Diamonds *and* Other Gems

J. C. FERGUSSON

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To
Mr. T. O. Palo
Compliments of
J. Ferguson
6/5/35

TO

My Many Friends

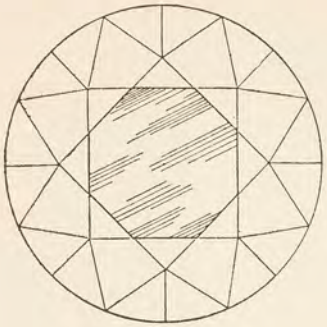

FIG. I

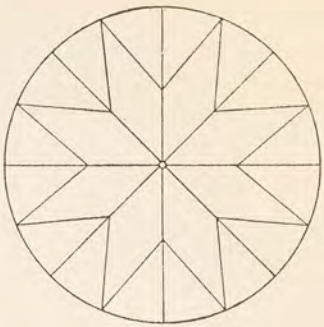

FIG II

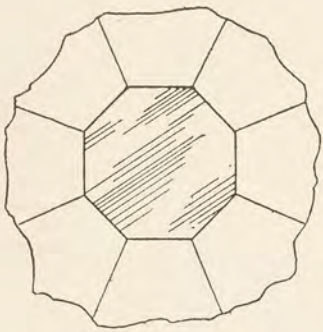

FIG III

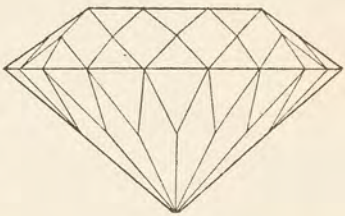

FIG IV

Fig. 1. Top or crown view of a round diamond.
Fig. 2. Back or pavilion of same.
Fig. 3. Enlarged drawing of perfectly cut culet or point of round diamond.
Fig. 4. Side view of round diamond.

DIAMONDS *and* OTHER GEMS

By
J. C. FERGUSSON

207 HAAS BUILDING
LOS ANGELES, CALIFORNIA
U.S.A.

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FOREWORD

IT is hardly necessary to write a preface to a book of this sort. The reader will observe that the treatment of the subjects at hand has been done promptly with a view to making them interesting and understandable.

There is very little else to say: gems have been overlooked from the literary angle to a degree that is nothing short of surprising. The most valuable books on the topic, with but few exceptions, invariably have come from abroad. Should, then, this book be even a minute contribution to the study of gems in America, the effort expended in its preparation has been of more value than it is possible to calculate.

JOHN CLYDE FERGUSSON.

207 Haas Building,
Los Angeles, California.
February, 1927.

CHAPTER I

An Introduction to Diamonds

NO MAN, fresh from the laboratory and without actual experience in handling countless numbers of diamonds, should presume upon his capabilities to the extent of examining, before a reader's eyes, the subject of diamonds. Contrariwise, without having more than a rudimentary experience in the laboratory, I for one, am vain enough, after having handled countless number of diamonds, to ask the reader to bear with me through this text, BECAUSE I am not going to load him down with technical facts and uninteresting figures. Commercially speaking, the actual laboratory of the chemist and physicist is thoroughly neglected, and for that reason my parlance, to the best of

my ability, will be kept to the level of practical usage.

Unfortunately, one gravitates to certain facts about the diamond and forthwith must assert certain principles about the stone which alone could have been determined by the patient efforts of laboratory technicians.

I note that the diamond is the only gem composed of a single element. Science puzzled over the matter for a great number of years and destroyed many stones attempting to determine the formula of the diamond, which ultimately proved to be nothing more than pure carbon, crystallized. Other characteristics of this form of carbon are: the inability to melt or fuse at any temperature. It will oxidize (or burn) rapidly when sufficiently heated and at the same time exposed to the air. If the stone is protected from air and raised to intense heats it is in no way affected. So far, no laboratory has been able to produce synthetic diamonds above the microscopical sizes. Frankly,

I doubt if it will ever be done because, obviously, the diamond was made when the earth was young; great heat and pressure was applied over such a period of time that would cause any laboratory interested in duplicating the feat to crumple under the weight of uncountable years.

The physical properties of the diamond are unique and distinguishing. It is the hardest substance known. The nearest to it in hardness is corundum, a composition popularly known as abrasive stones, and when clear, as rubies and sapphires. There is as much difference between the hardness of the corundums and the diamond, as there is between talc (a soft compound of magnesium and silica) and the corundums. The only thing capable of cutting a diamond is itself. There is nothing else that can even so much as scratch it. On the other hand, the diamond is subject to breakage. This tendency is distinctly apart from the hardness of the stone, and is known as

frangibility, and is an attribute of the ability of the crystal to cleave. The diamond, like a piece of wood, will split along certain planes or grains. This is invaluable to the cutters, for they can thus save a great deal of time by cleaving the stone, removing thereby unsuitable material which would otherwise take days to remove on the polishing wheel. This grain, therefore, if exposed to a definite blow, will cause (even in the case of the polished stone) the stone to break.[1]

The diamond has the highest index of refraction known. In fact, there is no refractometer in common usage that will accommodate the stone, whilst every other substance may be examined with it. Strictly speaking, high index of refraction, as in the case of the diamond, causes

1. On the other hand, jade is the least breakable of all gem materials. Still, it may be readily cut and polished for it is quite soft. It is very impractical because it shows wear very, very rapidly. I have noticed in the Chinese jewelryshops that pieces of poorly colored jade are used for anvils, and the gold is pounded thereon with steel hammers! A diamond under such treatment would soon be ruined.

the light that passes into the interior of the stone to be greatly broken up when it is refracted back: more broken up than if the same light had passed to the interior of any other substance. As light is broken up, it displays the prismatic colors, and proportionately to a stone's ability to break up the light does it display *fire*. A common comparison, for an instance, is that of beveled glass. One notices that when looking through the bevel (prism) each object observed has various and brilliant colors outlining it. If you were to look through a prism of diamond, you would note that the colored outlines of the things observed would be very much more pronounced than when looking through glass. In short, this phenomenon cannot be approached in intensity by any other transparent substance.

Accompanying this great amount of internal reflection is the luster. Again, in this case, the diamond remains the

King of Gems, for its luster is unequaled by any other substance. That is, the light reflected from the outside surface of the stone is greater than that from any other material known.

I mentioned that a diamond is composed of but a single substance: carbon. That is theoretically true. But inasmuch as the bulk of ALL diamonds found show various colors, it has been proved they carry a very slight impurity content. The absolutely white diamond, though, has nothing in it except crystallized carbon. This writer prefers the watery-clear stones to any other of commercial occurrence, they being quite as rare as the very fine, light blue diamonds.

There is very little more, in a technical way, to be said. These facts have been gathered from personal experience as well as from the best technical authorities. Should the reader find himself interested in the purely technical side of the subject, let him turn to the chapter,

Critical Bibliography, in a latter portion of this book, wherein he will find a discussion of the various merits of the books considered, in a manner that he may choose his reading for himself.

CHAPTER II

An Inquiry Into Diamonds

The first thing to consider upon examining a diamond is its quality. Whether a stone be superbly cut or badly butchered by the cutter, neither adds nor detracts from the inherent substance. Therefore, the dealer or connoisseur of diamonds is chiefly concerned with the determination of the actual substance Nature did create.

In such a study as this, it is hard not to conclude that the reader can always determine a diamond from its several imitators with no aid other than that of a lens. To a trained eye, a diamond has no imitations. The basis for accuracy in judging is confidence in onesself. Because of the peculiar ability possessed by the diamond to refract light, all of its imitations look dead and lifeless in com-

parison. The diamond breaks the rays of light in such a way that reds, greens, blues and other spectral colors emanate from the stone, whilst in the majority of imitations the white light that enters will be only partially refracted, and fire, consequently, will be greatly lacking.

As there are diamonds of all grades, running from the black carbonado good only for industrial purposes, to large, clear germs suitable but for admiration and adornment, it is necessary that a person who is at all interested in the subject at hand know the various considerations which make for the several qualities so that his appreciative knowledge may be complete. Of course, one must never lose sight of the fact that rarity above all else makes for value. I am quite inclined to believe that our natures are so trained that the gem possessed of the scarcest coloring will prove, more than any other, to have the greatest appeal to our eyes. Therefore, we shall study first the color,

then the flaws and their tendencies, and finally, man's improvement upon the rough stones, or the cutting.

COLOR

Certain rules for judging diamonds must be arbitrary to one's tastes or to market conditions. At the present time, because of the constant increasing rarity of stones of fine color, it is quite safe to assert that the color of a diamond is its most important attribute. The bulk of the diamonds mined during the last fifty years have come from South Africa,[1] and today, more than ever is the world's supply of them coming from there. As the pipings are going to greater depths to extract the precious stones, the more frequently yellow diamonds are brought to the surface, and with corresponding rarity are the fine white and blue diamonds

1. " . . from 1867 to 1887 over 33,000,000 carats, or more than 6½ tons of diamonds have been taken out" of the Kimberly, South Africa, mines, "valued at $225,000,000 and after cutting at $450,000,000."—From the report of the National Museum for 1900, page 504.

mined.[2] Constantly the productions elsewhere are dwindling to insignificance: in a number of places the workings are being entirely abandoned.[3] Thus we find the prices on fancy gems rising out of all proportion to the frequently mined yellow diamonds. Diamonds of large size, in any color, are very scarce. They bring high prices when markets can be found for them. Because they are difficult to wear without displaying bad or gaudy taste, diamonds of fifty carats or more often find their ways to governmental treasuries where they remain as Crown Possessions. Put exquisite coloring into these large stones and you find wealthy collectors from America, India, France, England, Turkey, South America, ready to out-bid the Crown collectors. Thus color definitely becomes the first consid-

2. It is interesting to note that, as a rule, the nearer to the surface diamonds are found, the bluer they are in color. The famous Blue River diamonds, noted for their fine, steel-blue coloring, are generally found in the beds of old river bottoms.

3. It is reliably announced that 95 per cent. of ALL diamonds mined in the world are under the control of the one syndicate.

eration in attaching value to this crystalline substance so greatly prized by men.

The determination of this elusive stuff is one of the most difficult tasks confronting any diamond broker. He must immediately bring into play the knowledge gained from years of experience that he may pass an opinion both positive and correct. There can be no possible error without him paying dearly for his mistake. This task becomes doubly difficult when the stone or stones to be considered are set in mountings, for only can the top, or crown section of the diamond be viewed.

In examining unmounted diamonds, one is particularly favored in not being forced to use a lens for color determinations. The loose diamonds are placed sideways in a crease of a diamond paper and observed in that position. Because the prismatic play of colors is designed to emanate only from the top of the stone, the color seen on the side might be designated as pure or natural. If, under

certain unfavorable circumstances, one cannot accurately judge the color of the stone because certain brilliant hues are refracted from the side, the blowing of the breath upon it will sufficiently frost or dull the diamond so that its proper color may be determined.

There are two important factors which must always be remembered during this process of color discrimination: daylight and actual comparison with a stone of a KNOWN color. Various forms of daylight need be examined and analyzed so that no false colors will be injected into the diamonds. Certain offices handling diamonds find that the work must be limited to four hours a day, e.g., from ten to two. A north light is the best for then no direct rays from the sun will touch the stone, nor will there be any glare to confound one. But if, due to the practicability of certain locations for business reasons, one is obliged to use a south light, by careful study, credits and discounts can so favor the work that the

correct color is actually judged into the stones. As for comparing diamonds of unknown color with stones of a known or predetermined color, one will find this a most valuable method of assuring accuracy in matters of fine discrimination.

I have a little knack for making sure of the color of a mounted diamond that seems to be generally unknown and which, under certain circumstances, is well nigh invaluable. A lather made of Ivory soap, applied to the stone with a clean brush will dull the diamond, killing the prismatic colors and at the same time giving a dead-white contrast so that the yellow or blue or whatsoever color will show up with great clarity.

No matter how poor one's working light may be, it is better constantly to make final color judgments under it than to judge color under a strange light. As I say, one can know what to add or detract from the stone's body color under a familiar light, but under the influence of

a strange light good stones are as apt to look poor as poor ones are to appear as gems. Finally, one will find any attempt to judge color under artificial light about the most futile thing one can do. The reason that electric light is impossible is simple. Light is a matter of heat, and shows the spectral colors of the elements heated. White light, a mixture of a number of colors, when refracted by diamonds breaks up into any combination of whatever spectral colors the lamp filament may produce. As lamps are improved upon, too, the composition of the filament changes, and one would ever be at a loss to know what one is about.

As a warning, beware of faked diamonds! A piece of cotton wrapped as a swab about a toothpick and gently rubbed against the lead of an indelible pencil will afford a most startling method of painting yellow or brown diamonds so that they will have a decided bluish cast. As this "paint" is lightly applied to the back of the stone, one must be very

careful to examine the back walls of a diamond to see that no colored streaks are there which in any wise might change the natural coloring of the stone.

Radium and the X-ray have been used to advantage in changing the color of yellow diamonds. The result is a rather poor green. Inasmuch as there is something obviously wrong with stones so treated, the buyer is intuitively put on his guard. From this uncanny insight no saner aphorism has been coined for the gem trade than: *when in doubt, don't.* When buying a stone against one's intuition one is taking a chance that may prove of no worth.

It may not be amiss to state here that there is nothing so generally misunderstood, and at the same time of common parlance, than the nomenclature of diamond colors. I suppose this is due to the fact that unscrupulous dealers have always attempted, even down to the present moment, to sell for less. Because definite qualities have quite definite values, the

only way these sharpers can compete is to sell inferior grades for the better qualities. Inasmuch as such practices exist, the names applied to off-color diamonds by reliable houses and by questionable dealers is of confounding disparity. But getting down to actual color appreciation: certainly some of the fine browns and brilliant yellows are extremely beautiful, affording stones equally splendid to the fine blues, pinks and greens. Of course, the rarity of the latter causes them to be placed at higher values than the former. From a strictly appreciative standpoint, however, the beauty of a given color is entirely according to the fancy of the individual. Pronounced colors, though, should not be so deep as to materially affect the brilliancy of the diamond, for above all, the beauty of the gem lies in its unique and gorgeous brilliancy. Therefore, the darker shades are not so desirable as their lighter gradations.

Definitions make for further misunderstandings. A stone that may have the slightest amount of yellow, when set is very brilliant and displays blue. A white diamond, i.e., one entirely devoid of the slightest amount of color, is about as rare as any of the commercial stones, and strangely, does not command nearly the price of a very fine, light-blue diamond of similar quality. I suppose this is due to the fact that the phrases "blue" and "blue-white" have been used so frequently in sales talks and advertising that the public demands what it presumes to be the best and therefore has overlooked a very fine gem.

As to a definite cataloguing of colors and their names, I have reserved space in the appendix for that purpose. As I say, color is so much of an arbitrary matter, and the definite names more so, I feel that it is not a suitable matter to indulge in in the text.

FLAWS

I consider flaws more important than

the cutting, because the cutting is a matter left entirely to the whims, fancies and capabilities of the owner of the rough stone. Too, there are so many different ways in which a diamond may be cut, and if it is cut well, it is utterly ridiculous to criticize the *mode* should it not meet with the approbation of the writer. I list, then, the cutting as secondary to the more important factors. I consider flaws less important than color, for certainly delightful colors more than offset the derogatory effect of negligible flaws invisible to the naked eye.

America is particularly favored in one very definite respect. She is demanding the better diamonds from the markets and, consequently, stones which are badly flawed are not wanted here. Instead, they are consumed in Europe where a ready market is found for all grades—good, bad and indifferent. However, do not gain the opinion that Europe lacks the proper esthetic appreciation for fine gems. The foreign buyers are sufficiently

fastidious about fine large gem diamonds that it is through the demand thereby, prices for such goods in America are constantly mounting to unprecedented heights. In fact, stones of ten carats and over of gem caliber are more than difficult to pry away from the private buyers of Paris.

Like everything else, workmanship may be either perfect or imperfect, but at this point we are discussing only the perfection of the naturally created gem and not the qualities or blemishes given the stones by cutters. Thus we find that imperfection of material is quite varied, running from the obviously bad to the microscopically imperfect. Many stones that are commercially judged as perfect would, I suspect, show the very tiniest of imperfections if observed under the lens of a high-powered microscope. There has been established, however, an ethical standard that is manifestly fair, and that protects all parties concerned. When an imperfection cannot be seen by

an expert using a 12X lens, it is generally considered that no imperfection exists in the stone.

There are any number of lenses used by the trade, but the best is the triple aplanat, corrected for chromatic aberration. This lens is so constructed that a flat object when viewed through it will appear the same in the center as it does on the edge of the field of vision. The old lenses had the unpleasant habit of causing the edges to blur if the center appeared well focused. As for color correction, this writer, for one, can testify to the need for lenses so adjusted. We had a lense that had its segments cemented with some sort of balsam that was slightly yellow, and a number of our best stones appeared as yellow of consequence. Indeed, it was not long until the trouble became apparent and the glass was very properly discarded.

As there are a number of good lenses on the market, each individual will find one particular to his tastes and require-

ments. I am not inclined to look with favor upon removing one's spectacles while using any of them while examining diamonds. So many inexperienced men will use the eye-loupe fastened into the eye like a monocle. By removing one's glasses, any correction for astigmatism is immediately destroyed. But when the lens is held to the eye with the hand, the hand affords a brace for the stone, holding the stone and lens steadily at a constant distance. A little practice will make the advantages of this method apparent.

The use of the lens precedes any knowledge of the internal structure of the stone, and until one has become proficient in this technique, one is not at all competent in matters of accurate opinion. It must be remembered that when the lens is focused upon the table, only the table may be seen. Therefore it must be known that the lens needs to be constantly re-focused so that each plane within the diamond may be carefully examined. *Cf. Ill. No. 1.*

Presuming that you have your eye focused upon the table and you wish to examine the culet, it is necessary to bring the lens as much closer to the table as the distance from the table to the culet if you are to keep the focus absolutely clear and perfect. This process of focusing from outer surface to inner surface must be repeated over the entire stone. The diamond must be examined through each facet (front and back) if an accurate report of its purity is to be made. Of course, so many stones are obviously imperfect that the coarsest of examinations will reveal their undesirabilities, and careful and extended investigations are not only unprofitable, but useless as well.

If the diamond is loose, it is quite necessary that it be examined from the back side as well as from the crown side, for certain imperfections are capable of being hidden beneath facet edges so that they do not reveal themselves from the crown. If the stone is mounted, it behooves the person examining it to note

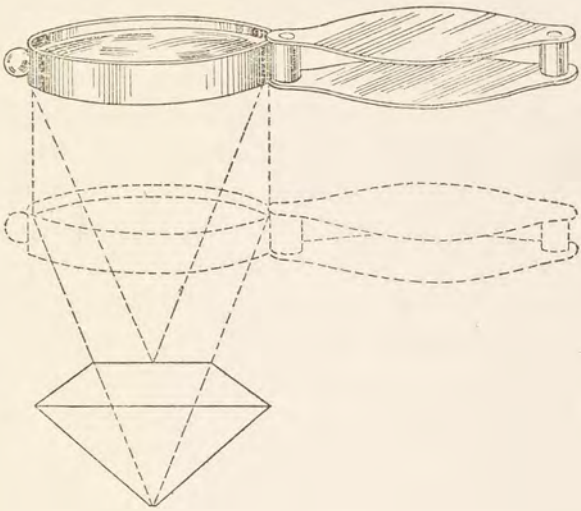


ILLUSTRATION No. 1

Shows the correct usage of the lens.

carefully beneath the prongs, so far as possible, for flaws are frequently covered up in this manner. This is quite a common trick, possessed entirely by unscrupulous merchants who attempt thereby to sell imperfect goods as perfect. Frankly, though, no expert, no matter how clever he is, can positively say that a mounted stone is perfect, if he is not otherwise acquainted with it. All that he can say is that the stone is perfect so far as he can see.

Frequently flaws of numerous sorts appear under the lens, but because they are so placed, they reflect. Only careful observation will assure one that the flaw is singular in reality. The especial characteristics which assist in the detection of this manifold illusion cannot, of truth, be reduced to print. The most that can be said is that when flaws are seen within the body of a diamond, one should be very careful to note that they are unlike, for similarly shaped flaws are quite apt to be only reflections. This little note

may be amiss, but, after all, a reflected imperfection is just as unsightly and deteriorating to the value of a diamond as several very natural faults.

All this effort I have described as necessary to the examination of a diamond may seem to put a great deal of work into the hands of a busy man. Since there is no object so small and at the same time of such intensified worth in commercial parlance as the diamond, surely care may be very profitably exercised. However, proficiency is the parent of speed, and this work, in the case of the average commercial diamond, can be very adequately and thoroughly done in a minute's time. Special stones of the larger sizes containing very, very slight imperfections may, and frequently do, take considerably more time.

So far, I have merely pointed out the technique required for an accurate examination of a diamond, and have neglected entirely the actual nature of flaws. Definitely, anything within the crystal that is

not removed by cutting, and shows itself in contrast to the clarity of the entire piece of material, may be deemed a flaw. The parlance here is varied. Perfect stones are, obviously, without blemish of any sort. Trade connotation means perfect material and disregards the quality of cutting, unless otherwise stated. Imperfect stones with various modifying adjectives to more accurately describe them, are stones which contain faults of any sort (excepting cutting) which can be discerned by an expert with a 12X or weaker lens. It might be well to parenthetically state that color is never spoken of as perfect, for so long as it is clear and not muddy, mottled or streaked, it is merely something appraised proportionately to its scarcity, and judgment is either esthetic or arbitrary. The word "clean" has a variable meaning. The best dealers in America mean by it the same thing they mean by "perfect," while some of the importers fresh from the old country mean by clean goods such stones

as have feathers, clouds, cracks, air-bubbles and any other clear imperfections, so long as no black, uncrystallized carbon appears.

As to the specific nature of the various flaws, it is safe to say that their nomenclatura are almost adequately descriptive. We find included in our critical list the following: carbon specks and spots, air-bubbles, needle-points, pin-points, feathers, clouds, cracks, fractures, together with various combinations thereof. I might add that a substance known as milk is often detectable and when it becomes a mottled, cloudy mess, detracting visibly from the stone's brilliancy, I do not see why it should not be included as one of the veriest of imperfections.

At this point it is well to note that stones containing very small, irregular, ragged spots of the black (uncrystallized) carbon are quite generally of a bluish cast, while diamonds entirely free from this blemish are quite apt to be yel-

low to a marked degree, with, of course, many notable exceptions.

Carbon spots are very easily recognized for what they are by their inherent nature. They are black, graduating from the smallest needle point sizes to such dimensions as to embody the entire stone, whereupon it is marketed as a black diamond. Frequently, the carbon will be found on, or at least near, the edge of the stone, and here it is wise to be unusually careful in making examination. This is entirely due to the fact that cutters try their mightiest to remove as many of the undesirable specks as possible, and have otherwise cut the stone away so that the center and other obvious portions of the stone remain unaffected by whatever it is necessary to leave. The general nature of such defects are sufficient to warrant the most careful consideration that by no possible chance they may be in the diamond. In stones of smaller sizes with carbon spots which are readily visible to the naked eye, it is quite safe to say that

the values thereof are not very much more than nominal.

Air-bubbles make for interesting blemishes. I have noted some under the microscope which were so symmetrically formed that they resembled nothing so much as octangular lead pencils sharpened at both ends. Though these little bubbles may appear as spherical under the twelve power lens, when placed under the scrutiny of higher powered instruments they are, so far as I have observed, geometrical in shape. This is due, I believe, to the fact that the diamond is crystallized carbon and the imperfections contained therein must conform to the rules of crystallization. On the other hand, the black carbon spots often appear as being very ragged in shape; almost as though the stone were an amorphous substance, like the opal. I attribute this virtue of the black blemish to the fact that it is NOT crystallized carbon, and is not, therefore, subject to the laws of crystallization.

It is of more than passing interest to note the reports from the mines which state that when certain diamonds are found possessed of large air-bubbles, they will burst on occasion when slightly warmed, either from the heat of the hand or from the friction of the polishing wheel. This is claimed to be caused by the cavity being filled with liquid carbonic acid that expands sufficiently from warmth to break the stone. Further, the stone out of the ground lacks the additional pressure of the surrounding earth, and is thereby more readily affected by internal stress.

Speaking of the nature of imperfections draws us to the study of the structure of diamonds. Being crystalline, they possess a certain grain which is generally invisible. Once in a while, though, a stone is found that has a very noticeable grain, and this is known as a crack. Unfortunately, this crack will run to the center of the stone, thereby making it very fragile. I have known certain of these

cracks to apparently occupy but two dimensions, i.e., length and breadth, without thickness. Obviously, they are without color, and are noticed only because of the manner in which they refract light. Often while casually examining such a stone, these cracks are utterly invisible, and pass unkown. The discovery of them is quite dependent upon the quality of light used at the time of examination. I have known these faults to so embitter diamond men that no matter how fine a stone might be; no matter how nearly it approached gem material, they would not guarantee the stone as to absolute perfection. I relate this obesrvance because it is well to remember that for all the fineness of better diamonds, still every now and then under the best of conditions an imperceptible fault will get by, only to show up at a later date to give the seller a reputation for being either incompetent or deceitful. My own inclination is to regret that such slight cracks, unobservable even to the average lens,

and only with difficulty detected with a high-power lens, should under any circumstances affect the value of the stone. Certainly it does not, nor cannot, mar nor alter to the slightest degree the beauty of the diamond. And for what purpose does a diamond exist if it is not to be admired for its beauty?

Pin-points and needle-points are the very smallest flaws which can possibly be detected with the lens. They are generally colorless, though perhaps they do not show color because of their extreme minuteness. It is always well to make sure that one is not seeing a speck of reflected dust when such a small blemish is suspected, for it is so easy to get the two mixed. I find that a diamond can best be freed from dust by wiping it with an old silk handkerchief, and then blowing the breath upon it. If, after the stone has been cleaned thoroughly, and one is absolutely sure that there is no dust on it, and still a needle-point is apparent, it is well to again clean the stone to make cer-

tain that the infinitesimal speck is not dust after all. When these little spots actually exist and are near the surface of the stone, they may be frequently removed with little or no apparent loss of weight. I have seen this process of polishing applied to fine gems with a loss of not over 0.03 carats weight, increasing the value of the stone three to four hundred dollars a carat. These little specks may be regarded for what they are worth. In yellow or other off-colored stones they matter but little, if at all. Proportionate alone to the stone's size do these fractional imperfections bear on the value, provided the consideration of quality is put into the ratio. Again, if a diamond is of large size and exquisite color it will not fetch much more if perfect than if very slightly imperfect.

I might relate here the difference in value of two stones which came under my observation during a single week in 1926. One weighed sixteen carats, was absolutely perfect and brought less than

sixteen hundred dollars for the stone. The other, containing a needle-point, and therefore slightly imperfect, weighed but six and a half carats, and was offered for sale at two thousand dollars a carat! This not only serves to illustrate that in fine diamonds imperfections of a negligible nature are regarded as such, but aptly indicates the importance of coloring over what is frequently spoken of as quality. Quality is an elusive thing, and should be made to describe both color and freedom from imperfections, according to the accepted standards. As it is now, unfortunately, the lay buyer of diamonds asks first if the diamond be perfect. How much more pleased he would be ultimately if he would insist that the prospective stone be of fine color, for he is reasonably assured that no reliable dealer will sell him a stone that has a flaw in it visible to the naked eye. Inasmuch as I am writing this book from the standpoint of the reputable merchant, I am not inclined to hazard a guess what might hap-

pen to the buyer who should overlook specifying a perfect stone from one of the unscrupulous sellers, the type of which the trade is plentifully over-run. About all he would get, I presume, is what he gets now: any kind of a diamond and a piece of paper guaranteeing it to be a genuine diamond, "absolutely perfect cut." Do you see the fraud there?

To continue our list of flaws: feathers are rather common and often transparent. It is only when they are viewed from certain angles that some of them become visible. This particular type resembles the crack, and like the cracks, generally come to the surface of the stone. The true feathers, however, are very much as their names indicate and are not clear. As a rule they are at the side of the stone, for otherwise they would diminish the value of the diamond to a very considerable extent. Frequently they branch out and are ragged. Sometimes they have little black spots in them, but these are so minute that they merely

give the flaw a grayish tinge. Because of their nature and because of their strict resemblance to their namesakes, it is unnecessary to say more about them, except that when anything resembles a feather and cannot be rubbed from the stone, there is no possible doubt as to what it is.

Clouds are quite common, giving a milky appearance to the stone. Some diamonds are completely colored with them, but in spite of the clearness apparent, there is that look about them of water slightly diluted with milk.[4] Stones with this blemish do not find a ready market for they lack the prime requisite of value: fire. Fortunately, though, we find diamonds which have but very small patches of this stuff and are not complete-

4. In a later chapter, "What Price Diamonds?" I refer to the Premier diamond of the species which displays an obvious false color. It is a very noteworthy species, as I say, for they are frequently sold as true violet blue stones. The reader must not gain the impression that the Premier mine produces nothing but this false colored stone, nor, further, gain the idea that they come from nowhere else. Intrinsically, this phenomenon is a bluish fluorescence, caused by some minute composition as yet undetermined. I deal with this under the heading of flaws simply because it is an undesirable constituent within the stone, incapable of removal.

ly spoiled from the esthetic standpoint. Often enough these blemishes are to be found in the center of stones in such a way as to reflect themselves about, giving the whole diamond a very poor appearance. On the other hand, very small clouds are sometimes to be found on the edges of the stone, and these do not impair the beauty, but affect only the value if they are not discernible with the naked eye. As ever, the diamond free from blemishes of any sort commands the highest price and always will.

Summing up the matter of imperfections, I do not propose to overlook the fact that sharpers will chance upon any opportunity to put into their sales-talks certain remarks which I have made about imperfections. I do not mean in the slightest to convey the impression that imperfect diamonds are as desirable or as inherently beautiful as perfect ones. I merely say that stones carrying blemishes capable of being detected only with the lens when carefully examined by an

expert, are, from all outward appearances, worthy of sound consideration on the part of the thrifty buyer. Certainly they cannot have the value attached to them that is the heritage of their scarcer brothers.

But be careful! I have known dealers to offer a lens to a customer and tell him that the stone is perfect, and falsely prove it by insisting that the customer cannot find the slightest fault with the stone. This knavery is based upon negative psychology, coupled with the knowledge that the use of the lens cannot be mastered at a moment's notice.

Another warning: do not buy a diamond with a flaw in it so that you may have some mark of identification in the stone. This practice has been used to such an extent that it is laughable. Simply, it is an attempt to justify flaws, which alone are compensated for by their very proper lower price.

If you are buying diamonds you can effect no small savings by either becom-

ing an expert and thereby dealing in stones constantly, or by placing confidence in an established dealer noted for his integrity. I do not mean to sermonize. This matter does not apply alone to the retail buyer, but to the small jeweler who uses diamonds for but a part of his livelihood. Unless one is particularly skilled in the work, constantly using the lens and examining colors, it is so easy to make mistakes. Thus I commend the smaller dealers to place confidence in a reputable diamond house. Such firms grade their goods honestly and sell them the same way.

Thus confidence is the mainstay of the diamond business, and is the only absolute protection the buyer has. The reliable houses make mistakes, but fortunately are able and willing to rectify them with cold cash or with a very definite replacement for the best if there has been any mistake or misunderstanding. And lastly, beware of the house that is

not willing to put its statements regarding the quality of its stones on paper.

MAKE

No matter what the color of your diamond may be; no matter whether it be badly flawed or perfect, it is no more brilliant than the cutter has made it. He is, withal, the magician who can make an ugly pebble into a prized gem, sought by investors, critics, collectors, connoisseurs and dealers, or he can reduce the pebble to something equally unshapely and undesirable as the original stone, producing that which is no tribute to an otherwise highly specialized craft. Certain pardon is due, of course, to the cutters of twenty-five and thirty years ago, for they had not particularly thought of applying their knowledge of the physics of light to the brilliancy of the diamond. Or more truthfully, several men as far back as the middle of the last century did know how to cut diamonds correctly, and they did cut a few, but the technique remained more or less of a secret, and was

not adopted generally for the reason that it took considerable heart out of a man to waste from one-half to three-fourths of the rough material to make a perfectly cut brilliant. Even Europe today lacks the nerve to demand fine cutting in preference to bulky stones, and for that reason alone it has fallen upon the extravagant American to demand of his own workmen the ultimate of perfection at any sacrifice of weight. So stones cut in this country stand comparison with the best which come from the European countries which have for many years made the diamond industry a principal business.

I have no desire to become elaborately technical and explain therewith why diamonds should be cut to certain proportions if the stone is to display the maximum brilliancy. I am writing a chapter on the "make" or the cutting of commercial diamonds, and other books, with their advice and instruction to the contrary notwithstanding, diamonds are not

put to specific gravity tests, nor are they applied to the refractometer to determine the index of their refraction. Nor are diamond men, as a rule, familiar with such practices as alone belong to the laboratory. So I deem it rather out of place to here go into the details of physics that I might show how the present proportions of the round-cut brilliant have been arrived at. Therefore I ask the reader to believe that I know whereof I speak when I say that the correct proportions of the diamond are as shown in illustration number 2.

As the mode of cutting is the open sesame to the beauty of the stone, I feel that it is not indiscretionate to treat the subject at hand in a super-critical way. Not only does cutting add to the brilliance and the fire of the diamond, but it often times, as I have before mentioned, "cleans up" the stone. Precisely: in the old method of cutting a diamond for weight, flaws were permitted to stay in the material. Today, wise American cut-

ters will waste a goodly portion of the stone to bring out a clean and perfect diamond. Such considerations add materially to the cost of the stone per carat, but as the demand for perfect, finely cut goods is increasing out of all bounds, it is quite easy to observe that the wastage is worth the expense. Therefore, deviations from the strictest standards on the part of cutters are deserving of the severest condemnation from both the commercial and esthetic standpoints.

In an earlier portion of this work, I spoke of the term "perfect cut" and its abuses. To point out clearly the necessity of knowing a perfectly cut stone from one that is poorly cut, allow me to say that a round diamond, with fifty-eight facets, thirty-three above the girdle and twenty-five below; a stone that has slightly less than two-thirds of its depth below the girdle and a trifle more than one-third above; and a stone that has an octangular table slightly less than one-half of the stone's diameter, is a perfectly cut

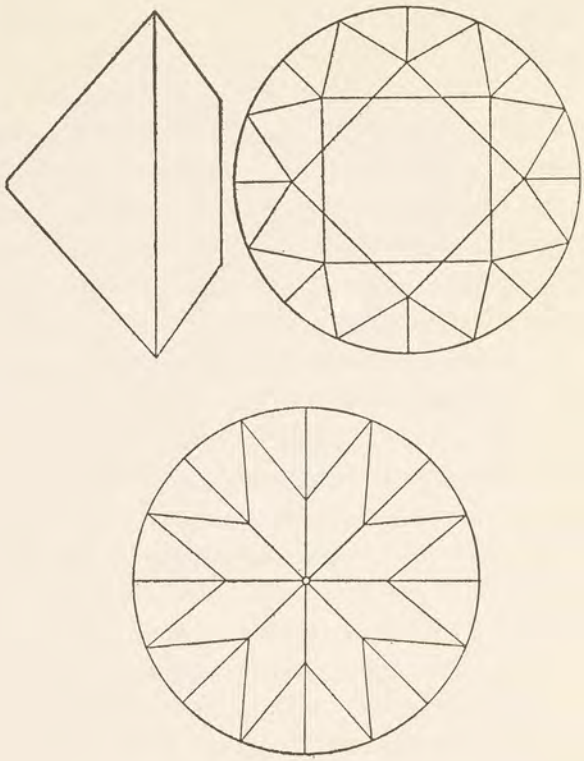


ILLUSTRATION No. 2
Crown, side and pavilion views of a correctly proportioned brilliant.

diamond, providing: the facet lines meet perfectly, the stone is absolutely round, the girdle is neither rough nor too thick and is parallel with the culet and table.

Now a selling method adopted by shysters has been to mislead the public into thinking it is getting something fine by saying to the public "perfect cut diamond," and giving a written guarantee to that effect. The point is, in its desire to get a perfect diamond, good cutting has been overlooked, and the public has been sold imperfect stones under this pretext. Because many poorly cut diamonds have been passed out as being perfectly cut, it is surprising that no definite action has been taken to stop this fraudulent practice which has been going on all over the country. I invite any reader who doubts my statement to walk past the windows of the admittedly second-rate shops in any city and notice the diamond rings on white cards, bearing the inscription, "Perfect Cut Diamonds." Then if the reader will note the quality of the stone

very carefully, he will notice, in most cases, that such merchandise does not warrant even so much as the time necessary to cut it perfectly.

But again to the actual subject of cutting, and what constitutes good workmanship. The term "brilliant" is applied only to round diamonds (unless otherwise modified by a preceding adjective) of the proportions enumerated, and displays, by virtue of its cutting, the very maximum brilliancy possible for a diamond to show. In the fancy-cut stones, e.g., pendeloques (the pear shapes), the emerald cut, marquises, in fact, any diamond not of the "brilliant" cutting, does not break up light so well, and consequently is not capable of producing extreme brilliancy. However, these fancy stones have their virtues, for when well cut, they have a depth of subtle beauty that is greatly enhanced by the natural adamantine luster of the diamond, superlative beyond comparison.

Meeting frequently with the brilliant-cut, round diamond, one desires to know how one may ascertain the quality of its cutting. As I have pointed out, the facets must meet their angles sharply, the stone must be absolutely round, and the table and culet must be parallel to the girdle. Inasmuch as there is no gauge yet on the market that makes it possible to measure the elusive and necessary third and two-thirds proportion of the crown and back, how is one to know the correctness of the stone's dimensions? And even though there were such a gauge available, how could it be applied in the case of a diamond set in a mounting? The last question is easily answered, for it is a simple matter to judge of a stone's proportions while it is mounted as when it is loose. But, again, how?

When a diamond is carefully examined from the top, it is noted that the play of fire flashes uniformly across the face of the stone. Experience will rapidly teach you the meaning of this uniformity

of spectral display, for this is the first impression gained from a brilliant that is really perfectly cut. But when you observe a diamond that has a pasty appearance in the center, and is brilliant about the edges, you know intuitively that the stone is cut too thickly. The thinly cut diamond has the appearance of being smudged with a light coating of clear grease; the lights fight valiantly to come forth with their full fires, but no! all the stone manages to do is to permit a gentle, grayish light to emanate.

It is impossible to give further details which will be of practical value, for the actual observation of particular stones must be made. But to sum up: the perfectly cut diamond is uniformly brilliant; the thick stone is brilliant only about the edges, having a "well" in the center; and the thin stone, or the "fish-eye," is lifeless, resembling nothing so much as the real fish-eye, after which it has been aptly named.

The Moe gauge (an instrument for

simply calculating the weights of diamonds from two dimensions) is of some benefit in adjudging the proportions of the diamond. It may be roughly said that when a stone does not check up with the proper scale (a list of dimensions and weights, a component part of the gauge), it is not correctly cut. However, one must be cautious and know the appearances of well-cut stones, for diamonds can measure "to the gauge," and at the same time be lopsided, heavy girdled, small (or large) tabled, and so on. It is always well to check a stone that is mounted, with the gauge, for it can help one to come to certain definite conclusions that would be otherwise unchecked.

The diamond, in being cut, is most generally "cut by eye." There are several little instruments used, but they do not measure up in accuracy like the various measuring blocks used in other fields of industry. Thus when novices cut diamonds, one is not entitled to expect too much. On the other hand, when an ex-

perienced craftsman takes a stone, it is sure to come out a perfectly cut brilliant. I think, too, that the reason we see so many poorly cut diamonds is because there is and always will be a class of people who would rather tell their friends that they have a two-carat diamond than to tell them that they have a carat and a quarter FINE diamond. This demand for flash will always keep certain cutters applying their talents to get the most possible material into the finished stone, no matter what ultimately goes into the cut diamond.

Before leaving the subject of round diamonds, I am going to take the liberty to quote from my notebook certain observations which may be of assistance, and from which the reader may be sure he is getting cold facts born from the experience of handling many, many diamonds.

"How is one to ascertain whether or not a brilliant is scientifically proportioned? The first thing to do is to exam-

ine the brilliancy of the stone. If you see neither the back facets, the culet, the crown facets nor the table—nothing but a play of fire; and if, under careful examination, the stone appears to be round; the edge not too thick; and the table facets meet the back facets exactly (as illustrated) and finally, if the stone gauges accurately you may know that it is scientifically made.

"A stone too thick will appear to have a number of culets, and reflects most of the imperfections to various points in the stone when it is examined under a lens. A diamond cut too thin will readily show the back facets from the front. Neither stone is very brilliant, and brilliant proportionate to its perfection in cutting.

"The thick stone when viewed from a distance of about eighteen inches appears to have a dead spot, or a well, in the center of the same size as the table. The thin stone has a dull fire and looks fishy, and is therefore often called a fish-eye.

"When a diamond is not sufficiently

flat to appear fishy, but still does not have enough depth to be a scientifically cut stone, it will appear fairly brilliant, but through its fire and flash may be readily seen the back facets peering through the table.

"Of course, to tell a casual reader how to immediately determine a well-cut brilliant and what it looks like, is quite on a par with telling a total abstainer the taste and effect of fine liquors. It can't be done. What can be done, though, is to help him so that he is not entirely at loss when the opportunity presents itself for him to examine either one or a number of stones."

Hereupon we shall pass from the round diamond to the fancier shapes. There is really not much to tell about them, for there are no strict rules for the enhancement of their several virtues. There are certain reasons for these shapes, aside from their esthetic values and qualities. The first, of course, is that a piece of rough material is found that is

broken or somehow misshapen, and will lend itself to the cutting of a fine fancy[5] with less loss of weight than if it were to be cut to a round brilliant. On the other hand, when a diamond may best be cut round, if the decision were made to cut it, say into an emerald-cut stone, the loss of weight would be appalling. However, I am inclined to think that diamonds of twenty carats and up, when cut to fancy shapes are much more refined than if round in shape. They do not display so much apparent bulk, and are therefore entirely appropriate for the most refined occasions.

After the shape of the diamond has finally been decided upon by the cutter, the procedure at hand takes into consideration the elimination of color if the material at hand is not of the top-color. The greater the amount of material, the greater the amount of color it will draw,[6]

5. The general term applied to all but round, brilliant-cut diamonds.

6. Draw: a word used by the trade to denote the tendency of diamonds to show color. Simply, the word is an idiom of the business.

and often times fancy stones are cut thinner than ordinarily so that they will show less color. Generally speaking, though, there is no rule, for weight often is considered more importantly than color, and *vice versa*. It is well that all fancy stones should have at least one-third their depth above the table and two-thirds below; the same proportions applicable to the round brilliant. Though the fancier cut diamonds are not cut primarily for brilliancy (excepting the marquise and the pendeloque), still, without proportionate depth, they lose that subtle and indescribable something that makes for their exquisite esthetic beauty.

The cutting of the marquise and pendeloque is the same as that of the round diamond, except that certain facets are elongated and others shortened so that the inherent shape of the *mode* may be carried out.

The emerald-cut diamond and the square-cut are both misnamed. The emerald cut is not cut exactly the same as

an emerald though they both are octagons: the diamond has an additional plane of table facets that is not to be found on the emerald. The term "square-cut" is applied to emerald-cut diamonds having four of the diagonal edges cut so as to give the stone the appearance of a square. In other words, four sides of the octagon are long, whilst the other four are very short. The true square-cut diamonds, or Swiss-cut, are rarely seen excepting in sizes under a half carat.

The baguette is a true rectangle in shape, though rarely is it seen drawn down to a square, for it is generally at least three times as long as it is wide. These stones are becoming extremely popular in *small sizes up to a half carat,* and because of the terrific loss of weight necessary to produce them, they are rarely seen in sizes over a carat. When such sizes in this shape are met with, they command unusually high prices. Incidentally, this shape is generally sold in pairs, though one, if not both, are fre-

quently imperfect. If the buyer of a fine piece of jewelry should find that the baguettes contained therein are imperfect he has no ground for complaint, for they are next to impossible to obtain in matched pieces in perfect pairs.

I have had some debates with diamond men as to the application of the word baguette to stones weighing over a carat and a quarter, and have found opinion rather divided. My own contention has it that such stones are different, and to fall back upon the emerald-cut and square-cut names really covers up the true type. Therefore, when a stone is cut to a perfect rectangle, having table, girdle and culet, with incidental facet-planes, it is truly a baguette in shape.

The term "baguette" has not been defined from an etymological standpoint. It seems that the word somehow was applied to diamonds of certain shapes and thereto stuck without having any particular meaning.[7]

7. I will greatly appreciate any more accurate knowledge on this subject.

The other shapes are almost without number, being cut to the fancies of the cutters. The most important ones I shall describe, permitting the rest unmentioned to pass on with proper credit, but unacknowledged for want of proper space.

The old-mine diamonds are the stones cut to the best proportions known to the earlier cutters. This type of cutting began to go definitely out of vogue along about 1900. However, a number of these old stones are from India, and yield, when re-cut, gems of unusual quality. The wastage in the process is so great, unfortunately, that they cannot command very high prices in spite of the lovely material of which they consist. And, too, the factor of labor charges in recutting *to modern shapes* is a further discount which must be considered in determining the value of these old diamonds.

The rose diamond was the forerunner of modern cutting. It is a stone cut flat

on back, faceted on top and without a table. These diamonds are very pretty but have no particular worth because they lack the necessary fire.

Melee, or the sizes running from ten to three hundred diamonds to the carat, are cut in three ways: full cut; three-quarter cut and eight cut (or single cut). It goes without saying that the full-cut is identical to the larger size round diamonds. It is a cut rarely seen in sizes smaller than a hundred to the carat. It is well to remember that in sizes smaller than thirty to the carat, three-quarter-cut and single-cut stones are more brilliant than the full-cut melee. In sizes smaller than seventy to the carat, the three-quarter-cut drops out, giving supremacy to the single-cut. I believe that the reason for this is that the more-faceted stones break up the light to such an extent that it is lost to the eye, for such stones are extremely small and reflect only a tiny amount.

The cutting of diamonds is extremely

important. I sometimes feel that in spite of the necessity for fine-colored diamonds, nearly perfect, the consideration of cutting is primary. Still, in discussing the subject of diamonds, one must remember that the cutting has nothing to do with the inherent nature of the stones, except that good cutting can always enhance the rough material, and make it infinitely more beautiful than nature intended it to be.

Yes, fine cutting is extremely important.

CHAPTER III

What Price Diamonds?[1]

The tale of the diamond is a tale of hardships, wars, superstitions, big business, science, ignorance and a thousand other phases of life. It is quite impossible to tell the story of each phase, for much of the history of the diamond has remained untold and unwritten. With the burial of Indian potentates and Brahmans; with the death of princes and paupers; with the obliteration of scores of hundreds of people, many interesting facts about the diamond and its lore have disappeared from existence. But what has been handed down to us through the literature of many races, together with what we know from actual observation,

1. This little chapter really contains a number of things already brought out. It is not, however, devoted to the technical subject of diamonds, but is presented as a readable, interesting thesis that attempts to correlate the work of production to value and critical appreciation for the gems. The reader will pardon, therefore, any repetition herein contained that has been stated previously in the more elaborately detailed chapters.

constitutes one of the most *interesting* studies available to intelligent people.

A poet, in speaking of art, defined at the same time our critical appreciation for the diamond. He definitely remarked that "all art is quite useless." So, too, with beautiful diamonds, for only the black, ugly specimens, known as carbonado or boart, are put to practical usage. The gem adorning milady's tiara, or the small, poorly cut diamond glittering to the fullest extent of its cramped powers, are completely incapable of doing a single stroke of good, except to make people happy in the possession of such brilliant, subtle creations. And if memory fails not, the poet suggested that beauty and good are one and the same thing.

Not that diamonds, alone of all things, are beautiful. I suggest a sunset, a rainbow; fleecy clouds drifting leisurely overhead; a tropical, verdant isle viewed from the distance as the sun breaks into the silence of the night.

There are other things equally as beautiful, but they must all be seen from a distance; their beauties die with the passing of time and become languid as soon as distance ceases to lend enchantment. And all that is then left is a memory that cannot be shared by others. But a diamond has something of the colors of the rainbow; it shows the brilliant hues of sunset and flashes the chromatics of dawn; each perpetuated into the obduracy of stone. It is, then, the extreme beauty of the diamond, together with its resistance to time's erosive pranks, that holds us spellbound in its magnificent presence. I speak in terms of art, for Nature has seen fit to be an artist, and contemptuously signs her name with inimitable permanency on the sparkling facets of the diamond.

II.

I hint that part of the interest one has for a diamond is due largely to the mystery surrounding not only the origin of the stone, but its production and distri-

bution as well, for so few people have actually been to the mines. This, together with the fact that the stone has been chosen by the world generally as an unofficial medium of exchange, and has, thereby, become subject to a universal translation of value. There is hardly a city on the globe where the diamond cannot be readily exchanged for the coin of the realm. In spite of the universality of the gem, there has never been, according to history, a deliberately discovered diamond mine. I mean that certain qualities of ground and hills indicate that gold, silver, copper or iron are likely to be there discovered; that certain soil types, coupled with hills and valleys, point strongly to the probability of oil running beneath the surface. But no geological structure or soil type, so far as is known, presaged the discovery of a single diamond mine. It was quite by chance that a pebble, found by a child in South Africa, led ultimately to the world's greatest spot of wealth.

The Brazilian washings, where diamonds are found in streams washed down from a prehistoric, undiscoverable somewhere, were first found by a priest who recognized the valuable pebbles, having seen them while doing missionary service in India. Quite probably had the man not seen the rough stones previously, it would have been many years later before the Brazilian stones would have been recognized for what they are.

Every continent in the world provides some diamonds. Australia produces a considerable quantity of fine diamonds, recognizable by cutters because of their extreme hardness.[2] In Lapland (to represent Europe) a few stones have been found. No small quantity of fine gems have been brought from India and Bor-

2. I am reliably informed that the Australian diamond is so hard that the smaller cutting shops have to give up the work, as they use only the commercial grade of dust. This brings out that point that even though diamonds are the hardest substance known, they vary in hardness themselves. Further, please observe that Moh's scale of hardness does not indicate exactly the difference in hardness between minerals as a progressive thing. He merely lists hardness in order ranging from 10, which represents the diamond, to 1, which represents talc.

neo, in Asia. South Africa, of course, since the discovery of diamonds there in 1867, has given the diamond markets more stones than all the rest of the world's mines put together. Brazil, as has been noted, has produced a considerable number of fine diamonds, particularly the gems of the finer colorings. And finally, North America, not to be overlooked in this diamond sprinkling affair, has offered a few stones for consideration of diamond collectors. Some stones have been found in States bordering upon the Great Lakes: these stones having been brought down by the glacial drifts from Canada that so altered the relief map of North America. It is presumed that there are vast potential diamond mines in Canada, where not so much as a single diamond has been found! But the mammoth ice packs, covering the northland perpetually, make it impossible to do any prospecting there. Arkansas has given us the bulk of this country's stones. A very fine gem, weighing about twenty-

four carats, has been found in the state of Virginia, while other stones have been discovered in California, Arizona and Indiana.

III.

Very little, except rubbish, has been told the public about diamonds. There is a great deal of interest pertaining to the production, transportation and distribution of them. It is strange, indeed, that those who know the inner workings of this vast industry have not put themselves to the task of telling about it. I suspect, however, that those familiar with the complete process are sufficiently fascinated with the lure of the business that everything else forthwith becomes subordinate to the work at hand.

The biggest of the South African workings is an open digging which appears as a single, circular hole, occupying a surface area in excess of seventy acres. Originally there were a number of small mines, each just a few yards square, separated only by cart roads.

Various miners got to cheating: the roads caved in, and there was a general scramble. Gradually the roads were abandoned, and the pay dirt was henceforth brought out in buckets, suspended and operated from overhead cables. It was not long until the mine-pit resembled a huge spider web: a ghastly spectacle, it was reported to be, in the moonlight.

Mind you, this method of operating was done by a number of miners, each owning no more than a few square yards of claim. Thus such methods of mining was so unsatisfactory that a huge mass of opposing forces stood steadfastly in the way of system. In spite of this kind of work, from 1867 to 1887, 33,000,000 carats or 6½ tons of rough gems were taken from the Kimberly, South Africa, fields. In 1880, a group of miners, with the present day co-operative spirit, got together, pooling their properties, their expenses and profits. This organization, through the capable management of Cecil J. Rhoades, by 1887 had completed

the purchases of the entire lot of claims, thereby giving control of the most valuable acreage in the world to the DeBeers syndicate.

Development in mining created new implements of production, and by common necessity, the several mines operate with similar equipment when ground conditions are alike. The earth in which the diamonds are found is a blue, clay-like soil. This is brought to the surface and spread out on huge, level fields, several feet deep, exposing the clay to the actions of the elements. In passing, it is interesting to note that diamonds are seldom, if ever, found in the open field. Thus it is that this disintegrating process must be completed before even the largest pieces of rough diamonds become visible.

After the dump-carts have brought their loads to the fields, the clay is smoothed down by huge steam-rollers. If the seasons are dry, the soil is thoroughly sprinkled, rolled and ploughed. This

process is kept up from six months to a year and a half. Then the dirt is again loaded into conveyors and taken to the mill.

By several methods, the diamonds are separated from the clay until only a very small mixture of diamonds and clay is left. This is finally run over greased shaker-tables. By some fortuitous quirk, the diamonds, gold, together with several other valuable minerals alone stick to the grease, whilst the waste passes out to the discard.

An interesting thing happened. The Cullinan diamond, found January, 1905 (the largest ever discovered), weighing 3025¾ carats in the rough (about 1½ pounds), showed conclusive evidence of being only a fragment of a stone considerably larger than itself. Diligent search was made for the missing portion. Each spadeful of dirt might contain the elusive fortune. The section already found had been insured by the British Government for 1,500,000 pounds, or, roughly,

$7,000,000; truly, the search for a still larger stone would be worth while. One day, October 18, 1919, a cablegram was received in London, from Johannesburg, South Africa. Very briefly it told a story —I would say a tragedy—the diamond the world had been patiently waiting for had, at last, been untimely discovered. The cable read: *A very large diamond has been found on the Premier Mine. It is estimated to have weighed fifteen hundred carats, but unfortunately had been crushed in the crusher. It is believed to be part of the other half of the Cullinan diamond.* The crushers which break the clods of blue-ground had been too closely set to accommodate this huge gem. And there is still another fragment of no mean dimensions yet to be found, which may yet make history.

Surely the Klondike cannot match this for adventure!

IV.

People often, and wisely, ask why diamonds are valuable. They ask a most

sensible question, for within themselves, diamonds are not useable, except as beautiful things as already suggested. Diamonds are valuable because of the effort expended in obtaining them. If it takes ten thousand men, and five million dollars' worth of equipment to mine a given number of carats of diamonds a year, the actual cost of the stones produced may be readily ascertained, and without giving the slightest heed to the demand for them. First you have labor charges: payrolls and salaries. Then comes the depreciation on the plant, interest on the investment, together with the lessened value of the property because of the extracted wealth. Incidentally, there are taxes, insurance, and burglary losses that count up to no small figures. Too, there are wages of management, or, definitely, the profits accruing to the owners of the property. Then from Africa, after leaving the mines, the stones are shipped to England, adding thereby shipping insurance and post charges to the original

cost. In England, the stones are sold to cutters who prepare them for ultimate consumption, adding again to the cost, for there is considerable loss in weight due to polishing, together with the wages which may be paid the artisans who do the work.

If the diamonds are brought to America, customs brokers receive their commissions, along with the duty of ten per cent. on rough diamonds, twenty per cent. on cut diamonds, and eighty per cent. on jewelry that contains them! Finally, after passing from importer to wholesaler to retailer, the stones reach the ultimate consumer. With such an amount of handling, it is quite miraculous that diamonds do not cost ten times their present values.

In speaking of the expense necessary to produce diamonds for the market, an illuminating incident occurred: A new territory was expected to be worthy of development, and speculators bought shares in the newly formed company with

high hopes of making huge fortunes. After spending considerable money in the development of this possible mine, the machinery was started to work. Upon bringing out five hundred dump-carts of likely ground, two stones, weighing together about one-half carat in the rough, were found. These stones, if cut, would have weighed about 0.08 of carat each. The workings, so I understand, have been abandoned; the stock has no particular market value for its English owners, and those two stones can go on record as having cost as much as any, for their size, in all history.

The amount of labor necessary in cutting a diamond is more than one would suspect. A rough diamond, which will cut to a carat size, will be on the polishing wheel for about three days. The cutters do the shaping and matching of the facets by eye, for it is impossible to have automatic gauges to do the work. One side may cut faster than the other; a diamond has a grain and will cut down

much faster when the wheel (which is of soft steel saturated with diamond dust) is cutting against the grain than with it. Thus a careful eye must be ever trained upon the work, guarded constantly by fingers sensitive to the task.

In speaking of cutting diamonds, one would hardly expect such a beautiful object to emerge from such a mess as a cutting shop. On examination, one finds the rooms more or less dirty because the rapidly turning motors and belts which revolve the cutting discs are constantly spraying oil about. There are a number of tools, spare wheels, and rags scattered about the room. The men, like the true artists they are, dress as the work requires: in overalls. Their hands are blackened with a mixture of grease, olive oil, diamond dust and dirt; their fingers are huge-jointed, developed so by the extreme strength needed to move the holders which clamp the diamonds firmly against the wheel. But their work! Commercially, the diamond, when cut by

any good cutter, approaches mechanical perfection beyond all other products of modern industry and science.

V.

Nearly everyone, at some time or another, has had occasion to determine the value of a particular diamond. One may want an appraisal for insurance purposes; to ascertain the value of an heritage or for many other reasons. No doubt you, as a casual reader of his chapter, have been in such a position, and as you stood, watching the expert examine your gem, you wondered what he looked for and what he saw. If your stone is loose, no honest dealer or appraiser will permit it out of your sight if you are a stranger to him. If the stone is set, you wonder how he knows its weight.

The first step is to look at a stone for imperfections, for instantly the expert knows by intuition whether or not it is a genuine diamond, and if it is, he proceeds with his task of finding flaws which may be black spots, varying in size; minute

air bubbles clear and visible only through a strong glass; cracks, known as feathers and clouds, and cleavage fractures, or, your stone may be perfect. This examination is accomplished by looking into the stone from every posible angle with the aid of a powerful lens. There are thirty-two facets which compose the crown of a round, brilliant-cut diamond, and twenty-four facets and the culet which are below the edge of the girdle. Through each of these facets, the interior of the stone is scrutinized. If the stone is in a setting, it can only be examined from the top, and your expert will be able to judge of its perfection only so far as he can possibly observe. If it is loose, he can tell you definitely, beyond all doubt, as to its purity. The expert can look through each of these facets and make a satisfactory examination of the entire diamond in from fifteen seconds to one minute. Only on gem stones of larger sizes does the examination take longer.

After determining whether or not the

stone has flaws, the expert then decides upon the quality of the workmanship used in the cutting; he must judge whether the stone was cut to best proportions or not; and knowing the tendencies of cut diamonds, it is only necessary to note the proportions from the side and the fire from the top, and within a very few seconds he knows the 'make" of your diamond.

Equally important to the make of the diamond is its color. There are a number of colors and characteristics afforded by this carboniferous stone which help to determine its value. In fact, a finely colored, imperfect diamond is preferable to a stone that is perfect, but not of good color. These factors must be considered in arriving at the proper value. Because the nature of the work is such that comparison with a diamond of a known color is necessary for close sorting and judging, it is impossible to describe the colors better than to say that commercially, the

best diamonds are blue-white, white and blue.

In speaking of coloring, there are a number of odd occurrences which cause one to be ever on the alert for unusual tendencies. For instance, certain diamonds which are extremely yellow with a slight tinge of brown, will, when brought into the direct rays of the sun, turn a cloudy green that resembles nothing so much as stagnant swamp water. There is another popular type of diamond, often sold as a violet blue, which under normal light is rather dull, and when put on its side in a paper, is very light brown, known as the "Premier" diamond. When these diamonds are put in the direct rays of the sun, they will turn a beautiful coal-oil blue. They are about as valuable as the popular blue-white stones, and worth considerably less than the true violet-blue gems, which in the sunlight they represent.

This tendency to change colors under different lights is a phenomenon which

is not yet explained. It may be from some impurity within the stone, or it may be a form of minute air-bubbles not visible to the strongest microscope, but whatever it is, it has been called "tiffanyite" by George Frederick Kunz, America's foremost gemologist, in honor of America's foremost jeweler.

And, finally, if your stone is set, and at the same time you require an accurate appraisal of its value, it is quite important to know its weight. On the average stone up to, say, five carats, one who constantly handles diamonds can estimate weights, without comparing, weighing or measuring them, to a closeness not exceeding ten per cent. However, this is not close enough, and, after all, it is simply guessing. The trade has been favored with a specially prepared gauge, known as the Moe gauge, a table of figures to go with it, so that when the depth of the stone and its width or diameter have been translated to terms within the table, the weight is very closely calculated.

This method of obtaining dimensions is quite necessary in making such statements as insurance appraisals: for besides the weight, the actual physical dimensions of the diamond are given, and will aid in locating and identifying a given stone if it happens to be lost or stolen. The gauge is generally used on round diamonds, though with certain calculations, it is applicable to some of the fancy cut stones. Due to the difference in specific gravity of various substances, this instrument, obviously, can only be used for diamonds.

VI.

Because the subject of diamonds is one that is interesting and profitable to those who do not try "to beat the game" by getting something for nothing, and because there are so few men engaged in handling gems who know more than the crudest of elementary facts about them, this writer, for one, would like to see established in the universities a course, even though a short one, dealing with

gems, so that a number of their characteristics could be made understandable and popular. I further suggest that interest on the part of university students might bring forth original research which would be of immense importance to the realm of science. And strangely enough, some of the leading scientists of recent times have intensely interested themselves in this work, and yet the colleges and universities studying the subject within the United States may be counted upon the fingers of one hand.

CHAPTER IV

A Chapter on Large Gems

In spite of the fact that this book, together with all other text-books dealing upon the subject of precious stones, deals largely with their special characteristics, the reading public is most interested in the larger stones, their histories, including their owners; the amounts paid for them, their values; and their places of safekeeping.

Exact information upon such subjects, since the Great Conflict, is next to impossible to obtain. Many of the finest gems in the world were owned by the Russian Crown, and they have mysteriously disappeared. However, some of the lesser stones have been sold to the public. The French government sold a number of its fine stones, but has not announced the purchasers. Again, the stones owned by Indian princes are al-

ways an unknown quantity. Only the large gems of the British Crown collections have been noted and officially tabulated for the benefit of those interested in the subject.

In our own country there are but two stones of international importance to this writer's knowledge: the "Tiffany Yellow" and the "Hope Blue." Of these two, I will have more to say later.

The reason that more of the famous gem stones are not seen outside of regal collections is because it is nearly impossible to wear a diamond of a hundred carats or more. The more important stones are often individually cased and displayed in specially made cabinets, or else they are mounted in crowns, scepters or other portions of royal regalia. In America there is no place for such personal ornamentation. A further discouraging feature for the American connoisseur is that all but bankrupt crowns are very unwilling to part with their gems.

And, too, should such a prize be

brought into this country for the purpose of being sold to a prospective customer, the appraisal price would make the twenty per cent. duty amount to more than a small item. Apparently, this government is discouraging the purchase of large gem stones.

* * * * *

In describing the following large and important gems, the reader is asked to remember that very few of these stones, aside from the British Crown jewels, are every permitted to be seen by experts. Even in the case of the British gems, they are never examined by experts, and consequently, the information about them comes directly from the keepers of the collection, and it is to them we must look for our information.

A few of the most famous stones in history have not been seen for several hundred years, and there is much to be taken for granted about them.

Others have not been seen since the war; their presence is only to be sur-

mised; whilst some have been surreptitiously destroyed or altered so as to yield smaller, more saleable stones.

Thus in listing these large gems of history, legend, and romance, I have merely collected the available data, and pass it on at its face value, ever conscious, however, that I have quoted from the best and most reliable authorities.

THE CULLINAN DIAMOND.

This diamond is, without doubt, the foremost gem in the world. It eclipses all others to such an extent that they pale into insignificance before the very immensity and quality of this tremendous prize. This stone is best described by Major General Sir George Younghusband, K.C.M.G., K.C.I.E., C.B., the keeper of the Jewel House, wherein the British Royal Regalia is stored. Better than any other person, this man is able to give the history of the most precious gem known.

"As gems the two greater portions of

the Star of Africa[1] eclipse in size and brilliancy all others in the Jewel House. Though the stone may have taken a million years to form in the womb of mother earth, it only saw the ligh of day (January 25th) in 1904. In the rough when found it measured 4 in. in length, 2¼ in. in width, and 2½ in. in depth, and weighed roughly 1½ lbs. But even this huge block, as large as half a Roman brick, it was concluded was only a part of some even more gigantic diamond, for its base was clean cut as with a knife, showing that a portion perhaps as large, perhaps even larger, in some remote age, by a great convulsion of nature, had been split off. For fourteen years diligent search was made for the missing portion, for any block or spadeful of blue rock might contain it. Yet, strangely enough, when by chance it was found, it came to an untimely end. A telegram from Jo-

1. The Cullinan Diamond has been renamed the Star of South Africa at the request of George V. The reason for this becomes obvious as the history of the stone unfolds.

hannesburg, dated October 18th, 1919, made note of its destruction.[2]

"The diamond was first known as the 'Cullinan Diamond,' Mr. T. M. Cullinan being at that time manager of the Premier Mine, near Pretoria (South Africa), where it was found, and it is still very generally known by its first name. It was insured for the sum of £1,500,000. The Union Government of South Africa eventually became the purchasers, inspired with the happy sentiment that this magnificent diamond would be a graceful emblem of the entry of South Africa into the British Empire.

"When this monster stone was presented to Edward VII it looked like a block of rock salt, as may be judged from the exact model of it now to be seen in the Jewel House. When the experts were called in they declared that it was impossible to cut a stone of this size and shape into one brilliant; they therefore

2. I refer to this incident in the chapter, "What Price Diamonds?" on page 81.

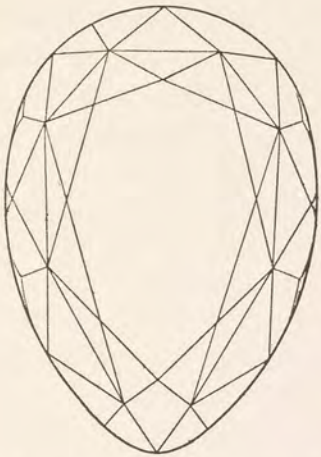
recommended that following the natural cleavages it should be broken up into four parts, two of which would be very great brilliants, and two of lesser size. King Edward, following this advice, and with the full consent of the donors, called in the famous diamond cutters of Amsterdam, the Messrs. Coster,[3] and put the work in hand. One can imagine the enormous anxiety and the extraordinary coolness, steadiness of hand, and skill of the man who with one tremor of the mallet or chisel might mar the greatest stone of all ages. The chisel and the steel mallet with which this delicate operation was performed are preserved at the Tower, and it is noticeable that there are only two or three dents in the chisel, showing how true and clean the strokes must have been.

"Thus split up, the largest portion was cut into a pear-shaped brilliant, and set at the head of the King's Scepter. The

3. Other authorities give Messrs. I. J. Asscher credit for this work, but I am inclined to permit Sir George Younghusband to settle all matters of controversy regarding this great gem.

next largest portion was cut into a cushion-shaped brilliant, and placed in the band of the King's State Crown, just below the Black Prince's ruby. Both of these brilliants are larger and finer stones than any others, including the Koh-i-noor. The two remaining large portions are set, one in the band, and the other in the cross pate of Queen Mary's Crown. It may be of interest to record the exact weight and sizes of these four great brilliants which collectively are called the Stars of South Africa. The largest portion, that in the King's Scepter, weighs 516½ carats, and measures 2 5/16 in. in length and 1 13/16 in. at its broadest part. The next largest portion, that in the band of the King's State Crown, weighs 309 3/16 carats, and measures 1 13/16 in. in length, and 1 11/16 in. in breadth. The third portion, that in the band of Queen Mary's Crown, weighs 96 carats, and a fourth portion, which is drop shaped and is in the cross pate on the top of Queen Mary's Crown, weighs 64 carats. Thus

A CHAPTER ON LARGE GEMS



The exact size of the largest fragment of the largest diamond in the world, in the King's Scepter, and known as the "Star of Africa."

it will be noticed that a rough stone weighing 3025¾ carats cuts down into four brilliants weighing in the aggregate under 986 carats."

In addition to the above four stones, there are a heart-shaped stone 18⅜ carats, two marquises 8 9/16 and 11¼ carats, an oblong stone 6⅝ carats, a pendeloque weighing 4 9/32 carats and 96 small brilliants weighing together 7⅜ carats. It is interesting to note that the finished stones weigh roughly one-third of the rough material, the balance being wasted entirely so far as gem material was concerned.

But to continue the narrative of the Keeper of the Jewel House: "The question is often asked: 'What is the value of the Star of South Africa?' And it is a very difficult one to answer, for curiously enough stones above a certain size lose their commercial value, for few have the money or the inclination to buy gems of enormous size, and fewer still would be bold enough to wear them. Nobody but

a King or Queen, for instance, could wear a diamond which on an ordinary person would look and certainly be taken for the lustre from a candelabra. Thus the market becomes strictly limited, as was definitely brought home to the owners of the Premier Mine. It was thus that Union Government were enabled to buy a stone valued at £1,500,000 for £150,000, a stone which even when split into four is still of an aggregate value difficult to compute. Let us elude the difficulty and say they are worth a million and a half, and leave it at that."

It might be well to remark that the Cullinan would be difficult to buy, because of the diplomatic reasons arising from its being a gift from South Africa. However, I should hazard the guess that $10,000,000.00 would be a fair estimate of the value of the cut stones from the original, basing this estimate on the fact that the stone is the largest in existence; that each piece, since the cutting, is absolutely perfect in the strictest sense of the

word; and that, above all, the color is the very finest of clear white, making the stone, even though it were not exceptional in size, extremely rare because of its inherent qualities, which in stones of five carats or more are infrequently seen.

The same mine that yielded the Star of Africa has produced other large stones, seven of which have weighed over three hundred carats! Their weights are as follows: 511, 487¼, 458¾, 391½, 373, 348, and 334 carats each.

* * * * *

There is a stone in the Portuguese Crown Collection known as the "Braganza," which, if it is a diamond, is the largest complete stone in existence (the Cullinan has been reduced by cutting). This stone is reported to be about the size of a hen's egg, and weighs 1680 carats. The authorities refuse to submit the stone for examination by experts. Its value in 1900 has been placed at £224,000,000! Doctor Max Bauer, the world's foremost authority on gems and gem minerals, is

inclined to believe this stone to be nothing more than a topaz, and of an insignificant value. Evidently, royalty is inclined to "keep up with the Jones'" too.

* * * * *

Then there is another famous stone, owned by the Rajah of Mattan in Borneo. This stone is known as the "Danau Rajah," but is referred to more frequently as the "Mattan." Its weight is reported to be 367 carats, and if it is genuine, it is the largest diamond ever found in Borneo. Dr. Bauer says that "the stone was examined at Pontianak, in Borneo, in 1868, when it was declared to be rock-crystal; this decision is generally accepted, although it has been stated that an imitation, and not the real stone, was submitted for examination." This stone is about the size of a pigeon's egg, and is pear-shaped. Beyond that, very little is known of it, for these Asiatics are quite inclined to disregard opinions of the Western world. They are connoisseurs, and come to the European markets to buy

rare or large gems, and then retire with them, keeping them in complete seclusion.

* * * * *

Perhaps the best known large diamond in the world is the "Great Mogul." Its history is very obscure, but we know of its authenticity through Tavernier, who both drew and described it in detail. He examined it in the treasury of the Great Mogul, Aurungzebe, in 1665. The "Great Mogul" then was shaped as a very high rosette, and was of good quality. It was said to weigh 319½ ratis, which recent authorities conclude to be equal to 188 carats. This stone was supposed to have been found between 1630 and 1650, in the Kollur, India, mines, weighing 787½ carats in the rough, making it unquestionably the largest Indian diamond.

This great discrepancy between the rough and polished stone is attributed to the faulty workmanship of Hortensio Borgis, the Venetian diamond cutter,

who was at the time in India, and to whom the work of cutting was intrusted. Subsequently, the history of the stone is utterly unknown; the belief is that it has been destroyed or lost; to be in existence under another name, such as the "Orloff" diamond, or the "Koh-i-noor"; to be in the possession of the Shah of Persia; or to be lying forgotten among the jewels of some Indian Prince.

There is an account of another large diamond of the same weight, which is described in the memoirs of Baber, the founder of the Mogul dynasty. This stone had long been famous in India, and had formed part of the spoils of war of many an Indian Prince, finally passing into the posesssion of Baber, in 1556. This diamond is regarded by Professor Story-Maskelyne as being identical with the diamond seen at Delhi, and described by Tavernier, and identical with the stone at present known as the "Koh-i-noor." "This view," says Dr. Bauer, "is very generally accepted." At any rate,

this opinion is passed on for what it is worth.

The history, paradoxically, of the "Koh-i-noor," is quite definitely known. In 1739, it was appropriated by Nadir Shah, the Persian conqueror of the Mogul Empire. In 1813 it passed into the possession of the Rajah of Lahore, and after the British annexation of the Punjab, it became the property of the East India Company, which in 1850 presented it to Queen Victoria, at which time it was an irregularly shaped rosette. The weight of the stone was 186 1/16 carats, which is approximately the same as the one described long before by Baber, weighing 320 ratis. In order to improve its form and brilliancy, it was recut in England in 1852 by Voorsanger, the diamond cutter from the Amsterdam firm of Coster, the work requiring thirty-eight days, of twelve hours each.

The "Koh-i-noor" is now a stone of considerable beauty, weighing 106 1/16 carats. However, in its new form, it is

too thin to show its maximum brilliancy, and, furthermore, it is not perfect, and is slightly grayish in color. In spite of these faults, at the beginning of the present century was valued at £100,000.

Regarding this stone and the "Great Mogul," Dr. Bauer remarks that "the question as to the identity of the 'Great Mogul' with the 'Koh-i-noor' can scarcely now be decided. Tennant regards them as identical, and suggested that the 'Koh-i-noor' and the 'Orloff' are both parts of the rough stone of 787½ carats, mentioned by Tavernier, and that the third remaining portion of it is the plate of diamond weighing 132 carats, often mentioned as having been taken by Abbas Mirza with other jewels from Reeza Kuli Khan at the capture of Coocha, in Khorassan."

At any rate, this is interesting history, and shows how diamonds are prized by nations. Strange to say, these stones are kept in mystery, and there is always more

or less speculation regarding their sizes, qualities, and shapes.

The largest diamond in the Russian Crown Collection, before the war, was the "Orloff," which usually formed the termination of the imperial scepter. It is reported as being of the "finest luster, perfectly pure and with a brilliant luster." It weighs 194¾ carats.

The career of this stone is very peculiar. It was once reported to form one of the eyes of a Brahman idol, Trichinopoly. It was stolen from here, at the beginning of the eighteenth century, by a French soldier, who was murdered by a captain of an English ship for his prize, and thus found its way to Europe, and in 1791 was bought in Amsterdam by Prince Orloff for the Empress Catherine II of Russia, for the sum of 1,400,000 Dutch florins. Another story says that the Prince paid £90,000 and an annuity of £4,000 to the seller.

At any rate, this stone is with the rest of the Russian Crown Jewels at the pres-

ent time, which, so far as the rest of the world is concerned, means that it is out of existence.

Another fine diamond, the "Moon of the Mountains," which is with the Russian Crown Jewels, weighs 120 carats, and was purchased by Catherine II for 450,000 rubles in 1775.

In the same collection is the "Polar Star," a cushion-shaped brilliant weighing forty carats, and the "Shah," which was presented to the Czar Nicholas, in 1829, by the Persian Prince, Chosroes. This stone is said to be of the purest water, and in the form of a very irregular prism, 1 inch 5½ lines long, and 8 lines wide in the thickest part. On three of the boundary edges the names of three Persian kings were engraved, so that the "Shah" was one of the few examples of engraved diamonds. Professor Gustav Rose, who saw the stone soon after it was brought to Petrograd, gave the weight as eighty-eight carats, but this does not agree with a subsequent statement to the

effect that the stone has been re-cut and its weight reduced from ninety-five to eighty-six carats, the interesting inscription being lost in the process.

Speaking of engraved diamonds, one is forced to include the "Akbar Shah." This stone had arabic inscriptions engraved on two of its faces. It disappeared for a long time, reappearing in Turkey under the name of the "Shepherd's Stone," but recognizable as the "Akbar Shah" because of the engraving. It first weighed 116 carats, but after recutting in 1866 its weight was reduced to seventy-one or seventy-two carats, the inscriptions being lost in the process. In 1867 this stone was sold for £35,000 to the Gaikwar of Baroda.

The "Regent" or "Pitt," is a very large gem of unusual beauty, said to be amongst the finest of large stones, being absolutely perfect, but not of extremely fine color. It was found in India in 1701, weighing 410 carats in the rough. Governor Pitt, of Fort St. George, Madras,

paid £20,400 for it. In 1717, it was sold to the Duke of Orleans for £80,000. It was cut in London, taking two years to perform the task, at a cost of £5,000, and weighed, when finished, 136 14/16 carats. The fragments left over from this job went to the original owner, who sold them for £7,000. This stone was valued in 1791 at 12,000,000 francs, or £480,000, when it was valued along with other of the French Crown Jewels. This valuation, incidentally, is still applied to the stone, though at the present market value it must be worth considerably in excess of $2,500,000. During the Revolution it was pawned, but later redeemed by Napoleon. France very wisely retained control over the stone, not selling it along with the other Crown Jewels, and it may be seen yet in the Apollo Gallery of Louvre, at Paris.

The "White Saxon Brilliant," one of the most beautiful diamonds known, is square in outline, measuring 1 1/12 inches, weighing 48 carats. August the

Strong is said to have paid 1,000,000 thalers (about $700,000) for it.

Perhaps the most notorious colored diamond is the "Hope Blue," now in the possession of Mr. Edward McLean of Washington, D.C. Mr. McLean is reported to have paid about $300,000 for it, in 1911. The best and most authoritive description of this stone is that from the pen of Dr. Max Bauer, which follows:

"The 'Hope Blue' diamond is characterized not only by the possession of a beautiful sapphire blue color—an extremely rare tint in diamonds—but also by a brilliant luster and a fine play of colors. Its existence has been known since 1830, and it at one time formed a part of the famous collection of precious stones of Henry Philip Hope, who bought it for £18,000. It is a perfect brilliant, weighing 44¼ carats.

"A beautiful blue, triangular brilliant of 67 2/16 carats, and valued in 1791 at 3,000,000 francs, was preserved among the French crown jewels up to the year

1792, when it was stolen, together with the 'Regent' and others. It had been cut from a rough stone, weighing 112 3/16 carats, brought from India by Tavernier for Louis XIV. There are substantial grounds for the suggestion that when this brilliant was stolen it was divided, and the portions recut and placed on the market about 1830 in new form. It is very possible that 'Hope Blue' diamond is one of these portions; another being a stone of 13¾ carats of the same blue color, and formerly in the possession of Duke Karl of Brunswick, who sold it in 1874 in Geneva for 17,000 francs; the third portion may be identical with a stone of 1¼ carats of the same color, once bought for £300 and now in the possession of an English family."

I might remark, in a personal way, that I have examined reports on this stone, and, in a very technical way, they are quite conclusive in the opinion that the three blue stones above mentioned are ALL from the same piece of rough. It

is furthermore asserted that these three diamonds of this particular shade of blue are the only ones known to be in existence, proving the very extreme rarity of the color.

It is interesting to note that throughout the history of the stone there has followed a wake of ill fortune. It is reported that in the immediate family of the present possessor there has been a tragic, accidental death. Surely, coincidences that lead one to place a slight credence in superstition!

* * * * *

The "Excelsior," or the "Jubilee," next to the Cullinan, was the largest of all known, authentic diamonds. When found, it weighed 971¾ carats, measuring 2½ inches by 2 inches by 1 inch. The Kaffir who found it in the Jagersfontein Mine, Orange River Colony, South Africa, received £500 and a horse equipped with saddle and bridle. The stone is of a beautiful blue-white color and of the purest water, except for a black spot near

the center which necessitated cleaving it in two. From the larger portion there was cut an absolutely perfect cushion-shaped brilliant weighing 239 carats, measuring 1⅝ inches in length, 1⅜ inches in breadth and 1 inch deep. This stone, in the rough, at the time of its discovery was appraised variously by experts to be worth $250,000 to $5,000,000. Though the latter value at the time seemed prohibitive, still it would not be very far amiss today, and quite conservative at that.

Tiffany and Company, of New York City, are in possession of one of the finest yellow diamonds in existence, and one of the largest diamonds in America. It weighs 125½ carats, and is reported to be the only thing in that large establishment which is not for sale. This diamond was discovered in the Kimberly mine, South Africa, in 1878.

* * * * *

Of course, there are many other large and famous diamonds, but the stones

mentioned are dealt with, perhaps, as much as any in a popular and historical manner. But of large and rare gems, there are certain other stones of historical and financial importance, and here follows a partial list of them.

Tavernier states that he saw two rubies, in the possession of the King of Bijapur, in India, which weighed 50 and 17½ carats, and he valued them at 600,000 and 74,550 francs, respectively. The reader is asked to remember that this valuation was placed nearly two hundreds years ago!

The King of Ava was reported to be in possession of a ruby mounted in an ear-pendant which is the size of small hen's egg. The importance of such a sized ruby must be greatly stressed, for in spite of the fact that a number of diamonds over ten carats are found, a ruby of that size today would be entirely prohibitive in price. Though a two-carat ruby of fine quality would be worth roughly eight hundred dollars, a similar gem

weighing twenty carats (if there is such a thing) would easily fetch $200,000.

"Perhaps[4] the gem which holds the greatest interest in the British Empire is the great ruby, which indeed is as large as a small hen's egg,[5] and is given the place of honor in front of the King's State Crown. This is the celebrated and historic jewel which first in its English history belonged to the Black Prince, the eldest son of Edward III.

"The ruby came to him in true knightly fashion on the field of battle. In those days the potentates of Europe were accustomed to lend each other armed forces, large or small, to accomplish such military achievements as might be dear to one or the other or both. Thus it was that Edward III lent a small force of some four or five thousand English troops to Don Pedro, King of Castile, to be employed during a short campaign in

4. From "The Jewel House."

5. The reader's attention is called to the fact that rubies, per carat, are about two-thirds the size of diamonds. See specific gravity, appendix III.

Spain. Mainly through the skill of the Black Prince, aided by the courage of the English soldiers, Don Pedro defeated his enemies at the Battle of Najera, which is near Vittoria, where the Duke of Wellington many centuries later won another British victory. In gratitude for this signal service Don Pedro gave to the Black Prince his most treasured jewel, an enormous ruby.

"The ruby, red as human blood, had come to Don Pedro in bloody fashion. In 1367 it belonged to the King of Granada, another minor sovereign in Spain, and Don Pedro greatly coveted the greatest gem of the Western world, as it then probably was. He therefore took direct action towards obtaining the stone, and in cold blood slaughtered the King of Granada and carried off the ruby. His gift to the Black Prince, therefore, however generous it may have seemed, was not improbably a decent pretext for getting rid of a treasure ignobly acquired, and which once possessed lost its value.

How old the ruby was in 1367 history does not relate, but it bears visible evidence that it had previous to that date an oriental origin, which may have extended over many centuries.

"This is judged by the fact that at the top of the ruby may be seen a piercing, made evidently so as to enable it to be worn suspended from a necklace. This piercing of precious stones is of very ancient oriental origin, from which it is concluded that the ruby came from the East, and not improbably from Burmah, where similar rubies have been found. The ancient piercing has in a later century been filled up by inserting a small ruby in a gold setting.

"However ancient its origin, the ruby came into the possession of the British Crown in 1367-68, and has since been through many and great adventures before it reached its present well-earned security in the Tower of London.

"The Black Prince, using the pierced hole, had the ruby sewn to a velvet cap

he wore under his coronet, and an ancient print shows the gem thus disposed. The Prince died in 1376, a year before his father, and therefore never came to the throne; but he bequeathed the ruby to his son, who afterwards became Richard the II. Henry IV, on usurping the throne, probably usurped the ruby with it, but it does not reappear in history until the next reign, that of Henry V. Here it had a very notable and thrilling adventure, for it took part in one of the greatest of British victories, the Battle of Agincourt. It was the custom in those days for the King, if a doughty warrior, and Kings were expected to be so, to take the field with his troops and to fight at their head. Nor did he go to battle meanly clad, or disguised as a knight of small account. On the contrary, he went armed, caparisoned, and mounted, as a King; and so that there should be no mistake about it, wore a regal diadem round his helmet. Thus went Henry V on the morn of Agincourt, and glittering on the front of

the coroneted helmet was the great ruby. As the battle swayed backwards and forwards many exciting encounters took place between redoubted champions on either side, each choosing out an opponent worthy of his steel. In this knightly quest the great Duc d'Alencon, searching no doubt for an English duke or earl, came upon a commanding figure, who, from his bearing, rich armor, and coroneted helmet, was evidently a knight of importance. Him, therefore, the Duke d'Alencon challenged to mortal combat; and lesser folk, as was the chivalry of the day, stood aside and held the lists.

"The duel was fierce and strong, and many a shrewd blow was dealt and parried, but at length Henry V prevailed, and the Duc d'Alencon was unhorsed and made a prisoner, to be later held to ransom. It was only after the battle was over, and the victory of Agincourt emblazoned forever on the standards of England, that the King being unhelmeted, and his armor removed, it was

discovered that a shrewd blow had only just missed the great ruby, or perhaps had been turned by it. Indeed, a mighty cut from the Duc d'Alencon's sword had hewn off a portion of the golden diadem in which the ruby was set.

"Some say that this was the last occasion in which the ruby has figured in battle, whilst others are of the opinion that so striking a jewel would always have been in the crowns of succeeding monarchs. If this was so, another decisive battle, though not on the victorious side, may be added to its war record. A little more than a hundred years after the battle of Agincourt was fought in England another battle of importance, which decided not only a local quarrel, but influenced the course of the history of the nation. In this battle, which was fought at Bosworth Field, Richard III, the Hunchback, was defeated by Henry Tudor. According to the well-known story, when the tide of battle turned against him, Richard, who had worn his

crown throughout the day, though probably behind a safe barbed wire of knights, was seized with panic, and to insure a less conspicuous retreat, took off his crown and hid it in a hawthorn bush. There some lucky underling, doubtless in quest of loot, found it in good and appropriate season, so that the victorious army was through its appointed leaders enabled to crown there and then, amidst the dead and dying, Henry VII King of England. Let us hope that the great ruby was in the crown on this historic occasion, for it was the birth of the House of Tudor.

"Henry VII was the issue of a romance nearly connected with the Black Prince, and through him with the ruby. When Henry V died, Katherine, his widow, having first tasted royalty, became a mere woman, and for love of a mere man married a plain but stalwart soldier from the ranks named Owen Tudor. It was their grandson who was the

victor at Bosworth, and who was there crowned Henry VII.

"The next recorded adventure of the great ruby came more than a century later, though doubtless if it could speak it would have much to say of what it saw or suffered during those hundred and sixty-four intervening years. When Charles I was beheaded, it was ordered by Parliament that all the insignia of royalty should be destroyed and the gems set therein sold to best advantage. In the list which we have of the Regalia, which was in accordance with this order totally destroyed, defaced, or sold, we find the item: 'To one large ballas ruby wrapped in paper value £4.' Thus humbly disguised and lowly priced the Black Prince's ruby passed to some unknown purchaser. He may have been a Royalist in disguise, or he may have been a dealer in stones, or this may have been a spurious deal to favor a Parliamentarian whom it was wished to gratify; perchance even it passed by favor to a fair

lady beloved of a Roundhead. But whatever its adventures during the Commonwealth era, we find the ruby safe and sound back in the State Crown of Charles II.

"As is related in the account of Colonel Blood's attempt to steal the Crown, for convenience of porterage the arches were battered in and the rim bent double, so that it might conveniently be slipped into a bag carried for the purpose. During this rough treatment many of the stones fell out, and amongst others the great ruby, which, when the marauders were captured, was found in Parrett's pocket. That this large ballas ruby, as it is described, was the Black Prince's ruby is very clearly evident, because the setting of Charles II's State Crown is still in existence, in which may be seen a vacant hole the exact size and shape of the Black Prince's ruby. Curiously enough, this historic setting is not state property, but passed into the private possession,

and was last owned by the late Lord Amherst of Hackney.

"The ruby is not set clear, but has a gold backing, how ancient is not known, but so old that no jeweler will run the risk of taking it off to weigh and accurately measure the stone. Messrs. Rundell and Bridge more than a century ago refused to do so, and Messrs. Garrard, the court jewelers, at this day would be equally diffident. A stone so old as this, though apparently perfectly sound, is not wisely put to so severe a strain as might be occasioned in removing the gold setting.

"That was the last great adventure which is recorded of the ruby. From that time to this, a stretch of two and a half centuries, it has passed in succession to thirteen Kings and Queens of England, and now occupies the pride place in front of the State Crown of King George, and rests secure and safe in the Tower of London."

Have I been officious in quoting this

tale? Indeed, it aptly illustrates, in a bold way, the tales surrounding any number of lesser gems in the crowns of lesser states. This ruby has been wrapt up in the affairs of a great nation for nearly seven hundred years, and today, it carries no valuation, protected only by the armies and navies of Britain. Surely, this is romance!

Of pearls, we find several very interesting and rare specimens which occupy high places in the world of gems. Admittedly the most beautiful of large pearls is one that was in the museum of Zosiman in Moscow, which received the name "La Pellegrina." It was found in India, is perfectly spherical, of a pure white color, almost transparent, and weighs twenty-eight carats.

CHAPTER V

Rubies and Sapphires[1]

Who would think that the brilliant and fiery ruby could in any way be related to the gorgeous and subtle sapphire? And yet, in the chemical laboratory, we find that the ruby and sapphire are identical in composition, excepting a very minute, negligible difference which accounts for the actual difference in color.

First of all, the special properties of these stones, known as the "corundum" gems, must be considered. The particular property to warrant their classification under the heading of gems is due entirely to their hardness, for the corundums rank next to the diamond. Remove this virtue, and the beauty of the stones would shortly be lost through wear and breakage. But they are hard, and no other

1. As these stones are of the same family, and known as "corundum" gems, data in regard to them in the appendix shall always be under the technical heading of Corundum.

substance, save the diamond, is as hard as they are.

The next feature of course, is the scarcity. I think that scarcity is really primary to beauty, but all the scarce gems are beautiful. Thus it would take a considerable psychologist to really determine which factor actually dominates our esthetic tastes. But at any rate, rubies of fine colors, and of reasonably good qualities over three or four carats are so exceedingly rare that they simply do not reach the commercial markets. When they do, by a fortuitous chance, they are immediately taken up and are shortly lost to the marts of trade.[2] The sapphire, though not so scarce, is, in very fine colors, exceedingly rare, and commands a very high price.

Both the ruby and sapphire crystallize similarly, and sometimes they do not perfectly form, consequently leaving a series of very fine lines, meeting at 120-degree

2. Under the "Chapter on Famous Large Gems," I have listed certain of the larger rubies, together with a detailed account of the most important ruby in the world.

angles, throughout the stone. This is due to the six-sided shape of the natural crystal. The very small lines are hollow, and known as silk. When uniformly present, and the stone is cut rounded or *en cabochon,* the light will be reflected out of the stone, causing the stone to show a very pronounced, six-pointed star. In proportion to the quantity of silk, are these stars visible. There is no such thing as an absolutely clear star stone. On the other hand, stars are slightly visible in stones which are nearly transparent.

The ruby runs in a various series of reds, from nearly pink, through the purplish red, to the vivid scarlet. The most desirable color is the stone the same color as the blood of the newly killed pigeon, and for that reason, the rubies of the finest color are known as "pigeon's blood" rubies. These stones are cut in almost all conceivable shapes. The shape is primarily determined by the lapidary, or cutter, who knows what angles will bring out the color to the best advantage.

Whether the silk be visible or invisible, the ruby has a pronounced grain which materially affects the light which passes through it, and for this reason, the lapidary is forced to the utmost of his skill to bring out the better stones to the best advantage with the least loss of weight.

The sapphire is somewhat more common than rubies, inasmuch as stones of the larger sizes are more frequently found. But like fine rubies, the fine sapphires are extremely rare and rapidly removed from the markets by appreciative connoisseurs. These stones run from a very pale blue to a blue-black, nearly undiscernible from black onyx. In between shades are light and dark blues, rich, soft, harsh, velvety, cold, and warm. Stones with light greenish casts, together with others pronouncedly lavender, are found. In fact, the corundum family boasts of being possessed of every color, so it is hard to tell where certain rubies begin and certain sapphires leave off. Suffice it to say that the sapphire itself is

found in every possible shade of blue. However, to describe with words, or put upon paper colors that take of but two dimensions, is nearly folly, yet it is hardly out of place to list the special characteristics of the sapphires. The following table of names and shades will be of some assistance—particularly so when real stones are available for checking.

NAME	COLOR
Australian	A dark, greenish-blue sapphire, principally found in Australia. Its commercial worth is not high. It is used to replace imitation stones, so that the term "genuine" may lend prestige to the sale.
Burmese or Burma	Perhaps the finest of all sapphires, noted for its soft, rich, royal blue shade. These stones command the highest market price of all sapphires.
Ceylon	Ceylon sapphires are of a light, cornflower blue, and very delicately shaded, though not of high commercial worth, unless in the case of a very rare specimen.
Cashmire	A sapphire quite similar to the Burmah, distinguishable from it, however, because of a subtle lack of softness. The color discrimination is very finely drawn between these stones, but readily appreciable to a connoisseur. These stones fetch but slightly less than the Burmese stones.
Oriental	A common name given to the Burmese, Cashmire sapphier.

Montana — A sapphire but slightly darker than the Ceylon, found, principally, in Montana.

This list nearly covers the entire subject of sapphires, though, of course, there are many, many shadings that make it nearly impossible to be absolutely definite in the case of particular stones.

Sapphires, or rather corundums, are found, as I say, in nearly every color, and among those shades not uncommon, the light bluish-gray seems to predominate. This color is particularly noticeable in the star-stones, and it produces the best stars, though, fortunately it is the least expensive, due to the frequency with which it is met.

The golden sapphire is about the same color as the golden topaz, and to the inexperienced eye, it is nearly the same. However, comparison will prove the golden sapphire to be the most brilliant of all the colored stones, save the diamond.

The other colors are rather infrequently seen, though perhaps the most com-

mon variety of corundum, aside from the red, blue and golden varieties, is the green, known as the Oriental Emerald. This stone rarely reaches the market, but nevertheless is very beautiful.

The corundums are found in Burma, Siam, Ceylon, India, Afghanistan, Australia, United States, and Bohemia.

Both the ruby and sapphire are imitated with synthetic reproductions. This work is done in laboratories, using the chemical formula of the real stones. The results are imitations of approximately the same color and hardness as the real, limited to smaller sizes.

But there is something lacking in the fire and beauty of these synthetic stones, due to the fact that they are built up from the molten mass like an onion, or in other words, they resemble an onion in physical construction. The real stone is distinctly angular in its makeup, and rarely, if ever, is an absolutely perfect ruby or sapphire seen. Contrariwise, most all synthetic rubies and sapphires are per-

fect. Thus the brilliancy of the genuine stone is altogether different than the imitation, due to the fact that the light which passes through it is reflected and refracted in a different manner.

For the benefit of those who are of the opinion that the market for fine rubies and sapphires was disturbed by the appearance of the synthetic stones, let it here be said that the critical buyers of gems in no way felt the presence of these cheap imitations, and the fine stones of any sizes are now commanding prices higher than ever.

CHAPTER VI

Emeralds[1]

There is very little to be said of emeralds, or about them, that is not highly technical, save that they are crystalline in formation and green in color.

This stone belongs to the beryl group, and only the specimen of fine grass green are known as emeralds. They have long been cherished possessions, but only in the last few years have the stones of five carats and over taken top place on the list of gems, both from the standpoint of scarcity and high price.

The main thing to impress upon a person interested in this subject is the absolute rarity of perfect emeralds. I sincerely doubt if such a thing exists in sizes over three carats! In Dr. Max Bauer's discussion of the subject of flawless emeralds, he emphasizes the point very em-

1. The technical characteristics of the emerald may be found on page 151 of the appendix, along with comparative tendencies of the diamond, and corundums.

phatically, repeating himself several times, "The transparency of the emerald is perfect only in rare cases." "Compared with other precious stones, the rarity of perfect specimens of emerald is unique." "Flawless emeralds of large size are extremely rare, so that only small stones are available for cutting." And I remark, of the stones which are cut, more imperfections are tolerated, by far, than in any other gem.

CHAPTER VII

A Critical Bibliography

The preparation of this book has required, in addition to a vast amount of actual experience, no small amount of reading. After one is quite familiar with a subject, the investigation necessary is only of a collateral nature, and therefrom one gleans somewhat of an opinion of the various authors who have put themselves to the task of writing upon the subject.

From the entire mass of literature perused in the gathering together of material, but two books stand out as conspicuous and valuable, not only to the gem expert, but to the layman interested in the subject as well. These books are: "Precious Stones, Their Characters and Occurrence," by Dr. Max Bauer, and "The Jewel House," by Maj.-Gen. Sir G. Younghusband.

Dr. Max Bauer's book is nothing short of stupendous. It is a large volume of

627 pages, profusely illustrated, both in line drawings and superbly colored cuts. The color work is as near to naturalness as anything I have ever seen. The line drawings are to illustrate technical points brought out in the text, and serve well their purpose. This book is, without doubt, the foremost text on the subject of gems and gem minerals, and should be the gemologist's bible. Reading on the subject proves that Dr. Bauer's work has been plagiarized upon to no small extent. Indeed, it would be hard to suggest a phase of the work that he has not thoroughly covered and indexed. Thus it is nearly impossible for any writer to approach such an interesting study without treading directly over the paths hewn by the illustrious Bauer. The only thing that any of us can now do is to bring together certain specific phases of the business into compends that will help the student who desires to specialize along certain lines.

Though Dr. Bauer's book was trans-

lated from the German in 1904, it is as much alive today as ever before, but in spite of that, it has gone through but one edition, and the publishers inform me that it is quite unlikely that it will ever again be printed. Today, copies of this book bring from fifty dollars and upwards on the second hand book markets, and he is a lucky person who is possessed of such a remarkable volume.

In this little book, I have quoted Dr. Bauer, and upon any matter pertaining to mooted points, I have taken his judgment as final, and there let the matter rest.

* * * * * *

There is no source of accurate information regarding the British Crown Jewels, save that which the English themselves decide to give out. Thus, the "Jewel House" affords the most authentic information available regarding the prized British possessions, together with an historical resume that is extremely interesting. Much regarding regal orders

and their insignia, though of little consequence in ordinary parlance, is here to be found, and throughout one has the assurance of authority, because the writer of the book is the responsible party to the British Government for the safekeeping of the jewels in the Tower of London.

I have drawn largely upon this book for information regarding the British gems, because it is next to impossible for any one not connected with that government to make a careful examination of the regalia, and because this man is charged with the task of keeping them safe, clean and in general good repair, his opinion is equal to that of anyone speaking upon the subject.

This is not an out-of-print book, and may be found on the book shelves of most any good bookshop. It is interesting reading.

The third book in sound value, dealing with the subject of precious stones, is that by G. F. Herbert-Smith, entitled "Gem Stones." Mr. Herbert-Smith is an M.A.,

D.Sc.; Assistant Secretary, British Museum (Natural History). His book is simplified, and treats with the scientific side of the subject, and is genuinely readable. However, much has been taken bodily from Bauer, and reduced in grandeur, but nevertheless, to the non-technical reader, it gives interesting facts, with the mineralogist's phraseology peeled away.

Mr. Herbert-Smith is the inventor of the best refractometer available for determining the index of refraction, and has thereby gained prestige for himself by making certain determinations rapidly available, which would otherwise be impossible.

This book, though not out of print, is rather difficult to find, and is available only through the publishers, or their representatives, at this time.

* * * * * *

From here on, now that the three foremost books on the subject have been dispensed with, it is nothing short of diffi-

cult to place the following books in an appreciative order. I call the reader's attention to the lamentable fact that the two foremost textbooks on gems have been done by a German and an Englishman, respectively. The next best treatment, though local, is by the eminent gemologist, Dr. George Frederick Kunz, of New York. His book, "Gems and Precious Stones of North America," is well worth the reading, but, as I say, it deals with only the production of gems in our own country, and because the finest gems of the world are NOT found on the North American continent, this book has but little practical value and leaves much to be demanded. He is, however, quoted by Dr. Bauer regarding American gems.

Dr. Kunz's other book, "The Curious Lore of Precious Stones," is highly entertaining, and should prove extremely interesting to the student of psychology.

I might remark that it is one of the very few books which I have ever read, in any field, which stays entirely to its

dedicatory title. The reader who expects to find something in it that is not suggested by the title is bound to be disappointed; but he who reads it with a mind to gather such meanings as hinted, will be more than repaid for his time. Simply, it is an interesting study of man's inclination toward gems, which, though Dr. Kunz fails to conclude but presents the evidence without summation, is actuated by three main purposes, e.g., (1) esthetic appreciation, (2) vulgar display of wealth, and (3) a desire to attract the opposite sex by scintillating or rare adornment.

Julius Wodiska's book, "A Book of Precious Stones," is hardly more than second rate; a book obviously written by someone else, and which wanders from the subject at hand with considerable frequency. Like everything else, considerable worth is in it, repaying anyone who desires to take the time to dig it out.

Frank Wade, has a book, entitled "Diamonds—A Study of the Factors

That Govern Their Value." This is an elementary primer, written by a school man, with obviously no practical experience in the business. However, there is much in theory which proves itself invaluable in practice, and Frank Wade has shown himself to be a very good master of theory. He is, of late, gaining considerable prestige, and has been addressing a number of the conventions of jewelers in various parts of the United States. It is evident that he has something to say.

Professor Wade has written another book, "Diamonds and Precious Stones," which is more elaborate than the other, and much more technical; it has certain suggestions for laboratory work, but who in the diamond world, selling diamonds, has time to experiment in the laboratory?

Professor Wade is apparently unmindful that a capable knowledge of precious stones makes it unnecessary for one to do technical work in order to know whether or not he is buying a gem or an imitation.

But as I say, so little has been done in America by our own specialists in this line of work, Professor Wade is entitled to considerable more credit than his successors who may handle the subject with the completeness and thoroughness of a Bauer. In short, he has shown the way, and may his books go through many more editions.

And so on. It is not my purpose to make a book review, but merely to help those interested in this subject to find further works of value. The following, without comment on my part, are thoroughly readable books, and will declare dividends for any time spent reading them.

"A Descriptive Catalog of the Collections of Gems in the United States National Museum," by Wirt Tassin.

"Precious Stones," by W. Goodchild, M.B., Ch.B.

"Precious Stones and Gems," by Edward B. Streeter.

"A Book of Precious Stones," by Julius Wodiska.

Appendix I.

Certain collateral information is generally spread out so much that readers have quite a time in running down certain facts, which occassionally become necessary and important. I list, then, the several features of diamonds, corundums and emeralds:

	Diamond	*Corundum*	*Emerald*
Form	Crystalline	Crystalline	Crystalline
Shape	Generally duo-octa hedron	Six-sided prism	Six-sided prism
Specific Gravity	3.52	4.03	2.74
Chemical Formula	C	Al_2O_3	$Be_3Al_2(SiO_3)_6$
Hardness	10	9	7½
Index of Refraction	2.417	1.761-1.770	1.578-1.585
Refraction	Singly	Strongly double	Noticeably double
Luster	Adamantine	Vitreous	Vitreous
Color	All colors	Ruby: Red Sapphire: Blue	Grass green

Appendix II.

The definition of a gem is as follows: A hard mineral that is transparent, possessed of a play of fire, together with luster, and when scarce, may be classified as a gem.

Pearls, being organic in form, soft, and not transparent, are, nevertheless, known as gems. This, of course, is because of their exquisite beauty, coupled with extreme scarcity of reasonably good and fine specimens.

At first, I proposed to treat the Alexandrite in the text, for it has all the virtues of a gem, but because of its unpopularity, due to some unaccountable cause, I have deemed it advisable to omit it entirely.

Appendix III.

I have translated the weights of the Cullinan Diamonds, (The Stars of Africa) into the metric system, which is now entirely used in America by diamond merchants. The old weight of 1 carat is equal to 1.02½. Carrying out, then, I offer the Cullinan weights as follows:

Old	New	
3025¾	3101.39+	(Original rough)
516½	529.41+	
309 3/16	316.91+	
96	98.40	
64	65.60	
18⅜	18.83+	
8 9/16	8.77+	
11¼	11.53+	
6⅝	6.79+	
4 9/32	4.37+	
7⅜	7.55+	

Appendix IV.

The duties on diamonds and other precious stones (excepting pearls), according to the Tariff Act of 1922 (H.R. 7456) in effect at the present time, is as follows:

Uncut, 10% Ad Valorem.

Cut or Polished, 20% Ad Valorem.
Mounted Jewelry, 80 Ad% Valorem.

Appendix V.

An arbitrary classification of the colors common to diamonds.

1. Galconda.....
   A general name usually applied to any large, fine diamond.
1. River .....Blue
2. Jager .....White
3. Top Wesselton.....
   Extremely light touch of yellow
4. Wesselton .....Light touch of yellow
5. Top Silver Cape .....Touch of yellow
6. Silver Cape .....Light yellow
7. Cape .....Yellow
8. Yellow .....Pronounced
9. Brown.....Brown in any shade

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