and will not be liable to move during the process; wet the joinings with a solution of borax and water mixed into a thick paste or McLanes Anti Oxetyn, applying it with a small camel-hair pencil; then lay the bits or pallions of solder upon the parts to be united, and having placed the article upon some suitable object, take your blow-pipe and blow with it, through a gas jet, a keen flame upon the solder in order to melt it; this will render the unification of the parts complete and compact.

When filed solder is used, the process of charging the article is rather different from the above. In the latter case the filings are commonly put into a small cup-shaped vessel, in most cases the bottom of a tea-cup, or some other similar vessel being used for the purpose; a lump of borax is then taken and rubbed upon a piece of slate, to which a little water is occasionally added during the rubbing; when this solution attains the consistency of cream, it is put into the solder-dish and well mixed with the solder. This is then applied to the article to be soldered, by means of a charger, consisting of a piece of round metal wire, flattened at one end, and shaped for the purpose it has to serve. The joinings, when this kind is employed, require no boraxing with the pencil, as described under pallion solder; the borax being intermixed with the solder flushes with it through the joinings to be united, thus rendering any further application unnecessary. The process to which we are alluding is called "hard soldering," and cannot be applied to metals of a fusible nature; neither must it be attempted in the case of goods bearing the name of plated, which are put together with soft or pewter solder, similar to that used by tinsmiths and gasfitters. If there should be any soft solder about the article to be soldered by the means we are describing, it would be almost certain to destroy it, the soft solder having such an affinity for entering in to combination with metals more infusible than itself when overheated.

There is an art in soldering greater than some people would believe. The heat required is of various degrees, some articles requiring a broad rough flame, others a smooth one, and others again a fine pointed one. All these circumstances connected with the process, together with others which we could detail, proving that it is an art only to be acquired by practice, must be considered enough; and we proceed to observe that the skilful jeweler in soldering a large piece of work will direct the flame of the gas jet to all parts of it, until it is tolerably hot, and then return to the spot to be soldered, and by a very dexterous movement of the flame, produced by the blow-pipe, increase the heat at that spot until the solder has flushed and the parts are rendered thoroughly secure. So far as some of the work of the silversmith is concerned, the process of soldering is a very delicate operation, and ought not to be undertaken by an unpractised hand.

The method of preparing solder for filigree work is worthy of a passing notice. It is called by the Germans Lemaille solder. In the first place it is reduced to very fine filings, mixed with burnt borax powdered fine, and in this state it is sprinkled from a spouted grater over the work to be soldered. The English filigree workers commonly use clean filed solder, and by means of the camel-hair pencil apply a solution of borax to the work, and then sprinkle the dry solder upon it from the grater.

In Vienna a kind of powdered borax is employed, called *Streu borax*, or sprinkle borax. It is composed of the following ingredients, which should be gently annealed to expel their water of crystallization, the whole well pounded and mixed together, and sprinkled over the parts to be joined from the spouted grater as before:—

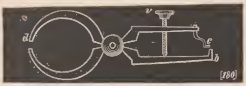
	oz.	dwts.	grs.
Calcined Borax	0	17	12
Carbonate of Soda	0	1	12
Common Salt	0	1	0
	1	0	0

The object of this mixture is to prevent the rising of the solder, and to facilitate its flushing. Too much of it should not, however, be put with solder in the grater at one time, as it is as objectionable as too much borax applied in the ordinary way, but every workman will learn from experience concerning these matters. We have tried this mixture, prepared with filed solder in the ordinary way, and found it advantageous at first; but its greatest drawback is the turning of the solder yellow if not quickly used upon the work after mixing, thus rendering the solder permanently injured. For this reason we have had to abandon its employment in the wet state. But, in its dry state, to the silversmith for filigree purposes it is likely to be of advantage. It may be remarked that this preparation encumbers the work with a great deal more flux than borax does, and consequently it requires to be more often boiled out during the period of soldering together the component parts. This is effected by boiling in a weak pickle of sulphuric acid and water, composed of the following proportions: one part of acid to thirty parts of water.

Height Gauge.

SAYS BLANCHEBARBE in *Revue Chronometrique*: I would make your readers acquainted with a means for manufacturing a height gauge from an ordinary calliper, for the purpose of measuring therewith the height of cylinder and anchor arbors. The tool is very simple, and only about an hour's work is necessary to make it; it is cheap and very exact. It has served me well, and I am free to offer it with all confidence to my colleagues. It is represented in the following figure: The end of one arm of a calliper is cut off, and a hole drilled into it, in which a little brass or steel piece forming a hook is fitted as at *a*, and fastened. A thumb screw *v*, is placed in the middle.

The tool is now ready and its use simple; for instance, for replacing a new cylinder in place of a broken one, I use it as follows: Having removed the cap jewel, I place the jewel hole upon part *b* of the tool (which is fastened into a vise, to enable the operator to ascertain the measure with greater exactness), and by aid of the thumb screw *v*, I move the little hook *c* down until it stands opposite to the bottom of the cylinder wheel; this, as is well known, must stand in the middle of the cylinder notch. This having been done, I set the arbor of the little plug according to the length given by the tool, that is, I shorten the arbor of the lower plug until *c* stands exactly in the middle of the little cylinder notch, when the lower point of the cylinder has been placed upon *b*. The most important measure necessary for the cylinder placement is obtained in this manner.



When the balance bridge has been fastened in its place, I ascertain the entire height or length of the cylinder, either with the pinion measure or with the side *d* of the tool here described, and according to this measure I shorten the arbor of the upper plug. After these shortenings, only the turning and burnishing of the pivots remains, taking care to give them sufficient length, in order to touch the cap jewel.

The intelligent watchmaker will easily comprehend the farther uses and applications of the tool.

Proceedings of the Horological Club.

A Distinguished Body of Watch and Clock Makers.

One hundred and first Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

KROEBER'S NEW ROTARY PENDULUM NOISELESS CLOCK.

Mr. Uhrmacher exhibited one of the Kroeber rotary clocks, which he considered well worthy of the commendation of the Club. A great need has been felt for some timepiece which could be kept in a room without disturbing nervous persons by the incessant ticking of the common clocks. Many persons cannot sleep with an ordinary clock in the bedroom, or anywhere within hearing distance. Even the ticking of a watch will effectually banish slumber from their pillows. They are thus compelled, in order to sleep at all, to pass their nights in complete ignorance of the time, or to depend upon someone to call them at a stated time. Others, especially those engaged in absorbing work of a literary or other nature, are driven almost distracted by such noises, even during the day. Every little tick produces a sort of nervous shock, and their continued iteration becomes at last almost unbearable. These and many others will welcome a noiseless clock which is at the same time a good timekeeper, and not expensive.

Rotary pendulum clocks have been imported for many years, but they were either quite costly or were hardly worthy of the name of timepieces. But the Kroeber clocks are really well made, the mechanical design is good, and the details of the execution are well carried out, and include several improvements over the usual constructions of movements. Mr. U. said that he had tried one of them himself, and was well pleased with its performance. He also called attention to the artistic and pleasing arrangement of the pendulum upon the case, giving the clock a very attractive and agreeable external appearance. Altogether, he thought Mr. Kroeber deserving of great credit for his new addition to the list, and hoped he would find his venture so profitable in a business way, as to encourage the introduction of other novelties in our lines.

GOLD OR COMPENSATED BALANCES.

Secretary of Horological Club:

Will a watch that has a "plain gold balance" keep as good time as one with a compensated balance (adjusted to heat and cold)?

Are the highest grades of American watches, Elgin, etc., more reliable as time measurers when stamped "Adjusted to heat, cold and position," than the same grade would be with a "plain gold balance" in them, in place of the cut balance?

As to the question I ask, I am certain in my own mind that a compensated balance is most reliable; I wish, however, to see your answer in THE CIRCULAR, to show to a "born watchmaker."

A. M. L.

Mr. Horologer said that a watch with plain gold balance would certainly *not* keep as good time as one with a compensated balance, other things being the same in both cases. Watches made by good companies, and stamped "adjusted to heat, cold and position," are far more reliable as time measurers than the same grades would be with plain gold balance. A watch with plain gold balance may, however, be adjusted to positions, although it is probably very rarely done except in movements with adjusted balances. The most usual adjustment is that of the balance to temperatures. The adjustment to positions relates to the balance pivots and their jewels, to secure equal vibrations in all positions. The adjustment for isochronism relates principally to the hair spring. Consequently, the argument about gold and cut balances concerns only the question of the adjustment for heat and cold.

A compensated balance is one which, when expanded by heat, contracts in some direction to neutralize the effect of that change, and *vice versa*. The usual method of securing that result is by forming the balance rim of two metals, one of which is more affected by heat and cold than the other, as of steel and brass, with the brass on the outside. When the steel center bar expands and carries the entire rim outward, the brass portion expands more than the steel, and therefore curves the rim and carries the free end of the section or "segment" nearer to the center than the other end, which is attached to the center bar. By attaching a weight to the free end of the rim, the effect of this movement is increased, as the center of weight of the rim, as a whole, determines the virtual working diameter of the balance, and this diameter is more rapidly varied as the weight thus moved inward and outward becomes greater, or nearer the free end of the segment of the rim. If the weight is moved too far, the vertical diameter of the balance is changed more by that motion than by the heat and cold, the effect of the latter is more than neutralized, and an error of the opposite kind is produced. In this case the balance is said to be over-compensated, and the remedy is to move the weight (or screws) back from the free end of the rim, till its movements exactly neutralize the error of time caused by the expansion of the balance by heat, or its contraction by cold. When this is done the balance is correctly compensated, and the movement is adjusted for heat and cold.

It is obvious that a balance may be correctly made, but not afterwards adjusted. It would then be a compensation or expansion balance, but not a compensated or adjusted one. A balance, the rim of which is not cut entirely through, is certainly not adjusted, and cannot be until it is cut. So also, a cut balance, the rim of which is not so made as to be susceptible of adjustment, may be a nuisance, causing the watch to run perfectly "wild." A well-made compensation balance, whose rim is not cut, is no better than a plain gold balance, because its rim, though capable of compensating, has no chance to do so, its rim being fastened at all points. Consequently it expands and contracts under the influence of changed temperatures just as any other solid balance would do, whether made of gold or other material. The screws may be ornamental, but they have no function as compensation weights, and such a balance is merely a "screw balance." Mr. L. will find all these points about adjustments, etc., practically treated, with detailed instructions and explanations, in Excelsior's work, published at the office of THE CIRCULAR. By carefully reading this he will not only be enabled to perform the adjustments, but to give the reasons for his beliefs, and convince a "born watchmaker" that he is a born ignoramus.

DRESSING OFF COINS FOR ENGRAVING.

Secretary of Horological Club:

Will some one of our fellow-craft give us details of the simplest way to dress off and polish coins for engraving? We country watchmakers are often called upon to do such jobs, and I think it would be interesting to know how some practical man (jeweler, for instance) would do it, to make a good job of the thing. By answering above you will oblige one of the readers of THE CIRCULAR. Z. Y. Q.

Mr. O'Lever answered that there was no uniform method of doing the work. Some chuck the coin in the lathe, and turn off the face, (and sometimes the edge also,) using a file across it to get the flat while revolving. Others simply rest the coin firmly on the palm of the thumb and file it flat, or any other way to get a truly flat surface. It is then ground off with powdered pumice stone or rotten stone, according to the nature of the surface, on a flat buff stick or similar tool, and polished in a like manner with rouge. Revolving brushes in the lathe are very convenient for such work, but have to be carefully used or they will destroy the "dead flat." One advantage of turning the coin off in the lathe is that a part of the original surface can be left on it.

USING MAINSPRING WINDER.

Secretary of Horological Club:

Will some one of the Club please explain how to use a mainspring winder? I never saw one used, having always seen them taken out and put in carefully with the fingers, which I see is done by many fine workmen. I have a good winder, but have not been able to use it successfully. A little information would oblige me very much.

I. B. G.

Mr. McFuzee replied that the spring is hooked upon the arbor of the winder, then wound up thereon, while holding the coils flat by the thumb on one side and the second finger on the other side, with the first finger pressing on the outside of the spring to retain the winding. When fully wound, or very nearly so, the barrel is carefully placed over the spring, which is then allowed to slip around within the barrel until it becomes properly hooked, after which the barrel itself is allowed to slowly turn till it is entirely free, and the spring can be easily removed from the arbor.

Of course, the winder should not be used when the winding arbor is in the barrel, as in watches having a solid ratchet screwed to the bridge, and holding the barrel or barrel-head fast on the bridge—otherwise the center of the spring would doubtless be badly bent. It is also necessary to use in the winder an arbor of the same diameter as the collet of the winding arbor, as a larger one would open the center of the spring, and a smaller one is very likely to cause the spring to snap off near the center. Caution must also be used to avoid dirtying the spring and barrel with the fingers, especially if the hands sweat much. That is done by holding the parts with a piece of clean tissue paper between them and the skin. It hardly needs to be said that the winder can work in either direction by moving the spring pressing on the ratchet pawl—and that the spring must not be allowed to slip from the fingers during the winding, else an inextricable snarl may result, damaging or breaking the spring. Many workmen do not use the winder at all, but hold the barrel in tissue paper, hook the outer end of the spring properly, then coil it in from the outside, pushing in a half-coil alternately on each side, with the thumbs. For thin and narrow springs this is as well as the other way, but thick and wide springs are less liable to be bent when inserted with the winder.

Marine Chronometers.

PROBABLY no piece of human mechanism represents more brain labor, or a greater amount of unyielding endeavor, to overcome obstacles than we find embodied in a first class marine chronometer. And yet the instrument is far from the state of perfection which "theory" would promise. We are beset with difficulties on every hand, which, although purely mechanical, are still serious enough to be perplexing. These mechanical imperfections beset us the instant we enter the workshop and seek to realize our *theories;* and these imperfections will impede our operations, and stand a barrier to our progress to perfection forever; yet patience and skill will remedy many, and modify other of those difficulties, until, like the problem of squaring the circle, although perfection can never be reached, still, an approximation to it can be attained, which will leave little to be desired. I do not propose to follow the development of the instrument up to its present state of perfection through all its modifications, but rather to call notice to inherent faults which exist and admit of remedy to a certain extent. First and foremost among the imperfections stands compensation for heat and cold, as counteracted by the composite curb, or, as it is usually called, the chronometer balance. It is quite unnecessary to describe this appliance to my readers, as it is supposed to be thoroughly understood in all its actions by such readers as usually peruse this journal. But certain features exist in it which are not generally known and appreciated—first, its imperfections in extreme temperatures; several devices exist to remedy this defect to a limited extent; second, its elasticity begets the trouble to a great extent of "shop rate," and "sea rate;" third, its susceptibility to centrifugal action. I will waive the first count of the indictment and proceed to the second and third, which, in reality, grow out of the same cause, *i. e.*, the springy nature of the compound curbs or segments of the balance rim. It is a well-known feature of a curved spring that it is more easily bent outward than inward, or, in other words, it requires less force to straighten a curved spring than it does to increase the curve; hence, any motion or disturbing influence like the sway of a vessel, will tell in the line of least resistance; this proposition is proved by the fact that in nine cases out of ten the "sea rate" of a chronometer is slower than the "shop rate." The exceptions to this rule is with inferior chronometers having unsteady rates. In regard to the effects of centrifugal action, it is more serious than at first would seem probable. It is impossible to construct a balance in which both segments are exactly alike in elasticity or resilient power; but we will suppose we can seize and comprehend the exact conditions of a balance just at the instant it pauses on a return vibration; we will conceive it to be in a perfect condition of repose in all its particles—a condition we will see does not and cannot exist with this form of balance—the tension of the balance (pendulum) spring causes the return vibration to set in, our segment with its adjustable weight yields to the centrifugal action first, the center of gravity (poise) is disturbed, and the pivots thrown to one side of the hole jewels; the opposite segment and its weight follows, and if we could see the pivots in such a way as to take cognizance of their action, we would find them taking advantage of the side shake in the jewel holes at the rate of *several* shakes a second; I say several, for it is much to be doubted if those shakes are a *constant* number, and if not constant they must in some degree affect the performance of the instrument. It is a well-known test with old and experienced adjusters, that a chronometer must in its "tick," give out a pure musical tone; or in other words, the vibrations in its component parts must be synchronous—in harmony. It is a well-known fact that if two springs whose vibration represent certain musical tones, if not *exactly* harmonious, will compromise if near each other, and produce a tone intermediate to both. So probably to a certain extent, a compromise takes place in the balance of a chronometer, and a synchronous harmony is established; but, on the other hand, a discord can also set in, which would tell irregularly on the chronometer's rate. It must be evident to all minds which give the problem careful attention, that centrifugal action on the segments must beget a train of unequal resistances, which tell unequally on the balance and all its belongings. I wish the reader to understand that I have no axe to grind, nor do I propose any better form of balance, but I wish to bring the facts to the attention of the thinking portion of our expert mechanics, and see if there is no better way to counteract the effects of heat and cold on movable timekeepers. But I would beg to say that, practically, up to the present time, the compound curved segments (in some form) gives the best results. A few suggestions may not be displaced—not my own, understand, but such as have been thrown out during the development of the expansion balance as it now exists. What is required in a balance for correcting heat and cold effects, are: perfect and equitable compensation through all ranges of exposure; rigidity of form except by caloric effects. To produce these results various devices have been offered; many with merit, some with varied points of excellence, which are worthy of consideration. The prominent ones of interest are based on two principles: first, keeping the timepiece exposed to an exalted temperature above anything it would be exposed to, and maintaining this temperature to constantly exactly the same degree; second, a mechanical arrangement of levers operated something similar to a gridiron pendulum. The problem is open, and will yet be solved by the ingenuity of some person, who will confer a great favor on humanity, and if properly managed, result in a financial return to the inventor. I am aware that I am venturing on a ground which has been carefully gone over by deep thinkers and skilful men—yet, twenty years ago, if a man had foretold the success of breech-loading guns, the very men who were supposed to know the most about such things would have treated the suggestion with contempt—but one small idea established or made practicable breech-loading guns, and this was the metallic cartridge. Now, in our case, may not some idea be thrown up by discussing the subject, which will happily solve the question? A balance free from dilation by centrifugal force would be much easier to match with an isochronal spring. There is another point deserving of consideration, which is, a compound segment is always liable to deterioration, like a hair spring or mainspring, but even more rapidly; there is a constant antagonism between the two metals which can never be reconciled. I think that my experience will agree with others when I say that chronometer balances will show some queer freaks. A chronometer which has been under one's care for years, and showing a marvelous fine rate, will all at once fly off on a tangent ("kick up" is a better phrase), and vary more in one day than it previously did in a month. Now, generally, the trouble lies in the hair spring, but sometimes a new balance is required—some latent defect has existed in the balance, and all at once it is developed in full force.

DETENT.

Gold and Silver—their Elaboration.

(*Continued from Page* 285.)

WHITE PICKLING IN THE CREAM OF TARTAR BATH.

CREAM of tartar is an acid salt, and consists of bitartrate of potash; if oxide of copper is boiled with the solution of this salt, the former is dissolved by the free acid; if table salt is added to the solution, this is endowed with the property of dissolving also chloride of silver. A fluid containing cream of tartar and culinary salt may therefore be used to white pickle a silver article.

The bath is prepared by pouring 36 parts water over 1 part cream of tartar and 2 parts salt, heating it to boiling, and frequently stirring it, in order to accelerate the solution of the former. The silver article to be brightened must be left in the bath for about 20 minutes.

If the article is not sufficiently handsome by a first treatment, it is to be pickled again; and this repetition must always occur in cases when certain parts of the surface are to be more mat than others, and in this case, an operation takes place between the first and second boiling, that may be designated as

MATTING.

In order to have certain places of the surface void of luster, "mat," and as if chilled with a breath, such places are covered with a paste after the article was boiled once, produced by mixing finely pulverized potash with gum solution sufficient to make a thin paste easily applied to the article, and with which also sketches may be executed upon the silver surface.

When the paste has been applied, the article is first heated upon live coals, to dry the former, and then red-heated. The red-heated article is dipped into water and quenched, after which it is subjected to the second white pickling.

These repeated glow heatings of the silver are done for the purpose of oxidizing all the copper near the surface, whereby this becomes far richer in pure silver than that within the interior, and this process of glow heating may be continued until the entire surface consists of pure silver, and if it is intended to have a layer of very white silver on the surface, the article is to be heated for some time in free air, whereby the copper is converted into oxide, and dissolved by boiling in pickle. On account of the greater softness of pure silver, compared with alloyed, such surfaces can easily be burnished to a high luster.

WHITE PICKLING OLD SILVER ARTICLES.

Silver articles that are stored for a long time without being used, for instance, objects of art collections, will gradually lose their handsome luster; they become dim, mat, and assume a grey color. Articles in constant use, although they lose their high luster, generally remain bright; silver table service that is seldom used, sometimes becomes very dim. The cause for this can either be mechanical or chemical; in many cases both causes operate together. Articles even stored in well-closed cupboards are covered with dust, which adheres with such a tenacity that it cannot be removed by ordinary rubbing. Greater yet is the effect of the chemical change to which the silver is subjected by the operation of the air. The air of cities always contains quantities of sulphuretted hydrogen, emanating from the sewers, sometimes of so small a quantity that it escapes detection, still it is sufficient to effect the purpose of tarnishing the silverware. As previously stated, silver as well as copper is very sensitive to this gas, and in a short time it forms a thin film of sulphuret of si.ver and copper over the surface, whereby it assumes a grey color. If it is at times seized with the bare hand, traces of perspiration will remain adhering thereto; this perspiration contains salt as one of its constituents, and chloride of silver, gradually passing into sulphuret of silver, is formed thereby. Such spots may be recognized by their darker color. Table ware that was not used for a long time, will be similarly spotted from the action of food, although it may have been carefully cleaned.

MECHANICALLY OPERATING CLEANING AGENTS.

In order to clean soiled articles in a mechanical manner, they are rubbed with very finely washed chalk and chamois leather. A powder of a highly cleaning power is produced by treating a mixture of 10 parts washed chalk and 1 part soda and 20 parts water, in which ¼ part citric acid has been dissolved. The mixture is stirred to a thin paste and slowly dried.

The so-called Belgian cleaning powder, very suitable for brightening silver articles, consists of a mixture of 250 parts washed chalk, 117 parts washed pipe clay, 62 parts white lead, 23 parts white magnesia, and 23 parts polishing rouge.

The so-called English silver soap, with which silver articles, with the use of brushes, can be very handsomely cleaned, is manufactured by heating 1 part ordinary white soap with 1 part water, until a viscid fluid is produced; 3 parts washed chalk are stirred in, and the mass is left to solidify.

CHEMICAL CLEANSING AGENTS.

The article is boiled with strong vinegar, whereby the sulphurets of silver and copper are decomposed; it is next to be treated in a mechanical way.

We have found the following method as very suitable for cleansing old silver articles: The article is immersed in very strong soda lye for an hour. It is then rinsed, wrapped around with a zinc wire, and boiled in a solution of 1 part borax in 10 parts water. The zinc forms a galvanic element with the silver, and the effectiveness of the acid fluid is materially increased.

Also very handsome results are obtained by dipping the article, treated in soda lye, and rinsed with water, in a solution of 1 part cyanide of potassium in 20 parts water, lifting it out from time to time to observe the progress of the operation. The article must not be left too long in the cyanide solution, as it is also capable of dissolving the silver. The brightened articles are well rinsed with water, and finally dipped for several minutes into boiling water; they dry quickly after being withdrawn from the latter.

In place of the cyanide solution, one of hyposulphurous soda may also be employed; excellent results are obtained with a fluid consisting of 40 parts water, 4 parts hyposulphurous soda, 2 parts sal ammonia, and 1 part caustic ammonia, used cold.

YELLOW PICKLING OF GOLD WARE.

The chemical treatment of the gold, after finishing the mechanical working of the article, must be undertaken for the purpose of causing the pure color of the metal to appear, and the yellow pickling corresponds to the white pickling of the silver.

While by the white pickling of the silver it is chiefly intended to obtain the purest possible white color of the silver, it is possible by the yellow pickling of the gold, to obtain different shades, and this manipulation is called coloring. Articles coming from the workshop are of a peculiar yellowish-brown color, partly caused by the condition of the alloy itself, and partly from the manner of treatment. Articles of an alloy rich in copper, and those that have often been glowed, are generally far darker than others consisting of a finer alloy.

By gold, also, the color is caused by the oxide of copper formed upon the alloy, and the main attention must be directed toward removing this oxide, whereby the natural color of the article will become visible, and this is best effected by pickling.

This pickling is done with sulphuric or nitric acid, to be diluted with water in the proportion of 1 part acid to 1 part water. The nitric acid can be employed either in form of white or red acid, but special attention must be paid to that it contains no chlorine. By a chlorous nitric acid a little of the gold of the surface is reduced into solution, but at once precipitated again by the other metals (copper or silver), and no gold will be found in the fluid at the end of the work; when treating silver alloys, the dissolved silver would at once precipitate as chloride of silver, in a flocculent form, and interrupt the course of progress.

When the pickling is finished, the fluid may be poured into a vessel, and mixed with a little muriatic acid; the small amount of silver, found in a state of solution in the fluid, will quickly deposit as chloride, and the fluid thus freed from silver (it only contains then a little copper) may be thrown away. The chloride of silver, gathering in the vessel from time to time, may be purified and worked as heretofore explained in these pages.

The utensil best adapted for yellow pickling is a porcelain vessel; although glass vessels are not attacked by nitric acid, yet they are objectionable, on account of their fragility. Enameled cast iron utensils cannot be used for the purpose; the enamel is glass, it is true, but it is so quickly attacked by strong acids that the bright metal will appear in a short time. The work of yellow pickling partly depends upon the condition of the alloy under treatment, and three such alloys must chiefly be taken into account. They are: 1. Gold-copper or gold-silver alloys; 2. Gold-copper-silver alloys; 3. Gold alloyed with other metals (cadmium, etc.). Equal results will be obtained with copper and silver alloys, if pickling is done with nitric acid, both metals being soluble therein. Consequently, the oxide of copper as well as silver will partly dissolve in the nitric acid, and the color of the pure gold will appear. If the article is treated only for a short time in the acid bath, only the copper oxide is dissolved therein, and the yellow pickled article will appear somewhat paler colored, owing to the silver percentage it still contains; if the article is exposed longer to the effects of the acid, then also the silver is removed from the surface, and the pure gold becomes visible.

If sulphuric acid is used for pickling a gold-copper-silver alloy, it will only remove the copper, while the silver is not attacked when boiled with dilute sulphuric acid. It will be seen, therefore, that with this acid, the pure gold color is never obtained, but always a gold-silver one. It is important, therefore, to the operative charged with pickling, to know of what alloy the article consists. Gold-copper, as well as gold-silver, and gold-copper-silver alloys may be reduced to a pure gold color, when pickled in nitric acid. If sulphuric acid is to be employed for the purpose, only gold-copper alloys can be used.

In order to do the work expeditiously it is advisable for the workmen engaged in pickling to simply pickle articles of one kind of alloy at a time.

With articles manufactured from colored gold—alloys of cadmium and steel belong to this class—the pickling must always be executed with great care, in order nor to alter the color of the alloy by chemical influences.

It is customary to feebly glow heat the articles before exposing them to the operations of the acid bath, for the purpose of destroying any organic adherences, such as fat and dust. Light gold ware, of little value, is but seldom soldered with hard solder, and it may happen when heating such an article that the solder fuses in places. In order to avoid these disagreeable occurences altogether, it is best not to heat, but simply to clean them by a treatment with boiling soda lye. In large factories in which hundreds of articles come at once to be pickled, the following expeditious way can be recommended:

The soda lye is contained in a square shallow iron pan, heated from below to such a degree that the fluid almost boils. The articles to be treated are laid upon a wire tray with iron handles, fitting into the pan, and capable of being sunk in it. After the tray with the articles has remained in the fluid for about ten minutes, it is withdrawn, repeatedly immersed into pure water to remove any adhering lye, and then kept under water until the time arrives that the articles are to enter the acid bath.

The time during which the gold articles are left in pickle depends upon the concentration of the acid bath and from the quantity of the oxide to be dissolved, wherefore, no definite rules can be established. In order not to prolong the reaction unduly, one of the articles is from time to time withdrawn with a glass hook, as a sample; it is rinsed in water and its color inspected. If this appears of a high gold yellow, the vessel is removed from the fire, the acid bath decanted, the articles are repeatedly washed with water, and finally dried.

THE COLORING OF GOLD ARTICLES.

The greater the copper percentage of a gold alloy, the greater the inclination of the color to red. Since this red color is a well-known distinguishing sign of the low grade of the gold alloy, the goldsmith must seek to give the article the appearance of a higher grade, by removing the copper from the surface, whereby the former is enveloped, as it were, in a coat of pure gold; this is best effected by coloring. Since, however, the present method of galvano-gilding offers such great advantages for gold-plating all such articles, the process of coloring in a bath is but little employed at present.

Gold articles are sometimes colored to give them some favorite color.

The fluids used in coloring them evolve chloric gas, and operate very injuriously upon the health of the operative. The master, therefore, should make it his duty of introducing all possible contrivances for preventing the workman who is engaged in coloring—and be it remarked here that very skilful workers are necessary for this—from breathing these extremely poisonous vapors. This is done best by placing a table at a well-lighted place in the work room, against the wall, while its other three sides are inclosed with glass casing reaching up to the ceiling. The wall contains a flue. The front glass side is provided with a sliding window. Upon the table stands a suitable frame, fitted for receiving a porcelain dish, in which the coloring bath is heated by a gas or alcohol flame. During the operation of coloring the workman arranges the sliding window in such a position that he can reach the dish, and also can watch it through the glass, while his face is completely protected against the injurious effects of the vapors, which can escape through the chimney without troubling him.

CHEMICAL COLORING.

The compositions used for coloring gold articles are prepared in different manners. An old one, originating from a time when the goldsmith did not perfectly understand the chemical behavior of bodies, is prepared in the following manner:

Potash saltpeter (nitrate of potash)	weight parts,	4
Culinary salt	" "	2
Alum	" "	2
Water	" "	13

These ingredients are placed into the porcelain dish and very carefully heated. The mixture begins to froth feebly after a while, and to rise, when 2 parts of strong muriatic (hydrochloric) acid are added, and the whole heated to boiling, after which the articles to be colored are inserted.

The saltpeter, in chemical view, is a nitrate of potash, the culinary salt a chloride of sodium, and the alum is a body containing sulphuric acid, the acid properties of which are not entirely neutralized. When boiling the solutions of these bodies, nitric acid is liberated from the saltpeter by the sulphuric acid, while muriatic acid is developed in like manner from the culinary salt. Nitric and muriatic acids together form a fluid from which chlorine is developed (nitro-muriatic acid). As soon as the fluid begins to boil the evolving of chlorine also commenees, and may be recognized by the peculiarly pungent smell of this body. If the article to be colored is immersed into this fluid, the following process occurs:

Copper and gold are at the same time dissolved by the nitro-muriatic acid, while the latter metal, at the time of its solution, is reciprocated as chemically pure gold by the excess of copper, and the article is covered with a film of pure gold, which, of course, shows the peculiar color characteristic to the pure metal.

If the alloy to be colored contains silver, this latter is connected by the fluid into chloride of silver, it is not separated in a solid body, but retained in solution by the salt present, since a solution of the latter is capable of dissolving a certain quantity of chloride of silver.

If the article is left sufficiently long in the bath until the gold layer has attained a certain thickness, the highest attainable limit of this method has been reached—the color of pure gold. If the article is withdrawn before the copper has all been decomposed, a color between the two extremes will be obtained—that of copper and that of gold. Wherefore it depends upon the skill of the workman to interrupt the process at a time in which the article has obtained the desired shade of color, and the not yet thoroughly skilled workman should repeatedly withdraw the article from the bath, in order to inspect its color; if still insufficient, a subsequent action of the bath will improve it; but should it have gone too far, however, nothing can correct the excess again, and the article must be left as it is.

Another and better bath for coloring is composed of the following ingredients:

Dried Culinary salt	weight parts,	115
Saltpeter	" "	230
Water	" "	150
Strong muriatic acid	" "	170

The salt and the saltpeter are first placed into the porcelain dish, the water is poured over them, and, while diligently stirring, the mixture is heated until all the water has evaporated, and an intimate mixture of the two salts remains. If these two salts are reduced to a finely pulverized state, and then thoroughly mixed, the treatment with water, as explained above, may be omitted, and the salt substance may at once be treated with the muriatic acid. This mixture, (after having been moistened with the acid) is then heated until it begins to evolve chlorine, when the article to be colored is immersed.

The manipulation of coloring is very simple: The article to be colored is suspended on a glass hook, this is sunk into the color bath for two or three minutes, it is withdrawn again, quickly rinsed in water, to judge of the color, and, should this not be to satisfaction, it is re-immersed until the desired tone is obtained. The desired shade having finally been obtained, the articles are thrown into a large vessel containing water, and remain therein until all have been colored in like manner. They are washed again, and one after the other dipped into boiling water; after having been withdrawn they quickly become dry.

It will be seen from the above that coloring gold articles is based upon a treatment in a fluid evolving chlorine. Wherefore, in place of the above specified baths, also nitro-muriatic acid, which has been graduated with a corresponding quantity of water and culinary salt, may be used direct. The following is a very commendable mixture of this kind:

Concentrated muriatic acid	weight parts,	3
" nitric "	" "	1
Culinary salt	" "	2
Water	" "	40

The mixture must be prepared fresh each time, and the addition of salt is only necessary when silver-containing alloys are to be colored. One circumstance must be stated in connection with this coloring bath, that it operates more powerfully than the previous ones, and the period of operating is to be lessened correspondingly; it is better to inspect the articles as often as possible, in order to hit the right color.

The surface of the articles is by this coloring altered in such a manner that it appears to be covered with minute gold crystals; wherefore, articles that have been subjected to this process are mat, and assume a high luster only by polishing.

GALVANIC COLORING.

The coloring of articles is at present entirely dispensed with in large factories, and they are simply subjected to yellow pickling; this purpose can be obtained in a different manner, viz., gold alloys of any desirable color and composition may be deposited by the galvanic current.

A gold bath is used for this purpose containing 6 to 7 grains gold per quart fluid, a small silver sheet is placed in, the positive pole of the battery is connected with it, and the negative pole with a gold sheet. After the electric current has been in operation for several hours, the color of the gold sheet is examined from 10 to 20 minutes. If this has assumed that shade desired for the articles, both the gold and silver sheets are withdrawn, and the articles to be colored, as many as the vessel will accommodate, are suspended on wires in the bath, united with the negative pole, and another plate of green gold united with the positive pole. The alloy begins to separate at once, and it depends upon the time during which the articles are left in the bath whether the deposit is to be thicker or thinner. The articles to be colored must have been pickled in the customary manner, and kept under water until they are to enter the bath. They must not be touched with the hand, as the alloy would not deposit on those places.

INCRUSTING WITH GOLD.

A peculiar method by which silver or bronze articles can be ornamented with designs in gold, is called incrusting. The process is as follows:

The article is first thoroughly brightened, and those places intended to be gilt are covered with a substance consisting of white lead, ground into a thin paste with mucilage water, to such a consistency that it may be applied with a feather or brush, like a thick painting color. Those places of the metallic surface which are not covered by the color, are coated with an asphaltum lacquer (a solution of asphaltum in benzine, to which, in order to make it less volatile, oil of turpentine has been added). When this is done the article is laid in water to effect the dissolving of the white lead, and it is then placed into the gilding bath.

Gold is now deposited upon the bright places of the metal by the galvanic current; when the layer has attained sufficient thickness the article is withdrawn from the bath, washed, left to dry, and placed into a vessel filled with benzole. The asphaltum is dissolved hereby, and the desired design of gold now appears upon the bronze or silver ground.

This work may also be executed in such a manner that the entire article is coated with asphaltum lacquer, when the design is engraven with a dull graver, which simply removes the coating without scratching the surface; places bared in this manner are then embellished with gold by aid of the galvanic current, and the lacquer coating is afterward removed in the indicated manner.

(To be continued.)

Mounting a New Wheel.

AFTER THE old wheel has been taken down from the pinion, the riveting place, the latter is corrected somewhat by turning, so that a new wheel can be mounted again firmly and securely.

Having found a suitable wheel, its teeth are inspected, whether they are all equally strong, in fact whether they are sufficiently strong. The wheel is placed into a turning arbor and examined whether it runs round; if necessary, it is first rounded. For doing this, the wheel is lacked, and while the lack is still warm, the spindle is turned and a pegwood held to the circumference of the wheel, which is laid upon the support of the turning tool like a graver, and slowly advanced, until the touch of all the wheel teeth is felt thereon. The hole is next turned concentrically to the wheel's circumference with a tapering graver. Chamfering is done with a chamfer, until the wheel enters sufficiently upon the pinion that it can be driven home.

Before the wheel is riveted in place, it is examined, whether it be not too strong, and if it has the same thickness at each place; if not, it is reduced sufficiently. As by riveting the balance, the wheel is also driven flat upon the pinion with a wooden punch, and next riveted with a drilled flat punch.

A groove is next turned in the wheel around the pinion with a round graver, of such a nature that it may be cleaned out with wood and crocus. After having regulated the corresponding depthing, the wheel arms are filed, the faces ground, polished, or gilt.—[V. LAUER, IN *Allg. Journ. d. Uhrm.*

A Clock and Music Box.

A COTTAGER had a clock which had been owned by his father and grandfather before him, and for a hundred years had ticked off the hours with utmost precision.

Day and night, week in and week out, the old clock kept ticking away, and it was the wonder of the children and the pride of the parents. Although the labor was wearisome and monotonous, the clock had never uttered one word of complaint, and although its face was cracked, its hands rusty, and its general appearance anything but handsome, it had no longings to be anything better than a clock, and to serve the family to the best of its ability.

One day a traveler passed that way, having a music-box under his arm, and while he ate dinner his box played its merry music. When he went away the clock was jealous minded and discouraged.

"Why couldn't I have been a music-box as well as a clock?" it argued with itself. "The box made faces at me because I have no music in me, and yet I am vain enough to think that I know more of music in one minute than any dwarf of a box does in all day. I am tired of being a clock, and I will now delight the family with a tune."

Thereupon the clock began to strike and buzz and hum, and the cottager's wife cried out:—

"Heaven save us! but the old time-piece is bewitched."

The clock tried it again and again, and when the cottager was called in he said:—

"As a clock, it was faithful, valuable, and highly prized. As a music box it is a horrible failure and a nuisance. I will therefore pull it down and sell it to the junk dealer."

MORAL:—If you can shoe a horse don't aspire to become an orator.

Metal Casts.

METAL casts of delicate natural objects, such as flowers, leaves, insects, etc., are, according to Abbas, obtained in the following manner: The object, for instance—a dead bug—is first placed in its natural position, with feet fastened with wax upon an oval rim of wax. It is next suspended with a pasteboard or wooden box, by means of a few fine wires, so that it is suspended free within. A few thicker wires are led to the object from the sides of the box, to form air escapes. A sharp-pointed piece of wood is placed upon the back of the insect, and serves to form the hole for casting. The box is next filled with a paste of 3 parts pulverized plaster of Paris, and 1 part brick dust, stirred with a solution of alum and sal ammoniac. It is best to previously paint the object with this mass, to avoid the formation of air bubbles. After the hardening of the form, it is slowly dried, next heated strong and stronger, whereby the body within it is reduced to ashes, and then left to cool slowly, to prevent cracks. In order to remove the ashes, the cooled form is filled with mercury, well shaken, poured out again, and repeating the operation. The thick wires are next withdrawn, the form heated, and filled with the molten metal. After cooling, the gypsum is carefully softened in water and broken away.

A Dealer Abroad.

To the Editor of the Jewelers' Circular :

LONDON, *Oct.* 10.—Many things in Europe strike our American business men as very peculiar. Englishmen especially are very methodical in all they do, and seem wholly unwilling to sacrifice any of their personal comforts or conveniences for the accommodation of their customers. They come late to their business and go home early, and no amount of persuasion or promise of business can induce them to forego their dinner at precisely the appointed hour. I was at Birmingham recently selecting some goods, and was being waited upon by a very attentive salesman, when he suddenly exclaimed, "it is now my dinner 'our and I must go." I said I would be through in a few minutes, to which he replied "but its my dinner 'our and I must go, you know," and at once began putting up the goods. I said I would like to look at a few more goods, but would be able to complete my purchases in fifteen minutes if he would be kind enough to wait, and I could then employ my time elsewhere. "But I can't, you know; its my dinner 'our. If you choose to call again in the course of a couple of 'ours I shall be 'appy to wait on you, but now its my dinner 'our and I must go," was his response, and go he did while I had to employ myself as best I could till his return. Notwithstanding Birmingham's reputation for "Brummagen" jewelry, some very elegant goods are manufactured here, and he must be a hard buyer to please who cannot invest something in this city to his satisfaction and advantage.

I did not see in Paris any common jewelry so attractive as our own. Our manufacturers of cheap commercial goods excel anything I have seen on this side of the water, both in design and workmanship, while the variety in styles is far greater. But the display of fine goods of all descriptions is very attractive. It does an American good to see the elegant work in solid gold and silver, the precious stones in various combinations, and what would be to us the wealth of labor expended upon them. There certainly is an advantage in catering to the aristocracy and wealthy classes in the matter of jewelry, where taste has been educated to a full appreciation of artistic work. There is rapidly developing here also a great demand for Chinese and Japanese curios, representative of the condition of the arts centuries ago. Some of the collections of goods of this class are not only artistic but very elegant, having also the additional merit of extreme rarity, a special excellence in the eyes of many aristocratic purchasers. Indeed there is many a titled lady who will buy nothing in the way of ornaments, personal or otherwise, that is duplicated. To have the only example of something artistic is quite a passion with many, and is carried to such an extreme that I doubt if they would care to go to a heaven they would have to share with others. But these curios to which I have referred, some of them seven, eight and ten hundred years old, are valuable acquisitions for any lover of art to possess. Of course there is a comparatively limited demand for them, for there are but a limited number of persons who can appreciate their beauty and value. I understood that a collection of them, made by a gentleman who spent a number of years in China and Japan, and who had especially good opportunities for obtaining them, will be exhibited in New York in the course of a few months. This will be a treat to all who take an interest in such matters.

While visiting Holland recently I was surprised to see the number of American watches sold there. It is considered *the* thing to wear a watch of American manufacture. While I was in one of the jewelry stores a gentleman came in and asked for an American watch. On being asked if he had a preference for any particular style he replied that he wanted one made by a "man named Waltham." He was soon satisfied with a Waltham watch and departed. I am satisfied that many more watches of this make could be sold this side of the water if the supply was kept up equal to the demand, and a little American vim put into their introduction, in the way of advertising and selling. But Europeans know nothing of the science of advertising, nor how valuable it is to business men.

Theatrical and journalistic gossips are writing and talking a good deal about Miss Fanny Davenport's diamonds. The Violet Camerons, Nellie Farrens, Florence St. Johns, and Kate Vaughans of English burlesque and comic opera have recently exhibited a spirit of rivalry in regard to the display of jewels, but Miss Davenport is said to have out-glittered the whole of them, and her diamonds are announced to be worth over $60,000. Mrs. Rousby in her day wore diamonds which eclipsed those of Adelina Patti, and a correspondent who dwells somewhat cynically upon those matters says that the "other evening a thrill ran through the stalls of one of our theatres when a diamond star fell unnoticed from the hair of one of the ladies just named, but Miss Fanny Davenport might drop a couple of handfuls and yet she would shine. In fact she is a jeweler's shop in herself." But, after all, in the way of diamonds, $60,000 is really a very small matter. I remember at that famous reception given by Mr. Pierrepont, the American ambassador, to ex-President Grant, at least a score of titled and other distinguished ladies who individually wore upon their heads and around their necks diamonds the size and blaze of which would have left Fanny Davenport's display almost in the dark. The wife of an English commoner residing in the country wears a necklace alone that is worth $100,000; and, if I remember rightly, I should imagine that the lady who some years ago drove London and Paris wild as the grand duchesse in Offenbach's famous opera, must have worn jewels considerably in advance, as to value, of those which decorate the famous American comédienne. It is not without satirical point, in connection with the excitement which is being raised about Miss Davenport's jewels, to read in a recent history of the "Great Diamonds of the World" that out of a list of 67 historic gems the smallest of them (the Cumberland) was purchased over 100 years ago for $50,000, and the "Holland" jewel, which only weighs 36 karats, is valued at $51,840; while the "Nassak," of 78.58 karats, is reported to be worth $150,000. These are single stones; a necklace of such gems would possibly be beyond the dream of even a Manchester princess, a blue-blooded duchess; or Fanny Davenport; though the history of Persia puts in evidence entire costumes of jewels that would outvie a string of Cumberlands or Hollands. Sir R. Kerr Porter tells us, in his travels, of a visit he paid to Tat'hh Ali, the illustrious monarch, on which occasion his Persian Majesty entered the saloon "one blaze of jewels, which literally dazzled the sight on first looking at him. A lofty tiara, of three elevations, was on his head, which shape appears to have been long peculiar to the crown of the great king. It was entirely composed of thickly set diamonds and pearls, rubies and emeralds, so exquisitely disposed as to form a mixture of the most beautiful colors in the brilliant light reflected from its surface. Several black feathers like the heron's plumes were intermixed with the resplendent aigrettes of this truly imperial diadem, whose bending points were finished with pear-shaped pearls of an enormous size. The vesture was of gold tissue, nearly covered with a similar disposition of jewelry; and crossing the shoulders were two strings of pearls, probably the largest in the world. I call his dress a vesture, because it set close to his person from the neck to the bottom of the waist, showing a shape as noble as his air. At that point it devolved downward in loose drapery like the usual Persian garment, and was of the same costly materials with the vest. But for splendor nothing could exceed the bracelets around his arms, and the belt which encircled his waist. They actually blazed like fire when the rays of the sun met them; and when we know the names derived from such excessive luster, we cannot be surprised at seeing such an effect. The jeweled band on the right arm was called the "Mountain of Light," and that on the left, "the Sea of Light." These names were, of course, derived from the celebrated diamonds contained in the bracelets." MAIDEN LANE.

Extraordinary Old English Clock.

A CORRESPONDENT of the *British Horological Journal* gives the following interesting description of an old timepiece: A large eight-day weight astronomical clock, "Green and Bentley, London," playing twelve tunes. Size of dial plate, 18½ inches wide by 25 inches in height. The planetarium in the arch, though of small size, is exceedingly perfect in its various motions and calculations. The sun in the center has the engraved plate screwed behind it, on which is indicated the ages, in daily rates, of the planets Mercury and Venus; Mercury revolving in 88 days, Venus in 224 days. The outer motion is the earth's revolution in 365 days, and the moon around it in 29½ days, and also its motion on its own axis in the same time. There is also an engraved plate on which are the twelve signs of the zodiac, with index pointers showing the earth's and sun's place in the signs; pointing also to the various changes in the shape of the earth's orbit. The earth has its poles inclined 23½°. The top of the dial is supposed to be the north; and the earth is directly above the sun on the shortest day. The inclination of the poles northward is maintained throughout its whole revolution; so also are the various phases of the moon, the illuminated side being correctly always towards the sun, and producing its right appearance to the earth. There are also the periods, in days, of the conjunction between Venus and Mercury, and also between the earth and Venus—the one in 115 days, the other in 584 days. I have had the small globe correctly repainted; you will observe it has the four quarters of the earth written on it. It also shows a tolerable delineation of the various continents and seas, with the equator, ecliptic, tropics, Arctic and Antartic circles. The work for carrying the planets Mercury and Venus had been either taken away or lost. It had therefore to be recalculated—the whole of that part of the work made and planted afresh.

Below the orrery are two circular paintings—one on each side of the dial—one representing a lady playing the harpsichord, the other a man playing a drum. The arms of the figures are moved by long levers from the chime-hammer frame; the feet of each figure also keeping time with the tune. Below the figure on the left is the circle containing the names of the tunes, in the center of which is the square by which the tunes are changed—the hand pointing to the tune required. Under the right-hand figure is the synodical or apparent revolution of the moon, in 29 days, 12 hours, 45 minutes, exceeding the correct time by only 57 seconds in each revolution. This is another proof of the correct calculation of the movements. Usually 29½ days is considered sufficiently near for this calculation, but 29$\frac{1}{2}\frac{1}{3}$ is a very much closer approximation to the moon's mean revolution. The same circle also shows the time of high water in various parts of Europe. The two small hands beneath the circles just mentioned are for opening and shutting the winding and setting holes of the dial plate. The square for setting the planetarium and other work is the highest on the right-hand side of the dial. The square was too large. I have reduced it, and provided a new key. The left-hand openings are for the going and striking parts; the right for the chime part and setting. The whole of this shutting work, which was greatly damaged, is very curious and ingenious.

In giving any description of the center work, you will be good enough to observe that without drawings, or the clock in view, it must appear imperfect; but if studied with the clock, I think it may be some guide to its correct reading. The motion that lies furthest back from the surface of the dial, through the opening, is the great circular plate of the stars. This plate is divided off into the twelve signs, and has two silver bands upon it—one representing the moon's path, whose arc is the same all round the plate; the other is the sun's apparent path, whose arc varies every day. The band of the equator is divided in signs and degrees of signs, and the band of the ecliptic is divided into 360°, from which is found the sun's longitude at any day in the year. This great star plate revolves in 23 hours, 56 minutes, 4 seconds, or, in siderial time. It is carried round by a 24-hour motion, but is accelerated in its daily rate by 3 minutes, 56 seconds by means of a fixed wheel, round which its own wheels revolve. As there are several of these accelerating and retarding movements in the clock, I may just remark that they are all produced by means of fixed wheels. If the fixed wheel is of less number than the wheel that runs into it and around it, the motion is retarded; if the fixed wheel is of greater number, the motion is accelerated, more than usual care being required that the difference of the numbers shall bring out the desired results. The constellations and stars on this plate are, I believe, tolerably well known; and the declination either north or south, and the altitude, are read off from the narrow silvered index through the opening of the dial. Immediately over this plate is the sun's apparent passage through the heavens in 24 hours, or mean time. There is a connection between the star plate and the sun's movement, by means of an eccentric fastened on the star plate, which causes the sun to appear farther from the center at some parts of the year than at others. As the sun passes beneath the silvered index, as well as the stars, its altitude and declination are seen to be constantly changing. The star plate's 3 minutes, 56 seconds daily acceleration is equal to 24 hours in 365 days, so that the star plate has revolved 366 times in 365 days; by which means the eccentric upon the star plate has caused the sun to pass through all its variations of 23½ north and 23½ south of the equator, and following also the band of the ecliptic. By the same means the rising and setting of the sun are seen according to the season and time of the year, also the point of the heavens, by compass, marks where he rises and sets. It is difficult further to explain this matter, except to observe that the opening in the dial is also eccentric, and that as the sun is thrown farther from the center by means of the eccentric on the star plate, it makes a greater arc, and therefore shows earlier and disappears later over the eccentric part of the dial. The dial plate shows a fixed horizon; but the contracting and enlarging of the sun's arc causes the times of its rising and setting to change. Directly over the sun, the moon makes her daily revolution in 24 hours and 50 minutes, or in lunar time. The moon's path in the heavens being nearly in the plane of the ecliptic, it is represented here by a circle whose distance from the center is the same on all points. It therefore cuts the sun's path on the star plate at the vernal and autumnal equinoxes, and frequently shows the eclipses of the sun. The moon crosses the meridian 50 minutes later each day, and alters her phases also according to her age, until, after 29½ days, she is again parallel with the sun, and consequently *new*. Just within the opening of the dial plate is a broad silver band, with the names of a number of places engraved on it, with the longitude and latitude of each. As the sun passes beneath each of these places, it is then meridian, or 12 noon.

The first hand, immediately on the surface of the dial, describes the ascending and descending nodes of the moon, and revolves in 18 years, 225 days. The second hand from the dial plate revolves in 365 days, and points to the day or the month. It also shows the days on which the feasts and fasts and holidays of the calendar fall, on a large movable circle, which should be set at the commencement of a new year. The segment of another circle underneath the large one, points to the changes of the Sunday letter. There is a small sun near the point of the hand, which travels through the signs of the zodiac during the year. There is also a shorter index at the other end of the hand, revolving over three smaller circles—one showing the number of minutes to be allowed between solar and mean time, or the equation of time, another showing the declination, and a third the altitude of the sun—all corresponding to the date of the year to which the long part of the hand is pointing. The third hand from the dial is simply the 24 hour hand of the clock, the upper 12 being *day*, the under 12 *night*. The fourth hand is the ordinary minute hand, revolving in one hour, discharging the striking part at every revolution, and the chimes at every third hour after the striking part has ceased. The two short hands on the lower part of the dial on the left hand are for the lunar and solar cycles. The longer one points to the golden number, the epact, and goes round in 19 years. The short hand points to the dominical letters and the solar cycle, and revolves in 28 years. The hand on the opposite side of the dial describes the periodical or real revolution of the moon through the zodiac, irrespective of the earth's progress, and which occupies 27 days, 7 hours. Under this hand is a very curious dial, revolving in 8 years, 102 days, showing the moon's anomaly, the equation of the moon's center, and its perigee and apogee. The work for this part of the clock was also gone, and it was not without much research and inquiry that I was able to make and replace the missing actions. By a communication kindly sent to me by the Astronomer Royal, I was enabled to do so with certainty. The hand is the pointer, not only to the circle beyond the small dial plate, but also to all the engravings on the circular dial beneath it, which, as well as the hand, is constantly moving, and in the same directions, though at very different rates. The hand makes a revolution in 27, days 7 hours, etc., and the circular plate is 8 years, 102 days in making one revolution. The difference from the apogee to the following one is 27 days, 13 hours, etc. The dial, therefore, has had only to advance 5 hours, 55 minutes during the time the hand has made a whole revolution. It is from the apogee and perigee that the anomaly and equation are dated. The anomaly is the angle formed by the sun, earth and moon, the earth being the base of the angle; and the figures respecting the equation are so many degrees in distance, showing the increasing and decreasing velocity of the moon's revolution, and must be added or deducted when reference is had to the outside circle of the zodiac, to which the end of the hand is pointing, and which indicates the average, but not the irregular progress of the moon's orbit. The notch in the dial plate just beneath the center hole is connected with a very elaborate and curious piece of work, describing, by a small bright surface representing the moon, the declination and altitude of the moon through the whole of her nodes. A large eccentric travels round during one revolution of the moon, causing the small bright surface to rise and fall; but, as the declination and altitude vary with every rotation of the moon, provision is made for the various changes by means of another smaller eccentric within the greater one, and constantly changing its size and direction. This is done by another of those fixed wheels, whose action is so slow upon the small eccentric that it requires 235 revolutions of the moon, or 18 years, 225 days, to bring the two eccentrics to the same point again with each other.

In thus endeavoring to describe the various movements of this valuable and elaborate clock, I have no doubt it will occur to you that I have not used the most appropriate astronomical terms. I have simply tried to explain its motions in those with which I am acquainted. I have also to mention, that in addition to the very numerous and necessary repairs and new work required to the movement, I have, at your suggestion, managed to introduce a maintaining power work to the going part, so as to prevent the whole of the astronomical work from receding during the time the clock is wound.

Cutting Cameo Portraits.

"Yes, the demand for the old style of cameo jewelry is decreasing rapidly, but the demand for good portrait cameos is increasing just as fast. It is the general impression that no good cameo portraits are cut in this country, but that they all come from Paris. As far as I know there are no portrait cutters in this country outside of New York. There is one cutter of cheap cameos in Boston, but they send to New York for all the portraits they have orders for."

"Are there first-class portrait cutters in this city?"

"Yes, there are several excellent workmen. I have made cameo portraits of Garfield, A. T. Stewart, ex-President Hayes, the late Senator Morton of Indiana, Mrs. Scott Siddons, and many other prominent men and women, and here are letters from Mr. Hayes and Mrs. Garfield praising the portraits highly. A galvano-plastic copy of the Garfield cameo I sold for $50 to a sculptor, who had an order to make a marble bas-relief of the late President. The original cameo portrait was bought by a jeweler and set in a broad gold setting, in which thirty-eight larger gems were set; thirty-four diamonds close to the cameo, two rubies above and two below, and two emeralds on each side, without the row of diamonds. This copy of the well-known picture, 'Cleopatra before Cæsar,' I value at $1,000. It is, as you see, an oval, three and one-half inches long and two and one-half wide. The cost of the stone before it was dressed for cutting was $75. I worked on it at frequent intervals for three years."

"Do you make your portraits from life or from photographs?"

"I start them from photographs, as it would be too tedious to do that from life, and finish them in a few sittings from life, it being impossible to get a natural, life-like expression from a photograph. Yes, nearly all the portraits are ordered for making up into jewelry, brooches being the most common, and sleeve buttons next. These are two portraits of a little boy and girl, whose father wants a portrait of one of them on each of his sleeve buttons."

"Where do the best cameo stones come from now?"

"They all come from Brazil; they are taken to Germany, where they are dressed ready for cutting, and then taken to Paris, which is the only market for them, as most of the cutters are there."

"What is the process of cutting?"

"Well, that is very tedious and complicated, and requires very careful manipulation, a good eye for form, and a steady hand. The lathe is the chief factor employed, very fine files and knitting needles ground to infinitesimal points are brought into constant use. The tools are of three kinds—for cutting, for grinding and for smoothing. These detachable tools are tapering iron bars, on the small ends of which are fastened wheels of soft porous iron, to hold the diamond dust better than the steel would. These wheels vary in size from an inch in diameter to such ones as this (holding up one), which an untrained eye cannot see. For cutting, the wheels have sharp edges; for grinding they are blunt-edged; while for smoothing the wheel becomes a cone. The diamond dust, which, mixed with oil and rubbed on the tools, does the cutting, is prepared thus: Here is a cast-steel mortar and a pestle of the same material that fits this deep mortar closely; into the deep mortar I put a few diamond fragments and a drop of oil, insert the steel pestle, and pound vigorously with this hammer. There is the dust ready for use. I make it myself, as it must be of different degrees of fineness for different stages of the cutting, but if you will step this way I will show you the whole process of cutting."

"On a pad of leather, before the cameo cutter, was a block of wood just big enough to be grasped with his hand, and cemented to the middle of it was an oval object that looked like a piece of alabaster, just big enough to make a seal for the finger of a man who did not object to wearing large rings. Upon this the artist was just finishing a copy, with a pencil pointed to needle fineness, of a photograph in profile, of a gentleman, which was leaned against a little photograph easel before him. Having finished the outline, he laid his pencil by, and taking up a fine wire tool he scratched the pencil mark around with it. Then he took a darning needle with a sharp point and scratched the line deeper. He worked with a magnifying glass at his eye, and stopped continually to inspect the progress of his work with critical minuteness. Then he went at it again, working slowly, scratching over the same line again and again, and always examining after each scratch. He changed his tools as he went on, and from the darning needle descended to a trifling little fragment of steel wire, not as thick as an ordinary sewing needle, set in a slender handle.

"With this he scratched and rescratched, until the lines he had drawn with his pencil had quite vanished, and a thin, fine streak of a dark color had marked the outline of the head he had been tracing his way around. Next he took one of his burin-like tools and commenced again. This time he worked on the outside of the outline, cutting and scraping at the surface until the white turned gray, then brown, and finally vanished, leaving the face in relief, surrounded by a black ground—that is, the portrait remained intact in the white substance which formed the outer layer of the cameo, while it had been cut away around it to the lower or dark layer. The portrait or figure is then modulated upon its surface until it assumes the roundness of nature. The edges are left square to the dark ground.

"This is necessary, as, if they are gradually rounded down, the outline becomes undefined toward its juncture with the relieving surface, owing to the white of the raised portion being partially transparent and permitting the dark to show through it when it is thinned down. Care is taken to finish this dark surface as much as possible with the cutting tools, and so separate the white from it as to leave it smooth and unscratched. A final polish is given it, however, with putty powder applied dry with a stiff brush, but the utmost care is necessary in this operation, as the slightest slip will ruin the work. This is the cameo cutter's work, the mountings being the jeweler's work.

Queen Victoria's Crown.

QUEEN VICTORIA'S crown was made in 1838 by the well-known London jewelers, Messrs. Rundell & Bridge, with jewels taken from old crowns and others furnished by her Majesty. It is thus officially described: It consists of diamonds, pearls, rubies, sapphires and emeralds, set in silver and gold; it has a crimson velvet cap with ermine border, and is lined with white silk. Its gross weight is 39 ounces, 5 pennyweights, troy. The lower part of the band, above the ermine border, consists of a row of 129 pearls, and the upper part of the band of a row of 112 pearls, between which, in front of the crown, is a large sapphire (partly drilled), purchased for the crown by his Majesty King George IV. At the back is a sapphire of smaller size, and six other sapphires (three on each side), between which are eight emeralds. Above and below the seven sapphires are fourteen diamonds, and around the eight emeralds 128 diamonds. Between the emeralds and the sapphires are sixteen trefoil ornaments, containing 160 diamonds. Above the band are eight sapphires surmounted by eight diamonds, between which are eight festoons consisting of 148 diamonds In the front of the crown, and in the center of a diamond Maltese cross, is the famous ruby said to have been given to Edward, Prince of Wales, son of Edward the Third, called the Black Prince, by Don Pedro, King of Castile, after the battle of Najera, near Vittoria, A.D. 1367. This ruby was worn in the helmet of Henry V., at the battle of Agincourt, A.D. 1415. It is pierced quite through, after the Eastern custom, the upper part of the piercing being filled up by a small ruby. Around this ruby, in order to form the cross, are seventy-five brilliant diamonds. Three other Maltese crosses, forming the two sides and back of the crown, have emerald centers, and contain respectively, 132, 124 and 130 brilliant diamonds. Between the four Maltese crosses are four ornaments in the form of the French fleurs-de-lis, with four rubies in the centers and surrounded by rose diamonds, containing respectively, eighty-five, eighty-six and eighty-seven rose diamonds. From the Maltese crosses issue four imperial arches, composed of oak leaves and acorns; the leaves contain 728 rose, table and brilliant diamonds, thirty-two pearls form the acorns, set in cups containing fifty-four rose diamonds and one table diamond. The total number of diamonds in the arches and acorns is 108 brilliant, 116 table and 559 rose diamonds. From the upper of the arches are suspended four large pendant pear-shaped pearls, with rose diamond caps, containing twelve rose diamonds, and stems containing twenty-four very small rose diamonds. Above the arch stands the mound, containing in the lower hemisphere 304 brilliants, and in the upper 224 brilliants, the zone and arc being composed of thirty-three rose diamonds. The cross on the summit has a rose-cut sapphire in the center, surrounded by four large brilliants and 108 smaller brilliants.

The summary of the brilliants comprised is as follows: One large ruby, irregularly polished; 1 large broad-spread sapphire, 16 sapphires, 11 emeralds, 4 rubies, 1,363 brilliant diamonds, 1,273 rose diamonds, 147 table diamonds, 4 drop-shaped pearls, and 273 pearls. One estimate in detail makes the value of the precious stones almost £112,000, without taking into account the gold in which they are set. The Agincourt ruby is popularly supposed to be worth "£500,000 sterling," but apart from its historic value it would not bring more than one-tenth of that sum. A few years ago, however, it and two other stones in the Queen's possession were valued at £100,000, so that the detailed estimate already given is perhaps under the mark. The Ampulla is an eagle-shaped receptacle of chased gold, weighing about ten ounces, with an accessory gold spoon, ornamented with four pearls. The coronation ring is a large table ruby engraved with a St. George's cross and set in plain gold. The regalia, it may be said, came near being destroyed at the fire in the Tower, October 30, 1841. They would have been sacrificed but for the pluck of a police officer, Superintendent Pierce, and he didn't even get a royal warrant negotiable at fifty per cent. discount.

THE SEAL, as affixed to letters, has a claim for consideration in the fact of its historic interest. The seals of Sennacherib and Cheops are yet extant; together with a multitude of ancient signets both of the East and West, and our letter seals are probably their lineal descendants and relatives of the official, legal and royal seals still affixed to documents. As symbols of power they were no doubt affixed upon a missive to forbid its opening by an unauthorized person, and their significance would be generally regarded. The early Christians used the sacred devices of the dove, the fish, the anchor and the lyre; and the monks of Durham, becoming possessed of a seal on which was figured the head of Jupiter Tonans, had engraved beneath it the name of good King Oswald, thus sanctifying it to the uses of the Church. In England, before watches were worn, the seal was attached to the wrist, forming, in fact, a pendant to a bracelet. Shakespeare's signet has his initials, "W. S." and a true lover's knot —a device which has led to the supposition that it was given to him by Anne Hathaway. Mary Queen of Scots had a seal with the arms of the Three Kingdoms upon it, and the use of this formed a count in the indictment against her. Another ring of interest, which may possibly have been used as a signet, is the cameo ring in the possession of the Thynne family, which is said to be the identical one given by Queen Elizabeth to the Earl of Essex. This is only one of a thousand signets of historic interest that are still preserved. The "biggest thing" among these belongs, as a matter of course, to America, and was presented to President Pierce by some citizens of San Francisco. Upon this was represented a kind of summary of Californian history and a number of devices, such as a grizzly bear and an enraged boa. Without it was engraved the President's name, and in its interior parts were small cases containing specimens of various native ores. The weight of this precious gift was something like a pound! The materials impressed have been nearly as varied as the shapes of the signets impressing them. Gold, silver and other metals were anciently in use, and even prepared earths or clays. Common wax was, of course, most prevalent before the introduction of sealing wax, a compound of lac and other materials invented in the sixteenth century. White wax was used by Otho I. of Germany and by many of our monarchs. Rufus, however, very appropriately adopted red. Blue is the rarest of tints; green was favored by the emperors and patriarchs of the East. At present vermilion wax is most common, but should the method of sealing letters be revived we may expect, with the resources of modern chemistry and the diversity of modern tastes, a polychromatic range of hues unknown to former ages.

An Official Correction.

ROCK ISLAND, ILL., Aug. 32, 1882.

OFFICE OF THE WATCHMAKERS' AND JEWELERS' GUILD OF THE UNITED STATES.

To the Watchmakers and Jewelers of the United States:

Notice is hereby given that the New Haven Clock Co., having been placed on our black list by too hasty action and incorrect information received at the time, are hereby restored, and are entitled to the confidence of the jewelers of the United States, believing as we now do, that the New Haven Clock Co. always have intended to protect the retail jeweler in his legitimate business. While we acknowledge the error to be ours, we respectfully call the attention of the trade to page 9 of our Proceedings of 1881, where you will see that we have guarded ourselves as well as the interests of the jobbers, so that it will be impossible for a similar affair to occur again. Hoping that the members of the different state associations will in future give the New Haven Clock Co., their share of their business, we remain, very respectfully,

LOUIS HOEFER, Chairman of Executive Committee of Iowa.

Approved, OTTO E. CURTIS, Chairman of Executive Committee of Watchmakers' and Jewelers' Guild, U. S. A.

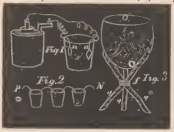
By order of, W. N. BOYNTON, President.

Attested, JOSEPH BAKER, Secretary and Treasurer, MISS C. PATTISON, Assistant Secretary.

Galvano-Plastic Art.

BY EXPERT.

THERE are many useful and ornamental purposes to which the electro deposit of metals can be applied. The writer, a few years ago, devoted some considerable time to experiments in this direction, and several processes which have been made public by other experimenters were discovered by him, and some methods and manipulations (as far as he knows) are still in his hands, or at most imparted orally to friends. Most metals are capable of being deposited by the galvanic current, and the deposit made on molds; but still few know to what a varied extent this may be carried. Copper is for most purposes the most practical metal for general use. I will start with the statement that this metal can be deposited profitably by electricity for one dollar per pound. Various attempts have been made to use the metal cast in this way for useful purposes, like hollow ware, but hitherto some obstacle has rendered the scheme unsuccessful; one reason being that the deposit on articles made in this way were "dumb"—that is, had no ring. Another and more fatal objection was one side of the article so cast, was rough and uneven for many purposes; these objections do not amount to much, or can hardly be called objections. The process of casting medals and similar work has been repeatedly described, and in these articles I will only give a slight notice of such articles, but devote the space to such processes as are comparatively new, and in most cases easy of manipulation. Almost every person, especially those in the jewelry trade, are more or less familiar with galvanic batteries of some form; yet to most of even such persons there are characteristics about the galvanic current which have never been brought to their notice. In these papers, where such characteristics can be made use of to advantage, they will be pointed out. The best form of battery for electro-metallurgy is that known as the Smee, so named from its inventor. These can be bought of any dealer in telegraph goods; Patrick & Carter, 110 South 3d street, Philadelphia, is one place, no better than others, but as good; these gentlemen furnish a catalogue and price list on application. The writer has seen beautiful work done with a battery rigged up out of a flower pot; where there is a will there is a way, is a great truth. You will need a small-sized Smee cup (battery) for each four square inches of surface you are depositing on. We will now suppose that you have a Smee or some other battery, and wish to produce some little article in this way. Copying medals is the simplest experiment which can be done, and to represent a medal we will take an old style cent or some foreign coin. We must cover the back with something which will resist the current, or in other words, interpose a non-conductor, for if we allowed the deposit to form all over the coin, it would simply be encased, and we could not remove the coin. The solution to be used for copper is simply blue vitriol (sulphate of copper) dissolved in water—all the water will dissolve at 90 degrees. There is no need of keeping up this temperature, but it is a fact worth keeping in mind that the higher the temperature the greater the amount deposited, but the deposit will be softer. The power to harden the deposit at will, will be pointed out as the papers progress. A good sized vessel



should be provided for the copper solution, as large work requires some space between the electrodes. For a coin, an ordinary tumbler will answer, and the miniature apparatus shown at fig. 1. A tumbler is shown, but in subsequent operations a vessel holding several gallons will be needed, and a battery of 5 or 6 cups. The coin should be covered all on the edge as far as it would keep the mold from cleaving. To prevent the mold from adhering, dissolve a small piece of beeswax in turpentine—size of a small pea in 2 oz.—dip in this and let dry; or, brush with black lead. Dials of metal for steam gauges and clocks, for such molds, vapor of iodine is the best, as it in no way fills up any fine line or delicate trace. The perfection to which the electrotype process can be carried is marvelous; even a finger stain can be copied by a skilful man. A small copper wire should be fastened to the coin by solder or otherwise, before the shellac coating was applied. Now take a piece of copper the size of the coin, and attach it to another fine wire. Hang the coin in the solution as shown, and connect its wire to the zinc pole; hang in the copper slip and connect it to the carbon pole. In a short time the face of the coin will be covered, and in 10 or 12 hours a deposit half as thick as the coin will be on; a slight tap or bouncing will free the mold; this can be used to cast a *fac simile* of the face of the original coin if desired. This process, so far, is common enough, but after you get a little practice, and know how to manipulate the thing, you can commence with objects of more interest. Pieces of wood, and even fruit and flowers can be coated with copper and then gilded, or silvered, or nickel plated; but such feats require a good bit of practice, and the best way is to perfect one's self in simple details. A piece of wood well coated with black lead is soon coated with a coat of copper. Silver bronze, not such as is sold at the shops, but silver deposited from a solution in nitric acid, by immersing a piece of copper in the solution, makes an excellent coating, by varnishing the article with a very thin coat of Demar varnish—add four times the quantity of turpentine to the varnish as bought. This does well for twigs and small branches of trees, acorns, etc. Pine cones are very pretty treated in this way, but they require great care, as they swell so rapidly. The coating of leaves and even insects are in the possibilities; these are of course imprisoned in their copper casket for a little eternity. The writer has a goblet which he manipulated in this way years ago, and it is an article which has been much admired and wondered over. It was originally a red or ruby colored Bohemian goblet, and by an accident got the foot broken off, when he conceived the idea of coating the lower part with modeling wax, and sculpturing figures in relief, as shown in fig. 3. The engraving gives but a poor idea of the appearance, as the figures are in high relief; they were put on with modeling tools when the glass was a trifle above blood heat, and when cool carved into form; the upper portion of the cup (goblet) is left bare, as shown at *b d*. The wax used was beeswax and white lead—4 oz. of the first and 1 oz. of the latter. The entire lower portion is covered with wax, which completely conceals the end of the broken stem. After black-leading the wax, a coat of copper about as thick as writing paper was cast on, and then the whole thing gilded. The legs *g g g* were made of slips of wild grape vine, with the bark on, and the knot *f*, formed of chalk line twine dipped in melted beeswax. Many small earthen toys, copper coated and gilt or silvered, can be combined into very beautiful combination. The coating of copper can be brushed up with wire scratch brushes to smooth it, not to mat or frost it; smoorh panels can be etched by coating with wax, and scratching through and reversing the article in the battery

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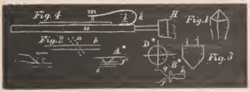
Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

AMONG the jobs which puzzle and annoy the young watchmaker are dial jobs, such as the fitting on of new dials and the repair of old ones. Fitting a new dial in most cases means either putting on one or more new dial feet, or drilling a new hole through the lower plate; the last named method should never be indulged in; either put on a new dial foot or attach the dial with screws. This last named method is adopted by many good Swiss makers, but it requires great care in drilling the dial not to crack the enamel; this is true of all the methods to be described. We will consider the fastening with screws first. The holes for the screws (two generally) are usually drilled outside of the figures or Roman numericals, and at the positions occupied by the figures 12 and 6, or 3 and 9. To drill the holes for the screws depends, for complete success, on *going slow* One consolation in this case, is that after a little practice and we learn to "make all the motions count," that a job is done tolerably quick after all. The best tool for drilling the holes through the dial is a square-pointed drill inserted in a screw-driver handle—a screw driver with a loose washer on the top, so it can be readily and rapidly twirled between the thumb and fore-finger. By a square-pointed drill I mean a point pyramid-shaped, as shown at fig. 1 (magnified). As it gets dull it is sharpened by whetting (on an Arkansas stone) the four faces of the point equally. In drilling, use turpentine; have some little shallow dish into which you can dip the point of the drill. The same tool does well for enlarging the hole for the second hand, and occasionally for the center hole, but as a rule, this hole is large enough to commence with a round file to enlarge it. I should have stated above, that before commencing to work on a dial, a thin paper should be gummed or glued to the face of it, to avoid scratching; tissue paper will answer, but the best is a fine note paper, sometimes called French note. Such a protection not only avoids scratches, but in a measure will prevent the hole from chipping out. The drilling with the square-pointed drill should only be continued until the countersink is deep enough to admit the screw-head, and the copper is laid bare, or rather attacked, to the size of the screw you will use. At diagram *A**, is shown a vertical section of a dial and the countersink; the line at *f* indicates the copper plate on



which the dial is enameled. About the time the drill is deep enough in, the enamel on the inside of the dial will swell (from the copper being forced out) and chip off; the drill can now be applied to the back of the dial and the hole enlarged; but the drill should never be used from the back until the copper rises from the hole toward the front, for if it does, it will split or cleave up the enamel in front. The file used to enlarge the center hole should be kept wet with turpentine. To finish and round out the center hole, and also the hole for the second hand, a tool can be used shaped as shown at fig. 3; these can be bought of the material men made of emery composition, or copper cone and emery and water; the best by far is a copper cone charged with diamond dust. After the holes are all right in the dial, the screw holes should be drilled in the lower plate of the watch for the screws. It is better to make a new hole in the movement than to attempt to drill to match the old ones, as it is not like the holes for dial feet, being quite small, consequently, not cutting up and injuring the looks of the plate. If it is required to use the old screw holes, the best way to proceed is to take a piece of light card or Bristol board, and lay the old dial face down on it, puncture holes for the screws and also for the center hole and the second hand; mark carefully around the old dial with a fine-pointed pencil, and finally cut out with your scissors the paper imitation dial; then try it on the watch and see if all the holes come exactly right; if not, modify and correct them until they do. Gum this paper to your new dial and start your drill in paper holes. If you use feet to your dial and they do not come right, cut them off close and file them off smooth. Next apply the dial to the movement and insert a piece of pegwood into the holes where the dial foot goes and mark the location of the new foot. To make the pegwood mark, whittle it off with your knife until it just goes snugly into the hole, and cut the end off square and smear the top with rouge and watch oil; this will mark the back of the dial so we can see nearly where the foot goes. Now for a new dial foot; this is easily and quickly made. With a small coarse emery wheel, grind off the enamel on the back until a space of about $\frac{1}{16}$ of an inch of the copper is perfectly bare. After the grinding, the surface of the copper should be scraped with a steel scraper, as the solder will not flow well (it seems as if emery was left in the surface). To make a dial foot take a piece of large brass wire (from $\frac{1}{8}$ to $\frac{3}{16}$ in diameter) and turn it as shown at *B**; *h* represents the portion which goes through the plate of the watch; *i*, the disc (or head like a tack) which is soldered to the dial. The neck shown at *g*, is turned smaller than the cylindrical part *h*; this is done to permit the dial foot bending at this point, and not tearing loose from the dial. If hard brass is used (and it turns best) it should be annealed before it is soldered on. The neck at *g* can be quite small (size of dressing pin) and be amply strong. To attach this dial foot to the dial, put your dial on again so all the holes come right, and with a sharp steel instrument mark the bared copper exactly where the center of the dial foot comes, then make a cross as shown at diagram *D**, the lines crossing each other at the exact center of the hole (or rather corresponding to the hole in the plate). This will be our guide in fastening the new dial foot. The flat part *i* of the dial foot should be turned; but if any little excresence should be left at the point designated by the dotted line *j*, it should be filed off flat and smooth. A flat plate of thick brass should be used to lay the dial on when it is heated. At fig. 4 is shown a vertical section of such a plate, *n* representing the plate, *k* a spring made a piece of mainspring bent over as shown, and attached to the plate *n*, by the screw *l*. The dial is simply laid on the plate *n*, and moved about until the spring *k* rests on it and holds the dial foot until the solder melts. The only knack about doing this is to heat the dial slowly, and thus prevent cracking; also let it cool slowly. The thick plate *n* will ensure these results. A dial foot put on in this way will hold either by a button, screw or pin. The repair of chipped dials is something one has to do sometimes; the best composition for this purpose which has come to my notice, is plaster of Paris and white of an egg; plaster Paris and gum water does pretty well. But any composition has a tendency to cleave off from the copper; to avoid this the best way is to rise curls on the copper with a keen graver—diagram *E** shows the method; the little chip should not be broken off, but allowed to remain as a hook as shown. The whole face of the copper should be covered with these hooks, commencing on one side and backing up for a fresh hook. A cake of water color known as "permanent white," does very well for repairs, scraping it up with a drop of water and a knife point; but it darkens by age, where the plaster does not. Figures over such repaired places can be restored by a very fine pencil brush, one of brown sable being the best; red sable will do—a No. 1 is the size—in fact, the smallest you can get. India ink is the best coloring matter. The figures of metal dials are hand painted, but should first be engraved and filled in. Those painted on without engraving are done with oil of rosemary and a little varnish with lamp-black, but it requires a great deal of practice to do it nicely. Engrave the letters with a flat bottom graver, and they fill in quite readily.

Sight.

WHAT THE OPTICIAN SHOULD KNOW ABOUT OPTICS.

Continued from Page 295.

THROUGH our correspondence, two cases have been heard from that were unable to find satisfactory glasses.

Mr. B., about forty years of age, has had great difficulty in reading for some four years. Has made innumerable attempts to obtain glasses which would assist him. He sometimes thinks he has found satisfactory glasses, but, after using them five minutes, the print he is reading runs together. Testing each eye separately, the distant vision is found to be normal, that is, he can read the line No. 20 * at 20 feet. Testing each eye separately with fine print near by, his range of accommodation is found to be satisfactory in each eye. Weak convex glasses do not relieve the trouble, although they make the fine print for a moment a little more distinct. The moment I cover either eye with my hand his trouble instantly disappears, and returns the moment he attempts to see with both eyes.

I placed a prism of glass before the right eye, base downward, and asked him to look at a black vertical line on a sheet of paper. He naturally saw two lines when both eyes were open, and he held the prism before one of them; they were slightly separated, and the upper line was on the right hand, and the top of the line leaned decidedly toward the right; the left line appeared vertical.

Weakness of the superior oblique muscle is the only cause for this condition of things. When he looked for a long time at the letter **A**, for example, with his left eye, he saw this letter in its proper position, but when he looked at it with both eyes, he saw a second letter **A** in a slightly different position—that is, the letter in the right eye appeared slightly twisted to the right, while in the left eye the letter stood vertical. Enquiring into his previous history, I found he had, some years ago, a slight stroke of paralysis, after which he saw double; the double vision gradually disappeared, and this weakness remained. As the disease had been of four years' standing, and the man is obliged to continue has daily vocation, he could not wait for the results which tonics and electricity might bring; he demanded immediate relief.

I gave him a reversible spectacle frame—on one side a convex 48—on the other side a ground glass, with instructions to repeatedly reverse the frames, so as to keep both eyes in use, and only to use them when he found it impossible to get on without them. The unpleasant symptoms were perfectly relieved by the glasses.

SPECTACLES IN GENERAL.

They are manufactured from glass or native crystal. Where glass is used, pure white glass, free from bubbles of air or spots, and of a uniform density, is the best. Natural crystal, commonly called pebbles, should be free from specks; it is much harder than glass, much more difficult to grind, and, consequently, the lenses are much more expensive. They have the single advantage over glass that they are not easily scratched.

Pebbles disperse the colors stronger than glass, consequently, in strong glasses, the rainbow colors are much more likely to show in a pebble lens than in a white glass lens of the same strength. The only practical advantage of pebbles over glass, which has always kept them in the English and American markets, is, they enable us, with perfect honesty, to gratify persons who do not know what they want, but simply wish to pay more than the usual price, or more than their friends did for their spectacles.

Spectacles are *spherical*, *cylindrical* and *prismatic*. Spherical lenses are divided into concave and convex. If a hollow sphere be made to revolve, and is used as a grinding instrument, a plain piece of glass which is ground on its outer surface will be a plain concave lens. If both sides of the glass are ground on the sphere, a bi-concave lens will be produced. Should one side of the glass be ground on the outer surface of a small sphere, and the other side be ground on the internal surface of a larger hollow sphere, a *concave periscopic* lens will be produced.

* See visual tests, June number.

Should a plain piece of glass be ground on both sides on the inner surface of the same sphere, a bi-convex lens is produced. If one surface of glass be ground on the inner surface of a sphere, and the other side on the outer surface of a much larger sphere, a *convex* periscopic lens is produced. Plain convex or concave glasses being but little used, we will consider immediately the much disputed point of the advantages of *periscopic* lenses over bi-convex or bi-concave lenses. The word periscopic means that it is easier to see through the periphery of the lens. It cannot depend upon an increase of the visual field which these glasses produce, as compared with the bi-concave or bi-convex lenses, the field of vision being theoretically smaller through a concave periscopic lens, and greater through a convex periscopic lens.

In practice it is impossible to make the visual field measure any more with one lens than the other. Neither is it possible to obtain any increase of the acuteness of vision which is measureable. You will frequently meet persons who complain of the floor being bent upwards, so they have trouble in walking, or a carpenter will say that every board he planes looks hollow when he has his spectacles on, and the only way he can satisfy himself that it is not so, is by seeing if his straight-edge fits the hollow. He is probably wearing a pretty strong pair of bi-convex lenses, which, if exchanged for periscopic lenses, will cause the trouble to disappear. We are, therefore, forced to the conclusion that the only practical advantage of the periscopic over bi-concave or bi-convex lenses is the avoidance, to a certain degree, of the prismatic effects of the peripheral portions of the lens.

If a plane of glass be placed against a revolving cylinder, and is ground till it fits the convex surface of the cylinder, we have a simple concave cylindrical lens. If the plane of glass is ground on the concave side of a section of a hollow cylinder, a simple convex cylindrical lens is produced. Such a lens acts only upon rays of light which fall in the meridian crossing the axis upon which the lens is ground, at right angles.

If the vertical curve of the cornea is too sharp, we can compensate for it by placing a concave cylindrical lens before it, with the axis horizontal.

If the horizontal curve of the cornea is too flat, as is usually the case in hyperopic astigmatism, we can compensate for the defect by placing a convex cylindrical lens before the eye, with the axis vertical. The axis of a cylindrical lens is always placed at right angles to the faulty corneal curve we wish to correct.

Lenses are frequently ground spherical on one surface and cylindrical on the other, or they may be ground convex cylindrical on one side, with the axes in a certain direction, while the other side is concave cylindrical, with the axis in another direction.

A prism is a wedged piece of glass; it always bends all rays of light in the direction of its base. It is used where the muscles of the eye are too weak to direct both visual axes at a common point, to displace the entire retinal image so that it falls upon the visual spots of both eyes, although the visual axis of one eye is not directed at the object In other words, instead of rotating the visual spot to where the retinal image falls, we move the retinal image to where the visual spot is, thus resting weak muscles from fatiguing exertions. A prism is frequently combined with a lens which corrects a visual defect, both being ground out of one solid piece of glass.

We now come to the much disputed subject of colored and tinted lenses.

Blue glasses will be used independent of their merits, in proportion as the fever for blue glass exists in a certain locality. Everyone will remember the blue glass fever that was epidemic in the United States a few years ago. A London smoke glass allows all rays of light to pass through; it simply diminishes the quantity of light without disturbing the proportions which exist between the different color rays.

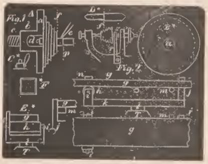
Everyone is acquainted with the irritating nature of yellow and red light. It is, therefore, not unreasonable to believe that where the eye is irritable from disease, or the illumination is unusually intense, the weakening of the light by smoked glass, or the excluding of a certain proportion of the most irritating rays of light by blue glass is agreeable. If blue glasses are to be worn simply because others wear them, simple eye-glasses with lenses will answer. If the eye, owing to disease, is really to be protected, the large watch crystal-shaped glasses are the best. Those that are blown are much cheaper, and usually act as weak concave glasses, while those which are ground are free from such action.

(*To be continued.*)

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

WE WILL spend the time on this occasion in considering the *modus operandi* of putting in a new winding arbor to an English lever—a fusee watch. It is frequent that the winding square is worn away with imperfectly-fitting keys, until a new arbor is absolutely necessary, while the old fusee and wheel are all right. Fusees come already mounted on an arbor, but they have to be fitted up, and it is very difficult to get one exactly right in every way; consequently, as a rule, the old fusee is the one to be used, and only put in a new arbor. We will consider that we are doing the job on a live spindle lathe of some kind, and use a flat-faced chuck, as shown at fig. 1. *A* is a vertical section of the chuck, *B* a front view of the chuck. The face *a* is made of thick sheet brass riveted on the large



wire *b*, while the screw *c* goes into the lathe spindle. Remove the great wheel, and with lathe wax secure the fusee to the face plate as shown at *A*; true up the arbor by holding a piece of pegwood against the old arbor as shown at *c*. As soon as the wax is cold and firm turn off the old arbor even with face (and shown at the dotted line *f*, fig. 1). Center the fusee as if drilling for a pivot, and drill a hole through the old fusee large enough to drive in a new arbor; after the hole is drilled it is well to bore it out with a tool as described in previous number. Next take a piece of steel wire and point the ends and harden and temper it, and turn up to fit tight in the hole you just bored out. It should be shaped as shown at *D**, with a shoulder as shown at *f*, diagram *D**; this goes against the face of the fusee at the dotted line *f*, fig 1. Now if your work is properly turned, the fusee will run dead true when driven on. If the job is *just* right, the fusee will be tight enough on the arbor to never slip, but if any doubts are felt, the job can be made secure by a little soft solder. After using soldering fluid, boil with chalk and alcohol, or dip in a solution of cyanide of potassium; all the pivots and bearings can be turned up to size, and the hole for pin at the foot of the fusee to hold the wheel on, should be drilled. A little care should be exercised in drilling this hole, so as to make it "draw" a little; that is, the hole in the arbor should be a little higher up, so that when the pin is put in it slightly forces the washer upward. The pin should be filed a little oval, so as to not perfectly fit the hole, so that when force is applied to the foot, and main wheel held between the finger and thumb, a little release can be made, so the retaining (or maintaining) power can act freely. In cutting off the portion of this pin which projects after the cutting pieces are used, should be cut with a knife as shown at diagram *C**; to file this pin off always mars the main wheel. I should have said that a double center lathe is indispensable for this job, even if you have a fine American. After the job is done, except the square at the top of the fusee, before the main wheel is put on permanently, should be waxed to the face plate, as shown at fig. 1, and turned up for filing the winding square. The method of doing this will be described, although most of the new American lathes have an attachment for doing this job. A simple and easily made device of this kind is shown at fig. 2. It consists of a bed plate of heavy sheet or cast brass; if sheet brass is used, it should be about No. 8; if cast, $\frac{3}{16}$ of an inch thick, $\frac{7}{8}$ wide and about 3 inches long. Fig. 2 shows the device looking in the direction of the axis of the lathe; *k* is the bed plate, *l* the piece which goes into the rest holder. At diagram *E**, is shown an end view of the device, seen in the direction of the arrow *o*. At *h* is shown a soft copper roller with steel bearings, shown at *i i*. It is not absolutely necessary to make this roller of copper, the whole roller bearings and all can be made of a piece of large brass wire, or the pivots *i i* can be dispensed with and two pointed screws used. The piece *n*, is for the edge of the file to run against for a guide; so also is *j*, figs. 2 and 3. Fig. 3 is a view looking down, and *g* represents the file; *m*, the square to be filed. In using this affair, the tongue *l* goes down into the rest holder until the top of the roller *h* is even with the fusee arbor, and the face of *j* corresponds to the dotted line *p*, shown in fig. 1. The file *g* is worked back and forth, resting on the roller *h*, and the fusee arbor guided by the pieces *n* and *j*. The lathe spindle should be held by something from revolving. Most, if not all of the later American lathes have divisions on the pulley, with a pin going into the holes, thus securing the spindle at four positions, which correspond to the four faces of the winding square. If you have an American without this arrangement, it is easy to drill through and add it. If your lathe is of the Bottum pattern, a piece, as shown at *r*, fig. 4, with a pin *s*, going into holes in the pulley, will do it. It needs no guide for the depth to which you will file, as a very trifle of practice will get you up to filing the right amount; the square should not come to a perfect angle, only "awful" near to it. The square should caliper alike both ways, that is, the distance between the two opposite sides should be equal. Sometimes the faces of the side are ground, so as to remove the file marks, but if a No. 6 Swiss file is used, such extra finish is hardly needed; but you can grind the side by using a flat slip of Arkansas stone, the same as the file on the roller; a strip of glass $\frac{3}{4}$ of an inch wide, roughened on one side by grinding, with oil-stone dust and oil, will give the best results. The extreme top face of the square is finished last; most workmen satisfy themselves by finishing the end slightly convex with a burnish file. But if a perfectly flat face is required, it must go into the triangle described in a former article. The angles are removed as shown at diagram *F**; this can be done either with a fine file or an Arkansas slip, finishing with a burnish file, so as to polish the angles as shown. The face *t* should have been ground dead flat on the ground glass slab, with oil-stone dust and oil, with the triangle before the angles were burnished. Now, if the face *t* is polished on a tin lap, the angles show as perfect as if they also were ground and polished, as the surface they present is so very small. A fusee fitted up in this way is quite as good as a new one. While we are on fusees we might as well consider the matter of ratchets and clicks. There is no lathe equal to an American for putting in a fusee ratchet wheel. The old pins should be turned off smooth, so as to leave the recess where the ratchet or click wheel goes perfectly clear and smooth. Select a ratchet wheel of the right size, and broach it out so it will drive tight on the lower part of the fusee arbor; drive it up firm to the fusee. It need not be so very tight, but tight enough to hold it securely while drilling for the steady pins; drill through the fusee for these, but not through the steel plate which serves for a stop piece. Crowd the pins in tight, and cut them off close up; slip the upper part of the arbor into a split chuck of the right size, face off the ratchet, and turn out the center of the wheel like the old one, to admit the socket of the retain wheel. If a Swiss or Bottum lathe is used, take the chuck shown in fig. 1, only reversing the ends. Very frequently one has a great deal of trouble with the chain running off the fusee; generally this comes from the barrel, but sometimes the fusee is in fault, the little flanges being worn away. In my next we will take this matter up.

Weather Provision by the Spectroscope.

A DISCUSSION in England as to the value of spectroscopic sky observations for purposes of weather provision has elicited from Professor Piazzi Smyth, a letter presenting facts which apparently settle this interesting question. The Astronomer Royal for Scotland writes this letter for the London *Times* of the 23d ult., in which he gives a remarkable prediction, based entirely on spectroscopic weather indications, which was strikingly fulfilled. On September 4, when the spectroscope at the Edinburgh Observatory indicated no "rain band," implying an unusual absence of water vapor in the atmosphere, this experienced observer published a prediction of dry weather, to the great relief of the Scottish farmers. From the 4th to the 9th inclusive, not a drop fell at the Observatory; between the 9th and 14th only a drizzle occurred, but on the 14th, the "rain band" reappearing in the spectrum in all its distinctness, rain began to fall, and the next day measured more than half an inch. The table of "rain band" and actual rainfall observations made at Edinburgh, which Prefessor Smyth gives, also corroborates his mature opinion as to the value of the spectroscope for forecasting weather.

The manner in which the spectroscope accomplishes this useful service is by its power to show whether the upper part of the atmosphere is permeated in a greater or less degree than usual with aqueous vapor. Aqueous vapor is by no means to be confounded with the clouds themselves, but is the invisible water gas, which, during the process of condensation, first becomes clouds and then water, and the absence of which in a considerable degree necessitates fair weather. "If the air vertically above any place becomes charged with more than its usual dose of such transparent watery vapor," as Professor Smyth says, "the spectroscope shows that fact immediately, even while the sky is still blue." Turned to the brightest part of the sky, where the greatest area of well illumined sky is found, a properly adjusted spectroscope shows between the orange and yellow colors of the spectrum, a dark or hazy band—the so-called "rain band"—which becomes more or less intensely dark as the air overhead is loaded with vapor or abnormally dry. Of this fact observation furnishes ample evidence, especially if the instrument is directed at a low, rather than at a high, angle of altitude. "Any extreme darkness, therefore, seen in the water vapor band beyond what is usual for the season of the year and the latitude of the place, is an indication," says Professor Smyth, "of rain material accumulating abnormally, while, on the other hand, any notable deficiency in the darkness of it, other circumstances being the same, gives probability of dry weather, or absence of rain, for very want of material to make it."

It was very recently urged on spectroscopists and meteorologists the importance of testing crucially the apparently great advantages of spectroscopic weather forecasts. Since doing so we have seen a valuable suggestion of Mr. Donnelly, an English scientist, who has found the use of a pocket spectroscope fitted with a telescope (which brings the light from external objects to a focus on its lens, thus enabling the observer to localize the spectra of different parts of the sky) to greatly facilitate this method of weather study and prevision. If the spectroscope can be made to reveal the humidity conditions of the higher atmospheric strata over large districts, it will certainly afford invaluable indications of extended spells of stormy and fine weather, which no instrument known to modern science has ever done. Although some meteorologists have seemed disposed to underrate the importance of Professor Smyth's announcements, repeated since 1878, as to the meteorological value of this simple instrument, none of them seem to have taken the trouble to test them scientifically. Until weather students find some instrumental means of daily examining the conditions and movements of the upper currents of the great aerial ocean, it is not likely they will make any marked advance in perfecting their science or in improving their methods of storm forewarning.

In the present state of knowledge it is not safe to consider the spectroscope as an infallible indicator of rain, since it often shows that a large amount of aqueous vapor exists in the atmosphere, which is not precipitated in the form of rain. The rain-band spectroscope is properly a form of hygrometer possessing an advantage over other forms, but whose indications are to be interpreted in connection with other meteorological conditions. It simply shows the aqueous condition of the atmosphere at any time, and not necessarily whether rain will fall. The advantage which the spectroscope thus possesses is unfortunately to a great extent offset by the indefinite nature of the observation. It is necessary, as Mr. Upton recently pointed out, for the observer to adopt a mental scale upon which to estimate the intensity of the band. Different observers will inevitably frame for themselves different scales, and consequently their results are not comparable. The mental scale of the same observer is likely to change from time to time, and also to vary with the instrument employed. In consequence, rain-band observations are not as yet sufficiently precise in their indications. It is quite possible, however, that improvements in the construction of spectroscopes intended for these observations will remove this disadvantage, in which case the spectroscope will take high rank as a hygrometer.

Simple and Compound Pendulums.

[BY ERASMUS GEORGI.]

Continued from page 292.

GRAHAM'S QUICKSILVER PENDULUM.

GRAHAM'S mercury pendulum has a thin and tight rod, while the mercury, contained in a cylindric glass vessel, and standing in place of the ordinary bob, constitutes the greatest part of the pendulum weight. Now, when the pendulum rod elongates, caused by a rise of temperature, the mercury will also rise, and if the regulating has been made with due care, it will raise the oscillation center in the same quantity it has been lowered by the elongation of the rod. The height to which the mercury column must attain in order to be exact, can be found by computation. It is necessary to add that the mercury must rise nearly twice as high as the elongation of the iron rod amounts to, as the oscillation center is very nearly at the center of the mercury column.

According to Jurgensen, a mercury pendulum will be most perfect if so arranged that the same mercury mass, which, according to Graham, is contained in one single tube, is divided into two tubes, since a greater surface is thereby offered to the influence of the temperature, and a greater sensitiveness obtained.

Accompanying fig. 18 has been arranged according to the proposed construction of Jurgensen's mercury pendulum. At *a* will be seen the lower part of the pendulum rod, parallelogram shaped, that is, of greater breadth than thickness. The rod below ends in a

FIG. 18.

screw, carrying the regulating screw; *c* is a brass tube, which can, without side shake, move up and down the length of the rod *a;* this tube is, with its lower end soldered upon the bottom plate *d d*, of oval form, and strong enough to carry the mercury without bending. The bottom plate *d d* is supported by the piece *e*, which rests upon screw *b*. The screw, upon which sits the nut, passes through a hole, perforating piece *e* and plate *d d;* two cylindric glass vessels, *g h*, are fastened upon plate *d d*, as shown in the cut; two brass rings, which embrace the vessels at their lower ends, are fastened upon it, and serve to retain them in position, while *i k* surrounds them at their upper extremity, and is fastened to them by two screws. These vessels have a depth of 7 inches, and the mercury rises within them to a height of 6 inches 2 lines. To remove any air bubbles adhering to the glass, already Graham, in his time, recommended boiling the mercury. [An additional weight may also be employed, which can be slid up or down the rod, to still better regulate the rate of the clock.]

With a pendulum so constructed, the closest compensation may be obtained, but in order to be secure, its rate must be compared with the motion of the fixed stars. Should the compensation be rather weak, it is easily increased by adding a little more mercury, while in a contrary case, the quantity of the mercury would have to be lessened, in very small portions, however, and of equal quantities from both vessels. If the fragility of glass vessels is feared, they may be replaced by iron ones, the interior of which should be enameled. Iron vessels contract and expand more than those of glass, and they must therefore receive a greater quantity of mercury. Iron receptacles also have the advantage that the best shape may be imparted them, both for cutting through the air, and to assume quickest the degree of the temperature of the air. On the other hand, glass vessels offer the advantage of transparency, and permitting with greater ease an examination whether the mercury be free from air; if not, it must be expelled by the above indicated remedy.

Fig. 19.

We would further mention here Loseby's improved construction of the mercury vessel for the mercury pendulum. This construction, represented in fig. 19, consists in introducing stuffing boxes into the vessel, which permit of an easy adjustment of the vessel. The pendulum rod carries a glass cylinder *B*, containing the mercury. Stuffing boxes *C* are inserted both above and below, into which screws *D* are fastened; the regulating is effected by nut *E*, for which a screw thread *F* is cut at the end of the pendulum rod. To facilitate the addition or removal of mercury at the time of adjustment, small closing screws *K K* are situated at both ends of the cylinder. On account of a more exact measurement, a scale is fastened behind and at the lower end of the pendulum rod, for measuring the oscillation angle.

JACOBS' COMPENSATION PENDULUM.

Jacobs, also, has sought to dispense with the gridiron pendulum, and contrived another one performing the same functions. Although he uses the linear expansion of different metals, yet the construction of his apparatus is different from the contrivances of other inventors.

Its main rod is of steel; its cross section is that of an oval cylinder; and of the length required for the duration of its oscillations. In the lower part of its length it is enveloped by a sort of zinc sheathing, and consisting of two sheets of this metal, which at their rims are united by several screws *C D*, fig. 20, in order to fasten the apparatus in a solid manner by small cross pieces. Both the arrangement of the steel rod and that of its zinc sheet are independent from each other, except that, in order to keep the sheath away from the zinc, and to prevent it from sliding down the pendulum rod, the lower end of the steel rod is provided with a screw thread, upon which sits a round nut, carrying the said sheath; this nut can be placed higher or lower in the ordinary manner.

The upper part of the sheath is cylinder shaped, and ending in a screw; it carries a disc nut, which serves as support to a hoop; this hoop, again, serves as support for two steel rods, which are fastened with their lower ends to the bob, and carry it, whereby it must be well observed that 1, the bob be unconditionally free from the steel rod, and that its zinc sheet only serves it as support, and 2, that the length of the zinc sheath is calculated according to the law of linear expansion, in order to produce more effect than necessary, thus that for regulating it, it is only necessary to shorten it by lowering the disc nut in a sufficient quantity.

The following is the operation of this ingenious apparatus:

Let us suppose that the pendulum is fastened to a good clock, its length regulated at a constant temperature, and it becomes necessary to correct the compensation.

The temperature is raised in the customary manner, and we find that the clock advances more than formerly, which will lead us to conclude that although the heat has elongated the rod, which should have produced a retardation, the disc screw, serving as support for the bob upon the zinc sheath, has also become elongated, and this bob has ascended in the same quantity; that it has been sunk less by the former operation than it was raised by the latter one. The pendulum, therefore, has actually been shortened, the oscillation center approached toward the suspension, and the zinc part has become too long thereby, when compared to that of the steel.

In order to shorten it, the disc nut, below the supporting hoop of the bob, is turned in a suitable direction for placing the latter a little lower, whereby two effects are produced: the former consists in a shortening of the zinc tube that produced too strong a compensation; the second, in a lowering of the oscillation center, by which the rate of the clock is retarded; this latter effect is not sought to be obtained, however, since it would alter the general rate of the clock; we raise the oscillation center in the same quantity by turning the screw at the end of the pendulum rod. Both screws having uniform threads, it will be easy, with the assistance of an index and equal divisions upon each of the two disc nuts, to turn them in equal quantities, so that with this whole alteration only an effect is produced upon the compensation.

This compensation pendulum, therefore, can be regulated in a manner without disturbing either the clock or pendulum, almost without stopping the latter, or at most arresting its motion only for a moment. Nothing is easier, therefore, than the manipulation of this apparatus, and, by repeated essays, to bring it to the highest point of perfection.

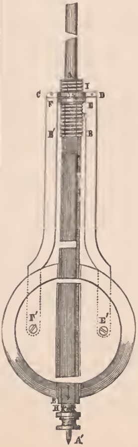


Fig. 20.

Fig. 20 shows Jacobs' compensation pendulum in a vertical cross section. *A A* is the oval steel rod. End *A* carries the suspension hook, and end *A'* is provided with a screw, for accommodating a nut. Upon this rod is placed a zinc sheath *B B'*, consisting of two zinc sheets connected at several places with each other by small cross bands of the same metal and the upper end of which is fastened at *I*, furnished with a screw thread The steel rod is, through an opening in the middle of the sheath, maintained in such a position that it can move freely; the sheath is retained in place on the rod by nut *H*. Upon the part of the sheath provided with a screw thread *I*, is screwed a nut *G*, upon which steel disc *C D* is freely placed. This disc is provided with two lappels, from which the bob is suspended by means of the two rods *E E'* and *F F'*, starting from the horizontal diameter. The length of the zinc is calculated so that when the nut placed at part *I* is screwed upward, an excess of compensation takes place, and by slowly screwing the nut downward, the requisite length is finally obtained. The nut

H, placed at the lower end of the steel rod, also serves to correct an advancing or retarding, in the customary manner.

BAILY'S COMPENSATION PENDULUM.

Baily's compensation pendulum consists of a lead cylinder fastened to an ordinary firwood rod. He took a cylindrical firwood rod, of suitable dimensions, not less than 46 inches long, and about ⅜ inch thick; next procured a lead cylinder, perforated through its center, and which freely accommodated the end of the rod, and of such dimensions that it could be reduced upon the turning lathe to 14.3 inches and the required weight. These dimensions are based upon the assumption that firwood expands by 0.0000022685, and lead by 0.0000159200 of its corporeal contents per 1° F.

According to Baily's statement, the following are the corresponding weights of a cylinder 14.3 inches in length, with a hole ⅜ of an inch in diameter through its center.

Diameter of Cylinder.	Weight of Cylinder.
1¼ inch	6.56 pounds.
1½ "	9.73 "
1¾ "	13.47 "
2.0 "	17.80 "
2¼ "	22.70 "

However, Baily forgot to duly consider the influence of humidity, which is even a still greater cause of aberration, when pine or firwood is concerned, than the influence of heat. In order to render the rod completely insensible to atmospheric humidity, Bryson, a Scotch watchmaker, subjected the former to a strong heat until all moisture was driven off, and he next overcame its inclination for absorbing other portions by immersing it in copal varnish.

Of course, it is understood that the pendulum rod must be completely ready before it is submitted to the above described operations; it stands to reason if further manipulations were necessary, that places would be bared thereby which would absorb fresh quantities of atmospheric humidity.

RULES CONCERNING ZINC RODS.

Jurgensen says that it is useless to observe the several precautions necessary for compensation, if due care is not bestowed at the same time upon humidity. That, above all, attention must be directed toward the stretching, which may occur with zinc rods. They carry the entire weight of the bob, amounting to at least 12 pounds, and if such rods do not possess the necessary thickness, they would either stretch or bend, as zinc does not possess the rigidity of iron. Experience has established that it is well to make those rods about double the thickness of iron ones; if these are taken at 3 lines diameter, those of zinc should be from 5 to 5½ lines, and no bending or lengthening need be anticipated. It is also necessary that the pins connecting the zinc rods with the two crosspieces be of sufficient strength, of nearly 1½ lines diameter, and lie upon their faces for the whole length or depth of the holes; otherwise it might happen that the weight of the bob would drag them down into the zinc, by which a noticeable elongation would be caused, followed by important disturbances in the rate of the clock.

THE BALANCE AND THE BALANCE SPRING.

BERTHOUD'S AXIOMS.

The pendulum serves as regulator of stationary clocks, while the circular balance discharges the same functions in the watch.

The first watches had small steel balances, which were very light, and without spring; wherefore they had a very irregular motion. The celebrated Huyghens, in the year 1675, invented the balance spring, which he applied to the balance, and noticed that its vibrations were shorter and quicker in ratio with the strength of the spring, and became feebler and longer the weaker the spring was. It has been found since that it is very easy to obtain a great exactness with these mechanisms, if, for purposes of obtaining the highest possible regularity, the following three elements are duly proportioned, viz., diameter of balance, its weight, and the power of the balance spring.

The truth was known, but the practical execution was nevertheless very difficult; science had not yet made sufficient progress to attempt the solution of such a problem, and it had to rest content with experiments, before it obtained decided results. Even at the present day it is not sufficient to be versed in theoretical science of the highest degree; it must be accompanied with practice, in order to apply science correctly. We have ocular demonstrations of this fact before us every day. We next will establish a few axioms on the power of the balance motion.

It has been proven that the power exerted by bodies in motion, to surmount obstacles, stands in an exact proportion to their weight and the square of their velocity. Now, since the power produced in a body is equal to the cause which produced it, it follows that the power which was exerted to transport a body into motion is equal to the product of the weight of this body and of the square of the velocity it has acquired. When we compare two bodies of different dimensions with each other, and designate with large letters the parts of the larger body, which we take as illustration, and choose small letters to designate the corresponding parts of the smaller body, we would designate with A the first part, or balance; with M its weight, with G its velocity, with K its power; in the same manner, we will designate with a the second small body, or balance, with m its weight, with g its velocity, and with k its power. We now have the proportion: $k : K = g^2\ m : G^2\ M$. Since, however, with each geometrical proportion, the outer parts are equal to the inner ones, we obtain thereby the equation $k\ G^2\ M = K\ g^2\ m$, which is the general formula for all cases that will occur.

1. When the two powers are equal, that is, if we take $k=K$, they may be left away from the two parts of the preceding equation, because we would then divide both parts with the same figure, whereby the quotients are not altered. Thus we will obtain $G^2\ M = g^2\ m$, which means in words, if the powers of the two balances are equal, then are the weights, multiplied with the squares of their velocities, also equal. A geometrical proportion may be deducted from this latter equation, by considering the first part as the product of the outer, and the second part as that of the inner; thus we will have: $G^2 : g^2 = m : M$, that is, if the powers of the two balances, set into motion, are equal, then the weights are proportioned in a reverse ratio as the square of their velocities; or, if the weights are proportioned in the inverse square of their velocities, then the powers of the balances are equal. If, for instance, the velocity of $A=1$, that of $a=2$, the square of the velocity of $A=1$, and the square of the velocity of $a=4$; if the weight of the balance $A=4$, and that of $a=1$, and we set these figures in the place of the letters of the last equation, $G^2\ M = g^2\ m$, which expresses the value of the power of each one of the two balances, then we have $1+4=4+1$; wherefore the two powers are equal, because $4=4$. Whereby the truth of our premises is ocularly demonstrated.

2. If the weights of the two balances are equal, and we have $m = M$, then the original equation, $k\ G^2\ M = K\ g^2\ m$, becomes the equation $k\ G^2 = g$, by dividing the two parts with the two equal dimensions $m=M$, whereby the proportion is obtained: $k : K = g^2 : G^2$, that is, if the two balances are of equal weight, and move with unequal velocities, their powers are proportioned to each other as the squares of their velocities. If, for better understanding, we take figures instead of letters, and assume that the velocity of the balance A be expressed with $G=1$, and its square, or $G^2=1$, that the velocity of balance a be expressed by $g=4$, and its square or $g^2=16$, then the above proportion would change into the following one: $k : K = 16 : 1$, which signifies that the power necessary to sustain the motion of balance a is proportioned to that necessary to sustain the motion of balance A as $16 : 1$, that is, that these powers are proportioned to each other as the squares of their velocities.

3. If the velocities of the two balances are equal, that is, if $g=G$, then the original proportion, $k : K = m : M$, is of value, and, consequently, the powers will be proportioned to each other as their weights; consequently the causes sustaining their motions will also be proportioned as the squares of their velocities.

4 If the velocities and the weights of the two balances are unequal, then their powers will be proportioned to each other generally as the products of their weights added to the squares of their velocities, which is expressed in the first and original formula: $k : K = g^2 + m : G^2 + M$.

These axioms, established by Berthoud, are made use of in order to solve all problems pertaining to the balance, and to determine its weight, diameter, power necessary, arc to be described by it, etc.*

If the weight of a balance, its velocity power, which sets it into motion, of a well-constructed, well-examined watch is known, which may serve as data for comparison, the conditions necessary for the balance of another watch may be deducted therefrom, as soon as its deviations, or more or less velocity, or more or less moving power, are ascertained.

(To be continued.)

The Mission of the Goldsmith.

THE GOLDSMITH expresses in his works the sentiment, spirits, and culture of his period. The more exalted the sentiment of the age, the purer are the conceptions, and the more artistic the works of the goldsmith. A sober and ignorant age also produces only a miserable treatment of the noble metals. Depraved taste does not understand to array itself in an artistic manner; its low vanity is satisfied with coarse, unwieldy trinkets, or the glittering ornament of a boastful, pretentious style.

The goldsmith was originally only a smith, who fashioned gold and silver into useful shapes, as the latter does iron. Growing culture, however, in individual people not alone awakened a desire for the possession of useful articles from the noble metals, but the possessor also wished to have its value augmented by more exquisite work, so that, as it were, the possessor would be distinguished among men by his superior ornaments. The kings demanded diadems, the heroes golden shields and weapons, the nobles handsome dishes and vessels for their table, the priests gold and silver ornaments for the temples, and the ambitious citizen finally desired spangles and bracelets, rings and chains, to serve as a noble distinguishing mark of his self-respect. The tradesman of whom all these demands were made, exerted his taste and ingenuity to always produce something better and purer. The silversmith no longer cast his trinkets, but gave them finer forms by hammering according to models; he embellished them by engraving upon them arabesques, flowers, figures, and entire pictures, and enhanced this style by mounting jewels; he skilfully added single pieces to form a whole by choosing different substances—silver, gold, ivory and jewels; he invented enamel. And thus the tradesman became an artist, one of the highest rank. He was called upon to adorn architecture, and became the chief auxiliary of the architect, the sculptor, the painter. The Bible and many historians of the Greek speak of this rise of the art of goldsmithing among the old cultured nations. Solomon's temple glittered in the pride of gold adornment; 666 hundredweights were employed for its embellishment. Homer exalts the golden arm of Glaucus, and the exquisite inlaid shield of Achilles. Semiramis caused gold and silver statues to be erected, and the greatest of all Greek artists, Phidias, was a goldsmith, who built temples, and in them set statues of the gods in a hitherto unknown perfection. In Sycion, Samos, Corinth, and Athens, the most excellent goldsmiths manufactured those vessels, ornaments, and master-pieces, for which the Romans afterward paid incredible sums, and which we marvel at to-day as the proof of the eminence of an art vocation.

As already said, the goldsmith in his productions characterizes the grade of culture both of his people and age. During the flourishing period of Greece, we find it upon the highest pinnacle of art; gradually it descends, commensurate with the increase of ignorance and wars, and finally the sun of culture sets behind them. In Rome, where the conception of the ideal languished and perished in the viciousness of the emperors and the brutality of the people, the goldsmith finally becomes the panderer simply for the senseless, boastful lavishness, and his art becomes nothing else than a more and more degenerating imitation of Greek works. Heliogabalus adorned his rooms with gold, only dined from gold plates filled from gold and silver vessels, which he presented to his companions, servants, and the hungry multitude before his palace after a nocturnal orgies; he caused gold dust to be strewn in his path, in order to show that he, as the first of Rome, could waste its possession and blood. But art had no companionship with this senseless expenditure, until, after a night of a thousand years, a new era began to dawn upon it, and as long as the merciful mission of Christendom shall exist, the art of the goldsmith will also not perish.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

W. N. BOYNTON AND THE GUILD STAMP.

To the Editor of the Jewelers' Circular:

A year ago your excellent Journal had a fine editorial eulogizing W. N. Boynton for the interest taken in the welfare of the retail jewelry trade, and wishing that there were more that would take hold of the work and do as well. In your September number, you have branded this same W. N. Boynton as a liar, and insinuated that he is a known adventurer and schemer.

Let us investigate and see why you should experience such a change of sentiment. A year ago, Boynton was making an effort to establish a uniform price list for bench work, and to get the different jewelers in the same town to realize that their competitors were all men, one just as good as the other, and not the mean persons they had always believed them to be, and in this work he left home and business, taking a stock of goods with him to assist in paying expenses. W. N. Boynton was then a gentleman and a philanthropist.

Now, this same W. N. Boynton is the representative of all that is bad, and is making a strenuous effort to revolutionize trade and break up the business of all retail jewelers. Why is this thus? Simply

* J. H. Martens, in his excellent work, "Descriptions of the Escapements of the Higher Horology," page 153, gives the following instruction for ascertaining the diameter, height and weight of the balance as proportioned to the size of the watch:

a. In order to determine the diameter of the balance for a watch, it is necessary to be governed by the dimension of that circle from whence the power of the watch mainspring emanates. The size of this circle is the barrel. Wherefore, the diameter of the barrel cover has to be accepted as the determining power.

b. As guide for establishing the height of a compensation balance, 4-9 of the breadth of the mainspring must be taken.

c. The weight of a balance can best be determined according to its size. The following are the proportions always used by me (Martens) with best results: The compensation balance, if to be used for an anchor or a duplex movement, and of a diameter of

14 mm.	(0.55 inch)	must have a weight of	5 grains.
15 "	(0.59 ")	" " "	6 "
16 "	(0.63 ")	" " "	7 "
17 "	(0.67 ")	" " "	8 "
18 "	(0.70 ")	" " "	9½ "
19 "	(0.74 ")	" " "	11 "
20 "	(0.79 ")	" " "	12½ "
21 "	(0.83 ")	" " "	14 "
22 "	(0.87 ")	" " "	15½ "

Common brass balances, or those without compensation, or balances intended for watches of less strong construction, although being anchor or duplex escapements, the following will be found to be correctly proportioned:

14 mm.	to receive a weight of	3½ grains.
15	" " "	4 "
16	" " "	4½ "
17	" " "	5 "
18	" " "	6 "
19	" " "	7½ "
20	" " "	9 "
21	" " "	10½ "
22	" " "	12 "

The balance must be somewhat lighter for cylinder escapements.

The following is a good proportion for balances of free escapements for pocket chronometers. A balance of

16 mm.	diameter must be of a weight of	13 grains.
17 "	" " " "	14 "
18 "	" " " "	15 "
19 "	" " " "	16½ "
20 "	" " " "	18 "
21 "	" " " "	19½ "
22 "	" " " "	21 "

because in his efforts to get the retail jewelry trade into better shape than it has been heretofore, he is the champion of the Guild stamp, and THE CIRCULAR does not take kindly to the idea.

It is right and proper that there should be difference of opinions in this world, and each person has an undoubted right to hold his own opinions; but applying epithets to each other never convinced any one that his ideas were wrong. Your interests are not identical with the retail jewelers, consequently you do not look at this Guild stamp in the same light that we do, still I do not declare that you are not honest in your belief, and instead of prophesying that the associations will go to the wall for giving the stamp a trial, you ought to encourage the associations to keep at work and advise them to go slow, but not to throw away the chances offered. If the Guild stamp proves a success, then you have made a mistake, but if it does not succeed, then some other method can be tried.

Now let us look at this Guild stamp bug-a-boo you are so frightened at and are so opposed to. In the first place there are five state associations working under the auspices of the U. S. Guild, and probably the average number of members in each state is 150, making a total membership of 750, and out of this number it is likely that not more than half will handle Guild stamped goods till they find the goods are in demand and are suitable. This leaves only 375 customers for the manufacturers to solicit trade from. You claim that the stamp ought to be common property for the several manufacturers. There are, say, one dozen manufacturers that make flat ware. Do you really believe that each manufacturer would care to go to the expense of getting up a stamp and get out such goods merely for his share of this 375 customers? Of course not. You also claim that all in the trade should be allowed to handle these goods. Well, perhaps they should. It isn't for me to say, but under the existing circumstances, it is certain if no one but members of some state association can get the goods, it is morally certain that no outsider will be apt to keep them for sale. You also claim that all we retail jewelers have to complain of is, that outsiders handle inferior goods, and having no reputation at stake, recommend and sell their goods, thus cheating us out of a sale. This is not wholly the case, for flat ware is handled largely by outsiders and is of the same quality as ours. You will agree that the public would not be overcharged for spoons or forks if they paid list price for them at retail, but a hardware store doing a business of $25,000 to $50,000 per annum can afford to sell goods at smaller margins than a retail jeweler can who sells from $2,500 to $5,000, and while the jeweler will charge list price for what spoons and forks he sold, the hardware merchant would throw off half his discount and thus take the trade from the jeweler. The customer knows too that he is getting just as good ware, for the jeweler keeps the same goods and has recommended them, but if he has Guild goods and recommends them, the customer cannot get them of the outsider, and being assured that the Guild goods are the best in the market, the jeweler gets the trade which rightfully belongs to him.

If the Guild goods create a demand for that class of goods, then other manufacturers will care to make them, and the retail trade knowing that the association has succeeded in protecting them in the sale of good goods in their line, they will become members, thus increasing the number of customers for manufacturers, and all will be lovely.

In this connection, allow me to allude to your correspondent in the September number, styling himself "A Disgusted Dealer." It is a pity that an editor cannot discriminate, but so long as he publishes communications from one correspondent, he must extend the same courtesy to another, still he ought to be allowed to exclude those articles by correspondents sailing under false colors.

Any one with half an eye could see that this disgusted dealer was no retailer, but either a jobber or manufacturer's agent. His claim to being a member of the Illinois association was altogether *too thin*. A man that does not write his honest convictions will hide himself behind just such a mask. It is certainly a sure thing that no retailer has been injured by any of the officers of the associations, neither has he been injured by being a member of any state association.

Yours very truly, W. H. THORP.

[In reply to the above letter we will endeavor to answer Mr. Thorp point by point. 1st. It is true that we commended Mr. Boynton for the active part he took in securing a uniform tariff of charges for bench work. We also commended him for the interest he took in aiding in suppressing the price list and catalogue nuisances. This was the legitimate work of the state associations, and we approved of the course taken by them in regard to it, and of the individual members who were active in the matter. 2d. We have never "branded W. N. Boynton as a liar." Mr Boynton made the assertion publicly that the eastern manufacturers of plated ware had been requested to manufacture goods bearing the Guild stamp. This assertion was endorsed by Mr. Shurly. Knowing it to be absolutely false, we stated that it was so, and in support of our statement, we published letters from the eastern manufacturers denying that they had ever been consulted regarding the matter. Having thus proved that Mr. Boynton had deliberately made one statement in public that was untrue, we said that he was unworthy of credence in anything he might say in future. The old latin maxim, *falsus in uno, falsus in omnibus*, applies as well to Mr. Boynton as it has through past ages to men far more distinguished than he. It is one thing to prove a man guilty of falsehood and another to apply to him an epithet never used by gentlemen. 3d. Mr. Boynton has not been so scrupulous in speaking of THE CIRCULAR and its editor. On the contrary, being unwilling to accede to an honest difference of opinion regarding the Guild stamp, he has, in his public utterances, charged us with being instigated by the basest motives, selling our editorial opinions to the manufacturers, and being subsidised by "wealthy corporations." It is he who has indulged in offensive personalities which we have not deigned to notice. He has followed the advice once given by a veteran lawyer to a student, "when you have a bad case abuse your opponent's attorney." Finding he had a bad case, Mr. Boynton has relieved what he calls his mind by abusing THE CIRCULAR. 4th. We do not care to reargue here the question of the desirability or otherwise of the Guild stamp. We think that the retail trade fairly understands it, and understands also that we have opposed it simply as a matter of principle in their interests. Mr. Thorp makes no points in its favor that have not been already fully discussed. 5th. Mr. Thorp makes the wholly unwarranted assumption that the letter in our September number signed "A Disgusted Dealer" was not written by a member of a state association. We would be quite as well justified in asserting that the above letter was not written by W. H. Thorp, although it bears his signature. The letter by "A Disgusted Dealer" was accompanied by the real name of the writer, whom we know to be a gentleman in quite as good standing in the trade as any member of the Illinois state association. We presume Mr. Thorp does not wish to insinuate that we give space to bogus correspondence, but his remarks would bear that interpretation. We beg to assure him that all our correspondence is genuine, and comes from gentlemen interested in the subject, and for whose identity we can vouch. 6th. We have endeavored to give the state associations full credit for the good work they have done, but they certainly are not above criticism. When they make a mistake we shall endeavor to point it out that it may be remedied, as we have with the Guild stamp, and when they lag behind in the work that should be done, we shall endeavor to spur them on. We have no desire to indulge in any personalities in this or any other controversy, and if we have made any reflections upon Mr. Boynton, he alone is responsible, because of the false assertions he made, and his most contemptible, unwarranted, and malicious accusations against us.—EDITOR THE JEWELERS' CIRCULAR.]

NATIONAL LEGISLATION AGAINST FRAUD.

To the Editor of the Jewelers' Circular:

I have read with much interest your articles regarding the Guild stamp and agree with you entirely that there is nothing in it calculated to benefit the retail trade. On the contrary, I should regard the introduction of goods so made and stamped as highly injurious to our interests and calculated to breed more harm than good. I am not a member of any state association, nor will I join any that endorses the Guild stamp. I should have joined the one in my state but for circumstances beyond my control. I was in sympathy with the organizations from the first, and heartily endorsed the warfare made upon the catalogue and price list abuses, but I cannot swallow that two year's contract with a single manufacturing company for a limited line of plated ware bearing the Guild stamp. If dealers buy their flat ware entirely of this company, where will they obtain the rest of their goods? The old manufacturers are not going to supply them with a part and let them buy another part from a preferred company for the express purpose of depreciating their goods. This is what it comes to. Dealers who handle the Guild stamp goods are expected to say "these are a better quality of plate than any other; we can show you other goods, but cannot recommend them as we can these, for these are endorsed by our association." Is it reasonable to suppose that the other manufacturers will consent to be discriminated against in this way? Or will those who are not members of associations consent to be thus misrepresented by those who are? I shall not, for one; if this competition springs up in my town, I *propose to hold my trade*, and to make competition hot for whatever attempts to push the Guild stamped goods at the expense of other brands that are well known and satisfactory. But I do not anticipate any serious competition in this direction, for I think THE CIRCULAR has so opened the eyes of dealers that very few Guild stamp goods will be offered to the public.

I fully endorse your plan of national legislation to prevent fraud in the manufacture and sale of jewelry. I think the public should to be protected from frauds of every description, and as the legislature of this state cannot prescribe the quality of goods manufactured in the eastern states, it remains for the national government to establish standards of value. As it would be impossible for the general government to say what would be the standard of purity in all kinds of goods that enter into commerce, it might answer every purpose if congress would enact a law simply declaring that any misrepresentation in the manufacture or sale of any article whatsoever, should constitute a misdemeanor, and provide heavy penalties for violations of the law; it seems to me that the end would be reached. Then if a manufacturer of flour adulterated his product, he could be prosecuted as a criminal; if the grocer put sand in his sugar, or the milkman watered his milk, or the jeweler degraded the quality of his goods, he could be reached and punished. There is so much adulteration in everything one buys, that restrictive legislation is necessary, and as one state cannot legislate to control inter-state commerce, it follows that the national government, that clearly has this power, should do so. I believe in a paternal government, and also that when the children of that government persist in lying and stealing they should be punished, as a wise and judicious parent punishes the fruit of his loins when they go wrong. There is no denying the fact that there is a vast amount of bogus jewelry floating around in the trade, and we retailers are victimized quite as much if not more than the public. For my part I should like to be protected, and I hope you will agitate the subject until the end is reached. OHIO RETAILER.

So-Called Accidents in the History of Inventions.

IT IS a peculiar fact that frequently the most important inventions and discoveries owe their origin to very trifling accidents. Guttenberg, according to some, saw the print of a horse's shoe in the dusty road, and gave us the art of printing. A philosopher observed the fall of an apple, and discovered the law of gravity. An alchemist who tried to compose an earthly mixture to make fire-proof crucibles, invents porcelain. A watchmaker's apprentice holds a spectacle glass between thumb and fore-finger, and is astonished at the large size of the point of the neighboring church steeple—and the telescope lens was invented. A Nuremberg glazier, in using nitric acid, accidentally lets a few drops fall on his spectacle lens; he noticed that the glass appeared softened and attacked; he then drew lines with varnish on glass, and moistened this with nitric acid, scratching the softened glass away around the edges of the varnish. After removing this, he had the raised picture upon a mat ground, and the art of glass etching was invented. The slow oscillation of the chandelier in the Dome of Pisa suggested to Galileo the invention of the pendulum, he discovering the law, Huyghens practically adapting it. Lithography also owes its birth to an accident. A poor musician was curious to ascertain whether notes might not be etched on stone as well as on copper. Having prepared his stone, his mother asked him to write down a wash hill. Having neither ink nor paper, he jotted the list upon the stone with his caustic preparation, intending to copy it. He desired to clear the stone a few days afterwards, using nitric acid, and in a few minutes the writing stood in relief upon the stone. Of course the next step was to apply printing ink, and to take an impression—the art of lithography stood full-fledged. Finally, another example. The store of a tobacco merchant by the name of Lundy, in Dublin, Ireland, was destroyed by fire. While he stood inconsolately mourning over the loss of all his earthly possessions, he noticed how greedily poor people collected the snuff thrown out of tin boxes that had been in the fire, although apparently it had become unfit thereby. Prompted by curiosity, he inspected it, and found to his surprise that it had increased much in aromatic strength. He accepted the loss, rented another store, subjected his snuff to a heating process, gave it a special name, and in a few years he was a rich man, thanks to the accident by which he thought to be ruined.

HERE IT IS again, and this time from the Atlanta *Constitution:* Near Norcross there resides an old German geologist who loves to live among the peculiar specimens of mineral and vegetable matter which he has unearthed and housed. He is an elderly gentleman of little sociability, but of great mental acquirements. His physical endurance is simply astonishing. For days at a time he wanders over the hills and through the dales near his home, collecting rocks and stones, limbs and roots, the properties and qualities of which are unknown to all but himself.

The room in which his collection is is wonderful. In one receptacle are arranged a number of stones whose bright rays remind the observer of diamonds. In the center of this long room there rests a stone half the size of a hen's egg, which was picked up by the owner months and months ago. It was found by its owner one rainy afternoon. For nearly a week he had been on a tramp through the hills and dales near his home, and, weary with his ceaseless toil, he was wending his way home, when his eyes fell upon something from which the rays of the sun were scattered in a thousand directions.

With little thought of what he was doing, the geologist stooped down and picked up the object. It was nearly half the size of a hen's egg, and of an irregular shape. It was covered in many places with thick, heavy clay, which was removed with great care.

It was found to be exceedingly hard, and whenever struck with a hard substance gave forth but little sound. It was almost colorless with hue, and then a tinge of green. Its form was that of an octahedron, but some of the faces or sides were inclined to be convex, while the edges were curved.

It was subjected to acids and alkalies without experiencing any perceptible change.

Some friends induced him to place it on the market, and only a day or two ago he received a letter from a diamond dealer in New York offering him $46,000 for it.

PEGWOOD.—Watchmakers usually buy this article of watch material dealers. A small shrub known as Indian arrow-wood, to be met with in the northern and western states, makes an excellent pegwood. It must be cut when the sap is down and split into quarters, so as to throw the pith outside of the rod.

Scientific Gossip.

—Phosphor bronze has an electric conductivity two and a half times that of iron or steel, and one-third that of copper.

—Platinum crucibles, on being ignited, suffer a greater or less decrease in weight when they are new, but after repeated ignition such changes no longer occur.

CLEANING DULL GOLD.—A solution of 80 grm. chloride of lime, 80 grm. bicarbonate of soda, and 20 grm. common salt in three liters distilled water, is prepared and kept in well-closed bottles. The article to be cleaned is allowed to remain some short time in this solution (which is only to be heated in the case of very obstinate dirt), then taken out, washed with spirit, and dried in sawdust.

—A chemist of Vienna has invented a glass which contains no silex, potash, soda, lime, or borax. In appearance it is equal with the common crystal, but more brilliant; it is transparent, white and clear, and can be cut and polished. It is insoluble in water, and is not attacked by fluoric acid, but it can be corroded by hydrochloric and nitric acid. When in a state of fusion it adheres to iron, bronze, and zinc.

—When alkalies are present in nitrate of silver. Herr Stolba recommends the salt to be dissolved in a very small quantity of water, and after the solution is filtered drop by drop of hydrofluosilicic acid is to be added to it until a turbid appearance occurs. The maintenance of a limpid state after the application of the acid is not conclusive. Finally, an equal volume of alcohol must be added, and then, if there is the slightest quantity of alkali in solution, there will be a precipitate.

—Is the southern hemisphere of our earth colder than the northern? Mr. Hennessy and Mr. Henel say that the southern, owing to its greater mass of water, must have the higher temperature, or about 15.4° Centigrade, although Herr Mann thinks that 15.2° Centigrade would fairly represent that of either side of the equator. This, in these days of active steam-ship traffic and meteorological research, should soon be placed beyond the reach of controversy. Arm-chair working out of facts amount to little.

—Prof. W. H. Brewer lately read a paper on the apparent size of objects under the microscope. A small insect was the object looked at, and scientific microscopists estimated that it was magnified to the size of 4.66 inches. By far the greater majority of 400 observers thought that the size of the object under the instrument was not so large. A few thought it was an inch; several said that it was over a foot; and one man who was a draughtsman, and might be supposed to have a trained eye. gave his estimate as at least 5 feet!

—A new gas lamp with two pipes has been successfully treated in England. One pipe supplies gas in the usual way, and the other furnishes air slightly compressed by the weight of a column of water. Upon the burner is a cap of fine platinum wire gauze, which, a few seconds after the current of mingled gas and air has been ignited, gives a brilliant incandescent glow like that of the electric lamp. Arrangements have been made for lighting several London thoroughfares with this light, which, it is asserted, is cheaper than the ordinary gaslight.

—A metallic alloy for silvering has been invented by M. de Villiers. Its ingredients are 80 parts of tin, 18 of lead, and 2 of silver; or 90 parts of tin, 9 of lead, and 1 of silver. When the tin is brought to a bright white heat the lead is added in grains and the mixture stirred with a stick of pine wood. The fire is increased until the surface of the bath, to which the silver had just been added, assumes a yellowish hue, when it is thoroughly stirred up and the alloy cast in bars. Articles to be coated with it must first be carefully cleaned with the aid of hydrochloric or sulphuric acid, and having been heated to 70° or 80° must be left in the melted alloy from one to five minutes, as their size, etc., may require. Excellent results are said to be obtained, but the work would seem to require much practice on the part of those undertaking it before they can assure success.

—A Belgian engineer is said to have invented a process by which he can weld steel at a red heat. He keeps an essential portion of his method a secret. It seems, however, that he carefully polishes the surfaces to be united, smears them over with some sort of liquid, raises the temperature of the metal to redness, and then joins the pieces. After severe tests, bars welded in this way were in no instance broken at the point of juncture.

—The following method has been suggested for coating metal surfaces with glass, which may be found to answer various purposes: Take about 125 parts (by weight) of ordinary flint glass fragments, 20 parts of carbonate of soda, and 12 parts of boracic acid, and melt. Pour the fused mass out on some cold surface, as of stone or metal, and pulverize when cooled off. Make a mixture of this powder with silicate of soda (water glass) of 50° B. With this coat the metal to be glazed, and heat in a muffle or other furnace until it has fused. This coating is said to adhere very firmly to steel or iron.

—The following (according to *La Nature*) is the way in which those glass plates are prepared which show an image, or writing, only when breathed upon. The piece of glass should be of the kind used for mirrors, and may be either transparent or silvered, and a little powdered fluor-spar is put in a porcelain capsule and moistened with ordinary sulphuric acid, to an extent which will allow of using it to write with, by means of a quill pen, on the carefully cleaned glass. The drawing, or writing, is then traced, and allowed to stand five or ten minutes. Then the plate is washed with ordinary water, and dried with a cloth, after which it is ready for use.

—From the researches of Mr. W. H. Barlow it appears that aluminum possesses properties of a high mechanical value. A cubic inch of it weighs only .0972 pound, while its tensile strength is about 12 tons per square inch. It has, also, a large range of elasticity, the extension at the yielding point being two parts of its length. The modulus of elasticity is 10,000. Some samples 2 inches long gave a ductility of only 2.5 per cent. Sir Henry Bessemer says that there is now invented a process of making aluminum in a cheap form. If the cost of the manufacture of this metal should be reduced there is no doubt that it would be greatly sought after by makers of instruments of precision and others.

—Water mixed with ice gives the best temper to steel. One may insert some small tools to advantage in a lump of ice, as jewelers and watchmakers do when they temper them in sealing-wax. Often oil is used, and is preferable to water, because it is not so easily evaporated. Damascened blades are tempered in a strong current of cold air passing through a narrow chink, a temper more uniform than with water being thus obtained. But of all the means for this purpose, it is believed the most efficacious is a metallic liquid, and, mercury being the only one known, and always a good conductor of heat, as well as the best of liquid conductors, it has come to be regarded as an unequalled bath for the temper of very sharp steel tools.

—A novel compass invented by Captain Magnagni, has been introduced into the Italian Navy. In it the needle floats on a pool of water, tinctured with spirits of wine to prevent its freezing. The water is contained in a glass vessel with an elastic bottom to allow its expansion and contraction without breaking the vessel. The needle consists of six bundles of fine magnets, built up of best ribbon steel, and fixed on a card. It is enclosed in a hermetically sealed case, which is delicately poised on a brass pivot. The pivot has a sapphire top and a jade point, all highly polished to diminish the friction. The advantage of the compass is that the resistance of the water, being great to rapid movements, is comparatively slight to slower ones; and hence the ordinary movements of the needle are free enough, whereas those due to sudden shocks from without are resisted, with a consequent steadying of the indications. Tried on board the Duillio, it is found that the discharge of a 100-ton gun, or the motion of the screw, does not affect the readings of the compass. The effects of the rolling and pitching of the vessel are also guarded against by suspending the floating case a very little above its center of gravity.

Foreign Gossip.

STRENGTH OF STEEL WIRE.—A series of experiments made at the steel works of Firmèry (France), on the resistance of steel wire to traction and torsion, have established that steel is superior to iron for wire cables.

CAST STEEL RENDERED FORGEABLE.—Since a proportion of 0.003 of phosphor renders nickel perfectly forgeable, the same results may be obtained with very hard and brittle cast steel, if 0.008 of magnesium is added.

ENTERPRISE.—One of the most valued of our exchanges, the *Journal Suisse d'Horologerie*, entered, from July 1, on its seventh year of existence, and has donned a new presentable attire all through. It is a sterling journal, and we wish it all possible success.

INVENTION.—An Austrian watchmaker, Mr. Köllmer, is patenting in all civilized countries, a new clock propulsion, which is highly spoken of by the press and experts. The clock has only one weight, and the quarters and hours striking work is continuously bound by the motion of the pendulum.

INGRATITUDE.—The thermometer is of no account in its own country. In France, the thermometer of the Swede Celsius is used; in Germany, Austria, and Russia, that of the Frenchman Réaumur; in England and America, that of the German Fahrenheit, and also the Swedes deny their countrymen, and use the thermometer of the Scotchman Leslie.

FRENCH JOKE.—Governess: "Name a few domestic animals." Emma: "The horse, the cat." "A few others, Charley." "The goose, the swallow." Governess: "Very well, I was thinking of a four-footed animal, it is allowed to be in our dwellings, and it makes a great noise at night, so great that we cannot go to sleep in the evenings. What is it, Emma?" Emma (with much confidence): "The piano."

A PRECIOUS HISTORICAL CLOCK.—The art dealer Wollmann, in Berlin, is in possession of a very valuable clock. The frame is of rosewood, and beside the main dial, it has four smaller ones, on which hands indicate day, date, hour and minute; it strikes the quarter hours. After every hour it plays one of eight selected pieces of music. The clock was constructed by J. G. Fischer, in the year 1720, and was presented to August the Strong by the Saxonian town Grossenhain.

HOTEL DE VILLE DE PARIS.—Two watchmakers, Messrs. Henri Lepante and Collin, have made offers to furnish the Hotel de Ville of Paris, dedicated July 10, with grand festivities, with a steeple clock. The Paris city council, in order to act with impartiality, nominated a scientific committee of horologists, consisting of Messrs. Cl. Saunier, Bréguet, and Bourdon. A part of the Paris watchmakers are loud in their complaints, and insist that the clock shall be furnished by public competition, and also have petitioned the city council. We will give the results as soon as known.

OLD, OLDER, OLDEST.—American legends of hoary-headed negroes and negresses, body servants of G. W. etc., are completely distanced by the following french veritable statement: "The oldest actor in the world was Jean Noël who died in 1829 in his 148th year of age, without exhibiting any deterioration of his faculties. He possessed all his teeth at the time of death. As late as 1812, he delighted Napoleon I., in the role of Burrhus, in Racini Britannicus. A masked ball was shortly afterwards given at St. Cloud, when an amazone attracted the attention of the Emperor and those participating, not alone by her admirable costume, but also her gracious, pliant movement. None could imagine who she was. Finally, the time arrives for unmasking, and Napoleon piqued by curiosity, approached the enchantress. Both mask and perruque drop, and Jean Noël's well known features smile on the astonished conqueror. He was at that time 130 years of age.

EAR PIERCERS WITHOUT END.—The mania—the cold, pitiless tidal wave for contriving ear piercers, has reached Germany, after having left our hospitable shores. Every paper for the last three months has come to us laden with devices for ear piercers from the random shot at the ear-lap (*vide* JEWELERS' CIRCULAR) to the most artistic pull-back, double-back-action contrivance, warranted painless, without an ear-piercing shriek, or money refunded. Every would-be inventor, with an ounce of brain, has patented at least a half a dozen for the last two months, and the cry is, still they come.

ELECTRIC LIGHT.—Mr. Gustave Sandoz has introduced electric light into the Palais Royal, Paris; a French paper speaks as follows of the result: We were present Saturday evening at the lighting of the shops of the Palais Royal by the incandescent Swann lamps, fed by Faure's accumulators. The illumination was very successful in the two large bijoutery stores of Mr. Gustave Sandoz, president of the Syndicate of the business men of the Palais Royal. A large crowd of admirers gathered around the stores, and expressed their unbounded delight at the sparkling glitter of the precious stones contained in the jewelry arranged in the windows, etc.

PATENT LAWS IN SWITZERLAND.—Switzerland, which, as is well known, has like several other small states, hitherto refused protection or encouragement to inventors, is not unlikely to have a patent law before long. On the recommendation of the Federal Council, the National Assembly is engaged in considering a bill having this object in view. The proposed measure, involving an amendment of the constitution, cannot become a law without the sanction of the people. It is not considered probable, however, that this sanction will be withheld, as a feeling has been growing in the country that the present state of the law, with regard to inventors, is prejudicial to the development of Swiss industries.

THE LARGEST TELESCOPE IN THE WORLD.—The lenses for the largest telescope in the world, intended for the Lick Observatory in California, have been cast in the Institute of Feil, at Paris, and are to be shipped for further elaborations to their place of destination. The casting of such colossal homogenous glass discs, with a diameter of over three feet, and a weight of 375 pounds, demand enormous exertions as well as theoretical respect, as far as the composition of the different sorts of glass is concerned, as also in their practical execution. The production of such lenses and the mighty telescopes to be manufactured from them, has taken of late years an upward tendency little anticipated heretofore. No country wishes to be rated second class. After the great refractor had been constructed in Washington, Vienna managed to eclipse it. But even this will in a short time be laid in the shade both by the instrument to be constructed for Pulkowa, Russia, and the Lick Observatory, and we may safely assert that we have reached the limits of these instruments. Actually whether the largest objective has a diameter of 30 or 36 inches, unhappily makes no great difference; according to formulas calculated by Professor Stampfer, of Vienna, the former reaches to stars of the 16.8 magnitude, the second to those of the 17.2, consequently, a difference of only $\frac{4}{10}$. According to theory, the former separates double stars of $\frac{15}{100}$ seconds distance, the second of $\frac{12}{100}$, and this superiority is to be paid for with $8,000 or $12,000 additional! The conclusion is self-evident that it would be more correct in perfecting the present telescope within the present dimensions, and to render it free of faults, than to retain all of those errors with which they are clogged, and to construct them simply of gigantic dimensions. The sources of errors increase most enormously as soon as the limits of the lenses are exceeded by ever so little. The fault lies in correcting the so-called secondary spectrum. Both theory and practice show that it is possible to unite with astonishing clearness upon a certain point single colored rays through four spherical surfaces, but unhappily chromatic aberration is quite another thing. If no new and hitherto unsuspected optical principles are discovered, we are entitled to attest that we stand at the limit of capacity of the telescope.

Workshop Notes.

Silver Assay by Smelting.—If no lead is present, mix 600 grs. of the pulverized ore with 300 grs. carbonate of soda, 600 grs. of litharge, and 12 grs. charcoal in a crucible, add a slight coal of borax over all, put on the furnace, melt, take off, give it a few taps to settle the metal, let it cool, and remove the button.

Assaving Argentiferous Galena, or Lead-Bearing Silver Ore.—Mix 300 grs. of the pulverized ore with 900 grs. carbonate of soda and 30 grs. charcoal; melt in a crucible on a furnace, and treat as described above, and remelt the button in a porous cupel made of bone dust, which absorbs the lead leaving the silver pure.

To Remove Rust from Steel —For cleaning purposes, etc., kerosene oil or benzine are probably the best things known. When articles have become pitted by rust, however, these can only be removed by mechanical means, such as scouring with fine powder, or flour of emery and oil, or with very fine emery paper. To prevent steel from rusting, rub it with a mixture of lime and oil, or with mercurial ointment, either of which will be found valuable.

Polishing Broaches.—They are usually made of ivory, and used with diamond dust, loose, instead of having been driven in. Oil the broach slightly, dip it into the finest diamond dust, and work it into the jewel the same as you do the brass broach. Unfortunately, too many watchmakers fail to attach sufficient importance to the polishing broach The sluggish motion of watches nowadays is more often attributable to rough jewels than to any other cause.

To Polish Steel.—Take crocus of oxide of tin, and graduate it in the same way as in preparing diamond dust, and apply it to the steel by means of a piece of soft iron or bell metal, made of proper form, and apply it with flour of emery, the same as for pivot burnishers. To iron or soft steel, a better finish may be given by burnishing than can be imparted by the use of polishing powder of any kind whatever. The German mode of polishing steel is performed by the use of crocus on a buff wheel. Nothing can exceed the surpassing beauty imparted by steel or even cast iron by this process.

To Make Burnishers.—Proceed the same as in making pivot files, with the exception that you are to use fine flour of emery on a slip of oiled brass or copper, instead of the emery paper. Burnishers which have become too smooth may be improved vastly with the flour of emery as above, without drawing the temper. To prepare one for polishing, melt a little beeswax on the face of your burnisher. Its effect then on brass or other fine metals, will be equal to the best buff. A small burnisher prepared in this way is the very thing with which to polish up watch wheels. Rest them on a piece of pith, while polishing.

Pinion Diameter.—The following are excellent rules for determining the correct diameter of a pinion by measuring teeth of the wheel that seizes into it. The term *full*, used below, indicates full measure from outside to outside of the teeth named, and the term *center*, the measure from the center of one tooth to the center of the other tooth named, inclusive. For diameter of a pinion of 15 leaves measure, with calipers, a shade less than 6 teeth of the wheel, full. For diameter of a pinion of 14 leaves measure, with calipers, a shade less than 6 teeth of the wheel, center. For diameter of a pinion of 12 leaves measure, with calipers, 5 teeth of the wheel, center. For diameter of a pinion of 10 leaves, measure with calipers, 4 teeth of the wheel, full. For diameter of a pinion of 9 leaves measure, with calipers, a little less than 4 teeth of the wheel, full. For diameter of a pinion of 8 leaves measure, with calipers, a little less than 4 teeth of the wheel, center. For diameter of a pinion of 7 leaves measure, with calipers, a little less than 3 teeth of the wheel, full. For diameter of a pinion of 6 leaves measure, with calipers, 3 teeth of the wheel, center. For diameter of a pinion of 5 leaves measure, with calipers, 3 teeth of the wheel, center. As a general rule, pinions that lead, as in the hour wheel, should be somewhat larger than those that drive, and pinions of clocks should generally be somewhat larger proportionally than those of watches.

Silver Assay with Testing Tube.—Place in the tube enough of the pulverized mineral to fill one inch of the space, and on this pour nitric acid in quantity to occupy 2 inches more, and hold the mixture over a flame until the acid boils. The acid will dissolve whatever silver may be present, and must be passed through filtering paper to remove extraneous matter, and returned to the tube. Next add a few drops of water saturated with salt; any silver or lead that may be present will be precipitated in a cloudy form to the bottom. Drain off the acid, place the precipitate in the sunlight, and in a few minutes, if it contains silver, it will turn to a purple color, and may be again liquefied by the addition of spirits of ammonia. The testing tube is formed of thin glass, about 5 inches long, and less than 1 inch diameter; bottom and sides of equal thickness. Where the tube is lacking, a cup may be used instead.

Correct Length of Lever, etc.—It is quite frequently necessary to determine the correct length of the lever, size of table roller, size of the pallets, and depth of the escapement of lever watches. A lever, from the guard pin to the pallet staff, should correspond in length with twice the diameter of the ruby pin table, and if such a table is accidentally lost, its correct size may be known by measuring half the lever between the points above named. For correct size of pallet, the clear spot between the pallets should correspond with the outside measure on the points of three teeth of the scape wheel. The only rule that can be given without the use of diagrams, for correct depth of the escapements, is to set it as close as it will bear, and still free itself perfectly when in motion. This may be done by first placing the escapement into your depthing tool, and then setting it to the correct depth. Then by measuring the distance between the pivots of the lever staff and scape wheel, as now set, and the corresponding pivot holes in the watch, you determine correctly how much the depth of the escapement requires to be altered.

Crocus Polishing Powder.—Culinary salt and sulphate of iron (iron vitriol) are well-mixed in a mortar. The mixture is then put into a shallow crucible, and exposed to a red heat; vapor escapes, and the mass fuses. When no more vapor escapes, remove the crucible and let it cool. The color of the oxide of iron produced, if the fire has been properly regulated, is a fine violet; if the fire has been too high, it becomes black. The mass when cold is to be pulverized and washed, to separate the sulphate of soda. The crocus powder is then to be submitted to a process of careful elutriation, and the finer particles reserved for the more delicate work. An excellent powder for applying to razor strops is made by igniting together in a crucible, equal parts of well-dried green vitriol and common salt. The heat must be slowly raised and well-raised, otherwise, the material will boil over in a pasty state and be lost. When well made, out of contact with the air, it has the brilliant aspect of black lead. It requires to be ground and elutriated, after which it affords, on drying, an infallible powder, that may either be applied on a strop of smooth buff leather, or mixed up with hog's lard or tallow into a stiff cerate.

Gold Assays.—Many of our readers live in countries containing gold-bearing rocks—for instance, Virginia, the Carolinas, Colorado, Nevada, etc., and the question of testing a particular rock often occurs; we therefore publish the following handy recipes for testing them: Take 600 grains of the gold-bearing quartz, finely pulverized, and free from sulphurets; mix with 600 grains litharge, and 7 grs. charcoal; melt all in a crucible of ample size, and set off to cool. Break the crucible when cold, and the gold will be found in a small button under the refuse matter at the bottom. To ascertain the *amount of gold in a metallic substance*, select a small sample, weigh it, and melt in a small cupel composed of calcined bone ashes. This absorbs the common metal, leaving the gold and silver exposed to view. The resulting button is melted once more in the proportion of gold 1 part, silver 3 parts, and then rolled into a thin ribbon, and boiled in nitric acid, which dissolves out the silver, and leaves the gold pure at the bottom. The gold can be removed, and the silver subsequently precipitated with salt. In the assay of rock containing pyrites, it must be roasted until it ceases to evolve sulphurous fumes, then mix 600 grs. of the powder with 300 grs. carbonate of soda, 300 grs. charcoal, 300 grs. litharge, 300 grs. dried borax, and 15 grs. charcoal; melt all in a crucible, and treat as directed above.

Trade Gossip.

Quite a number of new designs appear in gold chain.

Bracelets are worn by young swells in full dress. It is supposed to be locked on his wrist by his best girl.

A nugget of gold entirely free from quartz, and worth $1,300, was recently found in a Forest City (Cal.) mine. It resembled in shape a bear's paw.

Business in the South was never so prosperous as at present. An abundant cotton crop has given the people much money and their liberality is corresponding to their means.

L. Straus & Sons, importers of bisques and fancy goods, offer a large and comprehensive line of artistic goods from the most famous potteries of Europe. These goods are especially adapted for the jewelry trade.

J. F. Fradley has issued an attractive catalogue, illustrating the various designs of gold and silver walking canes. The work is handsomely printed and conveys an intelligent idea of the class of goods made in his establishment.

The manufacturers of the Acme Lever Button have introduced a new line of initial goods. They are very handsome and cannot fail to become popular. They have also introduced many new designs in stone and engraved decoration.

Diamond work was never more varied or elegant than at present. Some of our largest dealers have imported gems of exceeding beauty and value, some of which have sold as high as $1,000 a karat, even for stones that weigh but 1½ karats.

Wm. T. Smith, the well-known assayer and refiner of Providence, R. I., has issued "The Jeweler's and Silversmith's Handy Book of Reference," on the treatment of sweeps, gold and silver, etc. It is a valuable little book for manufacturers.

From the large number of wedding rings sold one would think everybody was getting married. Vast quantities have been sold in all sections of the country. It now behooves the trade to prepare christening cups and a liberal supply of baby pins.

A. M. Murphy, of Tyler, Texas, is said to be one of the best rifle shots in this country. He has recently been in the city buying goods, and, as he is always a cash buyer, his presence has been welcome to the trade. Mr. Murphy believes in paying for everything as he goes along.

J. O. Draper & Co., of Pawtucket, R. I., introduces a Fig Soap, especially adapted for washing jewelry, scratch brushing and drawing wire. It leaves the goods bright and clean and is spoken of in unmeasured terms of praise by the leading manufacturers of Providence and Attleboro.

Jeanne Bros., the well-known jewelers, have patented a very desirable setting for diamonds, as shown in their advertisement on another page. It is composed of a platinum inside surface embracing, with an outer surface of gold, which avoids the reflection of the gold through the diamond.

Randel, Baremore & Billings have introduced in their establishment facilities for cutting and polishing diamonds. This department is in charge of a competent foreman, and a number of skillful workmen are employed, who are kept constantly busy bringing out the hidden beauties of choice goods.

The Dueber Watch Case Manufacturing Company has secured very desirable and comfortable quarters in the new Bryant building, now approaching completion, at the corner of Nassau and Liberty streets. Their rooms will be elegantly fitted up, and will contain every convenience for the accommodation of their patrons.

The Middletown Plate Company has now ready a new and attractive catalogue of designs of goods made by them, which will be forwarded to the trade on application. They also carry an extensive line of goods not illustrated in their catalogue, which will be shown at their offices in Middletown, or at 13 John street, New York.

Joseph Baker, Secretary of the Jewelers' Guild, has been quite sick for a number of months and unable to attend to business. Not wishing the affairs of the Guild to suffer, he has employed, at his own expense, a young lady to attend to all correspondence. He is now convalescing, which fact will be pleasant news for his many friends.

Walter E. White & Co., manufacturers of fine rolled plate bracelets, are introducing a new and attractive line of goods, with original and artistic embellishments. Some of these having raised ornamentation, are especially noticeable from the fact that the ornamental designs are rivetted to the band instead of being soldered on. This makes them more durable and desirable.

H. C. Haskell offers a select and attractive line of intaglios cut in sapphire, hyacinths, sand and other choice stones, mounted in new and original designs. Also many novelties in scarf pins, lockets, fancy jewelry of all kinds. He sends a beautiful and artistic catalogue of his goods to the legitimate dealers on receipt of their business cards.

The quill reserve toothpick is a novelty recently introduced in rolled plate goods. It consists of a sliding barrel, in one end of which is inserted a section of a quill, cut in proper shape for a toothpick. In the other end is a chamber for holding a number of quills of the requisite size and shape. It is a neat and valuable article, and is rapidly becoming popular.

We notice that the Jewelers' League is increasing its Canadian membership quite largely. We would say to our friends in Canada that all members of the trade in good standing, not over 45 years of age, are eligible to membership in this benevolent institution. Those desiring to become members should do so at once, as the number is limited and the maximum is now nearly reached.

Enos Richardson & Co. have issued a beautiful little *brochure*, illustrating the numerous processes employed at their factory in the manufacture of the numerous kinds of jewelry produced by them. The illustrations exhibit the different departments of the factory, while the letter press fully describes the processes in detail. The work is an interesting one, and will add much to the literature of the trade.

Thomas W. Adams & Co., of 14 John Street, have secured the right to manufacture band bracelets under John A. Riley & Co.'s patent and now offer a choice line of goods, in all the latest designs and sizes, either engraved, encrusted, Roman goods or any other style of decoration. These self-closing bracelets have achieved a high reputation, and the introduction of this patent in band bracelets will be appreciated.

J. D. Engle, of Hazleton, Pa., introduces a new engraving machine to which the attention of the trade is invited. This machine is highly spoken of by those who have thoroughly tested it, and possesses many substantial advantages that will commend it to those who require a practical machine of this kind. Parties in search of such would do well to consult Mr. Engle's announcement to be found elsewhere in THE CIRCULAR.

Kahn, Hanover & Co., 32 Maiden Lane, N. Y., have just received from Europe, for the fall trade, an elegant assortment of opera glasses, from the finest grades down to the cheapest, and are enabled to please the most fastidious purchaser. Their importations also include a great variety of mathematical, surveying and meteorological instruments and optical goods. They are the sole agents for Bush's patent parlor kaleidoscope, a most salable article for every jeweler.

Twelve thousand dollars worth of diamonds and valuable jewelry were stolen from the Cincinnati Exposition Building recently, from the exhibit of C. Oskamp. The diamonds were kept in a show-case, fastened with two small padlocks. A visitor saw two men go to the case, and open it with such apparent ease as to give the impression that they were the owners After selecting all they wanted they quietly walked away. Ten minutes afterward the theft was discovered. The property has not yet been recovered.

William H. Appleton, a jeweler doing business in Third avenue, has made an assignment for the alleged benefit of his creditors, under circumstances that justify an investigation by his creditors. His liabilities amount to some $9,000 and assets to $4,000. The assignment is said to have been made to a clerk in the office of his attorney, and that the goods were subsequently sold at auction to the mother of the young man, who figures as a creditor. It is asserted that in August, Mr. Appleton ordered some $4,000 worth of goods, and succeeded in obtaining possession of about $2,800. Previous to this time his orders are said not to have succeeded $400 or $500 a month. The creditors do not regard this assignment with favor and are determined to push an investigation.

A few days since a young man presented himself to a prominent wholesale house in the trade, representing himself to be a brother of Henry Terlau, of Covington, Ky. He said he was about to establish himself in business at Cynthiana, Ky, and wanted to purchase a full line of goods. The goods were shown him and he selected a liberal amount, saying that he would call next day and give shipping directions. The young man left, and has not since been seen. A note received subsequently, from Henry Terlau says that he has no brother, and that he knows nothing of the individual representing himself to be such. Whether the imposter succeeded in appropriating any goods while examining them, is unknown, but the supposition is that he did. The trade is warned to look out for him.

Short ear rings are fashionable.

Chatelaine watches are still worn.

A tiny poke bonnet in gold is mounted as a scarf pin.

The demand for cameo portraits indicates a revival of these goods.

The settings of precious stones are rendered as nearly invisible as possible.

For engagement rings the choice lies between a solitaire diamond or genuinely fine ruby.

A unique design is a golden swallow on the wing, holding a pearl suspended from his beak.

Chas. W. Schuman and M. Fox and family returned from Europe Oct. 7th, in the steamer *Elbe*.

Dyer Brainerd, late of the firm of Brainerd & Steele, is dangerously ill at his home in New Jersey.

Since Oscar Wilde wore a carbuncle at a recent lecture, that stone has become quite the rage with the æsthetics.

Miller Bros.' initial goods are as popular as ever. They are constantly introducing new and desirable designs.

The designs in fashionable jewelry are half barbaric. There are many new styles, however, of modern invention.

Cairngorm stones, such as the Scotch chiefs used to wear in hilts of their claymores, are again becoming fashionable.

Finely wrought antique or mythological heads in topaz or unpolished amethysts, is the latest agony in scarf pins.

Mayer & Kohn, of 428 Broadway, have made an assignment to Earnest G. Schweig, for the benefit of their creditors.

George Strong, for many years identified with the Whiting Manufacturing Co., is severely ill at his home in Squan, N. J.

Just now Egyptian style of Jewelry is quite fashionable among those who can afford to undergo the caprices of the moment.

George Eaton, who has been very sick for many weeks at Manchester, N. H., is convalescing and hopes of his ultimate recovery are entertained.

Quite a number of odd gems that have been out of style for a number of years, have been brought into prominence and are now very fashionable.

The old house of Wood & Hughes, manufacturers of sterling silver ware, are offering some beautiful effects, napkin rings, mugs, and a great variety of other objects.

At the establishment of L. & M. Kahn may be seen some elegant specimens of agate. Collectors of minerals will here find an opportunity for obtaining some most desirable specimens.

Miss Ella F. Benedict, daughter of Reed Benedict, the well-known jeweler, was married to James V. Burkman, Oct. 26th, at the home of the bride's father near West Brighton, Staten Island.

The old house of Sturdy Bros. & Co., of Attleboro, Mass., whose productions have for many years enjoyed a high reputation, still maintain their standard excellence, quality, design and finish.

A Chinese coin 3,000 years old has been found by gold miners in Victoria, British Columbia. It is supposed to have been left there by Chinese mariners wrecked on the coast long before the Christian era.

Unger Bros., makers of fine jewelry, offer a large and attractive stock of goods in onyx and gold jewelry, consisting of onyx bracelets, Roman lace pins, ear rings, bangles, and a general line of jewelry.

Messrs. Cogswell & Wallis, of Chicago, present an attractive line of novelties for the coming festive season. They are well stocked up with full lines of desirable goods that cannot fail to attract purchasers.

The Pairpoint Manufacturing Co. are introducing some of the most artistic designs in plated ware ever offered to the trade, many of them are designed by Mr. T. J. Pairpoint, a gentleman of rare ability in classical subjects.

When you see a man who constantly keeps his thumbs in the armholes of his vest you can make up your mind that he is the proud possessor of a massive watch chain, or else his coat doesn't fit him and he is trying to disguise its shape.

A novel design in fashionable jewelry is a leaf two inches long studded with diamonds. In the center is a pink pearl, over which is crawling a tiny ladybug—a splendid imitation. A turtle made of a single large black pearl has the legs and feet formed of diamonds. A jeweled quill, with pink barb, has the stem set in tiny diamonds. A spider with claws of oxidized gold, with the body formed of a very large black pearl.

Pearl fishing is pursued by no less than 1,000 divers on the coast of Lower California. The pearl oysters are found from one to six miles from shore, in water from one to twenty-one fathoms deep. The yearly product is about $500,000.

The Waterbury Watch Co. have just introduced their improved watch. It possesses several attractive features that renders it most desirable. The dial entirely covers the work, and the cover is of solid nickel and said to be water-proof.

A rara avis has for its formation the design of a parrot with extended wings. The body and head are made of diamonds; the plumage of tail and wings are beautifully enameled; the gorgeous brilliancy is true to nature. In one claw is a huge pearl.

Ferdinand Koppen, watchmaker, who came to this country from Germany, in July, 1871, at the age of 20, and remained about a year in Stockbridge, Mass., will he or any one knowing his address please send it to "President," care of THE JEWELERS' CIRCULAR?

S. Sichel is about to marry the daughter of S. Eichberg. Mr. Sichel has been traveling for Mr. Eichberg for some time, and has been finally captured by the charms of the accomplished daughter of his employer. The wedding is to take place early in January.

Those who desire goods for the holiday trade and wish to get the pick of the market, should send in their orders as early as possible. While there has been a slight lull in business for a few weeks, there is every reason to anticipate an active demand up to the holiday season.

The trade is cautioned against the gang of burglars that are to be seen around John street and Maiden Lane. These scoundrels are always on the lookout for an opportunity to make a strike, and their presence in the streets is an indication that they mean business.

David Dodd, known to everybody in the trade, will shortly sail for Europe in the *Servia*, accompanied by his bride. His marriage took place at Orange, N. J., at a very recent date. His many friends congratulate him upon the event, and wish him a long life and a happy one.

Messrs. Sinnock & Sherrill, of this City, recently had a 14 karat ring, taken at random from their stock, assayed at the government assay office. The certificate shows the assay to have been 586, or 14.06 karat fine. This was simply an average specimen of the goods made by this firm.

John Ropes, the bookkeeper of Messrs. Benj. Allin & Co., Chicago, who recently absconded with some $10,000 of his employers' money, and was captured and extradited from Grenock, Scotland, has pleaded guilty and has been sentenced to ten years' imprisonment in the penitentiary.

Leroy C. Fairchild, son of Leroy W. Fairchild, was married to Miss Julia L. Moore, at the bride's residence, 22 East 33d street, N. Y. City, Thursday evening, Oct. 19th. The happy pair started immediately upon an extended bridal tour. The presents were numerous and handsome.

J. P. Wathier, of Chicago, enjoys an enviable reputation of being one of the most skillful and conscientious workmen in the trade. Mr. Wathier has the confidence of a large clientage of friends in the trade who entrust him with the most difficult repairs in watchwork, feeling confident that his work will be done in a workmanship-like manner.

S. F. Meyers & Co. have revised their new catalogue, containing nearly 10,000 illustrations of goods necessary to a complete stock of jewelry. It is a handsome and complete work, giving the uniform discounts to the trade, which are intended only for the private use of the dealer, thus protecting the interests of the trade to their best ability.

Messrs. Stern & Stern have just received an invoice of new movements, called the Brighton, for which they are sole agents. These goods fit Elgin 8 size cases. This firm has introduced many new styles in their jewelry department, among which is what is known as the Labradore stone, which possesses opal tints, changeable in various lights. It is a showy and attractive stone.

"Professor" McClellan, an ex-member of the P. R., who keeps a "hostelry" in John street, has fitted up a gymnasium in the basement of his place, where he gives boxing lessons to a choice few. Quite a number of the "boys" in the trade spend a leisure half-hour occasionally, sparring under the instructions of the talented "Professor." While the "Professor" can scarcely be called a member of the trade, yet he should be recognized as not of distant kin, because of his connection with the ring, albeit the ring favored by him was not of the hymenial order—rather more of an anti-honeymoon affair than otherwise. The exercise is good for the boys, well calculated to develop their physique, while the occasional black eye or sanguinary nasal protuberance obtained are but incidents to a thorough knowledge of the manly art of self-defense or personal aggression.

The practice of giving wedding presents is more generally observed than ever, while the variety of suitable articles for such presents is more extensive than ever before, embracing many elegant specialties designed for these occasions. The observance of wedding anniversaries, birthdays, etc., is also becoming more general, for which occasions presentation goods are especially prepared by the trade.

"Some men are born great, and others have greatness thrust upon them." Mr. A. K. Sloan, of the firm of Carter, Sloan & Co., appears to be one of these fortunate fellows. A very taking and seductive bass fly, as fascinating as a lady's spring hat, made by Messrs. J. B. McHarg & Co, of Rome, N. Y., has been named after him, doubtless out of compliment for the graceful manner with which he is known to toss this festive insect.

An interesting shoulder piece of jewelry is a lizard, composed principally of diamonds. Along the middle of its back are two rows of rubies, forming lines of light; two other rubies sparkle in place of eyes, and the crooked length of the reptile seems almost capable of emerging from its drowsy lethargy into slow activity. The flitting darning needle is reproduced; the variegated colors of its wings are made life-like by enameling; they are outspread as if in aimless flight.

Messrs. B. & B. W. Smith, the well-known show case makers and decorators, have just completed for the Gorham Manufacturing Company's offices in Chicago, a line of show cases that is not only attractive and artistic but excites the highest commendation from the trade in that city. They have also just fitted up the establishments of J. G. Dillon, Wheeling, W. Va., Harrison Robbins, Philadelphia, and Carrington, Thomas & Co., Charleston, S. C. Handsome decorations of this kind contribute very much to the attractiveness of the stock.

There is on exhibition in Stephen Preston's jewelry store on Broadway, a plain gold open-face watch, verge escapement, that was once the property of Lord Howe, commander of the English forces in America. In August, 1776, it was transferred by Lord Howe to Harmanus Barculo, who owned a large estate on Long Island, near the Narrows. It has since been in the possession of his son, Harmanus Barculo; his son-in-law, the Rev. Peter Stryker; his grandson, the Rev. Harmanus Barculo Stryker, and his great grandson, A. C. Stryker. It is still an excellent timekeeper.

The counsel of the Observatory of Neuchatel, Switzerland, have awarded Mr. H. L. Matile, of Locle, the grand prize of the Observatory for watches submitted for test, all having exceeded the required standard. This is the first diploma ever issued to any manufacturer by this Observatory, and is an honor which Mr. Matile must be justly proud of. The first prize was also granted to Mr. Matile for movement No. 10,778, showing the closest rate during the rigid trials given by the Observatory. Mathey Bros. & Mathez are the sole agents for the Matile watches in this country.

Robert Meeken, alias William Leuche, a commercial traveler for a New York house, was arrested at Wheeling, W. Va, a few days since charged with grand larceny. While standing in the jewelry store of Miller & Franzheim, he opened a show case and abstracted several articles of value. When detected by a clerk he gave up a gold watch, saying it was all he had; but upon searching his pockets a number of packages of silver forks and spoons and another gold watch were found. He was committed in default of $1,000 bail. He acknowledged the crime but pleaded indulgence in the opium habit as his excuse.

A pearl-making industry has sprung up in the Thuringian forests of Germany, and a large demand for the goods from abroad has made a boom in wages. The secret of making the so-called "lack-luster" pearls was accidentally discovered by a workman who put one of the original samples in his mouth, and felt a tiny grain of sand upon it. Previous to this acids had been tried without success, but the lucky workman tried "rubbing up" the pearls with common sand, and in less than a week hundreds of his fellows were making a living at the same work, and handsome goods were produced that now find a ready sale in the markets of the world.

At the monthly meeting of the New York Jewelers' Club, held Oct. 10th, a resolution was passed appointing a committee of three, consisting of Messrs. H. J. King, R. A. Johnson and F. H. Bliss, to ask the appointment of a like committee of the New England Manufacturing Jewelers Association to confer regarding the future annual entertainments of the Club, having in view the admission of ladies, wives of members, &c., at all entertainments. An amendment to the By-Laws was offered giving the Chair power to appoint the Investigating Committee. The President appointed as Executive Committee for ensuing year, Messrs. C. D. Marsh, F. H. Bliss, C. H. Miller, R. A. Johnson, T. L. Parker, C. W. Cooley and J. Marx; and Auditing Committee, Messrs. Wm. Bardel, A. Pinover and E. Untermeyer.

Messrs. Noterman & Jonas, manufacturing jewelers of Cincinnati, have issued a very neat and attractive book of designs, showing numerous styles of cameo and ophir diamond jewelry (a specialty with this house.) This style of jewelry is very showy and attractive and is among the best selling goods introduced this season. This enterprising firm also offer a large and comprehensive stock of ophir diamond and bangle rings in gold mountings that cannot fail to attract attention.

The many friends of G. G. Finn, of Elyria, Ohio, will be pained to learn of his sudden death. A few days ago, while superintending the interior decoration of Brainard's music rooms, Cleveland, he fell some four feet from a step-ladder, receiving, it was thought, but slight injuries. He went immediately to Elyria, and though confined to the bed his condition was not such as to cause anxiety to his friends, and his recent death was wholly unexpected. Mr. Finn has for many years had the reputation of being one of the most finished musicians in the State, and his mastery of the organ and piano was complete. During his later years he devoted much time to the study of color, and there are probably few men living having as thorough knowledge of the subject. His reading on scientific questions was also very extensive, making him of a most instructive and interesting conversationalist, and his death will be mourned by a host of warm personal friends.

The retail jewelers of Kansas, at a meeting held at Emporia, Oct. 10, organized a jewelers' protective association. Numerous influential members of the trade were present. A constitution and by-laws were adopted, and it was voted to hold another meeting at Emporia on the second Tuesday in April. The following gentlemen were chosen officers; President, G. W. Hardway, Columbus; 1st Vice-President, T. M. Fry, Emporia; 2d Vice-President, Wm. Russell, Wachita; Secretary, H. E. Fox, (of T. D. Fox & Co.) Emporia; Treasurer, G. Buckland, Osage City. We are glad to see the dealers in various states organizing for their own protection, and for prohibiting their rights being encroached upon by the wholesale trade. Under proper leadership and with judicious counsels prevailing, these organizations can unquestionably be of great service to the dealers. THE CIRCULAR has always advocated just this course, and so long as the associations remain true to themselves we shall give them our hearty support.

The quantity of gold dust annually obtained by traders on the African Gold Coast in exchange for commodities is said to be enormous and annually increasing, but even this quantity is, according to the *Bulletin des Mines*, but a very small proportion of what is actually gathered by the natives. These will never purchase goods with gold when they can help it, preferring to exchange palm-oil or other products with the white traders. The greatest part of the gold is shipped to Ashantee, or the interior, when not stored upon the spot. Some of it is used to manufacture jewelry. But this native jewelry is only exhibited upon rare occasions, as for instance a marriage celebration. Every black who can save some gold buries it in some obscure spot in a forest, and never reveals the hiding-place except at the point of death. But as natural deaths are the exception rather than the rule, a vast quantity of this gold is lost forever. In a civilized country such means of preserving one's wealth would hardly succeed; but among the Ashantees or Fantees such is the superstitious fear of *fetishes* that it is generally believed that to watch a person burying his treasure or to touch that treasure itself, is equivalent to pronouncing one's own death warrant. So that Voudooism has its uses and benefits.

Watchmakers are often asked why it is that the mainspring of a watch breaks. The subject is one that has engaged the attention of horologists and has led to much controversy and speculation in the trade journals. Steel, like all other metals, is composed of fine particles or molecules, held together by cohesion. When a piece of spring steel is bent the molecules are compressed on the inner side, while those on the outside are distended. The power, then, that keeps a watch going is the force exerted by these molecules to regain their normal position. It is the same force that breaks the tire of a locomotive wheel. All watchmakers know that a sudden change of temperature from warm to cold is a fruitful cause of springs breaking. The wonder with watchmakers is, not that springs break, but that they do not break oftener. We are led to these observations by Mr. Moss, of Chatham, N. B., showing to us the barrel of a Waltham watch containing a spring which was broken in a most remarkable manner. The watch had evidently been fully wound up, there being seventeen coils of spring through which the break occurred in one direct line. The recoil of the pieces had been so simultaneous that they retained their relative positions and represented a coil of seventeen thicknesses with a large section cut out, the broken ends forming two straight lines or radii from the centre to the periphery.

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THE

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The recognized organ of the Trade, and the official representative of the Jewelers' League.

A Monthly Journal devoted to the interests of Watchmakers, Jewelers, Silversmiths, Electro-plate Manufacturers, and those engaged in the kindred branches of art industry.

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☞ *All communications should be addressed to* D. H. HOPKINSON, 42 *Nassau Street, New York.* ☞ *Advertising rates made known on application.*

The Holiday Trade.

THE HOLIDAY trade during the past month has been excellent, notwithstanding the political revolution of last month. But trade and commerce do not depend upon political machinery or political combinations, which is a fortunate thing for trade and commerce. Business men have their political preferences, but if they take half an hour away from business to vote, that is quite as much time as most of them give to politics. So the election last month did not interfere to any extent with the holiday trade, but orders came in and were filled precisely as they would have come and been filled had there been no election and no political upheaval. There is an unusually choice variety of holiday goods in the market, every manufacturer apparently having done his best to surpass himself and his neighbors in the production of handsome goods in his line. The progress made in the production of new designs, elsewhere alluded to, is illustrated in the stock of every dealer, and attractive and desirable goods everywhere abound. Dealers in the finer grades of goods find a liberal demand for their choicest and most costly examples, while dealers in fine stone goods found plenty of customers. It has been complained that whereas a few years ago ladies wore sets of jewelry, now they are content with a single lace pin or something of the sort. But those who make this complaint are chronic grumblers, and could not have watched this season's sales closely. It is true that many diamond ear rings are sold, but the lady who can afford gems in her ears wants the accompaniment of a diamond pin, a diamond ring or two, besides various articles of gold jewelry to complete her toilette. But many prefer fine sets of richly designed gold goods, and there has been a ready sale of mosaic sets, and sets of Egyptian, Roman, and other unique and tasteful patterns. Richness in design, material and workmanship will surely find admirers who readily become purchasers. In solid gold and silver ware there has been a satisfactory trade for the holidays, as there always is. Manufacturers of this class of goods have shown great enterprise in producing this year goods which, in point of artistic beauty and elaborate workmanship, have never been equalled in this country or in Europe. As are the styles in fine goods, so are they in those of cheaper quality, for imitations of superior goods are always to be found in the cheaper grades. This is hard upon those who pay large prices to designers and skilled artisans for artistic originality, but it has always been the case that mediocrity pays merit the compliment of imitating it, and it probably always will be so. But manufacturers of cheap goods are not behind the progressive spirit of the age, and if they pirate some of their designs from the higher grades, they are to be credited with much originality in their own designs. Novelty succeeds novelty with such rapidity that one can scarcely keep track of them. Thus it was that buyers coming early for their holiday goods found the choicest variety ever presented to them. While sales of holiday goods thus far have been liberal, they have not been excessive, and there has probably been less overstocking of dealers at this season than usual. This is good for the trade in general, for nothing is so disheartening as to find dealers overstocked with goods that soon become *passé*, but must be worked off before a new and attractive supply can be purchased to replenish. To overload dealers at this season is to injure the spring trade. But this does not appear to be indulged in, buyers as well as sellers apparently having sought to avoid falling into this error. Following this issue of THE CIRCULAR there will be many holiday goods disposed of, but the trade up to the present time having been excellent, the indications are that the trade for the season will exceed in amount that of last year. Of that no one had a right to complain, so it is probable all will be satisfied this year.

Review of the Year.

THE YEAR 1882 has been, on the whole, a prosperous one for the jewelry trade. There has been an active demand for all kinds of goods, with but brief intermissions of dullness at those seasons when the least activity is expected. Manufacturers have been kept busy supplying the demand for their numerous and varied styles of goods, while jobbers have found full employment in filling the orders of retailers, whose sales have been all that could have been expected. There may be a few in the trade who are disappointed at the outcome of the year's business, but these were among those who built their hopes too high, anticipating an unprecedented "boom" in trade, with no foundation in reason to base such hopes upon. Manufacturers are almost unanimous in saying that their product this year exceeded that of 1881, while jobbers and retailers concur in placing their sales in excess of those of last year. The margin of profit has been shaved down very thin by excessive competition, and it is probable that no more money has been made during the year than was made last year, but business seems to have run smoother, and with less jolting, less friction and fewer disasters than usual. A steady growth in the demand for better grades of goods is noticeable, and this, too, without apparently interferring with the demand for the cheaper grades. The country is becoming richer year by year, and as this wealth is distributed among a greater number, the patronage of all that pertains to fine arts becomes more liberal. Our gold and silver smiths have produced some rare and artistic specimens of their handiwork, filling special orders or for the general trade. Importers of fine goods, especially of precious stones, have done an excellent business, the demand for gems of all grades never having been so great as during the past year. This market is now conceded to be the most critical and the most liberal in the selection of precious stones of any in the world, and Europe is scoured by our importers in search of goods for the United States trade. This speaks well for the development of the artistic taste of a people so young as we are. The year has been remarkable for the introducion of a great variety of new designs and patterns in jewelry of all kinds, for the application of valuable patents—the result of the inventive genius of our workmen—to various forms of jewelry, and for the introduction of many novel devices in charms, sleeve buttons, scarf pins, etc. In scarf pins alone one might readily accumulate a respectable menagerie, while finer rings would furnish forth a liberal gallery of portraits of eminent men and women, and sleeve buttons would supply emblems of every trade or occupation under the sun. In every branch of the trade progress has been made, and greater artistic excellence attained. There has also been a notable development of originality among our designers and workmen, resulting in the production of many examples of fine work that are distinctively American. Of failures in the trade, there were compartively few during the year, and the amounts involved were less than the trade is wont to expect. There have been some abuses of credit, of course, but the settlements of insolvent estates have been far more advantageous to creditors than in years past. The practice so long in vogue, and that served as a premium for dishonesty, of compromising with debtors blindly and upon their own terms, is falling into disuse, and creditors are looking more sharply to their settlements with their debtors, thus bringing about a healthier and more wholesome condition of affairs. The trade has every reason to congratulate itself on the treatment it received from the year 1882, and for the bright and cheerful outlook it presents for the future.

The Art of Advertising.

WHILE IT IS true that advertising is necessary to success in business, it is also true that rare discrimination is necessary to enable one to advertise judiciously, and in such manner as to obtain value received for the money expended. Every man who has anything of value to sell must advertise that fact more or less widely; it is absurd, in these progressive days, for him to sit in his office and expect customers to seek him out. That is not the way business is obtained nowadays. The successful man is he who makes a good article, and then proclaims that fact so loudly as to attract the attention of those interested in his line of goods. The lazy man's way of advertising, and one attended with the least benefit, is to authorize some advertising agent to spend a fixed sum in such a manner as he chooses. The agent at once selects a list of papers of limited circulation and little influence, in which he inserts the advertisements. These papers give him large discounts from their regular rates, by which means the agent makes two commissions, while the advertiser gets little or no benefit from his outlay. Respectable papers, conducted on business principles, have little or nothing to do with advertising agents, for the reason that the agents want to manage both ends of the bargain. Journalists can tell at a glance whether a paper is prosperous or not, by observing the class of advertising it prints; if it is full of patent medicine and clap-trap "ads," they know at once that it is so poorly supported that it is glad to pick up the crumbs professional agents choose to give it.

The jewelry trade advertises liberally, and, we are sorry to say, promiscuously and without proper discrimination. Their "ads" are to be found not only in reputable publications, but in almost every catch-penny affair that comes along, from a railway guide or hotel register to alleged trade journals that eke out a precarious existence by misrepresentations and false assumptions. As this is the season of the year when schemes of all sorts are put forward to catch advertisers, we propose to say a few words on the subject. In the first place, when a solicitor asks your patronage and unfolds his scheme to you, the question to ask yourself is, "how can this publication benefit my trade; does it circulate among persons who are likely to become my patrons?" Manufacturers of jewelry do not desire to reach the general public; if they did, wisdom would suggest that they patronize a few of the daily papers having the largest circulation; they look for their customers, however, among the jobbing and retail trade, and it is impossible for any half-dozen general papers to reach them. Each dealer has his favorite journal that he looks to for news, and for little else; it would be impossible for manufacturers to patronize all the newspapers their patrons read, and if they did, their advertisements would be regarded as out of place in a paper devoted to the news of the day. Few persons read and none preserve the thousand and one calendars got up every year for advertising purpose, while city directories and railroad guides are used for the purposes for which they are intended, and not relied upon for information regarding any particular line of business. Nor is it an indication, because a paper has a large circulation, that it is a good advertising medium. The *Daily News*, for instance, a cheap-looking, one-cent paper, has a large circulation, mainly in the tenement house districts and among the laboring classes, while some of the "story papers" circulate hundreds of thousands of each edition among servant girls, office boys, and callow, half-fledged youngsters of both sexes and promiscuous avocations. The jeweler who expected a dollar's worth of results from advertising in such mediums would be a fit sudject for a lunatic asylum.

It is because the journals catering to the general public are not good mediums for advertising for those who desire to attract the attention of a special public, that trade journals have come into existence. Nearly every well-defined profession, trade or manufacturing industry has one or more journals especially devoted to its interests. The jewelry trade has several east and west, and they are unquestionably the best mediums for trade advertising. It stands to reason that it should be so, because their proprietors, disregarding the general public, from whom they neither solicit nor desire patronage, have devoted their energies to placing their journals in the hands of the jewelers in every section of the country. THE CIRCULAR, for instance, has been established thirteen years, during which time the energeies of half a dozen men have been solely directed towards putting it in the hands of the jewelers in every city and village in the land, and making it so attractive to them that they cannot help but read it, and look forward to its monthly coming with eager anticipation. It is our business to reach the trade, and we are confident we do so much more systematically and thoroughly than any individual desiring to send out private circulars possibly could do. We have made a specialty of this one thing, and, as we are credited with at least the average amount of enterprise, it is reasonable to suppose that we have covered the ground as thoroughly as it can be covered. An advertisement in THE CIRCULAR, therefore, is sure to reach the trade in general, and to be read and noticed, while the same advertisement in papers of general circulation could not possibly reach one-hundredth part of them. As for the catch-penny concerns we have alluded to, they make no pretense of a special circulation, and as a matter of fact, a majority of them never travel further than the paper junk shop in Ann street. It is not the largest circulation that gives value to an advertisement, as we have stated, but the special channels in which it circulates. The New York *Herald* or *Sun* send out a great many more copies of each issue than we do of THE CIRCULAR, but how many of them go to jewelers, or of what value are those papers to the trade? There is something to be considered in an advertising medium besides its simple capacity to circulate advertisements, and that is, the true character of the journal itself. If it is honestly and earnestly devoted to the best interests of the trade, it is certainly worth sustaining, and the more prosperous it is made, the more influential it will necessarily become. But there is room for distinction to be made between journals in the same line of business. There are those which endeavor to give a fair equivalent for the patronage bestowed upon them, while others are conducted under false pretenses, and for the exclusive purpose of bringing to their publishers as many dollars as possible. Papers of this cheap-and-nasty order may be readily distinguished by the manner in which advertising is solicited for them. They apparently have no standard of rates, but take any price that is offered for advertising space. We know that solicitors for some of our would-be competitors, after begging and haggling over an advertisement, have taken one-quarter of the amount they first charged. No better evidence than this is needed of the worthlessness of such a paper as an advertising medium. When the owner of an article discounts it himself in the market, it may be taken for granted that he knows its true value, and is selling it for all it is worth. Advertising space in The Circular has an intrinsic value, precisely as 18-k. gold has; if a man offers what he claims is 18-k. gold for one-quarter its market value, one is very apt to believe that the stuff has no value whatever. So it is with advertising; when the seller cuts his own prices, it may be taken for granted that it has little or no value. Of course, there may be special reasons sometimes why a discount should be given from regular rates, but such occasions are rare.

We do not wish to be regarded as putting in a special plea for patronage for The Circular. The size of our monthly issues is evidence that our patronage is liberal, and all that we could reasonably expect; indeed, there has not been an issue for several months but we have been compelled to decline advertising. Our purpose is to indicate to the trade that it is spending much money foolishly for advertising, and that a little discrimination exercised in the selection of advertising mediums will result in a very considerable saving in the course of a year.

Important to Shippers to Canada.

THE FOLLOWING article from *The Trader* of Toronto, contains some valuable suggestions to the trade.

A great deal of annoyance and loss of valuable time is experienced by Canadian wholesale importers, especially those dealing in jewelry, on account of the careless way that American shippers have of sending goods to this country.

The average Yankee, smart as he may be in general matters, finds it extremely difficult to get the fact through his head, that Canada is an independent country, and not a mere state belonging to their great and glorious Union. Although perfectly cognizant of the tribute levied by the United States' customs, he fails to comprehend that any such kindred institution exists on this side of the line, and as a consequence, his shipping of goods is a very mixed and muddled piece of business.

Perhaps it would not be very wide of the truth to say, that there are not, in all the myriad exporters of the United States, one hundred of them who know how to ship goods properly to this country.

Many of them have been told how to do it a score of times, but still with presistent carelessness, or worse, they will insist on pursuing the even tenor of their way, and shipping as before.

Tell them that invoices should always be sent *in duplicate* by mail, and never enclosed with the goods themselves, and they think you are joking; they send bills in packages in the States, and because it suits their home customers, they seem to imagine that everybody else also should be satisfied. For the information of any such, we may here say that the Canadian importer has to leave one invoice with the customs' authorities when he enters his goods, and the other is necessary for his own use.

Some firms send one invoice by mail and enclose the other in the package. This should never be done, because the importer not being aware that it is there, or if he is, not being sure of getting it, is compelled to make a duplicate for his own use before he puts the original out of his possession. The name of the sender should always be marked on the outside of the package, as it will often help the importer to decide what goods are waiting for entry, without the trouble of getting a permit to examine them.

Then again, a great many shippers have a habit of enclosing sundry small packages sent there for packing, without notifying the consignee that they have been so enclosed, and the result is, that when such a package comes to be examined, the enclosures on which duty has not been paid, on account of the ignorance of their presence by the importer, are seized, and a great deal of worry and trouble are occasioned before the error can be rectified.

Such things are not only very annoying, but in many cases actually damaging to the importer, who, though he may be entirely innocent of any complicity in the affair, has yet to shoulder some share of the odium attached to having goods seized for want of being entered.

Shippers enclosing packages should always make a memorandum on the bottom of their own invoice of any such enclosures. Such a memorandum will save a great deal of worry, annoyance, and probably loss, as it enables the importer to tell at a glance what goods are in each package. As we said before, although American exporters have been warned time and again about the danger of such absurd ways of shipping goods but few of them pay any regard to it.

The Canadian customs' authorities, recognizing the fact that the fault rests mainly with the shippers, have decided in future to enforce the law which enables them to seize all goods not mentioned in the invoice, or any goods that are improperly invoiced for the purpose of evading the payment of the full amount of duty.

This we imagine, is about the most thorough and practical way of bringing such people to their senses, and we are satisfied that when any of these gentlemen once get a package seized and confiscated, they will for ever after that event have a thorough recollection that Canada is a separate country, and has customs' laws which have to be complied with.

If this lesson can be thoroughly learned, by the loss of a fifty or one hundred dollar package of goods, it will probably be cheap enough at the price, and certainly the Canadian importer will have no cause for complaint, seeing that he will be benefitted by its application, and that the consignor will have to foot the bill.

The customs' officials will now be doubly on the alert to detect enclosures, and "such like," and no doubt they will be happy to *initiate* American exporters at the rate of fifty or one hundred dollars per head into the mysteries of Canadian customs' laws.

We think, however, that prudence should dictate a strict adherence to the customs' laws of this country, and thus at once make it easier for the importer to whom they sell the goods, and safer for themselves.

In order that there should be no misapprehension upon this subject, we give below the full text of the circular referred to, and would merely add, that in all such matters "a word to the wise is sufficient."

CUSTOMS DEPARTMENT,

Ottawa, 6th October, 1882.

Sir—In consequence of the very frequent discovery of enclosures, which are not noted in the invoice or entry, in packages sent for examination, I am desired by the Minister of Customs to furnish you with the following copy of the fiftieth section of the Customs' Act relating thereto, with instructions to distribute the same generally to all the principal importers of goods at your port, not only for their own imformation, but that they may communicate the same to their correspondents in foreign countries and in Great Britain, with a view to the future prevention of this most dangerous practice:—

"40 Victoria, Chap. 10, sec. 50:

"The Collector shall cause at least one package in every invoice, and at least one package in ten, if there be more than ten in any invoice, and so many as he or any appraiser deems it expedient to examine for the protection of the revenue, to be sent to the warehouse, and there to be opened, examined and appraised—the packages to be so opened being designated by the Collector; and if any package is found to contain *any goods not mentioned in the invoice, such goods shall be ABSOLUTELY FORFEITED*, and if any goods are found which do not correspond with the description thereof in the invoice, and such omission or non-correspondence appears to have been made for the purpose of avoiding payment of the duty or of any part of the duty on such goods, or if in any invoice or entry any goods have been undervalued with such intent as aforesaid, or if the oath made with regard to any such invoice or entry is wilfully false in any particular—then, in any of the cases aforesaid, all the packages and goods included or pretended to be included, or which ought to have been included, in such invoice or entry, *shall be forfeited.*"

By this it will be seen that the mere fact of an enclosure being found, which was not mentioned in the invoice under which the package under examination was entered, the goods so enclosed are *absolutely forfeited*, and no room is left for the consideration of extenuating circumstances.

I am, Sir, your obedient servant,

J. JOHNSON, *Commissioner.*

Retail Jewelers' Protective Association of Pennsylvania.

THE FIRST regular annual meeting of this Association was well attended, and an enthusiastic spirit manifested itself amongst the members present.

The meeting was called to order at 8:45 P. M., Mr. W. Haines acting as temporary chairman. After the reading of a letter from Mr. J. G. Wilson, Reading, in which he declined to be a candidate for the office of President, a Committee on Election was appointed, and the members handed in their votes.

The election showed the following result: President, Mr. Jacob Ladomus; Vice-Presidents, Mr. W. Haines, Mr. S. O. Levy; Treasurer, Mr. Smith, of Smith & Dreer; Secretary, Lewis Breitinger; Executive Committee, Mr. I. Herzberg, Mr. W. Haines, Mr. S. O. Levy, Mr. I. Bedishimer, Mr. O. M. Hamrish; Delegates, Mr. W. Haines, Mr. I. Herzberg.

A communication from Mr. G. T. Woglom, President of the Jewelers' League of New York, called the attention of our Association to the fact that the similarity of the names might bring confusion between the two organizations, which have different objects in view, and following the suggestions contained in the letter, it was proposed and carried to change the name of our League into "The Retail Jewelers' Protective Association of Pennsylvania."

The Executive Committee reported that they had arranged a meeting with the wholesale dealers of Philadelphia, at the Continental Hotel, on Sept. 28th, but only three firms deeming it worth while to send representatives, no definite result could be reported.

On motion, the Executive Committee was instructed to call personally on the different wholesale houses of Philadelphia, and to find out how far they were willing to acquiesce to our demands for protection of the retail trade of the state.

The newly-elected Treasurer was instructed to audit the accounts of the Secretary.

No further business being before the meeting, a motion to adjourn was carried, the members to meet again at the same place on Wednesday, Jan. 3d, 1883, to hear the report of the Executive Committee.

Proceedings of the Horological Club.

A DISTINGUISHED BODY OF WATCH AND CLOCK MAKERS.

One hundred and second Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

ABBOTT'S STEM-WINDING DEVICE FOR HOWARD WATCH.

Mr. Uhrmacher opened the session by showing Abbott's well-known stem-winding device, adapted for the Howard watches above No. 30,000. He stated that it was equally as simple, compact and efficient as the device heretofore supplied for other American watches, and he had no doubt would be equally popular with the trade. It is sold complete at a very reasonable price, and full printed directions for fitting it to the movement and case accompanying it, making it easy for any good workman to change a watch from a key-winder to stem-winder and setter. He believed that Mr. Abbott also made the alteration for the trade, when desired, at moderate prices.

SILVER WATCH CASES TURNING YELLOW.

Secretary of Horological Club:

Will some member of your Club be so kind to inform me why a new silver watch case turns yellow, or a brassy color, when exposed to the weather, or even in a show case? If you know of anything that I can use to prevent those brassy spots on the case, you will greatly oblige me by answering through THE CIRCULAR. J. V.

Mr. Clerkenwell replied that a new case is very highly polished, and therefore shows tarnish much more plainly than after it has been used a while, and been scratched up and dulled. The color of a case which has lost its original luster is very different from that of a new one, and itself has a yellowish tinge which masks the color of tarnish produced by handling or otherwise. The surface when new is almost chemically clean, and is therefore very sensitive to oxidizing influences, such as moisture from the fingers, sulphurous exhalations from burning gas, coal stoves, matches, etc. Some kinds of paper and cloth contain traces of chlorine from the bleaching processes to which they are subjected to make them white. This gas combines with silver, forming chloride of silver, which is well known to turn dark in the light. Some kinds of flannel contain traces of sulphur or sulphurous acid gas, which also tarnishes the silver. The only remedy is to wipe the cases thoroughly every time they are handled, and to keep them at all times scrupulously clean, and perfectly dry, as even a damp atmosphere will either cause or promote tarnishing.

NEW MAINSPRING WINDER.

Secretary of Horological Club:

I herewith mail a package containing a mainspring winder, of which I would like to have the Club's opinion, of its merits and demerits, and whether it would pay to have it patented. By so doing you will oblige, D. S. B.

Mr. McFuzee explained that it consisted of the usual frame, arbor, ratchet and reversible pawl, but on the outside of the frame was soldered a mainspring barrel encircling the arbor collet. The barrel was open, and had a notch filed through it on each side, forming openings about one-eighth inch wide, through which the spring was to be wound into it—depending on which way the arbor was turned. A lever hinged to the top of the frame was arranged to turn down over the open barrel, and hold the coils of the spring flat while winding, without touching them with the fingers. The collet was fitted on a square on the end of the arbor, and by removing a capping screw which held it, could be replaced by a collet of another size, when required, by the spring being inserted. There was a groove filed in the face of the frame and the back of the lever, whose use or purpose was not apparent. Nor did it appear how Mr. B. would remove the spring from the barrel when wound up therein, or how he would get it into the barrel of the watch. It was to be regretted that Mr. B. had omitted to send any description of the apparatus and the mode of manipulating it. Our friends who forward us samples of new devices should always accompany them with full explanations—as the points of the new thing, although very plainly to be seen after being specified, may be quite overlooked in the hasty examinations at our meetings. We are always glad to describe and commend improvements in every branch of our trades, but in order that we may do them full justice, their good points and advantages should be clearly described. Their inventors are presumed to understand them better than anyone else, and are, therefore, the proper persons to set them forth, leaving to us only the task of expressing our opinion as to their real merits. In the absence of such explanations, it would hardly be fitting in this case to give any expression of opinion, inasmuch as we do not yet fully perceive the object or operation of the device. We should be pleased to hear further from Mr. B.—and also from any others of our readers who have new and improved tools, attachments and modes of working, which would be of interest to our readers.

POLISHING BALANCE STAFFS—REPOLISHING PINION LEAVES—OVERBANKING—CUTTING JEWEL SETTINGS.

Secretary of Horological Club:

I would like to ask a few questions: 1st. What is the best way of polishing a staff? I have tried repeatedly and cannot get anything like such a polish on them as they have when they come from the factories.

2d. When you put a pivot in the pinion of a watch, you of course have to draw the temper before you can drill it, and how do you polish the leaves again?

3d. When an American watch banks, where am I to look for the trouble, and how to remedy it?

4th. Is there any rule as to how close the banking pins should be together.

5th and lastly. I have one of H. Anderson's jeweling tools, and it works like a charm as far as it goes, but does not cut settings large enough for the third and fourth jewels of an American watch. Is there any jeweling tool that does? Please answer and confer a favor on a subscriber. CHUCK.

Mr. O'Lever replied that the secret of getting a perfect polish lies in having the surface perfectly flat or straight, finishing as nearly as possible with the graver, first grinding out all the graver marks, and obtaining an even gray surface, and carefully cleaning both the work and the tools from every particle of the polishing powder last used, before applying a finer grade. Of course there are many details of manipulation, but they are generally known, and have been frequently described in the back numbers of THE CIRCULAR, so that it is needless to now do more than insist upon the necessity of strict observance of the points just specified. That being done, the particular mode of working, or the particular polishing powders and tools employed, are of secondary importance. Workmen have different methods, and all succeed in securing high polish by properly following out the method used.

When taking the temper from a pinion for pivoting, be very careful to confine the heat as much as possible to the spot which it is necessary to soften. If the heat is carried so far that a scale will peel off the leaves, the pinion is practically ruined, as no amount of repolishing can restore the original shape of the leaves. But a slight coloring is easily removed. Some workmen use a dilute solution of muriatic acid—two or three drops in a spoonful of water. This they dip the discolored part of the pinion in for a short time, assisting it by rubbing with a piece of pegwood dipped in the same solution. Others use a similar solution of sulphuric acid in the same manner. But the use of acids on watch movements is hardly to be recommended, even in the most careful hands. A better way is to use a properly shaped piece of pegwood with fine oilstone dust, finishing with crocus. If the pinion has not been overheated, the polish can easily be restored by this means, with care and patience.

Overbanking is almost too large a subject to be discussed in a few words. There are several causes for it, each of which requires entirely different treatment. The most common cause is a short lever. The upright pin in the end of the lever fork nearest to the balance staff may be bent back, or its front filed away. In case of a sudden jar, that end of the fork may be jarred from its rest against the banking pin and fall towards the balance staff. When this occurs the table roller *should* prevent the pin passing until the ruby pin comes around into the notch in the lever and carries the lever over to the other banking pin in the normal way. But if the pin is bent or filed away as mentioned, it will not be stopped by the edge of the table roller, but will pass directly over the other banking. Then when the ruby pin comes around, it is of course on the outside of the lever fork, and the watch stops from overbanking.

If this is caused by the brass pin being bent as described, it should be bent forward again until it stands vertical in all directions. Sometimes the table roller is not round, its edge being nearer the balance staff at one point than elsewhere, so that the brass pin can slip by it when the scant side comes opposite the pin, although it may not be able to pass at any other place. In this case the roller should be turned up, or a new one fitted in. The same thing may occur when the roller is not fitted truly on the balance staff—or even when the staff or its pivot is bent or eccentric. The roller itself may be too small, instead of the lever being too short. How to ascertain which part is at fault would require a long and detailed explanation of the principles of the detached lever escapement, which would not be practicable to give within the space at our disposal for the publication of our Proceedings. But the subject has been very thoroughly treated in the pages of THE CIRCULAR, where Mr. "Chuck" can find full particulars by examining the back numbers. The articles by Excelsior, in his Practical Hints on Watch Repairing, are especially practical and useful to the workman.

Another kind of banking is caused by the lever pallets being set too far from the escape wheel—making what is called a shallow depthing. In this case, when one tooth of the wheel escapes from its pallet, the next acting tooth does not fall properly upon its pallet, *i. e.*, it does not fall upon the locking face of the pallet and draw the fork against the banking, but comes short of it and falls upon the driving face, or working surface of the pallet. This tends to force the lever back, when it should be resting against the banking and leave the table roller free. This backward tendency brings the upright brass pin forcibly against the edge of the roller, and retards the motion of the balance. When the latter stops and takes up its return motion, the friction between the pin and roller becomes more excessive, and assumes a sort of wedging nature, which reduces the balance vibrations to very small arcs, stops it entirely, or may even bend or break off its pivots in the effort to pass by the roller and get to the other side.

If the depthing is very scant indeed, it may be detected by removing the balance, when the escape wheel will cause a continuous oscillation of the lever, and the movement will rapidly run down. This kind of banking may occur even when the escapement does not run down, but is close enough for the lever, when lightly pushed from one banking, to fly over and lock on the other banking. In this case, take a fine pin point, not half filling the notch in the lower fork, and carefully lift the lever off the banking pin, and hold it still. The lever flies forward, and the pin is no longer pushing it forward, but is now holding it back by its presence in the notch. Then slowly let the lever pass over to the other side, till the acting tooth passes off the pallet it is forcing forward, and notice the action which follows. As it passes off, the next acting tooth will drop upon *the locking face* of the other pallet if the depthing is correct, and the lever will go to the banking and rest against it. But if the depthing is scant, the lever will fly back, and the other side of the notch will rest on the pin point, tending to force it back instead of drawing it forward. When tested in this way, a very slight scantiness of the depthing may be detected, and whether one or both pallets are wrongly placed. The remedy is to move the pallets upon the arbor until the depthing is correct, so that, when the lever is freed as before described, it will draw the pin point along until it rests against the banking on the other side, and will there remain, securely locked.

As regards a rule for the position of the banking pins, it should be remembered that they are not acting parts of the escapement, but are merely barriers set up to keep the lever in proper bounds. The only possible rule is, first, see that the escapement is correct—the parts all of proper proportionate sizes and shapes, *i. e.*, adapted for each other—and placed at the proper distances apart; then the banking pins should be so placed that they, at the same time, allow the escape wheel teeth to rest far enough up the locking faces of the pallets to secure safe locking, and no further—and hold the lever fork in such position that the upright pin will be quite free from the table roller, and the notch will receive the ruby pin without striking on either corner, *i. e.*, the ruby will clear the outer corner in passing, and will strike safely below the other corner, inside of the notch. In order to conduct his operations understandingly, the workman should have a clear comprehension of the principles of the entire escapement, and for this purpose he cannot do better than refer to Excelsior's Practical Hints, as before recommended. With regard to jeweling tools, he thought that almost any first-class material dealer could supply him with what he desired. If not, let him write to the leading New York firms advertised in THE CIRCULAR, and he will have an opportunity to make a choice between different kinds.

UNSTEADY BALANCE VIBRATIONS; HOW TO CURE THEM.

Secretary of Horological Club:

I have a watch to repair which acts so strange that I would like your experience to help solve the problem. The watch, when it makes its best motion, makes a ¾ turn, (I finally understand the meaning of that word) and then suddenly it drops down to ½, and perhaps a little less; then, without any outside aid, the motion is accelerated to ¾ turn again. At first I supposed the scape teeth were uneven, and that it would lock more at one time than another; after watching it for a few revolutions, I marked a tooth by a little oil when the motion would drop, and then watched that tooth to see whether it would always do so at that tooth, but I found that it would drop the motion on any tooth. I took it out and tried its true and found the teeth alike, and then I thought it might be in the fourth wheel, and after a thorough examination of the teeth with a double magnifying glass, and not seeing anything wrong, I tried it and found it to be true in its circumference, no tooth longer than another. Putting it into the movement and marking a tooth, I found that it too would drop its motion at one tooth at one time, and the next time the wheel came round the motion would be at its best. I tried this with the third wheel also, but could find nothing. The watch will do this in *any* position. I thought the mainspring might be very dry or else gummy, so I cleaned it carefully and oiled it slightly, but to no purpose, it was the same. The motion is to its farthest turn about every fifteen or twenty seconds, but this varies so much that sometimes it gets to its longest in about five or eight seconds, and at best it is very irregular; if it would have its best motion *regularly*, I might find out, but it does not. It is a common patent lever. Will some of your body suggest reasons for the above, as my plans are run out. E. Y. D.

Mr. O'Lever said that the best way to treat "a common patent lever watch" was to suspend it by a fine silk thread about five feet from the floor, with its plane in a true north and south line. Then take a magnetized steel bar, three feet long and weighing thirty-five pounds, with the north end or pole in the hands, and swing the south end horizontally from west to east, towards the watch, at a velocity of 210 feet per second, increasing to 225 feet per second at the moment that the bar touches the watch. Precisely at the instant that this occurs, the motion of the bar should first be suddenly checked, then reversed, and the bar removed from the watch at the same velocity as that of its approach. The effect will be to demagnetize the watch so thoroughly that the vibrations of the balance will thereafter be always of the same extent or amplitude under all circumstances. Even with an eye-glass of quadruple magnifying power, it will be impossible to detect any variation whatever. Success is certain if the directions are strictly followed, although it may require a little practice to attain dexterity at first.

If Mr. D. is sure that his watch is not magnetized, he will probably find the trouble in the escapement. Let him first see that the pivots of the escape wheel, lever arbor and balance staff are not loose in their holes, but as closely fitted as consistent with perfect freedom of movement. Also, that the ruby pin is vertical and tight on the staff, and true both in the flat and round. Then hold the movement still in one position for a while, and see if the motion "breaks," in the absence of any change in the conditions. If so, the trouble is probably in the action of the escape wheel teeth on the pallets. The teeth may be not inclined forward enough, so that the *points* do not rest on the locking face of the pallets; they may be inclined back enough to give them a tendency to slide off the pallets instead of to draw further on them; or the locking faces themselves may not be sufficiently inclined to draw the teeth on—but will rather cause them to slide off, and thus move the lever out, when it should be resting against the banking pins; the depthing may be so scant that, when one tooth passes off one pallet, the next acting tooth may occasionally fail to reach the locking face of its pallet, and fall on the driving face; an occasional tooth may be a little short, or battered up; the front corner of the pallets, or one of them, may be splintered off, or rough; or the parts may have so much end shake that they do not always meet in the same way. A frequent cause, also, is that the pallets have not sufficient play between the two teeth outside of them, and catch on the corners in passing, *i. e.*, do not clear freely. Or the pallet may strike on the back of the tooth which has just left it. This will soon make marks which will show it. The pallet jewels are often loose, caused by cleaning the watch with alcohol, which dissolves away the cement that holds them in, leaving them liable to shift their positions enough to cause catching. In short, there are so many things which *might* be wrong, that only a long and careful search is generally required, and even that will sometimes fail to discover the difficulty. In such cases it becomes clear that the watch is magnetized. In old times we used to say that it was "bewitched." But in these more enlightened days we know better, and express ourselves in more refined and cultivated phraseology. The scientific term for it is "magnetized," and when a common patent lever watch gets magnetized, the latest discovered and only known sure cure is the process first described.

A HOLIDAY PRESENT FOR OUR APPRENTICES.

Secretary of Horological Club:

I have an apprentice in my shop who has been a faithful boy and good worker, and I would like to make him a gift of something that he can keep, and that will be useful to him. I do not want to give him jewelry or money, as that is soon used up and forgotten. Please give me your ideas about a suitable present. R. N.

Mr. Regulator thought that the very best gift that Mr. N. could select would be some standard treatise on horological science, or a collection of them. There was Grossmann's Essay on the Detached Lever Escapement at $4, and Saunier's great work on Modern Horology, for $15. The latter was rather advanced for a "boy," however; and without question the most suitable would be Excelsior's book on the Balance Spring and the Adjustments of Chronometers and Watches, at $3.50. This is a re-publication, in book form, of the first series of Practical Hints on Watch Repairing, which were so deservedly popular on their appearance in THE JEWELER'S CIRCULAR. They are really practical and thorough, expressed in language comprehensible by any intelligent youth, and tell just what the workman wants to know about the making and fitting of hair springs, the adjustment for isochronism, for positions, for heat and cold, for rate, besides many other points. It is the only thoroughly practical English work obtainable on those subjects—subjects which everyone who aspires to be a fine, or even a good workman, must understand. And if Mr. N. could not afford them all, he advised him to present this work to his young friend. It would not only be useful and appreciated, but the information and help obtained from it would continue with the boy and aid him through life, till he became old and gray, and keep his employer's memory green as long as memory and gratitude remained.

Decorative Brass-Work.

NO ONE CAN fail to be struck with the great amount of brass-work used in decorating modern houses. We find it everywhere; indeed, the frequency of its appearing almost recalls the days when hammered brass and repoussé were the glory of gold-workers, who did not disdain to exercise their skill upon the baser alloyed material. There is a very close connection between bronze-work and brass-work, but whereas the former, fashionable as it is, is mainly the work of foreign artisans, under the direction of French and Belgian principals, the latter is daily becoming more successful as an article of domestic manufacture. The reason of this is obvious; most of the ornamental brass-work upon stoves, fenders, chandeliers, and articles of the same kind, can be manufactured in great quantities, and after the models are once made the process becomes mechanical, whereas the perfection of bronzes lies in the artistic finish given to each individual piece. The skill necessary to the perfecting of original conceptions is still in its infancy here, while in many European countries it is an absolute inheritance, and the art of working in bronze and in brass is handed down from father to son, and in the same way the details of composition are often family secrets. In England the greatest perfection is attained in "hammering" brass, that is to say, in making shaped articles out of a single piece of metal. For instance, the brass coal-scuttles, which play so important a part in the parlor decorative furnishing to-day are almost of English manufacture, the American artisan having at the present succeeded only in producing an article made up of several pieces not being artistically joined together. In the same way the very fine gauze work of which brass screens and shades are made is generally of French origin, and has so far found no perfectly successful imitators upon this side of the Atlantic. It is very difficult to imagine where the use of brass in decoration will stop; it has so very much to recommend it that it is no wonder that it is becoming more and more popular, and that it is to be met with alike in the homes of the wealthy and the small apartments which are at the command of persons of very limited income. The adaptation of this material to the decoration of the open fire-grate is one of the most noticeable instances of this popularity. In dwellings of really moderate rent the ornamental stove will be found in the best rooms, and in nine cases out of ten it will have brass fittings, an ornamental facing in open brass work, and in all likelihood a fender and irons of the same material.

There is a large field of possibilities in decorative brass; such a grate, with all the fixtures complete, may cost only $50, or it may be worth thousands. Much depends upon the material itself, the extent to which it is alloyed, but more to the education and skill which has been expended upon its manipulation. Nothing can exceed the cheerful aspect of the open fire-place, with its fittings of burnished brass. There is but one drawback to it, and that must, unfortunately, be admitted by all who have had long experience of it. Days—cold, biting, wintry days—will come when it will not throw out heat enough to thoroughly warm a large room. Everyone is familiar with the stereotyped British interior. In the land of fogs, where stoves and furnaces are alike looked upon with disfavor, and where the family circle upon a bitter winter night is close around the blazing fire, impartial observers are forced to concede that with all its beauty, the open fire sends as much heat up the chimney as it does into the room. That while the cozy arm-chair, drawn within the immediate influence of the blaze, is radiant with heat, the far corner of a spacious room will be of the temperature of Siberia, and the hallways and passages of the house enough to make a cat shiver. Something, nay, much is done in English houses to increase the heat of open fires by the use of steel facings and fenders as reflectors and radiators of heat, and very effective such additions to the stove are; indeed, with their aid the seat in the cozy arm-chair may become so very warm that screens will be needed to shield its comfortable possessor from the fierceness of the blaze, and what steel does in English drawing-rooms the judicious use of brass and tiles may accomplish for us. Open fires, let it be said, with all appreciation, need just such aids, and just in proportion as they are given by the adjuncts of the grates will they increase in popularity. In this country the heating of dwelling-houses becomes an absolute necessity in many localities; the furnace or the steam-boiler are as much a part and parcel of home comfort as the stove itself, and that being the case, there is no reason why the open stove should not carry the day, and by all appearance it is likely to do so; and yet in many respects it is inferior to the porcelain stove of Germany. It is all very well to laugh at the monumental character of the favorite heater of that philosophic country, and to recall the remark of the Englishman who admired the affectionate tribute to the departed members of the family as shown by the monumental erections in the dwellings, but the fact remains that nothing is at once so effective, so cleanly, and so satisfactory as a means of warming apartments as the closed porcelain stove. It gives out an enormous heat, can be made up and left for hours, and makes neither smoke, dirt, nor disagreeable odor. So much for the stove of Germany, after which digression we can cheerfully admit that in point of appearance it cannot compare with the latest open stoves of America, with their brass decorations, polished tiles, and burnished appointments, to say nothing of the latest form of decoration in the introduction of raised enamel-work.

There is much that is of interest in the manufacture of the brass which plays so important a part in our midst. It is in reality a composition made up of copper, zinc, and lead, and its value depends very largely upon the extent to which such material is represented in its make. The copper used for the purpose by most of the New York foundries comes principally from the shores of Lake Michigan, reaching the consumer here in the shape of ingots, which can be molded and used in the condition in which they are received. The most ordinary piece of ornamental brass-work has passed through seven processes before it is ready for sale. After the design has been furnished a cast is modeled in plaster of Paris, and it then passes to the molder, who casts it in metal. The filer then works upon it and rids it of all imperfections and unevenness, when it is ready for the chaser. The article, whatever it may be, probably consists of various parts, which are now brazed together with hard solder and forwarded to the filer once more and then to the polisher and colorer. In this way the commonest article made of brass is perfected, while what is called "shell-bark" is more elaborate. This is spun upon a block known as a chuck, and requires very skilled workmen. The copper is first cut in sheets and placed over the block on a lathe, and as the lathe revolves the workman with a steel instrument molds the metal into the required shape until it is perfectly fitted on to the chuck. The highest rate of speed is necessary in thus welding the brass onto the model, and lathe and chuck revolve with the greatest rapidity. In this way knobs and balls of brass are made, such, for example, as form the base of chandeliers or the top of pedestals. The ornamental open work with which we are familiar upon the chains of chandeliers, or that which has the appearance of half-relief, is made by a still more difficult process known as half-scouring, and for this branch of ornamental brass-work, competent hands receive high wages. In some of the wealthy houses of New York the most beautiful brass-work may be seen. Very often it is intermixed with and relieved by open iron work or bronze, but is, as everyone knows, entirely different in effect; it is so bright and so susceptible of polish that it is introduced with increasing favor. Embossed sheet brass is used for finger plates to doors, for panels, and for the decoration of flat surfaces in almost every position. Brass plates shine resplendently upon the walls, hammered brass salvers replace those of silver or electro-plate, and in domestic utensils of every kind brass is used for the exterior.

It has been asserted that the revival of the art of sheet brass repoussé work is due to the encouragement given to pupils in all kinds of hard work in a school in Philadelphia, and it seems quite certain that the taste, once inaugurated, will increase. Some of the most beautiful decorative brass articles are unquestionably those which are popular accompaniments of the grate—andirons or fire-dogs for example. These are now made in every variety, expensive and inexpensive, merely upright posts ornamented by a ball or by the unextinguishable sunflower or elaborately carved images of animals on the faces of objects. Perhaps a still more popular form of brass ornamentation is the fender with its twisted bars and radiating knobs, as costly in its way as the ordinary cut brass fender is inexpensive. After all, what a responsible agent fashion is! Public taste in England a while ago demanded that these very brass fenders should be relegated to the attics. Even the second best bedroom would have none of them, and now here they are again triumphant. House-maids should look upon them with more favor than upon the polished steel which drove them into temporary obscurity, for they do not call for half so great an expenditure of energy in polishing. Indeed, brass-work is very easily kept bright. The brass knobs to doors which are again to be seen in luxurious homes recall those in old-fashioned country towns in England where a most important part of the maid's work is the polishing of the door-handles, knockers, and brass plates. Brass knockers are as yet not found here in any quantity, and yet they are essentially decorative and certainly handsomer than many atrocities in iron which have replaced them.

It is often very strange in comparing the every-day life of cities to find how important little things become and how seldom people notice them. In that very matter of knockers, how universal they are in London, how unusual here? "Every morning, sure as the clock," runs a popular London melody, "somebody hears the postman's knock," and so truly in fashionable quarters the squares reverberate every noon with the rat-tat-tat of the footman. How odd it would seem to a Londoner to listen to the postman's whistle, how strange to a New-Yorker to have every nerve beat at the distinct double rap which should announce the coming of that longed-for mortal! And the hideous construction of some of these London knockers, grinning heads, or griffins, or other atrocities, make us grateful that here they are not perpetuated, and keenly sensible of the great gain in point of beauty when they are made of brass. Then, indeed, they serve a distinctly decorative purpose, and might become popular if only for the sake of appearance.

Now, more especially, brass is desirable since it is possible to polish it without hand-burnishing. It has taken many experiments, many failures, and much patience before it has been feasible to communicate a highly polished surface to the material by the use of artificial means, but now that it has been accomplished an immense impetus has been given to the trade in brass. It would be impossible to call to mind even a quarter of the beautiful things now manufactured in this material, but a few of them are familiarly known to everyone of us. Lamps, for example, the latest style of which is found in spiral columns of burnished brass, surmounted by a globe. Chandeliers in the center of the room are no longer fashionable in very luxurious dwellings, but until the electric light completely banishes gas from our midst, they will be found in the majority of homes. The brass used in their construction differs from that employed for articles which need constant polishing, such as the facings of stoves, andirons, etc., in the fact that it is lacquered, or polished with a fine composition which gives it additional luster but would not stand any very frequent polishing. Occasionally the brass-work of chandeliers its relieved by the admixture of cut-glass drops or stars, and every possible combination of porcelain and brass ornamentation is found in gas fixtures and fittings. Frames of wrought iron or of ebonized or carved wood are fitted with the finest brass wire, which is almost as fine as spun silk, and which is often very beautifully decorared with a center of repoussé work.

Embroidery is mounted in frames of hammered brass, and beautiful effects are produced by its introduction in the fitting of colored glass, for medallions, circlets, screens, and even mosaic window margins. Rods of polished brass are found upon the carved upper mantels of large houses, and in the midst of dark wood fittings for book-cases, library shelves, and even stairways brass, with its lightening gleam, is found. A novelty in door-handles has been introduced in up-town houses in those made of wrought brass in the shape of shells, an idea which is certainly practical, and should prevent much splitting of gloves on the part of those whom small sizes in kids is a matter of moment.

Brass has long been subject to most elaborate workmanship in far eastern lands. Probably with all our progress we shall never achieve results which can compare with those which excite our marvel as the work of untaught hands. There is something in the free, untrammeled design of eastern repoussé work which seems forever to escape the artistic workman of the western hemisphere, and the exquisite specimens which have come down to us of mediæval conception and execution owed their origin to stray samples which found their way from Asia into Southern Europe to take an individual expression in the hands of artistic workers. The great difference in the modern application of this truly decorative material lies in the fact that it is used by us in combination with so many other things. It is no longer left so entirely to its own merits, excepting in the case of certain articles such as scuttles, fenders, or plaques. In other cases it serves the double end of being in itself decorative and enhancing the effect of other decorative materials. So in its use with woods we find it equally effective with light and dark colors. As a finish it harmonizes with both, and in many of the most expensively fitted stores on Broadway plays a most important part in lighting up the general aspect of large interiors. In many offices trellis-work of brass forms the separating line between the desks, and it often is the agent of ornament upon each landing in the shape of the elevator door. Brass railings are found on the staircases, brass rods on the window-fittings, brass wire as curtains, and no material which has become suddenly popular better illustrates the increasing demand for decoration in modern houses. Tenants expect bright and cheerful surroundings, and, in spite of the constant outcry against the apartments and dwelling-houses of the city, the fact remains that they are becoming steadily brighter and more decorative in all the details which represent finish and style. This is very largely owing to the fact that brass is so inexpensive and can be so universally employed in ornamentation; but, perhaps people are scarcely alive to the great difference that really exists between houses erected some 20 or 30 years ago and those springing up upon all hands to-day. Improvements may still be needed; they certainly are, but justice compels us to admit that much is done in new buildings to-day to make them pleasing and attractive, and that in this we find a striking evidence of an increasing demand for cheerfulness and beauty in home life.

Obituary.

We are pained to announce the death of Dyer Brainerd, formerly of the firm of Brainerd & Steele, who died at his residence, at Jersey City, Nov. 11th, after a long and painful illness. The deceased was one of the earliest members of the Jewelers League, and served that society on several important committees, also a member of the Veteran Association of the 9th Reg., N. G. S. N. Y., the Old Guard, and an active member of the Jewelers' Club of this city, and was held in high regard by the craft.

His remains were conveyed to their last resting place in the great "city of the silent majority" at Greenwood, and were tenderely laid away by his sorrowing family. The pall bearers were the life-long friends of the deceased, viz., Robert A. Johnson, J. N. Tingley, C. D. Marsh, and C. B. Bishop.

At a recent meeting of the Jewelers' Club, held at the Astor House, No. 14, the following resolutions were passed by its members;

Whereas, This club learned with profound sorrow of the death of Mr. Dyer Brainerd, which occurred at his residence in Jersey City, Nov. 11th; and,

Whereas, Mr. Brainerd was one of the charter members of this club, and one who always manifested an earnest interest in its welfare and success, being ready at all times to perform carefully and well, all duties assigned to him; and as he was recognized in the jewelry trade as a capable, energetic, intelligent member of the trade, zealous in promoting its best interests, a courteous, affable gentleman, a steadfast friend, and an agreeable and desirable associate; and,

Whereas, This club desires to convey to his widow and children and to his other relatives, its high estimate of his moral and business character, and to spread the same upon its minutes; therefore be it

Resolved, That in the death of their fellow member, Mr. Dyer Brainerd, the members of this club feel that they have individually and collectively lost a warm personal friend; an earnest co-worker in all that was calculated to promote the best interests of the trade, a gentleman of culture and refinement, possessed of a large, generous nature and of sterling integrity.

Resolved, That we sympathize most keenly with his afflicted family in this great sorrow that has come upon them, and that we mingle our regrets with theirs that one possessed of so many manly qualities, having a character and disposition that endeared him to all who knew him, should be taken away when in the full flush of his manhood, and when the promise of a brilliant business career was still held out to him.

Resolved, That this expression of our sorrow at the loss of so estimable a member be spread upon the minutes of this meeting, and a copy of the same be forwarded to his widow, and published in THE JEWELERS' CIRCULAR.

A Stroll through a Watch Factory, and the Finishing of Blank Works According to the Swiss Method.

By Otto Behrend, of St. Petersburg, in *Deutsche Uhrmacher Ztg.*

IF, AFTER a residence of several years, I invite my colleagues to accompany me in a tour of inspection through a Swiss watch factory, I am chiefly impelled by the desire of offering them the opportunity of becoming acquainted with its arrangements and working systems, for their improvement. We will see many things highly instructive and interesting to the young beginner, as we proceed in our stroll for obtaining information.

Before entering upon the actual topic, it is necessary that I should preface these remarks with a running account of the Swiss manufacture of watches.

The manufacture of watches in Switzerland is separated into two well-defined branches of industry; one of them has for its object the production of blank movements (Fr. *ébauches*, Germ., Rohwerk), the other one is occupied with their further elaboration and finishing, apart from the manufacture of cases, which, as a matter of course, is a separate branch (as well as that of springs, dials, hands, etc.), but is connected more or less with the finishing of blank movements.

Although there are factories engaged in the finishing of their own blank movements, still, they are forced to purchase several components, as it would not be practicable to produce everything themselves.

The general course of business is as follows: The blank movement factories (*fabriques d'ébauches*) manufacture blanks of various qualities, and in a more or less advanced condition, and they sell their goods to those factories engaged in finishing, and either making the cases themselves, or obtain them from outside sources. The larger establishments of this kind are called watch factories (*fabriques d'horlogeries*), while those of lesser note, and those who give work to outside parties, are called *comptoirs d'horlogeries.*

As far as the skill of the factory hands is concerned, I will state that they always perform one and the same work, and that there are only a few equally skilled in the several branches. There are, for instance, the *repasseurs*, who only execute the necessary work on the blank; the *remonteurs*, who mount the ready pieces; the *polisseurs*, who polish them; the *regleurs*, who only pick out and insert the balance springs, and regulate the watches. By far the greatest part of each component passes through several hands until ready, this, for instance, is also the case with jewel holes. The first in this branch splits a larger jewel into thin lamina, grinds, cuts them into octagon pieces, and drills the holes. The work of the second consists in grinding the holes according to the degrees of the pivot gauge, making the oil sinks, turning the jewel into a correct shape, and finally polishing it in all its parts. He assorts the jewels according to the dimension of the holes, and only the third hand mounts them.

It will be seen by the preceding that the factory workman, although he proudly calls himself a watchmaker, when compared to the *repasseur*, upon whom he gazes in his pride as very inferior to him, is, after all, a simple specialist, who understands nothing about what lies beyond his actual sphere. He is, therefore, incapable of mounting a watch in all its parts, or even repairing one already put together, as many, who are not acquainted with his functions, are inclined to believe. These workmen, however, as a class, possess an incredible dexterity in their labors.

Let us next examine the arrangement of such a watch factory, and enter the room of the foreman (*visiteur*). He is the master of the factory; he gives out work, superintends and judges, and then turns the ready watches over to the proprietor. We next see a great quantity of blank movements of different styles and execution, just as they were received. The incompletest ones consist of the plate, which is round and flat upon both sides, with a somewhat protruding rim for receiving the dial plate. The sinks for the latter and for the lower escapement bridge are ready, and the holes for the dial feet and bridge screws drilled. The bridges and potances are turned out upon their lower sides, but otherwise they are far too thick and broad, both their appearance and shape are wanting. The spring barrel and wheels are still at the lowest degree of execution. The teeth are separated from each other simply by small incisions, consequently far too broad and devoid of shape, awaiting their completion by the cutting and rounding machine. The pinions are in that condition as they are found in furnishing stores. Both spring arbor and escapement parts are wanting entirely. This kind of blank movements is called *ébauches, sans finissage*, that is, uncompleted blanks.

Farther on we will see those of the same caliber, the trains of which already stand between bridge and plate, but still without jewel holes. The spring arbor is ready as far as being shortened; the center wheel pivots are too long, the sinks for the minute work not yet made, and the bridges have still the same unwieldy appearance as formerly. This kind of blank works is most generally elaborated in the watch factories. They are called blanks with ready finishing.

Again, there are those with ready escapement, in which it is simply necessary to insert the jewel holes for the train, the minute work, part of the spring barrel, and the bridges reduced into shape. The movement is then fitted into the case, and finally gilt. This kind of blank movements is chiefly purchased by the smaller establishments, only occupying a limited number of workmen.

We find the *visiteur*, at the time of our entry, engaged in preparing work. A so-called work-box of about 16 inches long, 3½ inches broad, and only 1¼ inches deep, provided with a lid, stands before him. It is divided into six compartments, and each one of them again divided by a low partition. This box serves for the reception of six blank movements, their entire fabrication always basing upon the half-dozen system. The *visiteur* places a plate with dial belonging thereto, barrel parts, bridges and screws into each of the larger holes, wheels and escapement parts into the smaller ones. He next adds minute works, scape pivots, fork and balance arbors, springs and cocks, of each one-half dozen, as well as a dozen of case screws, a dozen dial screws, with hands of the desired shape, and a half-dozen mainsprings. The parts of the escapement, such as scape wheel, anchor, fork and table rollers, are called assortment, also cylinder with wheel. The balance springs, main springs, screws, etc., are best obtained from the special factories or watchmaker's furnishing house.

A sheet of paper is pasted upon the cover inside, upon which the different working branches are printed, alongside of which the *visiteur* notes the name of the workmen who have to perform the necessary work. We finally see a tag upon the outside of the box, bearing the number of the movement, as well as quality, caliber, etc. Thus prepared, the box is turned over to the workmen, and, after the completion of one branch, and due inspection by the *visiteur*, it passes into the hands of another one, until its contents consist of a half-dozen ready gold, or silver, or pinchback watches, when it returns, to be packed in the well-known manner, and sent into the cold and pitiless world.

We do not intend to follow them on their journey, but remain to inspect the Swiss watch factory.

Before attempting an explanation of the working method, let us make ourselves acquainted with the principles upon which its safe and rapid progress is based. These are in the first line, the correct division of work and systematic execution, with which we will get acquainted farther on; and, second, the observation of order among the movements in hand, and their parts, that is, preventing the possibility of mixing and interchanging. For this purpose, both plates and cases belonging thereto, are stamped with the current factory number, and before work is begun upon them, all the parts of the half-dozens are marked in a similar manner. This enumeration is done upon the bridges and cocks, by stamping in the numbers of from 1 to 6; or else, as with the other components, by small dots or notches filed in upon the lower side of the piece, so that they cannot be seen from above, to prevent the movement from being disfigured

Should such a mixing occur, nevertheless, the faulty piece must unconditionally be replaced by a new one. The numbers seen in the paper box always from left to right, so that the parts of the first movement are marked with one, those of the second with two dots or notches, up to the fifth. This is, for facilitation, not marked with five, but with two dots standing far apart, differing from those of the second work, the dots of which are close together. The sixth work remains without marks, and is thus equally known. Those parts, for instance scape wheels, on which the marks cannot be well introduced, are placed in envelopes, which are then numbered. By balances, the dots are made upon the arms, because if placed upon the rim, they might destroy its equipoise, or in case this was not yet established, other dots made for the purpose of establishing such equipoise, might mystify the original ones. Much trouble and consumption of time, that would ensue upon an accidental mixing, is saved by the enumeration of ali components of a box, a manipulation that must at any rate be undertaken before grinding and polishing, or gilding. I will state an occurrence during my residence:

A workman, by sheer carelessness, threw three boxes of entirely dismounted and not yet marked cylinder movements of a good quality upon the floor, whereby a part of their contents fell out. They were stamped-out movements, of which it is often said that the piece of one fits into another train of the same caliber. This may happen at times, but did mo t decidedly not in this instance. I saw that the workman would not be able to assort the different parts again, and I handed all three boxes to another possessing more skill, to engage in the undertaking. He was a mounter (*remonteur*) whose specialty is to mount the watches after gilding, and I expected that it would be easy for him to do it. After he had spent two days in the thankless labor, he brought me back the boxes, stating that he had mounted the majority of the movements, but with the best of will, could not locate the remainder. In order to be satisfied, I attempted it myself; the mounted movements contained ill-fitting parts, and the remainder would fit nowhere. The main trouble was encountered with the barrel parts, not one piece would fit well, and to fill the measure full to overflowing, various parts had been broken in the accident. The only remedy remaining was to replace everything by new parts, which had specially to be made. Much time had been lost in searching, and from that time forward, I made it an undeviating rule of having every part of the half dozen marked before it was taken in hand.

In order to expedite the work as rapidly and accurately as possible, in whatever branch it be, the work performed on the part of one work, must also be executed upon the same parts of the other movements of the same box. The workman will arrive at such a state of perfection that he will lay down no utensil uselessly, and to have to take it up again, or turning a screw on or off. It is self-apparent that all utensils, such as drills, rounders, cutters, etc., must be exactly suitable for their intended purposes, A factory workman does not by far need as many utensils as the repairer, since he constantly does the same work. They rest in the drawers only from Saturday night until Monday morning, as on Saturday evenings, after the cessation of work, all working benches, except the painted ones, are thoroughly scrubbed, to have them always neat and clean. Only the mounters have a sheet of paper on their bench. All these are trifles, but if dispensed with, they would seriously interfere with the progress of the work.

We next come to the case making, to obtain a general insight into their activity, as it is a part of the factory, and has to keep pace with the progress of the blank movements. When the latter are ready as far as fitting into cases, these must be ready also, that is, as far as the drilling of the pendant holes, finishing the joints, engraving, engine turning, etc.

First, the measure of the cases is determined by the size of the plate, and its height measured from the surface of the dial to that of the center bridge, whereby for the hands on the one side, and the winding and setting square on the other, another certain quantity is added.

The metal to be worked into center pieces and rims is melted, alloyed, and cast in molds into round ingots, about one cm. thick.

After cooling, they are passed through rollers provided with two graduated notches, whereby they become square and of the requisite thickness. They next pass through the center piece rollers, by which their first crude shape is imparted them. Many chucks belong to this roller, all of different shapes, smooth, fluted, engraved, embossed, all of which forms are imprinted upon the metal. In the same manner also is the metal treated prepared for the rims and bezels. After the pieces have received the suitable proportions, they are cut into exactly-gauged shape and length, according to the circumference of the plate, the two ends are bent together, soldered, dressed round by suitable forms, and finally turned in the foot lathe. Previously, however, also the plates are turned by a workman of the case maker, the turner (*tourneur*), that the small rim around the plate remains for resting upon the case center piece, and the inner diameter of the center piece is turned out thereby, in such a manner that the plate fits firmly in. Next, the previously prepared and turned rings for the bottoms and the glass are fitted on.

After the completing of this part, the movements themselves are taken in hand, and the cases, progressed so far, are turned over to the mounter, who solders on the knob, joint pieces and joints, during which time the turner shapes the bottoms from flat-pressed metal, to make them fit and spring them into place. If the cases are to be provided with closing springs, the work of the *monteur de secrets* (the spring maker) begins now, who makes them from flat, very elastic steel, made for the purpose. It happens but seldom that such a spring breaks, provided it was not made too strong or too short with its spring end. They are glow-heated upon charcoal in the customary manner, tempered in oil, and left in it. Many of my readers will be astonished at learning that a spring maker will finish daily, from beginning to end, one-half gross of springs, also with the screw in each, which he receives ready furnished, except the fitting into the case. Closing springs demand a little more time, especially those with notched heads.

The cases remain in this condition until after the fitting in of the movement, which is the work of the watchmaker, and is finally finished. To this also belongs the grinding of all parts, the engraving, engine turning, fastening of the pendant, placing in the joint wires, rounding its ends, and finally the polishing.

As each of these branches is performed by a separate workman, eight are necessary for making the case; gold cases are made by workmen with more experience and skill, who also receive better pay than those who only understand making a silver case. The finishing of the joints, as well as grinding and polishing, is chiefly done by women; they earn about 100 to 130 francs per month, while the case makers make from 180 to 200 francs, as much as the engravers and engine turners, who frequently receive much more. Spring makers bring it seldom up to 150 francs.

We leave the case maker shop, and enter into the other division of the factory, in which the blank movements are elaborated.

As previously mentioned, mostly movements in an advanced state are used in factories. The first part of the work to be performed upon them is finishing the escapement, for which purpose we find eight workmen seated in a large room. Two are occupied with cylinder and four with arbor movements, one workman mounts jewel holes, and a *regleur* inserts balance springs. Of large working utensils we notice four. Universal lathes of the largest caliber, with large wooden fly wheels; a very small chuck lathe, also with fly wheel, and provided with small brass chucks for shellacing the article in hand. The spindle has cord runs of 2 to 3 cm. diameter, and runs in a sapphire, instead of steel. This turning lathe serves for turning, grinding and polishing the crude, already perforated jewel holes. Again, we see several drilling and uprighting tools with fly wheel in motion, and notice that the workmen sit at ease and straight, that the cord roller is placed upon the first lathe center, and that the graver is guided from right to left. We are astonished at this at first glance, and wonder whether it is possible to turn well in this manner, but after watching for a short time, see that this method is comfortable for the body of the turner, because it is not necessary to sit square before his place, as is the case with us who turn from left to right. It is actually only custom, and everyone should endeavor to give this practical method the preference over the unpractical, handed-down usage. Let us examine the different labors.

The one sitting nearest has in a row six plates with the screwed-on lower cylinder bridges lying before him, not containing as yet either foot pins or holes for them. He now screws all the upper cylinder bridges in place, and straightens each one singly upon the plate, by aid of the uprighting tool, by inserting its lower point into the already drilled pivot hole in the lower bridge, so that the upper point of the tool marks the center of the bridge's breadth. The holes for the foot pins connecting both bridges are marked next and drilled upon the drilling tool, the upper bridge is taken down, the pins are filed round nicely, polished and driven in as deep as possible, after their holes upon the lower part of the bridge have been countersunk somewhat, to prevent the formation of heights when the pins are driven in. One or two filings out are also made on the lower side of the bridge, for lifting it off. The holes in the lower bridge are next chamfered sufficiently so that the foot pins enter neither too loosely nor too firmly; also countersink a little from above, more from below, so that its outer end from within closes with the sinking, and it is next rounded with a rounder. All the bridges are then again screwed in place, again uprighted, and the pivot holes drilled. The depthing distances are then struck upon the plates, from the fourth wheel toward the scape pinion, and from the center of motion of the cylinder in the lower cock toward the scape wheel. This is done by placing the corresponding parts of the movement in the depthing tool (all the parts of the six movements being of equal dimensions, it is not necessary to put them all into the tool) and where the two circles intersect each other, is the motion center of the scape wheel, which, when drilled, is uprighted upon the scape bridge and also drilled after, the foot pins are also made here. With a good construction of the cylinder, and wheel, the escapement must stand sufficiently low that the repose of the wheel upon the cylinder does not amount to more than 4, at most 5 degrees, and the lifting will in all amount to 40 degrees. The ready cylinders have generally the defect of being cut out too little, whereby the rest becomes too large, or by placing the escapement shallower, the wheel drops before the center of the cylinder.

The turnings out for the cylinder and wheel are nicely and smoothly turned in the plate upon the universal lathe, and the passage for the scape-wheel teeth in the bridge is set in order.

With this the labor of this division is ended, except the foot pins for the lower cock in the plates, which, however, are only made after the mounting of the jewel holes, since the escapement might accidentally have been placed a trifle too high or shallow, which can be corrected by moving the cock, as long as the foot pins have not been placed.

These boxes are next handed to the *sertisseur*, for mounting the jewel holes, and next to the *pivoteur*, for turning in the escapement parts.

Although all of us are acquainted with this work, we will not turn from it, especially since the *pivoteur* assures us that he finishes one-half dozen movements per day. Whence this astonishing rapidity by so delicate a work? we ask. It is practice, and several little "tricks of trade," with which we will soon become acquainted.

Caron de Beaumarchais.

THE FOLLOWING occurrence took place on a fine day in the month of July, 1750, in the city of Paris:

Mr. Caron, an honorable, modest watchmaker, living in the St. Denis street, drove his only son and heir-apparent, Pierre Augustin, out of the house.

And he had good reasons.

The young gentleman, who, since his thirteenth year had been an apprentice of his father, and counted upon as following in his footsteps, could by no means be held up as a pattern of a diligent horologist and orderly citizen. He was far from being ignorant; on the contrary, he was too smart; he lacked likewise not in accomplishments—in fact, he possessed too many—so many that his father grew desperate. The young man, for instance, rather played music than wrestled with the intricacies of depthing; and worse than all, he exhibited a talent for committing all manner of frivolous jokes, which, in an honest citizen's boy, were entirely out of place.

Father Caron, however, was no strong-hearted parent; he loved all his six children, his scapegrace son the most; he, therefore, was willing enough after the lapse of a fortnight, when his passion had cooled, and at the intercession of all the paternal and maternal uncles and aunts, to receive the scamp again into his house—*provided, however*, he was willing to submit to the following conditions:

First, to dispose of nothing of his, the father's, things, without due permission—not even an old watch key.

Second, to rise in the summer at six and in winter at seven, and to labor until supper, in order to honor his calling.

Third, feast and Sundays excepted, to eat nothing outside of the paternal house, and to be back by nine o'clock on these exceptional days.

Fourth, to quit that unhappy music; or at most to play violin or flute only in the evenings after work.

Fifth, not to go out without leave, and to invent no bad excuses therefor.

Sixth, to be satisfied with free board and eighteen livres per month, and to liquidate his indebtedness gradually from this sum.

The young Caron did not even attempt to soften the vigor of these, to him, very harsh conditions. He subscribed them obediently, full of repentance, and again entered into the house and business of his father. He began to suddenly develop a peculiar zeal for horology. In order to show his father that he could be capable of becoming one of the foremost watchmakers of his time, he invented the pin escapement for watches. He incautiously confided his secret to a very famous watchmaker in Paris, by the name of Lepaute, who misused the confidence so far as to proclaim himself openly of being the inventor of the escapement. But Caron was not the man to quietly let his right be usurped in this manner. He proceeded publicly against Lepaute, claimed the invention solely for himself, and demanded the arbitration of the Academy. This scientific body, indeed, declared, on the 4th of March, 1754, young Caron to be the sole rightful inventor.

This was the first process of the man, who, afterward, as Monsieur de Beaumarchais, was destined to interest the entire cultivated world in his processes. This case had made the name of the watchmaker, Caron Son, well known in Paris, and the consequence was that the King, Louis XV., ordered a watch made by him. By means of his inventions, published to the four corners of the earth by the interesting lawsuit, the young watchmaker was enabled to make the watches as diminutive of size as demanded. The joy of the King at the handsome and excellent timekeeper constructed by Caron was so great, that he invested him with the title of "Furnisher to the Court." Madame de Pompadour ordered a similar one, and Caron in person handed it to the all-powerful *amie* of the monarch. The watch was so small that it was mounted in a finger ring; it was 4½ lines in diameter, and not thicker than two-thirds of a line. It was wound by a new and very ingenious contrivance, and ran thirty hours with great exactness.

Caron had opened his path. The princes and princesses all ordered watches of the same Lilliputian pattern, and their young producer always carried it himself to the place of Versailles, and handed it to the purchaser, because, of course, everyone wanted explanations concerning the thing, especially the ladies. The King favored him greatly, and even received him once personally. The favorite wrote the following letter in 1754 to a relative in London:

"I have finally delivered the watch to the King, who did me the honor of recognizing me, and remembering my name. His Majesty ordered me to wind it, and to explain it to all the gentlemen of the *Lever*. Never has the King received an artist with so much kindness; he desired information about every part of the movement. I lauded the magnifying glass at this opportunity, the one you presented me with, and it was universally admired. The King used it to inspect the ring watch of Madame de Pompadour. He demanded one like it for himself, on which I am engaged at present. All the gentlemen of the Court follow the example of the King, and each one desires to have his watch first. I have also constructed a remarkable little pendulum for Madame Victoria (one of the daughters of the King). It has two hands, and from whatever side it is viewed, it indicates the time."

If all this attests to the skill of the young Caron as horologist, his personal attractiveness, and even his faults, were calculated to pave his fortune in a manner little suspected. A still young wife of a Court official, who also had ordered a watch by him, took so lively an interest in the tall and shapely young man with the *spirituelle* face, that she influenced her husband to surrender to him his office, by paying a certain pension. This was nothing uncommon at that time, and the King patented the office to Caron, who stood in his special favor, as well as that of Madame de Pompadour and his daughters. From this day forward—November 9, 1755, when not yet 24 years old, young Caron left the store of his father in the Rue St. Denis, hung horology on a nail, and played the roll of courtier in the palace of Versailles, with a self-esteem of his actual value that was not by any means circumscribed by too great a modesty.

And, indeed, he moved upon the beeswax flooring of the palace as if he had been to the "manor born." He had become acquainted with the daughters of Louis XV. by means of his watches. They were four old maids, with the remnants of a convent education, who lived in great retirement in the palace, and suffered much with ennui. They passed their time as well as they could, and their strict rules permitted; one played several instruments, the other painted, the third studied languages, and the fourth took an interest in the mathematical and mechanical arts, and at times essayed to be watchmaker. They gave a musical soirée once a week, at which also the King, the Dauphin and various other princesses were wont to attend. When they learned that Monsieur Caron also performed upon several musical instruments, and was especially expert upon the harp, he was invited to perform before them. The harp, little known until then in French society, was just beginning to grow into favor. The young harpist delighted the old ladies, and understood to make himself so amiable with all of them that he was regularly invited to assist in these concerts, and to assume the role of bandmaster. He also instructed the royal daughters upon the instrument.

The awakening ambition of Caron, since such favors were showered upon him, aimed with single calculation for higher objects, which he wished to obtain in the court world open before him. The old gentleman whose office he had purchased, died, leaving his youthful wife a widow, and she consented to become the wife of Caron. This gave him not alone wealth, but also another name, which threw around him the halo of nobility, even if only by the effrontery of its inventor. Because if the son of the humble Caron, from the Rue St. Denis, henceforward styled himself Caron de Beaumarchais, he simply added the cognomen upon the strength of an estate which his spouse had possessed formerly, either as a thing real or imaginary. Enough, the Court of Versailles counted one nobleman more—Caron de Beaumarchais, of whose patents of nobility no one knew anything definite.

It is not to be supposed that such a bold character lacked jealous and envious enemies. But he possessed spirit and wit, together with courage and confidence to break a lance with them morally and physically. He fought a duel with a nobleman and killed him. This added not a little in making him respected. With malicious verses and quick repartees, he understood how to be respected.

A cavalier had undertaken once, when he returned through the ante-chamber, coming from the boudoir of the royal ladies, to ridicule him in the presence of the courtiers.

"Monsieur," he addressed him, and held out a costly watch, "you understand something about watchmaking. Would you be so very kind, I pray, as to look at mine; it is in disorder."

"Monsieur," Beaumarchais responded, "since I have ceased to be occupied with watchmaking, I have become very unskilful."

"O, do not refuse me this favor."

"Be it so; but I reiterate that I have become very unskilful."

He took the watch, opened it, lifted it up high, as if examining it closely, and let it drop.

Deeply bowing, he turned to the cavalier, saying:

"I cautioned you that I had become very unskilful."

And he left the apartment, while the duped nobleman collected the pieces of his timepiece.

At another time, Beaumarchais heard that evil-minded persons had prejudiced the princesses, by telling them that he stood in unfilial relations with his father. He therefore went to Paris, visited his father in the watchmaker's shop, and under pretexts persuaded him to accompany him to Versailles. He was extremely careful to meet the princesses several times during the drive. He went to see them in the evening and was received very coolly, but was asked, as he had expected, with whom he had been driving.

"With my father," he responded.

Great astonishment; explanations followed, and Beaumarchais begged the honor of presenting his father, who was in the ante-chamber. The old gentleman was admitted, and with paternal pride he sounded the praises of his son. In fact, the honest citizen who had expelled his scapegrace son, had learned to hold him in high esteem, and was ready enough to proclaim it. And his son gave him an opportunity soon after.

In order to obtain a patent of nobility, he had, for 85,000 frs., purchased the titular position of Secretary to the King. There was only one obstacle, his father still pursued the business of watchmaker, a vocation incompatible with the high pretensions of his son. Wherefore he persuaded him by letter to retire, and bound himself to honorably support him and his sisters. The father, in order not to thwart the aspirations of his son, acceded, the latter obtained his patent, and the former lived afterward, in company with his four unmarried daughters, as *rentier*, amply supported by the munificence of his son.

We cannot part from so interesting a member of the horological fraternity without following his fortunes, the more so, since he was destined to play a large part in the future events of France.

Beaumarchais, a favorite of fortune in everything he undertook, in his new relation engaged in the sale of arms to America, and other speculations, and soon became a very rich man. Three lawsuits made him known everywhere, and two theater pieces raised him to the rank of the most celebrated of French authors. His lawsuits, which he conducted against a high functionary, obtained their great popularity because Beaumarchais very skilfully defended himself, and with it, all the rights of citizens heretofore wronged by justice.

In them, he attacked the ancient effete order, the descended and ossified right, the corruption of the administration, the preferences of the higher ranks. The great minds were impelling France to that immense revolution, destined to change the face of the entire civilized world, and Beaumarchais shook with vigor and energy, in his law documents on the decayed pillars of the temple of justice, the tumbling down of which speedily followed thereby. What he termed Memoirs, in which he recounted in a masterly manner his disputes, were illustrious pamphlets against the government, which long ago had become odious to the people. Beaumarchais published them, and his lawsuits became themes of national interest. They exerted such a power that the German poet Goethe dramatized it, and personified M. de Beaumarchais in his drama "Clavigo."

His two theater pieces scarcely earned him less fame. "The

Marriage of Figaro," and the "Barber of Seville," are known to everyone.

The "Marriage of Figaro," was first played in Paris in 1784, and its success was simply immense. Not on account of its special beauties, but of its wit and poetical proclivities. In Figaro, the merry Barber, the everywhere felt democratic idea was reduced for the first time; this servant of the Count Almaviva represented the third estate, the citizenship, which still was regarded as subject by both the nobility and the government, and as inferior in rights, but which was already in ferment, caused by this political and social inferiority. Everything he felt was expressed in this pert and witty Figaro, and laughers were not wanting, even in the highest circles. This established before the whole world the moral right of these attacks upon the privileges of the nobility, and the principles of social equality were thus sanctioned. The sayings of Figaro were secret thoughts of the people, and silenced all those against whom it was aimed.

The infirmities of existing society were laid bare at once, as if the last shred of deception had been dropped. All ancient authorities, the existence of which, simply because being things handed down from the past, was still sanctioned and commanded respect, could be seen tumbling together in a miserable manner, and became a laughing stock, whereby their respect was lost forever. If there was a rotten concern, Beaumarchais aimed a shaft of derision thereat, and it never failed its mark. Before this, letters had been written lacking signatures, he affixed them. He was another Aristophanes, who pointed with his finger at what he assailed, and at the same time he had been a successful aspirant for that nobility himself.

It is remarkable that this piece, which the French government critic would not permit, was performed at the special command of Marie Antoinette. Beaumarchais was greatly liked by her, as well as by the King, and both did naturally not dream that they were loading a cannon with Figaro, the charge of which should hit themselves. The rights of the nobility to all the preferments in the State could not be derided better than by the words of Figaro, "because he had taken the trouble to be born."

Beaumarchais was the witty genius who predicted the Revolution as an inevitable fact. When it entered into the arena of history with an earnest face, and finally played its tragical part, carried away by passion, a genius like that of the poet of "Figaro's Marriage," was of no further consequence. He whose works had struck such heavy blows at the old regime, could not escape the Nemesis; to fall with it, as it had carried him upward. In the year 1784, he was the most honored man in France, rich, popular with the citizens, feared by the nobility, and his piece was performed 72 times in succession, calling forth an ever-increasing applause from the public, until he himself said: "There is only one madder thing than my piece, and that is its success."

Fifteen years afterward, at the end of the century, the same Beaumarchais died, almost unknown, and impoverished, after having been proclaimed the enemy of the people, and barely escaped with his life.

Report of the Neuchatel Observatory.

WE HAVE received a very interesting document entitled "Report to the Department of the Republic and Canton of Neuchatel, on the competitive examination of chronometers at the Cantonal Observatory during the year 1881, by Dr. Ad. Hirsch," its able director; and the want of space alone forbids us from laying the entire report before our readers. We shall, however, cull those portions which we deem to be of special interest.

The doctor felicitates the department on the cessation of the terrible crisis that had depressed Swiss horology for so many years, a truth well shown by the great increase of chronometers presented at the Observatory, which, in 1879 and 1880, amounted to 165 and 170, while in 1881, it has suddenly increased to 270, of these 228 received bulletins of rate.

As customary, Locle has again sent more than one-half, or 121 chronometers, while Chaud-de-Fonds, which formerly occupied the fourth rank, has risen to the second, in 1881. There were observed

A.	Marine chronometers. for 2 months	5
B.	Pocket chronometers, for 6 weeks, in 5 positions	29
C.	Pocket chronometers, for 1 month, in 2 positions	116
D.	Pocket chronometers, for 15 days, horizontal and changing temperature	78
	Total	228

It is usual, in flush times, to find a certain looseness from a very careful regulating; and the present year is no exception to the rule; the following tables will show it:

Daily mean variation:

Class A, in 1881, 0.17 sec.; in 1880, 0.13 sec.
Class B, in 1881, 0.46 sec.; in 1880, 0.43 sec.
Class C, in 1881, 0.52 sec.; in 1880, 0.46 sec.
Class D, in 1881, 0.57 sec.; in 1880, 0.64 sec.

Total for 228 chronometers, in 1881, 0.52 sec; in 1880, 0.49 sec.

As for the kind of escapements, we find them to vary as follows:

187	chronometers,	anchor, gave a mean variation of	0.53 sec.
33	"	bascule, " " "	0.55 "
7	"	spring, " " "	0.25 "
1	"	tourbillon, " " "	0.38 "
228	chronometers	" " "	0.52 "

This time again, the spring escapement showed a decided superiority; 5 furnished with it were marine chronometers, and 2 were pocket, which showed a mean variation of 0.47 sec. Also the tourbillon, represented in a single chronometer, showed to be excellent, and far below the mean.

The different proportions can be judged best by the following table, representing the results of 20 years:

Years.		Anchor.	Bascule.	Spring.	Tourbillon.	Mean for the year.
1862	sec.	1.51	1.80	1.02	2.30	1.61
1863	"	1.39	1.28	1.37	0.64	1.28
1864	"	1.14	1.47	1.17	0.66	1.27
1865	"	0.89	1.01	0.70	0.42	0.83
1866	"	0.67	0 73	1.01	0 35	0.74
1867	"	0.70	0.61	0.74	0.52	0.66
1868	"	0.57	0.56	0.66	0.29	0.57
1869	"	0.61	0.58	0.60	0.55	0.60
1870	"	0.55	0.62	0.52	0.40	0.54
1871	"	0.56	0.53	0.47	0 56	0.55
1872	"	0.53	0.46	0.54	0 58	0.52
1873	"	0.62	0.63	0.56	0 72	0.62
1874	"	0.54	0.52	0.48	0.60	0.53
1875	"	0.46	0.47	0.17	0.49	0 46
1876	"	0.54	0.53	0.53	0.24	0 53
1877	"	0.51	0.59	0.25	0.52	0.51
1878	"	0.62	0.56	0.32	0.58	0.60
1879	"	0.66	0.59	0.22	0.35	0 61
1880	"	0.50	0.51	0.28	....	0.49
1881	"	0.53	0.55	0.25	0.38	0.52
Mean variation for 20 years	"	0.581	0.682	0.600	0.626	0.607
Given by chronometers	"	1.986	0.681	0.187	0.85	2.938

It will be seen by the above table, which embraces the results of nearly 3000 chronometers, that although the general average of the anchor escapement, with which two-thirds of the chronometers were provided, shows the least variation in the last ten years, the result is sensibly the same (0.54 sec.) for the two principal escapements, anchor and bascule, which are both employed for pocket chronometers.

Regarding the different kinds of balance springs, the experience of 1881 confirms what we have heretofore stated on the preponderance of the Philipp's spring, and it has been used in 85 per cent. of the chronometers observed. The spherical spring, which appeared to have been abandoned within the last few years, re-appears in 5 chronometers. Also for the first time, we see the palladium spring in a goodly number of chronometers (11). The mean variation of these chronometers (0.60 sec) is noticeably higher than the average, but it would be premature to become prejudiced against the use of this metal, from this first imperfect experiment, especially since we know nothing yet of its adaptability for regulating in the positions, because all the movements containing it belonged to class D.

According to custom, we will next examine the influence of the different forms of springs upon regulating; the following table shows for 1881, also for the last 11 years, the mean variation corresponding to the different kinds of springs:

Chronometers Furnished With	In 1881. Daily Variation.	In 1881. Given by Chronom'tr.	From 1871 to 1881. Daily Variation.	From 1871 to 1881. Givan by Chronom'tr
Breguet Spring........	0.48	18	0.59	283
Flat Philipp's Spring with Terminal Curve.............	0.54	154	0.55	1344
Flat Philipp's Spring with Double Curve.....................	0.51	29	0.49	273
Philipp's Cylindric Spring.....	0.36	11	0.45	141
Ordinary Cylindric Spring.....	0.52	11	0.58	104
Spherical Spring	0.59	5	0.53	44
Mean.....................	0.52	228	0.54	2189 Chronometers.

In examining these figures, it must be borne in mind that the cylindric Philipp's spring, as spring escapement, has been employed for all the marine chronometers, and the slight variation it showed must be largely ascribed to this fact, because the six pocket chronometers which also had this spring showed the usual variation (0.52).

If the Breguet spring ranks second in 1881, it must be ascribed to the reason that a manufacturer had exclusively used it for a number of chronometers, which, in other particulars, had been gotten up with the greatest care. For the average of 11 years, it has occupied the lowest rank. To this average must also be classed the three kinds of Philipp's springs, with a somewhat slighter variation (0.53) than other springs not furnished with the theoretical curves (0.58).

For the variations from horizontal to vertical, the flat springs appear to give better results than the other; especially does the cylindrical Philipp's spring sustain its alleged uniformity we already noted the past year. The following exhibit will show it:

Sort of Spiral.	Variation from Horizontal to Vertical. In 1881.	Given By.	From 1871 to 1881.	Given By.
Flat Breguet Spring..........	169	13	205	127
Flat Philipp's Spring........	187	94	206	975
Flat Philipp's Spring with two Curves..................	170	28	194	242
Cylindric Philipp's Spring.....	362	1	263	61
Ordinary Cylindrical Spring...	256	4	211	58
Spherical Spring.............	220	5	179	38
Mean..................	186	145	206	1501

It will be seen that the variation from horizontal to vertical, although being somewhat higher in 1881 than 1880, (1.75) is nevertheless an improvement on the preceding years. This is not equally true of the other variations of class B, we have here a real retrogression, as will be seen by the following table:

Sort of Spring.	Number of Chronometers.	Variations of. Flat to Hung.	Pendant High to Pendant Left.	Pendant High to Pendant Right.	Dial High to Dial Reversed.	Total of the Four Variations.
Flat Philipp's.........	17	1 76	2.18	2.60	2 39	8.93
Flat Philipp's with two Curves...........	8	2.09	3.00	2.87	2 59	1.055
Ordinary Cylindric Spring.............	3	1.52	1.97	2 50	1.07	7.06
Spherical Spring.......	1	0 54	4 78	2.22	0 96	8.50
Mean.............	29	1.79	2.47	2.66	2.26	9.18

All these variations are not alone much larger than the past year, but for the greater part far above the average for 9 years, for which time we possess the necessary data. The mean variations of position for the chronometers of class B, observed during 9 years from 1873 to 1881, are, for

Flat Breguet spring, 18 chronometers, sum of 4 variations of position, 11.29 seconds.

Flat Philipp's spring, 161 chronometers, sum of the 4 variations of position, 7.62 seconds.

Flat Philipp's spring, with two curves, 98 chronometers, sum of the 4 variations, 7.82 seconds.

Cylindric Philipp's spring, 17 chronometers, sum of the 4 variations of position, 8.47 seconds.

Ordinary cylindric spring, 5 chronometers, sum of the 4 variations of positions, 7.14 seconds.

Spherical spring, 5 chronometers, sum of the 4 variation, of position, 11.56 seoonds.

Or an average of 314 chronometers, with sum of variations, 8.04 seconds.

It will be readily seen by the above that both the Breguet and the spherical spring appear to be little adapted for regulating in the positions; on the other hand, the superiority of the Philipp's spirals is satisfactorily established, the three forms of which, for 276 chronometers, averaged 7.74 seconds as the sum of the 4 variations, while the mean is 9.69 seconds for 38 chronometers, provided with other forms of spring.

* * * * *

The learned author next published a table on the rate in heat and cold, of less interest, and he next recommends the several awards, and the first prizes again go to the house of Mr. Henri Louis Matile, of Locle, who presented 31 chronometers for observation of 6 weeks and 1 month; the average is as follows:

Mean daily variation..............0.42 sec. (limit by rule 0.5 sec.)
Variation from horizontal to vertical 1.57 sec. (limit by rule 2.0 ")
Variation for 1° temperature........0.12 sec. (" " 0.15 ")
Difference of extreme rates.........6.08 sec. (" " 5.00 ")

Another very large house, Messrs. Borel & Courvoisier, of Neuchatel, competed with chronometers of the following rate:

Mean daily temperature...............................0.44 sec.
Variation from horizontal to vertical....................1.93 "
Variation for 1° of temperature.................. .. . ...0.12 "
Difference of extreme rates.................. ....5.95 "

Wherefore for the two groups, the three first conditions are satisfactory, but the difference of daily rate, both maximum and minimum, is rather strong. It might be presumed, therefore, that this last condition is too rigorous, and that it would be better to extend the limit of the rules, by changing it to 6, in place of 5. I am correct in saying that we might have accorded the general prize many times under the present conditions, which proves that it would be well to preserve this limit of extreme rate. At any rate it would be well to submit the question to the decision of a committee of the Observatory. * * * * The first prize of this class, therefore belongs to No. 10,778, of Mr. H. L. Matile, of Locle, regulated by Mr. Borgstedt, and which complied with all conditions.

The second prize is awarded to the following number of the table, to wit, chronometer 16,666, of the Workingmen's Association of Locle, also regulated by Mr. Borgstedt.

The chronometer next on the list, No. 10,789, also belongs to Mr. Henri Louis Matile, equally regulated by Mr. Borgstedt, is awarded the third prize.

All these three chronometers are anchors, and provided with the flat Philipp's spring; that of the Workingmen's Association contains a spring with two theoretical curves, the last one is ochronograph.

I will therefore sum up my recommendations as follows:

That to Mr. Henri Louis Matile, of Locle, be awarded the first general prize of 200 francs.

A prize of 150 francs be awarded to marine chronometer No. 1, of Mr. Nadenbousch, of Neuchatel.

B.—Chronometers observed for 6 weeks, in 5 positions.

The first prize of 130 francs be awarded to Mr. Henri Louis Matile, of Locle, for No. 10,778.

The second prize of 120 francs be awarded to No. 16,666, of the Workingmen's Association, of Locle.

The third prize of 110 francs be awarded to No. 10,789, of Mr. Henri Louis Matile, of Locle,

Next follows a list of lesser awards to other parties, which would be uninteresting to our readers.

Japanese Gold Lacquer-Work.

A REPORT has been prepared by Mr. J. J. Quin, Acting Consul at Hakodate, on the lacquer industry of Japan. It is intended chiefly as a description to accompany a collection of illustrative specimens, tools, and products at the Economic Museum at Kew. The cultivation of the lacquer tree and the manufacture of the various kinds of lacquer is described, the woods used for the production of lacquer ware, and the various processes of lacquering, from the ordinary plain work to the treatment of gold lacquer. In drawing up the report it was found that a number of Japanese terms had to be employed, which necessitated a somewhat detailed explanation, so as to be intelligible to anyone not acquainted with the language, and not familiar with the technicalities of the trade. The *Architect* makes the following extracts on the gold lacquer work, describing the mode of treatment, which are of interest:

Mode of making gold lacquer.—A description is given first of *Togi-dashi* (bringing out by polishing). The article, having been already subjected to twenty-two processes of ordinary lacquering, is then treated as follows: The picture to be transferred to the article is drawn on thin paper, to which a coating of size made of glue and alum has been applied—that known as *Mino-gami* is best. The reverse is rubbed smooth with a polished shell or pebble, and the outline very lightly traced in lacquer, previously roasted over live charcoal to prevent its drying, with a fine brush made of rat's hair. The paper is then laid, with the lacquer side downwards, on the article to be decorated, and is gently rubbed with a whalebone spatula wherever there is any tracing, and on removing the paper the impress may very faintly be perceived. To bring it out plainly it is rubbed over very lightly with a piece of cotton-wool, charged with powdered white whetstone or tin, which adheres to the lacquer. Japanese paper being peculiarly tough, upwards of twenty impressions can be taken off from one tracing, and when that is no longer possible, from the lacquer having become used up, it only requires a fresh tracing over the same paper to reproduce the design *ad infinitum.* This tracing does not dry, owing to the lacquer used for the purpose having been partially roasted, as previously mentioned, and can be wiped off at any time.

The next process is to trace out the veining of the leaves, or such lines to which, in the finished picture, it is desired to give the most prominence, and these lines are powdered over with gold-dust through a quill. The qualities called *Mijin*, *Koma-kame-mijin*, and *Aragoku* are generally used; either finer or coarser qualities cannot be used. The article is then set to dry for twenty-four hours in the damp press. The outline is now drawn carefully with a rat's-hair brush over the original tracing line with a mixture of black and branch lacquer, called *Rō-sé.* The whole is then filled in with *Rō-sé* applied with a hare's-hair grounding brush. Gold-dust of a slightly coarser quailty than *Mijin* is scattered over the lacquered portion, and the article is set to dry for twenty-four hours. Another thin coating of *Rō-sé* lacquer is again given to the gold-powdered portions, and the article set to dry for twelve hours. Next a coat of *Rō* (black lacquer) is applied over the whole surface of the article, which is set to dry for at least three days. It is then roughly ground down with magnolia charcoal, the surface dust being constantly wiped off with a damp cloth till the pattern begins to appear faintly. Another coating of *Rō* lacquer is then given, and the article set to dry for thirty-six hours. It is again ground down with magnolia charcoal as before, this time till the pattern comes well out. The ensuing processes are the same as described in black lacquer.

In making *Togi-dashi* on hard woods, transparent lacquer is used instead of *Rō.*

Flat gold lacquer.—For this method, called *Hira-makiye*, the article having been thoroughly finished, either in black or red, etc., a tracing is applied to the surface as in *Togi-dashi*, the outline is carefully painted over with a fine brush of rat's hair, and then filled in with a hare's-hair brush, using *Shitamaki* lacquer (branch lacquer and red oxide of iron). Over this surface, gold-dust, of the quality called *Aragoku* being generally used, is scattered with a brush of horse's hair (*Kebo*) till the lacquer will not absorb any more. The article is then set to dry for twenty-four hours. A thin coating is next applied over the gold of transparent lacquer or *Yoshino* lacquer, and set to dry for twenty-four hours at least. It is then most carefully smoothed with camelia charcoal, and finally polished off with *Tono-ko* and a little oil on the point of the finger, till the ornamented portion attains a fine polish. The veining of leaves and the painting of stamens, etc., of flowers, or such other fine work, is now done with a fine rat's-hair brush charged with *Ke-uchi* lacquer, over which fine gold-dust (*Goku-mijin*) is scattered from a brush of horse's hair (*Kebo*) as before, and the article set to dry for twelve hours. Some *Yoshino* lacquer is then applied to a piece of cotton-wool, and rubbed over the whole surface of the box or other article, and wiped off again with soft paper. It is set to dry for twelve hours, after which it is polished off with deer's-horn ashes and a trifle of oil. When very high-class work is desired, *Yoshino* lacquer, to which a little water has been added, is applied and polished off a second time, and a very brilliant surface is attained.

More ordinary "flat gold lacquer" differs in the manufacture as follows: the tracing is accomplished in the same manner, but *Shitamaki-nobe* lacquer (branch lacquer, red oxide of iron and camphor) is used for filling in the pattern with a horse's-hair brush. The article is then set to dry in the press for ten to twenty minutes, during which time the lacquer has begun to harden and less gold will adhere. Then gold-dust (*Goku-mijin*) is applied with cotton-wool thinly, and the article is set to dry for twenty-four hours. The whole surface is then smeared over with *Yoshino nobe* lacquer (*Yoshino* lacquer and camphor) on a piece of cotton-wool, and wiped off again with soft paper. The reason is that it is less trouble to smear over the whole surface thinly, and it is, moreover, not necessary to give a thick coat of lacquer to the decorated part, as the gold-dust has been very thinly applied. It is set to dry for twelve hours, and ground smooth with camelia charcoal, and polished with powdered whetstone and oil on the point of the finger. The fine lines are then drawn with a rat's-hair brush charged with *Shitamaki* lacquer and sprinkled with gold-dust (*Goku-mijin*) from a brush (*Keto*), and the articles set to dry for twelve hours. The whole is again smeared with *Yoshino-nobe* lacquer and carefully wiped off again with paper, and set to dry for twelve hours. The article is then polished with powdered whetstone and oil on the point of the finger, and a second application of *Yoshino-nobe* lacquer with a little water, wiped off with soft paper, set to dry for twelve hours, and finally polished off with deer's-horn ashes and oil on the finger finishes the operation.

Should it be required to make any dark spots or lines, such as bird's eyes, or to draw human hair, etc., or other shading, this is done last of all with *Kuma*, "bear" lacquer, and *Jō-hana* and lamp-black.

For a more common kind of flat gold lacquer painting, instead of tracing the design in roasted lacquer, it is done with a mixture of powdered *Tono-ko* (burnt clay from Mount Mari) and water, and the impression is transferred to the articles with the whalebone spatula as before. The reason for only using *Tono-ko* instead of lacquer is that the ground-work being inferior, it cannot be ground or smoothed afterwards, and the edges of the pattern would not be clean nor stand out clear, should any lacquer get smeared outside the tracing line. The outline is then filled in with *Shitamaki-nobe* lacquer with a coarse hare's hair brush, and the article is set to dry for twenty minutes, or till a thin skin has formed on the lacquer, and then the half-dry surface is wiped over with cotton-wool charged with *Keshi-fun*, the finest gold powder, and set to dry for five or six hours. The whole surface is then smeared with *Yoshino-nobe* lacquer, which is carefully wiped off again with soft paper, and the article set to dry for half a day. The surface is then rubbed over gently with deer's-horn ashes and soft paper to give it a polish, and to get rid of any of the last coat of *Yoshino-nobe* lacquer.

The fine lines are now drawn with a fine hare's-hair brush charged with *Shitamaki-nobe* lacquer, and the articles set to dry for twenty minutes or so; then *Keshi-fun* is applied with cotton-wool, and again set to dry for five or six hours. No further process takes place.

Raised gold lacquer.—In the method *Taka-makiye* the groundwork may be either black or colored lacquer, *Nashiji* (pear bases of gold-dust), or the plain wood. The outlines of the pattern are transferred to the surface of the article in the same manner as in *Togi-dashi*, or "flat lacquer." The outline is then painted over with *Shitamaki* lacquer, and this is covered with powdered camelia charcoal. If the outside is to be higher than the inside, a broad margin is painted and covered with the charcoal powder, leaving the center untouched, and *vice versa;* if the center is to be higher a faint line only is painted outside, and the inside is given a thickish coating, which is sprinkled with the charcoal-dust, and the article set to dry for twelve hours. When taken out of the press it is well dusted to get rid of any loose charcoal powder, and is also washed, using a brush made of human hair (*Hake*) to clean out all crevices and bring out the lines, etc. Some *Yoshino-nobe* or "branch lacquer," with camphor, is now rubbed on with a piece of cotton-wool, and carefully wiped off with soft paper, and the article set to dry for twelve hours. The raised parts are next carefully ground smooth with a piece of magnolia charcoal, and a second coat of *Yoshino-nobe* or of "branch lacquer" is applied as before and dried.

[If a well-raised pattern is required, one, two, or even three coats of *Sabi* ("branch lacquer" and *Tono-ko*) are applied, the outside edges being painted with a brush of deer's hair (*Menso*) and the inside lacquer applied with a small *Sabi* spatula, the article being set to dry between each application for twelve hours. For coarser work it is then ground smooth with a white whetstone, and for finer work with a yellow whetstone. Over this some "branch lacquer," mixed with camphor, is rubbed with cotton-wool and wiped off with soft paper, and the article set to dry for twelve hours.]

If the pattern is not to be very high, the operations described between the brackets are omitted. A coating of *Takamaki* lacquer is now given, the outside edges being carefully drawn with a rat's-hair brush, and the inside of the pattern filled in with a hare's-hair brush, and the article set to dry for thirty-six to forty-eight hours. When taken out of the press the surface is ground smooth with magnolia charcoal, and then partly polished with powdered camelia charcoal on a cotton cloth. A little oil is now rubbed on, and a further polishing takes place with powdered "whetstone" on a cloth. Next "branch lacquer" is rubbed over the raised parts with cotton-wool and wiped off with soft paper, and the article set to dry for twelve hours. It is next polished with deer's-horn ashes and a little "rape seed" or "sesanum" oil applied on the point of the finger. Up to this point the formation of the pattern, whether mountains, waves, trees, men, birds or animals, has been gradually completed.

If small squares of gold foil (known as *Kiri kane*), or of colored shell, are used in producing the pattern, they are now applied one by one on the point of a bamboo stick (*Hirame fude*), the spot where they are to be affixed having been smeared with a little *Rō-sé* lacquer to make them adhere. When all that is required has been affixed, a piece of soft bibulous paper is spread over the freshly-done parts, and pressed very carefully with the finger. This is to get rid of as much as possible of the *Rō-sé* lacquer as is not covered by the gold squares; the article is set to dry for twelve hours, and then the portion where the gold has been applied is gently polished with a little camelia charcoal on the point of the finger, to get rid of the remainder of the *Rō-sé* lacquer. Shell patterns and the coarser kinds of gold-dust that may be required are applied in the same manner. The finer kinds of gold-dust are applied next, over a coat of *Shitamaki* lacquer, and the article set to dry for twelve hours. The remaining processes of polishing, drying, etc., are the same as in first-class "flat gold" lacquer.

For making raised lacquer patterns on plain wood, the whole surface is covered with tin-foil, stuck on with rice paste, to keep the wood quite clean, and then the place only where the pattern is to come is cut out. In making all high-class lacquer the edges of every article are pasted over with tin foil to prevent their being rubbed or injured by the workman, and the same is done over each portion as it is finished.

The above is the ordinary method of making best raised lacquer, but there are such innumerable modifications of one process or another, according to the object to be produced, that it is manifestly impossible to do more than give the above cursory sketch. Nearly every piece of good lacquer made exhibits a specimen of each kind, viz., *Nashiji*, *Togi-dashi*, *Hira-makiye*, or *Taka-makiye.*

In making raised lacquer on inferior articles, the methods do not vary much from the good kinds; the work is merely less carefully executed. The saving is in the quantity and quality of the gold-dust used, and the absence of minute after-work, or in the use of silver and tin instead of gold-dust. In the very cheapest kinds burnt tin-dust is used instead of charcoal over the first coat of *Shitimaki*. This is burnished bright, and over it a thin coating of lacquer and gold dust is applied. At first it looks well, but loses its color in a year or two. By using tin powder the same height is attained in one coat that would necessitate at least three coats of lacquer and charcoal dust. This kind of work is, however, only used for cheap articles for foreign export, and has been quite lately introduced.

Lacquering on metal.—For lacquering on iron or copper, brass or silver, the metal is smoothed and polished, and then given a coating of "crude lacquer" or "black lacquer;" the article is put over a charcoal fire, and the lacquer is burnt on to the metal till all the smoke ceases to escape. The fire must not be too fierce, and the metal must not be allowed to get red hot, or the lacquer turns to ashes. After the lacquer has burnt quite hard, the surface is rubbed smooth with *Largerstramia* charcoal; these operations are repeated three or four times, till a good foundation of lacquer has been obtained. Then the same operations exactly are repeated as in making best "black lacquer," *Togi-dashi*, "flat gold lacquer," or "raised gold lacquer," only that the lacquer is burnt dry over the fire instead of being dried in the press. The lacquer is thus rendered quite hard and very durable. After the first two or three coats have been burnt on, the subsequent drying processes can be carried on in the damp press, should it be so desired.

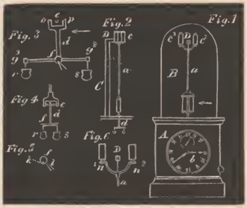
In winter, or when any article is required in a hurry, the workmen sometimes put a charcoal fire in the press, over which a pan of hot water is placed. The steam which is thus generated helps to dry the lacquer in an hour or two, which would take twenty-four hours to harden ordinarily, but the lacquer thus dealt with loses its strenth, and is never very hard. "Black lacquer" turns a rusty brown, the coloring virtue of the iron being apparently lost, and therefore this plan is never adopted for good work, and in second rate work only for under coats.

The style of ornamentation *Nashiji*, occupying an intermediate position between plain and ornamental lacquer, is therefore treated of last. Till the opening of Japan to foreign trade it was in the hands of workers in gold lacquer, but now for the most part all *Nashiji* on articles intended for exportation is applied by the workers in plain lacquer. In making best *Nashiji*, as in *Togi-dashi*, the first twenty-two processes are identical. A coating of *Rō-sé* is applied and the gold-dust is sprinkled over this surface through one or other of the bamboo tubes, according to the fineness required. The article is set to dry in the press for forty-eight hours, and is then given a thin coating of pure transparent varnish. This is set to dry for three or four days, when it is roughly ground with magnolia charcoal, and a second coat of transparent lacquer given. The article is set to dry for forty-eight hours, and then ground with magnolia charcoal till a perfectly smooth surface is obtained. Transparent lacquer is then applied with a piece of cotton-wool, and wiped off again with soft paper, and the article set to dry for twenty-four hours. It is then polished with a mixture of *Tono-ko* and camelia charcoal powder and a little oil. Next a coating of *Yoshino* lacquer is given, and wiped off with paper; the article is set to dry for twelve hours, and then it is polished with deer's-horn ashes and oil. This is repeated three times to finish the article.

The same processes are gone through when using silver instead of gold dust. For cheap qualities tin-dust is used, and the powder is scattered on glue immediately above a coating of *Kanoji* (whiting and glue). When the article is dry it is burnished with *Tokusa* (*Equisetum*), and as soon as it presents a bright surface a coating of pure transparent lacquer with gamboge, is given to it. It is set to dry for a day in the press, and then ground with *Magnolia* charcoal. Over this a coating of *Shu-urushi* (transparent varnish containing oil) is applied, and another drying for twenty-four hours completes the process.

Correct Local Time and How to Obtain it.

THE INDEPENDENT pendulum mentioned in my last article, together with the dial and general arrangement, is shown at fig. 1. Such a time keeper all told would stand about two feet high. The pendulum which is 9⅝ inches long (for half seconds) is placed above the box holding the train of wheels which only serve to carry the hands. Such a clock placed in a show window attracts (if nicely made) a good deal of attention. A bell glass 12 inches high covers the pendulum and magnets, and protects them from dust and also permits the novel action to be seen. The case A can be made of hard wood and ebonized. The dial about 6 inches in diameter should be of brass, whitened like a marine chronometer dial. The magnets, $c\,c$, are about 2 inches in length and made of ⅜ soft round iron, wound with No. 20 copper wire insulated with silk. The form of magnet is precisely as those in common sound telegraph instruments, and the readiest way to construct such a clock is to buy magnets made for the instruments mentioned. Two light soft iron armatures are lifted by these magnets alternately. To describe the method we shall have to refer to the cut. At fig. 6 is shown the top of the pendulum as seen in fig. 1, only enlarged. Fig. 2 is a side view, and shows the support for the pendulum, which is a steel rod firmly attached to the top of the case A by a foot plate shown at C, and has an arm extending forward shown at D, from which the pendulum a is suspended, and serves also to support the magnets $c\,c$. Attached to the top of the pendulum is a U-shaped piece, shown in fig. 6, terminating in



pieces lieing horizontal when the pendulum is at rest, the top of these pieces shown at n^1, n^2 rise to the same height as the top of the pendulum spring. On the ends of these pieces is alternately dropped the light iron armature which is the source of power which keeps up the vibrations of the pendulum. But to explain we must leave this part for the present and describe how the magnets are alternately brought into action. From the top of the box A protrudes a fork very much like the fork to the lever escapement, only it is not used to impart any impulse to the pendulum which it engages by a pin. This fork is so wide that four-fifths of the vibration of the pendulum is made without touching either of the prongs. This fork is shown separated at fig. 3, which is enlarged from what would be seen if the front of the curve A was removed. The fork d is attached to an arbor (like a pallet staff). We will now suppose that the pendulum is set in motion, the pin e would strike one or the other of the prongs of the fork d, and carry it to the left or the right according to the direction in which the pendulum swung. Now when the pendulum swings back on its return vibration, the pin e does not encounter the opposite prong of the fork d, until four-fifths of the arc of vibration is passed. The fork in this way imparts a tilting motion to a horizontal bar shown at g^1, g^2, but this tilting is not done gradually but intermittent, occurring almost instantly at the end of each vibration. At each end of this bar is a piece of platinum wire which dips into two mercury cups shown at $r\,s$, fig. 4, and establishing a circuit through one of the magnets. To illustrate we will suppose the pendulum to swing in the direction of the arrow, fig 3. The pin e swings free in the fork d, until it strikes the prong o, when the platinum wire at g^1 is immersed and a current is established through the magnets at c^2, fig. 1, and the light armature lieing on n^2, fig. 6, is lifted, and the opposite armature at n^1 is dropped on n^1, this armature acts as a slight weight and impels the pendulum forward. The arc of vibration once established by the weight of these armatures and the distance they are allowed to follow the pieces n^1, n^2, no power can be applied to change it, no matter if the battery be strong or weak, if it lifts the armatures it is all it can do. The arbor on which the fork d turns is also the escapement. The train is a very simple one, and needs only power enough to carry the hands and keep the teeth of scape-wheel pressed against the arbor f of the fork staff. The escapement is also simple and consists of a 60-tooth wheel on the same arbor as the one on which the seconds hand goes, the teeth of this wheel rest against the arbor to the fork which has a notch like the jewel on a duplex staff; and as the arbor rocks back and forth, the teeth are alternately let in and out of this notch. The action will be understood by inspecting fig. 5. A common lever clock movement with a second hand will answer for such a clock, putting the 60-tooth scape-wheel on the arbor carrying the second hand, and putting in one more wheel so as to have it run 8 days. A light weight should be used instead of a spring. A weight weighing only one-fourth of a pound and falling the height of the case *A*, will do all the work required.

With a nice easy running train of properly arranged wheels, a weight of two pounds falling one foot will carry all the dial work for one year. The best battery for such a clock is one known as the gravity battery. It needs three cups, and one (cup) should be renewed every week, so that all are renewed once every three weeks. The pendulum is constructed the same as other pendulums, and compensated proportionate to its length with mercury tubes. Such a clock, if carefully made and once regulated, requires no care but to renew the battery and wind once a week. In regard to its time-keeping qualities, the writer has used independent pendulums beating seconds and half-seconds like the one just described, and obtained better average results for long periods with half than with full seconds. A clock made in this way can be regulated to a rate of a few seconds a year. The pin at the bottom of the rod which engages the fork *d*, should be of hard gold wire and set in a stirrup as shown in fig. 4. The mercury cups *r*, *s*, are best made of ivory and should contain about ½ oz. of mercury each. These cups are the terminations of the wires from each pair of magnets, and serve to alternately pass the battery current through the magnets. We will suppose that the right hand cup of each pair is connected to the battery, while the left is connected with one end of the wire which is wound around the magnets, while the opposite end (of the wire around the magnets) runs into the earth, or to the opposite pole of the battery to which the cup is attached. Now it is evident that as often as the platinum wire at the end of the bar *g* connects the cups at that end of the tilting piece, the magnet to which the left hand cup of that pair is connected will be excited and lift the armature below it, thus alternately imparting power to the pendulum through the pieces n^1, and n^2. The platinum wires at g^1, and g^2 are insulated from the tilting bar by little ivory blocks through which they pass. Many attempts have been made to use the current of the battery as a source of power for keeping the clock wound, but so far no arrangement has been made which is exactly satisfactory. Among the plans proposed is to use a spring for the motive power, and by means of a battery, separate from the one which moves the pendulum, to wind up the inner end of the spring as is now done with all going barrel watches, only there is a sort of reverse train which multiplies the power, so that a slight mechanical force, acting rapidly at one end of this supplementary train, gradually winds the spring. And when a certain tension is reached, instead of a stop work the battery current is cut off. In this article I could only give a sort of general description and point the principles involved, but in my next I will give details of the entire arrangement illustrated by cuts, so that the functions and position of every piece will be understood. The writer holds that independent pendulums are to astronomical clocks, what detached escapements were to transitory time-keepers; like marine chronometers and pocket watches. Consequently that the study and perfecting of such detached pendulums is a subject worthy of the attention of all who have an interest in horology.

Reform of the World's Time Service.

THE PROBLEM of fixing upon a standard time for the whole country has recently been much elucidated by Mr. E. R. Knorr, the Washington engineer. The proposal, made by some advocates of the scheme for securing a universal time standard, to establish a prime meridian through the Pacific Ocean, which will entirely avoid any nationality, Mr. Knorr meets with most forcible objections. This proposal contemplates the selection of a meridian running through Behring Strait, but it is hard to see how it can be drawn so as to avoid both Russian and United States territory, and if it were possible thus to conciliate national jealousies, the navigation interests of the world would protest against its adoption. The meridian of Greenwich is, as this writer urges, already in use as the initial one for probably nine-tenths of the nautical and scientific publications of the world, and its universal adoption for all purposes of life would meet with far less opposition than any other.

It has been suggested that twenty-four standard meridians (one for every fifteen degrees of longitude, or one hour in time) be established round the world for reckoning sectional or local time, so that all clocks and watches would be regulated by the standard time of the section in which they run, and not by the solar local time. This plan would involve many obvious difficulties. It would render useless in every place not on one of the sectional meridians the passage of the sun over the meridian of that place as a time index, which (as a natural phenomenon visible to all classes) is for the practical purposes of life the chief guide. The traveler between two standard meridians would have to set his watch an hour ahead or back, when crossing the middle line between two sectional meridians. This plan would disturb important branches of industry, and would be met with widespread and earnest opposition.

For these reasons Mr. Knorr advocates the establishment of a uniform time throughout the world, without disturbing local time, by adopting Greenwich time in addition to the astronomical local time at present used. To make this arrangement acceptable, and to enable all men to carry both times conveniently, he proposes an additional dial for clocks and watches, to show the standard time as well as the local.

The necessity for establishing uniformity in reckoning time among all nations is every day becoming more manifest. But in any reform that is attempted, even though entire international concert can be secured, unnecessary innovations should be carefully avoided. If all chief commercial powers can be prevailed on to adopt a single prime meridian and time zero, the main end of those who have so long and wisely urged this measure will be gained. Minor reforms can be then much more intelligently considered, and gradually they will introduce themselves.

Steel Plate Engraving.

AS REGARDS steel plate engraving, it has proved eminently superior to the old copper-plate system. A soft steel plate is first engraved with the required subject in the most finished style of art, either by hand or mechanically, or the two combined, and the plate is then hardened; a softened steel cylinder is then rolled over the hardened plate with great pressure by powerful machinery, until the engraved impression appears in relief—the hollow lines of the original becoming ridges upon the cylinder; the roller is reconverted to the condition of ordinary steel, and hardened, after which it serves for returning the impression to any number of decarbonized plates, every one of which becomes absolutely a counterpart of the original, and every plate, when hardened, would yield the enormous number of 150,000 impressions without any perceptible difference between the first and the last. In one instance, from one engraving of the Queen's head on the postage stamp, over 6,000 plates were produced from the original, and plates for bank note printing are multiplied in the same way. Great caution must be used in the various processes of annealing and hardening, as only slight carelessness would result in ruining the most costly plate. The method in use in the Bank of England is as follows: The work to be hardened is inclosed in a wrought-iron box, with a loose cover, a false bottom, and with three ears projecting from its surface about midway; the steel is surrounded on all sides with carbon from leather, driven in hard, and the cover and bottom are carefully luted with moist clay; thus prepared, the case is placed in the vertical position, in a bridge fixed across a great tub, which is then filled with water almost to touch the flat bottom of the case; the latter is now heated in the furnace as quickly as the uniform penetration of the heat will permit. When sufficiently hot, it is removed to its place in the hardening tub, the cover of the iron box is removed, and the neck or gudgeon of the cylinder is grasped beneath the surface of the carbon, with a long pair of tongs, upon which a couplet is dropped to secure the grasp. It only remains for the operator to hold the tongs with a glove, while a smart tap of the hammer is given to their extremity; this knocks out the false bottom of the case and the cylinder, and the tongs prevent the cylinder from falling on its side, and thus injuring its delicate but still hot surface. For square plates, a suitable frame is attached by four slight claws, and it is the frame which is seized by the tongs; the latter are sometimes held by a chain, which removes the risk of accident to the individual. The steel comes out of the water as smooth to the touch as at first, and mottled with all the tints of case-hardened gun locks.

The Jewelry Caskets of Handsome Parisiennes.

II.

ALONG we course upon our racer, of which we spokc in the opening paragraph, and enter the world of Rococco.

Anne, of Austria, the handsome mother of the "Sun King," the passionate spouse of Louis XIII., found much pleasure in jewels. The diamond buttons presented to her by the King, play a great part in the gallant intrigue between her and the English Lord Buckingham. This lord had hit upon a very consummate scheme for purchasing the favor of the French ladies and gentlemen of the Court. When dressing for his first audience with the Queen, he fastened very handsome and precious strings of pearls across his breast in such a manner that they should break by a little exertion. According to Court etiquette, the Queen held forth her hand for him to kiss, the lord sank down upon one knee, whereby the strings of pearls broke, and rolled helter-skelter among the assembly of knights and ladies fair. Everyone stooped to pick them up to restore them to him, but the lord refused to take them, by saying that one kiss of the hand of the Queen was worth all the pearls in Christendom.

Luxury assumed gigantic proportions in the Court of Louis XIV., who understood right royally where to bestow jewels. His spouse, Maria Theresa, was not richer in jewels than the ladies that in succession enjoyed the royal favor. Louise de la Vallière possessed exquisite emeralds, and rare and handsome opals. We will pass in silence by the treasures of the princely ladies and divers royal sweethearts.

After reading the above, it will not be astonishing to hear that the far-famed Dubarry possessed jewels to the amount of 4,000,000 pounds sterling. And to this Court, in the midst of this pomp and splendor, came Marie Antoinette, with her youthful ardent imagination, her love of ostentation and beauty. Her proclivity for diamonds caused her death. The unhappy story of the "Queen's Necklace," of which she was entirely guiltless, robbed her of the nation's esteem, and formed one of the counts against her at the trial.

Her crown does not glitter with the refulgence of ruby or diamond. The horizon is blood red from the reflection of the rivers of blood that run upon and are imbibed by the thirsty soil of France. *Sauve qui pent!* Save himself who can! Such of the nobility as can escape a desperate people's direful retaliation, seek refuge in foreign countries, and take their heirlooms with them. The broken ornaments are carried stone by stone to the money lenders, and the miserable *refugé* for years ekes out a scanty subsistance on these proceeds. There is no further use for Louise de la Vallière or Madame Dubarry. "Othello's occupation's gone."

We next arrive at Napoleon's reign; the jeweled ornament is again in the ascendency. Napolcon loved ostentation, partly because he was an Italian, and partly because he did not wish his dynasty to stand behind the others; beside, Josephine was a vain woman, and a great friend of glittering jewels. It is said that she repeatedly received diamonds to obtain the bestowal of some office, or close the negotiation of some party with Napoleon. His mother, as well as his sisters, possessed diamonds worth millions. When the god of war turned his face from him at the battle of Waterloo, his sister, Pauline Borghese, at once offered her ornaments to be turned into cash—a disinterested piece of sisterly love, which he did not accept. The wealth of the house of Orleans has remained intact, in spite of all the tempests of the times, or of lavish expenditure. The Regent bequeathed treasures of diamonds worth millions to his great-grandchildren.

When Eugenie Montijo, Countess de Theba, gave her hand to the Emperor of the French, she wore the most exquisite jewels in her bridal dress and tiara. Eugenie loved ostentation, but with her reign disappeared all the low, senseless flash ornamentation, and an exalted, pure taste took its place. She caused the French jewelers and goldsmiths to arrange jewels and diamonds into bouquets and wreaths, into butterflies and arabesques. The value of the jewel henceforth was nothing compared to its setting; it was to be determined by the taste with which it had been mounted. This was not always successful, as is proven by the belt studded with crown jewels, made at her command; it has been valued at 800,000 francs, and still does not comply with the rules of taste.

After the Franco-Prussian war, the Parisian lady conceived the whim of putting on mourning; all jewelry or ornament was banished; everything was laid aside except black onyx and silver. The admirable Genoese filigree, the handsome mosaic of Florence, Rome and Venice, was in danger of becoming tarnished in the *étuis*. But Paris is not a city to remain in sackcloth and ashes forever, nor are the fairer portion of its inhabitants perpetually weeping Niobes. Paris wished to laugh again, and an opportunity was offered at a charity ball. All its patronesses appeared gorgeously gotten up. The Baroness Rothschild had the front breadth of her dress sown over with pearls, of a value amounting to several independent fortunes.

Fashion has at present established a law, to which every really elegant and refined lady humbly submits—diamonds and pearls, except solitaires, are worn only at home or in the social circle, and on gala occasions at the theater. No ornament is worn on the street or drive.

Fashion crowns a new jewel to be its pet during the entire season. During the last few years, the cat's-eye, surrounded by diamonds, was the *furore;* this year the *lapis lazuli* has insinuated itself in its good graces.

Of the colored gems, clustered by diamonds, we may mention the sapphire and gold topaz as being the favorites of certain ladies of fashion, while the pearl remains the beau ideal of others. The ruby is hardly met with any longer, and if of good size and fine water, commands fabulous sums. The Hotel Drouot offers the opportunity, several times a year, for becoming acquainted with the treasures of jewels amassed by individuals during a lifetime.

Alongside of the world of high aristocracy that receives and transmits its family jewels intact from generation to generation, that loves to amass wealth for the pleasure of transmitting it, there exists another one in Paris, the members of which received an untold wealth, impossible even to be estimated, which, as soon as received, is converted into cash and deposited in bank, as provision for old age, when one no longer dreams of the god of love, and remarkable jewels are sometimes brought in this manner into market. Also the whim of the dying sometimes causes a sale.

Such jewels were formerly possessed alone by the noble and wealthy, but ever-leveling time has also removed these barriers, and the multitude at present possesses them. Among the theatrical ladies who were honored with the gift of jewels, may be mentioned the former chanseuse of ballads, Hortense Schneider, as the possessor of the rarest ones. Also Sarah Bernhardt and Adelina Patti are mentioned as being immensely wealthy in gems.

At the beginning we spoke of supernatural influence ascribed to several gems. This superstition has been handed down to the present day. Pearls mean tears; no man in Paris would dare to present pearls to a lady, as they bring misfortune and annihilate love. The green emerald is a star of fortune, a belief also current in other countries; the young doctor in Brazil, as soon as he has his diploma, wears a ring with an emerald. This ensures him fortune, and convalescence to his patients. The amethyst signifies melancholy; a ruby conquers love; sapphires mean firmness of character; turquoise, fidelity; gold topaz, ambition; chrysolith, power.

Gems have their language as well as flowers, and the ingenious donor understands how to choose the jewels of an ornament for a lady, so that they shall convey, as silent messengers, his sentiments and aspirations.

So far our ride through the country of the past, and the demons of luxury and ostentation derisively call to us: "Have you now satisfied yourself that man has at all times humbled himself before us? He may in his infatuation imagine that he can control nature, but we control him, and the more he bows himself to our dictates, the more do we remove him from the Godlike, from liberty. Diogenes was freer than Alexander."

The Passage of Venus.

THE VARIOUS expeditions to observe the passage of Venus, occurring December 6, have nearly all reached their foreign stations, and preparations of a large magnitude are made for making this occurrence one of a peculiar interest to science. The main point to be ascertained will be to exactly determine the distance of the sun from the earth, which, so far, has only been estimated approximately. Although such a measurement can also be performed without the assistance of a planet, still, it is impossible to do it with that exactitude afforded by such a passage, if observations under favorable circumstances can be obtained.

In order to measure the distance of the sun from the earth, the former is to be observed at two extremely remote places at exactly the same time, and being seen from these two stations under different angles the distance is obtained by the customary calculation. But, unhappily, such an angle is so minute that an exact measurement, in spite of all the improvements of the observing instruments, is almost impossible, and therefore the calculations of the sun's parallaxes have given different results, everything according to the errors, impossible to be prevented by even the best astronomers. The parallax is that angle formed by two lines drawn to the sun, one from the center and the other from the horizon of the earth, or in other words, the angle which the semi-diameter of the earth forms with it, and it is the same angle under which the semi-diameter of the earth would be seen from the sun. How minute this angle is, can be imagined by figuring the diameter of the sun at an angle of 30 minutes. The parallax of the sun amounts to only about 8 seconds, and consequently it is an angle smaller than the one-hundredth part of the sun, under which the entire diameter of the earth is seen from there.

Other auxiliaries have therefore been employed, by using the parallaxes of the nearer planets, Mars, Mercury, and Venus, to arrive more securely at correct results by comparison with the sun's parallax. But the most important event is the passage of Venus, because it offers sharper defined moments for observation than any other occurrence among the celestial bodies. The periods of the entrance and exit of the planet are so well to be recognized, that astronomers in 1874 thought they might establish the distance up to $\frac{1}{500}$. They were unhappily not successful, and the parallax still is between 8.75 and 8.90 seconds Under this uncertainty the knowledge of the entire solar system has to suffer, because the distance of all other planets can be determined only by assuming as base the earth's distance from the sun as unit. We know to a fraction how many such earth distances a planet is removed from the sun, by only knowing its time of revolution, and since this has been established with all planets to the very second, it is only necessary to calculate the proportion according to Kepler's laws.

While, therefore, the exact determination of the sun's parallax is of the utmost magnitude for astronomy, all the civilized countries have combined, similar as in 1874, to finally obtain correct results. It is well known that in the autumn of last year, all the most eminent astronomers of these countries met in Paris for a conference, in which they determined the different stations to be occupied by each country. By simply regarding the division of the stations to be erected by the expeditions of the United States and Germany, it will be seen that the interesting phenomenon can from them be observed in all its bearings. At the same time the superintendency has devolved on the most eminent talents, and if a failure should again occur, the fault can at least not be ascribed to defective provisions.

The United States have erected eight stations for observation, of which four are situated within the Union and four in foreign countries, while observations will be made from all the observatories of the country, with the means at their command. Of the four stations remaining in the country, the most northern will be at Washington, D. C., under the guidance of Prof. William Harkness. The station at Cedar Keys, Fla, under Prof. John R. Eastman; San Antonio, Texas, Prof. Asaph Hall, (the discoverer of the Mars moon), and Fort Thorne, New Mexico, Prof. Geo. Davidson. For foreign stations have left: Professor Newcomb, for the Cape of Good Hope, with the assistance of Lieutenant Casey; Mr. O. B. Wheeler, with two photographers, for Santa Cruz, Patagonia; Professor Lewis Bass (of the Dudley observatory), for Santiago, Chili, and Mr. Edwin Smith (of the Coast Survey), with the assistance of Professor Pritchett, to New Zealand.

Germany has sent to Hartford, Conn., Dr. Müller, of Potsdam, and Dr. Deichmüller, of Bonn; to Aiken, S. C., Dr. Franz, of Königsberg, Dr. Kobold, of O'Gialla, Hungary, and to Bahia Blanca, Patagonia, Dr Hartwig, of Strassburg. The greatest significance in scientific circles is attached to the fourth German expedition, the station of which is located at the inhospitable shores of Puntas Arenas (South America), a former penal colony of Chili. It will be accompanied by Dr. Anwers, who superintended the extensive preparations for all the expeditions, although really in charge of Dr. Küstner, of Berlin, and Dr. Kempff, of Potsdam. A German cannon-boat, stationed in South America, has orders to assist the expedition to its utmost extent.

Advices from Montevideo state that the French expedition had arrived there on the 6th of September. The scientific body will be separated into two parties, one of which goes to Carmen de Patagones, the other one to Santa Cruz. The Brazilian astronomers will observe the event from four stations, Rio Janeiro, Pernambuco, West Indies, and Cape Horn.

The reader will have formed an estimate of the magnitude of the enterprise. The observations will spread over a domain of 95° longitude east, to 113° west, of Washington. The entire phenomenon will only be visible in the eastern part of America, and the more remote stations either have to observe the entrance or the exit of the planet. Entrance occurs in Washington at 9 hours 17 minutes morning, and at the same time the occurrence will be watched at all the stations wherever the sun is above the horizon, of course, the local time of day at them will be different, so that entrance occurs at 3 hours 37 minutes afternoon at the Cape of Good Hope, the exit occurs there in the evening at 9 hours, and is invisible, as the sun sets at 7½ hours. In New Zealand, it is 1¾ hours morning when entrance occurs, and exit can be observed at 7 hours 7 minutes.

The periods in which entrance and exit occurs give a slight difference, because the farther a station lies to the east, the later it will take place, and this slight difference of time has to be exactly determined, because forming the true basis of all calculations. The reason why so many stations have been located in the South is, because it is summer and the days are as long as the beginning of June under the like degrees of latitude of the northern hemisphere. The length of day in Patagonia is equal to the June days of our latitude, and at the Strait of Magellan (Punta Arenas), the days are as long as the June days of northern Germany; the entire occurrence can be observed from this station, although entrance occurs at 4¾ hours, morning, because the sun is above the horizon at three o'clock.

The fitting out of the expeditions has caused many difficulties, which are all happily overcome, however. Everything down to the smallest detail had to be considered, and the German expeditions to South America have even carried the bricks necessary for the erections of the observatories. As soon as arrived at the stations, work is to be commenced at once, and when the locations are ready, and everything *in situ*, exercises will be begun, so that when the momentous second arrives, the astronomer in charge will have a well-drilled army of subalterns around him to earn in the few precious seconds perhaps a world's and futurity's renown. If untoward accident should prevent a correct observation this time, science will wait long for a like opportunity, since no other passages occur for the remainder of this and the entire next century.

Jewels and Jewelry.

BY FRED F. FOSTER.

ALL ANIMATE creation seems to have an instinctive love of personal decoration. The favorite "poodle" apparently rejoices in the bits of ribbon tied into his ears. The lordly strut of the peacock testifies to the delight afforded him by a display of the prismatic hues of his fan-like tail. The bower-bird of Africa adorns her nest with pieces of glass, bright feathers, and colored stones. Naturalists affirm that "elephants have been known to take great pleasure in having the points of their tusks ornamented with gilt, metallic balls."

The human race especially manifests this proclivity in the matter of jewelry. Costly gems, inexpensive "imitations," nose-rings, and anklets are the means respectively adopted by the wealthy lady of fashion, the impecunious servant-girl, the "fair barbarian"—whose face is tattooed with brilliant pigments—to enhance her personal charms and enable her to stand well in the estimation of others.

The antiquity of jewelry is quite indeterminate. But of pre-historic nations, the principal relics which we have are ornaments and weapons. And while in museums there is nothing more interesting than the collections of the jewelry of various people who long since have ceased to exist, so there is nothing by which the advancement made by successive generations can more readily be traced.

The most valuable ring of antiquity is that worn by Cheops, with which every decree connected with the erection of the great pyramid bearing his name was sealed.

It is made of the finest gold, and within the oval crowning its top are hieroglyphics that represent the name of Pharaoh. It was found during the excavations at Ghizeh, and is to-day in one of the European museums, in a perfect state of preservation. Magnificent rings were very common in Greece during the reign of Alexander the Great. The ancient Romans, too, were passionately fond of rings, and there was scarcely one of them, however humble, but owned several such ornaments. From the fingers of the Roman knights slain in the battle of Cannæ, the victorious Carthaginian Hannibal, gathered three bushels of rings.

Among precious stones, the diamond easily holds the first rank. It was called adamant by the ancients; a word that signifies "invincible hardness." Diamonds originally came from India, "the land of gems;" particularly from that section of Hindoostan formerly known as Golconda, but laterly as Hydrabad. The method adopted by the Indians for finding them was to tramp the loamy soil bare-footed. For the past century Brazil has furnished most of the new diamonds. The course there pursued for discovering them closely resembles that practiced by the early miners of California for finding gold. The gravelly earth is "washed" in troughs, and the diamonds, after the operation, are on the bottom of the trough, if there were any diamonds in the gravel; and, in the majority of cases, it proves there were not. The labor is chiefly performed by slaves, and who are so closely watched while at work, and afterwards so critically examined from head to foot by their overseers, it is next to an impossibility for them to "confiscate" a diamond, though occasionally they succeed in so doing.

Many a man has engaged in diamond-hunting, fully expecting there would be "millions in it" for him, only to have his expectations ruthlessly blasted. Diamonds of an especial size are extremely rare in Brazil; so rare, that the slave who finds one that, in the rough, weighs seventeen karats, is at once given his freedom; and he who occupies his time in searching for them will average to be poorer at the end of a few years than he would have been had he worked on a farm for "ten dollars a month and board."

Whether diamonds exist in this country to any great extent is an open question. Possibly our boys have hurled them at birds, squirrels, or "a mark," deeming them ordinary stones; for, when first excavated from the earth, they closely resemble such stones, being covered with a crust which effectually conceals their peculiar shape and brilliancy. The only genuine diamond, however, which the United states has produced, so far as we know, is the one found, some quarter of a century since, near Richmond, Virginia. "California diamonds" are simply quartz, and really worth no more than other crystallized rocks.

If the diamond is the "king of gems," most emphatically is the pearl their "queen;" nor does its lowly origin in any wise detract from its merits. Pearls as generally known, are found in oysters, principally taken from the seas of India; and in Ceylon thousands are engaged in fishing for them. They are also obtained in Persia, Scotland, Lapland, Germany, China, and our own country. In point of value, those from India and Persia take the precedence.

There are false pearls, as there are false diamonds, and such are usually worn by actresses who play minor parts. These "stage-pearls" are sold by the pound and cost very little. The test of the genuineness of a pearl is its weight, the artificial weighing no more than one-half or two-thirds as much as the real of the same size. Pliny says: "The first place, after the diamond and the pearl, must be given to the *smaragdus*," identical with our emerald; and there is ample evidence that the most ancient nations were familiar with this stone. In the Holy Scriptures it is mentioned several times, in a way that indicates the value set upon it.

Above the grave of Hermione—daughter of that Helen who caused the Trojan war—on the island of Cyprus, was placed the statue of a lion whose eyes were emeralds. Their glare frightened the fish from the shore; so the fishermen gouged them out and "supplied the animal with less glittering eyeballs."

Formerly, in Peru, the emerald was worshipped as a god. When the Spaniards conquered that country, they sent a hundred weight of emeralds to their king. After the conquest of Mexico, Cortez bore back with him to Europe many exquisite specimens of this stone, the finest of which formed his wedding-present to his bride. They had been cut by Mexican lapidaries—one into the form of a fish with eyes of gold; another, into that of a rose; a third, into that of a bell with a pearl for a tongue. "The most valuable had the shape of a cup, with a foot and a rim of gold, and with four minute golden chains attached to a large pearl as a button. On the rim of the bell was inscribed, in Spanish, 'Blessed is He who created thee,' and on the edge of the cup was, in Latin, 'Among those born of women, a greater has not arisen.'"

Upper Egypt was the original source of emeralds; now, the finest specimens are obtained from New Granada, where they are embedded in limestone. Large emeralds, free from flaws, are rarely found; hence the great value of those that are perfect. In most instances, they are set in connection with diamonds, and, thus disposed, the effect is extremely pleasing.

In its constitution the beryl is so closely allied to the emerald as to be regarded a variety of that stone. The best beryls are of a bluish-green color—though some have a yellow hue—and, if perfect, are generally very small. But Dana mentions one "belonging to Dom Pedro, as large as the head of a calf, which weighs more than eighteen pounds, is perfectly transparent, and without a flaw."

The turquoise—Turkish stone—has, for centuries, been recognized as a gem. It is a product of Persia, Thibet, Arabia, and other sections of the world, and its color varies from white to a cerulean blue. The finest are blue and come from Persia. It is liable to fade with age; but many turquoises are in existence that have never changed, though hundreds of years old.

As is the case with emeralds and beryls, perfect turquoises are scarce and costly; one an inch in diameter being worth from $1,500 to $2,000. The most elegant of which we have been able to find any account is one nearly four inches in length and one inch wide, in the Imperial Academy, Moscow.

The scientific term *corundum* embraces the sapphires, the ruby, the topaz, which differ from one another only in color and value. The sapphire is blue and quite inexpensive, though one was formerly owned by an English lady that was valued at 10,000 pounds—$50,000.

The ruby is the hardest thing in nature, save the diamond. The finest rubies are of a "pigeon-blood" color, and in some countries—notably in China—rate with diamonds. They are principally found in the East Indies, and the King of Burmah derives one of his titles, "Lord of the Rubies," from them. In Burmah this gem is a royal monopoly, and seldom is one of any size suffered to be carried from the kingdom. The Burmese assert that "the gods live in a splendid hall, underground, exclusively lighted by rubies." Among the French crown-jewels is one of the largest rubies in the world, and is valued at 300,000 francs—$60,000.

The topaz—the name is derived from Topazos, now Zemorgel, an island in the Arabic Gulf, whence the stone was obtained by the Romans—is of two colors. The one has a golden hue, the other inclines to a leak-green. The latter is usually denominated chrysoprase. Seventy years ago the yellow topaz was very popular. and brought a high price. The ring placed by George Washington on the finger of his bride, Mrs. Martha Custis, in January, 1788, was a topaz. To-day the gem is comparatively valueless, and a few dollars will purchase one of considerable size. This depreciation in value is largely owing to the fact that great quantities of yellow quartz, known as Cairngorm, from the Cairngorm mountain, Scotland, have been sold for genuine topazes, and people are fearful of being imposed upon.

The opal has always held a reputable position among gems, and commanded a goodly price. It consists of silex—a species of quartz—and a quantity of water in fissures so minute the microscope fails to reveal them. The play of delicately-tinted colors characterizing this stone is probably produced, as is the rainbow, by the refraction of rays of light falling upon the particles of water. It differs from all other precious stones in that an imitation of it is impossible. It is found in Hungary, the Faroe Islands, Saxony, and Honduras.

There is no mention made of the opal in the Bible, but, in her collectoin of jewels, Semiramis, queen of Assyria some two thousand years before the Christian era, had a favorite gem which, from the description of it given by certain historians, was presumably an opal. Nonius, a Roman senator, owned a ring which contained an opal as large as a hazel-nut. Marc Antony was anxious to procure it, possibly as a gift to Cleopatra, and offered its possessor $100,000 for it. Nonius refused to part with it, and because of his "stubbornness" was exiled by Antony. An opal in the museum at Vienna is said to be worth £40,000 ($200,000), and is the finest known.

When the deification of heroes came into vogue, portraits of men and women supplanted the earliest styles of engraving gems. This lead directly to the cameo, which is not, as some imagine, a stone, but a peculiar manner of cutting precious stones, whereby a figure is made to project above the ground on which it is formed.

Greek artists were probably the first to adopt this mode of cutting, and every inducement was offered them to settle in Rome, where the demand for these ornaments was almost unlimited. The stones used by the Greeks and Romans for cameos were the agate, the onyx, and the sardonyx; the last, especially, on account of its several layers, each of which has a different color. Latterly, shells of various sorts have been used, and any will answer that has a white surface and a tinted inner layer.

As cameos nowadays are quite "stylish," a brief description of the way in which they are produced cannot but prove interesting. The piece to be used is first sawed from the shell, in the square or oval form, on a grindstone. This piece is cemented to the middle of a block of wood—just large enough to be grasped by the hand—resting on a leathern pad. A copy of whatever is to be engraved—usually a head—is drawn on a piece of shell with a finely-pointed lead-pencil, and then the outline is scratched with a delicate tool made of highly-tempered steel wire. The scratching is continued by "needles"—each somewhat larger than the preceding—till the desired depth is attained. With a "burin" the outside surface is cut and scraped away till the figure itself becomes prominent. The image is then rounded to a natural likeness, care being taken to leave the edges square, else the outline at its juncture with the base will be indefinable. Finally, it is rubbed with a dry powder, made from putty, applied with a stiff brush; and no part of the operation requires greater carefulness than this, as a slip of the brush will effectually ruin the work. The value of an unmounted cameo is from $20 to $40, according to its size and figure. As there is an increasing demand for the article and few "cutters," cameo-cutting is a profitable vocation. The best work in this line is done in Italy, though many fine cameos are cut in Paris.

Respecting the talismanic properties of gems, curious ideas have prevailed. For instance, the diamond imparted courage to the wearer; pearls warded off disease; an emerald prevented one "bearing false witness;" the man who had an amethyst never became intoxicated, however frequently he drank.

So much for precious stones, concerning which much more could be said.

The Great Pyramid.

RICHARD A. PROCTOR, who has been expounding his views on the use of the great Pyramid of Cheops in *Knowledge*, claims that the structure was both a tomb and an astronomical observatory. When we remember, he says, that the astronomy of the time of Cheops was essentially astrology, and astrology a most important part of religion, we begin to see how the erection of the mighty mass of masonry for astronomical purposes may be explained—or, rather, we see how, being certainly astronomical, it must be explained. Inasmuch as it is an astronomical building, erected in a time when astronomy was astrology, it was erected for astrological purposes. It was in this sense a sort of temple, erected, indeed, for the peculiar benefit of one man or of a single dynasty; but as he was a king in a time when being a king meant a great deal, what benefitted him he doubtless regarded as a benefit also to his people; in whatever sense the Great Pyramid had a religious significance with regard to him, it had also a national religious significance.

There is no other theory of the Great Pyramid which comes near to giving a common-sense interpretation of the combined astronomical and sepulchral character of this wonderful structure. If it is certain on the one hand that the building was built astronomically, and was meant for astronomical observation, it is equally certain that it was meant for a tomb, that it was closed in very soon after the king died for whom it was built, that, in fine, its astronomical value related to himself alone. As an astrological edifice, a gigantic horoscope for him and for him only, we can understand its purport, much though we may marvel at the vast expenditure of care, labor and treasure at which it was erected. Granted full faith in astrology (and we know there was such faith), it was worth while to build even such a structure as the Great Pyramid; just as, granted the ideas of Egyptians about burial, we can understand the erection of so mighty a mass, and all save its special astronomical character. Of no other theory than that which combines these two strange but most marked characteristics of the Egyptian mind can this be said.

CORRECTIONS of the greatest magnitude of the earth's surface are at present either under execution or projected. The Suez Canal has moved the southern part of the Asiatic Continent closer to Europe; the Panama Canal will separate North and South America; a canal is projected to pass through the isthmus of Corinth; the Zuyder Zee has been stolen from the ocean, and laid dry; the Desert of Saharah will sooner or later be filled with the waters of the Suez Canal, and become an inland sea of the African continent; tunnels of miles in length perforate the giant Alps, and locomotives interchange the semi-tropical fruits for northern products; a tunnel is in progress that will make a peninsula of the "tight little isle passing away under the" protecting silver-streak from France to England; another tunnel is projected to connect the firm land of Italy with Sicily under the straits of Messina. Continually new schemes are conceived and matured for other projects of equal magnitude; to these may be classed the construction of a canal for connecting the Bay of Biscay with the Mediterranean. The French *Journal Official* lately published a decree for the nomination of a committee of 38 members, composed of the officials of the different departments, members of the legislature, senators, and civil engineers, for the purpose of enquiring into the project. The canal is to be pierced from Bordeaux to Narbonne, of a length of 407 kilometers, (253 miles) and a breadth of from 56 to 80 meters (180 to 263 feet), the project places the cost at 550 million francs, but a committee raised the figures to at least 1100 millions.

Sight.

WHAT THE OPTICIAN SHOULD KNOW ABOUT OPTICS.

BUCKLIN.

Continued from Page 336.

THROUGH our correspondence, several cases have been heard from.

Mrs. F., age sixty, has never been able to find glasses which were comfortable to her eyes. She has, however, been using slight magnifying glasses for several years, but after reading fine print for thirty minutes it would blur, the paper would look dirty, and she was obliged to give up reading for some hours; accidentally seeing the radiating lines given in our June number, she found that the vertical lines were indistinct. A convex *cylindrical* glass, axis vertical, made all the radiating lines appear equally distinct in each eye; this lens added to the convex lens *usually* required at this age, makes the print so clear and distinct, that she constantly regrets that she did not find out what the trouble with her eyes was years ago.

The Hon. Edward Newcomb could not see a single line on this test which did not run in a vertical direction. If attempting to read a legal document in court, he was continually stumbling, and acquired the reputation of being an indifferent reader. After blundering for twenty years, he accidentally found out, by looking at these radiating lines, that there was something the matter with his eyes. Optician after optician had selected glasses for him, sublimely unconscious of what the trouble was; a pair of concave cylindrical lenses, with the axis horizontal, and he was surprised and delighted to find out that everything in the world was much more perfect than he had ever before had any conception of.

TINTED SPECTACLES.

Without dismissing at length the comparative merits of tinted and white glass, let us look at the question practically. If four pairs of spectacles are placed side by side, one being a finely-polished white glass, one common green glass, one tinted glass, another an old pair which has been badly scratched, a person selecting spectacles will prefer any pair rather than the finely-finished ones.

There is an unpleasant glare to a finely polished lens, which is not possessed by any of the other lenses.* If one will take the well-polished spectacles and wear them a few days, till he becomes accustomed to the glance and sharp retinal images, they fill much better the optical purposes for which they are intended, than either of the other lenses which have no glance and do not make the retinal image as sharp. The sharpness of the image formed by lenses made from pure white optical glass, is very easily demonstrated by placing the lens in the opening of an adjustable dark box, and catching the inverted image on a piece of ground glass, or on a screen of any kind. The image formed by the lens made of pure white optical glass is much brighter and sharper than the image cast by a lens manufactured from common glass. If you are, however, from pecuniary or other motives, inclined to favor poor spectacles or tinted glasses, you will find but little difficulty in convincing your customers of the advantages of poor glass or tinted glass over pure white glass. The purest white glass is the only material which is recommended by anyone who is authority in America, Germany or England.

If you lived in Berlin during the blue-glass rage, you would have been obliged to give your patients blue-glass spectacles, or if the fever should break out again, you will be obliged to sell blue glasses independent of their merits.

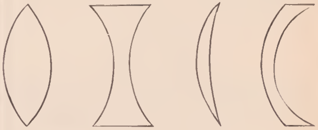
In ordering glasses the optician should know how to order just what he wants. I therefore attach a diagram of the various lenses in use.

A is a double convex lens, say No. 14; it will bring rays of light from a distance to a focus fourteen inches behind the lens. Its value is expressed thus: $+\frac{1}{14}\,s=$(spherical) bi-convex, or No. 14 bi-convex.

* NOTE.—I frequently send a patient away rejoicing, by simply covering his spectacles with finger marks.

B is a double concave lens, say No. 14; it will exactly counteract the above lens, or will correct $\frac{1}{14}$ of near-sightedness. Its value is expressed as $-\frac{1}{14}\,s=$(spherical), or bi-convex No. 14.

A B C D



E F

C is a periscopic convex lens, say No. 14; its convexity on one side so far exceeds the concavity on the other, that it has the same effect as *A* upon rays of light, bringing them to a focus fourteen inches behind the lens. Its value is expressed as $-\frac{1}{14}\,s$.

D is a periscopic concave lens, say No. 14; it is used to counteract $\frac{1}{14}$ of near-sightedness, or myopia. Its value is expressed as $-\frac{1}{14}\,s$.

In ordering spherical lenses (near or far-sighted spectacles), periscopic lenses are understood unless otherwise mentioned.

E is a section of a convex cylinder of glass; rays of light which pass through this glass at right angles to its axis are brought to a focus. Rays of light passing in the meridians of its axis are not acted upon.

F is a plain piece of glass which has been ground on one side on the convex side of a cylinder; it is a concave cylindrical lens.

Spherical and cylindrical lenses are combined in a great variety of forms when required. They are described thus: Suppose we wish to combine a convex 14 spherical with a convex 14 cylindrical, with the axis vertical: $+\frac{1}{14}\,s=+\frac{1}{14}\,c$, axis 90°, or vertical. The usual method of expressing the position of the axis of a cylindrical lens is to express it in degrees. As the patient looks at his watch, commence at nine o'clock to count the degrees for each eye, and follow the hands to three. Nine o'clock will be 0—three o'clock will represent 180°. If you want a periscopic glass for a person who is not near-sighted, do not forget to mention, when you give the number of the lens, that it is +, or periscopic convex.

If it is for a near-sighted person, say it is —, or periscopic concave. Persons frequently send for a concave glass of a certain number, because they notice that one side of the glass is concave, without noticing that the other side has a sharper convexity. It finally comes out that they want a periscopic convex lens.

The nature of a lens may be determined instantly by looking through it when held a distance from the eye, and moving it in various directions. If it is convex lens, every observed object will move in an opposite direction from which you move the lens. If it is concave, objects will move in the same direction. If it is a convex cylinder, objects will stand still when you move the lens in the direction of its axis, but will move in an opposite direction when the lens is moved in other directions.

If it is a concave cylindrical lens, objects will stand still when the lens is moved in the direction of its axis, and will move in the same direction you move the lens when moved in other directions than its axis.

Where the lens is a combination of a spherical and cylindrical lens, there will be less motion in the direction of the axis of the cylindrical lens than in other directions; counteract the spherical lens of concave by a convex, and *vice versa*, and you will be able to determine the nature of the cylindrical lens and the position to its axis.

It is always important to have the frame so adjusted that the eye looks through the curve of the lens. Celluloid is certainly becoming very popular as a frame for eye-glasses, and I commend it to your favorable consideration.

(*To be continued.*)

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box* 3,444, *P. O., New York*, or the office of THE CIRCULAR.

The suggestion comes to us from the Chairman of the Executive Committee that members would do well, in case of the death of a beneficiary, to immediately send a notice of such death to the committee, and by the regular form, provided for change of beneficiary, to name another beneficiary as soon as practicable. Much trouble may thus be saved to some future Executive Committee, as well as to the executors or administrators of the estate of the member.

The regular meeting of Friday, November 3d, was held as usual by the Executive Committee at the office of the League, No. 61 Nassau street, New York City, Chairman Kimball presiding, and a full attendance of the members. The following named applicants were admitted to membership:

Theodore E. Bowne, George C. Booth, Chas. H. Coon, Wadsworth L. Decker, Fred. B. Van Doorn, Jas. P. Ford, Frank Gillmor, M. H. Harrison, Nathan Harrison, Alvah Osman, David S. Price, Theron A. Ramage, John W. Reddall, Albert Schreiner, D. O. Scofield, New York City; Josephus Bailey, Cornwall, Ontario, Canada; Geo. W. Beall, Lindsay, Canada; Jas. Bremner, Montreal, Canada; John Speirs, Houlton, Maine; Henry H. Eaton, Nashua, N. H.; Richard T. Hewitson, Carl J. Roback, Boston, Mass; Lawson C. Sargent, Clinton, Mass.; Adolph Vester, Valentine Germershausen, John C. Schott, William H. Thurber, Providence, R. I.; Frank L. Camm, Louis E. Cuinet, Brooklyn, N. Y.; Eugene B. McClelland, Syracuse, N. Y.; John L. Weil, Brooklyn, E. D., N. Y.; Willard Weld, Lockport, N. Y.; Rudolph Isenmann, John W. Chandler, Newark, N. J.; Chas. W. Bailey, Philadelphia; Jas. M. Burkhart, Reading, Penn.; Eugene W. Davis, Athens, Bradford Co., Penn.; William L. Brice, Lima, Ohio; John W. Worstell, Chester Hill, Ohio; Albert L. Blankenmeister, Marissa, Ills.; Andrew Paulson, Elgin, Ills.; Mathaus Hansen, Lafayette, Ind.; Albert B Wallace, Louis E. Mayer, Indianapolis, Ind.; Peter Henry, J. Fredrick Piper, Newport, Ky.; Hernden C. Lerew, Perry, Dallas, Co., Iowa; Maximilian J. Mayer, Appleton, Wis.; Chas. S. Hooper, Dardanelle, Yell Co., Ark.; Harry F. Legg, Minneapolis, Minn.; Zebulon K. Straight, Walla Walla, Washington Ter.

These members add 51 to the League, making the total membership 2,214, and (the membership now being limited to 2,500) leaving *an opening for but* 286 *more members.* We again warn the members of the jewelry and kindred trades throughout the United States and Canada that they who desire to become members of the League should send in their applications before the annual meeting, which takes place on the "third Tuesday in January" next (January 16th), and make a certainty of it, rather than to rely upon the uncertainty of the limit of membership being removed.

Eight applications were deferred for further inquiry. The amount in the benefit fund, subject to draft for the payment of the next death loss, is $4,155.30, and in the general fund, accumulated from the entrance fees, and out of which is paid the expense of management, $3,133.13.

Another examining surgeon was appointed, making the list now as follows:

City.	*Name.*	*Address.*
Attleboro, Mass.	Edward Sandford.	Attleboro, Mass.
Baltimore, Md.	W. P. Morgan.	119 W. Monument St.
Boston, Mass.	M. P. Wheeler.	744 Dudley St.
Chicago, Ills.	N. B. Delamater.	125 State St.
"	Gilman Smith.	"
Cleveland, O.	E. W. Robertson.	367 Euclid Ave.
Louisville, Ky.	S. H. Garvin.	817 Jefferson St.
Newark, N. J.	R. Staehlin.	333 Washington St.
New Orleans, La.	W. R. Mandeville.	125 Canal St.
N. Attleboro, Mass.	Jas. R. Foster.	North Attleboro, Mass.
Philadelphia, Pa.	B. Trautman.	529 North 4th St.
Pittsburgh, Pa.	S. M. Benham.	Pittsburgh, Pa.
Providence, R. I.	Geo. W. Carr.	Providence, R. I.
St. Louis, Mo.	S. H. Frazer.	St. Louis, Mo.

Applicants from the cities named are now and hereafter required to be examined by the local examining surgeons as named above, and other surgeons will be appointed from time to time, conformably to the requirements of the League.

Another month has passed without any assessment being required.

The Committee of Eighteen held its final session on Monday evening, November 20th, and formulated its report, which will be sent out to all the members, advising them of the recommendations to be made to the League in annual session on January 16th next; the report will recommend:

That there shall be adopted a badge of membership, after the style of the seal of the League, of suitable size, and to be worn or not at the option of members.

That as there are many who do not want the benefit, nor would they care to pay the assessments necessary to carry the amount of benefit paid by the present membership, viz.: nearly $5,000, there shall, in addition to the present membership (which, with its methods of work, shall be termed Section A), be established another section, to be termed Section B, into which present as well as new members shall be eligible, under the same restrictions as to admission that control Section A, and which Section B shall pay a limited benefit, when full, of $1,000.

The assessments in Section B will be graduated according to the age of the member at the time the assessment is made, thus making it equitable to admit men of any age, from 21 to 55, the extreme limits; each man, according to his age, thus paying the exact cost of carrying his risk during the year, and each man bearing an exactly figured proper share of the benefit paid.

In this section a certain percentage of the excess of the amount collected, over the amount required to pay each death loss, will be set aside as a contingent fund, to be used in case of emergencies which might increase the normal (1 per centum) death rate beyond 1¼ per centum.

This section will be without limit of membership.

The limit of the present membership is removed (in Section A), and it is proposed to make the present membership more solid, if that be requisite, by providing, by quarterly dues of one dollar, a similar contingent fund, in the event of an excessive mortality in any one year. This fund to be thus rapidly built up for immediate or future possible contingencies.

The entrance fee and assessments are to continue in Section A as they are at present, and the limits of age to remain as at present (21 to 45).

The entrance fee for Section B to be the same as in Section A.

The moneys of the reserve funds to be invested in United States Registered Bonds, or New York State, N. Y. City or N. Y. County Bonds, and be in the custody of a board of six trustees, to be elected so that their terms, by couples, overlap each other.

Change of business after becoming a member of the League will not impair the rights of a member to be admitted, if otherwise eligible, into either section.

The Committee have earnestly and honestly endeavored to arrive at conclusions for the best interest of the League. If they have erred it will not be through lack of heart in their work.

We shall discuss the plans suggested, in the January number of THE JEWELERS' CIRCULAR, after the report has been authoritatively issued in compliance with the instrutions given the Committee at the last annual meeting.

The History of a Necklace.

A PARIS newspaper publishes the following occurrence: Some time ago a young lady appeared in a jewelry store, and offered for sale a costly pearl necklace. The jeweler expressed his inability to purchase it, but offered her to sell it on commission to his rich customers, to which she assented, leaving name and address. A few days afterward, she was notified by the jeweler to appear at the palace of the old Countess X., to arrange the sale of the necklace. When arrived there, she was at once admitted, and taken into an examination by the old Countess, who said: "I caused you to come, because the necklace left by you with the jeweler, and which he accidentally offered me for sale, was once my property. It was stolen from me about four years ago, out of my jewelry box, and every inquiry was fruitless. There is no room for mistakes, because my coat-of-arms is engraven inside the lock—its presence has doubtlessly escaped your observation." Which was but too true. "If matters stand thus," the young lady replied, "it is necessary that I should state the truth. I received the necklace, some four years ago, from one of my admirers, a young Count. I was at the time engaged at the —— theatre." She was able to prove her assertions with a letter that had accompanied the *cadeau*. The old lady only glanced at the writing, a corner of which bore the same coat-of-arms. She trembled nervously, and silently paid the price demanded.

Views of Correspondents.

This department of THE CIRCULAR is open for communications relating to the jewelry trade, but the editor does not hold himself responsible for the sentiments expressed by contributors. We invite correspondence, but require that it shall be free from all personalities, and the writer's integrity guaranteed by the disclosure of his true name to the editor. Anonymous communications will not be noticed.

IN SEARCH OF A GUILD.

To the Editor of the Jewelers' Circular:

I have read so much in THE CIRCULAR about the United States Guild and Guild-stamp for flat plated-ware, that I determined on a recent trip west to find the Guild and learn all I could about it. I am interested in the plated-ware trade, and so had special reasons for finding the Guild. Arriving in Cincinnati, I commenced my inquiries, thinking of course, that a jewelers' Guild claiming a national organization must have some representatives among the numerous and influential jewelers of that city. So I inquired everywhere I went if they could tell me about the United States Guild. Not one among the resident jewelers knew anything about it except what they had read in THE CIRCULAR. They had been looking for a Guild to come along, but none had put in an appearance. In one place where I called, I saw a big fat stranger talking with the proprietor, and I thought he was big enough to be a United States Guild, but it turned out that he was only trying to get a bet on the Democratic majority in New York State.

From Cincinnati I went to Indianapolis, and everyplace I inquired if they had seen anything of the United States Guild. One man asked me if I had lost a Guild, and another wanted to know if it was something to drink and said he usually took his with sugar and a little lemon in it. I found one man who said he believed there was such a thing at Chicago, for he had paid fifty cents assessment for it once. But he did'nt appear to know anything about it or what it was doing. In St. Louis no one knew anything about a Guild and could'nt imagine what it was used for. But finally I got to Chicago and there found several jewelers who were confident there was a Guild because they belonged to it. They had never attended any meetings, but they paid fifty cents a year each as members. Did'nt know why they paid unless it was to keep their ante good; they had never called a hand or seen anything for their money. Did'nt know who raked the pot, but supposed it went to pay the traveling expenses of the peripetetic president. One man told me Mr. Shurley had the Guild in his hat. Went to see Shurley and ask him to show me the inside of his hat. He did so and there was'nt anything in it—not even a brick I searched to see if there was a Guild concealed in the lining, but found only his credentials as a delegate from Texas.

Mr. Shurley said there used to be a Guild he knew, for he was the first president of it. At that time it was in good health and prosperous; lots of fellows paid fifty cents a year, and everything was lovely. But now he wasn't president any more, and he did'nt know anything about it. Another member told me that there was nothing left of the Guild-stamp but the president and a traveling trunk, but I thought this was envy. I saw Otto Young in the street, and thinking he might be a Guild I asked him about it. He could'nt tell me anything, thought there was such a thing lying around loose somewhere, but none of it had been offered to him; he was'nt buying Guilds, and had'nt heard of any demand for them.

In short, Mr. Editor, I could'nt come up with the Guild anywhere in my travels, or ascertain that it had any existence that is tangible. The general impression seemed to be that three or four interested persons had worked up the scheme, and, on one occasion, succeeded in getting fifteen or twenty jewelers together who organized themselves into what they called the United States Guild. They were honest and sincere in believing that it might be made a medium for benefitting the trade, but it has failed of its mission through the utter lack of capacity on the part of its managers to comprehend its possibilities. As near as I can learn, there are some forty or fifty persons who have paid their dues this year and can be considered as members. All interest in the Guild has died out since the exposure of the schemes of its manipulators in THE CIRCULAR. Outside of a few persons in Chicago, little is known of the Guild, and no particular interest taken in it. TRAVELER.

New York, November 20th.

The New York Jewelers' Association Banquet.

THE EIGHTH regular annual dinner of the New York Jewelers' Association was given at Delmonico's on Wednesday evening, Nov. 15. It was, as usual, the great social event of the month, within the trade, and was, also, one of the most elegant affairs of the kind given during the year by any association. The members and their guests assembled at an early hour in the elegant reception rooms of Delmonico's, and at 7 o'clock were escorted to the large dining hall that had been prepared for the event. The tables were tastefully arranged and handsomely decorated with floral emblems, and with ornamental pieces from the cuisine. Flags and other emblems were gracefully disposed about the room, the whole presenting an attractive and most inviting appearance. At the head of the tables, on an elevated platform, sat the president of the Association, Mr. Thomas G. Brown, flanked on either hand by the distinguished invited guests and orators selected to respond to the various toasts. At a signal from the president the assemblage became seated, each individual finding a place reserved for him, his name appearing upon a card beside his plate. The *menu* was an artistic affair, consisting of a printed bill of fare, variously ornamented, affixed to broad ribbons of different colors, deeply fringed. When all were seated, an elaborate dinner, prepared in Delmonico's best style, was served in numerous courses, with the accompaniment of choice wines of various kinds. For some time attention was given to the discussion of the various viands presented, while the quiet hum of social conversation gave evidence that the diners were not only enjoying themselves, but were cultivating pleasant acquaintance with each other. An excellent orchestra enlivened the festivities of the evening with choice selections of inspiring music.

The following is a complete list of the guests and members of the Association present:

OFFICERS.

Thos. G. Brown, President,	Aug. K. Sloan, Treasurer,
Wm. R. Alling, Vice-President,	H. Olmstead, Secretary.

ASSOCIATION GUESTS.

Rev. Robt. Collyer, Hon. Algernon S. Sullivan, Hon. Chauncey M. Depew, Hon. Isaac H. Bailey, Mr. Thos. N. McCarter, Mr. E. T. Bartlett, Mr. Aba Woodruff, Mr. Gilbert T. Woglom, Mr. D. H. Hopkinson, Mr. H. Olmsted.

MEMBERS.

Thos. G. Brown, Thos. B. Brown, Wm. A. Brown, Wm. R. Alling, Aug. K. Sloan, C. E. Hastings, Geo. R. Howe, D. F. Appleton, E. C. Fitch, F. S. Douglass, D. C. Dodd, Jr., H. B. Dominick, L. B. Haff, E. C. Hine, Geo. C. Taylor, N. Taylor, R. N. Peterson, F. S. Gorton, C. G. Lewis, John C. Mount, W. H. Howes, W. A. Lee, J. F. Chatellier, Rogers & Bro. by G. C. White, Jr., J. W. Beacham and A. Unkles, Wm. L. Gilbert Clock Co. by Geo. B. Owen and Chas. E. Looker, Seth Thomas Clock Co by R. B. Kenyon, W. T. Woodruff, C. H. Brahe, E. N. Welch Mfg. Co. by E. C. Hine, F. B. Jennings and Geo. H. Gale, New Haven Clock Co. by F. E. Morgan, A. O. Jennings and G. E. Stevens, Elgin National Watch Co. by L. L. Woolley, Meriden Britannia Co. by J. G. Bacon and J. W. Miles, Alfred H. Smith, Harrison B. Smith, Gorham Mfg. Co. by Ed. Holbrook and W. C. Spencer, Reed & Barton by Geo. H. Fish, Wilcox Silver Plate Co. by Messrs. Beach & Hall, Aikin, Lambert & Co. by J. C. Aikin, Eisenmann Bros. by C. F. W. Eisenmann, D. F. Conover.

MEMBERS' GUESTS.

H. Semken, of Washington, D. C.; W. H. Kennard, Benj. Shreve, A. Stowell and F. B. Toppan, of Boston ; H. Duhme, of Cincinnati, Ohio ; W. W. Wattles, of Pittsburgh, Pa.; C. Weaver and E. Ketterlinas, Jr., of Philadelphia; J.C. Freeman, Jr., of Atlanta, Ga.; Henry Tilden, Jr., of Providence, R. I.; J. H. Hart, of Brooklyn; Geo. H. Ford, of New Haven ; D. H. Buell, of Hartford—and the following, all of New York City: W. L. Rich, J. W. Senior, A. J. Rose, R. W. Beyrich, J. W. J. Pierson, H. S. Ward, Geo. C. F. Wright, Alex. Lelong, C. W. Starr, Wm. Marcus, S. Cottle, Alex. Dominick, James Cary, E. J Scofield, H. S. Cozzins, G. W. Shotwell, J. S. Cooley, W. S. Sillcocks, Robt. C. Black, F. L. Redgely, H. Schaus, Geo. Montague, Richard Oliver, T. B. Bynner, N. H. White.

The following is a copy of the *menu:*

MENU

Huîtres

POTAGES

Consommé Deslignac — Créme St. Germain

HORS D'ŒUVRE

Olives — Céleri

Bouchées à la bohémienne

RELEVES

Bass à la hollandaise, ravigote

Filet de bœuf au madère

ENTREES

Dindonneaux braisés à l'algérienne

Escalopes de chevreuil à la Berthier

Cotelettes de ris de veau à la parisienne

SORBET

Dalmatie

ROTIS

Canvas-back — Perdreaux

Salade

ENTREMENTS

Haricots verts — Tomates — Petits pois

SUCRES

Pouding aux cérises

Gelée mirabelles — Charlotte russe

Pièces montées

Petits fours — Gateaux variés

Napolitaine — Biscuit glacé

Fruits and dessert

Café

Le 15 *Novembre* 1882 — *DELMONICO.*

At 9.30 o'clock President Thomas G. Brown rapped his gavel on the table, and the sound of merry laughter and the clatter of knives and forks ceased in an instant.

President Brown welcomed the members and their guests in the following happy strain:

REMARKS OF PRESIDENT BROWN.

Gentlemen:

Autumn, with its pleasant days, has gone and come again since these tables were last spread for our accustomed love feast, and now, at this crowning season of another year, with its horn filled with plenty, and its wealth of beauty lavished on every side, we come again with our friends, and our good clothes, and our good cheer, to welcome and celebrate the natal day of our cherished Association. Fellow members, guests, friends *all*, I am glad to see you and give you a warm and cordial greeting. I congratulate you especially, fellow members, that under a benign Providence, we are once more permitted to meet here with numbers unimpaired by sickness or death. I congratulate you upon the past year of prosperity for ourselves and our Association. I congratulate you upon the present year of fertile promise and boundless plenty. And I hope and trust that good health, and all the blessings that follow in its train, may be vouchsafed to you and your families, and that you may further share in the general prosperity that in this memorable year has fallen to the lot of our favored land. Bearing in mind that I have been enjoined from trespassing upon the time allotted to our distinguished visitors, and, bearing also in mind that you are all anxiously waiting to partake of that feast of reason and that flow of soul—as I believe it is sometimes called—that is in reserve for you, and, moreover, remembering the lamentable fate that befell one of my predecessors for disregarding this injunction, and for other causes, I hasten on as best I can to say my few words in behalf of and for the cause of the Association. With some mistakes, perhaps, on our part, and with the full, or rather fair share of the imperfections that fall to the lot of all human endeavor, with the loss of some old friends who have fallen from our ranks, with the loss of other friends who have fallen in the ranks working patiently by our side, our Association has not only held its own, but stands to-day on higher ground, and better equipped and prepared for its work, than it has ever stood before. Its history for the past seven or eight years is written, and we can look back to it with satisfaction and honest pride at the work that has been done. Its record is made up and secure ; the future is before us; we are the actors of the living present ; we can even now let go our hold and allow it to drift away without aim or purpose, or we can hold it and guide it and model it as we will. As the delver way down in the dark mine sometimes strikes his pick into and through the hard rock deeper than his fellows, and turns up the shining gold or the sparkling gem, so by patient labor, and earnest and honest endeavor, each doing—as it is sometimes called—his "level best," and all together working with one common aim and for one common object, we shall, year by year bring out into the clear light the hidden and undreamed of possibilities of this Association. And so, as year after year goes by, sooner or later, in the light of an ever advancing civilization, and as labor and culture go hand in hand, as the sculptor works with the marble and the potter works with the clay, and the jeweler works with the precious metals, until hour by hour and day by day, under his patient care and magnetic touch, they grow into forms of exquisite loveliness and comeliness and artistic beauty, so shall this Association, under your wise guidance and fostering care, grow with its growth, and strengthen with strength, and express itself in ever varying forms of usefulness, and be deeper and stronger and broader in its aim and purpose and influence with every successive year.

But now my time is up and more, but I want to say just another word. I trust, fellow members, that you may all have many years of pleasant and useful labor and leisure, also, before you ; and I trust you may all be permitted to meet here in this pleasant and social way for many years to come—and be sure and bring your friends with you. But as time goes by and the shadows begin to lengthen in the evening sun, and when, at last, that summons comes from which no man is exempt and all must heed, and you go to join that great majority which has gone over to the other side, then, as you have continued your work, even unto the end, faithfully, patiently, earnestly, you will leave behind you not only in this Association, but in others like it, that shall spring up in all or many of the great centers of trade throughout our land, then, indeed, I say, you will leave behind you something that will be enduring as the diamond that sparkles in the ear of beauty, and precious far than the pearl of the Orient.

And now, gentlemen and fellow members, my pleasant task is ended, and I have only to add that, as the *avant courier* of the olden time heralded the coming of honored, and distinguished, and welcome guests, so I announce to you—not the coming—but the actual presence of our guests, no less distinguished and honored and welcome. So I invite your attention with listening ears, for the real pleasures of the evening are now about to begin.

Somebody proposed three cheers and a tiger for Mr. Brown, and it was given with a will by all present.

PRESIDENT BROWN—We have letters of regret from Chief Justice Daly, Mark Twain, Whitelaw Reid, Mayor Low, Hon. William M. Evarts, General Stewart L. Woodford, E. C. Steadman, Dr. Thomas, J. T. Metcalf, Joseph H. Choate, General Horace Porter, Mayor Grace, Dr. Storrs, and others.

The first regular toast of the evening is

"*The President of the United States.*"

The gentleman who was to reply to this toast is not here. I understand that he was taken suddenly ill last Wednesday morning while reading the morning papers. He may, perhaps, see us later. Gentlemen, I propose that we drink to the health of the President of the United States.

The whole assemblage arose to their feet, in response to this toast.

PRESIDENT BROWN—The next regular toast of the evening is

"*The Nation; To be cherished in all our hearts, and defended by all hands.*"

I have the pleasure of introducing to you Algernon S. Sullivan to respond to this toast.

ADDRESS OF MR. ALGERNON S. SULLIVAN.

Mr. President and Gentlemen:

It could not be possible that I should forget that a little less than a year ago I had the pleasure of addressing, so far as my memory goes, nearly the same company. I can observe now, as the faces of the company present themselves, nearly the very persons who were at these tables at your last annual dinner. And I remember, also, an incident of that evening. I remember it with great satisfaction as that to which probably some of us are indebted to this repeated pleasure of dining with the Jewelers' Association. It may be remembered by most of you that on that occasion one of my esteemed friends, and evidently one of your favored friends, on this platform, and occupying a chair four or five removed from my left, almost as much as invited me, on your behalf, to come here again at another annual meeting. He certainly invited himself. I remember how the junior members of this society looked pleased and satisfied when my brother Bailey expressed to them in overflowing style and jubilant manner the unparalleled enjoyment that he had had. As he put in a good word for me, I am here. I wonder a little that he was able to come again, because he certainly did get satisfaction that evening, and if he did not, it was not because of the extreme fullness with which he had partaken of everything. One of my neighbors here has told me of a little story that it is proper to mention in connection with these thoughts. When a boy, on a Christmas day, at the family dinner in Yorkshire, he filled himself to discomfort—to that point that must have been almost inconceivable, so that he commenced to cry. (Rev. Robert Collyer, interrupting, "I will never tell him a story again"). And when grandma, with that well-known fondness of grandmas for children, patted him on the head and asked him what was the matter, between his boo-hoos he replied he had the belly-ache, and when asked why, he said because he had eaten too much. "Well then, bubby, don't eat any more," said grandma. "Oh well," boo-hooed bubby, "it's got to be a darned sight worse than this before I'll stop eating." I am glad, with Bailey, that it is part of the Christian character to defy difficulties, and that after we have gone through the agony and paroxism of one Jeweler's dinner, we have the nerve to say we will be there again.

But we are to talk of the Nation. I call to mind that the room where we now are, has scarcely yet grown quiet from the echoes of a speech made by one of our distinguished English friends, who dined here only six evenings ago. I think I can hear now our English philosopher with that extra self-consciousness and superciliousness of style—it seems to be inbred in our English friends, that from the moment they land here the idea appears to possess them that they have a mission to perform here, and that is, to let us know that we are filled with noticeable defects which they can see better than we can. And so to them it seems that we receive with all graciousness and humility their animadversions upon ourselves. If our great guest, Mr. Spencer, had particularized the other night, and said that he saw among the jewelers of the American Nation a great many excellencies, I could have agreed with him; but he seemed to feel that their case did not need notice, and he left it to be understood that there was no fault to be found with the jewelers. But as to the whole subject covered by him: now, when my mind is directed by the toast to a contemplation of what the American Nation is, I feel that it is not passing the limits of good taste for us just here and now to say, at least among ourselves, that we can very well understand that we would not regard it as altogether becoming and within the rules of propriety if one of our distinguished citizens feasted on a visit to London—and his first visit at that—and, rich with dyspepsia from the bad cooking on the other side of the Atlantic, after being in England only ninety days, should undertake to scold the British people for their social deficiencies and for many things, as Mr. Spencer did us, I rather feel this is a thing which had better be hereafter omitted by Englishmen, and the condescension part of it is appreciated at probably just its worth.

Now one word more, and that is a thing which ought to be said. November, when your feasts occur, is a month that means a great deal in a natural sense to us in the City of New York. Ninety-nine years ago in November, nearly on the very spot where we stand, there was a drama transacting which was the closing scene and the dropping of the curta n after n Revolutionary war of seven years. Just within a stone's throw, almost, were the lines of Washington, waiting until the last company of Sir Henry Clinton's army should embark. It will be ninety-nine years ago exactly, ten days from now, when the Evacuation occurred, and on this centennial, practically, Washington's army was coming down across the Harlem, until, on the 25th day of November, 1783, a grand entry was made, amidst the firing of guns and the ringing of bells, and the still more eloquent beating of the hearts of the people as the British evacuated. Now all that I wish to say, especially in reply to the sentiment in so far as it brings to us emphatically the thought of the nation, is that we are almost commemorating the centennial of that event, which, occuring, made the birth-day scene of the nation. And just as Washington in marching down this road, which was the old Albany road, just past the building in which we are in, so as to have the grand assembly at the old City Hall after the British troops had passed out, so he started our Nation upon its career then and he started it upon an idea which even now I feel I may introduce as the concluding part of my response to this sentiment . that he inaugurated it on an idea, on a sentiment which is altogether at variance with these philosophic evolutionistic views that led away the thoughts and the faith of men from all moral rectitude and hope to this abstraction, this vague idea of a principle as distinguished from a personal God. I remember, and it is within my reading by accident, and not in preparation for this, within a very few days ago, that it was not many days after this triumphal entry of Washington and his army, that in making the surrender of his commisison to Congress, his words were—and I wish them to be remembered by the American people—"I cannot bring my mind to close this last act in my official life without commending the fortunes of this people and of our much-loved country to the Almighty God;" and so I trust that even when these missionaries of the gospel of unbelief and rejection of the faith on which Washington based his conduct, and on which he invoked that the institutions and forms of his country might rest, make the attempt, that they may fail in intruding their disbelief and their rejection, and that the holy book of Revelation may continue to have an influencing effect on the minds of the American people. [Applause.]

THE PRESIDENT—The next regular toast of the evening is

"*The Empire State, and the City of New York; Their material growth dependent upon the prosperity of the Nation.*"

It is scarcely necessary for me to introduce to you the Honorable Chauncey M. Depew. (Loud cheers).

ADDRESS OF MR. DEPEW.

Mr. President and Gentlemen:

I feel embarrassed to-night by the peculiarity of my surroundings. I find my brother Sullivan, whom I have always understood to be a reputable and able and admirable representative of the bar, is so far affected by his associations with the clergyman alongside of him, that in a speech upon the Nation, he delivers the sermon which Dr. Collyer intended to deliver to you. In my experience, nothing has pleased me more than a lawyer's reprehension of infidelity, which you have heard here to-night. Another thing which surprised me is, that having been a student of Bailey, I should be unaware of the fact that an ancestor of his was in the jewelry business in the early part of this century, and still survives. That probably accounts for the fact that whenever I attend the Jewelers' Association dinner, I find Bailey here as an invited guest. (Laughter and applause). He gets his invitation from his aged relative. I understand from your president that this is the seventh anniversary of your meeting. (A member, correcting: "The eighth anniversary.") Mr. Depew, continuing: I want it understood that the floor cannot correct the platform. It is always a fact that, owing to the miscellaneous manner in which fluids circulate upon the floor, at such dinners as this, and the select manner in which they circulate upon the platform, the unscrupulous statements from the floor are always corrected from the platform. (Laughter and applause). Your president tells me it is the seventh. But to proceed. Humanity in general—I do not know how it is with jewelers' humanity—changes every seven years, and the only difference that I note between the jewelers whom I met seven years ago and see now, is the preponderance of bald heads to-night, in place of the fully covered crowns which I saw seven years ago.

From my standpoint, and with my beliefs and principles, nothing could have been more unfortunate than the allusion of your president to the late election. But I am glad to see that the Jewelers' Association is not cast down by that unfortunate result. I take it that it is due to the fact that though you are undoubtedly a machine, you lack a boss. But in the eloquent language of the Governor of this state in his Thanksgiving proclamation, I am glad to see that the lengthening shadows of the waning autumn bring about the season of the Jewelers' dinner, and one of the thanks that I shall render up upon that day is that I was a recipient of your invitation.

If there is one thing more than another that pleases me it is to address myself to a subject which is novel. I think that in the course of a long and varied experience, I have not spoken to the toast of the State and City of New York more than five hundred times. But like the maiden to her lover—some of the young men can remember the ardent experience—to whom every new appearance is a new beauty, and every new interview a new discovery, so every new approach to the consideration of the State and City of New York is to find something new to love, and something new to arouse patriotic regard and enthusiasm. I have discovered in life that men amount to nothing, who, having something to brag about, do not brag about it. I have discovered that nations amount to nothing in comparison with other nations, who, having something to brag about, do not brag about it. Now, the great defect of the state of New York, conscious of its superiority, is the modesty of the citizens who compose it. (Cries of "hear! hear!". If we had one-tenth of the self-assertion and self-opinionatedness of Massachusetts—is there anybody here from Massachusetts? (A voice: "Where were you born?") On the Hudson River, from an original Dutch stock. That stock which fails to see after 4 o'clock, but is very bright in the morning. If this state had a particle of the boldness of the western brother—is there anybody here from the west? If we had anything of the flowery speech and grandiloquence which characterizes the southern brother—is there any person here from the south?—New York would inevitably, in spite of the claims which McCarter will present for New Jersey, take the lead, and the others would recognize it. But consciousness of strength sometimes produces inertia, and the result is that the citizens of New York, in their ease, their comfort, their self-complacency, their ability to go ahead of all the other people of the United States, fail to recognize the elements of their superiority, and in lacking the element of brag, they lack the element of leadership. And yet there are some things about the State of New York that one may state in a modest way, and no one would dispute, which, on an occasion like this, in the most modest language, would be simply historical accuracy. It is this: It was the Constitution of the State of New York which gave us the Constitution of the United States. It was the State of New York that gave the country the system of education to which we owe that grand common school upon which rests, in its broad intelligence, the future and the hope of the institutions of this Republic. It was the initial statesmanship and wisdom and energy of the State of New York that dug through the land that great ditch uniting the lakes with the ocean, creating states where now is the center of the Republic—where now is its productive energy. It is the banking system of the State of New York, adopted without amendment in the national system, which gives that present Constitution of National Banks, under which no bill-holder ever lost a dollar, under which no depositor ever lost a penny, and which constitutes the basis upon which rests the prosperity of the whole land. (Great applause). Now the City of New York is the weather bureau of the financial United States. It gives the weather to the whole country. However the barometer financially stands in New York City, precisely so is storm or sunshine in San Francisco or Boston. However the thermometer financially stands in the City of New York, so is the financial temperature in New Orleans or Bangor. There is a geniality about the people of the City of New York which is not recognized by the people of any other city in the world. (Mr. Kennard, of Boston: "I doubt it.") Where do you come from? (Mr. Kennard replied: "From Boston.") My friend says he is from Boston. Now, as soon as a man in Boston accumulates $500,000, he makes up his mind that his ability and energy is too large for the community in which he resides. (Laughter.) He instantly breaks up his business and seeks some business connection in the City of New York. He generally fails to find it, and then he establishes himself in some fashionable hotel and proceeds to speculate in Wall street. In about a year he finds that he has taken his place in the grand procession of shorn lambs. But he discovers that New York tempers the wind to the shorn lamb as no other financial metropolis in the world does, because it furnishes him with a free ticket back to Boston. There he starts in life again, and, with the assitance of the Church of which he was a reputable member, before he left Boston—and in regard to which membership his associations in the City of New York never furnished any testimony—he gradually resumes a position in that community, and gets his $500,000 again before he dies. But he puts in his will that if any member of his family goes to New York to invest his money, the bequest to that descendant fails.

Now you all know New York has received a distinguished recognition lately in the presence of Oscar Wilde and Lily Langtry. Oscar Wilde says that while the ocean was a disappointment to him, and the Atlantic a failure, from an æsthetic point of view, the Park Theater fire the other evening furnished a combination and brilliant coloring that met the highest idea of modern æstheticism. Langtry says, as reported in a paper this morning, that after being familiar with those elements of the jewelry arts which adorn and beautify in other countries, all lack that which was concentrated in a single store in New York. I was over on the other side of the ocean last summer, with my friend Bailey, and while he was engaged in the examination of other matters (laughter), I thought I would look into the jewelers' shops with a view to this entertainment, and I found that the contents of all the shops that are gathered together under the arcades of the Palais Royal, which is the pride of Paris, could be dropped and lost in one of the grand jewelry stores of New York, and nobody would know it. One of the largest jewelers in London said to me, "Why is it that the folly and vanity of Americans leads them to come here and purchase the articles in our trade, when our craft finds its best work and has its most magnificent exponents in the country from which you come?" My own experience justified that remark. I found that there were fools in Europe spending their little in shops there—the money which they had earned here—and paying twenty-five per cent. more for the same articles which they could buy here.

The jewelers' art is older than history—older than sacred writ, for which my friend Sullivan has such an ardent and devoted reverence—older than Spencer's speculations, for which Sullivan has such a horror. You dig into the Etruscan tombs, and there you will find the finest evidence of jewelers' art. You knock over a mummy case and there you will find a dried-up Egyptian, and secreted in the linings of his case you will discover jewelry illustrating an art which is older than all the arts, and far beyond all recorded history. You dig into the graves of the Greek, and there you find evidence of the grace and skill which precede all Grecian poets that we worship in the colleges and schools, and then by that sort of productiveness by which the first becomes last and the last becomes first, you come here to New York—to the last exponents of art—and find here, reproduced in brilliant form, in varied color and in artistic skill, those elements recognized in Egyptian mummies, recognized in Grecian graves, improved upon by the Yankee, and adopted by the effete aristocracy. You remember, gentlemen, that one of your representatives whose biography you have in sacred writ, Demetrius, the silversmith, created a riot at Ephesus because the new religion was likely to interfere with his craft. This has been cited as an evidence of the avarice of the silversmith. I am not familiar with Scott nor with Henry, or any other of the great commentators on the Scriptures, but I do say that the silversmiths have at all times been the supporters of the established religion. The worship of Diana was the established religion at Ephesus, and the silversmiths stood by Diana to the last. The representatives of the silversmiths in the United States to-day are the foremost and most ardent supporters of all that pertains to established religion. There is no sacrament so sacred to the Christian mind—there is no sacrament which indicates Christianity and its best fruits like the ordinance of marriage, and there is no ordinance which silversmiths stand by and support like that. (Cheers and laughter). From the first blush of initial love, which leads to those presents that are to secure the bride and win the beauty, up to the grand ceremony that spreads all the tables in the house with the things bought at twice their value from your stores, and down to the christening—I never saw a jeweler who was not in favor of christening—there is nothing more beautiful in our modern civilization than this sort of support of the best principles of morality and religion, which increase and add at the same time to the beauty and the growth of the soul and the development of the pocket. Gentlemen, I do not mean to be flattering in these remarks, but only to state the calm and undisputed truths of history. My toast says that the State and City of New York indicate commercial prosperity or adversity all over the United States. Whatever truth there may be in that, it does not apply to you. You represent the elements which promote the prosperity of the country, but which at the same time indicate your trade to be a luxury. Impecunious cusses have no place by you. It is only the fellows who have the ready rhino in their pockets who are familiar with the jewelers. But your trade in its prosperity indicates the prosperity of the country. You are the barometer by which we can tell whether all other trades are highly prosperous or whether all other trades are dull. All well-regulated families in the City of New York, with a proper regard for the rules of society, have a large store of old silver on hand. It is marked with the family crest, and is classed among the heirlooms. In times of prosperity it is stored away in the cabinet for the purpose of showing it to admiring guests to whom the host pertly states that this silver came over with his ancestor with William the Conquerer to old England, and as his more recent ancestor was of an adventurous turn of mind, he put it in his pocket and brought it over in the Mayflower. He states that it was for a long time lost to the family, but he afterwards discovered it at Cypher's and bought it up. This shows that America is not so young and not so utterly devoid of hereditary distinction. But when hard times come the children eat their oat meal with the battered teaspoon which came over with the Norman Conqueror. When times are prosperous the table shines with all the elements of art and beauty which characterize the American Jeweler's Association, which make them best in their art, their craft all over the world, and which concentrate in themselves the truest elements of modern art.

PRESIDENT BROWN—The next regular toast of the evening is

"*Statesmanship; A disposition to preserve and an ability to improve should be the standard of a Statesman.*"

The Hon. Carl Schurz was to have replied to this toast, but was detained by sickness.

The next toast is

"*The Clergy; He is wise who can instruct us and assist us in the business of daily virtuous living.*"

I will introduce to you the Rev. Robert Collyer. (Greetings of applause.)

ADDRESS OF THE REV. ROBERT COLLYER.

Mr. President and Gentlemen:

I feel very grateful for this opportunity of meeting with the Jewelers' Association and finding so many jewels. (Laughter and applause.) I have enjoyed my dinner immensely, and I have enjoyed the most part of the speeches very much indeed. But I felt once and again very much like an old Methodist preacher we had once who was to preach on a great occasion one Sunday evening, while an eminent brother was to preach in the morning. This brother, who was to preach in the morning, dropped around to see old Sammy, as he was called, and said to him: "Sammy, what are you going to preach about to-morrow night?" Well, Sammy said about such a subject. "And that is a good subject, Sammy; what is your text?" responded the brother. "I am going to take such and such a text," said Sammy. "A good text," said the eminent brother, "how will you introduce your discourse?" "In such and such a way," replied Sammy. "How will you divide it?" "About so and so." "Capital, Sammy; I cannot imagine anything better; and how will you close?" "Well," said Sammy, "I will close with such and such figures." "Excellent, Sammy, I cannot imagine a better sermon," the brother said. Sammy was a simple-minded old man; he never supposed anybody would lay for him (laughter), he hadn't the remotest idea that anybody would give him away (renewed laughter), or sit down on him (roars of laughter), and so he went the next morning to church to hear this great doctor in divinity. When the doctor gave out his text, Sammy was struck with the coincidence that two men on the same day should take the same text. When, after the introduction, the minister proceeded to divide the thing up into four parts, Sammy was more thoroughly impressed than ever at this wonderful concurrence of thought in two men. As the story goes, the old divine had got into his second part before it struck Sammy what was going on. Then he rose in a mighty rage, and he lifted his hand and shouted: "Thou bald-headed old rogue, come down. Thou hast stole my sermon," and the story, as it ends, is that the old doctor in divinity was completely non-plussed and had to give up in the middle. Well, I do not mean that anybody has stolen my sermon, but I feel that my friend who spoke last somehow got inside me and got hold of what I meant to say here to-night.

However, it seems to me, gentlemen and friends, that one thing has been said here to-night—said by my friend, Mr. Sullivan—that does touch us a little to the quick. We were talking about that before he rose to his feet, and we found that we agreed in a certain touch of resentment toward the eminent gentleman who spoke in this room, I believe, a week ago to-morrow night. I felt, when I read that address, that while it might be wise enough and wonderful enough for the admirers of the speaker, if such things were to be accepted without question and without reply, we have by no means got through with that Declaration of Independence, and that war for freedom, of which Mr. Depew was speaking in his wonderful address. (Applause.) We are willing still to be admonished by the lordly brethren from the other side of the water, who, it has been well said, are so sick pretty much all the time they are here, as not to be able to look into our life at all; but when they come to talk to us with talk such as masters talk to pupils, as superiors talk to inferiors, we shouldn't take our admonition and go away and feel as if it was all right. I say it is all wrong, and that we have a right, standing on this continent, doing the work we have to do, to look to the roots of things, to determine what it is our duty to do in the business of our daily life, and what it becomes men of our beliefs and standing in this new age and in this new world to do for a day's work—and do it and then say "hands off," and turn away from any man and from any people that wants to act as our pedagogue and want to try and put us down. (Loud applause). I am an Englishman by birth and breeding, as most of you know, and I love my old mother so well that I don't want to hear anybody scold her except myself, and I don't want to do much of that either. (Laughter). I am too proud of her grandness, I feel that kinship too deeply in my heart; and the truth that "blood is thicker than water," but at the same time this is true, that only once in the history of that grand old nation has it happened, so far as we know, that England has ever paid a bill of damages to any nation under the sun. Her conduct before times had been this: if it suited her she would at first snub a nation, and then, if that did not suit them, she would turn around and lick them, and then she would make them pay the bills. She snubbed us, she did not fight us, but after it was all over, and we had proved by dispute among ourselves that a Republic like this of America is the strongest government in the world, and we had stood grandly to the racket and saved the nation, we then said to the old lady, "Now what are you going to do about it?" And she generously put her hand in her pocket and paid the damages. (Applause.) It was a grand thing to do; nothing ever showed her greatness more thoroughly to me. But she must understand that after making such a confession and such a revelation as that, she cannot send her sons over here to jaw us. (Loud Applause.) We are going to hold our own; we are going to do our day's work as we were meant to do. If our friend had had some wise monitor, like myself, at his elbow, to say a word or two to him after he was through, I think he might have gone back to the old country with a flea in his ear. I think this might have been said to him: "Do you know what we have to do here? Do you know that every year you are sending immense myriads of men, women and children over to this side of the water as poor as poverty can make them? Do you know that you are sending them over here with the roundness in their shoulders and the hollowness in their stomachs, and we have got to turn them round the other way? Do you know you are sending them with their feet wet and their eyes heavy and their tongues tied, and we have to put wings in their feet and brightness into their eyes and limberness into their tongues, and to set them thinking and to make them men?" But first of all we have got to give them something to do. A lady I was talking to some time ago told me the whole story. She and her mother were conducting a farm. "When I began with my mother," said she, "I was at first fearfully astonished at the way our farm hands would eat. The way those poor immigrants would make everything that we prepared for breakfast and dinner and supper disappear, was one of the most wonderful things. At last I said to my mother, 'They will eat us out of house and home,' Mother replied, 'They are only eating through their old hunger. Let them alone; they will soon get filled out like our own folks.'" (Laughter.) And, gentlemen, you have got to feed this great mass of people from Europe every year, and you must provide something for them to do.

I remember how, thirty-three years ago last April, I went to a dear, good girl, the best on earth to my thinking, and I said to her: "Now I have made up my mind to try my fortunes in the new world. It is a risk to go to the United States; it will entail great hardships. I will tell you what I propose to do," and I pulled out of my pocket and began to unwind the paper, at first only to be seen, until there was revealed to her a little plain gold hoop that I had bought at a jeweler's. "Now," said I, "I will tell you what I want you to do. I do not want to go to that new world unmarried. I do not want to go to that new world and take you with me. We will get married. I will go one way and you shall go another. I will go to America. You go back home and stay until I get back. I will pitch in in that new country and work hard, and then just as soon as ever I get my place there, and money enough to send for you, we will be married right clean along, leaving nothing out." (Laughter). I do not know that I said just that, you know. (Renewed laughter). She had it all in her heart, just as brother Sullivan was telling us—that deep, sweet, restful faith. She didn't make any argument, but she dipped back into that old Bible, she lifted her hand just a little, and she said, "Whither Thou goest I will go; Thy people shall be my people; Thy God shall be my God. The Lord do so to me and more also if aught but death part me and Thee,"—and then I kissed her. (Applause). That little golden hoop was the confirmation. We went to church and got married, we followed our plan out—and we have had nine children. And I have been as happy a man during all these years as the Lord ever made, and some how, you know, it all seemed to come from that little golden ring. Now my mother always clung to old ways, and one of the customs was that you could not be married without a ring. I have heard my mother, in her old age, as she looked at the worn ring and looked back at the old days when she was a young woman—I have heard her speak with pride about my father putting it on her finger in the old church—and I often say to myself, where in the world would I have been if there had not been a ring? (Laughter).

I think four things make a good, solid, virtuous daily life, such as you have touched in the toast to which I am to respond: first, a man should do a good honest day's work; second, a man should get a good home; third, he should get as good a family of children as he can manage to have; and, fourth, he should feel when he has got these three things that he is the best fellow in the world. Jewelers can see to this as well as any other men. And, gentlemen, if you can agree with this, you have heard my response to the toast that has been offered to which I must respond. What is your reward? It lies in the will, in the work, in the life we all live, if we live it beautifully and well. But it seems to be thought that there might be little chance of a jeweler who does not come to be a minister. The Bible pays a high tribute to the jewelers. You know the Bible begins with gardeners, and mention of one craft after another is found in its pages, but when the Israelites wanted to crown their temple with gold they had to have the jewelers come and see to it. And so we speak of your craft in the grandest book of the world all through its pages until their closing draw near, and then, in that vision of the celestial city, the New Jerusalem, you will notice that everything clusters about your craft. Now whether you get to the New Jerusalem or not I cannot tell—it may be something of a problem, I only see one man here to-night who belongs to my church (laughter); but you can take that to your heart, that while we do not know certainly about the rest, so far as we can look in between the walls of that celestial city, the dream of humanity, it seems, will be perfected in its beauty by some divine jewelers' association, and if you live up to that simple noble daily life I have tried to teach, I cannot have any better wish in my heart than, as the Boy of Minidab says, in that charming story, the Gates Ajar, that "you may be permitted by the Lord to help hist one of dem 'ere golden gates." (Laughter and applause).

THE PRESIDENT—Gentlemen, the next regular toast of the evening is

"*The Legal Profession; Do as our adversaries do in law, strive mightily, but eat and drink as friends.*"

I will introduce Thomas N. McCarter, Esq.

ADDRESS OF MR. MCCARTER.

Mr. President and Gentlemen of the Jewelers' Association:

Since your very kind invitation reached me I have racked my brains to know with what intent you have sent for me. Why an obscure Jerseyman, unknown to most all of you, should be sandwiched in between Mr. Depew and Mr. Bailey, the two, perhaps, most distinguished after-dinner speakers we have in this country, and expected to fill in the niche between them. I cannot account for it except that you might not regard, in this Jewelers' Association, the Society for the Prevention of Cruelty to Animals. When my distinguished friend on the right got back to the mummies of Egypt, I thought of what we are told about those people in those days, who considered it rather a hard task to be required to make bricks without straw, and so, when my friend Sullivan used up the Nation, and when my friend on the right hand used up the City of New York, and the reverend clergyman, who just addressed you, used up everything else, and as I saw subject after subject on which I might be expected to talk disappear, I could not help saying to myself, "friend after friend departs." I almost felt as if nothing was left to say, but on that topic to which my friend on the right challenged me, and that was "New Jersey." If there had been a toast to-night to that gallant little state I would have been proud to respond to it. I would have told you how, many years ago, when some man conceived the idea of writing to all the men in the country to know to what thing more than another they attributed their success in life, Mr. Longworthy, a great wine seller, wrote back: "The first element of success is to be born in New Jersey." I would say for New Jersey that she has land worth more per acre than the land of any state in the Union. Her manufactures are as varied and as extensive as any state in the Union. With the exception of Massachusetts, she has more miles of railroad to the square mile than any state in the Union. She is proverbial for her laws and her justice, and her low taxes. She is known to have made more municipal provision for her insane than any state in the Union. She has her state prison filled with more respectable men than any state in the Union. (Laughter). Her system of education is unsurpassed by any state in the Union. If it were not for one thing she would yield to no one; she votes the Democratic ticket.

But I had almost forgotten my toast. What was it Mr. President? (A voice: It was about the girls). I cannot compete with my reverend friend who has already spoken about the girls. I think I have stuck to my text as well as Dr. Collyer did. The legal profession; its aims and its objects. There is one department of the legal profession which seems, by our sentiment, to be given to me more especially; that is, "do as our adversaries do in law, strive mightily, but eat and drink as friends." Now I think the latter part of that sentiment I have done great justice to to-night, I have eaten and drunken with the Jewelers' Association. The only regret I have to express on this subject is, that seven years have gone by which have been to me, so far as the Jewelers' Association is concerned, seven years of famine. I trust the next seven years will be seven years of plenty. Now, Mr. President and gentlemen, a great deal might be said about the legal profession, and a great deal might be said about the sentiment which is involved in your toast, "Strive mightily as adversaries do in law, but eat and drink like friends." That sentiment illustrates and records a characteristic of the legal profession, which, I believe, is peculiar to that profession, and which none other of the learned professions can lay a claim to; it is, that no matter how bitter, how vile may be the struggles of the legal profession, when they get out of the court they are friends, and they sit down and eat and drink, forgetting all the asperities of their profession in little time. Now as to the clergyman—there is something in the exercise of the profession of the clergy which makes him an autocrat. He stands up in his pulpit and he lectures, and no one dare "sass" back to him. So it is with doctors—that other learned profession. The allopathic physician would rather see a patient die than consult with a homœopath. But this is not so with the lawyers. A respectable lawyer does not lose his standing with the craft by associating, for instance, with a specialist, a railroad man like my friend on the right. It is a peculiarity of the legal profession that when the lawyers leave court they leave arm in arm, and this has been the wonder of the common mind for many a year. I remember when I was quite a small boy, in the rural districts of that grand state of New Jersey, it was the custom for the eminent lawyers to go around from county to county in their coaches, to attend the circuits. The circuits were held in little country villages, and they would go and try their cases from place to place. On one occasion a very distinguished member of the New Jersey bar, Governor Ogden, was trying a case in the county in which I resided, and he had a very sharp altercation with the counsel on the other side which lasted quite a little while. But when the lawyers went out of the court room they went down to the street arm in arm. A Jerseyman, who had witnessed the scene in the court, came up to the distinguished Ogden and asked him to explain this friendliness. "Well, now," said the Governor, "if you will put up the drinks for the party I will tell you the secret of it." So this inquiring friend set up the drinks. Then said Ogden, "the lawyers on the opposite sides of a case are like the blades of a pair of shares, they cut everything else, but they never cut one another." Now there is a good reason for this. It may not be known, perhaps, to many here, what the ancient or the olden time custom was, before the days of railroads and gripsack enabled a man to go to his court in the morning and get back to his home at night by means of the many approaches to the city of New York, of which Mr. Depew spoke—but he meant the Central Railroad no doubt. In the olden time the lawyers could not go about and return in a single day, and in the evening they would come to the bar of the tavern and a committee would be appointed to see the landlord or landlady—the latter was usually the better house—and the lawyers would make a bargain that they were to have a separate table in a room by themselves; they should have white sugar in their coffee and sperm candles to write with, for a dollar and a half a day. These lawyers would all eat around the same table, and it was impossible for them, eating together as friends, to maintain and keep up the asperities which the court house sometimes engendered. So it would be that after the labors of the day were over and whist was set up, I have known it to be that a grave and serious judge who had, on the previous day, sentenced a man for playing dice, would say, "Fellows, there is no use of our playing whist unless we have fifty cents on the corner." (Laughter). That is the reason why the lawyers learned in the early day that while they might strive mightily in the court they could eat, and drink, and play whist like friends. And in those good old times, when those friends would meet from circuit to circuit, they all became acquainted with each other. They didn't need any Bar Association then. Now in these days of means of approach and railroads and gripsacks, the lawyer does not know anybody, except when the Jewelers' Association gives him an opportunity. Now I have kept you too long, I know what you are after. Oh, you are after Bailey, and I feel that I would do you a great injustice if I kept you much longer, but I must say a word more for Jersey and Newark. I got on the train from Trenton recently with a gentleman with a big satchel. As we drew near Newark, and he saw me preparing to get off, he said, "You lives in Newark?" I said, "Yes, sir." He said, "How ish does jewelry beesiness in Newark?" I said I thought it must have been pretty good, and I thought of showing him the jewelers' invitation and say the gentlemen who can afford to invite a poor Jersey lawyer to their dinner must be in a good business.

Three cheers were proposed and given for Mr. McCarter.

THE PRESIDENT—Gentlemen, this toast to woman is generally the last. I propose to advance it a little this evening. This toast was intended for Mr. Bartlett, our legal adviser and friend, as it was understood that he desired to speak to this toast, it being something new for him. But, by some inadvertance on the part of our worthy secretary, the wrong toast was sent to him. However, the toast is in good hands. I will give you the toast:

"*Woman; The guardian angel o'er man's life presiding; doubling his pleasures and his cares dividing.*"

I have the great pleasure in introducing to you Aba Woodruff, Esquire, of Newark.

ADDRESS OF MR. WOODRUFF.

Mr. Woodruff thought it almost too much to expect in a company of New York jewelers, that gentlemen from the small and yet great state of New Jersey, should occupy prominent positions on the platform, and it seemed almost unfortunate that a toast so comprehensive and that commanded so wide a range, should have been assigned to the speaker who had so little experience and could speak so little upon the subject. The topic of woman covers a great range and had been alluded to by every speaker during the evening. Woman is so closely allied to men that the latter feel almost lost when a company of gentlemen gather together to have dinners like the present one, and leave out that important element of their home life. Man's experience with woman certainly forms an important part in his life. We owe much to the training of our mothers, to the patience of our wives, and to the devotion of our daughters. Nothing comes nearer to the heart than the reverence which every man must have for the mother that bore him, the love that every man must have for the wife with whom he lives, and the pride that every man must have for his daughter. Life would indeed be a worthless blank if it were not for these redeeming features. The speaker had hoped that his friend and neighbor would have said something about the Jersey girls, but he seemed to think the subject too old. The speaker for himself, always thought the subject was fresh and new. (Mr. Depew, interrupting: Perhaps *he* is too old). The speaker thought every man must speak for himself on that subject. He himself knew that he was getting a little gray, he had to wear spectacles, and his hair was a little thin on the top, but the girls were just as good to him as they were years ago. (A voice: That is you think they are). The speaker hoped he would never get that thought out of his mind, for he thought too much of the girl he lived with. He could say one thing for the girls and that is, that they always get what they want. When a woman sets about to get what she wanted she always got it. He had one daughter, but when that little girl made up her mind about anything she always managed to get it out of the old man. The topic said: The guardian angel o'er man's life presiding. The speaker once heard a good man talk about the two things of this life, and he quoted a good many two things, but as for him he knew of no two things in life better than a man and woman taking each other to bosom, sticking to each other through thick and thin, and after living together thir-tythree years, for the husband to get up like Dr. Collyer did and say his wife is the dearest woman on earth. That sentiment covered the whole story of his life. It was pleasure to hear a man speak in terms of affection of the wife that had gone with him through the long journey, had shared his pleasures, had soothed his cares, and had made him really what he was. Man was just what his mother and his wife made him. As the mother trained the boy, teaching reverence for everything that is good, and hatred for everything that is bad; as the wife encourages her help-meet to walk in the path of rectitude through life, so it was that great men were made—men who are chosen to represent the great interests of this American Nation, being in the full sense of manhood American citizens. The American Nation, as some people claimed, was not dying out, nor was it becoming inferior. The spirit which planted this nation and has carried it down to the present day was just as strong as ever, and to the maintenance of these noble feelings, men owed a great deal to the women of the American Nation. The true women of this country endured every privation for their husbands. God bless the American women. In conclusion, the speaker wanted to give one piece of advice; if there were any gentlemen present who had not got a good wife, let him come over to Jersey, whose land was the most desirable in the world, whose railroads were numerous, whose administration of justice was proverbial, and which produced as good women as were to be found. If they would come over they would find hundreds of women just as pretty as the Jersey Lily which makes such a sensation in New York. And many of these Jersey girls were waiting anxiously for just such men as those composing the Jewelers' Association. (Applause).

THE PRESIDENT—I will give you the next regular toast:

"*The Pen; Beneath the rule of men entirely great, the Pen is mightier than the sword.*"

It is hardly necessary for me to introduce to you Hon. Isaac H. Bailey. (Loud cheering).

ADDRESS OF MR. BAILEY

Mr. President and Gentlemen:

I feel perfectly at home here, and I suppose you all wish you were at home. The fact is, I presume I have been appointed to pronounce the benediction. I will do as the young man did when he went to get a situation as clerk in a bank. The president said to him: "Now we will give you a situation if you will stay with us, we want somebody who will stay with us." "Well," said the young man, "how long does your charter run?" "Our charter runs a hundred years" said the president. "All right," responded the applicant, "I will—I will stay until that runs out." (Laughter). Now gentlemen I will stay here until you all go home. Now I call to mind that last year at this meeting you had a very effective scene when we were giving salutations to a certain gentlemen who was soon to venture out into matrimony. Now the first thing I did when I came into this room to-night was to inquire about Sloan. I am grieved to say that Sloan is not carrying out the scriptural injunction of which you have had such a delightful admonition in the testimony of the expert Dr. Collyer. (Laughter). And I shall be pledged to say next year, if Mr. Sloan cannot make a better report, we will change his name and call him "A Slow-un." (Laughter). We have had a remarkable scene of discourses here to-night. You will remember, if you have been observant, that the Rev. Dr. Collyer was seated by the side of a distinguished local politician, and his power in imparting instruction can be noted by the fact that that gentleman delivered a lesson in theology after six minutes conversation with the doctor. Then Depew, in his power of whims, delivered a remarkable speech. Depew studiously avoids anything in his speeches that savors of truth. He carried his theme so far to-night that he even made your chairman say that this was the 7th when he meant to say that this was the 8th anniversary of your meeting. And if there was one thing that interested me, it was to hear for the first time a eulogy of the state of New Jersey introduced in the bills, neck and heels, by a gentleman from that state. These Jerseymen tell us there are no taxes in Jersey, what a suggestion that is to the rest of the world. If they have little taxes to pay over there, great heavens! who is it that pays the bills! Fellow citizens of New York, you who travel back and forth in these Jersey roads, have to do it.

We have heard much of American hospitality, but don't you think there was something a little incongruous in certain citizens who invited Herbert Spencer here the other night, and asked him to give them his opinion about this country and people? Spencer told them his views—he said, you Americans are over worked. I can understand how absurd such an idea must have been to a clergyman, or a lawyer; but I want to ask you my fellow citizens who are toilers like myself (laughter)—who get up early in the morning and work till late at night, in order that you may raise money to pay your lawyers' bills and your pew-rents, (laughter)—are we not an over-worked community?

Now, I am to speak at last to the press. What a subject it is! In the first place you cannot be insensible any more than myself of the magnificent achievements of this press; of the exceeding delicacy and refinement of language that you always find in the newspaper; of that strict and careful observance of the duty of never misrepresenting anybody—never saying anything that is not true. If you want to realize the generosity and the true-heartedness of a newspaper, get a nomination for an office and see what the papers will say about your character. The newspapers are omniscient. They take a hand at government as well as at everything else. The newspapermen sit in Washington, and say to the gentlemen in authority: "We will take charge of your place; you can keep up the form of government but we will transact the business," and then they attend to the judicial functions also. If there is a trial going on, the newspapers always settle the question beforehand. If the jury happens to differ from the newspaper, then comes that immortal spirit of criticism which rises up and denounces the jury. (Laughter and Applause). And you must understand that this reticence on the part of newspapers, is more remarkable for the fact that it is literally free from all necessity of restraining itself. The editor is responsible to no man. He exercises his will-power at pleasure. If a man maligns you in a newspaper, you may bring an action against him, but it is not probable that you will live long enough to hear the conclusion of it. You may get a verdict for a small sum, but it will be carried up to the general Term and to the Court of Appeals. The Court of Appeals will decide that the court below erred, and the case must be re-tried. Occasionally the maligned man may try more severe remedies still, but the editor is always ready for emergencies. It is only a few weeks ago that a man went to a newspaper sanctum in St. Louis for this purpose, but the editor, acting in the spirit of that palladium of which he was the proud representative, drew upon him and laid him in the dust. After this in that city, whenever a man is abused by a newspaper, he keeps as far as possible from the newspaper office. If we had a press that was not careful and considerate, just and reasonable, we might suffer great injury, but it is one blessing that this estate of the realm, so universal, is also so tender and considerate. It never meddles with people's private affairs. If a lady comes to our shores for the purpose of endeavoring to earn a trifle by her dramatic power, the newspapers are very delicate in speaking of her. They might ask her what she intended to do with her money, but beyond that, every delicacy is observed. The tenderness of the press is something that is extremely touching. Let us thank God for what we have got, and let us be thankful also that it is no worse. I suppose none of you have ever been misrepresented in a newspaper—you have been fortunate if you have not. Perhaps none of you ever ran for a political office—that is also a fortune. Gentlemen, if it should ever happen in the providence of God, that our press should fall into reckless bands and should indulge in a merciless way in calumny and vituperation, and rough speech and cruel language, and interferes with men's private affairs, why then the republic would be in danger. Let us thank God for our lovely press. [Loud applause, and three cheers and a tiger for Mr. Bailey].

THE PRESIDENT—The next regular toast is:

"*Art, Literature and Science; The three graces that allure men to noble deeds.*"

I have the honor to introduce to you our friend, Edward T. Bartlett, Esquire.

ADDRESS OF MR. BARTLETT.

Mr. President and Gentlemen:

I feel sorry for you, but I feel more sorry for myself that I am called upon at this late hour to deal with the toast in hand, but as I came here to-night under some embarrassments myself, I think perhaps before I am done, you may be inclined to sympathize with me. I suppose every man can at times express himself more clearly than at others. Often it happens that the victim of an after-dinner toast finds himself enveloped in a sort of mental fog, when he desires the use of his faculties. Under ordinary circumstances, the toast is used to introduce remarks with an apology. During the few moments that I shall detain you in giving the history of art and literature and science, my shortcomings may be attributed to the fact that I was a late member of the Republican party, and that I am not well. Something seemed to fall through early last week, and I do not think I was removed from the ruins until about three days after. I presume that many of my Republican friends will be able to resume their business functions in the course of a few days. I am glad to have a light sort of toast. When I found that I was to be confined to the narrow limits of art and literatue and science, I said to myself, well, you might not fail on that; that is a simple toast—so I got a permit from the hospital authorities and I came down here, and I concluded to indulge in one square meal. But we come now to the toast. It is, "Art, literature and science; The three graces that allure men to noble deeds." I think we can spend the first hour of this discussion very profitably on art (laughter). Art is a system of rules, and there is the art of sculpture, the art of painting, and many other kinds of art, but, gentlemen, it has always seemed to me that your art was more satisfying than any other in many respects. Your best work is not hung in the dark cathedrals of the old world. Your best work is not concealed behind some lofty altar, where the feet of the stranger cannot penetrate; nor is it contained in some rare gallery of art. The fate of the productions of Raphael and Angelo is not yours. Your art is allied to the present. Your art gives sunlight to the white clouds that float in the gloom of the heavens, and those thousand nameless charms that go to make up this life of ours. Gentlemen, your art beautifies our homes; you add to the values of things in the world; you paint the lily and gild the fine gold; you make beauty more beautiful. You take the last and best gift of man, and you give her new adornments and new attractions. I bad anticipated saying many things in regard to your art, but they have been anticipated by some of the speakers that have preceded me, and I think that the best thing that I can do is to omit many remarks I had intended to make. I had thought to allude to our friend Demetrius, but Mr. Depew has taken the words out of my mouth. Demetrius was advised to go to law, which he did. That advice was given on the theory that it would use him up, and it did. (Laughter.)

Your position, gentlemen, in literature, is honorable. The first accounts of your art are found in those earliest days, when the baser metals were worked. It has been well remarked here to-night, your rarest work is found in the tombs of the Egyptians. I think that, owing to the lateness of the hour, I will pass over the science and literature, and trust that at some future occasion I may be able to extend more fully the remarks that I should be glad to make now, if I did not know you were all anxious to go home. I thank you for your hospitality, and hope that when the time does come when we may meet again, I might perhaps be permitted to allude to that vision that has already been referred to by the clergyman here, when your eyes will be opened in the immortal dawn, you may be greeted with the sight of that New Jerusalem, with her light most precious, even like a jasper stone, clear as crystal, and whose wall foundations are garnered with every stone known to your art. (Applause).

THE PRESIDENT—The next toast is:

"*Our Guests and Customers; Sirs, you are welcome to our house. It must appear in other ways than words, therefore I scant this breathing courtesy.*

I will call upon George H. Ford, Esq., to reply.

ADDRESS OF MR. FORD.

When this toast was announced and I looked around this board, I was reminded of a shop window which attracted my attention not long since, in which was a dog, above and around his ears was suspended a hornet; out of the mouth of the dog came this legend: "I wonder where the darned thing will light." It has lit, and, Mr. President, I can hardly pardon you for calling on me to respond, when there are so many distinguished guests on either side of you, whose eloquence, wisdom and wit have entertained us so pleasantly the past hour, and the valued customers around you from Pennsylvania, Massachusetts, New York, Ohio and other states, who could, in more fitting words and ways than I, convey to you the sentiments of your customers. My only solution of your selection is that you have heard so emphatically from these great states the past few days, that their representatives to-night prefer to remain silent, or you chose to hear from a locality where we can boast at least of the election of a State Comptroller of the other complication, as in the little state of Connecticut.

We have listened to so many and deservedly complimentary expressions to this Association, the manufacturing jewelers and art workers in gold and silver of the country, that it is with a degree of pride that we congratulate ourselves that we are your constituents. On you we have depended in the past, on you must we rely in the future. The ties which bind us together should be co-operative. We do not ask you to produce more artistic designs, larger quantities or afford us better facilities for becoming familiar with your lines, for your wares now, sirs, like your dinners, are tempting beyond our digestion. If we have one boon to ask of you, it is that you maintain the same standard of quality; retain the same schedule of prices on your gold and silver ware as heretofore, extend to us the courtesy of silver-plated ware discounts, and forward invitations to a Delmonico dinner with every monthly statement. If you have one to ask of us, it is that we buy largely and pay promptly.

It is a remarkable fact, gentlemen, that yours is almost the only important industry on this hroad and busy continent that has comparatively no foreign competition, consumers almost invariably preferring and seeking articles of home production. American designs and the work of American artisans in jewelry and silverware stand first and foremost, and the purchase of a foreign article of gold or silver is rarely heard of among our resident Americans of wealth and culture, or returning tourists from other lands. While your watches and clocks occupy a commanding prominence in the leading markets of the world.

Gentlemen, your customers cherish no higher aim than to follow in your footsteps and be able to dine in your princely style, and in their behalf it gives me great pleasure to express to you their appreciation of your regal hospitality, as well as your frequent "ways of welcome" during the interval of these annual occasions.

THE PRESIDENT—The next and last regular toast is:

"*The Jewelers' League; He is safe from danger who is on his guard when safe.*"

I have great pleasure in introducing to you Gilbert T. Woglom, Esquire, President of that Association.

ADDRESS OF MR. WOGLOM.

Mr. President and Gentlemen of the New York Jewelers' Association:

In responding, by my presence here as your guest, to the courtesy extended to the Jewelers' League of the City of New York, I had fully hoped that I might be permitted to enjoy this banquet, both physically and mentally, free from everything associated with trade and the shop. I learn, however, that "be only is safe from danger who is on bis guard when safe." I innocently thought that I might safely accept the invitation, and in an unguarded moment I did accept. And following my acceptance yesterday came the alarming suggestion that I respond to a toast and sentiment; the toast, "the Jewelers' League;" the sentiment, "he is safe from danger who is on his guard when safe." My first interpretation of this sentiment was that he is safe from danger who is on his safe on guard. (Laughter and applause). But that, Mr. President, as the ladies say, is just too ridiculous for anything, therefore, I read it again and found the two safes there still, but not in the position which I had supposed. I had hoped when the safes were closed in the office this evening, that they would have remained there, but this toast requires that I should present to you two safes, "he is safe from danger when on his guard by the safe." (Applause). My only hope in responding to this toast is to get as far away as practicable from my subject; that is the correct thing to do in after-dinner remarks. Your Jewelers' Association joins hands with our Jewelers' League in demonstrating the wisdom of the motto I have been deputed to bring before you. Your Association in its inception founded on that motto: He is safe from danger who is on his guard when safe; for just let a jeweler out in the country show some signs of debility, and bow quickly you will all leave your ninety and nine safes and go out into the wilderness to "safe" that which is in danger of being lost. Your Association in part is for the purpose of protecting yourselves, your families and your business during life. But you may go back further still than the epic of Virgil—away back to the Chinese, who have a saying that there are two classes of men that we most despise: The first, the creditor who does not guard himself, and secondly, a hen-pecked husband. You guard yourself in life; our Jewelers' League guards your families after you have departed. Protecting one's family is one of the noblest instincts that God has planted in the human breast. What sight is better than the three thonsaud men of our trade uniting as they have done, and paying during the last few years, to the families of the deceased members of the jewelry trade, the snug sum of fifty thousand dollars. Finally, Mr. President and gentlemen, will you accept my sincere wishes for the long life and usefulness of both institutions, yours for your business, your wives and little ones, and ours for tbe unprotected and fatherless. (Applause).

THE PRESIDENT—I want to propose the State of Massachusetts, and the health of our friends from that State present here. I will call upon Mr. Kennard to respond.

REMARKS OF MR. KENNARD.

Mr. President and Gentlemen of the New York Jewelers' Association:

The hour is so late I do not propose to detain you, but I feel that I ought to thank you for the delightful entertainment I have had, and I think I voice the sentiment of the guests in that we have had an eighteen karat time. I might also say, in regard to myself, that the only alloy that I have is that I never accepted a previous invitation. To some of the remarks made to-night I certainly would take exception. As to the speech made by Mr. Herbert Spencer, I would recommend it to the members of this Association who have not read it. We certainly live at a very high pressure, and you, Mr. President, know, as well as myself, that we can look around us and see many a young man fill an early grave in consequence of his desire to make money. I did think, while I was sitting here, that perhaps I might say something regarding the early jewels of the ancients, but I find tbat my friend, Mr. Depew, has told you all about the wonders found in the fine cities explored by Schlieman at Mycæne. Therefore, I will close by thanking you kindly for this entertainment. I see a charming set of gentlemen before me—I have never met a finer set of gentlemen. It is said that the Roman matron Cornelia, when her children came from sebool, showed her jewels in her children, saying, "These are my jewels," and your city, I think, can point to you with equal pride, and say, "These are my jewelers." (Applause).

THE PRESIDENT—Gentlemen, the regular exercises of the evening are over, and the hour is a little late. I can hardly close, however, without proposing the health of the first president of this Association. Mr. Baldwin is well known, not only in this Association but in our trade and in this community, and wherever he is known he is much respected, and I regret exceedingly that he is not here to enjoy the pleasures of this evening. Gentlemen, I wish you would fill your glasses and drink to the health of our first president, Moses G. Baldwin.

The toast was accordingly drunken.

MR. BAILEY—Mr. President and gentlemen, I want to tell you how much I feel relieved in having discovered that Mr. Taylor is here. I last saw him on the 26th of August, in great distress, in Liverpool. There were two jewelers in Liverpool, and both of them wanted to get home. I could only take one of them home with me, and I took Mr. Caldwell, of Philadelphia. Taylor felt badly when he found he was left. I understand that Taylor has got home, and that in all probability he will keep Thanksgiving with a realizing sense that, notwithstanding the misfortune he had to take a sail, he did certainly arrive safely in New York at last.

THE PRESIDENT—Gentlemen, I have alluded to the first president of this Association. Now I want to allude to the last president—that is, the last ex-president, Mr. Hine. Mr. Hine served this Association as truly and faithfully as an eight-day clock, and if the Association could have had its own way, he would have occupied this chair to-night. I propose now the health of all the ex-presidents of this Association here present, and I invite Mr. Hine to respond.

REMARKS OF MR. HINE.

Mr. President, Messrs. ex-Presidents and gentlemen who are willing to be presidents and ex-presidents, and, as the deacon said after distributing alms to the widows, I think I will embrace all. (Laughter and Applause). I am profoundly impressed with the scope and grandeur of the theme upon which I am to discourse. The length and breadth of it might well appall any citizen, but no clock peddler who aspires to adorn his profession is afraid to tackle any subject offered him. The real heavy work of the evening ought to begin now. But there are only two or three thoughts suggested by the subject to which I shall refer. One is that we who have the honor to be ex-presidents are safe. If there is anything that has been impressed upon me of late, it is the certain result of popular election, particularly if you belong to the Republican party. Some allusion has been made to the elections to-night. I do not want to lug politics into a social gathering like this, but I do not wish to occupy any false position. Over in the city where I live, they voted against my ticket by acclamation. But there is a silver lining to nearly every cloud. I share the feeling of the man who was run over in Philadelphia the other day by the "black maria." This gentleman got in tbe way of the "black maria" and they ran over him. Gathering himself up and brushing the dust from his clothes, he shouted after them with objections that would do a Sunday School no good, "I would rather he run over by you than ride with you."

I suppose that it will not be expected that I shall confine myself to the subject given me. Certainly when distinguished gentlemen, ehosen to discourse upon law, proceed to tell us which of a pair is a better horse, and leave us in ignorance as to the subject in question, you can hardly expect me to confine my self very elosely to the subject. In regard to the ex-presidents, I cannot add anything to the appropriate words which most of you remember were so well expressed hy ex-President Appleton at another meeting. I can only express for myself my profound respect for him, and I am sure I voice the sentiment of every one here, when I wish that his health may be spared many years, that he may be a living standard of emulation for us, and I wish that pain and suffering for him may be alleviated by every kind of fortune that may be suggested. His immediate predecessor, President Guitan, I was not very much acquainted with. I remember him as a courteous gentleman. My only belief is that the white hair which crowned his head was not whiter nor purer than the essential cbaracter of the man. And ex-President Haile—he is a "Hail" fellow but not well met here to-night. I shall not, wbile expressing my hearty respect for ex-President Haile, waste my eloquence upon him, but I propose the health of ex-President Haile; I propose that you drink to his domestic virtues, for he told me himself tbat he preferred to take tea with Mrs. Haile rather than witb us. (The Association drank Mr. Haile's health). We come now gentlemen, to ex-President Appleton—a man to whom I think this Association is more indebted than to any other one member in many respects. The same skill, ability, persistent energy and enterprise which established in this country a new industry, stood us in good stead at a time when we certainly needed the importation of those qualities which he so remarkably possesses. The history of the administrations of the different presidents of this Association from the first and up to him, certainly illustrates its growth in a certain direction. Many of you will recollect the first banquet we had seven or eight years ago. Under Mr. Appleton's administration impetus was given these social gatherings. I think I hazard nothing in saying that at the close of his administration, the Jewelers' Dinner was *the* dinner. I never saw a brighter array of talent than on that occasion. Gentlemen, it remains for us to keep at the high standard which he established for us. How well you sir—Mr. President—have done so, I leave for my friends who still remain to say. (Applause). Gentlemen, I thank you for the patience with which you have heard me, and will now bid you good-night. (Applause).

THE PRESIDENT—Gentlemen, I am much obliged to you for your attendance here to-night, our guests and all, and I have the pleasure of bidding you a good-night.

A MEMBER—Gentlemen, I wish to propose the health of our president.

Three cheers and a tiger were given for President Brown, and the company departed for their respective homes.

During the banquet and subsequent exercises there was much quiet entertainment among the guests, who gathered in congenial groups and had their own particular fun. At one table sat Mr. Duhme, of Cincinnati, who had traveled a thousand miles to attend this dinner and renew acquaintance with old-time friends. He was the guest of Mr. Appleton, of the firm of Robbins & Appleton, and these two gentlemen discussed the incidents and adventures of their early life, beginning at B. C. 500, and working down towards the present era by slow stages. Mr. Holbrook, of the Gorham Manufacturing Company, was seated with these venerable youths, but finally became tired of antediluvian reminiscences, and, going over to a group of more youthful members, remarked that he "would like to hear a little modern conversation. I have been listening to Duhme and Appleton," he said, "discussing events that occurred before the Christian era, and as they have now only got down to the beginning of the present century, I would like to hear something of modern times." Mr. William R. Alling was radiant with smiles and pleasant words for everybody, and as he insisted on drinking everybody's health every five minutes, the Appolonaris bottle circulated freely in his immediate vicinity. Fitch, Conover and Hale, flanked on the right by a group of plated-ware men, entered into the festivities of the occasion with zest, and their table resounded with laughter excited by the brilliant anecdotes and witty repartees emanating from the group. George C. White, Jr., the only temperance man at the table, confined himself to Congress water, and has regretted it ever since.

Mr. Thomas G. Brown made an excellent presiding officer, and was attentively listened to by both the old and young members of the trade.

The remarks of Mr. Chauncey M. Depew were brilliant and sparkling, but, like most after-dinner speakers, he is liable to repeat himself occasionally. It is to be regretted that he did not read his speech of last year before making the one this year.

Mr. McCarter surprised everybody by the fluency and wit of his remarks, but indulged in considerable romance about New Jersey.

Rev. Robert Collyer was earnest, unaffected and witty, holding the undivided attention of his audience during his remarks. In personal appearance he much resembles the Rev. Henry Ward Beecher.

For a sick man, Mr. Bartlett made a very able address, totally irrelevant to the toast assigned him, but nevertheless entertaining.

Mr. Bailey made an excellent satirical and pungent address, hitting off the follies and the faults of journalism with subtle wit and the keen blade of trenchant satire.

Mr. Woglom, in a brief, witty and eloquent manner, explained the advantages of the Jewelers' League.

Mr. Sullivan gave the cue to the other speakers by his criticisms of Herbert Spencer, and the "Silver-tongued orator" did honor to the occasion and to himself. He now regards himself as well-established in the jewelry business, and deals in nothing but 18-k. goods.

Mr. Semken, of Washington, saluted everybody with cordial greetings, and studiously avoided the seductiveness of the widow Cliquot.

Mr. D. H. Buell related some pleasing incidents of his adventures while hunting for broken china on Long Island.

Mr. Woodruff made a very happy address, although called upon to speak upon a subject of which he knows less than any other—"woman."

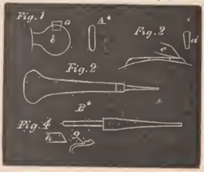
Altogether the dinner was a most enjoyable one, and the verdict was unanimous that the annual dinners of the New York Jewelers' Association have become an established institution, and are unequalled for their brilliancy and social features.

The Committee of Arrangements is entitled to great credit for the successful manner in which their part of the programme was carried out. Indeed, their good taste shone forth at all points, and nothing was left to be desired.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

MY ATTENTION was called a day or two since to the general methods of cleaning watch cases, spending time brushing with a hard brush and chalk; but there is no use of discussing the wrong way, but rather to point out the right. A little philosophy should be exercised in regard to cleaning cases, and also in instruction to customers in regard to their care; this is an important item in the appearance of a case. People should be advised to keep their pockets free from grit and dirt. It seems to be a mistaken policy to polish a case every time the movement is cleaned, and in a gold case the actual removal of metal is something to be considered. It seems as though about the correct idea is, in order work and cleaning, when it comes to the cases, to remove any dirt and stain, but to polish out all scratches is a useless wearing out of the material. Gold cases above 14-karat seldom are much stained, and need but little more than washing. A mixture of three parts of water, 1 part of spirits of ammonia, with 1 part by bulk of fine whiting, well shaken and applied with a brush to the silver cases, will remove all stains. The way to use the mixture is to brush it well over the cases inside and out, then wash with clear water, or a little soap and water, brushing the whiting out from the joints and case springs; the water should be wiped off by a soft napkin or towel, when the case should be dipped in alcohol to remove any water lurking around the case spring and joints. If any stains remain, a stick of pegwood dipped in a

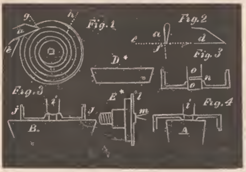


mixture of rouge, ammonia and alcohol will soon remove it. Slight brushing with a dry, clean brush will give a bright, clean look, which is all that can be expected from a case that is carried constantly. A clean, soft linen towel is almost, if not quite as good for cases as a chamois skin. While on the subject, we might as well consider the repairs of cases. A common, or rather, frequent job, is bushing the stem or pendant where the bow is attached. It can be done very quickly by soldering in a short piece of large-size joint wire. Soft solder will answer for most silver cases. The bush should be slightly taper, as shown at Fig. 1, when *a* is the bush and *d* the star. All workmen in country towns should devote some time to case work, not only for the accuracy of the thing, but because frequently they will not be allowed time to send to a regular case maker. Joints should always be hard-soldered on, and there is nothing an apprentice can do which will be more to his advantage than to take three or four old watch cases—those to be melted up are as good as any to practice on—and get three or four sizes of joint wire and some sharp cutting round files, or what is better, a flat file with round edges, shaped in transverse section as shown at *A;* the teeth should be coarse and sharp. The plugs of gold or silver can be taken out with a flat-bottom graver—the manner is shown in Fig. 2, and *d* is a cross section of the kind of graver used. A good, quick-flowing kind of hard solder should be used, and the work laid on soft-wood charcoal, and a blowpipe used which will scatter the flame so as to heat well over the work. One idea must be impressed on the novice, and this is, you have a job on hand which can and must be done quickly. Fifteen to twenty minutes is ample time to file, fit and solder any common silver joint. All watchmakers and jewelers should have a polishing foot lathe with brush wheels. After the job is soldered, it should be dipped, while hot, in a mixture of water 4 parts, sulphuric acid 1 part; if the work does not come white (if silver), heat over lamp or gas jet while wet with acid mixture, or heated in a porcelain dish with the above mixture or *pickle*. In broaching out joints the broach should be kept oiled. When the joint is done, and the plugs in, it should go to the polishing lathe and be submitted to three kinds of brushing, first with fine emery and oil to take out file marks, then rotten stone and oil, finally with rouge. If very particular, the job should be washed between the different kinds of brushings. For the inside, walrus leather or felt buffs should be used for final polishing. A comparatively small amount of practice will soon enable one to do a creditable case job. In the matter of case springs, no kind are as good as the old style solid case spring with screw, and the best way to proceed is to soften the spring in hand so that it can readily be filed and bent to suit, then rehardened, which is done by heating on charcoal, after smearing the spring with a thick paste of Castile soap and water; when at a cherry red it is plunged or dropped into a dish of olive oil; when removed, wipe off the oil and put the spring into a piece of thin sheet iron bent into a trough, **V**-shaped; apply a piece of beeswax the size of a pea, and heat until *all* is burnt off. An emery wheel in your polishing lathe will give the finish to the inside of the spring; the tip which protruded can be polished with Vienna lime or diamantine, or a burnish polish with a burnish file. Case stakes of several sizes, with box or lignumvitæ wood mallet are also necessities. The usual method of using these is to apply the stake to the inside of the case, and strike gently with the mallet over any dents or bruises; but in many instances a case can be got into good shape quicker and better by rubbing it forcibly on the face of the stake, letting the rounded edge of the stake act somewhat like a burnish; the method of doing this is a little difficult to describe, but it much resembles the manner of a shoemaker getting out pegs from a shoe. I have given this sort of desultory rambling description of the methods for restoring old cases for the benefit of the learner, as he will find many such cases to come to his notice; and as a rule, most of our watchmakers in country towns are incompetent to handle such jobs, not on the account of their difficulty, but they have had no experience, and look to the hard-soldering on of a joint as a tedious job, when in fact it is very quickly done. The great thing in this kind of work is to get sufficient heat without too much lung exertion; if you have gas, take off the regular burner and get a big blue flame; have your blowpipe permit a good quantity of air to pass through. If you use alcohol, have a big wick, well spread out, so as to get a big flame. As said before, practice; study what you want to do, so as to do it quickly, and by using old worthless cases (except for old silver), you are free from fear of doing any injury. In regard to joints, you will need two or three sizes of joint pushes; these are best made with wood handles, as shown in Fig. 3, and can be got of any material dealer, but the push piece is generally inefficient, and are best made by yourself; you should use steel wire about ⅛ of an inch in diameter and turned taper, as shown at *B**, with a tongue for going into the handle, as shown at *e*. This prevents the handle from splitting, and allows the end of the handle to be struck; a light wooden mallet will give a blow which will start a joint pin which would defy a heavy hammer. In all kinds of case jobs, a great thing to know is just exactly what is wanted to produce the desired result: this determined and the job is half over. Many times one is bothered with cases which will not stay shut—backs generally; either the cap is too high or the center band of the case does not rise high enough, or the back is beveled too much on the edge. If the cap is too high, push out the joint and file some from the edges; a very little will probably do it; if the notch on the main part of the case (as shown in Fig. 4) is not high enough, the lower edge of the back case must be filed flat on the edge; and at fig. 4 is shown a transverse section of the center part of a case; with a smooth graver scrape the part shown at *g* with the point of the graver until it is somewhat undercut.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

ENGLISH FUSEE watches are frequently considered as *bug-a-boo's* by many watchmakers, and after the escapement, nothing worries them worse than the fusee and barrel. We may as well begin with the fusee and correct here any fault, then proceed to the barrel. The great wheel and fusee should be perfectly upright, this is best secured in the universal lathe. If the watch is jeweled foot and top, it generally is upright throughout the train, but if any little distortion exists, it can usually be found to result from the pillars being loose in the lower or pillar plate; this condition can be remedied by using the prong of the lightest bench hammer you have, letting the top of the pillar go into a hole of your riveting stake, selecting a hole of the same size as the whole in the top plate. No conscientious scruples about marring the plate should deter you from securing the rigidity of the post. The top hole jewels for fusee arbors are almost invariably set in a steel collet which cannot be much tampered with, but the setting in the plate can be manipulated to a certain extent. It is best not to trouble the lower hole, as the depth in this way would be affected more than by moving the top hole. If as said above, only a slight error is to be corrected, put the plates together and pin them, then put the lower plate in your universal, letting the lower hole be your guide to the center; turn away only enough of the seat in the plate to correct the error, *i. e.*, do not let the tool cut all the way round the hole, only cut off on the side toward which the jewel has to be moved. The plate can be closed from the lower side toward the setting jewel, to hold it secure. I have mentioned this method only as dernier resort and to be considered in no favorable light, for the little distance in which a jewel could be safely moved in this way would hardly need correcting at all. The correct method is to reset the jewel or put in a new one. But new fusee jewels are not kept in stock so that one can always get their exact choice. The best way to remove an old jewel setting is to put it into a watch-glass and pour on a few drops of aquafortis, this will soon set the jewel free and no danger of breaking. The steel used for jewel setting is as soft as it can be made, and the jewel set in and the outside turned to fit the seat in the plate. The polish on such steel jewel setting is only a burnish polish. The method of setting and polishing jewel settings will be discussed in a subsequent article. After our fusee is perfectly upright, the next step is to see if the fusee itself is correct, and the little flange which holds the chain in place is intact; if this needs any restoration it should be done in the lathe and by no means attempted with a file. To do this, put your fusee (after removing the great and maintaining wheels) into the lathe as shown in fig. 1, November number, and with a thin edge graver turn the spiral into shape. At fig. 1 is shown the method; *c* represents the fusee; *a* the graver; *b* the lathe rest. The lathe is not revolved, but by grasping the pulley on the spindle of the lathe between the thumb and the finger of the left hand, and revolving the spindle only a slight way, say from *g* to *n*, using the tool as with a bow-lathe, gradually advancing as the flange is restored. Fig. 2 shows the graver in cross section. The flat face of the graver should be at right angles to one side, the one extended in the dotted line *f*. The graver you need comes ready made for the use of wood engravers. A little more or less whiting on the line *e*, determines the width with which it cuts to correspond to the thickness of the chain. The job can be done quite as expeditiously on a bow lathe, the same general instructions will serve. Now for the barrel. If this is spread and distorted nothing will correct it like one of Clackner's barrel closers; this tool, and how to use it, everybody knows, and needs not to be described; but after the cylindrical portion of the barrel is restored, comes the truing. The holes where the arbor runs must be looked to, and if not much out of the way can be closed. We will first conceive this condition to exist, and then tell how to bush. A large round faced punch is applied as shown at *i*, fig. 3; resting the barrel on a flat stake shown at *B*, two or three blows of a light hammer will generally close the hole enough. A word of digression in regard to a very useful tool, not in general use, which is a flat steel die-blanc shown in cross section at diagram *D**, these come in all sizes, but one about 2½ inches square and ¾ thick is about the right size; such a piece is useful for many purposes, and is shown in sections at *B*. Next the hole is closed on the outside as shown at fig. 4, where *A* is a round stake going into the barrel; *i* is



the punch, *j j* the barrel; the holes should be closed in excess, but not (as a rule) broached out, but with a round broach brought so as to fit the arbor. After the barrel has been closed it will be found that the cover is too large, the old style right and left hand screw arbors for a bow lathe is the most expeditious tool for this, but in absence of this a flat-faced chuck, only smaller than the barrel cover as shown at diagram *E** does firstrate; indeed, this is the most accurate, only it takes time to remove the wax. Here for another digression; most watchmakers who use a wax chuck lathe spend too much time in boiling off the wax. In this case, as in the majority of others, time your work so that if you throw the cover into alcohol and go to doing something else it will have ample time to remove the wax. You should have several sizes of these flat-faced chucks, as they are very useful for many purposes. At *m* is shown a piece of pegwood used to true up by, *l* representing the barrel cover. It will be found that the cover when turned the right size will not let the barrel run true, to correct this you must stretch the cover over to the side you desire by hammering on the inside, carefully removing from the opposite side with a file until the barrel runs true. In truing a barrel, it is best to let there be no end-shake to the arbor while truing, but make the right amount by laying the barrel on your bench, and depressing the lower part of the barrel, the position is shown at fig. 3, only substituting soft wood for the rigid steel stake shown at *B*. In case it is necessary to bush the holes, a solid piece of hard brass wire can be soft soldered into the holes after they have been somewhat enlarged by broaching out; the parts which extend below the barrel can be filed flat to the barrel, and if plug is sawn almost off before it was soldered in, it can be broken off near to where it is to be faced. At diagram *F**, is shown a vertical section of the barrel at *j*; *o* the bush; *n* where it is sawn nearly in two. The barrel is next cemented to a flat-face plate trued up by the outside, the plug or bush *o* centered and drilled, and finally turned to nearly fit the arbor; the inside end of *o* is turned off flat to the same face as on the old bearing surface for the arbor to run against. The cover is only a repeat. To those who abjure soft solder I would say screw in a bush and treat in the same way. Only few watchmakers have any means of cutting a thread fine enough, but in a subsequent article I wil describe a method of chasing a screw fine enough for this purpose, but this is one case where we can say that soft solder is good enough. for most watches which need such treatment are not to be respected. Never screw a hook into the barrel but fit it (the hook) to the spring. In putting in a new barrel the flat-faced chucks are all right, but in finishing, polish the cylindrical part and the flat edge, but frost the cover. By polishing the cylindrical part you will make it easier co fit a hook, and moreover it makes a finer looking job.

Mediaeval Bookbinding.

[*From Mr. Henry B. Wheatley's New Book.*]

The goldsmiths, the silversmiths, the enamellers, the ivory carvers any many other artists not ordinarily associated in our minds with book-production, all united to adorn the precious manuscripts of ancient times; so that St. Jerome was forced to exclaim, "Your books are covered with precious stones, and Christ died naked before the gate of his Temple." These adornments, however, helped to shorten the lives of the books they covered, as they often excited the cupidity of those into whose hands they fell. Thus the Turkish soldiers, when they seized the magnificent library of Corvinus, King of Hungary, tore off the rich bindings and threw the manuscripts away as useless and valueless. Then, again, covers belonging to one book got separated from it and were subsequently used as a protection to another of a different date. The late Mr. Libri made some remarks on this point which are very pertinent but were intended by him to account for certain "botchings" of his own: "Not only are those bindings in metal, ornamented in different styles and called Byzantine, very rarely of the same period as the manuscripts to which they may be found attached, but it is sufficient to cast an eye upon them to feel convinced that to form them objects belonging to different ages, due to various artists, and even executed in distant countries, have been employed. Indeed, we often meet with a singular mixture of cameos or ancient intaglios, Byzantine or Limoges enamels and bas-reliefs of ivory or metal belonging to totally different periods and having widely different artistic characters. Sometimes even ancient bindings made originally for smaller volumes have been used at a later date for books of a larger form, by affixing borders to some ornamental sides, placed as centers of the new cover. An example of this singular mode of botching is to be seen in an Evangelistarium taken from the Sainte Chapelle, and now preserved in the National Library at Paris." It is well to bear in mind that these books were intended to lie flat, and the upper cover, which was made heavy to keep the leaves down, was generally the only one ornamented.

Galvano-Plastic Art.

BY EXPERT.

SEVERAL processes have been made public for giving a conducting coat to leaves and flowers, and so making it possible to deposit a coat of metal on their surface; but none to the writer's knowledge have succeeded as well as one devised by himself. If a rose or other flower is dipped in a solution of acetate of lead (sugar of lead), and, while still wet, exposed to sulphurous acid gas, it will instantly be covered with a brilliant coat of metallic lead, which serves as an excellent conductive medium for depositing copper on. The copper deposit should be very light, so as not to detract from the form of the article in hand. It requires careful manipulations to produce leaves and flowers in good form, and it is well to commence with single specimens like geranium or fern leaves; these, dried or half-dried by closing in a book, will serve for trials. Most green leaves resist water, and leave a thin filiment of air between them and the water, making the leaves look silvery when immersed. Leaves, after being dried, lose, to a great extent, this power to resist water, and it is important that the solution of acetate of lead should be spread perfectly over all the surfaces when the article is immersed in the sulphurous acid gas. The method of proceeding is to make a saturated solution of the acetate in soft water, and simply dip the leaf to be coated in it, and then in a jar containing sulphurous acid gas. Sulphurous acid gas is prepared by burning sulphur in pure oxygen gas; the preparation of oxygen gas is simple enough and comparatively inexpensive, and any of the text books on chemistry will give the method of making. After trying single leaves, and a short piece of vine, like myrtle or strawberry, bouquets can be attempted; of course the leaves and petals of bouquets cannot be dried by pressing in a book, but must be dried by a sand process. Such flowers should be selected as has the least tendency to wilt, for the first essay, like some of the immortelles, accrolynum or daisy. Dry, clean and rather fine sand should be chosen, and a deep earthen dish which will stand heat in an oven. After your simple bouquet is made up, put an inch or so of dry sand in the bottom and set the flowers up in it; let your sand run in a fine stream until the pot is full and the flowers entirely covered. Of course the sand fills every interstice between the leaves and petals; the pot should now be put in an oven and heated to about 450° F., to expel all moisture. The sand and pot should be removed after an exposure of about two hours to this temperature, and allowed to cool off. The sand should now be carefully removed by dipping with a spoon, so as not to touch the flowers, as they break readily. After the sand is removed the flowers will be very perfect in form and appearance. They should now be immersed in the acetic acid solution slowly, presenting the stalks first, until completely wet, when they should be removed and allowed to drip and drain, but not to dry. The sulphurous acid gas is so much heavier than air that it can be kept in a jar like water, and covered with a piece of plate glass; the top of the jar should be ground to fit, and the cover of glass removed deliberately so as not to flirt out the gas by producing in-going currents of air. This gas has the property also of bleaching most vegetable colors, a red rose becoming white when immersed in it. A common red earthen flower pot does well for the sand bath, after plugging up the hole in the bottom with a bit of cork. Fig. 1 shows a vertical section of a flower pot with the sand surrounding the flowers. Fig. 2 shows the jar containing the sulphurous acid gas; a common candy or fruit jar answers if the top edge is ground; but a fruit jar will answer with its glass cap, but is not so convenient as simply to close tight with a flat plate

of glass. Reptiles, bugs, small fishes, etc., can be coated in this way and imprisoned in a copper casket and then gilt. It is best, after a sufficient coat of copper is deposited, to preserve the form (this coat need not exceed the $\frac{1}{250}$ of an inch, or the thickness of thin writing paper), to remove the specimen if it is some animal like a frog, lizard or fish, and make one or two small holes in the copper coat to let out the gases, and subject it to a drying process at a temperature above 212° F. Really, the specimen is now ready to be gilt, after closing the holes you made for drying with sealing wax; but the specimens feel light and frail, and seem to need strengthening. This can be done in several ways; but to cast on copper enough, so the shell is stiff and strong enough of itself, destroys all sharpness of outline (form). The animal remains of an eft or fish can be completely dissolved with concentrated sulphuric acid, and washed out with water, after which the thin copper form can be stiffened with wax or plaster of paris. To make the process simple we will suppose we have an eft (*Lacerta Seps, Lin.*) in hand, and wish to reproduce its form in metal. The animal is killed by chloroform, and treated in one of the following forms: A composition of brick dust and plaster of paris, in the proportion of two of the former to one of the latter, is mixed with sufficient water to form a paste of the consistence of cream, and poured completely over the specimen and allowed to harden and afterwards dried slowly until all the water contained free in the composition is expelled; by *free* in this sentence, I mean such moisture as is held mechanically, not such as is united with the plaster of paris, as this last named is united chemically as water of chrystalization, and requires a heat above 212° F. to disengage it. The mould made of the composition given, can be heated to red heat after the slow heating. Here occurs a necessity of explaining an explanation (as Barney O'Brien would say). If plaster of paris is just as it is ground from the stone in which it is found natural, it is put in an iron dish and heated although it seems as dry as flour; at about 400° F. it commences to bubble and boil like hasty pudding, it is losing its water or crystalization, becoming anhydrous. Now, if more than one part in three of plaster of paris is mixed with the brick dust, this bubbling will destroy the mould. After this action has been allowed to take place slowly by gradual heating, the heating can be extended to a bright red heat, when of course, all the animal remains will be reduced to ashes and can be shaken out of a small hole, and this same hole used as an inlet in which metal can be poured. This process would be much more perfect if the animal could be got rid of below red heat, or rather before the tenacity of the plaster of paris was destroyed. I give this process as it is a popular one in the books on this subject, not that I can recommend it. After the dust from the burnt eft is removed, melted metal (preferably type metal) can be poured in, when, after cooling, the mould can be broken and the cast form removed and gilt or silver-plated. The method which I have found to succeed best is to treat the subject as described for flowers, coating it with copper to say the thickness of $\frac{1}{250}$ of an inch, then making holes at convenient places say *b*, *d*, fig 3, and immersing in strong sulphuric acid (which does not attack the copper when cold) the animal is soon eaten out. The copper form can be filled with plaster to stiffen it, by mixing plaster of paris with water until of the consistence of thick cream, and injecting it with a syringe at one of the holes (*b* or *d*,) mentioned. The animal form should be gilt or nickel-plated in preference to silver-plated, as the latter soon darkens by the effect of sulphuretted hydrogen gas in the air.

For bugs and insects such treatment is not necessary, and indeed for that matter with small objects, the drying process is quite sufficient.

IN A RECENT issue of THE CIRCULAR we printed the following paragraph:

"Some idea of the extent of the American Watch Company's factory at Waltham, Mass., may be formed from a statement of its dimensions: The buildings cover an area of 48,374 feet; the frontage on the street is 754 feet; length of main building, 646 feet; aggregate length of twelve wings, 1,137 feet; length of benches, 3.87 miles; length of shafting, 3.93 miles. The machinery is driven by an engine of 100 horse power. Nearly 1,800 persons are employed in the factory."

A French contemporary ridicules the idea that there can possibly be a factory of such dimensions in the world. Our friend is not familiar with the magnitude of our American industries. The figures above given were taken from the architect's plans and measurements, and are absolutely correct, and without measuring bench room by "going up one side and down the other," as our critic suggests. Our friend will better understand the necessity for so extensive a factory when informed that the Waltham factory turns out 950 movements daily. This is the actual average of its annual production. In addition to the Waltham company's factory, the Elgin has a large establishment, whose daily production is said to be over 650 complete movements. There are several other factories in the country producing from 100 to 300 a day. The watch industry has achieved gigantic proportions in America, employing not less than six millions of dollars capital, and paying wages to some five thousand persons, male and female.

Foreign Gossip.

A Glass Bridge.—A trial is at present being made in England to build a glass bridge. In point of solidity, it is not excelled by any material, and, beside, glass is not attacked by insects, or rot like wood, or rust like iron.

City Hall Clock.—The Municipal Council of the city of Paris, after a prolonged debate, have definitely accepted the offer of Mr. Henry Lepaute of furnishing gratuitously the steeple clock intended for the front of the City Hall.

Search of Knowledge under Difficulties.—A continental jeweler had long and vainly endeavored to collect a bill from a lady of fashion. He came on an off-day, and after ringing the bell the footman politely informed him that "My lady only receives on Tuesdays." "I don't care a button when she receives, all I wish to know is the day when she pays."

Reward to Merit.—A statue has been raised at Avignon to Phillipp de Girard, a native of the town, who first succeeded in spinning flax by mechanical means. The statue has been presented by the artist who executed it. According to the speeches which were delivered on the occasion, it seems that Girard spent a fortune and injured his health in attaining the object he had in view. The first Napoleon, with his wonted generosity, had offered a prize of one million of francs for the successful invention of spinning flax by machinery, but Girard lost this on account of the fall of the first Empire. He, however, emigrated to Russia, where his services were appreciated, and where a town was founded, bearing his name, and where he lived for twenty years after leaving his native country.

Lace.—The passion for wearing lace reached its height in the reigns of Louis XIV. and Louis XV. In 1653, we find an account of the great Mazarin, while engaged in the siege of a city, holding a careful correspondence with his secretary, Colbert, concerning the purchase of some points from Flanders, Venice, and Genoa. He advises Colbert to advance 30,000 or 40,000 livres for the lace, adding that by making the purchase in time he will derive great advantage in the price, but as he hopes the siege will soon be at an end, they may wait his arrival at Paris for his final decision. It seems, however, from Colbert's answer to Mazarin, that these laces were destined as patterns for the improvement of the French manufactories; for in the inventory of Mazarin's effects, after his death, there is no mention of Italian points or lace coverlets, "dentelles d'or ou d'argent." There is no doubt that the minister and his secretary were then meditating the establishment of those *points de France* that Colbert so successfully instituted in 1665, at Alençon. The history of the establishment of this nanufacture is interesting in itself. In 1660 the French government issued a sumptuary ordinance, prohibiting the use of all foreign *passemes, pontis de Gènes, points coups*, and any French laces and *passemens* exceeding an inch in width. The ordinance then goes on to condemn the canons, which, it states, have been introduced into thek ingdom with an excessive and insupportable expense, by the quantity of points of Venice and Genoa with which they are loaded. The use of these canons was entirely prohibited, unless they were made of plain linen or the same stuff as the coat, without lace or any other ornament. The lace trimmed canon of Louis XIV., as represented in his interview with Phillip IV., in the Isle of Pheasants previous to his marriage in 1660, give a good idea of these extravagant appendages. The ordinance of 1660 had but little effect, for various others were issued in the following year, with the oft repeated prohibitions of the points of Genoa and Venice. But edicts were of no avail. No royal command could compel people to substitute the coarse, inferior laces of France for the fine artistic productions of her sister countries. Colbert, therefore, determined to develop the lace manufacture of France, and produce fabrics that should rival the coveted points of Italy and Flanders, so that if money was lavished upon these luxuries, it should at least not be sent out of France.

Recognition.—The German colony at Odessa, have ordered a magnificent bowl, with stand, ladle, and six goblets in the Russian style in the time of the Czar Alexei Michailovitch, to be presented to his Highness Prince Bismark, as a token of their admiration on the twentieth anniversary of his entrance into office head of the Prussian ministry. Mr. Khlebuikoff, the most celebrated goldsmith of Moscow, was the manufacturer of the set.

Important Exposition.—The international exposition which is to take place at Amsterdam, in May, 1883, will be very important. Many of the French industrial houses have already made claim for spaces, "and," Mr. Cl. Saunier says, "their number is augmenting sensibly, and we will be enabled to sustain the strife to advantage against our competitors, the Germans, who will largely be represented there." Americans make a note of it.

A Remarkable Wood.—A Nevada paper thus describes a remarkable kind of wood which is said to grow there. The trees do not grow large, a tree with a trunk a foot in diameter being much above the average. When dry, the wood is about as hard as box-wood, and being of a very fine grain, might, no doubt, be used for the same purpose. It is of a rich red color, and very heavy. When well seasoned, it would be a fine material for the wood engraver.

Compensated Pendulums.—A continental horologist is preaching against seconds pendulums, and contends that, after an observation of twenty-five years, he has come to the conclusion that they are useless, and more or less affected by dust and thickening of the oil. To avoid the direct effects of this evil, he has constructed one of half-seconds, brass bob, steel rod, and Graham escapement. The pendulum receives the impulse at one extremity, instead of in the usual way. He tested it with a mercury compensated, and found it to keep excellent time. He says! "The advantage I claim is this: A short vibration and a good safe rest of the tooth of the dead part of the pallet. When the pendulum receives the impulse at the upper part of the rod in short vibrations, it does not move sufficient to allow the tooth of the escape wheel to rest safe."

Military Pocket-Handkerchiefs.—Last year, a Swiss manufacturer, Herr Wettstein, of Toss, in the canton of Zurich, "published" a military pocket-handkerchief, illustrated with diagrams of all the portions of the new Wetterli rifle, with explanatory notes in German and French. It appears that a specimen found its way to the French war-office, and it was so highly approved of, that a similar handkerchief, but with a number of improvements, has now been introduced into the French Army. The material is cheap cotton, and the article is so handled as to serve as a vehicle of military instruction as well as cleanliness. The center is occupied with the cross of the Legion of Honor, upon a red lead ground, with the inscription underneath it, *Honneur et Patrie*. Around the central point are a circle of medalions, containing representations of officers of all grades, from the modest *sous-lieutenant* to the proud commander of a *corps d'armée*. The different uniforms are pictured so distinctly that the French private can tell at a glance to what grade any officer whom he may see has attained. The special pocket-handkerchief prepared for the infantry soldier has exact drawings of the arms used by him, with explanations of their mechanism. The borders of the handkerchief are hemmed in with a frame-work of the national colors, and within this frame-work are printed a number of sanitary precepts to be observed on march and during a campaign. Here are some of the marching advices: Wear the cravat loose. A strip of flannel day and night around the body, in order to keep off diarrhœa. Quench thirst with very small doses of wine, coffee, vinegar and water, or brandy and water. Take a piece of bread and a little coffee before the march. Spirituous liquors do more harm than good. Drink water neither too hastily nor too cold. In quarters wash face and hands, and, when possible, the whole body. Wash the feet and rub in a little fat or brandy, next, cook the soup, and do it at once, even though feeling quite tired out." And thus the French have described the "Being killed made easy."

Workshop Notes.

PLATINUM BRONZE.—A rust-proof bronze consists of nickel, 100 parts; tin, 10; platinum, 1.

OREIDE, RESEMBLING GOLD.—Copper, 79.7 parts; zinc, 83.05; nickel, 6.09, with a trace of iron and tin.

OTHER BEAUTIFUL ALLOYS.—Copper, 69.8 parts; nickel, 19.8; zinc, 5.5; cadmium, 4.7; used for spoons, forks, etc.

ALUMINUM SILVER.—An excellent alloy of fine luster and polish, consists of copper, 70 parts; nickel, 23; aluminum, 7.

SILVERING MIXTURE.—Dissolve 2 oz. silver with 3 grains corrosive sublimate; add tartaric acid 4 pounds, and 8 quarts salt.

PASTE FOR CLEANING METALS.—1 part oxalic acid; 6 parts rotten stone; mix with equal parts train oil and spirits of turpentine to a paste.

TRANSPARENT BLUE FOR STEEL.—Damar varnish, ½ gallon; finely pulverized Prussian blue, ½ oz.; mix thoroughly. Makes a splendid appearance. Excellent for blueing watch hands.

SILVERING POWDER.—Nitrate of silver and common salt, 30 grains of each; cream of tartar, 3½ drachms; pulverize finely and bottle for use. Unequalled for polishing powder and plated goods.

SEPARATING SILVER FROM COPPER.—Mix sulphuric acid, 1 part; nitric acid, 1 part; water, 1 part. Boil the metal in the mixture till it dissolves; throw in a little salt to cause the silver to deposit.

DRILLING HOLES.—By means of carbolic acid, a hole ¼ inch in diameter has been drilled through ½ inch thickness of cast iron, with a common carpenter's brace; judge, then, what can be done by using the acid and pressure drill.

BLACK VARNISH FOR IRON.—Asphaltum, 1 pound; lamp black, ¼ pound; resin, ½ pound; spirits turpentine, 1 quart; linseed oil, just sufficient to rub up the lamp black with, before mixing it with the others. Apply with a camel's hair brush.

MAGIC POLISH FOR BRASS.—Add to sulphuric acid half its bulk of pulverized bichromate of potash; dilute with an equal amount of water, and apply well to the brass; immediately swell it well in water, wipe dry and polish with pulverized rotten stone.

SQUARE HOLES.—To file a square hole, it is necessary to reverse the work very often; a square file should first be used, and the holes be finished with either a diamond-shaped file or a half-round. This leaves the corners square, as they properly should be.

BLACK LEAD CRUCIBLES.—Black lead crucibles are made of 2 parts graphite and 1 part fire clay, mixed with water into a paste, pressed in molds and well dried, but not baked hard in the kiln. This compound forms excellent small or portable furnaces.

TO DYE METALS.—Metals can be dyed any color by dissolving any of the aniline dyes in methylated spirit and adding shellac. This solution must be painted on until the desired shade is obtained. If the iron has been previously painted white, so much the better.

TO RESTORE BURNT STEEL.—Borax, 3 ozs.; sal ammoniac, 8 ozs.; prussiate of potash, 3 ozs.; blue clay, 2 ozs.; resin, ¼ pound; water, 1 gill; alcohol, 1 gill. Put all on the fire and simmer till it dries to a powder. The steel is to be heated, dipped in this powder, and afterward hammered.

DYSIOT.—A new alloy, called dysiot, has been brought into the market by Rompel & Co., of Hamburgh; a chemist analyzed it and found it to consist of copper, 62.30 parts; lead, 17.75; tin, 10.42; zinc, 9.20, with traces of iron. It can be prepared by melting together 62 parts copper, 18 lead, 10 tin and 10 zinc.

POLISHING WHEELS.—Take a flat burnishing file, warm it over a spirit lamp, and coat it lightly with beeswax. When cold, wipe off as much of the wax as can readily be removed, and with your file thus prepared, polish the wheel, resting the latter while polishing on a piece of cork. The finish produced will be equal to the first buff polish, while there will be no clogging, and the edges of the arms and teeth will remain perfectly square.

SOLDERING GERMAN SILVER.—Dissolve granulated zinc in spirits of salt, in an earthen vessel. Cleanse the parts to be soldered, and apply the spirits of salts. Next put a piece of pewter solder on the joint, and apply the blowpipe to it. Melt German silver, 1 part, and zinc in thin sheets, 4 parts, then powder it for solder.

SOLDERING TORTOISE SHELL.—Bring the edges of the pieces of shell to fit each other, observing to give the same inclination of grain to each, then secure them in a piece of paper, and place them between hot irons or pincers; apply pressure and then cool. The heat must not be so great as to *burn* the shell, therefore try it first on a white piece of paper.

DEAD BLACK.—A dead black for the brass work of lenses is prepared and applied in the following manner: The brass work must be made quite clean, and the following preparation applied with a camel's hair pencil: bichloride of platinum, 4 drachms; nitrate of silver, 1 grain; water, 6 oz. When you get the right depth, wash with clean water, dry, and finish with plumbago.

CRUCIBLES.—The best crucibles are made from pure fire clay, mixed with finely ground cement of old crucibles, and a portion of black lead, or graphite; a little pounded coke may be mixed with the plumbago. The clay should be prepared in a similar way as for making pottery ware. The vessels, after being formed, must be slowly dried, and then properly baked in the kiln.

TO SEPARATE GOLD FROM SILVER.—The alloy is to be melted and poured from a height into a vessel of cold water, to which a rotary motion is imparted. By this means the alloy is reduced to a finely granular condition. The metallic substance is then treated with nitric acid, and gently heated. Nitrate of silver is produced, which can be reduced by any of the ordinary methods; while metallic gold remains as a black mud, which must be washed and melted.

TO WHITEN SILVER WATCH DIALS.—Flatten a piece of charcoal by rubbing it on a flat stone; on this place the dial, face upward; apply a gentle heat carefully with a blowpipe, allowing the flame to play all over the surface of the dial without touching it, so as to thoroughly heat without warping the dial. Then pickle and rinse, using acid enough to make the water very tart, and immersing but for a few seconds. Silver dials may also be annealed by heating them red hot on a flat piece of copper over a clear fire.

MOLDING SAND FOR BRASS OR IRON.—The various kinds of good molding sand employed for casting iron or brass, have been found to be almost uniform in chemical composition, varying in grain or the aggregate form only. It contains between 93 and 96 parts silex, or grains of sand, and from 4 to 6 parts clay, and a little oxide of iron, in each 100 parts. Molding sand which contains lime, magnesia and other oxides of metals, is not applicable, particularly for the casting of iron or brass. Such sand is either too close, will not stand or retain its form, or will permit the metal to boil through its closeness.

TO BRONZE POLISHED STEEL.—Methylated spirits, 1 pint; gum shellac, 4 oz.; gum benzoine, ½ oz. Set the bottle in a warm place, with occasional agitation. When dissolved, decant the clear part for fine work, and strain the dregs through muslin. Now take 4 oz. powdered bronze green, varying the color with yellow ochre, red ochre, and lamp black, as may be desired. Mix the bronze powder with the above varnish in quantities to suit, and apply to the work, after previously cleansing and warming the articles, giving them a second coat and touching off with gold powder, if required, previous to varnishing.

TO POLISH STEEL.—Take crocus of tin oxide, and graduate it in the same way as in preparing diamond dust, and apply it to the steel by means of a piece of soft iron or bell metal, made in proper form, and prepared with flour of emery, same as for pivot burnishers; use the coarsest of the crocus first, and finish off with the finest. To iron or soft steel a better finish may be given by burnishing than can be imparted by the use of polishing powder of any kind whatever. The German method of polishing steel is performed by the use of crocus on a buff wheel. Nothing can exceed the surpassing beauty imparted to steel or even cast iron by this process.

Trade Gossip.

Rubies set with diamonds are extensively worn.

In a railway station in Boston three distinct times are kept, viz., Boston, New York and Buffalo.

Mr. Henry Randel, of Messrs. Randel, Baremore & Billings, arrived from Europe in the *Scythia*, Nov. 9th.

George A. Eaton, who was dangerously ill for several weeks, is now convalescing, and has returned to business.

Watches made as early as 1700 were so delicately constructed by hand, and so small, as to easily fit on the top of a lead pencil.

Mr. James C. Freeman, of Messrs. Freeman & Crankshaw, Atlanta, Ga., recently led to the hymenial altar, Miss Lelia Prentice Lowry, one of Atlanta's fairest daughters.

Henry Duchert, a jeweler doing business in this city, committed suicide by taking cyanide of potassium, because he could not pay his debts. This is a new way of settling with creditors.

An English diamond merchant recently offered £400,000 for the regent diamond, now the property of the French Government. It was bought 150 years ago from an Englishman for £125,000.

Levy, Dreyfus & Co. have just issued a comprehensive catalogue of optical goods. It is arranged in a convenient manner, and will prove of great value to the trade. Copies will be sent on application.

A citizen of Fulton County, N. Y., the other day observed in his winter supply of coal, a bright, glittering object, which flashed and sparkled brilliantly, and picking it out it proved to be a valuable diamond.

The Yale Clock Co., of New Haven, Conn., introduce a line of novelties in clocks, with pendulum and lever movements. These goods are attractive and accurate timepieces, and are rapidly growing in public favor.

George Blackington, a traveler for a Providence house, has been sick for some time of typhoid fever, and being in needy circumstances, has been cared for by his fellow travelers in a substantial and generous manner.

Mr. Gus. F. Veith, of the enterprising firm of Oppenheimer Bros. and Veith, will occupy rooms No, 101, Palmer House, Chicago, during the month of December, where he will exhibit goods for the accommodation of western patrons.

Messrs. Miller Bros. have recently introduced an extensive line of diamond goods in addition to their large stock of artistic jewelry and initial goods. They are constantly introducing new and attractive articles of personal adornment that cannot fail to please customers.

The American Watch Co., of Waltham, Mass., will shortly issue movement No. 2,000,000. It is an Appleton, Tracy & Co., four pairs, stem winder, friction hand setter, quick train, pocket regulator, and will be the first watch in the world bearing such a number.

Plaques of hammered metal are mounted on deep-toned velvets, and then framed with narrow beadings of ebonized work. The most popular designs are Moorish or Arabesque. Those who are in the secret of such things assert that Moorish designs are to be universally adopted in decoration.

F. Jeandheur, Jr., gold and silver electro-plater, employs the dynamo process of electro-plating, which is universally acknowledged to be the most practical form of electro depositing in use. By this process a uniform deposit of any desired thickness is imparted, insuring a permanent and artistic finish.

Leopold Weil & Co., one of the most enterprising and successful firms of this city, present an artistic page in this issue of THE CIRCULAR. The enterprise and push displayed by this firm in the conduct of their business has been rewarded by a substantial success. This is due to their honorable treatment of customers, and to the employment of gentlemen to represent them in all branches of their business.

The workmen engaged in tearing down the old Post-Office building have found a number of relics of interest. Among them were some musty old law deeds and papers dated in 1796, an English penny of 1729, a Roman coin date unknown, a half-cent of 1797, and an old brass pocket calendar of 1792. On the last, not only the months, years and days were to be ascertained, but all of the secular celebrations and religious holidays were marked. The King's and Queen's birthdays were stamped upon it. A Spanish piece of 1761 was found in a bundle of papers. An old almanac of 1795, two Irish pennies of 1822 and 1825 respectively, and some American coins of 1802 were also found. The supposed corner-stone has not been reached.

A bold attempt was recently made to raise money on a forged check of Dominick & Haff. An old bank thief, who was under police surveillance, was observed by detectives to be in communication with other suspicious characters. They were followed to the East River Bank, where one of them presented a forged check for $507.50. The men were promptly arrested and are awaiting trial.

Messrs. Falkenau, Oppenheimer & Co. have secured the four floors of No. 40 Maiden Lane, the building recently erected by Joseph Fahys. They will fit these floors up in a substantial and business-like manner for their own requirements, and will occupy them about Jan. 1, their increasing business having outgrown their present quarters. The Brooklyn Watch Case Company will occupy the first floor.

A package of diamonds valued at $32,000, was recently shipped to Louis Strasburger & Co., of this city, from their Paris house. On the arrival of the package, it was found that it had been broken open, and the diamonds abstracted. An investigation is now being made, with a view to establishing the responsibility for the loss. The package was shipped in the usual way, and was, in fact, simply one of the weekly consignments of diamonds sent to this house from their Paris branch.

The Spencer Optical Co. have recently issued their new illustrated catalogue, which will be forwarded to the trade on application. The push and energy displayed by this enterprising house has gained for them a high reputation, not only in this country, but in foreign lands, where their productions are equally well known and appreciated. A great measure of their success is due, first, to the quality of the goods themselves, and secondly, to the intelligent manner in which they present their wares to the trade. There is no old-fogyism about them.

George Techmeyer, the notorious young scoundrel who has been victimizing the trade by obtaining goods on memorandum, has been sentenced to the Elmira Reformatory for five years. This youth was arrested two years ago for a similar offence, but the sympathies of his victims were worked upon, and they let him off with slight punishment. The lesson he had received did him no good, for he returned to his old practices, victimizing numerous firms. He was finally captured by Mr. Scofield, with Thomas W. Adams & Co., who has, on several occasions, done excellent detective work for the trade.

It was a belief among the Poles that each month of the year was under the influence of a precious stone. Thus: January was represented by a garnet, emblem of constancy and fidelity; February, the amethyst, sincerity: March, bloodstone, courage and presence of mind; April, diamond, innocence; May, emerald, success in love; June, agate, health and long life; July, cornelian, contented mind; August, sardonyx, conjugal felicity; September, chrysolite, antidote against madness; October, the opal, hope; November, topaz, fidelity; and December, turquoise. These several stones were set in rings and other trinkets, as presents.

Noah Mitchell, manufacturer of jewelry at No. 692 Broadway, has failed, with liabilities estimated at upward of $100,000. He has been in business about seven years, and he had a capital of about $40,000. In August, 1880, he suffered a loss of $10,000 worth of diamonds, which were stolen from one of his salesmen at Utica and never recovered. His health became affected and he went to Europe to recuperate. His business was considerably affected by the robbery and his ill health, trade becoming dull and unprofitable, suits were begun by creditors for payments, culminating in his failure. About $40,000 of the indebtedness is secured by collaterals, and it is thought that the assets will realize from forty to fifty per cent. to the creditors.

At a recent sale of objects of Oriental art, belonging to the American Art Gallery, the following articles were disposed of at ridiculously low figures: A rare Chinese porcelain bowl and cover, decorated in the hawthorne pattern, with "grain of rice effect," brought only $5.50 A Kang-he beaker with a *bleu poudre* glaze, decorated with landscape scenes in white ground medallions, was sold for $37, while a bottle-shaped vase of the Kea-King period, thirteen inches in height, with a flaming top and elaborate decorations in precious metal, applied over *bleu de roi* glaze, was disposed of for $57. The best prices were obtained for a fine collection of antique Chinese snuff bottles in agate and crackle. A large agate with ornamentations carved in relief brought $18, and an exceedingly rare "mustard-yellow crackle," of the choicest texture, was sold for $30. There was considerable competition over a silver bronze vase, of ovid form, with dolphin handles and gold and silver ornamentations in relief and inlaid work, which was finally sold for $320. The prices obtained for the collection of Daimio swords were very poor, the highest being $56, which was paid for a finely-engraved dress sword with a peculiar lacquered scabbard.

The new Yale College heliometer, with its delicate mechanism, was packed in the most careful manner for transportation from Germany to the United States. It was first inclosed in a tin box, this was packed in straw in a larger wooden case, then this was covered again with straw, and the whole done up in canvas and fitted with handles, so as to be carried easily. The case was not opened in New York by the revenue authorities, but an officer of the Custom House was sent to New Haven, by permission of the Secretary of the Treasury, to look on while the instrument was being unpacked, and see that nothing dutiable was contained in the case.

An individual has been visiting the country trade and representing that diamonds had lately depreciated greatly, and had, in fact, fallen off about fifty per cent. in value. He gave the lie to this statement, however, when he exhibited his own goods, the prices of which were fully maintained. The fact is, diamonds have a permanent value, like gold, but may, also, have a fluctuating value, like gold, dependent upon the question of supply and demand. When diamonds are scarce, the price goes up, and when the market is overstocked, it falls, but never below the actual permanent value of the stones. For some time past the demand for diamonds has been great, and prices have advanced, but they are as high now as at any time in the past five years, without any indication of any depreciation in value. It is easy enough to say that diamonds have depreciated fifty per cent., but it would puzzle a buyer to find any reduction whatever in price. Dealers can be assured that diamonds are excellent goods to have and to hold, if necessary, without danger of their depreciating in value on their hands.

One of those callow young salesmen who represent some of the eastern cheap jewelry houses, who hangs about the Astor House, looking for victims, was badly sold the other day. He had been looking for a buyer, and finally spying him in the vestibule, unrolled his harangue with the greatest volubility. "Why, how do you do, Mr. Meyers," he exclaimed, "how do you do? Glad to meet you; been looking all over the house for you; heard you were in room 160, and went there twice for you; I have got the finest lot of goods to show you that you ever saw; new goods—going like wildfire; can't get enough of them; you must have some, they are just the thing for your country, and I have been keeping some for you. Come to my room and look at them right away." "My dear friend," said the individual thus assailed, as soon as he could get in a word, "my name isn't Meyer, and I am not a jeweler. No doubt but you have nice goods, but they are not in my line. Good morning." Later in the day, this enterprising youth finally got his eye on Mr. Meyer, and rushed for him, exclaiming, "How are you Mr. Meyers? So glad to see you. I made the funniest mistake this morning—mistook a verdant country duffer for you, and tried to sell him goods. Ha! ha! Funny, but he looked just like you. I have the nicest lot of goods to show you that you ever saw; trade going crazy over them. Come to my room and see the samples." "Oh! young fellow," said the individual, "will you give us a rest. You told me that same story once before to-day, and I told you I wasn't a jeweler and didn't want to see your goods." It was the same fellow with a new suit of clothes on, and the youthful stripling didn't succeed in catching Meyers at all.

How an individual may be a little "too previous" in volunteered information was well illustrated in the Lane a few days since. Mr. A. M. Hill, of New Orleans, had been in the city some weeks, dividing his time between recreating and buying goods. While walking in the Lane with Mr. Graves, of Reed & Barton, a spruce, dapper young fellow, possessing a degree of freshness that is appreciated in early vegetables, but not in persons who have reached maturity, approached them and exuberantly called out: "How are you, Graves; did you know Hill, of New Orleans, was in town?" "Oh! yes," replied Mr. Graves, and would have introduced Mr. Hill, but could not remember the name of the fresh young man. "Have you sold Hill any goods yet?" continued the youth. "No, not yet," said Mr. Graves, "but I am expecting him to call." "Well," said fresh," I don't know as we will sell him any goods, anyway. We don't like his way of doing business." "Why, what is the matter?" said Mr. Graves, "isn't Mr. Hill good?" "Oh! yes," fresh replied, "he's good for all he'll buy—no doubt about that. But, you see, he is too pushing for some of our other New Orleans customers. Why he's been selling goods at auction. You know he bought the stock of George Strong, and then sold them at auction. That made our other customers mad, and I don't know as I shall sell Hill any goods. He is an enterprising fellow, makes lots of money, keeps a good stock and knows his business, but then, he's most too enterprising, don't give the other fellows a chance. If I see him, he must give some explanations before I sell him any goods. I don't like that auction business." "But didn't Mr. Hill do the best thing for George Strong's creditors when he bought that stock," asked Mr. Graves. "Oh! yes; that's all right," said fresh, "it was a good thing for the creditors, but he ought not to have sold the goods at auction; that hurt some of our customers, and Mr. Hill can't buy any goods of me till he explains." And off bustled the talkative fellow, who was aching to get hold of Mr. Hill and sell him goods. Mr. Hill very much enjoyed the conversation, especially the references to his financial standing, and was glad to learn be was held in such high repute, even by strangers who were reluctant to sell him goods because he is enterprising and pushing. It is an old saying that listeners never hear any good of themselves, but the saying doesn't hold good regarding conversations thrust upon one.

A stylishly-dressed female recently entered the jewelry store of T. & E. J. Dickinson, Buffalo, and attempted to victimize them out of a gold watch that had been left for repairs. "I called to see if my watch was repaired," said the stranger, in a musical voice and with the sweetest smile possible. "Your name, please?" asked Mrs. Dickinson, not recognizing the lady. "Mrs. Howard." "We have no watch for Mrs. Howard," said Mrs. Dickinson, after running over the names of her patrons. "Why, that is my watch," exclaimed the stranger, with well-feigned surprise, pointing to a valuable gold timer hanging in the case of the repair department. "I beg your pardon, but that belongs to Mrs. Green." "Your mistake is easily explained," said the unblushing female, "I sent it here by Mrs. Green." Mrs. Dickinson examined the watch to see if it was in good order, and was about to hand it to "Mrs. Howard," when she discovered that the timepiece had not been repaired. She expressed regret, and told the female to call later in the afternoon. "But I am going to the matinee; won't you loan me a watch until after the performance?" was the next remark. Mrs. Dickinson thought it strange that the unknown female should be so anxious to carry a watch in the matinee, but did not like to tell her so. So she remarked cleverly, "Well, you come in just before the matinee and I will have a watch ready for you." The stranger went out. She did not return, but in the meantime Mrs. Green, the real owner, called for the watch. She was told of the visit of Mrs. Howard, and expressed profound surprise, stating that she brought the watch herself, and knew nothing of the stranger. Mrs. Dickinson immediately informed the police of the facts in the clever attempt at swindling, and gave a good description of the woman. This appears to be a new dodge, that might be successfully played on parties less intelligent than Mrs. Dickinson.

A company has been formed in this city for the purpose of furnishing business houses, public institutions, railways and hotels with uniform standard time, by means of a system of clocks regulated by telegraph. The system is entirely new and differs entirely from that at present used in Paris and Geneva. It is known as the Himmer system, and the result of several years, experimenting. The apparatus is very simple, consisting of a magnet and ratchet movement, so that there is little danger of the machinery getting out of order. There is a central regulating clock, which is placed in the company's office, and runs according to time furnished from the National Observatory at Washington, the pendulum of which opens and closes an electric circuit with every beat. A magnet in each clock when the circuit is closed raises a gravity lever, which catches the wheel carrying the minute hand on its pinion for about one-third of a second, and the wheel is propelled one tooth In this manner also the levers mark off seconds or any portion of time, while the electric circuit may pass through any number of clocks—a million if the wires are properly fed. In the Himmer system the circuit-breaker and time regulator is independent of the clock, and there are no springs in the mechanism, the whole action of denoting time being accomplished by gravity. Already there is a regulator in use in the offices of the company in Temple Court which regulates clocks, marking minutes, two seconds and one second. The company has been organized with a capital stock of $1,000,000 for manufacturing the clock, A. H. Elliot being President, B. S. Clark, Secretary, and C. H. Pond, Treasurer, and will at once begin to furnish time at a charge of 25 cents, 50 cents, or $1 per month, according to the style and action of the dial, and will furnish subscribers with time indicators, connecting the same with regulator stations free of charge. At present one regulator will be placed in a block, so as to avoid crossing streets with wires, but eventually the whole system will be regulated from one central clock. They will work correctly as long as the batteries are in order, which will not need replenishing more than once a year. The indicators are now in use by the Pennsylvania Railroad Company, who tested them for a year. In this city they will be placed at once in the Hoffman House and in new apartment houses up town. They will also be placed in many down-town business houses.

THE

Jewelers' Circular and Horological Review.

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THE

JEWELERS' CIRCULAR AND HOROLOGICAL REVIEW

The recognized organ of the Trade, and the official representative of the Jewelers' League.

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NOTICE TO SUBSCRIBERS.

The THIRTEENTH VOLUME *of* THE CIRCULAR *closes with the present number. Those of our readers whose term of subscription has expired, and who have been notified by our usual circular, will confer a favor by responding as promptly as possible, as all subscriptions terminating with this number will be discontinued if not renewed.*

The Close of Our Thirteenth Volume.

WITH THIS issue we bring to a close the thirteenth volume of THE JEWELERS' CIRCULAR, and, in doing so, we look back over its career with no little pride and satisfaction. Devoted to the best interests of the jewelry trade in all its branches and ramifications, owing allegiance to no clique or combination of individuals, THE CIRCULAR has stood as a sentinel upon the outer wall of the trade, challenging all suspicious persons and practices, and zealously watching over the welfare of those who were struggling for the right. Recognizing that many bad practices had obtained a foothold in the business, we have sought to eliminate these by exposing them and holding them up to general reprehension. It has, at times, taken no small degree of courage and persistency to do this, but we have maintained at all times the course laid out for ourselves, and in the end have found our reward in the friendship and support of those who have the best interests of the trade at heart. And now, as we bring this volume to a close, it is with satisfaction that we note that the number of our readers has steadily increased, and that we now have the honor of addressing each month the largest and most respectable constituency that it is the good fortune of any trade journal to reach. From the first launching of THE CIRCULAR, the pioneer journal of its class, it has steadily grown in size and influence, till now we can boast of having a circulation and a patronage that none of our more recently born competitors can ever hope to attain. We do not arrogate to ourselves all the credit for the success our publication has met with, for we have had the hearty support of a class of men in the trade who comprehended our purposes, and, approving of them, have given us not only their sympathy and substantial patronage, but the benefit of their experience and counsel.

As the jewelers' handicraft is ranked among the arts, we have endeavored, in providing for it a representative journal, to maintain the artistic standing of the trade, and to present each month a magazine not only replete with news and technical information, but that should be an elegant example of the typographic art. In this respect we think THE CIRCULAR may challenge comparison with any journal published in this country. Our title page has been much admired as a masterpiece of designing and engraving, while the typographical appearance of our pages has been very generally commended. But we are not satisfied with what we have already accomplished in this regard, and with our next number shall present a new title page which, we believe, will be found to surpass our present one in artistic excellence. The design is by Charles Osborn, who originated the present cover, and the engraving is by George Wolf, whose workmanship may be judged by our present title page. We have other changes in view which will make THE CIRCULAR more attractive in appearance than ever before.

In running over the volume that closes with this number, we find it presents an amount and variety of matter relating to the jewelry trade that can be found nowhere else. Of the editorial matter it would not be becoming in us to say more than that we have tried to comment fairly and justly in each issue upon those topics that were exciting attention at the time in the trade. We are at liberty, however, to comment upon those technical articles that have found place in our columns, because they were prepared by other hands than ours. It has been our ambition to secure the best writers upon technical matters that were available, and their articles upon watch repairing, upon the jewelers' art, the science of optics, etc., have been unrivalled in the literature of the trade, and have excited marked attention both at home and abroad. The discussions of that distinguished body of scientific and practical men, the "Horological Club," so fully reported in our columns, would of themselves form a series of text books that could not be excelled, and from which experienced workmen, as well as beginners, have derived much valuable knowledge. Our translations of special articles from the French and German, prepared expressly for THE CIRCULAR, have elicited much favorable comment for their accuracy and their practical treatment of the subjects in hand. In our news columns we have kept pace with the progress of the arts with which we are so closely allied, directing attention to all new inventions and ideas, and keeping the trade informed as to whatever was transpiring of interest in their midst. We are not particularly given to boasting of our work, but at this time we feel that we may, with propriety, invite attention to the great mass of valuable and interesting matter that has appeared in our columns during the past year, and which can be found nowhere else. The acknowledged fullness and value of our various literary departments has made THE CIRCULAR recognized in the trade throughout the country as the only comprehensive and accurate journal published in the interests of the jewelry trade, while its steadily increasing circulation makes it the most important medium of intercommunication between advertisers and their patrons that can be found.

Of the future we have little to say, relying rather upon performance than promises for recognition. Our record in the past must furnish the basis upon which we found our claims for support in the future. As our thousands of subscribers have found THE CIRCULAR invaluable to them heretofore, so we propose to make it in the year to come. All the features that have made it valuable in the past will be retained, and new ones added from time to time as circumstances demand. Thanking our numerous patrons for the favors heretofore bestowed upon us, and hoping to be even more deserving of them in the future, we close volume thirteen and enter upon volume fourteen with increased vigor and energy, trusting that a riper experience will add to the value of our services in behalf of that class of our citizens to whose interests the best years of our life have been devoted.

Review of the Year.

THE YEAR just closed was one that the jewelry trade may well contemplate with satisfaction. It may not have been remarkable for the amount of profits it distributed in the trade, but the volume of business was, nevertheless, very great, and if profits were not commensurate, the fact must be attributed to the excessive competition that has prevailed. Three years ago the business began to recover from the protracted financial depression that had so long hung over the country like a cloud of ill-omen, and not only were many persons induced to engage in the business who had theretofore been strangers to it, but manufacturers, whose energies had lain dormant, were led into the folly of overproduction. These causes combined have tended to produce an unusual competition of late, whereby the margin of profit has been reduced to the minimum. There are probably few dealers whose sales in 1882 did not exceed those of 1881, upon which they made a fair living profit, if not more. Commencing with the holiday trade of 1880-1881, the demand for goods of all kinds was very liberal, and extended through the holiday trade of 1882 and to the present time, with only the usual interruptions at mid-seasons. This liberal demand inspired manufacturers to their best efforts, and, as a consequence, the market was never so well supplied with goods of new and artistic designs, or with so many novelties, both useful and ornamental. The universal inventive genius of the Yankee found a prolific field during the year in the jewelry trade, and scarcely a day passed that did not see some new article of use or ornament brought out in some branch of the trade. Some of these were decided "hits," having immense sales, while others shared the fate of thousands of their predecessors, falling flat, and involving their projectors in more or less loss. The copyright and patent laws of the country have been frequently appealed to to give that protection to new and original designs that unscrupulous pirates would not otherwise accord. Indeed, to such an extent has the pirating of novelties gone in the trade, artistic goods being imitated and reproduced in debased metal, that whoever originates anything desirable nowadays is obliged to rely upon the law rather than commercial honor for his protection. But this accumulative trait of human nature is not confined to the jewelry trade, otherwise we should not have patent and copyright laws.

The demand for the finer grades of goods during the year has been greater than ever before, showing conclusively that prosperity has been the lot of the people, and that an appreciative artistic taste is steadily gaining ground among them. Not only has there been an active demand for those fine goods usually kept in stock, but orders for special works from original designs have been numerous, a demand that has been responded to by our workmen, in the production of works of rare beauty and exquisite workmanship. So great have been the advances made in this direction of late, that it is now conceded that American workmanship in the precious metals is unexcelled by any artisans in the world. While elaborate works in gold and silver have been in demand, and the finer grades of jewelry eagerly sought for, there has never before been such extensive transactions in diamonds and other precious stones as during the year just passed. Our importers have had their agents abroad searching all the markets of Europe for gems of the best quality, to supply their customers on this side of the water. So critical are our buyers that it is conceded that Americans are the most fastidious people in the world in their choice of precious stones, and dealers on the other side have come to reserve their rare gems for our importers, who pay more liberal prices than any other buyers. Some remarkable sales of rare diamonds were made during the year, including solitaires, matched gems, brooches and necklaces, at almost fabulous prices, but which were fully warranted by the unique character of the goods. The trade in precious stones is yearly growing in importance, its maintenance employing a vast amount of capital, upon which moderate but sure returns are made.

In the cheaper grades of jewelry there has also been an active demand, and the novelties presented have been numerous and attractive. In this branch of the business there is apparent a reaching out for better things, and the demand has been general for a better quality of the cheap goods. Dealers, for instance, who buy largely of rolled plate goods, have demanded that the character of the plate shall be improved both as to the quality of the gold and the thickness of the plate. This is a good sign, and is a demand with which the best manufacturers are only too glad to comply. That quality has been sacrificed to cheapness in the past is freely admitted, and a return to better grades and better prices will be most acceptable to all concerned.

In the watch industry there was unusual activity during the year, involving an unprecedented production of movements, and, of course, of cases as well. All the large watch factories have been pushed to their utmost capacity, and some of them were compelled to greatly enlarge their facilities, nearly doubling their capacity for production. The export demand for American watches is steadily on the increase, while the home consumption was never so great as now. We have heretofore criticised what we believed to be an error in the policy of our watch companies, viz., a desire to cheapen their movements below what they were really worth. By doing this a demand was created which could not be filled. A good watch movement has its price, and when sold below that price it must entail a loss on the makers. Prices during the latter half of the year showed some improvement, and there was, also, an increased demand for the better grades. The watch industry certainly can find no fault with the business of the year 1882.

On the whole, the several branches of the jewelry trade have reason to congratulate themselves upon the prosperous business of last year, and also upon the favorable auspices under which they enter upon the business of 1883. The holiday trade for the past two months has been satisfactory, and, now that it is substantially over, there comes a brief breathing spell in which to prepare for the spring trade. That this will be excellent there is every reason to believe. The country is exceptionally prosperous, crops of all kinds were excellent, their sale has put plenty of money in the pockets of the people, and it is by them being distributed among the various mercantile industries. Dealers have been cautious in their buying, and it is believed that they are carrying over a smaller stock into the new year than usual. They are, therefore, in a position to buy liberally when occasion requires. The little speculative flutters that occur in the stock markets of Wall street from time to time, do not affect business generally, however they may squeeze some of the forlorn "lambs" that frequent that locality. The speculative craze that occurred in stocks a few weeks ago had scarcely an appreciable effect upon any business, or upon anyone outside of the gamblers who make a business of betting on stocks. A few croakers in the trade take occasion, when these events occur, to give forth their notes of ill-omen, but there is generally no foundation for their evil prophesies. As far as can be seen at present, the prospects for the coming year are excellent, and if 1883 deals as kindly with the trade as did the year just passed, few will have cause to complain, but many for rejoicing.

A National Standard of Value.

WE HAVE received many letters of late from members of the trade in different localities, approving of our suggestion for the adoption of a national standard for wrought gold goods. We have also been urged to have a bill prepared for presentation to Congress, incorporating our views on the subject. Congress would, no doubt, give respectful attention to a petition from the trade asking to be protected from swindling and fraud, and it is from that source the application for legislation should come. It is the respectable portion of the trade that is victimized and placed before the public in a false light by reason of these fraudulent practices, and the sufferers are the proper ones to apply to the legislative authorities for redress. What is wanted from Congress is a simple definition of what constitutes gold goods, defining the various grades that may be made, and providing that all misrepresentation as to quality shall constitute a misdemeanor, and be punishable as such. We are in favor of adopting the English standard, our commerce with that country being so extensive as to make a uniform standard desirable. This standard defines pure gold to be 24 karats fine, an arbitrary definition, of course, but it provides a starting point. The law should then provide that gold may be alloyed in various degrees, down to 12 karats, but that anything below that shall not be deemed gold, but the base metal constituting the alloy. It should also be provided that each quality of gold shall be sold for just what it is, and that whoever sells 14-karat goods for 18 karats, is a swindler in law as he is morally, and shall be liable to such punishment as is meted out to other swindlers. It is right here that the greatest abuses in the trade find their origin. Excessive competition has induced certain unscrupulous manufacturers to "skin" the quality of their goods so as to be able to undersell their neighbors, and hence we find 12-karat goods sold for 16, and even 10-karat guaranteed to be 18 karats fine. Retailers have no means of detecting these frauds, for ingenious methods of coloring gold have been devised till the most degraded can be brought to look like the genuine. The only possible way to detect the cheat is to assay the goods, whereby they are destroyed. Few dealers have the facilities for making assays, and if they had, and undertook to assay samples of all their purchases, they would have little time for anything else. The true way to protect the trade is to prohibit manufacturers making bogus goods, or, if they persist in making them, to compel them to sell them for what they are, and not represent them to be of a better quality. As a means of fixing responsibility, every sale of goods should be accompanied by a bill wherein the quality of the goods should be stated, and such bills should be received in any court as *prima facie* evidence when fraud is alleged. Such a law would not interfere in the slightest degree with the manufacture of rolled plate or other forms of cheap jewelry. These are legitimate goods when sold for what they really are. There is a large demand for rolled plate, filled goods, etc., and their manufacture is legitimate, as is also their sale, provided no attempt is made to palm them off as genuine goods, or to misrepresent the quality of the gold entering into their composition. But when rolled plate is represented to be 14 karats fine when it will assay but 5 or 6 karats, the fraud is on a par with selling oleomargarine for genuine country butter. A law such as we have suggested would tend to increase the demand for the better grades of rolled plate and cheap goods, and to exclude those wherein the gold is so debased as to be valueless.

Of late the trade has been overrun with cheap and fraudulent goods, having a goodly appearance, but possessing no intrinsic value whatever. Even street peddlers can be found on the corners of our thoroughfares hawking scarf pins, rings, sleeve buttons, collar buttons, studs, and a great variety of fancy articles, purporting to be made of gold, but which have no more gold in them than a five-cent nickel piece has. This same class of goods can be found in gentlemen's furnishing stores, and in the stores of many retail dealers are goods of but little better quality. Manufacturers, or their representatives, charge for them to a great extent according to the local status of their customers, and are apt to charge a local dealer in jewelry more than they do a peddler or an auctioneer, because they think the standing of the dealer will enable him to get better prices. To this end they misrepresent to him the quality of the goods, knowing full well that he has not the means of ascertaining the true quality, but must rely on their statements. Dealers are thus frequently placed in the awkward predicament of deceiving their customers as to the quality of their goods, and charging them a great deal more than the peddler or auctioneer will for precisely the same articles. There are numerous large establishments in the country devoted exclusively to the manufacture of these cheap, deceptive goods, and their profits depend upon their ability to produce articles from a base metal that can be readily sold for genuine. Dealers are innocently made *particeps criminis* in defrauding the public. It is impossible for honest dealers to protect themselves and their customers by any means that we know of except by national legislation fixing the gold standard, and providing penalties for fraud. That Congress is the proper legislative body to provide this remedy is unquestioned. State legislatures may pass laws that will be operative within their respective borders, but New York cannot prescribe the quality of goods that may be sold in New Jersey, nor can New Jersey legislate for Ohio or Illinois. Inter-state commerce has outgrown state limitations and jurisdiction, and can only be regulated and controlled by Congress, upon which body the Constitution expressly confers the power to "regulate commerce between the states." Congress has already assumed to regulate the transportation of those things which go to make up commerce; how much more important it is to preserve the integrity of those factors whose aggregate constitute our inter-state commerce. It is more important to the people, for instance, that the quality of our flour shall be maintained at a high standard of purity than that it shall be transported from one section to another at a stipulated price. We do not doubt but Congress has the power to legislate on this subject as we have suggested, but will it do so? That depends, we believe, upon the unanimity with which the trade appeals for such legislation. We know there is a strong feeling in favor of state rights, and an opposition to national legislation, whenever it can be avoided, but, at the same time, our inter-state commerce has assumed such gigantic proportions as to be beyond the jurisdiction of any state, and only within the control of Congress. When the people are being defrauded by the substitution of bogus goods for genuine, whether of food, clothing, personal adornment, or anything else, and state legislatures are powerless to apply a remedy, it is clearly the duty of Congress to interpose for their protection. That body is now in session, and we believe the time to be propitious for the trade to ask such legislation as will give it a definite standard of value for wrought gold, and prevent the frauds that are now being perpetrated by unscrupulous adventurers upon the trade and in the name of the trade.

Pearls and Beads.

BY ARTIFICIAL pearls are understood all the productions of human art, to distinguish them from the genuine pearl, which, without human aid, is produced by the bivalves. The artificial pearls, again, may be divided into genuine and false artificial. The forms consist of those produced by the bivalves, stimulated, or rather forced, by human aid.

It is no cause of wonder that pearls, from the earliest ages forward, have attracted the attention of man by their agreeable lustrous exterior. They are the representative of the beautiful, pure, and noble. Even the wine connoisseur or tippler calls the air bubbles of his beverage "bead," and thereby desires to convey that it is pure; teeth are compared with pearls, and the Frenchman, if he wishes to express the idea that anything is pure, he says, "*Cela est net, comme une perle.*"

Again, it is no cause of wonder that many, celebrated naturalists even, have tried to produce pearls, that is, the genuine, artificially-produced, article. Most of these speculators, even those who were only passably acquainted with the nature of the pearl oyster, conceived the idea of exciting the animal into this formation. The thought next at hand was to imitate the effect of the so-called boring oyster, which drills through the shell, and gives rise to the attached pearls. The experimenter also drilled through the shell, and inflicted delicate wounds on the animal, thus stimulating it to the formation of scars, hoping in this manner to force the animal into production. But in spite of making the wound as uniform and fine as possible, even going so far as to insert metallic plugs into the hole, the results were very indifferent. Still less successful was the forcing of free pearls. For this purpose, foreign bodies were introduced into the shells, but in spite of all the roundness given to these bodies, even by manufacturing them from mother-of-pearl, so as to offer a kindred substance, still the regularity of form, the smoothness of the surface, and the peculiar irridescence of the naturally-formed pearl was always wanting. It is singular that no attempt was made to introduce small, so-called "seed pearls." The Chinese have obtained the best results in this branch. They are able to force half-round pearls, but without irridescence. They also produce various relievos, the Buddha pictures, in a similar manner, especially those living around the interior lake Thaihn, not far from the mouth of the Yangtsekiang. For this purpose, the oyster shells are caught in the month of April and May, carefully opened, and clay or metal Buddha pictures are inserted. Their form is concavo-convex, and they are laid upon the shell face with the convex side. The chitinic deposit now coats the body with the mother-of-pearl substance. At any time from ten months to three years afterward, the shells are opened again, and the model is coated with the pearl, galvanized, as it were, somewhat enlarged, and the model itself is firmly connected with the shell. The fine layers around it are cut through, and it is taken out. Lustrous tin models increase the transparency of the superincumbent pearl substance. These pictures are much worn as ornament for the hair. The well-known naturalist Linnæus understood the art of forcing pearls, and artificially produced them, a fact well authenticated by reliable authority. He offered to sell the secret to the Swedish government, but died before the bargain was effected. It next came into the possession of a merchant, who paid 500 ducats for it, but he never tried it. His heirs offered it afterward for 500 thalers. Its end is not known. The experiment of producing them artificially is but seldom tried at this day. The present tendency is rather to produce specimens, artificial pearls, at a great consumption of time, money and labor, and to manufacture them in wholesale quantities. These imitations are chiefly produced in France, Austria, Italy and Bohemia. In the three first-named countries the largest factories are in Paris, Vienna, Pressburg, Venice, and Rome. These artificial pearls are known in commerce as wax and glass pearls. The latter are again separated into solid and hollow.

All these imitation pearls are intended to substitute the genuine article. The manufacture of the imitation was invented in Paris, in the year 1656, by one Jaquin, a manufacturer of rosaries, who lived near the end of the reign of Henry IV. When at his country seat, he cleaned a mess of fish one day. The rubbed-off part of the stomach scales imparted a silver sheen to the surface of the water, similar to that of pearls. He conceived the idea of uniting the single atoms of the lustrous layer by means of mucilage, and fill it into glass balls, which he caused to be blown, and next perforated; one hole was closed, while the other remained open to be used for filling. The process was gradually improved. These little glass balls are blown either of entirely white or slightly bluish glass, and of varying forms. But great skill is required. A still higher degree of dexterity is necessary if the glass is to be uniformly thick, as this has an influence upon the uniform luster. Many of these glass blowers have attained to an extraordinary degree of skill in it, and they are in great demand in these factories. The filling is taken from a little white fish, occurring plentifully in the Rhine and Seine. The scales obtained from the fish are stirred in water until the silver, lustrous, mucilaginous mass has dissolved and deposited. These lustrous parts, under the microscope, consist of silver-colored crystalline parts of oval form with beveled ends. They are composed of a crystalline combination of guanine and lime. The scales are separated from this substance which is then washed with ammonia, and a gelatine solution added as binding agent. This product now is the pearl essence. It therefore is a gelatine solution mixed with the silver gloss of the fish. One hundred weight of these fish furnish two kilograms of scales, and in order to obtain one-half kilogram of the silver luster, from 18,000 to 20,000 of these fish are necessary. When a glass ball is almost half filled with this essence, it is shaken until the interior is well coated with it, and any excess is carefully poured back, to be used for charging other balls. They are next filled with wax, in order to give them greater durability.

The art of manufacturing these pearls has at present arrived at such a perfection that even thoroughly practiced experts are unable to distinguish from the genuine those manufactured in rarest beauty by Constant Valés & Topard, Savary & Mosbach, in Paris, without first entering into experiments amounting to an analysis. These imitation pearls are not cheap. Beauty and purity determine their value. More than a million francs' worth is annually exported from France.

Other very handsome pearls of animal origin are manufactured from the incising teeth of an animal belonging to the sea, and inhabiting the tropical parts of the Atlantic Ocean, especially the Indian Ocean. They are of a beautiful satin-like appearance. These pearls by far surpass the very handsome ones turned from ivory. To this class also belong those from the mother-of-pearl shell, and chiefly used for rosaries; many of them go to Palestine. Smaller shells, for instance, the cowrie, also used as money, are perforated, strung, and worn in Zanzibar. We next come to the beads.

Coral beads are equally a favorite article.

There are not many beads manufactured from vegetable substances; the corozo and cocoa nuts are sometimes turned into them. The cavities of the cocoa nut frequently contain a peculiar pearl-like formation, somewhat analogous to that of sea shells. Their surface is smooth and milk-white, of no great luster, however. They are a universal article of ornament worn by the Radshas of East India.

The most worthless of this class are the dried berries; either black, ash gray, or gray with red dots. The Indians wear them as ornament.

The Turkish rose beads must be classed to those of vegetable origin. They are much in demand, on account of their very agreeable odor; their surface is ornamented with designs. It is frequently believed that they are manufactured from pulped rose leaves, pressed in forms. This is not so, however. They are made from different vegetable products, and their acceptable odor is due to the color, which either is ground with rose oil, or added to the pasty mass.

To this division, finally, belong the jet beads, the main component of which is gum, a resin, and therefore a vegetable substance. Jet being so universally known, a further description is unnecessary.

Mineral and earthy substances have been used for beads in all possible manners. Amber furnishes very handsome beads. They are classed in this category because amber is a resin occurring in the mineral kingdom, although standing in close connection with forests submerged by the sea. Very ordinary ones are made from stone coal. Porcelain beads are always very heavy. Very nice ones are manufactured from alabaster. This sulphate of lime, as a crystalized mineral, is blending white and as fine-grained as sugar. Beads turned from it are first immersed in wax, by which they receive a coating, and next dipped into real pearl essences; their handsome appearance, unhappily, does not last long, and soon rubs off with wear. Beads of the most varied dimensions and shapes, of all possible colors, and for the most manifold purposes are manufactured from glass. All glass beads are either solid or hollow; the latter are blown.

The Venetian or embroidery beads are also solid. These are the smallest manufactured from glass; they are called Venetian because they were formerly made in Venice, upon the Island Murano; but they are at present produced in large quantities in various parts of Germany. To manufacture them, glass of the most varied colors is drawn into long, thin tubes, then assorted according to size, and cut in small pieces with scissors; the pieces are then passed through proper sieves. The cavity is next filled with a fluid paste of lime and charcoal powder, and the beads are then ground with gypsum and molybdenum in strongly-heated rotating cylinders, and smoothed and polished by shaking in sacks intermixed with wheat bran. These very handsome little beads are especially used for embroidery work, and very handsome figures and patterns may be produced with them. In order to string them, the ladies take a very thin piece of silver wire, lay the thread in the middle, double and twist the wire together, whereby the extremely thin needle is threaded.

Industry annually manufactures prodigious quantities of hollow glass beads, and it is impossible to count up their names. Many of these thin, hollow, fragile glass products still bear the name of pearl, although they have no longer the remotest point in common with the original, except the round shape. Among them is one rather handsome. It is partly worn by the lower classes of Europe, more so by the uncivilized inhabitants of Africa, America, and the West Indies. It is a glass bead filled with pure white or colored wax, and also called Venetian beads, although a quantity is manufactured in Germany and Bohemia. Their export from Venice, six years ago, represented a value of 7,838,000 francs. They are chiefly sent to Africa, where they are in great demand as an article of barter, especially in Morocco, on the Guinea and Congo coasts, at the Cape, Zanzibar and Abyssinia.

Large colored beads, as rosaries, are shipped in vast quantities to Palestine. Smalt pearls are pieces of thin, hollow glass rods, and occupy the extremity of beads or pearls.

There are several other products of fancy, but it would lead us too far to follow them; among them metallic beads of gold, silver, tomback, brass, steel and iron, and we will close our dissertation on pearls and beads.

The Jewelers' League.

THE JEWELERS' CIRCULAR is the *exclusive* official paper of the Jewelers' League, and has been selected for the publication of all matters of interest pertaining thereto. Letters or inquiries pertinent to its business or purposes, and which might interest the trade or inquirers, will herein be answered. Address *Jewelers' League, Box 3,444, P. O., New York*, or the office of THE CIRCULAR.

The regular meeting of the Executive Committee was held as usual at the office of the League, No. 61 Nassau St., New York City, and the following named candidates were admitted:

A. A. Webster, C. E. Mott, F. A. Drudig, W. A. Keddie, Isaac Lawrence, J. W. de Aguero, P. F. Baab, J. Gaskell, C. C L. P. Schenck, A. R. Warner, T. A. Hopkins, N. Y. City; G. A. Harrington, Rome, N. Y.; T. A. Goddard, Fredonia, N. Y.; J. A. Shepard, C. E. Kattelle, B. M. Kattelle, Boston., Mass.; J. W. Risk, E. A. Hawkins, Plainville, Mass.; A. A. Cheney, Brookline, Mass.; J. S. Davis, N. S. Davis, Henry G. Smith, Providence, R. I.; Fred Harth, Danbury, Conn.; C. H. Meiners, Hoboken, N. J.; Geo. Folsom, T. M. Guilbert, Philadelphia, Pa.; J. H. Crawford, Pittsburgh. Pa.; C. F. Holderman, Shenandoah, Pa.; W. A. Henry, G. A. Schlechter, Reading, Pa ; J. Schroder, A. E. Geiger, Jr., Cincinnati, Ohio; James B. Rose, Norman H. Chance, Canton, Ohio; F. A. Curpen, Upper Sandusky, Ohio; A. A. Rovelstad, Elgin, Ill.; Thomas Davies, G. A. Miller, Newport, Ky.; F. Pfalzer, Louisville, Ky.; C. Wehrstedt, St. Louis, Mo.; H. C. Held, Grand Island, Neb.; Boyd Park, Salt Lake City, Utah.

The accession of the above named gentlemen makes the League now number 2,253 members; two applicants were denied admission, three applications were laid upon the table for future action, and eight requests for change of beneficiary were granted.

A special meeting of the Executive Committee was held on November 25th, when the proofs of death of Franz T. Forsberg of Chicago, and Dyer Brainerd of New York City, were presented, and being found correct and valid, the claims were ordered to be paid, and a double assessment of four dollars per member was voted, notice of which, dated November 29th, has since been sent out by Secretary Sexton. The widow and three children, beneficiaries of Franz T. Forsberg, have since been paid the sum of $3,980.50. In the last number of the Jeweler's Circular we stated that "the amount in the benefit fund, subject to draft for the payment of the next death loss, is $4,155.30," and in order to avoid misapprehension as to why a smaller amount was paid to the said beneficiaries, we explain that Mr. Forsberg having died in September last, only such number as were members at the time of his death contribute to the payment to his beneficiaries.

The examining surgeons appointed for several of the larger cities are as follows:—

City.	*Name.*	*Address.*
Attleboro, Mass.	Edward Sandford.	Attleboro, Mass.
Baltimore, Md.	W. P. Morgan.	119 W. Monument St.
Boston, Mass.	M. P. Wheeler.	744 Dudley St.
Chicago, Ills.	N. B. Delamater.	125 State St.
"	Gilman Smith.	"
Cleveland, O.	E. W. Robertson.	367 Euclid Ave.
Louisville, Ky.	S. H. Garvin.	817 Jefferson St.
Newark, N. J.	R. Staehlin.	333 Washington St.
New Orleans, La.	W. R. Mandeville.	125 Canal St.
N. Attleboro, Mass.	Jas. R. Foster.	North Attleboro, Mass.
Philadelphia, Pa.	B. Trautman.	529 North 4th St.
Pittsburgh, Pa.	S. M. Benham.	Pittsburgh, Pa.
Providence, R. I.	Geo. W. Carr.	Providence, R. I.
St. Louis, Mo.	S. H. Frazer.	St. Louis, Mo.

Dr. Joshua G. Wilbur, of No. 153 Broadway, is still examiner and consulting surgeon for the League on all applicants who reside in, or whose business is in, New York City or Brooklyn, N. Y.

The report of the Committee of Eighteen, dated November 29th, has, we learn, been forwarded to all the members for consideration, and is a model of brevity and conciseness; the first recommendation is:—

That the proposed amendment to the Constitution "to reduce the limit of age of new members to 40 years," be *not* adopted.

And in this we concur; 45 years appears to have become the standard of limit in societies analogous to the League, and there seems no good reason why those between 40 and 45 should be debarred the benefits of the League; the elimination of that five year cycle will be but a "drop in a bucket" toward reducing the average age of the members, and if the League does not take them, other competing organizations, which are perhaps less intelligently managed than the League, will take them in. In fact, one of the best managed associations in the country, the Mercantile Benefit Association of New York, is now following the example of the League, and is looking to the forming of classes which will take care of its own members, rather than to drive them into other societies, simply purporting to be of similar character.

Recommendation No. 2 is:—

That the proposed amendment to the Constitution making no limit to the number of membership in the League *be approved;* provided, that at no time shall more than $5,000 be paid as a death benefit.

And this also is wise. If adopted, the membership in either section, when enough in number to pay by one assessment more than enough for one death benefit, will often be relieved from an assessment, the surplus finally aggregating enough to pay a death benefit without assessing for it; furthermore, if the 2500 limit were not removed when section A is full, and all growing old together, after a few years it would become undesirable for young men to join, but with the limit removed there is no time when they may not join.

3d.—In the interest of members of the trade who desire to join the League, but who do not desire as much as $5,000 benefit, and for those who are members now and who would prefer a smaller amount of benefit, it is recommended that a new section shall be formed in the League, with a death benefit, when full, of not to exceed

$1,000, the entrance fee to be the same as at present, namely $3.00; this new section to be termed Section B, and the section composed of the present membership be termed Section A.

With this we are pleased. Many men at the bench and clerks with limited means at their disposal, shrewd enough to know that $5,000 benefit must cost something to be carried, will readily see the advantage of securing a smaller benefit, and they should be provided for if the League is for the "Benefit of the Jewelry and Kindred Trades."

4th.—That the limit of age at entrance for members of Section B shall be from 21 to 55 years, and the number of members shall be unlimited; provided that no more than $1,000 be paid as a death benefit.

5th.—That death assessments in Section B shall be graded according to age, the amounts to increase each year.

If another section is to be added, and there are the best of reasons why it should, it should be upon the most approved and modern plan, and such a one as this: a plan approved by the best actuaries in the country, and proven to be entirely equitable for men of any age from 21 to 55, and in this section may enter many who have been anxious heretofore to enjoy the satisfaction of membership, but were debarred by age. By all means, gentlemen, add Section B. The Committee states that

These assessments, when the membership reaches 500, will pay $1,000 benefit, and as the membership increases beyond 500, the assessments will produce more than enough for one death benefit, and will thereafter be less frequent. A member's age at the birthday nearest the time of his admission, to fix his assessment during the current calendar year, and thereafter adjusted on the first day of January in each year.

6th.—That "reserved funds" for both of the sections, shall be accumulated as follows:—

A.—For Section A, by an assessment of $1.00 every three months upon all the members of that section; also by the paying into this fund of 50 per cent. of the surplus of every death assessment which may be in excess of enough to pay $5,000 net to the beneficiary, the remaining 50 per cent. of the surplus to remain in the benefit fund to help pay future losses, and when these latter sums aggregate enough to pay a death loss, the regular assessment to be omitted.

B.—For Section B, by an assessment of $1.00 every three months for two years upon all the members of that section; also by setting aside 20 per cent. of the surplus of every death assessment which may be in excess of enough to pay $1,000 net to the beneficiary, the remaining 80 per cent of the surplus to remain in the benefit fund to help pay future losses, and when these latter sums aggregate enough to pay a death loss, the regular assessment to be omitted.

7th.—That the reserve funds of the two sections shall be drawn upon to pay death losses, whenever, in any one year, the death rate shall exceed 1¼ per cent. of the membership in the respective sections, and at the same time, one-fourth larger than could reasonably be expected, from the experience of the two years previous.

8th.—That the reserve fund of Section A shall not be allowed to exceed $100,000; and that of Section B not to exceed $20,000.

The recommendations here made are in conformity with the recommendations of such well known experts as Sheppard Homans, Elizur Wright, David Parks Fackler, and Titus M. Coan. Mr. Homans says, an association "must be compensated each year for the insurance furnished, for expenses of management and for adverse contingencies. Beyond this a provision of any kind is unnecessary." Now, while a provision beyond this may be unnecessary, a provision of the kind and for the purposes named are absolutely necessary to the longevity of such associations, such provisions are very properly provided for by the Committee of Eighteen.

The remaining recommendations of the Committee are of minor import, but in the direct line of those already quoted, and we bespeak for them hearty commendation and approval by the League in annual session. It is well that matters of such vital importance to the perpetuity of the League should have been referred to a Committee with a year in which to consider them, rather than to trust to the hasty and ill-considered, although doubtless well disposed, action of a larger body of men. Cool heads have devised these plans. Wise heads will adopt them.

Prof. Egleston on the Origin and Characteristics of Precious Stones.

BEFORE the Chemical Society of the School of Mines in Columbia College, recently, Prof. Thomas Egleston, Ph. D., delivered a lecture on precious stones, in which he described their origin, characteristics and imitations. The history of gems, the lecturer declared, was the history of nearly all the intrigues, wars, and good deeds of mankind since the world began. Many superstitions have been attached to precious stones. The amethyst was considered a cure for drunkenness, and was dedicated to Bacchus; jasper was used as a charm by athletes. Although the diamond is made of common carbon, no successful attempt has been made to reproduce it. Its composition was discovered in 1694, and its weight was determined by the weight of a bean found in the east called a karat. A diamond of more than ten karats is called princely; a diamond of more than 100 karats sovereign. There are not 1,000 known diamonds that weigh over 10 karts, and not 20 that weigh more than 100. The value of a diamond is determined partly by color and partly by weight, and in this country there is an absurd custom of considering no diamond worth having that is not absolutely white. Flaws in diamonds are black specks, carbon that has not crystalized, or bubbles of gas or liquid, or natural faces of the diamond that have not been ground off. Black diamonds are mostly used for tools, but in Russia they are worn when the Court is in mourning. They are beautiful gems with a brilliant luster. The lecturer described some of the famous diamonds of the world, and then characterized the ruby as the most precious of all the stones when it has the true pigeon-blood color. A ruby of five karats is worth twice as much as a diamond of the same weight. The ancients held this stone to be a charm against poison, disease and wicked thoughts. Sapphires, to be beautiful, must be of a uniform deep blue. The lecturer said he had seen a small stone which was ruby on one side and sapphire on the other. In an experience of twenty years he had seen only five Oriental emeralds and one Oriental amethyst. Of the five varieties of cat's-eye that he had come across, only one—chrysoberyl—was valuable. The deeper the green of the emerald the better, and this stone loses no brilliancy by artificial light. The color was supposed to be the same element that colors the leaves of trees. The opal, considered the unlucky stone, was to the ancients the only gem that seemed to store up the light of day. It cannot be successfully imitated. The hard opal is found in Hungary, the soft in Mexico. Five per cent. of water is a constituent of the latter, and when placed in water the dull stone resumes its wonted brilliancy. Garnets are found in Bohemia; the most beautiful are gathered in Nevada. They have been seen of almost every color of the rainbow, but green and red are used in jewelry. The lecturer urged in conclusion that his auditors should not lose confidence in human nature by reason of the widespread imitation of the precious stones which he had described.

Death of Emile Plantamour.

BARELY HAS the bell ceased tolling for the death of Alfred Gautier, the first director of the Genevan Observatory, when we receive the news of the death of Emile Plantamour, one of the most scientific men of Switzerland. His death occurred September 7, 1882, at the age of 67, after a short malady.

All the scientific and political publications of the world, contain notices of the death of this eminent scientist. He was born in 1815, made his first studies at the college of Geneva, and then entered the celebrated institute of Hofwyl, where he passed 8 years; he returned to Geneva in 1833, and entered the academy, devoting himself to the study of philosophy. The lessons he received from Alfred Gautier caused him to turn to astronomy, for which he went to Paris for two years and became a favorite of Arago; he next completed his studies at Königsberg, under the celebrated Bessel, and obtained the grade of doctor. He finally went to Berlin, where he labored conjointly with Encke, to determine the course of Encke's comet.

His eminent services as director of the Neuchatel Observatory will not soon be forgotten, and his acquirements will secure him a well-merited place alongside of Humboldt, Arago, Encke, Bessels, and others.

Gold and Silver—their Elaboration.

(*Continued from Page 328.*)

GOLD AND SILVER are frequently embellished with ornaments, which are not alone manufactured from the pure metal itself, but are produced in a peculiar manner. Art seeks to alter the color of the alloy on different places by chemical agents, and such articles are then called oxidized ware, although this term is incorrect, because the castings do not consist of oxides (that is, combinations of metals with oxygen); still, the expression is sanctioned by usage.

According to another method, coatings of variously-colored glass or enamel are fastened upon such articles, and the goldsmith is capable of producing paintings of extraordinary beauty of color, luster and durability in this manner. Enameling is executed in different methods, and we will treat this important branch at length farther on.

An entirely peculiar adornment, which was often resorted to even in ancient times, is the production of the so-called niello. During the middle age, we find that especially the Florentine goldsmiths were great adepts in manufacturing it, and at the present day their productions of niello gold and silverware are unexcelled.

An art which stands midway between the art of goldsmithing and that of the steel worker, consists in ornamenting steel with gold, silver and niello in such a manner that upon a steel ground, indestructible designs in gold, silver and black are wrought. This kind of inlaying was in its flower especially during the middle age, and chiefly in use among the armorers; different collections of art in Europe preserve specimens of incomparable beauty. A similar ornamentation is used at present upon bronze and silver.

These specialties require much time and an unlimited amount of patience on the part of the workman, in order to be faultless, and are necessarily very costly. Thanks to the progress of chemistry, we are at the present day enabled to execute the aforementioned works of incrusting, nielloing and inlaying by the electro-chemical agency.

Of course, objects are produced in this manner which are not by any means inferior to those of the old masters, as far as beauty is concerned, still they cannot attempt to compare with them in durability, since the inserts of gold, silver and niello, if produced by galvanic agency, do not by any means adhere as firmly as those from gold and silver wires, which were pressed in by powerful agency. The previously-mentioned incrusting is a process belonging to this category, of which, at the time of writing, the French produce the choicest specimens.

OXIDIZING SILVER ARTICLES.

Silver, as has already been said, is a metal exceedingly sensitive to the influence of sulphuretted hydrogen, and soon becomes gray when exposed to the operation of an atmosphere containing this gas. In contact with such an air, sulphide of silver is formed upon the surface, the object assumes a dark lead gray appearance, and pickling is necessary to restore the silver color.

This peculiarity is made use of for producing oxidations upon silver, by providing the article either entirely or generally only at certain places, with a more or less heavy coating of sulphide of silver; this is best done by introducing upon the surface an agent that contains an easily decomposing sulphur combination. We have such a one in the so-called liver of sulphur (sulphide of potash), which is so easily decomposed that even at a simple exposure to air it parts with hydric sulphide. This sulphide of potassium may be produced by intimately mixing two parts sharply-dried potash with 1 part pulverized sulphur, and melting the mass in an iron vessel. This potassic sulphide is also used in medicine, and it may be found in a drug store, and is a crumbling, liver-brown mass, which quickly decomposes in air, and has to be stored in firmly-closed vessels.

When it is desired to coat a silver article entirely with sulphide of silver, it must previously be thoroughly prepared by removing all fat and dust by means of soda lye; it is next rinsed in water, and at once immersed into the bath of the potassic sulphide solution. Its influence begins at once, and the coating adheres better in ratio with the increasing dilution of the bath.

It is of importance, however, not to hasten the course of the process, because the coating of sulphide only adheres loosely in such a case, and can easily be wiped off, which objection may be urged against the entire process. We satisfied ourselves by experiments that a far better adhering coating may be had by exposing the article for some time to an atmosphere of humid sulphuretted hydrogen gas.

After the article has been coated to satisfaction, it is removed from the bath, quickly rinsed in water, and next dried; if the process was well conducted, the article must be colored equally gray. Designs may now be wrought upon it which show the color of the pure silver.

For this purpose, the layer of the sulphide of silver is completely removed by means of the graver, so that the color of the silver underneath is made to appear, or else chemical agents are employed for the purpose. This is done by executing the designs which are to appear bright with goose quills dipped in moderately strong nitric acid. By this acid the sulphide of silver is altered into a sulphate, and this is dissolved after finishing the drawing of the design, by dipping the article for some time into boiling water, leaving it exposed therein for a while (sulphate of silver dissolves with difficulty in water).

It is not easy to obtain entirely faultless designs in this manner, and especially their rims are generally not of a satisfactory clearness. Better defined designs are obtained by coating those places of the article that are intended to remain bright, with asphaltum lacquer, after which the article is to be immersed into the potassic sulphide bath. When the desired effects have been produced, the article is dipped into benzole, to remove the asphaltum coating.

Experiments instituted by us have also been very successful, by tracing the designs directly upon the article by making a highly concentrated solution of potassic sulphide in water, thickened with sufficient thick mucilage solution that it might be used for writing and drawing. The sketches were executed upon the bright silver with aid of the pen and brush; the article was then left in that condition for 24 hours, then heated sufficiently that the dried mucilage mixture either separated by itself, or could be removed by gentle tappings. If the fluid was thickened correctly with the mucilage solution, the outline of the tracings will be of the greatest sharpness, and the dark gray sketches upon the bright silver ground of a very agreeable effect.

In place of the solution of the potassic sulphide, which contains sulphite of potassium or sulphide of sodium, sulphide of ammonium, which has been exposed to light until it becomes yellow, may be used with equal effect, only the ammonium sulphide easily separates with sulphur, in contact with air, wherefore the use of potassic sulphide is to be preferred to the latter as being cleaner.

By the sulphur bath, the handsome blue-gray to black tone, for which sulphide of silver is distinguished, is obtained upon pure silver; should the alloy contain much copper, the color will be different, more or less inclining into black, and less handsome. If the question, therefore, is upon obtaining oxidations, simply produced by sulphide of silver, attention must be paid upon heating the article sufficiently long in air, in order to oxidize the copper of the alloy to a proportionally great depth, and then to remove the oxide by twice or thrice pickling the article.

If the color is desired to be very dark, passing into velvety black, the article, before being immersed into the potassic sulphide bath, is to be dipped into a solution of proto-nitrate of mercury. The article herein assumes a passably white color, metallic mercury separating upon its surface, and uniting into an amalgam with the silver.

The solution of the proto-nitrate of mercury is produced by dissolving cold mercury in nitric acid in such a manner that a little quicksilver remains in excess; the solution is stored in a closed bottle upon the bottom of which lies a little mercury. If now the article is placed into the potassic sulphide bath, a thick layer of a mixture of mercury sulphide and sulphide of silver, of a velvety black color, will result.

The silver oxidation may also be toned down by chemical means; if, for instance, the oxidized article is dipped into a solution consisting of 10 parts sulphate of copper, 5 parts sal ammoniac, and 100 parts vinegar, the bright places of the silver assume a warm brown tone. Very elegant colored designs may be produced in this manner by skilful manipulation of the different processes. For instance, if ornaments are traced upon a bright silver surface by aid of asphaltum lacquer, the article is then dipped into a solution of proto-nitrate of mercury and oxidized again, black sketches upon a blue-gray ground are produced. If next certain places of the silver are brightened, and the article is immersed into the copper solution, these bright places are oxidized brown, etc.

Care is always necessary that the already produced oxidations are not ruined by the succeeding ones, and it is always necessary to coat such places with asphaltum lacquer.

THE GENUINE NIELLO.

Niello has been known for many centuries, and articles even dating to times of antiquity, and preserved in art collections, are embellished with niello, and have preserved their beauty up to our day. With the general decline of the art, this method of embellishment also fell almost in oblivion, but at the time of the renaissance we find it again made use of, especially in Italy, where it was artistically employed by the masters, and the handsomest of these works date from that epoch.

In our time, niello work has been much employed for the adornment of little pieces of art, and especially in Russia it has been raised to a special branch of business. Russian articles of this kind are known by the name of tula ware, and cigarette and match boxes, etc., are very handsomely decorated in this style.

The process of nielloing consists in engraving articles manufactured from sheet silver as deep as consistent, and filling these depths with a mixture of sulphide metals (mixtures of sulphides of silver, copper and lead); they are next heated to melting, and the article is then ground smooth and burnished. The design protrudes now with the greatest clearness from the silver ground, and has the appearance as if it had been drawn with black India ink. The design, as will be understood, is laid in, not laid upon, and the article will bear the general wear and tear without injury to the sketch.

This great durability, consequently, determines the greater value of the genuine niello work, compared to that produced by the galvanic process; with the latter, the color generally adheres to the surface, and is quickly worn off in a short time, whereby the article becomes anything but handsome.

The niello substance of the present day is frequently very poor in silver; that of antiquity and the middle age, so far as we have been able to examine it analytically, contained a far higher percentage of sulphide of silver, and we annex a few statements of authors of those times:

Niello contains according to	Silver.	Copper.	Lead.
Pliny	75	25	..
Theopilus Presbyter	66.7	22.2	11.1
Benvenuto Cellini	16.7	33.3	50
Blaise de Vinaigrée	16.7	33.3	50
Perez de Vargas	16.7	33.3	50
Georgy	7.7	38.5	53.8
Repertory of patents and inventions of the year 1827	5.9	35.3	58.8

Modern niello is produced in very different manners, and as far as beauty of color and design is concerned, each one may be employed to equal advantage; but the consistency of the mass is very varying. Taken by itself, sulphide of silver is so soft that it can be cut with the knife, and therefore would be subject to a very rapid wear. In order to prevent this, different sulphur combinations, consisting of silver, copper and lead, distinguished for greater hardness, have been devised.

We add a few mixture proportions of niello substance, such as are used in different factories, but wish to remark that the proportions referring to borax and sal ammoniac, as well as sulphur, cannot be taken as indications of the quality of the mass, since the former two do not whatever enter into the composition, and the latter is never used in such quantities in the first operation as to bind all the metals. Wherefore, simply those figures actually relating to the mixture proportions of the metals, must be considered as correct.

NIELLO.	I.	II.	III.	IV.	V.
Silver	8	2	3	1	2
Copper	18	5	5	2	1
Lead	13	3	7	4	..
Sulphur	4	2	6	5	3
Borax	90	30	24	..	..
Sal ammoniac	..	..	2	..	4

The niello mixture of No. 4 is pretty hard and takes a handsome polish; that of No. 1 has more of a pencil gray than black appearance, and is rather glassy. The hardness of composition No. 5 is produced by the small amount of copper, and the greater percentage of lead sulphide in No. 1 is the cause of the gray color.

THE MANUFACTURE OF THE NIELLO MASS.

The method generally pursued for producing the niello substance is in most cases rather imperfect, and the mass has to be remelted several times, until perfectly homogenous. According to the process generally pursued, the metals are fused together in a graphite crucible, under a cover of borax, and the melted alloy is poured into a larger crucible filled with the molten sulphur. The metals hereby combine with the latter, but by far the greatest part evaporates and burns away.

In order to make the sulphurizing of the metals more perfect, the mass is placed into another crucible containing the sulphur; it is heated again to fusion and then quickly poured into water, in which, owing to the rapid cooling, it obtains a certain degree of hardness, so as to be easily pulverized.

The casting occurs in a manner similar to casting solders; a broom is laid across a vessel containing water, and the contents of the crucible are then poured through it into the water. The melted mass is hereby run into many small drops, which solidify upon entering into water.

These small niello balls are next pulverized in a cast iron mortar, into as fine a powder as possible, and it is advisable to separate the coarser from the finer powder by washing, the former of which are then pulverized again.

We use a different method for producing niello, and obtain a perfectly homogenous mass thereby, in the following manner:

Sulphur is melted and heated to boiling in a graphite crucible, placed into an air furnace. The metals, silver and copper, are used in form of wire or thin cuttings, previously glow-heated by being placed upon live coals; the lead is introduced of the size of a pea. As soon as the sulphur boils, the silver wire is thrown into the crucible; the glowing metal consumes in the sulphur vapor and becomes sulphide of silver under a strong development of light, melts at once, and sinks to the bottom. When all silver has been added, the copper is next placed in, finally the lead, and the mass is stirred with a clay rod (for instance, a clay pipe stem), which is done for the purpose of ascertaining whether any unmelted particles are still contained in the crucible, and whether the mixture is perfect. If so, the mass is poured into water in the above specified manner.

A niello mass produced according to the above-described process, in reality consists of an intimate mixture of sulphide metals, easily pulverized, distinguished by a handsome dark color.

THE PROCESS OF APPLYING THE NIELLO.

The nielloing is executed in such a manner that the designs which are to appear black upon the silver or gold ground, are worked out with the graver upon the surface; the article is then dipped into a borax solution and dried. The niello powder is next stirred into a stiff paste with a saturated solution of sal ammoniac in water, and then applied with a spatula or other instrument, pressing it into the sinks. Any matter protruding beyond the surface is removed with a cloth.

The articles are treated one after the other in this manner, and laid upon the table for drying. After again inspecting these air-dried articles, and improving any places that have not been filled sufficiently, they are subjected to the so-called burning in, or fusing the niello mass.

If only one article of a small size is to be treated, the work may be done on glowing coals; if more, it is advisable to use a cupelling furnace.

Such a one, to be found in every large factory or workshop, consists of a stove of fireproof material, with grate, ash pit, and opening for supplying combustible (charcoal or coke).

This furnace contains a muffle of fireproof material, and is supported either upon wrought iron bars or projections in the furnace walls. It is closed at its further end, open in front, and before it is a clay plate. The articles into which the niello is intended to be burned are laid upon an iron plate, sufficiently large to cover the bottom of the muffle, and the plate, as soon as the latter is red hot, is pushed in.

In order to recognize the period when the mass has fused, a shallow silver vessel, of the size of a dollar, is placed in the mouth of the muffle. It is provided with a handle, in order to be able to draw it from the muffle by means of a hook. This small vessel is filled with niello mass, and indicates the period when the mass upon the article has melted. The iron plate, together with the article, is then withdrawn from the muffle and replaced by another, upon which other objects, intended to receive the like treatment, are placed.

The niello mass must be applied in a quantity sufficient to have the design, after being burnt in, a trifle higher than the surface of the article. This is then ground with pumice stone until the surface is level, and finally burnished in the customary manner.

A chef d'œuvre, together with the niello, is at times also to be ornamented with gold lines. This is done in such a manner that that part of the engraving which is to appear in gold color, is inlaid with gold wire of corresponding thickness. The wire is then strongly pressed into the deepenings with the burnishing steel, and the projecting part of the gold is filed smooth. Only after this manipulation the article is treated with niello.

RUSSIAN NIELLO.

In Russia, where niello work is manufactured in several large factories, articles of a very handsome and delicate appearance, composed of very finely meshed network, or covered with a great number of small stars, are often seen. If this kind of work were to be produced by hand it would be rather expensive, wherefore special factories manufacture it by stamping the pattern into sheet silver. The stamped material is then worked into snuff, match, and other boxes and utensils, and nielloed in the above-described manner.

The niello mass of the Russian factories is composed as follows:

Silver	1
Copper	5
Lead	7

On the other hand are mixed:

Pulverized Sulphur	4
Pulverized borax	24
Sal ammoniac	4

In such a manner that the sal ammoniac is dissolved in as little water as possible; the solution is then stirred into a paste with the sulphur and borax powders, a crucible lined with it and dried in a warm place. The crucible next is placed into the fire, the molten alloy poured in, and heated until a cover of melted borax swims upon the mass. The contents of the crucible are now poured into water, the solidified mass is pulverized and rubbed into the engraved parts of the article to be nielloed.

THE GALVANIC NIELLO.

Japanese artists manufacture goods known by the name of damascened bronze, and consisting of this metal, partly deeply engraven, and inlaid with silver or gold wire. The wires are then hammered in very carefully, by the use of hammers with flat faces, and the article is finally burnished, whereby the designs then appear of gold and silver in bronze ground.

Gold and silver designs also may be produced by the use of the galvanic current upon bronze, brass or copper, as well as steel, without having recourse to that tedious way of the Japanese. The following is the process: The designs are drawn with a color, consisting of white lead and mucilage water, upon the bright surface upon which they are to appear. All other parts of the article are coated with asphaltum lacquer. It is next laid into water, in order to soften the white lead color, which is carefully rinsed off. It is then laid into a glass vessel, connected with the positive pole of a galvanic battery by a wire, and poured over with dilute nitric acid. The latter attacks the metal not protected by asphaltum lacquer, and in a short time it is etched as deeply as if it had been engraven. Having washed the etched plate well with water, it is placed into the silvering or gilding apparatus, and the gold or silver is thrown down into the deepest parts. The lacquer is finally removed by placing the article into benzole and polished.

As will be seen from the description, the method of galvanic silvering has a great similarity to that of incrusting with gold, and differs from the genuine niello only by not appearing black.

JAPANESE SPECIALTIES.

The Japanese manufacture a few specialties in the noble metals, which are known in Europe for several years. Apart from the above-described damascened bronze, we will in particular mention the Gin-shi-bu-ichi, Shakdo and Mokumé.

The first is a silver alloy very rich in copper, (50 to 70 per cent.), to which a grey color is imparted by boiling in a fluid containing alum, sulphate of copper (copper vitriol) and verdigris.

Shakdo is a copper-gold alloy, with a gold percentage varying between 1 and 10 per cent.

Finally, mokumé is produced by brightening equally thick sheets of gold, shakdo, silver, copper and gin-shi-bu-ichi, laying them upon each other, and uniting them into one piece by hammering; in the same manner as by silverplating, when combining three plates, viz., silver, copper and silver. In whatever angle a plate of mokumé may be cut, it will be composed of parallel layers of different colored metals of a ribbon-like appearance.

A Stroll through a Watch Factory, and the Finishing of Blank Works According to the Swiss Method.

By Otto Behrend, of St. Petersburg, in *Deutsche Uhrmacher Ztg.*

(*Continued from page* 359.)

THIS BOX IS now delivered to the sertisseur for setting the jewel holes, and next to the pivoteur for turning in the escapement parts.

Although all of us are acquainted with the work, still we will not turn away at once, especially since the pivoteur assures us that he finishes one-half dozen movements per day. Whence this astonishing rapidity by such delicate work? we ask. It is practice, aided by several manipulations, which we will study.

Before beginning work the pivoteur lays the parts, such as wheel, cylinder and balance, in order, together with the plates and the bridges belonging thereto, also coverlids and regulator, all of which were marked with their appropriate numbers by the preceding workman, in case it should not have been done in the beginning. He next mounts the six pinions in collets, the screws of which have large protruding heads, so that they may be used at the same time as followers, and he then burnishes all the tapers in the lathe center or centering rest. Time is saved by the use of such collets, since they obviate the mounting of turning-dogs.

After he has screwed on the wheel bridges, he measures the height for the pinion of movement No. 1, with the pinion gauge well-known to all watchmakers, and then turns the riveting on one pinion, and tries whether wheel No. 1 fits upon it. If not, he tries the others, one by one, until he finds one to suit. It occurs but seldom that none fits, in which case he assists a little by a further turning; owing to his practice, he will hardly ever have the shoulder turned too small.

When all the wheels have been mounted in this manner, he commences with No. 1 to underturn the riveting, as well as to turn on the upper staff and pivot, as far as No. 6. The pivots are next burnished, fitted in the holes and rounded; the wheels are riveted and the riveting polished.

This finishes the upper end of all the pivots. The wheels are next cemented upon suitable chucks, which also perform the functions of follower. A hole is drilled in their pulley, in which a pin is inserted, protruding beyond the chuck. This pin is withdrawn by the use of the drill bow, without making it necessary to unlack the chuck.

The first pinion is now turned in accordance with the height gauge, the measure is taken again, whether the second must be of the same height, and so forth, until all are turned. The faces are now polished, and the pivots finally finished. In order to obtain the pinion rivetings and faces handsome and flat when polishing, no special contrivances either for the turning lathe nor depthing tool are necessary. These would even not be adaptable for polishing the rivetings, since in every case the riveted wheel would be a hindrance for the polishing disc, and it would be impossible to reach the riveting without at the same time touching the wheel. I have seen many repairers who dread this work, and therefore use pinions with already polished faces in preference, although these are most generally ruined when riveting the wheel. And yet, it is a trifling work to polish a small pinion face, especially for watches, after it has been turned rectangular.

A piece of soft round steel, a little thicker than the diameter of the pinion, is used for this purpose. A hole in which the pinion arbor has plenty of shake, is drilled into one end, and it is then filed almost flat, only very little rounding, and a little steel red, rubbed fine with oil, is given upon it. It is well to file a notch at the bottom of the hole in the steel, similar to that on a drill stock, to facilitate an inspection during work, whether the staff has plenty of shake in it, which is necessary for the success of the face. The drill bow is now placed upon it, the pinion staff inserted into the hole as far as the face, the other taper or pinion pivot is placed into the center, and the point of the left index finger holds the steel against the face, whereby it may at once be felt whether the two parts lie flat against each other. The other fingers on the left hand, for security, rest upon the bed of the lathe, while the right guides the drill bow.

When everything is in order, the face will already, after a few draws, be ground flat. Both the pinion and steel are then cleaned, and a little finer red or diamantine, for obtaining a polish, is applied, when the work is continued. A whistling noise will be audible in one, or at most, two minutes, caused by the drying of the polishing agent, when the face will be polished handsome and flat. If, however, a deepening should be visible during working, toward the hole, or it should happen that the outer corners of the pinion leaves have become rounding, it is a sign that either the pinion was not turned down flat, or that the steel was filed too flat. On the contrary, if the faces ground out hollow, a defect plainly visible during or after polishing, then the steel was rounded off too much.

It is well enough to state that not everyone will be successful upon the first trial; a short practice, however, will make him expert, provided he has the desire to succeed. The various utensils invented for the purpose, and costly auxiliaries, are perfectly superfluous, not to say impractical, because in the time necessary for mounting everything, the work may already be finished in the above-described manner, that is, if said piece of steel for polishing need not be first prepared from the rough.

When all the pinions have been finished, the cylinder wheels are placed into the plates, and the work of turning in the cylinders commences.

First of all, chucks similar to those of wheels are cemented upon all cylinders, and the lower tapers are turned on, but revolving the tube itself in the centering center. For the purpose of turning on the upper taper, the collet itself is revolved in the center, in case that it does not sit untrue upon the cylinder, a thing of frequent occurrence. In this case the collet must be turned off from above down to the tube, which then is revolved in the center, so that the cylinder becomes true round in its entire length.

The lower cylinder end is first finished, and for this purpose the height is measured from the counter plate to the passage, and also from here to the shoulder for the balance.

The gauge for this purpose is extremely simple, and, nevertheless, very practical. It consists of a small, thin piece of steel wire, from 10 to 15 mm. in length, upon which a thread is cut, about No. 16 to 18, and the lower end of which ends in a pivot, while its upper end is fastened in a small handle or head for a more commodious manipulation. Two nuts are screwed upon the thread, the lower one of which is either round or flattened on two sides, and so small that it can be accommodated between two teeth of the cylinder wheel. The upper nut, serving for measuring the height of the balance shoulder, consists of a small piece of brass, sufficiently long on the one hand to reach beyond the cylinder-wheel bridge, and on the other under the center wheel.

For using this instrument, the lower nut is screwed so that when the pivot rests upon the cap jewel, it stands at even height with the plane of the cylinder wheel, which therefore indicates the height of the pivot rounding onward. The upper nut is next screwed to such a height that it stands sufficiently free above the cylinder-wheel bridge, at which time, especially in flat watches, attention must be paid also to the center wheel, and thereby the height for the balance has also been measured from the lower pivot end onward.

The entire height of the cylinder is either taken from above over the bridge with the pinion or millimeter gauge, or from within between the same with the pinion height gauge. Notice must be taken that the cementing chucks are sufficiently flat not to cover the passage. The measure may thus be obtained in a commodious manner, and it is not necessary to relack the chuck for turning, but the cylinder may be made entirely ready without further trouble, while at the same time the spring collets are fitted on.

When they are fully ready, the balances are riveted on, the banking pins are made in bridge and balance, the degrees upon the plate are indicated by points, as well as the point upon the balance for fastening the spring. The lower escapement, in case it should not stand entirely true, is moved in place, and the foot pins are inserted.

These above observations have acquainted us with the little advantages and tricks of this division, whereby the work is expeditiously performed, and we next will acquaint ourselves with the anchor movements, for which more time is necessary.

The process for finishing the anchor movements is similar to that we have seen with the cylinder escapements.

Also with these, one workman fits in the escapement, sets the bridges in place, and makes the sinks in the plates, while a second one does the turning, after wheel, anchor, safety roller, coverlid and regulator have been burnished by the polisseuse. It is to be remembered that it is of greater advantage to obtain movements with ready regulators from the factory, than those only half finished.

As already mentioned, the parts pertaining to each escapement (scape wheel, anchor, fork and roller with jewel), are furnished in an unfinished condition, suitable to the caliber of the movement, and the placing of the escapement into the plate thus offers no difficulties. Wheel, anchor and roller simply require to be ground and burnished; the fork, however, is as yet entirely crude, and must be made of proper length, fashioned, hardened and polished.

The placing in of the escapement with the anchor from the side is done in the following manner:

The depthing of the fourth wheel is first transported upon the plates, and the motion center of the anchor determined. Next the center of the balance is uprighted from the upper bridge upon the plates, and the length of the fork, as far as its motion center, which must be drilled through, as well as the sum of the radius of the roller are transported upon the plates by a stroke with the compasses. The depthing distance of the anchor is now indicated with the depthing tool from the motion center of the scape wheel out, and the center for the anchor and fork is herewith established at the place where the two circles intersect.

The correctly placing and transporting of the depthing distance of wheel and anchor, however, cannot be done as summarily as with other depthings, but must be performed separately with each movement, and its plate, since these parts are not always exactly true, and even the least differences are of moment. A protractor or small degree gauge (also called *polygonne*) is made use of, and from the place of divergence of the degrees a pierced bushing is fitted on, with a screw in it, with which it is firmly screwed upon the projection of the depthing tool containing the anchor. Upon the turning arbor, upon which sits the anchor, an index is placed which shows the motion of the anchor upon the gauge. The repose must amount to one degree, the lifting to ten.

After transporting the escapement upon the plate, the single parts are at once marked, in order to prevent accidental mixing.

For establishing the straight-line escapement, two not essentially different methods are pursued. The one consists in determining the point for the scape wheel, and drawing to it a straight line from the balance center, after the fourth-wheel depthing has been marked; the depthing distance of the anchor is then marked, from the wheel center out, and the motion center for anchor and fork is established where this circle intersects the line. The exact length of the fork is then corrected from this point to the roller.

By the second method the fork is first finished, and its length indicated by a stroke of the compasses from the balance center out; the fourth-wheel depthing and the anchor depthing are placed into the wheel, and the latter transported from the anchor circle out. The center of the scape wheel is at the place where the two circles intersect each other, and a straight line is drawn from there to the balance center, upon which the motion center of the anchor and fork is marked at the place where it intersects the circles, which represents its length.

After the escapement has been located in such a manner, the bridges are uprighted in conformity with the points marked, secured by foot pins, and the plates are then turned out for the chief parts and coverlid. The turning out for anchor and fork may be made in different manners. For instance, either one large or three small sinks may be used for the anchor; for the fork, from the anchor forward as far as the roller, also one, two or three sinks. Their center is marked upon the lower side of the plate. By movements with lower escapement bridge, this space for the fork may also be filed instead of turned out. It is also a matter of taste to either leave the plate smooth underneath the balance, or to turn out one or two circles for sake of ornament, in case it is not required by the structure of the watch to turn out the entire space for the balance, frequently necessary in movements with heavy balance and Breguet spring, in order to obtain sufficient room.

It is of great importance for the appearance of the movement to make these sinks as smooth and as neat as possible, and a good, sharp, and burnished graver is necessary, which, by the last passing to and fro, must attack but little and proceed slowly, while the revolutions of the lathe must be as rapid as possible. In this manner the work will be at once done so completely that a subsequent corrective grinding becomes unnecessary, which, especially with small sinks, is connected with sufficient difficulties. Where it is necessary, small rods of hard charcoal are used. This ends the labor of the escapement workman for a time, as far as the last touches (achèvement), given after the escapement parts have been turned in, as we will see in proper time.

We next bestow our attention on the pierrist and sertisseur, who finishes the jewel holes from the crude jewels, already drilled and ground flat, and then sets them.

The ordinarily octagon pieces of ruby for average and finer qualities of watches, chrysolite and garnet for current sorts, are assorted according to color and thickness. The dark red and thicker pieces are worked for the upper wheel pivots, the others for the lower and escapement pivots. Their elaboration is not by any means as difficult as is imagined generally. The stone is first cemented upon the already-mentioned small jewel-turning lathe, and centered according to its hole; it is then turned round with a diamond graver, and the corners are chamfered somewhat. We remember that this tool has a very small pulley and a large fly wheel, which must be rotated as fast as possible to transport the spindle into the fastest revolutions.

Before the commencement of the jewel work, all the wheel pivots of the train of a box are measured, and their strength noted; the dimensions of the holes are ascertained according to the caliber, since the parts are not yet ready. If the required sizes of holes are not present, smaller ones are enlarged by grinding. For this work, the workman has an assortment of copper wire, numbered according to the pivot gauge. A piece of this wire, from two to three cm. long, is fastened in a little wooden handle, and the point is somewhat tapered.

Let us suppose that a jewel hole No. 18 is wanted, but the numbers from 16 to 18 are not on hand, and a jewel hole No. 15 must be taken and enlarged. For this purpose, the workman takes wire No. 16, which, by reason of its tapering point, fits into it, and while rotating the lathe as fast as he can make it go, and constantly turning and drawing backward and moving forward, he will grind it until it easily enters for its entire length into the hole. The hole is now No. 16, and the same mode is repeated with wire No. 17, and finally No. 18. Only little grinding is done with this number, and it is next polished with finer diamond powder, until the wire freely enters into the hole, which is then exactly No. 18 by the pinion measure.

The sharp corner is next removed from the hole with a tapering copper wire, when the face of the jewel is ground finely and polished. This is done with a piece of copper or brass wire, of 1 cm. thickness, and 1½ to 2 cm. length, into one end of which coarse diamond powder is beaten. This is held against the jewel by applying the end of the index finger against the other end, and exerting a gentle pressure upon the jewel. A subsequent grinding is given by a second and third piece of brass, by the use of diamond powder, and it is then polished. When the lower side is finished the jewel is turned round and recemented, and the other side is treated in the same manner, at the same time also grinding out the oil sinks with a suitable taper. If the jewel is to be highly convex above it is turned in accordance, while the thereby deepened oil sink is ground out correspondingly and polished. The piece used for grinding must be constantly kept shifting in all directions. This finishes the jewel. Its correction has cost less time than the penning of these lines, because a skilful workman finishes one-half gross jewel holes from the above-said crude material per day; that is, if the holes are only to be polished, but not enlarged.

When the jewels for one box are completed they are set. Since this work is sufficiently well known, we will simply point out a few notable points.

Swiss watchmakers always use the universal or chuck turning lathe, from which the clamp head may be taken off, in order to insert lack chucks into the spindle, for the purpose of cementing bridges upon them. Such a tool must be of very solid construction to prevent trembling during work.

The settings are easiest made by free hand with the graver, still a good many, or perhaps the majority, work with the support. It is entirely a matter of custom. There are also contrivances for setting the graver according to the size of the jewel to be mounted, the description of which, however, would at this place be inappropriate. The chief condition for the success of the work is practice and a steady hand; furthermore, sharp and well-polished gravers.

When turning the setting for receiving the jewel, care must be paid that it be of correct depth, so that the plane of the jewel be at the same height with that of the plate or bridge, as the already turned-in pinions of the train are exactly measured in height. The jewels may at most lie unnoticeable behind the metallic plane, but must protrude in no instance, as it would require an additional turning off of the pivots to give the necessary shake to the pinions, by which they gain nothing in quality, and no time would be gained—in fact, it would be a piece of botchwork to raise burr under the bridge by engraving or hammering. The sertisseur, where necessary, turns the bridges at the same time, since they are cemented, cleanly upon their lower side, by letting the graver pass over them once.

When laying bare the jewel, attention must be paid that sufficient metal remains for support. If too little, the setting is apt to be ruined if the jewel should burst, an accident sometimes occurring by carelessness in the course of the work. After opening the jewel, the sinks, which should be made as uniform as possible, are best polished with diamantine moistened with alcohol.

The jewel holes for the balance are to be set in such a manner that they stand back a little below the surface of the bridge or plate, so that the cap jewel does not come to lie upon the jewel hole. At the same time, the jewel hole must not lie back too far behind the surface, since it would produce the defect that the pivots would become unduly long, and thereby inclined to breaking. Beside this, both extremes would have a damaging influence upon the retaining of the oil, because, in the first instance, no place would be left for it, and he withdrawn by the cap jewel from the jewel hole and pivot, while in the second it would be difficult to apply the oil to the cap jewel, which is necessary to lessen the friction of the pivot end.

We would finally add a last remark on the location of the cap jewels. The lower ones are set in small metal plates, and the upper ones should also constantly be set. But this is omitted in the manufacture of the cheaper grades, and every work that can possibly be shunned or slighted, is sure to receive this treatment. In this case, at least, the opening of the jewel hole must not be made larger than necessary, and the covering jewel be chosen sufficiently large that it lies securely around the setting upon the surface of the bridge, and is not the least movable in the sinking of the coverlid. If these few points are conscientiously adhered to, there is not the least danger that the unset cap jewel does not fulfill its purpose. By better qualities, however, the setting of the upper cap jewel should never be omitted.

A Swiss sertisseur finished the 60 settings of half a dozen anchor movements in five hours, equal to one every five minutes. While he is engaged setting the jewels the polisseuse is busy in grinding and polishing the scape wheels, anchors and safety rollers.

(*To be continued.*)

Bohmer & Bassange.

MESSRS. Böhmer & Bassange belonged to the most important of the jewelers of Paris, under the reign of Louis XVI. The jeweler had already, as it were, separated from the goldsmith. True, also he worked in the precious metal, but in a more artistic manner; he sought his merit rather in the ingenious grouping of the jewels, than in the simple manufacture of the casket that was to contain them. It was his special province to have their artistic disposition constitute the principal value of the trinket, while the setting itself was to be more useful than ornamental. This was the reason why, in Paris, next in Holland, England and in the German cities, where the goldsmith had once enjoyed a world-wide renown, the jeweler gradually occupied his place, while he was reduced to a secondary rank, and the once independent master, little by little became a factory piece-hand—a simple human machine.

The jeweler Böhmer, as furnisher for the royal court of Versailles, and chief of the firm, had sold a necklace valued at 360,000 francs, to Queen Marie Antoinette, which sum was to be paid from the pocket money of the Queen, who had a yearly income of $100,000. Böhmer had, beside this, furnished her a trinket of rubies and diamonds, as well as a pair of bracelets for 800,000 francs. The Queen now told the court jeweler that she had sufficient ornaments of all kinds, and desired nothing further. Böhmer, however, more merchant than artist, more of a speculator with such precious ornaments than ambitious for artistic fame, nevertheless was incessantly occupied in arranging the handsomest diamonds to be found in commerce into a necklace, for the speculative purpose of selling it to the Queen. He engaged the services of a courtier, who mentioned the matter to the King. Louis XVI., charmed with the beautiful diamonds, quickly made them a present to the Queen, but Marie Antoinette persuaded her husband to consider the immense value of the trinket, beyond a million and a half of francs, and not to purchase it, wherefore it was returned to the jewelers.

A year afterward, during which time Böhmer had vainly sought to sell it in every court in Europe, he caused it to be submitted again to Louis XVI., who again destined it for a present to his spouse. The Queen refused it a second time. Immediately after this refusal, Böhmer, in his quality as court jeweler, solicited an audience with the Queen. He knelt at her feet and declared that he was a ruined man, with no other recourse than that of drowning himself. The Queen responded that the necklace, which threatened his ruination, had not been ordered by her; on the contrary, before he purchased the diamonds, she had distinctly told him that she possessed sufficient ornaments.

"I did not want to buy the necklace from yourself, nor did I wish to receive it from the King," she said; "therefore, separate it, and seek to sell it in different parcels; but, above all, do not drown yourself."

From that day forward, Marie Antoinette avoided a meeting with Böhmer, and went so far as to give her repairs to another jeweler. The business appeared settled, principally with the Queen, but not for Messrs. Böhmer & Bassange, who set entire Paris into a fever of excitement with their necklace. They left no stone unturned to bring it again before the Queen. They had heard that a lady, the Countess de la Motte-Valois, was honored with great confidence by the Queen, because being a lineal descendant of the old royal house of Valois. The two jewelers craved an audience with the countess, for the purpose of laying the necklace before her. She granted it, and the ornament was submitted to her December 29, 1784. Apparently angry at being drawn into the business, she nevertheless promised the jewelers to intercede in their favor with the Queen.

The countess invited them on January 20, 1785, to appear at her house, and when there, she told them secretly that the Queen now desired to possess the ornament, and a nobleman of the court was commissioned by Her Majesty to conclude the bargain on her behalf. Several days afterward, she herself visited them, inspected the ornament minutely, and assured them that the purchaser on the part of the Queen would soon come.

And, indeed, on the following day, His Eminence, the Cardinal, Prince of Rohan, one of the most important personages of the court, in spite of the enmity the Queen since her marriage cherished against him, came to the jewelers. He confirmed what Madame de la Motte had said, and submitted a contract to them, written by him, according to which the necklace was to be taxed, if the value of 1,600,000 francs should appear exhorbitant; the purchase sum should be paid in semi annual installments; the acceptation of orders was stipulated, and the necklace was to be delivered on the 1st of February. The jewelers agreed to these conditions and signed them, without any name having been mentioned in the transaction; they next delivered the contract to Madame de la Motte, who returned it in two days to the Cardinal, with the express written acceptation of every clause, and signed by "Marie Antoinette, of France."

The jewelers now delivered the necklace with full confidence to the rich and mighty Cardinal, and thanked their stars that this speculation had, after all, come to a successful issue. Their ardor was rather dampened soon after, when the Cardinal came, and in the name of the Queen demanded a cutting down of 200,000 francs. The jewelers also agreed to this, in order not to open the negotiation again, and at the desire of the Cardinal, they even directed a letter of thanks to the Queen. They were not a little taken aback when informed that the Queen, upon reading the letter, had exclaimed laughingly:

"What do these people wish to say? I believe they have lost their reason."

July came, and the first payment of rates failed to make its appearance. They became desperate. Böhmer paid a visit to Madame de Campan, a court lady of Marie Antoinette, and communicated to her his woe, and the payment of the installment due them from the Queen. Madame de Campan was astonished at the information, and assured him that she had neither heard nor seen anything of the necklace.

Bassange, on his part, had gone to the Cardinal, who sought to pacify him. The Queen, he said, had no money at the present time, as he had been importuned by the Countess de la Motte, and had only handed him 30,000 francs as interests, which he at once delivered.

"Is it perhaps possible that you may be deceived by your intermediary between the Queen and yourself?" Bassange asked, who had become distrustful.

The Cardinal repelled this suspicion with indignity, to be completely undeceived a few days afterward, as well as the jeweler. Madame de Campan had recounted to the Queen what she had heard of the latest necklace story and of the demand of Mr. Böhmer, and the cleverly-arranged stupendous swindle was by this means exposed. On the 15th of August, the King caused Cardinal Rohan, in his sacred vestments, to be arrested before the entire Court, charged with the crime of having forged the name of the Queen, for the purpose of becoming possessed of the necklace.

The course of affairs speedily developed that the Cardinal was the worst deceived of the party, and had simply been a tool in the hands of the Countess de la Motte, who had used him in order to obtain the necklace. She had only too well speculated upon the several weaknesses of the prelate, viz., first of all, his amorousness; his credulity, and his desire to become a favorite of the handsome Queen; she, herself, was neither a confidant of the Queen, nor known at Court; in fact, nothing else than an impoverished adventuress under her noble name; all the letters displayed by her as coming from the Queen, the request of the latter for, and her final assent to, the purchase of the necklace, as well as the ratification of the several contract clauses, and the final signature of the Queen, had all been forged by her. She had duped the Cardinal, by making him a party to a nightly comedy, in which the poor fool thought that in the darkness he was addressing the Queen of France, when it was only a companion of the Countess de la Motte, who resembled the Queen, and silently listened in the obscurity to his amorous pulings, and at parting presented him with a rose. And during this well-calculated and better executed infatuation of the Cardinal, the Countess had sold the diamonds in London; one part for 27,000, another for 16,000, and a third for 36,000 francs; the setting for about 50,000 francs; the central part, with the largest diamonds, for 400,000 francs. With this sum she had purchased and furnished a house in the country in the most gorgeous manner, while in the city she inhabited a miserable garret, and here made her confession to the Cardinal.

She, of course, was likewise arrested upon the statements of the latter, as *particeps criminis;* while Rohan was let off with a few acts of humility and many costs, the Countess de la Motte was sentenced to be branded and perpetual imprisonment. She managed to escape to England after a short time, from where she directed memoirs and pamphlets, full of libellous hatred against Marie Antoinette, contributing much to that the Revolution of 1789 was personally directed against her.

The jewelers, Messrs. Böhmer & Bassange, in this manner got rid of their precious necklace, of the value of one and a half millions of francs, perhaps the greatest price paid up to that date for an article of jewelry, or composed by a jeweler. The Cardinal Rohan had pledged his honor to pay for the ornament, and to shoulder both the damage and the blame. The jewelers thus received their money, but it may be expected that they had to lower the price considerably.

This is the celebrated case of the "Diamond Necklace," which has served as theme for novels, songs, poems, etc., and innocent as it was, the jewelers obtained an undying celebrity thereby, and furnished sharp weapons to the enemies of Marie Antoinette. It has been an unfortunate work of the jeweler's art, and formed a link of the chain that shackled the feet of French royalty, by which it was dragged down from the throne, and up the steps of the scaffold, because this story became one of special scandal to the Queen. Thus will often the actions of man unintentionally be magnified into historical events, and from these insignificant details, from these little causes that produce great effects, the future student of history will astonishingly comprehend what history is.

John Harrison, the Chronometer Maker.

AT THE Royal Observatory, Greenwich, one of the most remarkable instruments is to be seen—the first chronometer, the parent of a numerous progeny of chronometers, used on board of every seagoing ship, to the advantage of navigation, of commerce, as well as of science. As far back as the reign of Queen Anne, in the year 1714, the English Government offered the large prize of 20,000*l.* to the person who should find the method of discovering the longitude at sea, within certain specified limits. The reward was offered to the world, to inventors and scientific men of all countries, without any restriction of nation, or race, or language. To the surprise of everyone—it was thought remarkable, and it *was* remarkable—the prize was won by a man who had been brought up as a village carpenter, of no school, or college, or university. But the truth is that the great mechanic, like the poet, is born, not made; and John Harrison, the winner of the famous prize, was a born mechanic. He did not, however, accomplish his object without the exercise of the greatest skill, patience, and perseverance. Indeed, his life, so far as we can ascertain the facts of it, is one of the finest examples of difficulties overcome, and of undaunted perseverance eventually crowned by success, in the whole range of biography.

No complete narrative of Harrison's career was ever written. Only a short notice of him appears in the "Biographica Britannica," published in 1766, during his lifetime—the facts of which were obtained from himself. A few notices of him appear in the "Annual Register," also published during his lifetime. But no life of him has since appeared. Had he won battles by land or sea, we should have had biographies of him without end. But he pursued a more peaceful and industrious course. His discovery conferred an incalculable advantage on navigation, and enabled innumerable lives to be saved at sea; it also added to the domains of science by its more and exact measurement of time. But his memory has been allowed to pass silently away, without any record being left for the benefit and advantage of those who have succeeded him. The following memoir includes nearly all that is known of the life and labors of John Harrison.

He was born in Foulby, in the parish of Wragby, near Pontefract, Yorkshire, in May 1693. His father, Henry Harrison, was carpenter and joiner to Sir Rowland Wynne, owner of the Nostel Priory estate. The present house was built by the baronet on the site of the ancient priory. Henry Harrison was a sort of retainer of the family, and he long continued in their service.

Little is known of the boy's education. It was certainly of a very inferior description. Like George Stephenson, Harrison had always a great difficulty in making himself understood, either by speech or writing. Indeed, every board-school boy receives a better education now than John Harrison did a hundred and eighty years ago. But education does not altogether come by reading and writing. The boy was possessed of vigorous natural abilities. He was especially attracted by every machine that moved *upon wheels*. The boy was thus "father to the man." When six years old, and lying sick of small-pox, a going watch was placed upon his pillow, which afforded him infinite delight.

When seven years old he was taken by his father to Barrow, near Barton on-Humber, where Sir Rowland Wynne had another residence and estate. Henry Harrison was still acting as the baronet's carpenter and joiner. In course of time young Harrison joined his father in the workshop, and proved of great use to him. His opportunities for acquiring knowledge were still very few, but he applied his powers of observation and his workmanship to the things that were nearest him. He worked in wood, and to wood he first devoted his attention.

He was still fond of machines going upon wheels. He had enjoyed the sight of the big watch going upon brass wheels when he was a boy; but, now that he was a workman in wood, he proposed to make a time-keeper with wheels of that material. After many difficulties —and nothing can be accomplished without them—he succeeded in making a wooden clock, with wheels of wood. This, however, was only a beginning. He proceeded to make better clocks; and then he found it necessary to introduce metal, as being more lasting. He made pivots of brass, which moved more conveniently in sockets of wood, with the use of oil. He also caused the teeth of his wheels to run against cylindrical rollers of wood, fixed by brass pins, at a proper distance from the axis of the pinions; and thus to a considerable extent he removed the inconvenience of friction.

In the meantime Harrison eagerly improved every incident from which he might derive further information. There was a clergyman who came every Sunday to the village to officiate in the neighborhood; and having heard of the sedulous application of the young carpenter, he lent a manuscript copy of Professor Saunderson's discoveries. The blind professor had prepared several lectures on natural philosophy for the use of his students, but they were never intended for publication. Young Harrison now proceeded to copy them out, together with the diagrams. Sometimes, indeed, he spent the greater part of the night in writing or drawing.

As part of his business, he undertook to survey land, and to repair clocks and watches, besides carrying on his trade of a carpenter. He soon obtained a considerable knowledge of what had been done in clocks and watches, and was able to do not only what the best professional workers had done, but to strike out entirely new light in the clock and watchmaking business. He found out a method of diminishing friction by adding a joint to the pallets of the pendulum, whereby they were made to work in the nature of rollers of a large radius, without any sliding, as usual, upon the teeth of the wheel. He constructed a clock on the recoiling principle, which went perfectly and never lost a minute in fourteen years. Sir Edmund B. Denison says that he invented this method in order to save himself the trouble of going so frequently to oil the escapement of a turret clock, of which he had charge; though there were other influences at work besides this.

But his most important invention, at this early period of his life, was his compensation pendulum. Everyone knows that metals expand with heat and contract by cold. The pendulum of the clock therefore expanded in summer and contracted in winter, thereby interfering with the regular going of the clock. Huyghens had by his cylindrical checks removed the great irregularity arising from the unequal lengths of the oscillations; but the pendulum was affected by the tossing of a ship at sea, and was also subject to a variation in weight, depending on the parallel of latitude. Graham, the well-known clockmaker, invented the mercurial compensation pendulum, consisting of a glass or iron jar filled with quicksilver and fixed to the end of the pendulum rod. When the rod was lengthened by heat, the quicksilver and the jar which contained it were simultaneously expanded and elevated, and the center of oscillation was thus continued at the same distance from the point of suspension.

But the difficulty, to a certain extent, remained unconquered until Harrison took the matter in hand. He observed that all rods of metal do not alter their lengths equally by heat, or, on the contrary, become shorter by cold, but some more sensibly than others. After innumerable experiments Harrison at length composed a frame somewhat resembling a gridiron, in which the alternate bars were of steel and of brass, and so arranged that those which expanded the most were counteracted by those which expanded the least. By this means the pendulum contained the power of equalizing its own action, and the center of oscillation continued at the same absolute distance from the point of suspension through all the variations of heat and cold during the year.

Thus by the year 1726, when he was only twenty-three years old, Harrison had furnished himself with two compensation clocks, in which all the irregularities to which these machines were subject were either removed or so happily balanced, one metal against the other, that the two clocks kept time together in different parts of his house, without the variation of more than a single second in a month. One of them, indeed, which he kept by him for his own use, and constantly compared with a fixed star, did not vary so much as one minute during the ten years that he continued in the country after finishing the machine.

Living, as he did, not far from the sea, Harrison next endeavored to arrange his timekeeper for the purposes of navigation. He tried his clock in a vessel belonging to Barton-on-Humber; but his compensating pendulum could there be of comparatively little use; for it was liable to be tossed hither or thither by the sudden motions of the ship. He found it necessary, therefore, to mount a chronometer or portable timekeeper, which might be taken from place to place, and subjected to the violent and irregular motion of a ship at sea, without affecting its rate of going. It was evident to him that the first mover must be changed from a weight and pendulum to a spring wound up and a compensating balance.

He now applied his genius in this direction. After pondering over the subject in his mind, he proceeded to London in 1728, and exhibited his drawings to Dr. Halley, then Astronomer Royal. The Doctor referred him to Mr. George Graham, the distinguished horologer, inventor of the dead-beat escapement. After examining the drawings and holding some converse with Harrison, Graham perceived him to be a man of uncommon merit and gave him every encouragement. He recommended him, however, to make his machine before again applying to the Board of Longitude. He accordingly returned home again to Barrow to complete his task, and many years elapsed before he again appeared in London, to present his chronometer.

The remarkable success which Harrison had achieved in his compensating pendulum could not but urge him on to further experiments. He was no doubt to a certain extent influenced by the reward of 20,000*l*. which the English Government had offered years before for an instrument that should enable the longitude to be more accurately determined by navigators at sea than was then possible; and it was with the object of obtaining pecuniary assistance to assist him in completing his chronometer that Harrison made his first visit to London to exhibit his drawings in 1728.

The Act of Parliament offering this superb reward was passed in 1714, in the twelfth year of the reign of Queen Anne. It was right that England, then rapidly advancing to the first position as a commercial nation, should make every effort to make navigation less hazardous. At that time the ship, when fairly at sea, out of sight of land, and battling with the winds and tides, was in a measure lost. No method existed for accurately ascertaining the longitude. The ship might be out of its course for one or two hundred miles, for anything that the navigator knew; and only the wreck of his ship on some unknown coast told of the mistake which he had made in his reckoning.

It may here be mentioned that it was comparatively easy to determine the latitude of a ship at sea every day when the sun was visible. The latitude—that is, the distance of any spot from the equator and the pole—might be found by a simple observation with the sextant. The altitude of the sun at noon is found, and by a short calculation the position of the ship may be ascertained.

The sextant, which is the instrument universally used at sea, was gradually evolved from similar instruments used from the earliest times. The object of these instruments has always been to find the angular distance between two bodies—that is to say, the angle of two straight lines which are drawn from those bodies to meet in the observer's eye. The simplest instrument of this kind may be well represented by a pair of compasses. If the hinge is held to the eye, one leg pointed to the distant horizon, and the other leg pointed to the sun, the two legs will be separated by a certain angle, which will be the angular distance of the sun from the horizon at the moment of observation.

Until the end of the seventeenth century the instrument used was of this simple kind. It was generally a large quadrant, with one or two bars moving on a hinge—to all intents and purposes a huge pair of compasses. The direction of the sight was fixed by the use of a slit and a pointer, much as in the ordinary rifle. This instrument was vastly improved by the use of a telescope, which not only allowed fainter objects to be seen, but especially enabled the sight to be accurately directed to the object observed.

The instruments of the pre-telescopic age reached their glory in the hands of Tycho Brahe. He used magnificent instruments of the simple "pair of compasses" kind—circles, quadrants, and sextants. These were for the most part ponderous fixed instruments, and of little or no use for the purposes of navigation. But Tycho Brahe's sextant proved the forerunner of the modern instrument. The general structure is the same; but the vast improvement of the modern sextant is due, firstly, to the use of the reflecting mirror, and, secondly, to the use of the telescope for accurate sighting. These improvements were due to many scientific men—to William Gascoigne, who first used the telescope, about 1640; to Robert Hooke, who, in 1660, proposed to apply it to the quadrant; to Sir Isaac Newton, who designed a reflecting quadrant;* and to John Hadley, who introduced it. The modern sextant is merely a modification of Newton's or Hadley's quadrant, and its present construction seems to be perfect.

It therefore became possible accurately to determine the position of a ship at sea as regarded its latitude. But it was quite different as regarded the longitude—that is, the distance of any place from a given meridian, eastward or westward. In the case of longitude there is no fixed spot to which reference can be made. The rotation of the earth makes the existence of such a spot impossible. The question of longitude is purely a question of TIME. The circuit of the globe, east and west, is simply represented by twenty-four hours. Each place has its own time. It is very easy to determine the local time at any spot by observations made at that spot. But, as time is always changing, the knowledge of the local time gives no idea of the position of a moving object—say, of a ship at sea. But if, in any locality, we know the local time, and also the local time of some other locality at that moment—say, of the Observatory at Greenwich—we can, by comparing the two local times, determine the difference of local times, or, what is the same thing, the difference of longitude between the two places. It was necessary therefore for the navigator to be in possesson of a first-rate watch or chronometer, to enable him to determine accurately the position of his ship at sea, as respected the longitude.

Before the middle of the eighteenth century good watches were comparatively unknown. The navigator mainly relied upon his Dead Reckoning, without any observation of the heavenly bodies. He depended upon the accuracy of the course which he had steered by the compass, and the measuration of the ship's velocity by an instrument called the log, as well as by combining and rectifying all the allowances for drift, lee-way, and so on, according to the trim of the ship; but all of these were liable to much uncertainty, especially when the sea was in a boisterous condition. There was another and independent course which might have been adopted—that is, by observation of the moon, which is constantly moving amongst the stars from west to east. But until the middle of the eighteenth century good lunar tables were as much unknown as good watches.

Hence a method of ascertaining the longitude, with the same degree of accuracy which is attainable in respect of latitude, had for ages been the grand desideratum for men "who go down to the sea in ships." Mr. Macpherson, in his important work entitled "The Annals of Commerce," observes, "Since the year 1714, when Parliament offered a reward of 20,000*l.* for the best method of ascertaining the longitude at sea, many schemes have been devised, but all to little or no purpose, as going generally upon wrong principles; till that Heaven-taught artist, Mr. John Harrison arose;" and by him, as Mr. Macpherson goes on to say, the difficulty was conquered, having devoted to it "the assiduous studies of a long life."

The preamble of the Act of Parliament in question runs as follows: "Whereas it is well known by all who are acquainted with the art of navigation that nothing is so much wanted and desired at sea as the discovery of longitude, for the safety and quickness of voyages, the preservation of ships and the lives of men," and so on. The Act proceeds to constitute certain persons commissioners for the discovery of the longitude, with power to receive and experiment upon proposals for that purpose, and to grant sums of money not exceeding 2,000*l.* to aid in such experiments. The clause of the Act, by which rewards are offered to such inventors or discoverers as shall succeed in enabling the longitude to be ascertained within certain limits, is as follows:—

"And for a due and sufficient encouragement to any such person or persons as shall discover a proper method for finding the said longitude, be it enacted by the authority aforesaid that the first author or authors, discoverer or discoverers, of any such method, his or their executors, administrators, or assigns, shall be entitled to, and shall have, such reward as is hereinafter mentioned; that is to say, to a reward or sum of 10,000*l.* if it determines the said longitude to one degree of a great circle, or sixty geographical miles; to 15,000*l.* if it determines the same to two-thirds of that distance; and to 20,000*l.* if it determines the same to one-half of the same distance; and that one moiety or half part of such reward or sum shall be due and paid when the said commissioners, or the major part of them, do agree that any such method extends to the security of ships within eighty geographical miles of the shores which are the places of the greatest danger, and the other moiety or half part when a ship, by the appointment of the said commissioners, or the major part of them, shall thereby actually sail over the ocean from Great Britain to any such port in the West Indies as these commissioners, or the major part of them, shall choose or nominate for the experiment, without losing their longitude beyond the limits before mentioned."

It will, in these days, be scarcely believed that little more than a hundred and fifty years ago a prize of not less than ten thousand pounds should have been offered for a method of determining the longitude within *sixty miles*, and that double the amount should have been offered for a method of determining it within *thirty miles!* The amount of these rewards is sufficient proof of the fearful necessity for improvement which then existed in the methods of navigation. And yet, from the date of the passing of the Act in 1714, until the year 1736, when Harrison finished his first timepiece, nothing had been done towards ascertaining the longitude more accurately, even within the wide limits specified by the Act of Parliament. Although several schemes had been projected, none of them had proved successful, and the offered rewards still remained unclaimed.

To return to Harrison. After reaching his home at Barrow, after his visit to London in 1728, he began his experiments for the construction of a marine chronometer. The task was one of no small

* Sir Isaac Newton gave his design to Edmund Halley, then Astronomer Royal. Halley laid it on one side, and it was found among his papers after his death in 1742, and twenty-five years after the death of Newton.

difficulty. It was necessary to provide against irregularities arising from the motion of a ship at sea, and to obviate the effect of alterations of temperature in the machine itself, as well as in the oil with which it was lubricated. A thousand obstacles presented themselves, but they were not enough to deter Harrison from grappling with the work he had set himself to perform.

(*To be Continued.*)

Method for Cleaning Pearls.

[Mr. Paul Hiehle, in *Journal der Goldschmiedekunst.*]

IN ORDER to answer many inquiries desiring us to specify a method by which pearls that have become yellow by age or dirt can be purified and restored to whiteness, we have no hesitation in publishing the following, which, although not by any means new, appears to be unknown by many of our worthy colleagues:

The genuine pearl is a voidance product of several univalves and bivalves of both the ocean and inland waters. Its value depends upon its properties, among which size, shape, color, and luster (the so-called "water") are of chief importance. The pearls most valued are those which possess a pure silver-white luster, of very little irridescence, which is a rare sort. By far, the greatest number has a tinge into yellow, and varies through almost all color shades into brown, green, and black.

Such natural defective colors cannot be corrected in any manner. Still, even the purest white pearls may become yellow or change their once handsome color by continued wearing in the hair, around the neck, or on the arms, by absorbing perspiration and filth. This defect, produced by natural causes, may be corrected in the following manner:

Boil the pearls for about one-quarter of an hour in fresh cow's milk, in which soap has been dissolved; then take them out, rinse them in clean water, and dry with a clean white cloth. Inspect whether desired results have been obtained; if not, repeat the result several times. Should they still not become better, try the following:

Ask the baker in your neighborhood at what time he is engaged in baking bread, and go to him at this hour; let him form a small loaf of bread, within which the pearls are laid, either strung upon a silk thread or loosely wrapped in a piece of gauze, then let him bake the bread pretty strong, not too brown, however. When withdrawn from the oven, let it cool, break it and take out the pearls, which will generally be found to satisfaction and handsomely white. But it might occur that also this remedy is insufficient, and the pearls are still yellow; this is a sure sign that the dirt has become old and deeply penetrated into them, or that they appear green and blue, owing to having been strung upon silvered copper wire. Forcible agents now become necessary.

Take a teacup full of well heated wine-vinegar, and suspend the pearls, hung upon a silk thread, or wrapped in a piece of gauze, in it for a few minutes. Also sulphuric acid, diluted with its equal quantity of water, may be used. Then remove and rinse them well in clean water, and repeat the operation until they have become white, and that the green spots have disappeared. This remedy will never fail except the pearls were naturally yellow or colored, against which defect, as already said, there is no help.

The causes of these operations are about as follows: The boiling of the pearls in milk and soap simply dissolves the exterior coating of dirt, the baking in bread absorbs it by the steam. These two remedies are perfectly innocuous and may be employed any number of times without ever hurting them. If, however, the last forcible means has to be used, caution is necessary, because the acid of the vinegar, still more the sulphuric acid, attacks them and dissolves a little of the exterior coating, and would dissolve them altogether if not removed in time. Since, however, the dissolving occurs but very slowly, there is no danger of ruining them, if any degree of care is exercised, since they are composed of thin lamina, and it is plain that by exposing them to the vinegar, only the outer pellicle will be dissolved without in the least injuring the water of the others, and with it also the dirt is removed, and the blue and green copper solution which colored them exteriorly, by which they are restored to their original purity.

At this place I would like to append an observation to those jewelers who are principally engaged with stringing and setting pearls. I stated that the blue and green color originates from the silvered copper wire on which they have been strung. These wires being of copper, and the silver soon rubbing off, perspiration or other humidity will dissolve a little of this metal. This solution is verdigris which penetrates into the pearls, and imparts to them that disagreeable color to be seen in many, especially older articles, and which reduces their value most materially. Pearls should always be strung on fine silver wire, whereby they experience no alteration whatever. The trifling additional cost of the silver will not materially increase the value.

The Lead Bath for Annealing.

TO THE MANY secrets for annealing also pertains the use of the lead bath, to be maintained hot in a suitable vessel over the fire. Manifold are the uses of this bath. For instance, if an article thick at one end and thin at the other end is to be heated, it is very difficult, as every mechanic knows, of heating the heavy part, without overheating the thin. But if the lead bath is made and sustained at red heat, it does not matter how heavy the article is, if it is only allowed sufficient time to uniformly heat through the thick part as well as the thin, and that they do not become hotter than the bath in which they are dipped. For heating thin blades, springs, pivots, surgical instruments, etc., this bath is unexcelled. If a certain place of an article is to remain soft, for instance, the end of a spring, which is to be bent or riveted, it may be drawn through the lead bath at the lowest degree at which steel may be annealed, without in the least disturbing the temper of the spring at a place where it is not to be interfered with. A great advantage in the use of the lead bath consists in that no breaking by the contraction of the metal need be anticipated, a difficulty frequently occurring by heating according to the ordinary method, and then chilling in cold water. Since lead only slowly oxidizes at red glow, two methods may be employed for preventing it altogether. One consists in covering its surface with fine charcoal or common wood ashes. The other, and better one, is to let a thin iron plate, fitting over it, and provided with a hole either in the center or at one side, as will be found most commodious, float upon the lead, to permit the article to be annealed to pass through.—[*Techniker.*

The Automatons of Jacquet-Droz.

A MANUFACTURER of the Canton of Neufchatel, by the name of Jacquet-Droz, was famous for his astonishing productions of automatic figures. One day he presented the King of Spain with a clock containing a shepherd, a dog, and a basket filled with apples. At the stroke of the hour the shepherd played his flute, while the dog playfully gamboled around him. The King was astonished at the mechanism.

"This is not all," the skilful artist said, "Your Majesty will please take one of the apples."

The King extended his hand toward the basket, but the dog commenced barking so fiercely that all the dogs of the palace joined in.

"This is not all," Jacquet-Droz again observed. "Will your Majesty have the kindness to ask him what time it is?"

"*Que hora es?*" (What time is it?) the King asked.

"Ah, sire," answered the horologist, "this good beast is born in Switzerland, and does not understand Spanish. I was able only to teach him French."

"*Quelle heur est-il?*" (What time is it?) the King asked.

"Fifteen minutes to three," distinctly responded the dog.

"This must be the veritable devil," tremblingly exclaimed a Spanish gentleman who was present at the audience, and tradition adds that Jacquet-Droz was accused of sorcery.

Proceedings of the Horological Club.

A Distinguished Body of Watch and Clock Makers.

One hundred and third Discussion.—Communicated by the Secretary.

[NOTICE.—Correspondents should write all letters intended for the Club separate from any other business matters, and headed "Secretary of the Horological Club." Direct the envelope to D. H. Hopkinson, Esq. *Write only on one side of the paper*, state the points briefly, mail as early as possible, as it must be received here *not later* than the eighth day of the month, in order to be discussed and reported in the CIRCULAR for the next month.

MAKING CYLINDERS AND ESCAPE WHEELS—WHICH OF EXCELSIOR'S WORKS IS THE BEST?

Secretary of Horological Club:

Would you, through the columns of THE CIRCULAR, please instruct me in the art of cylinder making? Tell me how they are manufactured and so cheaply. Also how I should proceed to make one by hand, with instructions for polishing inside of tube? Also how cylinder escape wheels are made? I would also like to know which of Excelsior's works would be the most useful to a young workman—that is, which would give the most and best advice on general watch repairing. Yours respectfully, W. M. M.

Mr. Uhrmacher replied that it would not be possible to describe the making of cylinders and escape wheels within the space allowed in THE CIRCULAR for the reports of our Proceedings. The making of them is almost a trade of itself, and it is only by long practice that they are made so cheaply. The processes have been described at length in back numbers of THE CIRCULAR, with cuts to illustrate the tools and apparatus used, to which we must refer Mr. M. for particulars.

As regards Excelsior's works, they were originally written for the pages of THE CIRCULAR. Only one series of the articles has yet been republished in book form, although it is expected that the other series will also be reissued as soon as the author can find time to revise them. As to which is the most useful, Mr. M. may be assured that anything written by Excelsior will be found in the highest degree useful, practical and trustworthy. As only one of his works is yet obtainable, there is no occasion to say which is the best—but we can cordially advise Mr. M. to get his book from Mr. Hopkinson, and also to give any reasonable price for the back numbers of THE CIRCULAR containing the second series of his famous "Practical Hints on Watch Repairing."

ABOUT OIL AND OILING.

Secretary of Horological Club:

If some one would please inform me in the performance of watch and clock movement oiling, I shall feel under many obligations. When I oil watches, whether I put on much or little, I find in a short time they fail giving satisfaction; they begin to stop, and in cold weather this stoppage occurs frequently. In warm weather the oil seems to dry if but little be used, and in cold to thicken and become sticky. What is the matter? A. M. O.

Mr. Horologer replied that the oil used by Mr. O. was evidently poor, as good oil would neither dry up nor become sticky, except after considerable time. He should get the best watch and clock oil to be had, for a great deal depended on the oil. He should then be careful not to apply too much. Many workmen put on so much oil that it runs all over the jewels or plates and the arbors, gets into the teeth of the wheels, and everywhere else that it is not wanted, collects dirt, and makes a greasy muss of it generally. There should be enough to lubricate the pivot or part oiled, and no more. In watches, oil every pivot of the movement, and in common watches oil also the lever pallets, the cylinder and escape wheel—but not the ruby pin. In very fine watches this oiling is often omitted. In clocks oil every pivot and bearing throughout—except in some kinds of regulators and the like, which require special treatment. But those do not come under the general meaning of "clocks," in the average shop. But in all cases, remember the rule: Don't put on too much.

HOW TO REPAIR CLOCK TEETH.

Secretary of Horological Club:

I have for repair a grandfather's clock. I examined it carefully, and I find several grevious errors, and I would like to know what to do, or what your honorable body considers the best plan. It is a heavy brass movement, made in this country, before wheel-cutting engines and rounding-up tools were plenty. If I understand the shape that teeth should have, it is as in Fig. *A*, of the enclosed sketch, *i. e.*, olive-shaped, but this clock has every tooth in every train wheel as in Fig. *B*, *i. e.*, nearly square on the ends. The clock has run for fifty years and more, and in this time has worn the pinions on *both* sides, that is, the wheel has been set so close that when the wheel tooth was on the center line with the pinion center or axis, the tooth touched both pinion leaves, and has worn on the side the tooth *worked* on, and on the opposite side also. I guess you understand me. I cannot change the depth, for it is too *shallow* already. Now what does the Club think is the best plan to remedy it? I have no wheel cutter for clock wheels. E. Y. D.

Mr. Uhrmacher advised to dress off the *backs* of the teeth which touched on both sides, to enable them to pass with a little clearance. The next thing to inquire was whether the pinion leaves could be dressed off to get out the wear, and make the faces smooth, and whether it would pay to do it. If a thorough job is wanted, that must be done or else new pinions put in. Then the shape of the teeth should be looked to. Although "olive-shaped" teeth are desirable, yet it must be remembered that the "pitch circle" of the wheel and of the pinion must just meet, for good action. That it so say, when a bearing surface of a tooth and of a pinion leaf are on the line of centers, the pitch circles of the two must just meet. As the pitch circle passes through the points where the straight sides of the tube (or leaves) joined on the curved ends, it follows that if the corners of the tube in Mr. D.'s clock just meet the pitch circle of the pinions, then the teeth could not be rounded or made any more pointed, because that would carry the pitch circle of the wheel further from the ends of the teeth, and virtually make the wheel smaller. This would necessitate the correction of the depthings, by moving the parts closer together. It is often the case that such clocks run very well even with teeth which are very wrongly shaped, according to theory—and unless the owner is willing to pay for a thorough repairing, it might be as well to let that part go—*i. e.*, not round up the points of the teeth, but merely dress off the backs to give clearance, and repair the pinion leaves.

THE NEW MAINSPRING WINDER.

Secretary of Horological Club:

I humbly beg pardon of Mr. McFuzee for not sending him any description with the winder, and also regret not having done so for the reason that I am anxious to know what he thought of it. I think every workman should have one to do a good clean job in mainspringing. I have used it over a year, and I found it good in every respect. For explaining its use, we will take for an example an American lever watch with a broken spring. After the broken spring is out of the barrel, clean the barrel cover, and winding arbor; next fasten the winder in the bench vise, and clean the barrel of the winder; then get a suitable mainspring, clean it with a clean cotton cloth and see that it is flat, *i. e.*, not bent out of flat. After you are sure it is all right in every respect, hook it on the collet of the winder, without touching with the bare fingers, give the arbor a turn so as to make the spring stay on the hook, and brush away any dust or fibers from the cloth that may adhere to the spring; next get the lever over the coils of the spring so as to hold them flat in the barrel. Several coils of the spring will now be outside of the barrel, between the barrel and the lever. On the face of the winder are two notches or grooves, filed out so as to let the bar on the end of an American spring slip through while winding. After the spring is wound into the barrel, reverse the ratchet pawl, and let the spring uncoil itself slowly in the barrel, until there is no longer any danger of its flying out, but not far enough to let it unhook itself, when the lever is thrown back to its resting place with the left hand. Then put the watch barrel over the winder barrel, which is small enough for that purpose, then reverse the ratchet pawl again and wind the spring about a turn; then with the right hand and a screw driver, push or pry the spring out of the winder barrel into the watch barrel. The spring will hook itself in barrels having hooks. When the spring does not hook itself in the watch barrel, or when the spring has a bar riveted to it, it is necessary to put in the arbor and the cover on loosely, and with the bench key wind the spring until it hooks, or till the bar comes over its hole in the barrel, when it can be pushed into its place and the coils pushed down flat with the screw driver. Next oil the spring a little, also put a little oil on the bottom of the barrel and inside of the cover, so that every part of the spring gets greasy; next put on the cover solid, and with the bench key try the spring to see if it winds and uncoils freely.

Whenever I used it to put a spring in a ladies' size watch, I would wind the spring into the winder and then bind it with wire small enough so that the spring would go into the barrel, then with the screw driver push down the spring. The barrel would in turn push the wire from the spring. D. S. B.

Mr. McFuzee said that he thought the winder would operate well whenever the barrel of the watch was large enough to slip over that of the winder, and would then be a very handy tool. But he feared that it would not be so well adapted for general use as to be advisable to go to the expense of patenting and introducing it. However, our readers can judge of that for themselves, by reading the description given in our Proceedings for last month, in connection with Mr. B.'s letter of this month. Should anyone wish to communicate with Mr. B. about manufacturing them, we shall be pleased to forward the letters to that gentleman for his consideration.

HOW TO MAKE CASTINGS FOR JEWELERS.

Secretary of Horological Club:

I would like to reach, through THE JEWELERS' CIRCULAR, some practical man who is willing to impart some of his knowledge to others on "castings," in our trade. I had occasion to do some large casting lately. A fac-simile of large medal was ordered, and because I never have a "sure thing" at success in my castings, I looked over several volumes of THE CIRCULAR for information, but could find none, so I cast in fish-bone as generally, and the medal came out imperfect, and required much work to finish.

Will some jeweler give me information on this branch? In return I will cheerfully describe the whole process of my way of doing same as good as I can; also the points I have learned by experiments, though my success is only partial, yet by exchanging ideas we may all learn.

I have done a great deal of casting, and I find fish-bone best, generally. I have also cast in sand dampened with oil, but sand is not fine enough. In plaster paris I can get the finest impressions from originals, but the gold or silver will not cast perfect in it.

If some jewelers will write a little article for THE CIRCULAR on this branch, I think it will be read with interest by many, as there has been nothing in it of the kind for a long time. F. W. P.

Mr. O'Lever said that with practice one can do very good castings with fish-bone, or with plaster of paris, by baking it till it is *thoroughly* dry. But metal molds for special purposes are also used. Still there is much to be desired before satisfactory results can be uniformly looked for. We shall be glad to hear from Mr. P. with his experience, and also from others who have found ways or materials superior to those commonly used.

TREATISE ON ENGRAVING WANTED.

Secretary of Horological Club:

Will you or some member of the Club please inform me of some good work or treatise on engraving, designed especially for new beginners, the price, and where it may be obtained? Please answer as soon as possible, through THE JEWELERS' CIRCULAR. I do not know whether you answer the inquiries of non subscribers for THE CIRCULAR. I was a subscriber for it until the present year, and would be now were it not that my employer takes it and I have free access to the reading of the same. W. P. K.

Mr. Clerkenwell said that he knew of no work published on that subject. There was an excellent series of articles by "Expert" in THE CIRCULAR some two years ago, written expressly for the paper, which gave very full instructions for all kinds of engraving usually done by jewelers. Mr. K. will do well to look up those articles and give them a careful study, as they will probably give him all the information he needs.

A PLEASANT AND PROFITABLE JOB.

Secretary of Horological Club:

About a month ago I undertook a job which has been as pleasant and remunerative as it could well be. I thought I would write you about it and perhaps others will follow suit. I am sure no one will ever rue the time spent in that way, and cannot help being benefitted. The job is this. Every evening after closing my shop, I make a bee line for home, and as soon as I am seated, I take THE CIRCULAR and read it, beginning with the first number I received, and whenever I find anything which I think will be of special benefit to me I jot it down. There are a number of articles which have been *very* interesting to me, outside of "Proceedings" and "Practical Hints," and I will name them. The first one is the article by W. J. Suttie, on "Spectacles and Eyeglasses," Vol. XII, No. 2. His article is so very clearly written that anyone can understand it. Another article is on "Solder," Vol. XII, No. 4. Vol. XII, No. 5 contains two articles which are worth reading; one is "Preservation of Health," and the other and more useful to one who knows how to preserve his health, "The Breguet Spring and how to put it in Expeditiously," is the best I have read since I began re-reading THE CIRCULAR. The article of Grossmann's, Vol. XII, 7, I also found interesting, especially some chapters, the 5th and 6th, which are illustrated. The best article on the anchor escapement I *ever* read, is found in Vol. XI, No. 12. It contains a drawing which is worth, to one who wants to study it, the price of THE CIRCULAR, and while there are a goodly number of watchmakers to whom the article might not give much information, yet the major portion can find food to nourish their minds by studying the engraving, note its every line and bearing, and if it is not clear I would not be able to make it better. If you can get more articles like it you will undoubtedly confer a favor on many workmen. Yours, E. V. D.

Jewels, Plate and Bijoutry.

THOSE WHO have long been accustomed to dead and monotonous surfaces and uniformity in color scarcely realize the artistic advantage of change in metal. Absence of body-color has been the greatest defect in modern workings of gold, silver, copper, until scarcely longer than a decade ago. The cold white of silver chilled with its sameness, but now any article, from the simplest object for table use to the most elaborate and magnificent, or for the toilet, may be had in natural colors and in artistic glowing tints colored by alloys. The charming floral designs for the fashionable lace-pins of the summer are replaced by others, less delicate and graceful but more appropriate, as accompaniments to the rich, warm hues fashion orders for this season. Outrivalling the ancients, modern designers and workers in metal produce wonderful lace-pins wrought by chemical processes into the most life-like shades of color, in the shape of huge spiders, crabs, the graceful eel, tarantulas and small crocodiles, all of the liveliest imaginable description. Platina, gold and silver, colored by alloys, are used in the manufacture of these works of natural art. The result of examination is a prediction that the taste for natural history will gradually lead to a cyclopædia in which the pensive sloth, the pale-eyed oyster, the howling gyascuticus and the monkey tribe generally may appear in the splendor of oxidized silver and gold with jeweled eyes and a gleam here and there of Cloisonne enamel.

At present the fashion taste runs to owls. In the hollow of a silver crescent moon five owls of graduated size are perched, with wide, solemn eyes, the plumage exquisitely shaded and tinted in dull oxidized colors. A bough in natural colors also holds five owls that are gayer in dull blue, gray and brown tints carefully shaded and worked. An owl's head of large size with gleaming eyes is tinted in bright metallic colors. A bright silver crescent holds in the hollow a pair of owls tinted in different shades of red, brown and gray. Other lace-pins are in the shape of a large duck's head and neck, showing elaborate diapered work exquisitely shaded in natural colors. A small apple equally elaborate is impaled by the pin passing through it, and a pair of oxidized silver pincers holds a brilliant dead butterfly with drooping wings and dropping legs. Huge gray oxidized silver spiders are painfully natural. A bat of large size is tinted with dark and metallic blue alloys, the outspread wings punctured by the long pin. Several wonderfully worked heads of pug dogs are seen of different nationality and amiability of expression, having ruby eyes. A charming lace-pin takes the shape of a curving branch holding a large pansy enameled on gold in purple blue. Some forget-me-nots are enameled also on gold, the leaves exquisitely veined in pale green gold.

Silver dog collars are revived. These are intended to be worn outside the collar of the dress, clasping it closely. Some of these are so arranged as to be separated into a pair of bracelets. The designs are in the scales and chain-mail seen in armor, fastened with gadlings such as are seen on steel gauntlets. Other shapes are silver bars finished at each end by a silver ball, and again by silver beads, and in madiæval styles. In newest fashion come the costly garter clasps in great variety. A pair of these clasps, quite elegant enough for a bracelet, are of finest engraved silver, set with a large, exquisitely enameled pansy in low relief, fastened on blue silk elastic in a nest of blue satin ribbon. Another, more costly, has a hammered silver surface, holding a smiling face of the Man in the Moon, finely chased. These are placed on scarlet elastic and satin bows. Another set of oxidized silver shows finely carved and chased owls' heads with golden eyes, fastened on blue elastic satin ribbon and plush bows. Mourning garters are made of black silk elastic, the plain silver clasps set in tufts of black chenille and ribbon. A similar pair are set with antique silver coins.

In table silver and gold the last shadow of Puritan simplicity has departed. Some of the magnificent pieces of plate baffle description. The Merovingians and Anglo-Saxons are illustrated in the ornaments, the beaded and filigree and appropriate work of the design, and again in the Celtic hammered work. The designs and workmanship are rich in detail, yet light and exquisitely elaborate in the manipulation of the different metals of gold, silver, and copper. A very large superb punch-bowl of silver, gold-lined, is a specimen of marvellous work; a thick grapevine of natural colors is coiled carelessly about the brim; large branches of grapes of oxidized silver hang, forming the handles, from leaves of burnished gold here and there tinted with flecks of autumn's vivid coloring; the ladle, of satin-finished silver, gold-lined, has a long curved handle wound about by a delicate vine of gold and occasional small leaves of gold finished by a bunch of gold grapes laid in mezzo-relievo at the end from a carved gold leaf.

A large plate for the fruit, of satin finished gold, has a broad flat edge of gold; the center is irregularly hammered, with black oxidized work; laid half round on the wide edge is a sunflower of natural size, the finely worked golden petals flexible, and the stamens a reproduction of nature in rich brown and black shaded gold, the leaves brown and tinted in many colored alloys. A large oxidized silver pitcher shows wonderful elaboration; the thick handle is formed in closest resemblance to an octopus arm coiled half around; midway a tadpole in alto relievo is perched, and a large lizard having accomplished the trip upward looks over the brim; the body of the pitcher imitates water in irregular dashes and waves of black, oxidized, in which sea monsters disport. Another pitcher of the same character but of a different shape has the handle formed in alto relievo of a large dragon's hideous head bent over the edge, the long body finishes at the bottom with huge claws and tail; the body of the pitcher, of smooth oxidized silver, is covered with waves, curling foam, spray-tossed by large fish of the most elaborate workmanship. These pictures are purely Japanese in character.

A large square tray of Japanese design in oxidized silver holds a dozen tiny after-dinner coffee-cups in the shape of mugs and saucers; each handle is different from the others, consisting of a twig, a flower, a bunch of leaves, the decoration in niello also varying in each cup. The gold-lined bowl has similar quaint decoration, with an ornamented stem and clusters of berries laid about the edge. The lid of the coffee-pot has on top the Japanese dog "Jos," in alto relievo, quite free, and a winged dragon forms the handle; the decoration is of crancs, trees and bamboo stalks, in finest black lines and etchings. Another set of coffee-pots of Japanese hammered design has a decorated alto relievo branch in brown alloy tinting, from which hang barberries in clusters and some autumn tinted leaves; on the other side are a bird in bronze colors, a lizard and a frog. A superb tray is exquisitely decorated with a soft glimmer of pearl, opal and other tints on the satin-finished gold surface, showing dragon flies and butterflies hovering over the water; a bird pipes from some pale green branches; some broad leaved lilies bend over the bank. The two goblets and pitcher correspond, but in more elaboration of detail; there seems a contest of birds in the trees of palest green gold, and the pale white wild roses; a cluster of corn flowers gleams beneath the clouds of delicate amber and cloudy gray, all of the finest work and elaboration. A set of silver, snowy white, has a salver with a mirror-surface amid lily-shaped clusters of flowers of frosted and filigree silver; the top of the pitcher is of the mirror silver, separated from the base by gold bands showing in low relief flying nymphs and cupids; the lower part is satin finished silver, with antique decorations of gold and silver; the goblets correspond with slight variations. A superb center-piece supports a tall flower vase of hammered oxidized silver; a rose branch tinted brown trails about the body of the vase in alto relievo, the leaves of brilliant metallic autumn colors; a half-opened bud of dead silver droops from the side; the standard is in the shape of a square cross, the limbs are segments of a circle, the foliations a mere bud; in these foliations is set a bowl of hammered silver, gold lined, with decorations in alto relievo of branches, berries, knots from a stem, a snail and birds, in colored alloys.

Some very elegant gas-lamps for the library are in copper, hammered in Turkish shape; rising from the case is a branch, with leaves and a half-opened white rose of dead silver in alto relievo. Tobacco sets are very elaborate in hammered copper with silver decorations of beautiful artistic elaboration.

The popularity of plush and velvet asserts itself in frames of blotters, boxes, jewel-cases, glove, stationery and other cases, and perfumed sachets for laces and gloves. These beautiful articles of luxury are all imported from Austria. One of the most elaborate boxes of wine-colored velvet arranged for gloves is lined with white puffed satin, exquisitely perfumed; on the outside a large rose and foliage of satin are placed in high relief. Charming pin-cushions of velvet made square have a decoration on one corner of a little Greenaway figure, standing, of brass or oxidized silver. Some elaborate wall-pockets of rich plush backs have a front of green satin with oxidized decoration on the edges; also forming a part of a smaller outside pocket finished with a satin bag. Very elegant sachets of large size, for laces, and delicately perfumed, are made of puffed satin of various bright colors. Among some beautiful card-trays and plaques is a specimen showing the finest artistic skill in painting; on the soft white velvet is a woodland scene, a background of delicate pearl gray tints flecked with summer clouds of amber; miles away the hills are tinted with gold reflections through the trees, pale green in the sunlight, pale in the shadow; two or three figures are seen grouped by a blue stream. These are framed in plush. Others are painted on satin, with quaint little Greenaway children swinging on a lily leaf, among violets and lilies of the valley; others dance on the stem of a rose.

Card receptacles of different shapes of plush lined with satin have decorations of the starry primroses. A perfume-case and work-box are combined, opening from a pyramid shape with a lining of rich green satin; the bottles are of finest cut-glass and panels of hand-painted leather. Other very elegant handkerchief-cases are seen made of alligator-skin lined with gay satins. Large and elegant portfolios of plush have decorations of rolled gold and nickel, showing antique designs, such as plumed warriors in intermediate relief tinted by alloy. A very large crimson plush handkerchief-case has a decoration in brass in low relief of a mounted Arab chief; a portion of the decoration consists of tinted oxidized silver. Other styles are covered with antique dark woods, and a dressing-case of olive wood is elaborate in the luxurious fitting of three compartments.

Fashionable Gems.

A MYSTIC, poetic charm is lent to the magnificent flowers of the mineral world, indicating a tone of sentiment Oriental in design and coloring. Diamonds still maintain a high rank, representing the concentrated essence of wealth, a note that the bearers need never fear being dishonored in any quarter of the globe; but these regal stones are now arranged as part of a superb orchestra of color, forming a rainbow of harmonious and gorgeous beauty. Chief among these gleam sapphires of that India shade which the Chinese call a blue of the heavens after a rain; the Alexandrite, a new and rare stone of the Oriental chrysoberyl family, emitting soft yellow-green and red-brown lights; the lustrous cat's-eye, also of the chrysoberyl family; tourmalines; the balas ruby; peridots; green garnets; India topazes of gold color, violet and blue; Asiatic pink topazes; the beautiful green Hiddenite; and sapphires of rich citron yellow and brown ruby. A new and superb Alexandrite by daylight is of the rarest shade of blue-green, showing shifting lights of red and blue. At night beneath the gas the green disappears and a brilliant red takes its place. This wonderful stone also possesses great luster. With these dazzling gems mingles the delicate shimmer of pearls, the rosy pearl of the East lending a flush to the lustrous white, softly blending in the opal pearl, the metallic luster of the Panama pearl, the yellow pearl of China, the copper and bronze-tinted and black pearl, in gradation of light and shade.

There is a great deal of useless talk about the extravagance of Americans. When all other topics fail, newspapers attack fashion and the changes of fashion and the love of show, which is unparalleled since Chaos was made into a world. There exists no reason why wealthy people should not gather about them whatever luxuries they desire from the four quarters of the globe. They know that Juno charmed Jove with her exquisite toilet, and wore in her ears "pearls great and orient," jewels won the love of Rebecca for Isaac, particularly an ear-ring of gold that weighed over a quarter of an ounce; then there are the examples of the luxurious Assyrians, the magnificence of the Egyptians, the Jews—all of these fashions are borrowed in their jewels, their embroideries and workings in gold and silver. Tastes are indulged, and the wheel of trade kept in motion.

A glowing specimen of Oriental coloring is seen in a Greek cross of large size. A magnificent green tourmaline is set in the top; across in the strongest contrast is displayed a blue sapphire, a ruby gem spinelle, and a ruby brown tourmaline of great size and brilliancy; a rose ruby flashes in the lower end, and a large superb diamond is set at each point of each stone. The cross is suspended from a massive bar, a magnificent yellow sapphire radiant as the sun gleams from the center, and at each end is set in low relief a pear-shaped diamond. Accompanying this bewildering beauty of form and color is a narrow bracelet closely studded with the gems, showing the different colors of sapphires, of smaller size and pale tints, each one alternating with a diamond. A narrower bangle bracelet is set with an enormous, marvellously brilliant sapphire and two diamonds. Of the exquisite variety of lace pins, one is fancifully shaped somewhat of the form of two separate scrolls, brilliant with a large green garnet, a ruby and diamonds. A small diamond is set at each end of a scroll. One of the bangle bracelets, gorgeous in its Oriental beauty, is set with India topazes of vivid gold color, a violet having flashes of red, and one of blue; diamonds are placed between each pair of these.

In translucent depths and brilliancy of the stripes somelarge cat's-eyes are of unsurpassed brilliancy and chatoyant shifting lights. One of these forms the center of an artistic lace pin surrounded by equally large-sized diamonds, and another forms the chief beauty of a diamond-studded bracelet. One of a pair of bangle bracelets of the cross-over description is set with diamonds on the two bars; between the bars that pass each other gleam pearls of different tints. The other has a large pearl set in the top surrounded by diamonds, and the ends of the bracelet that cross are curved and closely studded with diamonds. A massive gold band bracelet is a glittering blaze of alternate immense diamonds and emeralds of equal size and purest color and luster.

Every variety of these superb stones is combined in lace pins, pendant, and other workings in gold for full-dress toilets. In the way of small ear rings, nothing can be more exquisitely modest, yet costly, and lustrous withal, than the balls of gold of finest beaded work, so paved with tiny diamonds that the metal, rich in detail, yet so bright, is quite unseen, excepting by the closest inspection. Another pair, simple in form, consists of a large black pearl, that is suspended from a diamond, and a pair of rubies of the rarest color and richness are surrounded by equally fine diamonds. A superb large green tourmaline, with a diamond gleaming like a star above, is lustrous beyond description.

One would imagine that the repertory of the jeweler's art was exhausted, but there is still a novelty to be chronicled in the way of some superb ornaments which have a special relation to the full-dress costume of the period, taking the place of the *bouquet de corsage* of natural flowers generally attached to the lower point of a heart-shaped waist. These large pieces of rich and elaborate work are seen in the most intricate designs of filigree, beaded, plaited and delicately overlaid wire-work. For example: A peacock standing in alto relievo—some portions stand quite free—set closely with finest emeralds, is mounted on an immense diamond. The spread tail is set with large diamonds for the eyes, and other smaller stones are arranged, rich in detail, but light and elaborate in the mass. Another style is in coronet or crown shape, the upper part studded with superb diamonds. There are besides flower pieces and designs bearing rows of jewels of contrasting colors, oval, heart-shaped with precious stones alternating in the most regal and enchanting manner with royal richness and burning glory.

Gentlemen's charms are out now in much variety. Some very elegant scarf pins are set with a pear-shaped pearl and tiny diamonds, or an exquisite moonstone, a cat's-eye, or Indian colors in a few small jewels, a black, brown or red tourmaline, or balas ruby. The glove ring is especially affected by gentlemen. Whatever may be the setting it is in low relief, so that it rests flatly on the finger without interfering with a glove. There are many elegant and artistic designs for the ornaments of the watch fob. In a clasp or buckle the cross-pieces are segments of a circle, and the ornamental foliation a mere bud. These are in oxidized gold, silver, or gold manipulated into various processes. Linked sleeve-buttons still remain fashionable.

The imitations of jewels which are too frequently seen are not only in exceedingly bad taste but are absurd. Like all other imitations they deceive no one, and the first luster soon passes away. They then stand revealed for what they are. Diamonds and pearls, but particularly diamonds, before which, if real, the Koh-i-noor would hide abashed, are met daily in frightful profusion, worn by the same people who wear a fine real India shawl with a wool dress and cotton gloves. To dress fashionably and well needs more tact in arrangement and color than money. Those who are deficient in taste must attend the theatres and study out what artists and the stage reveal.

The Art Treasure of Baron von Rothschild.

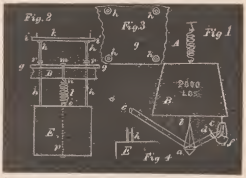
BARON Carl v. Rothschild, says a German periodical, possesses a treasure in art works only known to the very few chosen ones, which, although one generation old, may, both in material and imaginary value worthily compare with the most celebrated of European collections. Its chief value consists in a collection of the rarest and noblest of specimens of the old art of goldsmithing, of ecclesiastical as well as profane vessels, and of the choicest *chef d'œuvres* from the 14th to the 18th centuries. Rothschild, who, as well known, commands over unlimited means, understood how to obtain the best and most precious articles from every part, by means of agents, even such articles as were popularly believed to be in firm hands; among others, for instance, nearly the entire set of the Old Nuremberg's silver works, of which our columns have repeatedly contained notices. Art scientists, artists, and librarians have time and again expressed the desire that he might issue a suitably-illustrated publication of his treasure, similar to those of the Art Chambers of Vienna, Dresden, Munich, etc., but he has steadfastly refused, until, finally, a photographer obtained the permission. The latter associated himself with architect Luthmer, director of the Art school of Frankfurt, whose illustrated publication, "The Gold Ornament of the Renaissance," met with such a favorable reception. Both design to publish a highly illustrated art work of three series, each of 50 leaves folio, the first of which gives the bumpers, basins, clocks, etc.; the second, articles of personal ornament, and the third the larger silver utensils, such as table service, etc. The work cannot fail meeting with a favorable reception at the hands of art scientists, artists, manufacturers and collectors, since it will stimulate to new endeavors.

Correct Local Time and How to Obtain it.

SOME RECENTLY conducted experiments in England with the pendulum, or, rather, its equivalent, a plumb line, gives us the unexpected intelligence that the supposed solid crust of the earth is subject to daily disturbances, rising and falling along the Atlantic coast several inches—the highest tubes making a fluctuation of some five inches. But as the change is so slow, rocks and waters moving along in unison, that previous to their experiments the phenomenon was unnoticed. The reader will of course understand that all such influences have their effect on the pendulum of a clock, of course to a very minute degree, still, it is an impediment to absolutely perfect time keeping. And it is a fact that we have to accept, that up to the present time, a pendulum is the most accurate of all of our mechanical appliances for the measurement of time. And the best form of this appliance is a perfectly free pendulum, constantly vibrating in the same arc, which can only be accomplished by a constant and unvarying force, applied to a perfectly compensated pendulum. To be sure we can correct our clock variations by astronomical observations, and in a measure make up for our mechanical failures. And here comes another question: is our earth a perfect time-keeper—is the revolution on its axis precisely the same month after month, and year after year? Some astronomers say the earth is accelerating its velocity at the rate of one-tenth of a second a year. Now, if we had a clock running absolutely correct, this question could be soon settled, and many others quite as important. True, we have nothing now which approximates to such accuracy, still it is well to struggle on and try for it. It is not so very many years ago that a clock which did not vary a minute in a month was a curiosity—then came compensation for heat and cold, and still closer rates were obtained—a few seconds a month—and now by independent pendulums compensated for heat and cold and barometrical influences, together with means to guard against the effect of vibrations caused by winds and traffic, a few seconds a year can be relied on. The disturbing effect of jar and external vibrations are about the greatest draw-backs which well constructed independent pendulums have to contend with, all such disturbances having a tendency to retard or make the clock run slower. A clock placed at the bottom of a deep mine, would, in a great measure, be free from these disturbances, and if we had but one clock in the whole country, and this clock was so arranged as to dispense the time by means of electricity to all the dials to be consulted, it would undoubtedly be the best course to place it in such a position, but this is not the case, nor is it likely to be for some time yet. Electric dials are expensive, and I am sorry to say, hardly reliable; consequently the question of how to perfect the performance of isolated clocks is one of importance.

Solid foundations, by means of piers of masonry extending deep into the earth, have been tried, and to a degree correct the trouble, but not as perfectly as desired, or even hoped for. Consequently, some other solution of the problem must be sought for. Among the solutions offered is to suspend not only the pendulum, but a large mass of matter as well, in such a way that the vibrations and shocks are imperfectly conveyed to the pendulum. Suppose a piece of iron or stone weighing 2,000 pounds was suspended by a strong spiral spring as shown at fig. 1, where *A* is the spring and *B* the weight. Now this mass would be almost entirely freed the effect of jar and vibrations. If an arrangement was made as shown at fig. 2, although in the immediate vicinity of railroad traffic, passing trains would scarcely produce any effect. To test the efficacy of such a remedy for this disturbing influence, suspend a weight (a box of stone will answer) as shown, and beneath it suspend a hollow cone filled with quick-silver. At *c* suspends a lamp of some kind with a condensing lens *d*, so arranged as to throw parallel rays of light on the surface of the mercury. If the reflected beam of light is allowed to fall on an object at some distance (say ten feet) any jar or vibration of the weight *B* will cause concentric waves to pass over the surface of the mercury and the fluctuations will be shown magnified at *e*. The form of a hollow cone is the best form for the vessel of mercury, and a plano-convex lens as shown at *d*. For all practical purposes the lens can be dispensed with if the lamp is enclosed in a case, and only a pencil of light is allowed to strike the mercury. If the experiment is conducted as described, the surface of the quicksilver will hardly show a tremor. As a counter experiment, go into the cellar of our most substantially built buildings, and set a vessel of mercury on the solid earth bottom, and let a beam of light fall as described above, and every passing omnibus or heavy vehicle will cause the reflected beam (the round spot of light at *e*) to dance and shimmer. Indeed, so delicate is this test of vibrations in the earth, that if a condensing lens is used, and some other precautions taken, the footsteps of a passenger, though inaudible to the ear, will be betrayed by the reflected beam of light. We shall encounter some difficulties in arranging our independent pendulum, so as to take advantage of the inertia of the mass *B*, but these can be overcome quite easily. It may occur to some minds, that three or four spring supports would be preferable to one, and give greater steadiness; this is not the case, one secure spring is far the best. We will suppose that our clock is for a show window, although if these precautions are taken, a pendulum beating seconds would be the best, and a pendulum beating seconds is rather long (about 40 inches) for such a position.

To resume our window clock; at fig. 2 is shown a vertical section of such an arrangement, *D* representing a strong joist or floor-timber, *g* the floor. The stability of the joist *D* should receive attention, for although we are preparing to annul vibrations, still we should study to have as few vibrations as possible to overcome. At *m* is shown a strong bolt, passing through the floor and terminating in a hook shown at *n*. The large spiral spring is shown at *l*, and for a

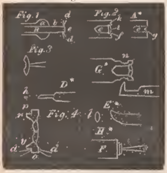


weight of 2,000 pounds should be made of round steel ¾ of an inch in diameter, coils 4 inches across and 6 in number, touching one another when at rest. The spring should be hardened and tempered, and subjected to a weight of 3,000 pounds as a test. The box *E* should be well made, and an iron rod from the hook *o* (engaging the lower end of the spiral spring *l*) should pass through the box *E*, as shown at the dotted line *p*. Rising from the cover of the box *E*, are four standards or supports for the clock to rest upon, (as if *i* was a table and *h h* the legs.) These supports are best of iron or brass tube, and pass through the floor *g* without touching, as shown at *h h h h*, fig. 3, which is a plan of the floor *g*, fig. 2. The bottom ends of the supports *h*, should rest on pins in the cover of the box *E*, as shown at fig. 4, these pins secure the supports *h*, from latteral motion, and in case of the spiral spring *l* breaking, the pins readily withdraw from *h*, and the washers *r r* strike the floor *g*, and no serious damage is done the clock. The wtiter has endeavored to give a general idea of what is required, rather than specific instructions for an individual case; as the same ided can be applied to an ordinary regulator, letting *i* come as near the floor as possible, and not touch. The precaution in such a case would be to make *E* heavier (at least 4,000 pounds) and have the center of gravity (also the center of oscillation) at least 5 feet below *n*. The friction on *n*, would prevent to a great degree the establishing of any synchronous vibrations, except sympathetic, and these could only repeat at long intervals, so that if a very heavy mass is concentrated at *E*, nothing is to be feared from this cause.

Lathes and Lathe Work.

BY THE MODEL WATCHMAKER.

SETTING watch jewels in the brass setting, like the top and foot-hole jewels of an American watch, is by no means a difficult job to do, but I venture to say that not one in one hundred watchmakers set their own jewels; and still it is by far the best course for all workmen who do not reside in a large city, as no man, except some heavy material dealer, can afford to carry such a stock of set jewels as will meet all the demands of even a small repair shop. Even American hole-jewels are getting to be of such a variety, counting all the grades of the different factories, that their name is fairly legion. We will first speak of such jewels as are used for balance holes, and finally describe the method of setting, finishing and polishing the large setting for plate jewels, such as found in the best American and English watches. A fine balance hole jewel, either in garnet or chrysolite, can be obtained for $5 or $6 per gross. At this rate a really fine hole jewel can be counted to cost five cents apiece, and allow something for loss and breakage. A word or two here about jewels. There is no doubt but a fine ruby jewel is the best, if they really are fine, which is seldom the case, even when a good strong price is paid. About the best test for a hole jewel is, after it is set to carefully point a piece of peg-wood, and peg out the hole; and if the peg adheres to the hole it is the best evidence in the world that the inside of the hole is not polished. When this is the case, the harder the material of which the jewel is made, the worse it is. As a rule, it is not the jewel which wears, it is the pivot. When we find the jewel worn to one side, one of two causes can be given as a solution; first, imperfect when made; second, a trace of diamond dust left in the hole when made or opened up. This can be explained easily. Suppose a few particles of diamond dust should be left in the hole; these would soon embed themselves in the pivot and act on the hole of the jewel. If, on the other hand, the jewel hole is imperfectly polished, the pivot is worn; consequently it is important that the hole should be perfectly polished. Fine garnet or chrysolite jewels are polished with rotten stone, a material which leaves no grit behind to stick in the hole. In regard to the wear, a garnet hole will outwear any steel pivot as the relative hardness of garnet and steel are as ten to one, and chrysolite still greater; consequently, to borrow any trouble about the durability would be a good deal like discussing the question whether a well-made watch would last 100 or 105 years. About the amount of all of it is, a good garnet or chrysolite jewel is good enough for all ordinary watches. If you are using an American lathe, select a piece of brass wire to fit one of your large split chucks, and let it protrude about ¼ of an inch, as shown in Fig. 1. Turn the end square and flat of the wire *B*, then with the point of your graver turn in a center pit as shown at *g* in diagram *A**; then with a drill a trifle smaller than the outside diameter of the jewel to be set, drill in the end of the wire as shown at *e*, Fig. 2, and also the dotted line *c*, diagram *A**. Now with a slim-pointed boring-out tool (shown in vertical plan and cross section at diagram *D**) sink in a recess, as shown at *f*, Fig. 2. This recess should be of exactly the size of the jewel, which is indicated by the dotted line *i*, Fig. 2. To facilitate handling, the jewel to be set is stuck on the end of a piece of nicely-pointed peg-wood, as shown at Fig. 3. All the cuts except Fig. 1 are magnified. Putting the jewel on a piece of peg-wood enables one to handle it and try it into the recess. After the jewel goes easily into the recess (without side shake), a notch or groove is turned as indicated by the dotted line *k*. This produces the little flange which is to be turned over the jewel to hold it in its setting. About the best shaped burnish for setting jewels is shown at diagram *E**; *l* shows a cross section. After the setting is turned as described above, just touch the edge of the setting with your burnish, so as to close it slightly, then press the jewel into the recess and withdraw the peg-wood, and hold the burnish against the edge to be closed in until the jewel is firm in its place. Fig. 3 shows the jewel on the piece of peg-wood in the position it should occupy, that is, with the convex side (the one which rests against the cap jewel or end stone) toward the stick; this is the best position for facing off the top. The end stone should come very near the hole, but not touch it, as the force required to push the setting into place would crack either one or the other of the jewels if they touched. Measuring calipers like those described in former article should be used—indeed, they are indispensable—and can be applied either for getting diameters or thicknesses. The manner of using is shown in Figs. 1 and 4, where *d d* represents the jaws of the calipers. A tool for turning, when it comes to cutting off and turning the shoulder, is shown at diagram *G**; this tool is filed out of a flat piece of steel, and shaped as shown. The thickness of the flange or edge *o* is of importance, but the part *p* is not important, and at any rate can be modified when the bevel at *r* is turned. After the setting is cut off with the tool *m*, a chuck of large brass wire with the end merely faced flat, is put in the lathe and heated until it will melt lathe wax: only a little wax is applied, and the jewel, with its setting, is placed upon a piece of peg-wood as described above, only reversed, and applied to the end of the brass chuck just mentioned, when it should be heated and centered. In diagram *H**, *F* represents the brass chuck, *s* the piece of peg-wood. The peg-wood serves also to true up by. When the wax is cold, the bevel at *r*, Fig. 4, is turned, and the face at *v* is turned off. Two gravers should be used, the first just whet smooth on an Arkansas stone, the second whet to a perfectly flat angle; by this I mean the face of the end of the graver should be perfectly flat and true (not rounded). It should next be polished at the cutting angle on sides and end. Diamantine or Vienna lime with alcohol, on a piece of sole leather, or what is better, on the end of a piece of box-wood, such as wood engravers use. The graver is drawn toward you in such a way as not to cut or scrape the block. The polished angle of such a graver produces a beautiful polish on any brass it is used to turn. The graver should be applied quickly, and the cut made as you want it at once, or you will not get the best effect. To illustrate, commence to turn with such a graver, and the work at first will be as brilliant as the most highly burnished and polished brass, but in a few seconds the extreme polished edge is worn away, and the cut surface dims in proportion. The top of the setting of cap jewels (end stones) can be finished perfectly flat on a tin lap, but the same precautions must be observed as in polishing steel to keep the work clean. The details, of this process might as well be given, although it is probably known to most of my readers. The surface to be polished is ground with rotten stone and oil on a piece of roughened plate glass; when perfectly flat and all scratches removed, the job should be cleaned with bread crumbs, and then polished on a tin lap with *diamantine and oil.* The diamantine should be mixed with oil and well worked together with a knife blade, to crush all coarse particles. The polish comes almost instantly; and if your work is clean and your tin lap free from grit, the surface will be perfect. This method of polishing applies also to brass wheels and English plate hole jewels. If rouge is used on the tin lap, it is best to select a sharp-cutting rouge like that used for polishing steel. Diamantine is much the quickest, and a very little practice will enable one to satisfy himself, even if fastidious.



GYPSUM CASTS.—To render a gypsum cast water-tight, submerge it in a rather concentrated bath of baryta for from 1 to 12 days, according to thickness, wipe with a cotton cloth and dry in air. The gypsum has changed into sulphate of baryta in this manner, an insoluble substance. It is still porous; to make it dust-proof, rub it with an alcoholic solution of soap, and the pores will be filled with the soap substance when the alcohol has evaporated.

A Credit to his Profession.

TRAVELING AGENTS are generally regarded by the majority of mankind as a superfluous faction of this sphere; but all classes have their good as well as members not so good, and this may with propriety be said of the immense array of walking circulars.

An incident was related to us yesterday in which the traveling agent for Rogers & Bro., of New York, figured conspicuously, and his action was one which in our mind was sufficiently commendable to insure his clan a comfortable seat in paradise. A business man of this city was returning from Midland a few days ago and as the train came in the daughter of the lady who keeps a hotel there informed the conductor that a young man had got on board who owed them a $15 board bill, and had purchased himself a ticket for Elmira, N Y. A search was made for the miscreant but he was not to be found, having secreted himself. After the train was nicely under way the gentlemanly agent requested the conductor to point out the man who held a ticket for Elmira. This was soon done and the agent stepping up to the flying boarder, who, by the way, was a large man, politely touched him on the arm asking him if his destination was Elmira. He was answered in the affirmative, whereupon he drew the landlaydy's bill from his pocket remarking that $15 would settle the amount due for board and that the prompt payment of the same was required. The boarder " would send the money upon his arrival," or almost anything except immediate payment, whereupon the agent declared his intention of lodging him in the station when the train arrived in Saginaw. This brought forth the required cash which our friend the agent handed to the conductor requesting him to deliver to the hotel proprietoress. When his action became known he was the recipient of hearty congratulations from the passengers present. The young man wilted and his remarks were addressed mainly to himself, " d—n bummer, what business was it to him?" was one of his effusions, overheard by a fellow passenger. All on board voted Rogers & Bro.'s traveling agent a credit to the firm and to the craft generally.—From *Bay City Morning Call.*

The Turning with the Fly-Wheel.

[G. BOLEY, IN *Œsterr Ungarische Uhrmacher-Zeitung.*]

ONE OF the most important improvements in the working method of the watchmaker is the turning with the fly-wheel, and it is really a cause of wonder that it has been so tardily adopted hy the watchmaker, while other vocations have made use of it for years.

But the greatest of all wonders is that at this late day there are still so many watchmakers who shorten their otherwise already short span of life by stubbornly adhering to the antiquated drill-bow, notwithstanding that the fly-wheel has over and over again shown itself to be immensely superior, not alone in the saving of time, but also in the execution of the finest kind of work.

The advantages of the fly-wheel in general, may be summed up as follows:

1. The turning with the fly-wheel, the article under treatment always remains in a constant, uniform, and equable motion, wherefore the graver can always lie quietly and firmly upon the rest, and it is not necessary to make twitching motions.

2. A far greater velocity may be imparted to the article under the operation of turning, a fact of great importance when manipulating very thin articles, if they are to be turned round and smooth.

3. The cord run is a continuous one by the fly-wheel, and takes place in one direction; it is unnecessary, therefore, to cross the cord, by which a not unimportant saving is effected, at the same time its disagreeable defibring is done away with, which has cost the life of lo! how many a pivot.

The disadvantages of working with the drill-bow on the other hand, are:

1. The article to be turned receives two contrary motions by the up and down motion of the drill-bow, of which, for self-apparent reasons, only the downward motion can be utilized. Even if the same speed were obtained with the bow as that of the wheel, the time of the upward motion would be uselessly lost, and the same work can be performed by the wheel in half the time. But this ratio in reality still increases by a significant degree in favor of the wheel, because the speed which the latter is able to impart to the article can never be obtained with the bow.

2. In consequence of the double motion when working with the bow, the operator is necessitated to remove the graver from the article during the upward motion, and to approach it again at the down stroke. Although this may occasion no new loss of time, still, even the most skilful workman will work more securely and better when these continual jerks are done away with, and he is enabled to keep his graver quietly and firmly upon the rest.

3. When turning with the bow, a split collet is generally mounted upon the piece in hand, upon which the cord crosses; this cord is not alone deteriorated by friction at the point of crossing, but suffers also from the sharp corners of the collet splits. The fibre created thereby entwine and give rise to a jerk and blow motion, which, in the case of fine work, is disagreeable as well as dangerous.

Many a reason might still be urged against this hoary-headed utensil of the watchmaker's guild, but I might as well direct my attention to something else, since everyone of my colleagues full well understand all its short comings, having made their acquaintance even in this very honeymoon of horology, when he articled himself to the profession.

It is not out of place, perhaps, to mention that the apprentice consumes fully three times as much time in acquiring the use of the drill-bow than he does with the fly-wheel—a fact cheerfully attested to by anyone who has had the education of apprentices. Even older workmen, who for the sake of curiosity have tried turning with the fly-wheel, soon accustomed themselves to it uses, and a short time after discarded the bow.

It is a marvellous piece of prejudice of many of our colleagues of the drill-bow party, to believe that the fly-wheel is not whatever adapted for the execution of finer work, such as turning on a pivot, drilling it in, etc., while actually these works can be executed rapidly and securely only with the fly-wheel; but for this, a small and very simple contrivance upon the turning tool is necessary, by means of which the cord is sufficiently slack that the article is arrested at once if the graver should be forced beyond the measure admissible for its security. This is the friction pulley, which I will later on elucidate when discussing the manner of turning.

When a watchmaker has at last decided to discard the ungainly heirloom, and to use a fly-wheel, the great question forces itself upon him—which? His first decision will have to be made, whether fly-wheel for foot or hand? If steam, water or gas power stand at disposal, and very many delicate pieces of work are to be turned, it is well to use such a motive power, because the workman in this case need mind nothing else but his work.

The watchmaker, especially he who labors in a large city, must by the choice of this utensil be influenced much by local conditions, and devices the most expeditious even cannot always be brought into use. If, for instance, it were to be decided to locate a foot fly-wheel, the somewhat larger place occupied thereby will frequently be a source of hindrance. Many of the workmen are already so much overburdened with chests of drawers, etc., underneath their working bench, that a man of large size frequently does not know what to do with his feet; and the benches are sometimes so small that it is barely possible to locate the necessary fixtures for placing a foot fly-wheel, which, moreover, may further be hampered by a show window right before his bench.

All these untoward conditions will therefore forbid the introduction of a foot fly-wheel, except the workman is willing to institute changes and incur considerable expenses. But whoever has the space to spare, and a steady business or situation, would commit an error if he should purchase anything else than a large foot fly-wheel, because, according to my estimation, the hand fly-wheel is simply a transition from the drill-bow to the actual fly-wheel moved by the foot, by which the workman is enabled to direct his entire attention to the work of his two entirely liberated hands. The great advantages of this manner of working, force me to the conclusion, that in the near future every one of my colleagues will have near his bench-vise the necessary fixtures for the fly-wheel. It is to the interest of every employer, because the work can be performed quicker and better, whereby the proportionately small expense will soon pay for itself. It cannot be denied, that the location of a fly-wheel on many benches would be connected with expenses, still, I can only reiterate that such a one, no matter what kind it is, is superior by at least tenfold to the drill-bow.

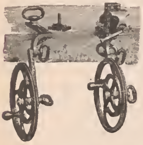


Fig. 1.

The hand fly-wheels are divided into two classes, with regard to their manner of fastening, viz., such that are fastened into the vise, and those screwed to the bench. (Fig. 1.) By the former, the turning tool is kept in place in a slot of the fly-wheel frame, and thereby if of one piece as it were with the wheel, so that the wheel and frame may be taken out of the vise after having used it, without even the necessity of loosening the cord.

The frame of the wheel forms an elbow lever, by virtue of which it can also be used for tightening the cord, and it possesses the advantage besides that it can be folded together when packing it, and thus occupies less space than as if of one piece.

The fastening of the wheel to the bench is contrived in such a manner, that the fly-wheel frame in this case consisting in a longer forked arm, may be moved backward and forward under the bench, whereby the wheel may remain under it when not in use, and withdrawn only when to be employed. The above described elbow-lever is introduced also to this contrivance. Both wheels are provided with a crank on either face, so that motion can be imparted to them from the right as well as the left.

Special care must be paid to the hand fly-wheels that they are not too small, else the hand has to make too many motions, a defect always connected with unsteadiness of position which is injurious especially in the case of more delicate work. The wheel at the same time must not be too light, so that it will equalize the irregularities of hand motion by its centrifugal force.

THE FOOT FLY-WHEEL.

The chief attention to be paid to these is that the outer rim of the wheel, which effects the compensation of power, be of sufficient weight, because as uniform and steady motion is only obtained by such a one. It is equally advantageous to choose the cord which effects the motion between wheel and fixtures of a good thickness, by which the necessary friction for the motion of the fixture is obtained without being forced to give too much tension to the cord, by which the friction of the wheel and fixture pivots would only be increased, and interfere with the steady motion of the machine.

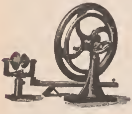


Fig. 2.

The wheel hangs on an iron foot, which can either be fastened underneath the woodbench or to the ceiling. The latter has the advantage that the wheel is no hindrance, and no holes need be drilled into the wood bench, while with the former manner, the wheel is near at hand, and it may easily be arrested, or rapidly moved backward or forward, which, for instance, by the polishing of a pivot is very commodious, because the forward and backward motion of the file requires a suitably opposed motion of the pivot. The foot contains a slot, in which the axis of the fly-wheel is movable, whereby the cord may optionally be tightened.

THE PULLEY DEVICE.

This contrivance serves for the transport of motion, and is contrived so that the velocity of the piece can be regulated thereby without removing the foot too rapidly. When using such a device, attention must be paid to having it so that it may be regulated toward all sides in such a manner that all the tensions of the cords may be regulated, because this work occasions much vexation and loss of time if the contrivance is imperfect. The pulley device of No. 2 consists of a cast-iron, cylindrically hollow foot, in the tube of which fits a pivot for regulating the cord tensio betweenn wheel and contrivance, and which may be retained at suitable height by a movable ring. The pivot carries the bracket in such a manner, that it may also move in order to regulate the tension of the cord. An attachment screw retains the bracket in place. The bracket is provided with an arbor, upon which two step-pulleys are mounted, each of which has four cord grooves. The pivots of the arbor run in drilled-out steel cylinders, which at the same time serve as oil sinks. The upper part (bracket with arbor) is also movable in a horizontal direction, to prevent frictions of the cord against the sides of the pulleys.

TREADLE.

Several kinds of treadles may be employed, and location as well as comfort decide the question. The one represented in fig. 2 is a simple board with a small shoulder, to prevent the sliding of the foot. The fulcrum or center of motion is under the instep, so that the motion of the foot is more of a rocking one; if the treadle was fastened with a joint, the point of the foot should have to execute the entire motion which disturbs the necessary quietness of the body when turning, especially by a high hub. The center of motion rests upon an iron angle, and the whole contrivance, if to be used, is placed upon the floor; when finished, it is placed to one side, a labor easily effected since the union with the ex-center of the wheel simply consists of a cord. The movability of the treadle is valuable especially when hunting for a lost article.

Fig. 3.

Fig. 3 shows one-half of a working bench, in order to present the position of the wheel and pulley device as well as run of cord, and needs no further explanation.

Should this article cause one or the other of my colleagues to abandon the drill-bow, I shall be glad, and I am fully satisfied that he will not regret the change.

Simple and Compound Pendulums.

[BY ERASMUS GEORGI.]

Continued from page 340.

JURGENSEN'S REMARKS ON THE BALANCE AND SPRING.

THE BALANCE is the regulator of the watch. We know that it is a circular body, provided with a concentric axis, and remaining in perfect equipoise in all possible positions. The balance staff ends in pivots, moving within proper holes, and in this manner facilitating its free motion. The pendulum oscillates by power of its attraction of gravity; the balance, by the operation of a very elastic, spiral-form spring, called the balance spring. The inner coil of this spring is fastened to the collet, which is cylindric, and pierced by a hole, in which the inner end of the balance spring is fastened with a pin. This collet fits tightly upon the balance staff.

The balance, when set in motion, would vibrate forever, but the friction of the pivots and the resistance of the air gradually destroy its action. In order to preserve this, an external force is necessary, for restituting the force lost by motion. This power must be more or less large, according to the greater or smaller friction of the balance. To insure, therefore, that the vibrations of this regulator be disturbed as little as possible by external interference, it is necessary to contrive it in such a manner that the friction and the resistance of the air be reduced to the smallest possible quantity, without, however, sacrificing any of its other properties necessary for the exact measurement of time.

The external motions and jolts to which a watch is liable, exert an influence upon the vibrations of its regulator, and increase or decrease its extension, which would be of an injurious effect upon the regularity of the watch's rate, if proper precautions had not been employed to render such an effect as small as possible. It will be seen by the preceding that it is necessary to: *a*. Decrease the influence of external motions upon the vibrations of the watch as much as possible; *b*. Reduce all frictions to a minimum quantity; *c*. Decrease the resistance of the air upon the balance to the smallest possible amount.

A.—Means of reducing the influence of external motions upon the balance.

As we have already said, motions to which a watch is exposed exert an influence upon the vibrations of the balance, and contract its arc. No means are known for preventing this influence entirely; but its injurious effect may be diminished in a manner sufficient to have as little influence as possible upon the rate of the watch. Motions occurring in the direction of a straight line passing through the center of the balance do not change its vibrations, because the influence of this motion upon the balance upon the one side of this line is annulled by the influence of the same motion on its opposite side. But there is no motion, perhaps, which is not more or less circular, because no matter how small the motion the watch suffers, varying from the straight line we mentioned, it occurs more or less in a circle, and attention must be paid to such motions, since especially they chance the extension of the vibrating arc. By supposing that the external motion occurs in the plane of the balance, and unconditionally in a circle, we assume the most unfavorable case that can ever occur, and if we then succeed in reducing the influence of such a motion to as small a quantity as possible, we may be sure of having rendered it still more insignificant, and to almost nothing in the case when such motion only occurs in a trifling degree, which is nearly always the case when the watch is worn.

Let us suppose that the balance makes two vibrations per second, that the vibrating arc be equal to 175°, and that the external disturbance occurs in a circle in the plane of the balance, and be of a magnitude of 25° per half second, then the motion of the balance will be accelerated seven fold more than that of the disturbance of the watch, and it will be clear that the motion of the balance cannot be accelerated or diminished more than one-seventh of its extent—that is, the largest arcs will be 200°, the smallest ones 150°. If we again suppose that the balance makes four vibrations per second, that the vibrating arc be still 175°, and that the outer disturbance of the watch in a circle amounts to 25° in half a second, then the motion of the balance will be 14 times quicker than the disturbance of the watch, and the vibrating arcs will in this manner deviate only by one-fourteenth; the greatest arcs will then, by the supposed external disturbance, be equal to 187½°, the smallest ones, 162½°. According to the first supposition, the arcs would vary by 50°; according to the latter, the vibrations will occur twice quicker, and the arcs would vary by 25°, whence may be deducted that the influence of external disturbances upon the rate of the watch can be lessened by an increase of its vibrations in a given time; and, in general, the greater the rapidity of the balance, the better it will resist external disturbances.

Notwithstanding the correctness of the preceding rule, both the number of the vibrations and the velocity of the balance have a certain limit, experience having taught that too rapid a vibration would unduly increase the frictions of the different parts of the watch, and the latter would prematurely destroy them. It has been found, therefore, that a mean between rapid and slow vibrations is best, and not to increase the number of vibrations beyond the power and composition of the watch. Experience has, happily, furnished us with safe rules for the purpose of attaining this object, by establishing that the balance should make at least four, and not beyond five, vibrations per second.

B.—Friction of balance pivots, and means for rendering them as small as possible.

Before we indicate the proper means for reducing the frictions of the balance pivots to as small a quantity as possible, it is necessary to state what is called the motion dimension of a balance. Two things must be considered in the motion of this regulator, viz.: The bulk or weight of the balance, and its velocity. The bulk, multiplied by the square of the velocity, gives the dimension of motion of the balance.

This dimension of motion, with regard to the friction of the balance pivots, must be as large as possiple, because the resistance of the pivot frictions is overcome thereby. This dimension of motion may be imparted to the balance in a two-fold manner, either by a larger weight and a smaller diameter, or by a larger diameter and less weight or bulk. The diameter determines the velocity of a point upon the circumference, and this point will have double the velocity of a point upon the circumference of another balance, the diameter of which is only the one-half of that of the larger balance. The velocities may therefore be expressed by the diameters, and if the weight of a balance $=16$, and its velocity $=16$, we will obtain for the dimension of motion $16 \times 16^2 = 4{,}096$. If next we set the weight of another balance at 4, and its velocity at 42, then we have for the dimension of motion 4×32^2, which also gives 4,096.

It is known that the friction multiplied by the bulk or weight may be ascertained. If the vibrations of the large and the small balances are assumed at 360°, then the motion of the pivots in their holes will be equal in both balances, and from this side the friction will be equal. Consequently, it is only the weight of the balances that could effect a variance in the friction. In the large one we have assumed the weight to be equal to 4, and in the small one to be equal to 16; therefore the friction of the large balance is four times less than the friction of the large balance is proportioned as 4 : 16, or as 1 :4, that is, that of the small. We see, therefore, that a balance of a large diameter but less weight, has less friction than another one of more weight but less diameter, while the dimension of motion is equal in both.

It will be seen by the preceding that it is not proper to use too small a balance, because the weight would have to be increased unduly in order to obtain the demanded dimension of motion, and the friction would be augmented to an undue amount thereby. It is also not admissible to make the balance so light that the entire momentum of motion is produced by an unduly large diameter, because such a regulator would not have the necessary solidity, and rather possess the qualities of the fly wheel than that of a regulator. There is a proper medium between these two limits, the correctness of which has been established by experience, and the dimensions found in balances of watches of very correct rate, may be adopted as pattern.

The stronger or weaker friction of the regulator pivots depends not alone upon the larger or smaller weight of the balance, but also upon the condition of the pivots themselves, and upon the holes in which they move. The thickness of the pivots, their greater or smaller hardness and polish, length, the substance of the holes, the condition of the oil used, the proportions between the diameter of the pivot and that of the hole—all can contribute to materially influence friction. It is necessary, therefore, to employ all means at command to lessen this friction, and, moreover, such must be used by which this friction, if it cannot be removed entirely, at least it can be made as constant as possible. These means are:

1. To make the pivots of as small a diameter as is commensurate with their solidity; since the pivot frictions stand in a direct ratio to their diameter, those of smaller dimension have also smaller friction.

2. To make the pivots as uniform as possible, polish them well, as well as harden, in order to retain their polish.

3. To use hard jewels, sapphire or Oriental ruby, in which the pivots are to move.

4. Cause the pivot ends to move against caps of hard jewels, and if a chronometer, which always is supposed to remain in a horizontal position, cause the pivot end carrying the balance to move upon a smooth and well-polished diamond.

5. To carefully oil the pivots, in order to prevent friction and oxydation.

The greatest possible liberty of the vibrations of the regulator and the constancy of the occurring friction, that cannot be prevented, are of the greatest possible importance in a watch. Nothing contributes more materially in producing these perfections than the jewel holes in which the pivots move; but it is very essential that these jewels are well shaped, for the oil to be well retained within them; and, again, it is unconditionally necessary that they be polished to the highest perfection, in order to preserve the polish of the pivots.

The jewel hole with its cap is too well known to the horologist to require an illustration. The jewel is perforated for receiving the pinion, and is set in the ordinary style. It is convex upon the side turned toward the cap jewel, and this is also provided with a brass setting. The flat side of the jewel is more contracted in the middle than at the end. By this means, the oil which is lost in fluidity, and the dirt which might collect in the hole, are prevented from exerting too much influence, and the corners of the holes, which stand farther apart, cannot injure the pivot, a thing which occasionally occurs if the holes are only cylindric, and the corners rounded but slightly. In such a case there needs to be no sink upon the raised side of the jewel; it is sufficient that the corners of the hole is a little rounded off; the cap jewel must almost touch the upper arch of the convexity of the jewel, and only very little shake must be between the jewel hole and the cap, because by this means the oil between the cap and the convexity of the perforated jewel will, on account of cohesion, constantly try to return into the hole, when the oil which has been placed into the sink is gradually drying out.

The different oils exert a great influence upon the regularity of the rate of watches. Some are subject to thickening and drying out, others attack the metal, and in both instances their influence is injurious. Many experiments have been made to improve these oils by chemical processes. Jurgensen tried a great many of these thus prepared oils, but results at last forced him to conclude that the pure and natural oil, as it is obtained from olives by incising and gently pressing them, is the best lubricant in horology.

As far as pocket and marine chronometers are concerned, no oil is necessary for the rubbing parts of the escapement, and much is gained hereby; it is only indispensable for the pivots, and by making those of the balance and scape wheel very fine, observing the above given rules, the influence of the oil is vastly reduced, so that, even if the best grade of oil is not used, its influence upon the rate is reduced to a minimum.

It has already been stated that it is also as necessary to have the balance pivots in good order, that is, well hardened and polished.

A pivot is not truly conical, but it passes from a conical commencement into a cylindrical shape. If the pivots are made in this manner they are very strong and solid, in spite of the delicacy of that part moving in the jewel. It is indispensable to make the diameter of the pivot much smaller than that of the jewel hole, so that the oil, which thickens sooner or later, cannot hinder its face motion within the hole. The rule generally observed most successfully, with regard to the diameter of fine pivots proportioned to that of the jewel hole, is to make the pivot diameter one-sixth smaller than that of the jewel hole.

The balance spring would interfere with the free motion of the balance if it were situated so that it presses the pivots against the walls of the holes.

In order to prevent this, care must be taken to have both the centers of the spring and balance fall together in one point, and that the spring, after it is fastened within the stud, retains its natural shape, and does not appear to be pressed either to one side or the other. The skilful and experienced workman, who understands the placing of the balance spring, never overlooks this essential part, since this spring is, as it were, the soul of the watch, as we will see farther on.

C.—The resistance of air to the balance.

We have seen that the reduction of the resistance of the air in the construction of the pendulum is indeed not a matter of secondary importance, and it is readily understood that it is the more so in the case of a balance, as it has a greater velocity than a pendulum, and has less weight with which to conquer such resistance, wherefore it is far more influenced by the air than the latter. It is beyond our power, however, to reduce this influence of the air to the smallest possible quantity, except by decreasing the diameter of the balance; but we have seen that a small diameter increases the friction, the influence of which is much more injurious than the resistance offered by air. But, happily, the density of the air is subject to only trifling changes, and will consequently never assume noticeable proportions for causing irregularities of rate. Since it is not possible for us to prevent this resistance by making the balance diameter very small and its vibrations less rapid and large, nothing remains for us but to give to the balance, the diameter and velocity of which are determined, the most advantageous shape, in order to be hindered as little as possible by the surrounding air. For this reason it is well to make the balance shanks sharp, to enable them to better cut through the air. It is also equally appropriate to make it circular, because in this shape it will have more weight or bulk and less resisting surface. According to the same principle it is also good to construct it of a metal of great specific gravity. Platinum would be most appropriate; after platinum, gold; and after gold, brass. As far as the compensation balance is concerned, of which we will treat farther on, it is subject to still greater resistance of air than an ordinary one.

Having reduced the balance friction to the smallest possible quantity, and decreased the resistance of the air as much as possible, the balance is far on the road to perfection for serving as a time measure, but the influence of the temperature, as well the heat as the cold, will be not a trifling cause for producing irregularities.

(*To be continued.*)

Obituary.

SAMUEL YOUNG ARROWSMITH, who was well known in the diamond and jewelry business for many years, died suddenly Dec. 17, at his residence, 155 Gates ave., Brooklyn, in the 74th year of his age. He was born in Shrewsbury, England, in 1808, and came to this country some fifty years ago. Shortly after his arrival here a jewelry firm was organized, of which he was one of the members, under the name of Barnard, Walters & Arrowsmith. After continuing for some time the firm was succeeded by Shaw, Walters & Arrowsmith. Subsequently this firm dissolved, and Mr. Arrowsmith formed a partnership with Mr. Rait under the firm name of Rait & Arrowsmith, which was afterwards succeeded by Saulsbury & Arrowsmith, and continued in business until 1860, after which time Mr. Arrowsmith associated himself with the late firm of Buckenham, Cole & Hall until 1868, when he retired from active business. He was widely known throughout the South among the jewelers, and highly respected by the trade in general.

Mr. Arrowsmith had been ill in the fall, but had apparently recovered. At the supper table Sunday evening he appeared to be in his usual health. On going upstairs, however, in the evening, he was taken ill, and died within an hour. The cause of his death was asthma and heart trouble. He leaves a wife and daughter. The funeral took place from his late residence, Wednesday, Dec. 20, at which there was a large representation of the trade.

Gilding Apparatus for Wires, Fabrics, etc.

THE DEMANDS made of such an apparatus are: a handsome gilding, a contrivance permitting that even the thinnest wires may be gilt without breaking, and that it spools the wires. The gilding is effected by conducting the silvered wire through a galvanic gold bath by aid of a mechanical contrivance.

The gold bath is contained in a porcelain enameled iron vessel, into which the galvanic current is conducted. Platinum or gold plate is used as anode. The wire to be gilt runs over a metal roll standing in connection with the zinc pole of the battery, and is kept down in the gold bath by porcelain or vulcanized India rubber rollers. After the wire or fabric has passed the gold bath it passes over glass rollers, and enters into a cyanide of potassium bath, in which it is also kept down by porcelain or India rubber rollers. It next passes through clean water for washing. It is then dried by 3 or 4 rollers swathed with cotton cloth, and reeled up.

For gold bath may be used 15 grams neutral gold chloride, 100 g. French cyanide of potassium II, 75 per cent., and 1 liter distilled water.

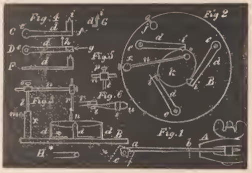
I store the bath of this strength. When used, it is to be diluted with 1 or 1¼ liters water; it is necessary to take 75 per cent. cyanide. The commercial French cyanide of potassium III contains only 55 to 60 per cent., which is too feeble and too much mixed with other salts. That of I is about 95 per cent. strong, which is too much, and, by its use, a decomposition of the gold bath easily occurs, black bodies are formed, also brown solutions of paracyan.

In the drawing contrivance the transmission of motion is only effected by tight cords, whereby all blows and knocks are avoided. In order to prevent every friction, the wire to be gilt passes over easily revolving rollers. The traction motion is effected by a crank, and the connection between crank and reel is obtained by tightened cords. A second run of cord from the crank axis produces the uniform spooling. Between the crank axis and conduit of the to-and-fro motion, several discs must be interposed, in order to produce a very slow motion. Different rates of speed can be effected by cones upon the traction contrivance.—[Dr. Ed. Ebermeyer.

Advice to Watchmakers' Apprentices.

BY A MAN WHO HAS SPENT TWENTY YEARS AT THE BENCH

AT THE PRESENT day the manufacture of jewelry is a trade by itself and separated from watch making, still, in small country towns, the watchmaker is expected to be watchmaker, jeweler, and engraver. This is *pooh-poohed* at by many workmen, but the oft-recurring advertisements in the columns of The Jewelers' Circular reading very much like this, is certainly significant: "Wanted.—A first-class watchmaker, one who can engrave and do jewelry jobbing preferred." With this condition of affairs looking us in the face, it stands one in hand to look to every inducement which will enhance a journeyman's chances of obtaining a situation. We will first discuss some of the jobs of jewelry repairing, and also give a few hints in regard to manufacturing some solid articles of jewelry, and likewise a description of some of the commoner goods made with dies. The simple thing of putting in pin tongues or stems, is something that should be done very quickly, yet most of our jobbing jewelers take four times the time necessary. The best pin tongues after gold ones (all things considered) are those of hard brass wire, hard soldered to the joint. This of course softens or anneals the part from *a* to *b*, fig. 1. To harden this part, most workmen burnish; this is a slow laborious process. If the pin tongue is grasped as shown in fig. 1 in the pin vise *A*, and the joint *a* is also grasped with a pair of flat-nosed pliers, as shown at the dotted lines *c*, and the pin vise revolved back and forth, producing a twisting of the soft part of the stem from *a* to *b*, it will harden it much more effectually than any burnishing. The amount of twisting required, varies a little with different samples, but generally from half to three quarters of a turn back and forth 3 or 4 times to commence with. A few trials will give the necessary experience, and enables one to judge of the right amount of hardening, as one extra twist after the hardening is established only injures the pin. The joint should now be filed and broached out to fit the other part of the joint attached to the broach. I should have started out with the remark, or injunction rather, that jobbing should never be done on the same bench as watch-work, as such an alliance or combination of work so different always leads to trouble. The same can also be said of engraving. A very small bench will serve for jewelry repair, and also do for engraving purposes. A few words on soft solder and soldering fluid may not be misplaced here. There are many receipts for soldering fluids some of which are warranted not to rust any steel thing, but the writer has not been so fortunate as to find their qualities coming up to the recommend. Chloride of zinc dissolved in alcohol is often recommended to possess the qualities mentioned, but it does not work as well as the ordinary *and will rust.* A bottle of soldering fluid should be kept three or four months before using, and allowed to stand with extra zinc which will not dissolve. A solution of cyanide of potassium will neutralize soldering fluid, *i. e.*, dip a job in a solution of this substance (½ oz. to the quart) and it will remove the soldering fluid, it also serves to remove stains. Some jewelers object to cyanide solution, saying it dissolves off the gold, but the same party will scrub away at a 5 cent plated broach



with a stiff brush and chalk without a qualm of conscience; the truth of the affair is, if the gilding is good, neither cyanide or any moderate brushing will materially affect the gilding, but with the ordinary cheap jewelry, any way to get it bright and "*shiny*" is perfectly legitimate. No doubt but the best method of proceeding is to have a polishing lathe, but in many shops room is important, and the space a polishing lathe would occupy must be devoted to something else. When one uses a foot lathe for watch work, a brush wheel for jewelry should never be used, as it will speedily destroy the lathe for any accurate job, saying nothing about the spatter of rotten stone and rouge. If you have a back shop, as was strongly recommended in one of the first of these articles, by all means have a polishing lathe, and that separate from the heavy solid foot lathe recommended for tool making and heavy clock work. Men who combine a knowledge of jewelry jobbing with watch making, should not be expected to be so rapid as such persons as devote themselves constantly to such work; still I know workmen who can put in a new balance staff and finish it as nicely as it could be done at the factory where it was made, in fact fine watchmakers in every sense, and in addition can put in pin tongues at the rate of 12 an hour, hard solder on a watch joint in 15 minutes (and polish it up), hard solder a finger ring, in fact do all ordinary jewelry repair jobs in a creditable manner, and still have good sense to know they are not diamond setters, nor high art jewelers of any kind. One of the difficulties the novice in jewelry jobbing experiences is the want of a third hand—as I once heard an apprentice say, "no boy if he had'nt three hands should ever learn the trade." A device shown in elevation at fig. 3, and in plan at fig. 2, will serve to hold almost any job which needs being pieced together. The making of such an affair will not absorb many hours, and it will be found very useful not only for soft solder jobs but for hard soldering as well. The bed *B*, fig. 2, is made of some moderately hard wood like cherry or black walnut, and about 4 inches in diameter, and half or three-fourths of an inch thick, and is best round as shown, as this shape facilitates turning in the hand so as to bring the blow-pipe flame into action. Attached to this bed piece are three pieces cut from sheet brass (about No. 16), these pieces are shown at *d d d*, fig. 2. One of the pieces is shown in its first form (as cut out from the plate) at *C*, fig. 4; this piece is bent to a right angle at the dotted line *f*, so that if it (the piece *d*) was seen in the direction of the arrow *h*, it would appear as shown at *F*. The teeth cut at *i*, are bent as shown at *G*, which is a view as seen in the direction of the arrow *g*; *D* is a plan of the piece after bending. These pieces (three in number) after bending as described, are screwed to the bed *B* with three wood screws shown at *e e e*, and are held in place by friction. The manner of using is—to illustrate, say we have a broach which we wish to solder a joint on; the broach is placed in the three jaws *i*, as shown at fig. 2, *K* representing the broach. At *x*, fig. 3, is shown a short piece of brass tube (interior diameter of which is about ⅛ of an inch), into this goes a piece of brass wire as large as will work easily; near the top of the tube *f*, is a set screw *m*, for holding the wire *l* at any position. At the top of the wire *l*, is a short piece of brass tube same size as *x*, shown at *o*, this piece is shown separate and enlarged at fig. 5, with a set screw at *p*; *n*, fig. 3, is exactly like *l*, consisting of a short piece of tube *o*, and set screw *p*. A piece of wire like *l* and *n*, is shown at *r*, this works in the short tube on *n*, and has at the lower end a pair of slide clips as shown in fig. 6, where *s* is a slide and *t* a screw or rivet for attaching the clips or jaws to the vise *r*. Another piece of tube like *x*, together with the pieces *n*, *l* and *r* can be attached at *j*, or other convenient place to hold a second piece. A piece of charcoal can be placed in the jaws to *d d d*, and the clips *u*, used to fasten work in place when hard soldering. The clips *u* are better made of Russia iron than of steel, as they bend better at *t* and stand re-heating. Such a tool as just described may seem a little unnecessary to the practiced and experienced workman, but I assure the beginner it will save a good many burnt fingers and lots of ill-temper. It takes but a few seconds to secure a piece in any position, and with the extra arm at *j*, as said above, two pieces can be held. By substituting a piece of iron wire for *r* with a notch in the end as shown at *H*, a joint for watch case is held to perfection; of course in this instance a large piece of charcoal must be in the clamps *d d d*, and the other arm say at *j* used to hold the case in position. The end of the wire *H* should be filed flat and notched, and in soldering this must be kept as hot as the job, or it will serve to chill and prevent the solder from flowing. It is not desirable that the arm which holds the case should clasp it in any way, but be only in such a position as to hold the case down firmly on the charcoal—if it is a cap, let the holding wire rest against the middle while the forked wire holds the joint. If the central band of a case needs a joint, put a 6-penny finishing nail across from side to side, letting the holding wire rest on this—the joint as before.

The Great Magnetic Storm.

THE GREAT magnetic storm which recently thrilled through the earth's frame was one of the most remarkable phenomenon of the kind which has occurred in a year, memorable for auroral displays. The sudden manifestation of its subtle but intense force, just as marked meteorological disturbances and winter's out-burst in our latitudes occurred, strongly suggests the probability of some unexplained connection between the magnetic and atmospheric weather. The appearance on the 13th November of a vast brilliant auroral arc at Phelps, in this state, led Professor Brooks to warn us that "great meteorological disturbances might be expected." Years ago the Italian astronomer Secchi pointed out the fact that the aurora "is followed by a decided and extensive change of weather and seems to be connected with great atmospheric movements." With more precision Marié Davy announced in 1866, as the result of extensive inquiries, that "general disturbances of the telegraphic lines due to widespread auroras, indicate general movements of the atmosphere in high latitudes and over the Atlantic." Subsequent observations of simultaneous magnetic and meteorological conditions undoubtedly corroborate this conclusion. But unfortunately no law connecting the two kinds of phenomena has yet been discovered, though science has had ample opportunity to make such discovery.

It seems, for these and other reasons, more probable that such phenomena as were recently witnessed in this country are due to solar agencies, the effects of which culminate about the same time both meteorologically and magnetically. It is easy to see how increased radiation of solar heat may affect the barometric and hygrometric conditions of our atmosphere, but it is not so clear how it will affect the earth's magnetic conditions. Still we are not wholly without evidence that the sun does affect terrestrial magnetism both directly and indirectly. The great magnetic storm of September 1, 1859, rose and made its vibrations felt simultaneously with an observed outburst of energy on the solar disk, and the equally remarkable magnetic storm of last April was coeval with the passage of a tremendous spot on the sun's surface. But a hopeful clew to the unravelling of the mystery is found in Sir George Airy's discovery that the diurnal inequalities of the magnetic horizontal force are "the effects of the attraction of the red or north end of the needle by the heated portions of our globe, especially by the heated sea, whose effects appear to predominate over that of the land." The sun, therefore, seems to exert a direct and occasionally powerful influence on the earth's magnetism and also an indirect influence, through the heated ocean and land masses of the globe. And it is not hard to believe that, after the recent observed variations in the sun's activity, that body is now responsible for our late magnetic storm. So marked have been the apparent thermal conditions of the sun during the last three months that the English scientist, Mr. Mattieu Williams, thinks "the recent weather of the earth indicates an appreciable increase of its mean temperature." Though these conclusions are necessarily hypothetical and the data on which they rest extremely fragmentary it seems nevertheless that they point to the inference that our coming season is not to be marked by abnormal and excessive cold.

The present year has been extraordinarily fruitful in intense and widely extended magnetic and auroral phenomena, and if science is to do anything in our generation toward clearing up the mysteries of their origin and of their relations to great meteorological events it should be astir. With the large network of meteorological observations encircling the middle latitudes of the globe and even the Arctic area, all the data requisite for reinvestigation of these phenomena are within reach. If the great problems of terrestrial physics thrust upon the world by such disturbances as have just been recorded were scientifically attacked in earnest, results of the highest scientific and practical value would doubtless be soon secured.

AN OPERA and spy-glass combined has lately been patented by B. H. Blank, a salesman in the employ of Levy, Dreyfus & Co. of this city. The instrument is constructed so as to be easily detached from the frame and used as a spy-glass, the latter part is provided with an adjustable lens (or ocular) and can be adjusted by simply turning the top (or eye-piece) to the right or left in cases where a person's eyes are not alike in focal power. The frame is centrally jointed and can be adjusted to the different widths between the eyes, it is of greater power than the ordinary opera-glasses, and the inventor of this instrument is also the author of a little work entitled "Imperfect Sight; its Causes and Remedies," which treats on the ailments of the eyes.

GILT SURFACES.—30 grams borax dissolved in 1 kg. of water is the best agent for cleaning gilt surfaces. Rub these gently, then rinse with pure water, and dry with a soft linen rag.

Foreign Gossip.

AMBER.—The yield of amber of the German Ocean is increasing. During the year 1880 it amounted to 315,000 pounds, and was obtained by means of steam-dredging machines; while in 1879, it amounted to 280,000 pounds. In one place 158 overseers and 800 workmen, and in another 500 workmen, were occupied.

PUBLIC INSTRUCTION OF PARIS.—The municipal budget of instruction for 1882, of the city of Paris, amounts to 23,000,000 francs, of which 99,700 francs are for higher branches; 1,541,793 for middle, and 14,990,800 for primary; 2,851,740 are for special primary; 1,250,400 for professional, technical, and special; 427,600 for the associations of public instructions and orphanages; 1,996,600 for asylums, etc.

GLYCERINE MIRRORS.—Glycerine separates the silver from an ammoniacal solution of silver nitrate, produces a more perfect mirror than aldehyde. The separation of silver is incomplete without the employment of heat. Upon the addition of a solution of potassium hydroxide, the separation is effected without heating. Alcohol and ether promote the separation of the silver in the hot solution. It is said that the mirrors are brighter in dark than in light.

BULLFROGS.—According to the *Vienna Landw. Ztg.*, English agents are busily scouring over Austria for the purchase of bullfrogs, paying for them at the rate of 30 to 40 fl.—$13 to $15—per 1,000. They are packed in moss-lined perforated boxes and expedited to England and Holland. A Mr. Krelage, of Harlem, Holland, one of the largest garden owners of that country, and a Mr. Smith, of England, purchase these interesting animals for their storehouses, to consume the many insects and cockroaches.

SUGGESTIVE.—A Paris correspondent says: "The paper manufacturer who would send a skilful, intelligent workman to Japan, to study the uses to which paper is put there, and to select judiciously those which may be introduced here, would be sure to amass a great fortune. The great changes of the coming age will be the uses to which glass, paper, and porcelain are going to be put. London jewelers find gas and glass their best shields from burglars; glass floors counters and shelves are getting common. Porcelain and earthenware walls are beautiful and recommended by many advantages."

MICROSCOPES.—The power of the microscope has been increased so greatly by modern science that it will magnify objects of about 100,000 diameters. Unassisted human vision can perceive no objects smaller than the three-hundredths inch in diameter; but the microscopist, with the best instrument, is able to examine monads one-hundred-thousandth of an inch in diameter. Beyond this is obscurity. Scientific men estimate that the ultimate particles or atoms composing all matter can be no smaller than one twenty-millionth part of an inch in diameter, and it appears to be barely probable that they will ever be revealed to the human eye.

MATERNAL LOVE.—A sorrowful discovery was made lately at Pompeii, well calculated to excite the highest sympathy of the feeling breast. While excavating a street, the remains of a child were found, and a plaster cast was obtained in the usual manner (pouring plaster of paris into a hole made for the purpose); the endeavor was not quite successful, one leg and a part of the right arm were wanting; yet that obtained shows that the child, with left arm wrapped in the tôga, with the right covered its mouth, in order to prevent the breathing of obnoxious gases. The body was found close by a window, while inside the house the skeleton of a woman was found, who, to judge by her ornaments, belonged to a wealthy family, had her arms extended toward the child. It is rightfully supposed that the child belonged to her, and that she either dropped it in her last agonies, or that she placed it outside upon the streets, to at least try to save it. She wore a heavy bracelet on each arm, and two finger rings with precious engraved jewels; upon one stone, Mercury, with bag and staff, is seated upon a rock; the other is an intaglio, representing a cornucopia.

SIGNIFICATION OF "STERLING."—When, during the middle age, the commercial England of to-day was only a feeble infant, its commerce, so to say, stood under the tutelage of that most famous union of the free hanseatic cities of North and Middle Germany, embracing Brügge on the west, Novgorod, in Russia, on the east, and Bergen, in Norway, on the north. These hanseates were called "Easterlings," by the English, that is, the eastern merchants, and England was so much dependant upon them that their money was the circulating medium of the country. One pound "sterling" signified one pound of the money of the Easterlings. Times have changed considerably since then.

PHOTOGRAPHY ON GLASS.—M. Leclerc has patented an ingenious method for producing mirror-like designs on glass. After having been silvered by the chemical process, the glass is coated with a thin and uniform layer of sensitive bitumen; this is then exposed under a transparency. The next step is to wash away the unaltered bitumen with oil of turpentine, so as to leave the bituminous design on the silvered glass. The application of moderately-strong nitric acid removes the silver, excepting where it has been protected by the bitumen, so that the metallic design shows like a mirror from the reverse side of the glass. The plate is to be backed by paint or any other suitable material.

NEW JERSEY AS SEEN BY TELESCOPE.—The new telescope for the Halsted Observatory, Princeton, New Jersey, is nearly ready for work. For the present, it ranks as the second largest telescope in the United States, the object glass having an aperture of 23 inçhes. Its lenses are nearly 7 inches apart—an arrangement which has been adopted to allow a free circulation of air, and thus obtain rapid equalization of temperature, while preventing "ghosts," that is, reflection between the lenses. The telescope, which was constructed by Alvan Clark & Sons, is supplemented by a fine spectroscope similar to that of Greenwich, made by Hilger, and Prof. Young is now fairly equipped with instruments suitable for his researches.

THE FUTURE OF LEAD.—According to a leading commercial European paper, commerce in lead has been very dull for the last five years, but the near future promises a rise, such as it has never experienced before. It opines that electricity and its daily increasing employment will very materially augment the uses of lead. It has been calculated that for a house illuminated with from 20 to 30 electric lamps, about two tons lead are used, and according to this estimation, monthly contracts have been given out. A still brighter future awaits it by the storing of electicity, since the only metals suitable for the purpose are gold, copper, and lead, and since the quantity of the latter is contracted, we may expect a sudden material rise at no distant day.

CORONATION PRESENT.—The *Golos*, of Moscow, reports: The symbolic group ordered by Prince Alexander of Bulgaria, in Moscow, to be presented to Alexander III. upon his coronation, is to be manufactured of pure gold, of the weight of 1 pud (36.11 pounds), representing two female figures standing upon a rock (solid gold); both are clad in ancient Russian war armor, and represent Bulgaria and Russia. Bulgaria, in coat-of-mail and helmet, is in the act of sheathing the sword, in a half-inclined position before Russia, while the symbol of this empire, with the right hand, raises the sword with cruciform handle aloft, while with the left it extends protectingly the shield over Bulgaria. The figures and expressions of the face are speaking. At the foot of the rock stand two small cabins, surrounded with trees, and fenced in with a wattle (woven brush fence). A cossack with enameled standard guards one of the cabins. Below the rock upon the pedestal is the inscription: "To the imperial protector Alexander III., from the Bulgarian Prince Alexander I., and grateful people." Below the dedication upon one side are the united coats-of-arms of Bulgaria and Russia, upon the extended wings of a double-headed eagle; the Bulgarian coat-of-arms, sustained by lions, is contained upon the reverse, surrounded by a decoration of ancient Russian arms. It is to be exhibited at the Moscow Exposition.

Workshop Notes.

Engravers' Border Wax.—Beeswax, 1 part; pitch 2 parts; tallow, 1 part; mix. Engravers' cement: Resin, 1 part; brick dust, 1 part; mix with heat.

Polishing Powder.—An excellent polishing powder for gold and silver consists of burnt and finely-pulverized rock alum, 5 parts, and levigated chalk, 1 part. Mix and apply with a dry brush.

Gum for Backing Labels.—Mix pure dextrine with boiling water until it assumes the consistency of ordinary mucilage. Apply with a full, evenly-made camel's hair brush. The paper should not be too thin or unsized.

Transferring Pictures, etc.—If you desire to transfer pictures from paper to wood, for re-engraving, soak the print in a saturated solution of alcohol and white caustic potash, to soften the ink, then transfer to the block under roller pressure.

Extracting Silver from Wastage.—Mix your refuse with an equal quantity of wood charcoal, place in a crucible and heat to a bright red, and in a short time a silver button will be found at the bottom. Carbonate of soda is another good flux.

To Renew Old Oil Paintings.—The blackened lights of old pictures may be instantly restored to their original hue by touching them with dentoxide of hydrogen, diluted by six or eight times its weight of water. The part must be afterward washed with a clean sponge and water.

Metal Letters on Plate Glass.—It is often necessary to attach glass or metal letters to plate glass. Use the following binder: Copal varnish, 15 parts; drying oil, 5 parts; turpentine, 3 parts; oil of turpentine, 2 parts; liquefied glue, 5 parts. Melt in a water bath and add 10 parts slaked lime.

Etching Fluids.—For copper: Aquafortis, 2 oz.; water, 5 oz. Steel: Iodine, 1 oz.; iron filings, ½ dr.; water, 4 oz. Digest till the iron is dissolved. For fine touches. Dissolve 4 parts each of verdigris, marine salt and sal ammoniac in 8 parts vinegar, add 16 parts water, boil for a minute and let cool.

Bending Glass Tubes.—Hold the tube in the upper part of the flame of a spirit lamp, revolving it slowly between the fingers; when red hot it may be easily bent into any desired shape. To soften large tubes, a lamp with a double current of air should be used, as it gives a much stronger heat than a simple lamp.

Silvering Solution.—The following is a good silvering solution for electrotype plates: Nitrate of silver, 2 drs.; distilled water, 37 drs. Dissolve and add sal ammoniac, 1 dr.; hydrophosphite of soda, 4 drs.; precipitated chalk, 4 drs.; agitate the preparation occasionally for twelve hours, when it will be ready for use. Apply with a fine sponge.

Cement for Petroleum Lamps.—Boil 3 parts of resin with 1 part of caustic soda and 5 of water. The composition is then mixed with half its weight of plaster of paris, and sets firmly in from ½ to ¾ of an hour. It is of great adhesive power, and not permeable to petroleum, a low conductor of heat, and but superficially attacked by hot water.

Rust Preventive.—To keep machinery from rusting, take ½ oz. of camphor, dissolve in 1 pound of melted lard; take off the scum and mix in as much fine black lead as will give it an iron color. Clean the machinery and smear with this mixture. After 24 hours, rub clean with a soft linen cloth. It will keep clean for months under ordinary circumstances.

To Prevent Rust.—Cast iron is best preserved by rubbing it with black lead. For polished work, varnish with wax dissolved in benzine, or add a little olive oil to copel varnish, and thin with spirits of turpentine. To remove deep-seated rust, use benzine and polish off with fine emery, or use tripoli, 2 parts; pulverized sulphur, 1 part. Apply with soft leather. Emery and oil is also very good.

To Clean Old Oil Paintings.—Dissolve a small quantity of salt in stale urine; dip a woolen cloth in the mixture and rub the painting over with it until clean; then wash with a sponge and clean water, dry gradually, and rub over with a clean cloth. Should the dirt not be easily removed by the above preparation, add a small quantity of soft soap. Be careful not to rub the painting too hard.

Printing on Glass.—A Frenchman, M. Wilbaux, has taken out a patent to use an elastic type for printing on glass, with fluor spar, rendered adhesive by some such material as mucilage or printer's ink; sulphuric acid of suitable temperature is then allowed to act on that portion of the glass. The hydrofluoric acid generated in this way would etch the glass on the places printed. When completed, the whole is washed off with warm water and lye.

To Remove Tin from the Stock.—Just previous to pouring the gold, throw a small piece of corrosive sublimate into the pot, stir well with a long piece of pointed charcoal, and allow the pot to remain on the fire for about half a minute afterward. This will take tin from the alloy; gold containing tin will not roll without cracking. To remove emery or steel filings from gold, add a small piece of glass-gall while melting; it will collect them in the flux.

To Clean Brass.—Rub the surface of the metal with rotten stone and sweet oil, then rub off with a piece of cotton flannel, and polish with soft leather. A solution of oxalic acid rubbed over tarnished brass soon removes the tarnish, rendering the metal bright. The acid must be washed off with water, and the brass rubbed with whiting and soft leather. A mixture of muriatic acid and alum dissolved in water imparts a golden color to brass articles steeped in it for a few seconds.

Salt as a Lubricant.—It is said that if iron or steel wire is immersed in a solution of common salt, and allowed to remain till the temperature is the same as that of the solution, the crystals will adhere to the surface with such tenacity as to form an almost perfect lubrication for future drawings. The practice of using brine, or salt and water on hot journals is an old-time one, the result being good when they are hot (not warm). The effect in both instances is probably identical.

Writing Inscriptions on Metals.—Take ¼ pound nitric and 1 oz. muriatic acid. Mix, shake well together, and it is ready for use. Cover the place you wish to mark with melted beeswax; when cold, write your inscription plainly in the wax clear to the metal, using a sharp instrument; then apply the mixed acid with a feather, carefully filling each letter. Let it remain from 1 to 10 minutes, according to appearances desired, then throw on water, which stops the process, and remove the wax.

To Transfer Prints, etc.—Take gum sandarac, 4 oz.; mastic, 1 oz.; Venetian turpentine, 1 oz.; alcohol, 15 oz. Digest in a bottle, frequently shaking, and it is ready for use. Directions: Use, if possible, good plate glass, of the size of the picture to be transferred, go over it with the above varnish, beginning it at one side, press down the picture firmly and evenly as you proceed, so that no air can possibly lodge between; put aside, and let dry perfectly, then moisten the paper cautiously with water, and remove it piecemeal by rubbing carefully with the finger; if managed nicely a complete transfer of the picture to the glass will be effected.

To Prepare Chalk.—Pulverize the chalk thoroughly and then mix it with clean rain-water, in proportions of two pounds to the gallon. Stir well, and then let it stand about two minutes. In this time the gritty matter will have settled to the bottom. Slowly pour the water into another vessel, so as not to stir up the sediment. Let stand until entirely settled, and then pour off as before. The settlings in the second vessel will be prepared chalk, ready for use as soon as dried. Spanish whiting, treated in the same way, makes a very good cleaning or polishing powder. Some watchmakers add a little crocus, and we think it an improvement; it gives the powder a nice color, at least, and therefore adds to its importance in the eyes of the uninitiated.

Trade Gossip.

There is quite a lively competition in gold chain.

There is quite a spirited competition in French clocks.

Mirrors framed in plush or in brass were conspicuous among holiday goods.

A new style of raised decoration will shortly be introduced in watch cases.

In Germany even the smallest wheels of a watch are now made from paper pulp.

An elephant's head in brass, enclosing an inkstand, is an odd conceit in metal work.

Ellison & Vester offer a large and attractive line of bracelets that cannot fail to tempt buyers.

Mr. Seth Thomas, of the Seth Thomas Clock Co., recently returned in the *Servia*, from Europe.

Open faced watches are almost universally worn by city people, and are rapidly growing popular everywhere.

The Jewelers' Circular enters upon the Fourteenth year of its publication with the issue of the February number.

The latest whim is to wear a diamond solitaire in one ear and a ruby or sapphire matching in size and setting in the other.

Quite a number of jewelry manufacturers in Newark and Providence seriously contemplate putting their men on three-quarter time.

C. Offerman, for many years with L. A. Kotzow & Co., of Providence, has associated himself with Martin Copeland & Co., chain manufacturers.

Onyx jewelry is as fashionable as ever, many new and beautiful designs in high-class goods have been brought out this season, and have sold rapidly.

Bangle bracelets have been very popular this season, and never before have so many been sold. Nearly every lady wears them, especially young ladies.

L. W. Levy, of Levy, Dreyfus & Co., is to be married Jan. 2 to Miss Annie Kubie of this city. Mr. Levy is just now one of the happiest men in the trade.

During the holidays, Clemens Hellebush, of Cincinnati, sold an Audemar watch for $1,000. It is one of the finest watches ever imported into this country.

Mr. Louis Neresheimer, of the firm of E. Aug. Neresheimer & Co., diamond importers, sailed for Europe in the *Servia*, Dec. 14th, in search of goods for the spring trade.

The jewelry establishment of J. A. Ephraim, of Philadelphia, has been levied upon and closed by the sheriff, at the instance of Morgan & Headly upon an attachment for $7,047.

The Chicago Jewelers' Association held their annual banquet at the Tremont House, on Thursday evening, Dec. 28. A report of the proceedings will appear in our next issue.

A New York female swell wears rings upon each one of her fingers, and it is thought she will introduce the fashion of wearing bells on the toes, so "she can have music wherever she goes."

In lace pins a new and howling device is a row of oxydized silver pug dogs running from large to small. They are given different names, and wearers of the pin do not fear hydrophobia.

Something new in alleged Japanese teapots is in the form of a dragon, very hideous to look at, but unique as an ornament. It is believed that no mother-in-law's table will be without one.

James J. Fisher, 697 Broadway, carries a full line of watchmakers' and jewelers' material, and also best quality tools of every description. He is noted for the prompt attention given to all orders.

The firm of Goldstein & Brodie, of Denver, Colorado, is dissolved by mutual consent. The business will hereafter be conducted by H. S. Brodie and Lewis Meyer, under the firm name of H. S. Brodie & Co.

Oscar Wilde scarf pins are the newest, and are already worn by many club men. They—the scarf pins—represent a tiny donkey with superfluously big ears, and on its side are stamped the figures 2 2. And now everybody knows why they are called Oscar Wilde scarf pins.

J. M. Chandler & Co., of Cleveland, have introduced a new style of bracelet. It is struck up from a solid piece of plate in imitation of chain bracelets, that are so popular. The new form has the advantage of the strength of a solid bracelet combined with the appearance of a chain bracelet.

A new bangle has a lot of comical monkeys hanging from it by their tails. These bangles come in silver and gilt, and are said to be of French origin. Ladies who wear them are not necessarily the missing links.

The chief of Police of Montreal has received notices from Scotland Yard of a great diamond robbery in London, England, and the offer of a reward of $2,500 for the capture of the thiet, who is supposed to have fled to Canada.

N. H. White, in addition to a large line of American watches, keeps a full stock of Ladd and Boss filled cases, also the new patent dust proof screw bezel filled cases just introduced, and are rapidly growing in public favor.

Henry J. Davis, manager of the Ansonia Clock Company, who has been seriously ill for several months, and confined to his house in Brooklyn, is convalescing, and his friends hope to see him return to business at an early day.

He wanted his clock repaired. He told the messenger to tell the jeweler that it had "periodical spells of stopping every two minutes," and the jeweler was dumbfounded by being told to "stop and spell periodical every two minutes."

A speculative or peculative genius is traveling about the country for a jewelry house, carrying with him a ball of wax, with which he takes impressions of anything new or novel in the jewelry line that he sees. This is ingenuity *vs.* brains.

N. H. White, a Newark jeweler, has been victimized by a salesman named Frank M. Hauser. An investigation showed that watches valued at $500 had been taken by him and pawned for $113. The young man was arrested and held to answer.

L. W. Sweet, a well known traveler in the trade, was married Dec. 26th, to Miss Abbie B. Scholes, of West Mansfield, Mass. This will be a matter of surprise to Mr. Sweet's many friends who had long since given him up as a confirmed bachelor.

A general reduction of the wages of the employees of watch and case factories is contemplated. The Illinois Watch Company, of Springfield, and one or two case factories, have already taken the initiative by reducing wages from 10 to 15 per cent.

C. R. Talcott, of Olympia, Washington Territory, whose jewelry store was destroyed by fire in May last, has erected a new two-story brick building on the sight of the old store, and has opened with as attractive a line of goods as can be found in that Territory.

The Dennison Manufacturing Company of this city, have organized a mutual benefit society in the interests of their employees. These number nearly 600, and the object of the Society is to furnish life insurance to its members and compensation in case of sickness.

The Seth Thomas Clock Company have recently appointed Clemens Hellebush, of Cincinnati, their agent in that city. They have erected in front of his establishment on Fourth street, the famous four-dial clock that formerly stood in front of their store in this city.

The old and well-known house of Carter, Sloan & Co., are about to return to their first love, Maiden Lane. They have secured a lease of the premises No. 15 Maiden Lane, from the owner, L. Strasburger, and will occupy their new quarters in the early part of May. The entire second floor will be fitted up for their use.

The Meriden Britannia Company have issued a supplement to their large catalogue, which, as a work of art, has never been surpassed in its line. It is beautifully illuminated in brilliant colors so artistically blended as to produce an almost perfect *fac simile* of the various articles thus illustrated. The engraving is something superb, while the supplement, as a whole, is a fit companion to the larger catalogue. It is intended, of course, to exhibit new designs and styles of goods manufactured by the company since the issuance of their catalogue. Among these new styles will be found many novelties that are desirable.

Some enterprising person has been filling a *Sun* reporter with fairy stories regarding the jewelry trade. He represents that there is no business doing, but he, the informant, is kept busy because he has some secret method of making goods cheaper than anyone else. This is all bosh, intended to advertise the individual giving the information. Trade has been fair during the holiday season, and there is nothing on which to base a statement to the contrary. There was not a "rush" and a "boom" in the trade during the fall and holiday seasons, but we do not think there is a legitimate house in the trade but sold more goods in 1882 than they did in 1881. The daily press is a very good medium for recording police news, accidents, murders, outrages, etc., but when it attempts to talk on trade matters it always makes a mess of it.

There have been quite a number of large auction sales of jewelry in different cities of late, Cincinnati having indulged in several. These are an injury to the trade in general, but especially severe upon the retail dealers, who have a hard struggle at best to make a living without coming in contact with this illegitimate competition.

The insurance companies of New England propose to raise the rates of insurance on the jewelry manufactories of Providence and Attleboro, unless their proprietors take better measures to protect themselves against fire. In short, the underwriters would like property owners to make their buildings fire proof and still pay premiums for insurance.

There has been a larger number of elegant and more costly gems disposed of in this country this year than ever before. It is a fact that richer and more artistic goods have been made of late than is generally appreciated. We are rapidly growing out of shoddy ideas, and of the better class of goods sold, a large portion of the price is in payment of the labor expended upon it by designers and artisans. It is a most excellent sign when customers recognize that artistic workmanship adds so largely to the value of articles of personal adornment. Many of the goods sold could not be duplicated at any price, because of the superior quality of the workmanship, nor can they be imitated in base material. It is a good thing for the trade that the manufacturers of fine goods have put their standard so high that their products cannot be imitated by manufacturers of fire gilt trash.

The absurdity of sending out goods on memorandum, and the reckless manner in which the trade consents to part with its goods, was well illustrated in the case of George Techmeyer, who was recently sent to the Elmira Reformatory for five years. Here was a young man not only wholly irresponsible, but who had before been caught stealing, who went about getting goods on memorandum in the name of different firms. He seems to have had no difficulty in getting whatever he wanted, and it was not until one of his victims sent a postal card to the trade, that his arrest was accomplished. The memorandum business is illegitimate, and should not be countenanced. Numerous grave abuses result from this practice of sending out goods on memorandum, and the trade should discourage it. It exists in no other branch of business to the extent it does in the jewelry trade, and it can be very much restricted to the great advantage of all interested.

A very ingenious electric clock for use in railway stations has been recently exhibited in Boston, which will give the signals for starting trains automatically at any time and with perfect precision, the apparatus being automatically regulated at noon each day, by electric impulse from some astronomical station. Although the details of the clock are rather complicated, the principle is simple. The mechanism for giving the signals shows two discs, each pierced with fourteen hundred and forty holes, arranged in spirals of twenty-four turns, with sixty holes in each turn. Small metallic pegs are inserted in the holes, corresponding to any given minute and hour, and the contact of these with an electrical conductor transmits the current for the signal. Any change in the time of starting trains is made by shifting the pegs, and one, two, three or more successive and different signals can be given for each train. It is proposed, we believe, to connect all the stations of a railroad with the main office, so that signals for starting trains will be given from a single apparatus, instead of depending upon the uncertainty of a conductor's watch.

Some very interesting and important experiments with diamonds have lately been made at the Paris Academy of Sciences. An experienced diamond merchant bought, not long ago, a fine white diamond for $4,600. One morning he gave it a good washing with soap and water, when what was his consternation to find that it had turned yellow, which sent its value down to $800. The matter was brought to the attention of the Academy, and experts submitted a report, which showed that diamond whitening is a fraud easy to accomplish and as easy to detect. By plunging a yellow diamond into an aniline violet dye, it becomes white, while at the same time it loses neither its transparency nor brilliancy. In fact, on making the experiment, the experts had in a few minutes transformed several yellow stones into what appeared magnificent white stones of five-fold value. Take a yellow diamond, dip it even into no stronger dye than violet ink, wash it with water to remove any discoloration, and the effect is immediate. The dried diamond remains white. But, on the other hand, the illusion is of short duration. Rub the stone even lightly and the yellow tint is seen coming back again, and a little further attrition with the finger restores the pristine hue completely. This discovery may entail upon many persons a rude awakening to the fact that the stones they have are of far less value than they supposed, and will necessitate even greater care than that hitherto exercised in purchasing.

Mr. P. L. Miles, of Cleveland, was recently robbed of a quantity of diamonds by a young person who came in and asked him to examine a watch. While Mr. Miles was doing so, the thief gathered up the diamonds and departed. The strangest part of the whole matter is that the clerks, a half dozen in number, were all in the room, and also a number of customers, and still not a person saw the daring theft committed. It is one of the boldest and most daring robberies ever committed in that city. The jewels taken were eighty-seven small diamonds and seven large ones, three fine gems and two large ones, a large number of packages containing small diamonds, a package of small rubies, a package of small cat's-eyes, two large emeralds, a package of emeralds, a package containing two diamonds and one large ruby, and three papers of rose diamonds and pearls. No arrests have been made.

L. L. Peddinghaus, a young man in the employ of Wheeler, Parsons & Hayes, was recently sent to the Elmira Reformatory indefinitely for peculation. The young man, who was a bright, promising person, held a responsible position in the house, being in charge of a department. But finally irregularities were discovered, and it was also found that Peddinghaus was given to fast ways. Finally his apartments were searched, when about $1,500 worth of fine goods were found cut up ready for the melting pot. The young man confessed that he had long been robbing the firm, but the amount of his thefts could not be ascertained. After his confession the firm was beseiged by friends of the accused with requests that they would not prosecute him, and it was a matter of wonderment how a confessed thief could obtain such influence. In justice, however, to their other employees and to the trade, the firm insisted upon pushing the prosecution, and the young man is now where he can do the state some service and the trade little harm.

Benjamin Greenwald, a diamond broker of Philadelphia, was arrested a few days since, charged with conspiracy to defraud several of his New York creditors. He was committed to answer, and while in jail made a confession implicating Morris Rosenberg and Jacob Myers, of Philadelphia. These persons were also arrested and held in $30,000 bail to answer. At a hearing before a magistrate Dec. 20, Greenwald testified that in September last, defendants arranged with him to obtain the goods. They advanced him $9,000, and with this money as a basis of his business, he procured, at various times, goods to the value of $38,000. The diamonds were sold at whatever prices could be obtained for them, and witness paid the accused back part of the money and gave them some of the goods. The arrangement was that, after the witness had failed, the creditors were to be settled with at ten cents on the dollar, the defendants saying that they could take that or nothing. The profits of the transactions were to be equally divided among the prisoners and himself. The accused were again held in $30,000 bail, which they were unable to furnish. The firms defrauded are Grinberg, Goodman & Pollack, Kuhn, Doerflinger & Co., Van Moppes & Marx, Hess & Schliesser, and L. Strasburger & Co., all of New York, whose claims aggregate $28,000. At the time of our going to press the case had not been disposed of.

This is the season when the trade is wont to harvest its annual crop of failures, and from present appearances, the indications are promising. Several dealers have come in a little in advance of the season, and have recorded their assignments—usually in favor of some relative. It is remarkable how solicitous a man on the point of failing becomes for the welfare of his "sisters, his cousins and his aunts," to say nothing of brothers, fathers, and even mothers-in-law, and insists on making them preferred creditors to the exclusion of the actual owners of the goods. As a general thing, New York creditors have been extraordinarily lenient towards their unfortunate debtors who honestly sought to protect them, but they have suffered so much from fraudulent bankrupts that they are becoming suspicious of all failures. Honest men, however, who can show a clean bill of health, will have no difficulty in arranging to continue in business if they fail from legitimate causes, but the scoundrels who make bankruptcy a means for defrauding creditors, had better keep clear of New York. A number of the more prominent members of the trade have formed themselves into an association, and retained one of the best criminal lawyers in the city for the purpose of thoroughly investigating all cases of failure. Those shysters who have so frequently victimized the trade will find difficulty in repeating their operations. It will be a good thing for every honest man in the trade when every failure is carefully investigated and any attempt at defrauding creditors promptly frustrated. There are provisions of law which render it possible to send to state prison all persons guilty of fraud, and the association referred to promise to show no mercy to bankrupts who deliberately plan to cheat their creditors.