

DEPARTMENT  
STORE  
MERCHANDISE  
MANUALS

JEWELRY

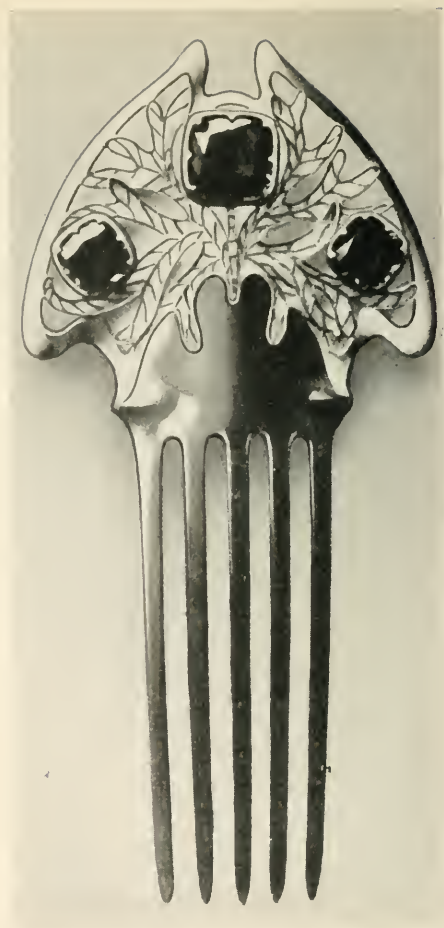
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KENNARD ■ ■ ■

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Courtesy of International Studio  
Comb in Gold and Horn (French Design)

# DEPARTMENT STORE MERCHANDISE MANUALS

## THE JEWELRY DEPARTMENT

BY

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**This Series is Dedicated**

to Mrs. Henry Ollesheimer, Miss Virginia Potter, Miss Anne Morgan, and other organizers of the Department Store Education Association, who desiring to give greater opportunity for advancement to commercial employees and believing that all business efficiency must rest upon a solid foundation of training and education gave years of enthusiastic service to the testing of this belief.





## EDITOR'S PREFACE

This series of department store manuals has been prepared for the purpose of imparting definite and authentic information to that growing army of salespeople who are not satisfied to be mere counter servers — to those who realize that their vocation is one of dignity and opportunity, and that to give satisfactory service to the customer they must possess a thorough knowledge of the goods they sell, as well as a knowledge of how best to sell them.

These manuals were planned and prepared as the result of many months of teaching department store salespeople in a number of large stores in New York and other cities. Later a series of courses for teachers of department store salesmanship was introduced into the curriculum of the School of Pedagogy of New York University. This gave additional opportunity for the study of store conditions and needs from the point of view of the teacher. Thus the material in these books has been tried out with the salespeople in the store and also with those who have proven themselves to be successful teachers.

In the preparation of these manuals we have received the most cordial co-operation from experts in the various lines of merchandise and from manufacturers who have freely given their time and valuable counsel. To all of these the authors and editors of this series wish to express their grateful appreciation.

BEULAH ELFRETH KENNARD.

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## AUTHOR'S PREFACE

This manual is an introduction to the merchandise of the Jewelry Department. On account of the scope of the subject it has been necessary to treat some sections in outline form, which, while giving the important facts, has necessitated the omission of many details. Some special articles such as Watches and Optical Goods will be discussed in another manual since they require more extended treatment than the limits of the present volume would permit.

Acknowledgment is gratefully made to Mr. Emil A. Kohn, Manufacturing Jeweler; Mr. S. L. Van Wezel, Diamond Merchant; Mr. August Goldsmith of Goldsmith, Stein and Company, Manufacturing Jewelers; Mr. T. Edgar Willson, Editor of the *Jeweler's Circular Weekly*; Espositor, Varni Company; and especially to Mr. Julius Wodiska, the author of "Book of Precious Stones" for co-operation in securing accurate information and for many helpful criticisms.

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# JEWELRY DEPARTMENT

## Chapter I

### INTRODUCTORY

#### The Jewelry Department

The jewelry section of a department store is one of the most interesting and attractive parts of the store, and the well-informed salesperson in this department possesses unique opportunities for service both to employer and customer. Sales are often made because of the artistic or sentimental appeal to the customer rather than any immediate need for the article.

Precious stones, for instance, are so fascinating that almost all customers welcome information concerning them. Again a tactful remark regarding the suitability of a certain jewel for the customer's purpose will win not only a sale but also gratitude. As in all departments, customers like to be waited on by "one who knows."

#### Divisions

Jewelry may be divided, according to purpose, into:

## Jewelry for Women:

Rings	Watches (Wrist, Pendant)
Brooches	Mesh Bags
Bar Pins	Lorgnettes
Collars	Novelties
Pearl Necklaces	Fans
Pendants	Combs and Hair Orna-
Earrings	ments

## Jewelry for Men:

Rings (Jeweled, Seal)	Pencils
Scarf-Pins	Knives
Watch Chains	Cigar Cutters
Cuff-Links	Cigarette Cases
Studs	Match Boxes
Dress Sets	

The jewelry stock may also be divided into:

1. Gold and platinum jewelry, set with real gems.
2. Plated and novelty jewelry, of rolled gold, silver, copper, or less costly metals, set with imitation stones.

There is almost infinite variety in the forms and decorations of the various articles. They may be elaborately designed and set with precious stones or plainly chased and simple. But the one requirement of all jewelry is that it should be beautiful.

# Part I—Metals

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## Chapter II

### GOLD

#### Popularity

Gold is the most beautiful of all metals. It is soft and easily worked, and combines artistically with any color found in precious stones. Silver and platinum are also used for jewelry, and copper and bronze are seen in “craftsman’s” work, but gold is used more than all the others combined.

#### Color

Pure gold is pale yellow with a bright luster, but by combination with other metals in the form of alloys it may be given a darker yellow tone or a green, gray, or red hue. Gold can also be made to resemble platinum in color. This variety is called “white gold.”

#### Characteristics

Gold is:

Malleable — may be beaten into thin sheets.

Ductile — may be drawn into fine wire.

Unalterable — does not corrode, as iron and copper, on exposure to the air.

Dense — the particles are very close together.

Soft — easily wears away and must be hardened by the addition of copper, silver, etc.

Gold may be beaten into a sheet  $1/250,000$  of an inch in thickness. In this form it is known as gold leaf, and is used for gilding.

### Source

Gold is found in small quantities all over the world. The rocks and soil of nearly all countries, and even the waters of the ocean, contain small particles of gold scattered through them. The Australian and Californian deposits are remarkably pure.

Gold is found in "ore" or in "barren rock." These differ only in the proportion of gold which they contain. Ore is "paying rock," that is, rock which has enough gold in it to make its extraction and refining profitable. With the improvements in methods of gold mining, barren rock may become paying rock and the poorer fields must be worked as the richer ones give out. Gold, like iron, is a part of the earth's crust, but is unevenly distributed. At present, the rich ores are very rare, because it has been prized by man in every part of the world, and as a result the

ore which could be secured by such simple methods as washing river sands has disappeared, except in out-of-the-way places. Gold is found under three conditions:

1. As a deposit in the sands of rivers.
2. As lodes or veins.
3. As sedimentary deposits.

### **Extracting Gold from Sand**

The gold which is found in river sand is most easily secured. It is separated from the sand by various methods of washing.

1. The sand may be washed in a wooden tub, or iron basin which is shaken to and fro by hand until the gold (being heavier than sand) falls to the bottom.

2. The gold may be separated by a flowing stream of water which removes the sand, the gold being caught on some obstruction. There are two variations of this method.

For large operations the sand or gravel may be put in a long trough called a "sluice" through which a stream of water runs. The gold falls to the bottom and is caught on cross strips of wood called "riffles," while the sand is carried off by the water. For smaller operations the gravel is thrown into a current of water in a "Long Tom," which is a box about four yards long and seven inches broad. The gold is caught on riffles or on sheep's fleece.

These methods of collecting gold are slow and wasteful, but are profitable so long as a rich deposit lasts.

3. The Hydraulic Method. The hills in certain parts of California were found to contain a large amount of gold, and in 1852 a new method of reducing these hills was introduced. Instead of slowly digging up the soil, the mining companies erected a high steel framework or "giant" supporting a hose pipe through which water was driven at very high pressure against the sides of the hills. This stream of water was extremely powerful. It sent a torrent of mud down into the valley below, where the mud flowed through sluices, and the gold was caught in the same way as from the river sand.

The hydraulic method had two great objections: first, the mud dammed up the valleys and destroyed land which was good for farming or fruit raising; and second, the débris was left on the land.

In 1884 a law was passed prohibiting hydraulic mining in California, but it is still practiced in some other states.

In the frozen regions of Siberia and the Klondike the ground is too hard to be broken up by the pick and therefore fires are built or steam pipes are inserted in order to melt the ice before the actual mining can begin.



### **Extracting Gold from Lodes or Veins**

Gold which is found in lodes or veins has been carried up from a lower part of the earth's crust by hot volcanic vapors. The metal, which had dissolved in the hot water, crystallized and was deposited in veins.

These lodes may be vertical, slanting, or horizontal. They are mined in the same way as other metals, by sinking shafts with connecting galleries. In a gold mine, however, no part of the paying rock is left for supports or chamber walls as in coal mines. As the various sections are removed the space is filled with a wooden framework containing crushed rock until the ore has been entirely replaced.

### **Crushing the Ore**

Gold is seldom found in the pure state. It may be combined with iron, silver, tourmaline, copper, galena, sulphur, or other substances. In order to separate it from the rock, the ore must first be crushed into powder. If the gold is "free" or unmixed with quartz, it is not necessary to reduce the rock to such fineness.

There are several kinds of machines used for crushing the ore:

1. The jaw breaker, which has two steel jaws with toothed edges. One of these jaws is sta-

tionary and the other moves backward and forward over it.

2. Vertical stamps in batteries, which are raised by a cam shaft and fall with a deafening din upon the ore which is contained in an iron mortar.
3. The tube mill is a large cylinder containing crushing materials which grind the ore still finer.

### Separating the Gold from the Ore

There are three methods of separating the gold from this crushed ore. These are:

Amalgamation

Chlorination

Cyaniding

### Amalgamation

The amalgamation process depends upon the ease with which mercury and gold combine.

The crushed ore or "pulp" is mixed with water and run over copper plates coated with mercury to which the gold adheres. The combined gold and mercury — called amalgam — is scraped off and the gold separated from the mercury by distillation.

### Chlorination

In the chlorination process the crushed rock is

roasted, mixed with water, and exposed to the action of chlorine gas, which is obtained from common salt by an electrical process. The chlorine and gold unite, and the gold is precipitated from this solution.

### Cyaniding

Cyaniding is the most economical method and has almost entirely superseded the others. The crushed ore is dissolved in a very dilute solution of potassium cyanide. The gold is precipitated from this solution either by electricity or by zinc.

### Bullion

These processes complete the work which is done at the mine or gold field. The metal, which is now called bullion, is then sent to some center in Europe or America to be further refined.

### Alloys

Manufacturing jewelers buy their gold in bars by the ounce and alloy <sup>1</sup> it themselves.

As stated earlier in the chapter, when gold is combined with other metals to form an alloy, its color is affected. Silver makes it lighter in color and copper gives it a reddish hue. Alloys of gold, in addition to being different in color, are naturally cheaper than pure gold, and they are also harder.

<sup>1</sup> For a further discussion of alloys, see Chapter V.

Pure or "fine" gold is described as "24 karats fine." The karat is a standard of weight for the precious metals and gems, but it has a special significance with respect to gold. Twenty-four karats fine means that gold has no alloy whatever; but such gold is too soft for use. Twenty-two karat gold has 2 parts alloy and 22 parts gold. Old jewelry was usually of 22 karat gold. Eighteen and 14 karat gold are now much used, and the gold used in cheaper jewelry is only 10 karat gold, that is, more than half its weight is some other metal. As these cheaper alloys contain a larger amount of copper than the finer forms, they are easily affected by acids and have a less brilliant luster.

### Testing Gold

Jewelers have a simple method of testing the fineness of gold by the use of a hard black stone called a "touchstone." The piece to be tested is rubbed on the stone. It leaves a little streak of metal behind, the color of which is compared with that of a streak made by gold of known quality. The touchstone method is easy but is not absolutely accurate. Gold is also tested with nitric acid.

### Assaying

The scientific testing of the quality of gold is done by a process of analytical chemistry called assaying. First,

a very small portion of the gold is weighed in a delicate balance. Then it is wrapped in pure sheet lead and heated. The lead unites with all baser metals as it melts and this combination runs away, leaving only a lump of pure gold and silver. This lump is weighed again to see how much base metal it had contained, after which the silver is removed with nitric acid and only the pure gold is left. The difference between the weight of this remainder and the lump containing silver determines the weight of the gold. It can be calculated to a thousandth part of a karat.

### Uses of Gold

In spite of the new gold fields which have been discovered from time to time, the world has never had enough gold. The insistent demand keeps its price steady and helps to make it the standard for other values.

Gold is used in dentistry, in chemical works and photography, as well as in gilding and making all kinds of lacquers. Nearly one-half of the output is used for money. Several years ago it was estimated that in the United States 24 per cent was used for jewelry, 10 per cent for watch cases, 44 per cent for coinage, and about 22 per cent for export and for other purposes.

## Chapter III

### PLATINUM

#### Rarity

The most costly of all useful metals is platinum, which in normal times is about two and one-half times as valuable as gold. Platinum was at one time considered impure silver — only fifty years ago Russian peasants wore buttons of platinum on their clothes — but when its peculiar properties became known it began to be greatly prized because of its rarity.

#### Color

The color of platinum is a glistening blue white. It is now in greater favor than gold for setting diamonds and other jewels, as it seems to increase their brilliancy.

#### Characteristics

Platinum is:

Malleable and ductile to a high degree.

Less affected by acids than gold.

Dense.

Soft as silver.

Platinum does not oxidize at any temperature, and melts only at a very high temperature.

### Source

Platinum is found chiefly in the Ural Mountains in Russia, but in small quantities it appears also in Canada, New South Wales, Colombia, Borneo, and Sumatra, and in the United States. In 1909 the world's production of platinum was over 198,000 ounces troy and of this about 190,000 ounces came from Russia, or about twenty-three times as much as the other countries produced. The United States supplies only about 700 ounces a year.

Platinum is found in veins or nuggets like gold, only in very much smaller quantities. It is mined in a similar way.

### Uses

One of the physical properties of platinum, its indestructibility, makes it most useful in chemical laboratories where crucibles and dishes are made of platinum in spite of its cost. It is also used in munitions and the European War has greatly increased its price.

Articles made of platinum are all marked individually, and the mark is recorded, together with the weight, so that they may be traced when stolen; therefore, as a thief is not likely to have the knowledge or

the materials with which he can melt or decompose the metal, it is almost impossible to dispose of it.

Two ways of meeting the scarcity of platinum have been proposed; one, to alloy it with two very rare metals similar to platinum called "palladium" and "iridium." This would not cheapen the metal but would make it go farther. The other is to substitute "white gold," which is gold alloyed with silver and nickel. This is much cheaper than platinum but far less durable. It is only superficially like platinum but produces somewhat the same color effect as a setting for stones.

For melting platinum, an oxygen torch, which produces very intense heat, is required.



## Chapter IV

### SILVER AND COPPER

#### Description of Silver

Silver is a brilliant white metal which sometimes occurs in nature in the form of twisted wire-like deposits in the upper levels of silver-bearing minerals. It is usually associated with gold, sulphur, or lead, and these silver ores are more important than native silver deposits. It is the most common of the precious metals and is easily separated from its alloys.

#### Characteristics of Silver

Silver is:

Harder than gold, but too soft to use without being alloyed with copper or some other metal.

Malleable and ductile.

The best conductor of heat among all of the metals.

Tarnished by sulphur compounds, but unaffected by pure air.

#### Sources of Silver

Mexico and Peru furnish a large part of the world's

silver, but it is also found abundantly in Cornwall, England, Saxony, Chili, and the United States.

Sterling silver has the same proportion of alloy as United States coins; that is, 92½ per cent pure silver and 7½ per cent of alloy.

Silver is also used with copper, nickel, and other metals as an alloy for gold.

### **Copper**

Native copper, that is, pure copper, may be found in crystals or thin plates but the surface is dull and tarnished, because it is so easily affected by the atmosphere. Besides appearing as pure copper, it also occurs as copper pyrites associated with iron, gold, silver, and other compounds. There are nearly two hundred distinct copper ores.

### **Color of Copper**

The color of pure copper is chocolate brown or green. It is so much affected by the air that it becomes dull and tarnished very quickly.

### **Characteristics of Copper**

Copper is malleable and ductile, but tougher and harder than gold or silver. It is particularly useful in alloys.

### **Sources of Copper**

Copper has been found in Cornwall, England, and

other parts of Europe, but the richest mines are on the shores of Lake Michigan and Lake Superior, and in Montana and Arizona. One mass taken from the lake mines weighed 420 tons.

### History of Copper

Copper has been known and used since the time of Tubal Cain, the first metal worker mentioned in the Bible. Bronze made of copper and tin or zinc was used before iron for weapons and implements. Copper was called "chalkos" by the Greeks, and "cyprum" or "cuprum" by the Romans, its name coming from the island of Cyprus, where it was found in ancient times.

Roman money was made of bronze. Church bells and clock bells have always contained a large amount of copper, and it is a component part of nearly all alloys of gold, silver, and imitations of precious metals.

## Chapter V

### ALLOYS

#### Definition

An alloy is a combination of two or more metals produced by fusion. An alloy of gold, platinum, or silver means a combination of gold, platinum, or silver with any of the baser metals.

The metals chiefly used in alloying the precious metals are:

With gold — silver, copper, or nickel.

With silver — tin, zinc, lead, or copper.

With platinum — palladium, iridium, or silver.

#### Purposes

When metals are alloyed, their good qualities seem to combine. When copper, silver, or nickel are added to gold, they increase its strength and toughness without destroying its beauty or metallic luster, unless an excess of metal is used. Gold and silver possess all the qualities, except hardness, necessary for making beautiful jewelry. Pure gold is so soft that it is practically unusable.

Pure gold cannot be affected by any gases or impurities in the air or water; silver is only affected by sulphur; but copper will corrode under ordinary atmospheric conditions. Gold which contains a large amount of copper will in hot weather leave a green mark on the skin. Platinum is unalterable by the air or even by acids under ordinary conditions but the "white gold" imitation of platinum contains silver and nickel which are attacked by sulphur or acids.

Metals are also alloyed to modify their color and to cause them to melt more easily. A solder must have a lower melting point than that of the metal to be soldered. Gold and silver solders are made by adding copper and silver to the first and copper to the second. An alloy may have a melting point even lower than that of either of the metals of which it is composed as in the case of tin and lead which are combined to make "soft solder."

One obvious reason for alloying the precious metals is to reduce the cost of material.

### Preparation

The metals used are selected and carefully weighed so that the proportions of the alloy may be exactly right.

The metal having the highest melting point is melted first in a crucible made of porcelain, plumbago, or

fire-clay according to the nature of the metal. The metals more easily melted are then added and the mixture stirred until it is thoroughly melted and mixed together. Sometimes a "flux" is added to remove the impurities of the metals. Fluxes may be of charcoal, borax, carbonate of soda, common salt, sulphur, or powdered glass. The mixture is then poured into a mold to be cooled. The ingot or bar of alloy should have the same weight when cooled as that of all the metals composing it.

## Part II—Precious Stones

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### Chapter VI

#### GROUPING STONES BY COLOR

##### First Steps in Learning the Stones

To the salesperson confronted with the glittering array of gems and precious stones of all colors and varieties, the task of becoming acquainted with the stones is a most bewildering one. Customers have in recent years become very discriminating in buying gems and jewelry, and expect the salesperson to be informed upon the stock. Misinformation and errors regarding stock can never be excused upon the ground of ignorance, and, almost more than in any other department, the jewelry salesperson can offer real service to a customer.

The most direct way to study and become acquainted with precious stones is, first of all, to group them mentally by colors, noticing the leading or typical stone of each group, and comparing similar stones with it. This method of grouping will also help in making ar-

rangements of definite color schemes, especially the harmonizing of jewelry with costumes which is a custom now in vogue. Women who can afford it, use jewels for every gown, and ornaments for afternoon as well as evening wear.

In each of the following color groups it will be noticed that there are opaque as well as transparent stones.

### Colorless Stones

The *diamond* is the representative stone of this group, although it is found in a wide range of colors — yellow, green, pink, less often red and blue. Its surpassing quality is its property of dividing light into colored rays. This wonderful brilliancy is termed “fire.” Its fire and hardness (it is the hardest of all known substances) are the two characteristics which distinguish the diamond from other colorless stones.

The *zircon*, also called *jargoon*, approaches the diamond more nearly than any other stone in brilliancy.

The *white sapphire* is very hard, ranking next to the diamond in this respect; but its luster is much softer than that of the diamond.

The *white topaz* takes a very high polish and thus resembles the diamond in the daytime.

*Bristol diamonds*, and *Lake George diamonds* are forms of rock crystal, used for imitating diamonds.



*Tourmaline*, *phenacite*, *spinel*, and *beryl* are other colorless stones less often seen.

The *moonstone* is an opalescent, opaque, white stone easily distinguished by its soft bluish light.

The *white opal* is also easily distinguished by its play of lights.

*White coral* and *white jade* are clear, opaque white stones.

### Red Stones

The *ruby* is the most beautiful and the most costly of the transparent red stones, being more expensive than the diamond, especially in the pigeon's blood hue. The ruby is very hard.

The red *garnet*, red *spinel*, red *tourmaline* and red *quartz* are so like the ruby as often to be mistaken for it. These stones are softer than the ruby.

The *fire opal* may be called a red stone, as red is its predominating tint. This cannot be confused with any of the other red stones because of the play of light in it.

The *carnelian*, which is the color of raw flesh, is an opaque stone often seen in signet rings.

*Jasper* is a bright red, opaque stone.

*Coral* is found in all shades of red, from very light, almost pink, to deep red. It is opaque.

### Green Stones

The *emerald* has been so universally accepted as *the*

green stone that the word emerald is now a general trade designation for various transparent precious and semiprecious green stones, and is not simply the name of any one specific stone. The *true emerald*, however, is a form of the mineral beryl, and is a very valuable gem, even more expensive than the diamond or ruby.

The green *garnet* (called olivine), *peridot*, *chrysoberyl*, and *tourmaline*, are emerald-green stones very often seen.

The *aquamarine* is distinctly different from these others in its sea-green color.

The opaque green stones include:

*Malachite*, a bright green stone with a silky luster.

*Chrysoprase*, leek or apple-green.

*Bloodstone*, distinguishable by its bright blood-red spots.

*Serpentine*, varying from rich olive to pistachio.

*Variscite*, rich green usually cut with the matrix, the rock in which it is embedded.

*Jade*, a very hard Chinese stone.

### Blue Stones

The *sapphire* of the cornflower-blue shade is the most valuable and beautiful transparent blue stone. It is much harder than any other stone of this color.

Blue *topaz* and blue *tourmaline* (indicolite) are similar in color but less frequently seen.

*Lapis lazuli* and *azurite* are beautiful deep blue opaque stones.

The *turquoise* is distinguished by its robin's egg or greenish-blue color.

### Yellow Stones

The *topaz* is instantly thought of as the typical transparent yellow stone, though the topaz may be of any shade. It has a brilliant luster.

The *yellow sapphire* is very like the topaz, but much harder.

The *yellow spinel* is a transparent stone less often seen.

*Amber* is a rich yellow and may be either transparent or translucent.

*Chrysoberyl* appears in different shades of yellow.

*Citrine* (yellow quartz) resembles the topaz, but is much softer.

*Hyacinth*, or *jacinth*, are forms of zircon of a deep yellow tint.

### Violet or Purple Stones

The *amethyst* is practically the only purple stone in general use. This is seen in all shades of purple.

The *purple sapphire* is almost identical in color with the amethyst but is very rare.

A *violet spinel* is sometimes seen.

### Pink Stones

Pink stones are rather rare.

*Kunzite* is a beautiful, lilac-colored transparent stone.

The *ruby*, *beryl*, *tourmaline*, *spinel* are sometimes seen in a pink shade.

The *topaz* becomes pink when heated.

*Coral*, in a large variety of shades, and *rhodonite*, often containing black markings, are opaque pink stones.

### Brown Stones

Brown stones are not very popular.

The *hyacinth* is a yellowish-brown transparent stone.

The *garnet* and *tourmaline* are also found in brown.

*Cairngorm* or *smoky quartz* is a rich yellow-brown.

### Black Stones

*Jet*, either in its dull or highly polished form, is a familiar substance in the Jewelry Department.

*Black tourmaline*, *garnets*, and *quartz* are sometimes seen.

*Black onyx* is used in mourning jewelry.

## Chapter VII

### VALUATION OF PRECIOUS STONES

#### Popular Misconceptions

After one has learned to know the stones of the various color groups, he should next become familiar with the values of the stones. Popular information on this subject is very inaccurate. For example, most people suppose that the diamond is the most valuable stone on the market, while in reality there are two stones ranking above it in value — the ruby and the emerald.

Again, it is popularly supposed that gems may be divided by a hard and fast line into "gems," "precious stones," and "semiprecious stones," but this again is an error, for scarcely two authorities will agree upon a classification. Some classify them according to mineral composition, others according to rarity, others according to transparency or lack of transparency, others by hardness, others by the popular demand and fashion.

#### Essential Characteristics of Stones

All agree, however, that there are three character-

istics which precious stones should possess, viz., beauty, durability, and rarity, and unless they do possess these essentials they cannot be satisfactory as precious stones. For instance, there are many very beautiful minerals which are too soft to be suitable for mounting and use as a personal ornament, although for sheer beauty they would be desirable. Other substances possess great durability, as the common black corundum, but lack beauty or rarity and so are not valuable.

### Beauty

The beauty of a stone depends upon its color, luster, and transparency or opaqueness.

### Color

Color is due to the property of reflecting light. A ray of white light is composed of six pure colors — red, orange, yellow, green, blue, and violet. The sparkling diamond *reflects all* the light and therefore appears white, while jet *absorbs all* the light and appears black. The blue sapphire reflects only the blue rays, absorbing the red, orange, yellow, green, and violet. The emerald reflects the green, absorbing the others and so on.

These differences in regard to the reflection of light are caused by differences in the chemical composition of stones. The presence of cobalt produces blue, cop-

per green, iron brown, manganese purple, etc. The glass maker uses the same method in manufacturing colored glass ware, putting these chemicals into "the batch" from which glass is made.

When it comes to identifying stones it is unsafe to place too much reliance on the color, for not only are there many stones of very similar colors, but one mineral may appear in many colors. An expert can usually distinguish the differences, but for most people color is not a reliable test.

### Luster

Beauty in a stone is also dependent on its luster or brilliancy, that is, its manner of reflecting the light.

The kinds of luster are described as :

Adamantine, as in the diamond.

Vitreous, or glassy, as in the amethyst.

Greasy, or waxy, as in the turquoise.

Resinous, as in amber or garnets.

Silky, as in crocidolite.

Pearly, as in the pearl and sometimes the opal.

Metallic, or the luster of metals.

The degree of luster is described as :

Splendent, as in the diamond.

Shining.

Glistening.

Glimmering.

The diamond possesses the highest and rarest luster which a gem may possess, the adamantine luster in the splendid degree. At the present time stones with a high luster are the most popular. Vitreous luster is a little more subdued than the adamantine. The finest rubies have the adamantine luster, but more often they have the vitreous. The luster is brought out by the manner of cutting and polishing as well as by the setting or mounting of the stone.

#### Transparency or Opaqueness

Another property upon which beauty depends is the transparency or opaqueness of a stone. Scientifically this is known as "diaphaneity," the degree to which a gem transmits light. A gem is known as transparent, like the diamond, when objects can be seen through it; subtransparent, when they are seen a little less distinctly; translucent, as the opal, when objects cannot be seen through it but when the light passes through; subtranslucent, when this is true to a greater degree; and opaque, as the turquoise, when no light is transmitted.

#### Durability

The durability of a stone depends upon its ability to endure wear and friction. A scale, known as the Mohs Table, was devised by a man named Mohs to indicate the relative degrees of hardness of the various gems. It is as follows:



10. Diamond
9. Corundum (ruby and sapphire)
8. Topaz
7. Quartz
6. Feldspar
5. Apatite
4. Fluorite
3. Calcite
2. Gypsum
1. Talc

The gems which do not appear on this list range between the others; for example, the emerald and aquamarine 7.75, turquoise 6, opal 5.5, etc. There is considerable variation in each degree, however, as stones from different localities often vary greatly in hardness.

Stones below the number 5 are generally considered too soft for jewelry.

### Rarity

All precious stones are rare. This is the reason they are so valuable. If diamonds were as common as coal they would be as cheap. But some stones are rarer than others. A stone may be rare in color, as the red diamond; or rare in size, as large emeralds.

This quality of a stone is the only one of the three essentials which is relative, as it varies with new discoveries of gem deposits. The crocidolite (tiger's

eye) is an example of this. Years ago it was used in fine jewelry and sold by the carat. Today it is so plentiful that it is used only for cameos and intaglios.

The other two essentials, beauty and durability, are constant, as they depend upon the chemical and physical composition and structure of the stone.

## Chapter VIII

### DESCRIPTIONS OF STONES

#### The Diamond — Its Characteristics

The diamond is generally regarded as the prince of gems.

In composition the diamond is the same substance as coal, lampblack, and graphite; that is, pure carbon but in its crystalline form.

In color the diamond may be perfectly transparent or in shades of yellow, brown, green, gray, red, blue, or black. For example, the famous Florentine diamond is light yellow, the Tiffany deep orange, the Hope diamond blue, one owned by the Czar of Russia a brilliant red, and a pear-shaped one in the Dresden vaults a bright green. The blue-white diamonds having a distinct bluish tint, are the finest, the white, colorless diamonds are next, and those with a yellowish cast, or "off color" stones, least valuable. Diamonds are usually transparent, though the gray or black diamonds known as bort or carbonado (which are used for drills, etc.) are opaque.

The luster of diamonds is much higher than that of other minerals. Zircon comes next. All grades of luster are found in the diamond, from the adamantine in the splendid degree, as in the A 1 brilliant, to the greasy and dull. A metallic luster is often seen in stones worn by water.

In hardness the diamond exceeds all other known substances. It is the most brilliant of all stones. The wonderful brilliancy of the diamond is due mainly to the total reflection of light from its various invisible faces. It not only reflects light from the external facets, but from the tiny internal ones. Its flashes of light are due to the property of dispersing or separating light into its different colored rays.

In size, diamonds range from the size of a grain of wheat to a few as large as a walnut, and one as large as a man's fist.

### Sources of Diamonds

For a long time all the diamonds came from India, from the rivers not far from the town of Golconda, and from Borneo. In 1727 they were discovered in Brazil, which for 140 years was the chief diamond field of the world. They are still mined there. In 1829 they were discovered in Europe, and in 1850 in California. Idaho, Oregon, and Wisconsin also have some diamond producing fields. In 1851 diamonds were discovered

in Australia, but these have never been very large, those weighing  $5\frac{5}{8}$  carats being the largest.

It was not until 1867 that the field which produces nine-tenths of the world's supply today, South Africa, was discovered. The first diamonds were found by accident in a river bed near Hope Town in Cape Colony. Among the most famous and most productive South African mines are those at Kimberley and Jagersfontein.

Diamonds are often discovered associated with quartz, garnets, sapphires, topazes, tourmalines, and zircon, whether in river beds or in mines. When the diamonds are in the gravel of river beds, barrowfuls of the sand are searched much as gold is "panned." When they are found in mines they are worked by shafts sunk in beds of deposit, as in the Kimberley claims. Some mines are already 2,000 feet deep.

### Mining of Diamonds

The modern method of recovering rough diamonds from the soil in which they have lain for ages is interesting, and it accounts in no small measure for their ever increasing value. The rock containing the clay and diamonds is blasted and carried to the weathering grounds, where it is spread out in the open air to disintegrate. From six months to one year is required to pulverize the earth thoroughly and to get it

ready for the washing machines. These machines separate the diamonds and other heavy material from the earth. This material is then sifted into sizes, and finally it goes to the sorting tables. After sorting, it is cleaned by boiling in acids. After this the stones are carefully sorted according to size, color, and purity, and made up in parcels to be sent to the syndicates' offices, where they are sold to the cutters and exporters.

### Value of Diamonds

The quality of a diamond is described by the terms "first water," "second water," "third water," and "fancy stones." The term "water" is used because when a perfect diamond is submerged in water it is invisible.

A first water stone is perfect.

A second water stone has some slight imperfection, being flawless but tinged with color, or colorless with a slight flaw.

A third water stone has marked flaws or imperfections or a noticeable color.

Fancy stones are those which have a distinct and beautiful color.

White diamonds are wholly free from color, that is, clear like a dewdrop.

### History of Diamonds

In early times, the diamond like other gems was

considered a charm against disease and evil spirits, and was closely connected with the art of medicine. Later on, diamonds were worn only by kings in their magnificence. They were worn for the first time as personal adornments in the fifteenth century by French women. Today they hold an important place among the world's commodities of beauty and luxury. The Russian crown jewels contain some of the famous diamonds of the world, and the Imperial Treasury of Austria has the Florentine diamond worth about \$500,000. The crown worn by Queen Victoria was of velvet with an ermine border, covered with diamonds, pearls, sapphires, and emeralds, set in gold and silver. It contained more than 2,000 diamonds and 277 pearls.

The origin of the use of diamonds in betrothal rings was probably due to the fact that for many centuries they were supposed to have a strong spiritual influence, being symbolic of constancy and innocence.

Many people purchase diamonds as an investment. In the past ten years the price of the highest grade of stones has advanced 175 per cent, and during that period prices have never declined. For twenty years before the outbreak of the European War the average yearly increase for stones of fine quality is said to have been 17 per cent.

### The Emerald

The true emerald is the green form of the mineral

beryl, although the name emerald has recently been used to designate various green stones, such as the Brazilian tourmaline, olivine, garnet, etc. The true emerald is worth as much as a ruby and more than a diamond. The reason for this high value is that green stones are greatly in demand, and that perfect stones are scarce as many emeralds contain small cracks and foreign matter which make them dull. Large stones are very rare and therefore very expensive. One of the largest known to exist is owned by the Duke of Devonshire; it measures two inches across and weighs  $8 \frac{9}{10}$  ounces.

The chief sources of supply of this gem at present are South America and Siberia. Emeralds are never found in gravel like diamonds, rubies, and sapphires, but are always embedded in rock formations.

The aquamarine has the same mineral composition as the emerald. The pale blue and sea-green shades take its name from the color of the sea. It is not so rare as the emerald nor so much in demand.

The word beryl is usually applied to stones of golden yellow or other colors which have the same composition as the emerald or aquamarine.

### **Pearls**

Pearls are very unlike other gems in origin as they are found in the shells of oysters and other shell-fish.



They are divided into two classes: (1) oriental or true, and (2) fresh water pearls. Other pearls may be similar formations produced by mollusks, but from material that is not pearly.

### Structure of Pearls

The structure of a pearl resembles that of an onion. Layers of calcium carbonate and other matter, extracted from the water by the pearl oyster or pearl mussel, are deposited about some foreign substance, like a grain of sand, which has lodged itself within the shell and irritates the body of the oyster or mussel. A pearl may assume any shape: spherical the most prized, drop or pear-shaped, oval or egg-shaped, or it may be quite irregular in form. The word pearl itself means a pear-shaped ornament. Boutons, or button pearls, are frequently found attached to the shell from which they are cut with the bottom part smoothed and polished. They lack luster on the side which was attached to the shell. Wart or blister pearls are the result of a parasite's being walled up at the point of entrance to the shell. Irregular and odd-shaped pearls are called baroques.

### Color of Pearls

Ordinarily the color of pearls is a satiny silver or bluish-white, or a faintly tinged yellowish-white. More rarely they are salmon-pink, purple, reddish, or

blackish-gray. Perfect black pearls are valuable, but not so costly as the finest white. Pearls are translucent to a varying degree.

### **Luster of Pearls**

What brilliancy is to the diamond, luster is to the pearl. This is known as "orient." The thinner the coatings of deposit are, the finer is the luster. As many as 87 layers are found in rare Indian oyster pearls.

### **Sources of Pearls**

About seven-eighths of all pearls come from the Arabian coast of the Persian Gulf. Most of the others are found off the coasts of Australia, the Philippine Islands, and about Ceylon. Those from the Arabian coast are of excellent quality, but of a more yellowish cast than those from Ceylon, which are beautifully white and silvery. The black pearl is found in the Gulf of Mexico. The abalone pearl, usually occurring as a baroque, is found in the English Channel islands, and on the coasts of France, Japan, and California. Pink or conch pearls are found in the Bahamas.

### **Pearl Diving**

Pearl fishers dive for the pearl oysters which are found embedded among coral reefs, sponges, and other

sea life, in limestone formations from 15 to 40 or even 150 feet below the surface of the water. Sometimes the oysters are on shoals, but always under the surface of the water.

The industry is financed by merchants who control the fishing. In the Red Sea district Arabs man the boats and black slaves do the diving. Several boats go out together and remain during the season, which may be three or four months. The diver, connected by a signaling line to the boat, is let down to the bottom and remains there for hours, gathering shells, which he brings up in his basket. These are counted and the next day the pearls are taken from the dead oysters and sorted by passing through brass sieves. They are then classified as to size, color, and quality and weighed and valued.

### Size and Value of Pearls

Large pearls are sold separately. The smaller ones known as seed pearls come into the market bored and strung on silk in bunches. The unit of weight is the pearl grain ( $\frac{1}{4}$  carat). Spherical pearls command highest prices, the pearl drop the next, and the button the lowest. The cheaper grades are sold by the carat.

Single pearls often command great prices, but a perfectly matched pair is worth four or five times the price

of either taken singly. It is said that there are only four individual pearls that have a world-wide celebrity.

### History of Pearls

The use and popularity of pearls extends back for centuries. Chinese records show that pearls were used as tribute in the twenty-third century B. C. They have always been associated with royalty and luxury, being counted among the principal treasures of kings. The pearl has been called the "aristocrat of gems."

### Culture Pearls

Culture pearls are made by cementing small pieces of mother-of-pearl to the interior surface of the oyster shell. In about a year a coating of pearl is added which is doubled in another two years. This is removed from the oyster, cemented to a piece of ordinary mother-of-pearl and the lower part ground to the usual symmetrical shape. It makes a pearl similar to the real except that the orient is inferior. Blister pearls are treated in the same way, but also lack orient.

The Japanese carry on pearl oyster cultivation for the culture of these artificial pearls about the Island Tadoka. Women and girls do the diving.

### Setting of Pearls

Pearls are not cut though, if dull, the first skin may be removed by a delicate operation and another

iridescent layer exposed. Because of their softness, pearls must be set carefully lest they be injured by the hard metal which holds them. When only the upper half shows they are often sawed in half. Button pearls are much used in rings.

### Ruby

The ruby is the red form of the mineral corundum, and the most valuable member of the group. It ranks above the diamond in value, because large, perfect rubies are extremely rare. In color it varies from a rose to a deep carmine, the "pigeon's blood" hue being the most valuable. There is a legend that the expert's test for the color of a ruby is to put the gem on a sheet of white paper and let a fresh drop of blood from a pigeon's heart fall beside it. This explains the name of the shade. The color varies greatly with the direction from which the stone is viewed. Therefore in cutting, the side from which the richest color is seen is always uppermost.

Burma and India contain the most important ruby mines. Other mines are located in Siam, Ceylon, Afghanistan, and in the United States in North Carolina.

Some rubies show a six-rayed star and are called "asteriated" or star ruby, sometimes "cat's eye ruby." They are quite rare.

Inferior stones and imitations are very often offered for rubies because the stone is so valuable. The most common substitutes are the red spinel and garnet. Optical tests readily detect the difference.

Common faults of rubies are a lack of clearness, or a presence of cloudiness, called silk, patches, and internal cracks.

### Sapphire

The sapphire is the same mineral as the ruby, namely corundum, but is the blue form. All shades and depths of blue are found, but the most highly prized colors are the cornflower and royal blues. The deep colored stones are known as lynx or cat sapphires, and the paler shades as feminine. The color usually grows pale under artificial light but some specimens become violet and these are very valuable. Like the ruby, some sapphires show a six-rayed star in certain kinds of light. If the rays are bright and the star well defined the stone is very valuable.

The sapphire is the hardest form of corundum. In value it is approximately two-fifths that of the ruby, but as sapphires of large size are more plentiful than large rubies, the value does not increase so rapidly with size. They often have to be cut down considerably as they are frequently patchy in color.

Sapphires are found in the same localities as rubies,

usually with them. More than half of the world's supply comes from Siam; the rest from Ceylon, the Himalaya Mountains, Australia, and the state of Montana.

### Amethyst

The amethyst is a purple variety of transparent, crystal quartz, ranging in color from the slightest violet tint to a very dark plum color. It is found chiefly in Brazil, the Ural Mountains, and Siberia, but also in a number of other localities, North America, the British Isles, Uruguay, and Ceylon. The Siberian stones are the finest. The word amethyst means "prevent-ink drunkenness," and the stone was supposed to keep its wearer from this vice.

At one time the amethyst was quite rare and very valuable, but because of the recent discoveries of large deposits it is not nearly so valuable today. Its beautiful color and ability to harmonize with a costume scheme make it a popular stone at all times. The amethyst is an appropriate stone for mourning wear. It should be simply mounted for this use.

A good amethyst should be a uniform deep reddish-purple color, and perfectly transparent. This shade will hold its color under artificial light, while the paler ones do not. Amethysts mounted in dull silver are beautiful for wear with pearl-gray fabrics.



## Chapter IX

### DESCRIPTIONS OF STONES (Continued)

#### Coral

Coral, like the pearl, is carbonate of lime. It is built up by the out-grown shells of minute sea animals, called zooids and is found 60 to 100 feet below the surface of the water, firmly attached to some object in the bottom of the ocean, such as a stone or bottle. It is found in many parts of the world, in low latitudes, but the gem coral comes almost exclusively from the Mediterranean Sea and off the coasts of Africa, Corsica, and Sicily. Italy is the center of the coral industry, both fishing and working, including the carving and cutting of cameos.

In color the gem coral ranges from white and bright pink to a dark red. The wild-rose pink is the most desirable. The demand for coral has increased steadily in recent years.

#### Garnet

Garnet is the name of a class of gem minerals, rang-





Figure 1. Garnets in Matrix



ing in color through red, pink, brown, yellow, and green.

The precious garnet, the cherry or blood-red variety, is known as almandite, from the name of the ancient city which first introduced them to Rome. These come from India, Australia, and Brazil. There has been an increasing demand for this variety of garnet for medium-priced jewelry in the last few years.

The garnet which is second in value is the very deep shade, ranging from a deep blood-red to almost black, is known as the Bohemian garnet, from the locality where it is found, or pyrope, meaning "fire-like." The other colors are known by a great variety of names. A beautiful, rich, green shade is known as "olivine."

### Opal

The distinguishing feature of the opal is its beautiful play of colors. The term "opalescence" is used to describe the blending of the yellow light transmitted through the stone. It is not certain what causes the variety of colors. Some authorities believe that minute cavities cause a refraction of light. In the variety used as a gem stone, the precious opal, brilliant and pure greens, vivid crimsons, electric blues, rich violets, or sherry yellows appear. The best precious opals come from Hungary. They are also found in Honduras, Mexico, Wales, and Australia.

The fire opal is so called because of its reddish tint. It is particularly apt to deteriorate through exposure. The harlequin opal is another popular variety showing bright green and crimson flashes. Within recent years a black variety has become popular, and there are a great many other varieties.

Opal matrix is much used in artistic jewelry in which a rugged effect is desired, because of the great contrast between the stone and the rock in which it is found.

In earliest times the opal was considered an omen of good luck, but since the seventeenth century it has been superstitiously considered unlucky. Queen Victoria is believed to have been responsible for reinstating it in its present popularity by wearing it herself and presenting it to each of her daughters upon their marriage.

### Topaz

Topaz is always thought of as being yellow, but it may be almost any color or quite colorless. It is not so popular today as in the past. The true topaz is very heavy,  $3\frac{1}{2}$  times as heavy as water, and can always be detected by any one accustomed to handling stones. It is also very hard, being the third in the scale of hardness. Therefore, it can be highly polished, and the colorless topaz has sometimes been mistaken for a diamond.

Other minerals known as topaz are the yellow sapphire, called "oriental topaz," and the varieties of quartz called "saxon," "Scotch," "Spanish," "smoky," and "false."

Brazil is the chief source of supply, but it is also found in Saxony, Mexico, and the United States.

### Turquoise

The turquoise is the most popular of the opaque stones. It is found in the light shades of blue, the characteristic color being a greenish, azure, or robin's egg blue. The color is due to a compound of copper which it contains. It has a waxy luster showing a beautiful play of light. Turquoises retain their color well at night.

Persia has for centuries been the source of supply for turquoises, but in recent years the supply has greatly diminished and today stones come from New Mexico, Arizona, and many other localities. History is full of the legends surrounding this stone. It was closely connected with social and religious rites and ceremonies. It is said that its name is due to its being brought into Europe through Turkey.

The value of this stone rises rapidly with increase of weight on account of the difficulty of obtaining large perfect pieces.

Turquoise matrix is somewhat popular at present.

The dark brown matrix is preferred as the mottling of the brown and blue gives a very rich effect.

### Cat's Eye

There are many different stones in the market called cat's eye, any stone having a changeable, undulating luster, like the eye of a cat in the dark being given this name. The true stone is very valuable.

The distinctive feature of the stone is the milky-white, bluish, or greenish-white sheen which crosses it at every movement. This is due to a streak of closely packed asbestos fibers contained in the stone. These fibers reflect the light. The effect of the streak is greatly influenced by the skill of the cutter. The greater the curvature of the stone, the better the effect. The best cat's eyes come from India and Ceylon.

The quartz cat's eye exhibits the same ray of light, but is far less beautiful. It is greenish-gray in color. The tiger's eye is also quartz and resembles the cat's eye. It is not much in demand at present, but about twenty-five years ago was much used for carving cameos. In color it is yellow, ranging to blue, green, or red. The blue variety is known as hawk's eye.

### Chrysoprase

Chrysoprase was at one time a very fashionable stone, then its use died out, but in recent years it has

again come somewhat into favor. It is the apple-green variety of quartz, obtaining its color from nickel. Moderate heat or strong light destroys the color. It is found in India.

### Jade

Jade is a sage-green or green-and-white stone particularly valued by the Chinese, who use it lavishly for ornamental purposes. In jewelry it is seen in bracelets and seal rings and it is set in silver chains. It is not the beauty of the mineral that interests people so much as the wonderful workmanship displayed by the Chinese.

The best variety comes from Burma and New Zealand.

### Moonstone

The moonstone is a very beautiful form of feldspar, reflecting a soft, bluish-white light in an opalescent manner. It is found chiefly in Ceylon, but also in several localities in North America. Colorless translucent pebbles found on one of the beaches in California, and sometimes called moonstones, are often gathered by tourists for cutting and mounting in scarf-pins and cuff buttons, but these are not the true moonstones.

Moonstone is usually cut so that the light takes the form of a more or less well-marked band. Lucky

charms of moonstone are often sold in ball forms, as the moonstone is popularly considered a lucky stone.

### **Peridot**

Peridot is found in a variety of colors, but it is only regarded as a gem when it is of rich olive-green color, resembling that seen on looking through a delicate translucent leaf, and when it is perfectly transparent. It is sometimes called "the evening emerald." When it is a bright yellowish-emerald green tint it is called "olivine," although green garnets are also known as "olivines."

Peridots come from Burma, Ceylon, Egypt, and Brazil. As they are moderate in price and effective, they are quite popular, but being soft they are not adapted to settings where they would receive hard usage as in rings.

An interesting variety of peridot is Job's tears, which are found in separate pear-shaped globules.

### **Kunzite**

Kunzite is lilac-colored, varying from a deep rosy shade to delicate pink. It is a comparatively new gem, having been discovered in California in 1903, and named for the mineralogist, Dr. Kunz, an American authority on gems. At present the supply of this gem does not nearly equal the demand.



### **Tourmaline**

Tourmaline is found in a great variety of colors. The shades which are most used for stones are green, pink, red, and blue. The green variety is the most beautiful of all green stones, the medium bright green shade being considered better than the brighter or more blackish-green. The deep blue shade is known as the "Brazilian sapphire," and the dark red "rubellite." It is so like the ruby that it easily deceives any one but an expert. In fact, the varieties of tourmaline show a strong resemblance to other stones such as the sapphire, the ruby, and so on, though they are easily distinguished by scientific tests. The stones are likely to show flaws or "feathers" especially the pink shades.

Tourmalines are found in a great many different localities in the United States, but the principal sources are Ceylon, Burma, Brazil, and the Ural Mountains.

### **Amber**

Amber, like the pearl and coral, is a product of the sea, but of vegetable origin. It is the fossil resin gum of extinct pine trees buried in the ocean beds of the Baltic and Adriatic Seas, and off the coasts of Sicily, France, China, and India, and in the states of New Jersey and Maryland. The chief source of supply is the Baltic coast where it is cast up by the waves. It is also dredged for in the sands of shallows.

In color it is yellow, sometimes reddish, purplish or brownish, brittle and both transparent and translucent. A mottled variety is called demi-amber. Amber takes a brilliant polish and is soft enough to be easily worked. It produces electricity when rubbed. In fact the word electricity is derived from the Greek word, *elektron*, meaning amber, because of this characteristic.

Amber is mentioned by Homer and another ancient writer says that it was stained to imitate precious stones. The Romans used amber for all kinds of ornaments.

It is much used for beads, for necklaces, mouth-pieces for pipes and cigarette-holders, cane knobs, and so on. It is very durable and is imitated in celluloid.

### **Bloodstone**

Bloodstone is a form of opaque, dark green quartz containing small red spots. The best qualities show bright spots on a uniform ground. It is not extensively used in jewelry now, except in signet rings, where it is used because it can be carved easily.

### **Agate**

All agates are varieties of quartz. The name agate usually describes the variety which contains parallels of different colors, spots, or patches. It is variously known as banded, ribbon, or ring agate, according to the formation of the lines. Agate in general is little

used in modern jewelry, although it is much in demand for art objects and interior architectural decorations. The center of the industry of cutting and polishing agates has been located at Oberstein, Germany, for centuries.

The moss agate, however, is in vogue for jewelry at the present time. This agate contains, instead of parallel bands, particles of iron giving it the appearance of a variety of vegetable growth. The finest specimens come from India and many beautiful ones are found in the Rocky Mountains of the United States. These are cut and mounted for sale to tourists as souvenirs.

### **Lapis Lazuli**

Lapis lazuli, or azure stone, is given a place among precious stones because of its beautiful blue color. It is frequently mottled with white spots and specks of iron. The finest variety, found in Russia, has a clean or very slightly spotted dark blue surface. Another variety, found in Chile, is lighter and mottled with white quartz. Lapis lazuli is also found in India and Burma. The stone is in great demand at present.

### **Amazonite**

This is a bluish-green opaque feldspar. It is found in Siberia and Scotland and Pike's Peak, Colorado; and is used in scarf-pins and cuff buttons.

**Azurite**

Azurite is a most beautiful, opaque, blue stone, whose color is due to the presence of copper. As it is soft, however, its use for gem purposes is limited.

**Cairngorm**

Cairngorm is a brown variety of crystal quartz, also called "smoky topaz." Its rich dark color makes it much desired for jewelry.

**Carnelian**

Carnelian is a form of quartz, so called on account of its flesh color. When found, however, it is usually very dark, sometimes almost black or greenish. On heating it becomes red and translucent.

Carnelian is used as a substance upon which to carve devices for signets. Its popularity for this purpose is due to the fact that the sealing wax leaves the design very easily, and because of its uniformity of color.

**Labradorite**

Labradorite is so called because it was first found in Labrador. It has bright splashes of blue which show when turned to the light but otherwise it has a dull gray or brownish appearance.

**Malachite**

Malachite is a carbonate of copper, an opaque stone

appearing in layers and patches of green. It has a silky luster and takes a high polish. When intermingled with azurite it forms beautiful peacock colors and is then called malachite-azurite.

### **Marcasite**

Marcasite is often called "fool's gold" because it is frequently mistaken by the uninformed for gold. It has little value, but is used in rings, brooches, and scarf-pins.

### **Rhodonite**

Rhodonite is opaque or translucent, and in color pink or flesh color. It sometimes has black markings. It occurs in large pieces making it suitable for cutting jewel boxes, paper weights, etc. It also makes a very beautiful stone for cuff-links, scarf-pins, and artistic jewelry.

### **Smithsonite**

Smithsonite is a translucent mineral, apple-green or sky-blue in color, named for the founder of Smithsonian Institution in Washington, D. C. A striped variety found in Greece makes a striking gem for scarf-pins. As it is rather soft it is not much used in other ways.

**Spinel**

Spinel is a beautiful transparent gem found in many colors, but the flame-red is best known.

**Zircon**

Zircon is found in a variety of colors, brown predominating. The white stones, called jargoon, are sometimes mistaken for diamonds. It ranks second to the diamond in brilliancy and also has the adamantine luster. It is the heaviest of all gems. Zircons come chiefly from Ceylon.

## Chapter X

### ARTIFICIAL AND IMITATION STONES

#### Difference

There is a wide difference between artificial and imitation stones. Artificial stones are identical in composition with the natural stones, but they are made in the laboratory instead of by nature. The ruby and the sapphire are the stones successfully made in this way, and these are used in high-grade jewelry.

Imitation stones, on the other hand, are used in cheap jewelry, and are only glass, or "paste" reproductions.

#### Synthetic Stones

Rubies and sapphires are made in the laboratory from the same chemical elements which enter into the composition of the genuine stone. A compound of aluminum, with the correct coloring matter, oxide of chromium for rubies, titanitic acid for sapphires, is allowed to trickle through a hole into the flame of the oxy-hydrogen blow pipe, which reaches a temperature of  $1800^{\circ}$  C. The mass fuses. It is then gradually

cooled. The resulting stone has all the properties of a genuine stone except the inner crystallization and therefore the synthetic stones lack the "fire" of real stones.

Chemists for years sought a practical method for duplicating nature's work. The conditions necessary are extreme heat and high pressure, and it was not until the invention of the electric furnace and the oxy-hydrogen blow pipe that sufficiently high temperatures could be produced. The originator of the practical method now used was A. Veneuil, a Frenchman.

### **Reconstructed Stones**

The term reconstructed has been erroneously applied to synthetic stones. A true reconstructed stone is formed from tiny fragments of genuine stones, fused at a very high temperature into a single stone. At the present time, however, there are no true reconstructed rubies or sapphires on the market.

### **"Faked" Real Stones**

Inferior, real stones which have been altered and improved in color by heating or by treatment with chemicals are also seen among good jewelry.

For example, Brazilian topazes, when heated become a beautiful rose-red color. Sapphires lose their color in burning. Off-color diamonds have been passed as "first water" stones by dyeing them with a magenta varnish, which neutralizes the yellowish color. This



wears off in time and the true color is exposed. A suspected diamond can be soaked in alcohol. This removes the varnish, if any is present, and shows the real color.

### Imitation Stones

The process of making glass imitation, or "strasse" stones, is similar to the manufacture of any glass. A mixture of powdered quartz, potassium carbonate, and lead to give brilliance gives a fairly good imitation. Rhinestones are made in this way. Definite proportions of coloring matter are added if colored stones are to be made.

### Coloring of Imitation Stones

To obtain the correctly colored imitations for the ruby, amethyst, etc., traces of metallic oxides are used. The proportions for the most commonly used imitations are:

Imitation ruby	— 1,000 parts	glass
	40 "	oxide of antimony
	1 part	purple of cassius
	1 "	gold
" sapphire	— 1,000 parts	glass
	25 "	oxide of cobalt
" emerald	— 1,000 parts	glass
	8 "	copper oxide
	.2 "	chromium oxide

- Imitation amethyst — 1,000 parts glass  
                                           25 “ oxide of cobalt  
                                           trace of oxide of manganese
- “ garnet — 1,000 parts glass  
                                           trace of purple of cassius
- “ turquoise — 1,000 parts glass (opaque white)  
                                           trace of copper oxide or oxide of  
                                           cobalt

The mixture is heated for about thirty hours in a crucible; the heat is then gradually lowered and the melted glass solidifies.

The stones are cut and polished in the same way as the real stones, although the process is simpler as the glass is not so hard.

The chief difficulty encountered in the manufacture of imitation stones is obtaining a sufficiently hard glass to withstand the knocks and hard usage which a real stone will bear. A very hard glass *can* be obtained but it is not brilliant. The harder the glass the less brilliant the stone.

### Test for Imitation Stones

The test for glass imitations depends on this lack of hardness, for a piece of flint will easily scratch the hardest paste known, but it has no effect on the ruby, sapphire, and others.

### Imitation Pearls

Imitation pearls may be perfectly made and have the

advantage of being more durable than real pearls.

Small spheres of glass, or beads, are coated internally with a preparation of fish scales. (It may be of interest to know that 4,000 fish are required to make one-quarter of a pound of "pearl essence.") The beads are then coated both externally and internally with pearl essence, and filled in with wax. They are exceedingly beautiful and have a rich luster, but lack the concentric layer effect of the true pearl.

#### **Imitation Coral**

Imitation coral is made from red gypsum or celluloid.

#### **Imitation Amber**

Amber is imitated also in celluloid.

#### **Imitation Cameos**

Imitation cameos may be made by putting glass or "strasse" into a mold of the raised portion, and melting it. After cooling, the cast glass is trimmed and cemented on a background of real stone. These imitations can be detected by placing them in hot water, which dissolves the cement and the front separates from the back.

#### **History of Imitation Stones**

The art of imitating precious stones has been practiced for centuries.

In the tombs of upper Egypt pastes dating back to 2000 B. C. have been found. Even at this early time this ancient country was in a high state of civilization and one of their most profitable and scientific trades was imitating all manner of precious stones.

Later on the Greeks, Etruscans, and Romans made them. An ancient Roman historian, Seneca, mentions a process of making emeralds by giving a green color to rock crystal. The famous table of Solomon taken from the Temple by Vespasian, the Roman conqueror, was studded with imitations. Many of the famous gems of antiquity were merely of glass.

In our own times the manufacture of false stones has become a thriving industry.

## Part III—Manufacture of Jewelry

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### Chapter XI

#### METAL WORKING

##### The Goldsmith an Artist

Because of the precious materials from which jewelry is made and the fact that jewelry is made for ornament rather than for practical use, the workman has an interest like that of the artist in creating and developing beautiful forms and combinations.

Some of the great sculptors and painters of Italy had their early training in the goldsmith's shop and the goldsmith was given a place of honor and respect among all craftsmen.

The goldsmith required in his workshop many kinds of appliances, including:

A lamp for melting and annealing the metal.

Blow pipes for controlling and directing the flame.

Charcoal blocks upon which small quantities of metal might be melted.

Crucibles or melting pans for melting larger quantities and for making alloys.

Draw plates for drawing out wire.

A draw bench in which the draw plates were held when necessary.

Pitch blocks upon which sheets of metal were placed for repoussé work.

Stakes or small anvils either flat or rounded upon which the metal was hammered and shaped.

A sand bag.

Molds for casting.

A doming block for making hollow balls.

Acid for making the "pickle" in which the metal was placed in order to remove the film which collected on its surface when it was annealed.

Sand, wax, borax, solder, binding wire, and wire gauges, and a work bench with pans or leather pockets beneath it to catch the tiny particles of metal from filings.

Enameling required:

Mortars and pestles for grinding colors.

Metallic oxides and enamel materials, lead, sheet-iron, aluminum, ground glass, burnishers, etc.

A muffle furnace for firing.

The tools used for delicate work included:

Hammers and mallets of steel and horn.

Gravers, chisels, and punches for chasing and repoussé work.

Files of many kinds including a set of "needle files."

Shears and piercing saws for cutting the metal,

Pliers, nippers, and vises for holding and bending the pieces.

Mandrels or steel rods upon which wire was coiled and rings shaped.

### **Making of Jewelry**

Much of the most artistic jewelry was "built up" from tiny grains or wires or shaped pieces soldered together instead of being cut out of a sheet or block of metal. The designs were in open filigree work or backed with a foundation of solid metal.

### **Grains and Grain Clusters**

When gold or silver is melted on a charcoal block the metal does not spread out in a thin sheet but gathers itself into tiny globules or grains. If the block has small hollows in it these grains will be of uniform or graded sizes.

Many beautiful designs were made of clustered grains soldered together but they were usually combined with wire which was made by a process called "drawing."

### Wire Drawing

If one end of a strip of soft metal is held firmly and the other end pulled with a certain force it will "draw" or lengthen out. The draw plates used for drawing wire were simply steel plates with holes of graduated sizes.

Wire drawing was one of the most important branches of the jeweler's work. The bar or strip of metal was first hammered at one end until it had a tapering point which fitted into one of the holes of the draw plate. It was then grasped with a pair of pliers and pulled through the hole. It came out thinner and longer. Then it was pulled through the next smaller hole in the same way until the wire was the required size. The coarser wire from short pieces of metal could be drawn by hand but fine wire had to be drawn with the draw bench.

The holes of the draw plate were not always round. They might be oblong, square, or triangular, producing different kinds of wire. Hollow tubing was made by shaping the end of a flat piece of metal around a tapering mandrel so that it would fit one of the holes in the draw plate. It was then drawn out in the same way as the solid metal.

### Annealing

As the wire became thinner, the metal hardened and



became brittle and had to be annealed or softened. This was accomplished by heating it to a temperature below the melting point and cooling it slowly. All jewelers had at hand a jeweler's spirit lamp and a blow pipe for this purpose.

The blow pipe was used for increasing and directing the flame of the lamp. A blow pipe is a metal tube through which a stream of air may be forced in order to supply additional oxygen to a flame and thus make it hotter. The heat was regulated by increasing and diminishing the pressure. The mouth blow pipe was simply a brass tube tapered to a fine point at one end, and the flame was controlled by the breath. Other pipes had the air forced in by a bellows which was operated with the foot.

### Wire Jewelry

When drawn to the required size, gold or silver wire may be twisted, plaited, or cut into small pieces which may then be bent into fancy shapes and hammered into leaves or other delicate designs. One of the methods of securing pieces of convenient size and shape was the winding of wire closely around a small rod called a mandrel.

Wire which has been coiled around a mandrel looks like a spiral spring. When the coils are cut apart they form small rings open on one side. Some rings were

made only to be melted into grains as this was the best way of insuring that the grains would be exactly the same size. They were also used to form chains or flat decorations, being soldered together with gold solder. Rings of a larger size were bent separately with pliers, and after being soldered together, were shaped on a triblet or tapering mandrel. Gold solder is made of gold alloyed with copper and silver. The alloy melts at a lower temperature than the pure gold and therefore can be applied without injury to gold ornaments.

### **Beaded Wire**

Beaded wire was produced by pressure when the metal was soft. A quaint description of the way in which beaded wire was made is given by Theophilus, a monk of the eleventh century:

“ There is an iron instrument called the beading tool, which consists of two irons, one above and one below, the lower part is as broad and as thick as the middle finger and is somewhat thin.

“ In it are two spikes by which it is fixed to wood below and out of the upper face rise two thick pegs which fit into the upper part of the iron and this upper iron is of the same size and length as the lower and is pierced with two holes, one at each end which receive the two pegs of the lower so that they can be joined together.

“ They must be joined very closely with the file and in both faces thou wilt groove out several rows of little pits in such a way that when the irons are joined together a little hole may appear.

“ In the large grooves place thou gold or silver rods beaten out long and smoothly round, and when the upper iron is smartly struck with the horn mallet while the gold or silver rod is turned around with the other hand, grains are formed as large as small beans, in the next grains as large as peas are formed, and in the third like lentils and so on smaller.”

### Repoussé Work

Jewelry which was not built up from grains and wires was either modeled from thin sheets of gold or cast in a mold. The first process is known as repoussé work. The thin sheet of gold was laid on a pitch block or other yielding material such as lead or soft wood, and the design was worked out slowly with hammers and punches from the back. In order that the metal might not be pierced or bent out of shape the modeling was done very carefully with rounded punches and light blows of the hammer repeated a great many times and occasionally the piece was removed from the block and worked down from the right side.

### Casting

Casting is too complicated a process to describe with-

out a number of illustrations. It was done by melting the metal and pouring it into a mold made of plaster, sand, or clay.

A model of the article was first made of wax or clay. Plaster of paris, sand, or other material was pressed around it. Then the model was removed from this cast, and the melted metal poured into the space. If the figure was to be hollow a "core" was made like the model only smaller. The core was placed in the mold and the metal poured around it.

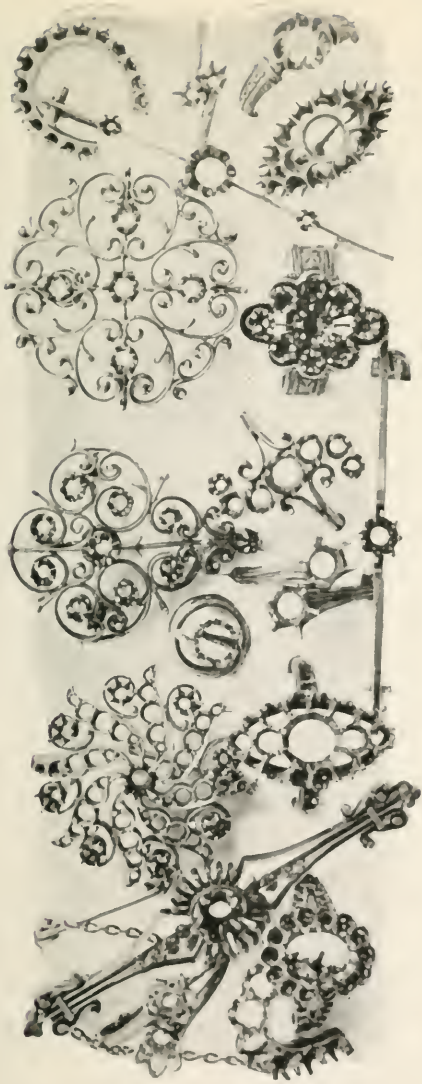
Very fine modeling was done by the "waste wax" process. The wax model in this case was not pressed into the sand but painted over with a number of thin coats of wet, finely powdered sand which were allowed to dry and harden. Then the wax was heated so that it melted and ran out, leaving a hollow shell of fine sand. When the metal had been poured into this shell and hardened the sand could be broken away.

After the figure had been taken from the mold it was modeled and finished by hand.

Silver jewelry was made by the same general process though silver is so much less valuable than gold that the work was not usually so delicate and finely finished.

### Methods of Ornamenting

Chasing was done from the right side with graving tools of various kinds. All this work required an



Courtesy of Daniel Low and Company

Figure 2. Examples of Gold Mounts for Precious Stones



“eyeglass” or small microscope which fitted in the jeweler’s eye and enabled him to see tiny flaws or irregularities in the pattern.

Damascening was the cutting of grooves in the metal and forcing into them wires or pieces of another metal.

Pierced work was done with tiny saws or drills, but, like carving, it was less used for gold than for silver or copper jewelry.

### Modern Methods of Manufacture

Fine jewelry still requires many of the same tools and equipment for its manufacture as in the past, but great improvements have been made as the result of discoveries in chemistry concerning the treatment of metals and through improvements in machinery.

The jeweler’s lamp has been replaced by the gas jet and the blow pipe has been greatly improved. Wire is now drawn by machinery and grains are obtained in large quantities in the various sizes needed.

The increasing use of platinum for fine jewelry has also modified the process as platinum may be hammered, drawn, or cut like gold and silver, but melts only at a very high temperature. No ordinary flame will affect platinum so that an oxygen torch must be used for melting or annealing it.

Designs for platinum jewelry are somewhat different in character from those suitable for gold. Much of this jewelry is pierced by means of fine drills and

studded with tiny stones. Diamond jewelry is now usually made of platinum incrustated with diamonds and set with larger stones where these are required by the design. Figures 2 and 3 show the differences between gold and platinum mounts for precious stones.

Though methods have been improved and some operations can be better performed by machinery than by hand those who wish distinctive jewelry wish to have it specially designed. In other cases the original is carefully wrought out and it is then duplicated by castings made in molds of cuttlefish bone.

### **Craftsman Jewelry**

Craftsman jewelry is made by hand from silver and copper with simple tools, but with much attention to design. It is ornamented with the softer precious stones, sometimes irregular in shape and unpolished. Inlay and enamel are also features of this type of jewelry which is often massive and somewhat barbaric.

### **Commercial Jewelry**

Nearly all the jewelry sold at a moderate price is now made in large factories by machines. Handwork is not entirely done away with, but the main processes are carried out by machinery which is very wonderful in its perfection and delicate construction.

The factory makes its own alloys, usually 10 karat



or 14 karats fine, from the pure gold which it receives from the government assayers. This alloy is cast into small bars, and then rolled into thin plates or drawn into wire or tubing by machinery.

Rings, brooches, and other solid articles are stamped out of thin plates by means of steel dies, operated by machines. Rings which are to have claw settings are cut in two pieces which are soldered together in the middle and are then rounded in another machine before having the settings soldered in place. In some cases a machine stamps the claws out of the plate composing the ring instead of having them made of a separate piece and soldered on.

Brooches and lavalieres are made in the same way, sometimes being cut in one piece, but more often made in several pieces which are put together by hand. A number of machines are usually required for the completion of each design. Chains are made by machines which turn the links and join them automatically. A long strip of chain or gallery is then put through another machine which can solder all the links in a section at once. When finished it is cut into the desired lengths and the clasps or fastenings put on.

Bracelets are cut from long flat pieces or from tubing and finished with clasps and hinges. The original designs for commercial jewelry are made with the greatest care and skill, and the machines used can fol-

low these designs exactly. One remarkable machine is able to copy a design in seven different sizes.

Sometimes the parts of rings, chains, brooches, or bracelets are sent from the factory in sets ready to be put together and finished in the jeweler's shop.

### **Cheap Jewelry**

Gold jewelry may range in fineness from 22 karats which is found in old pieces, through 18, 16, to 14 karats, which is the accepted standard in America. Ten karat gold is made, but as more than half its weight is alloy it should not be called solid gold.

The luster of the cheaper alloys is dull and they may be affected by dampness.

### **Gold-Filled Jewelry**

For gold-filled jewelry a thin shell of gold is stamped with the pattern and this shell is backed by baser metal, after which the back is covered with an inferior quality of gold.

Seamless filled wire is made by covering a wire with gold and drawing it to the required fineness.

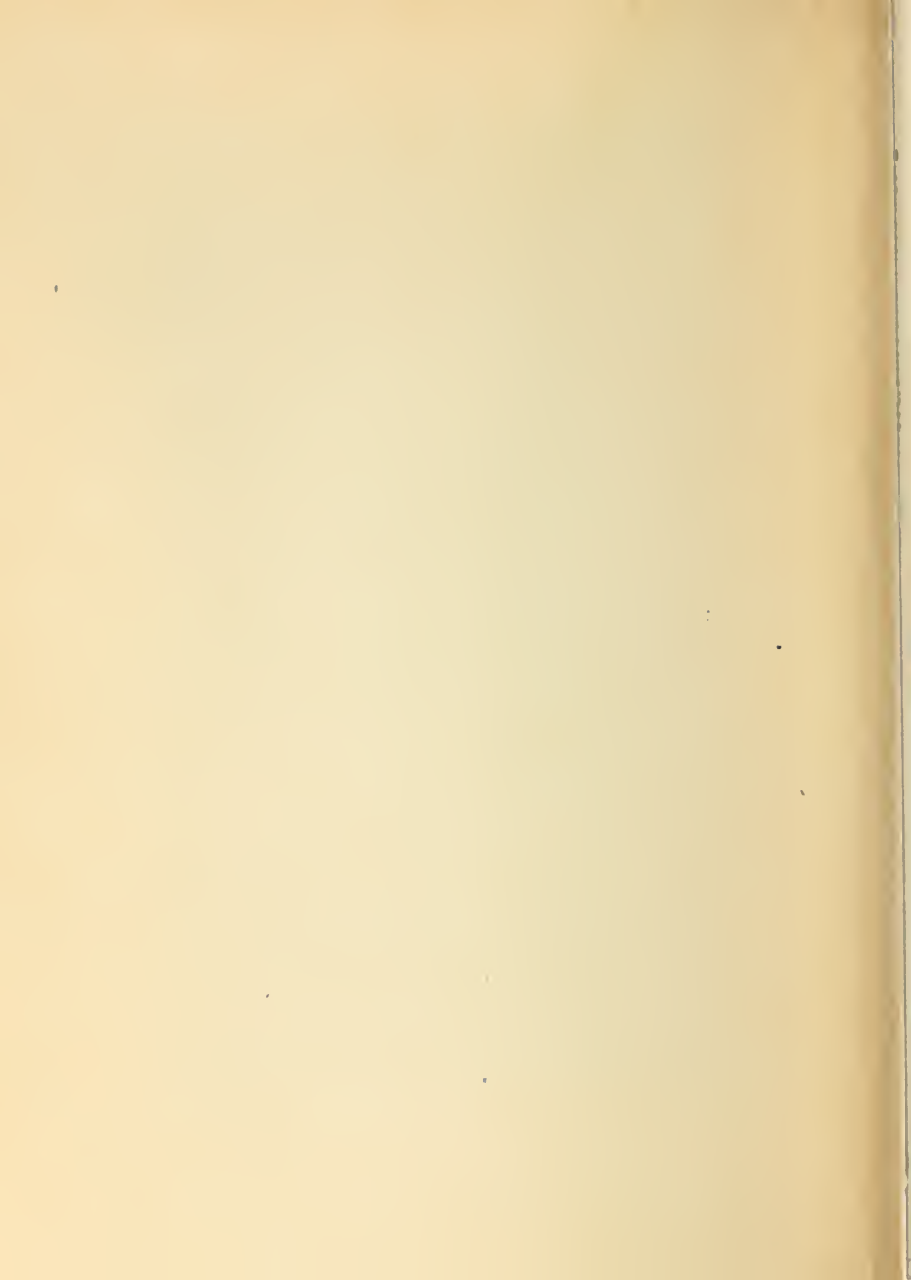
### **Rolled Gold**

Rolled gold, or rolled plate is made of exceedingly thin sheets of gold made to unite by pressure with a sheet of composition. The plate is rolled until it may become the thousandth part of an inch in thickness, but



Courtesy of Daniel Low and Company

Figure 3. Platinum Jewelry Mounted with Stones from Pieces in Figure 2.



even then it will not tarnish or be affected by acids if it is more than 14 karat gold. The plates are then annealed and polished on the gold side with rottenstone and oil.

Rolled gold may be of any quality or thickness. In Germany an official stamp is placed on the best rolled plate guaranteeing its quality and thickness; but in England the assay office does not recognize anything but solid gold and the United States is equally indifferent to the quality of rolled or filled gold. A revision of the stamping laws in the United States is now in progress and this defect will probably be remedied.

### Electroplating

When we speak of gold-plated jewelry, we now mean articles which have been electroplated. This is a modern method of covering articles with a very thin coat of gold or silver by means of a current of electricity.

For gold plating an enameled iron saucepan can be used, with the articles to be plated attached to one pole of an electric battery and a piece of solid gold to the other. Then the saucepan is filled with a gold solution and placed over a gas burner or lamp. Manufacturers of gold plate have vats of enameled iron heated with Bunsen burners and containing from ten to thirty gallons of the gold solution.

The electric current acting on the sheet of gold transfers it through the liquid to the article to be plated until it is covered with a very thin coat of the precious metal. If the article is made of zinc, lead, or pewter, it must first be plated with copper and it must be absolutely clean. A strong coat is deposited in a few minutes. For a thick deposit the article must be taken out and brushed with scratch brushes to remove a brown film which collects on it. A frosted appearance is given by roughening the surface. The color depends on the temperature of the solution and the thickness of the deposit.

When taken out the articles are weighed to determine the quantity of the gold. They are rinsed in pure water and dried in sawdust. At this stage the surface is dull and must go through several polishing processes in which soft mops of swans-down, felt, or chamois are used to apply rouge and emery powder.

The process of silver-plating is similar except that the vats are larger, sometimes holding several hundred gallons. The articles to be silver-plated must be suspended by copper wire and the anodes of the battery attached to copper rods because silver is such a good conductor of electricity. Iron or steel must be copper-plated before receiving the coat of silver.

### Tinting

The tinting of gold is a process by which the color

of gold is changed without changing its real character. It is done to produce artistic effects such as "dull gold." The article must first be absolutely clean, even the film left by the hand must be removed or the acids used will not act evenly on every part.

When the article has been carefully washed it is plunged in a hot bath of nitric acid to remove the silver or copper alloy from the surface; then alum, saltpeter, salt, nitrate of potash, hydrochloric acid, or other substances are used in solutions to give the desired effect. The objects to be colored are plunged into the hot solution. This process may be repeated a number of times till the right tint is secured; after which the articles are brushed and polished.

Roman gold is gold from which the luster has been removed by nitric acid.

## Chapter XII

### CUTTING OF PRECIOUS STONES

#### Importance

The cutting is the most important treatment given to the stone, the beauty of which depends to a large extent upon the skill and accuracy of the cutter.

#### Styles

There are two principal styles of gem cutting:

1. Faceted cutting, in which the surface of the stone consists of a large number of small, geometrical faces.
2. Cabochon cutting, in which the surface is smoothly curved.

#### Facet Cutting

The purpose of cutting gems with facets is to increase their sparkle, and therefore it is the transparent and semitransparent stones, such as the diamond, the ruby, the sapphire, etc., which are cut in this style.

There are three styles of facet cutting:

Brilliant

Rose

Step



### Brilliant Cut

The brilliant cut is the most popular of all and is the one used for the most valuable stones, as the diamond, the ruby, the sapphire, the amethyst, etc.

In this style there are 58 facets altogether, 33 in the section known as the "crown," which lies above the "girdle," or greatest circumference of the stone, and 25 in the "culasse," the portion below the girdle. (See Figure 4.)

There are many modifications of the brilliant pattern, the finished form of the stone depending upon the character of the rough gem. However, certain proportions of size and arrangement of the facets are adhered to. For example, if a diamond is properly proportioned, after it is cut, the depth from the table or top plane down to a line with the girdle is just one-third of the entire depth. The table would take up one-third of the face, and each side running from the table to the girdle would also measure one-third of the face of the stone. These proportions affect the brilliancy of the diamond. For instance, a stone of good color, cut shallow with a large table, will have a brilliant edge, but the center will have what is known as a "fish eye" as the culet or bottom plane will be seen through the stone.

A colored stone is usually cut shallower than a colorless one, the deeper the color, the thinner the stone.

The half-brilliant cut is sometimes used in very thin stones. The lower part of the stone is a plane surface; the upper part is cut like the crown of the ordinary brilliant.

The brilliant cut was originated by a Venetian towards the end of the seventeenth century, and its discovery first brought out the true beauty of the diamond.

### **Rose Cut**

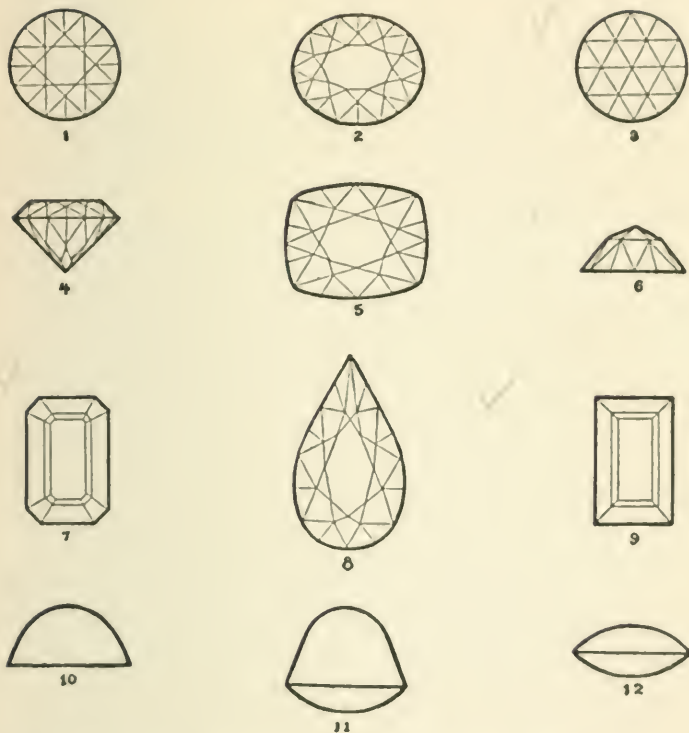
In the rose cut all the facets are nearly of a size and triangular in shape. The stone shines with a very mellow but subdued luster, as it has a flat base. This form of cutting was first used about 1655 and was one of the earlier ways of cutting diamonds. (See Figure 4.)

Sometimes a stone is double rose cut, the form of two rose cut stones joined together by their plane surfaces. This is called "briolette" or "rosette."

### **Step Cut**

This style of cutting is so called because when viewed from the side the facets form a series of steps. The crown may have two or three steps, the culasse five or six or more. Step cut stones are usually square or six-sided. (See Figure 4.)

This form of cut is suitable for stones where a display of color is the chief consideration, rather than a brilliant play of light from the interior. If a light



- |                                 |                               |
|---------------------------------|-------------------------------|
| 1. Round Brilliant (top view)   | 7. Step Cut (octagon)         |
| 2. Oval Brilliant (top view)    | 8. Pear Brilliant (top view)  |
| 3. Rose Cut (top view)          | 9. Step Cut (oblong)          |
| 4. Round Brilliant (side view)  | 10. Cabochon (side view)      |
| 5. Cushion Brilliant (top view) | 11. High Cabochon (side view) |
| 6. Rose Cut (side view)         | 12. Lentil Shape (side view)  |

Figure 4. Styles of Cutting Precious Stones

(Courtesy of Esposito, Varni Company)

color is desired, the stone is cut shallow so that the light may easily penetrate; if a dark color is desired it is cut deep to secure a deep tone.

The stones most often cut in this form are the topaz, sapphire, ruby, emerald, garnet, peridot, and amethyst.

### **Curved Surface Cutting — Cabochon**

In this style the upper surface of the stone is the shape of a low dome. The under surface is usually flat, although it sometimes follows the curve of the outer edge. (See Figure 4.)

It is used to bring out the natural color and luster of opaque and translucent stones; therefore such stones as the turquoise, garnet, lapis lazuli, carbuncle, cat's eye, star sapphire, etc., are usually cut cabochon.

### **Difficulties in Cutting Valuable Stones**

The cutting of a valuable stone from the rough form is a highly skilled operation, and great delicacy of touch as well as judgment on the part of the cutter is required to produce the final treasure.

The cutter must carefully study the rough stone to determine how he can get the greatest beauty and value from it, and at the same time diminish it in size as little as possible. He must take into consideration the proportions of the stone. How exact these should be was described under the brilliant cut, in the case of the diamond.

### Slitting

The first process is "slitting." The rough stone is held against a circular revolving plate made of thin metal on the edge of which there is diamond dust, which causes it to cut easily.

### Faceting

For gems which are to be faceted, the principal facets are next outlined by a horizontally revolving wheel. The stone here takes on a definite form. Each gem is then cemented to the end of a wood holder, very much like the ordinary penholder. The faceting is then finished on other wheels.

### Polishing

At the end of the faceting operations the gem is dull, colorless, and uninteresting. Its brilliance and color are brought out by the polishing process.

This is accomplished on a disk with some polishing material, such as rottenstone. This operation is also a very delicate one, as the angle or size of the facet must not be changed.

### Loss of Size During Cutting

In the processes of cutting and polishing a large rough stone will lose 5 per cent or more of its weight, a small one 40 per cent.

### Center of Diamond-Cutting Industry

Holland and Belgium have been the centers of the

diamond-cutting industry, but the United States has now established a number of factories with great technical perfection and more uniform standards than those in Europe. The center of the industry is New York City.

### **Diamond Cleaving**

When the rough diamonds arrive at the factory they are weighed and the weight of each is recorded with its other characteristics in a book. Each stone is then examined closely in order to determine the direction of the planes of cleavage which can only be recognized by an expert.

The cleaver then cements the diamond to a wooden stick and with another diamond cuts a narrow groove in it at the exact place selected. A dull steel knife is inserted in this groove and a smart blow struck upon it. If this has been skilfully done the diamond divides at once and both surfaces are as smooth as if they had been polished.

This process requires the greatest care and skill on the part of the cleaver as any error would cause serious loss. If the groove is not exactly in the right place flaws are apt to appear when the stone is split thus greatly lessening its value.

### **Diamond Sawing**

A new method has recently been introduced by which

stones may be sawed through the center and cleavage need not be considered. This gives much better results than cleaving though the former method is still used for large diamonds.

One-half of the stone to be sawed is embedded in a small metal receptacle filled with melted aluminum in a machine run by an individual electric motor. The edge of a circular bronze saw is set against the stone on the line selected and gradually cuts its way through. These saws are almost as thin as paper and are charged with a paste of diamond dust and olive oil. They make three thousand revolutions a minute.

The time required to saw a stone in half depends upon its size. A large diamond takes from three to four days. If the saw were not charged with diamond dust the stone would destroy it in a short time.

### Cutting and Polishing Diamonds

The diamond is cemented to the center of a rotating cutting lathe and another diamond is cemented to a long stick. The operator presses the stone on the stick steadily against the stone in the lathe at the proper angle until the stone in the lathe becomes rounded and smooth. The other stone is then put in its place in the center of the lathe and their mutual action is reversed until both stones are shaped and ready for the cutting of the facets.

This work is done upon iron wheels called "skaifs"



which make twenty-two hundred revolutions per minute. The diamond powder produced at the cutting is the only material used for polishing. It is applied with olive oil forming a paste which the polisher uses on his wheel. The utmost skill and watchfulness are necessary as the angles of the facets must be mathematically exact in order to secure the greatest brilliancy. Sometimes a gauge is used and each facet measured.

The smooth surface made by the saw becomes the table of the diamond which the polisher first cuts on four sides and then divides each section in half, making eight equal surfaces extending to the girdle. The number of facets cut from the girdle to the culet exactly corresponds to the ones above.

This accomplished, the stone is ready for its "brillandeening," or making the small facets. Eight star facets are cut close to the table and sixteen small facets run from the stars to the girdle while sixteen small facets are cut from the girdle down to the culet.

The perfectly cut diamond should have fifty-eight facets. Above the girdle there are eight division facets, eight star facets, sixteen small facets, and one table, thirty-three in all; below the girdle there are eight division facets, sixteen small facets, and one culet, twenty-five in all; making a total of fifty-eight in the finished diamond. (See Figure 4.)

During this process the stone is imbedded in a ball of



hot lead from which it must be taken out and reinserted eight times.

By modern American methods the loss in cutting and polishing has been greatly reduced by scientific methods, but the demand for perfect stones is greater than in Europe, making the quality assured but increasing the price.

Diamond cutting is one of the most highly skilled of all occupations. The workmen require five years' apprenticeship before they are qualified to take positions as skilled artizans.

### **Cabochon Cutting**

In cutting stones cabochon the operator keeps the handle on which the gem is mounted in constant motion so as to give a smoothly rounded form.

### **Special Cuts**

In addition to these two principal groups of cuts there are special forms of cutting such as:

Cameo	Monogram
Intaglio	Scarab
Crest	

### **Cameos**

During the last few seasons the fashion for cameos has been revived, and they are at present very popular.

A satisfactory definition of the word cameo is not easy to give because it may be applied to so large a

group of carved materials, and yet does not include all.

One writer, Percivale, defines a cameo as "A carving in relief on some hard substance of intrinsic beauty or value."

### Materials Used in Cameos

The substances upon which cameos are cut include all precious and semiprecious stones, such as emeralds, carbuncles, amethysts, turquoises, agates, onyx, jacinth, and a number of others and also amber, mother-of-pearl, shells, coral, ivory, and precious metals.

Cameos may be cut from a material all of one color, but the term is usually associated with delicate carvings on a material having layers of different colors which serve to bring out the beauty of the design, sometimes as a background only, sometimes with tints and shades which shine through the translucent figures in certain places.

### Stone Cameos

Onyx and the various forms of agate from which the largest number of stone cameos are cut, do not have their colors in horizontal, even layers, but with little bends and curves, thicker in some places than in others. This is due to the fact that the deposits were made in hollows of the rock by trickling drops of water which carried coloring matter in the form of metallic oxides. The layers took the shape of the hollows.

When the artist cuts a cameo he considers these variations in the stone as a part of the design, and tries to make them add to its beauty. Stone cameos must be cut with a diamond point or drill and grinding wheels such as are used in faceting. The height of the relief and elaborateness of detail give the carving its value. They are polished with diamond dust or emery.

### Shell Cameos

A large number of the cameos now made are cut on the inner surface of shells such as the pearl oyster, the abalone, and other beautifully tinted sea shells.

Shell cameos are not so valuable as those cut from stone, but they are softer in color and often very beautiful. All the work must be done by hand, the tools being similar to those used for carving or engraving metal. They may be polished with rottenstone. Brown and white and pink and white shells are most adaptable to cameo cutting, as beautiful flesh tints may be secured where the color shows through a thin upper layer of shell. The human head and figure is the favorite subject for cameos.

### History of Cameos

The earliest known were made in Egypt, where the scarab or sacred beetle was carved in stone or molded in pottery. Scarabs were worn as amulets. From there the art was taken to Greece where it was per-

fected. No modern cameos equal in beauty the finest of the Greek specimens which are very valuable and are preserved in museums and private collections among their choicest art treasures.

The Romans were great collectors of cameos, but they employed Greek workmen to make them. In the Middle Ages the Byzantine cameos were less graceful and beautiful because all their art was more rigid and formal.

At the time of the Renaissance when everything classic was in fashion, the ancient cameos were imitated and often actual forgeries were made of the signature on the back. Queen Elizabeth was a great lover of cameos and her own portrait was carved on a number of them.

Italy is the source of most of our cameos today, but they are no longer made by great artists and so do not equal the older ones.

### **Imitation Cameos**

Imitation cameos have been made of glass either cut and polished or simply molded, or of pottery. The Wedgewood pottery medallions look like cameos with their green, violet, buff, or pale blue backgrounds, and white figures.

### **Intaglios**

Intaglios are the exact opposites of cameos, as the design is cut into the stone instead of being carved in

relief. As intaglios have been used principally for seals they are nearly always small and oval in shape. Intaglios are often in the form of crests or monograms with which the wax is impressed in sealing a letter.

### Scarab

The scarab, which was the earliest form of carved cameo, has remained as an individual cutting to the present time. The sacred beetle of Egypt was a symbol of immortality and many of the little green or blue stones cut in this form have been found in the tombs and ruins in Egypt, but many also have been forged to imitate these treasures. The scarab is cut with the beetle's wings folded, but it is often set between two long outspread wings.

### History of Cutting

The art of gem cutting is very ancient. As early as 1285 an organization called a guild of gem cutters existed in Paris; and it is probable that the art was practiced long before this.

One Ludwig Van Berguen, or Louis de Berquem (French), is given credit for first cutting a diamond with facets in about 1460. It is said that the king sent him three diamonds to cut. The first one had a very romantic history, being taken as spoils of war, and it may still be seen in the collection owned by the Spanish royalty. Throughout the sixteenth century the style which de Berquem introduced prevailed.

## Chapter XIII

### SETTING OF STONES

#### Characteristics of Good Settings

The setting of precious stones is exceedingly interesting work and requires great skill in order that the stones may be held firmly and yet show no unnecessary thickness of metal and no mark of the process.

#### Tools

The tools used in setting stones consist of :

Drills for making holes in metal or flat stones.

Scorpers for hollowing out the metal.

Piercing saws, files, and shears.

Push tools for pressing the stone home in its setting.

Setting or pressing tools for pushing down the tops of the claws.

Graining tools, hollow at the end, for shaping the metal into grains.

A roulette wheel with depressions like a tracing wheel for making a row of small grains upon a narrow edge of metal.

Triblets for turning up and shaping rings or collets.

Sticks of wood with a knob of cement at the top upon which small articles are held firmly while working with them.

A wax stick to pick up stones when trying them in the settings.

Burnishers and polishing materials.

Stones for sharpening and burnishing.

### Styles

Settings may be open or closed, that is, they may show the lower part of a stone between the parts of the setting or from beneath or they may be like a solid cup showing only the top of the stone.

The principal settings are :

Claw or Coronet

Cut Down

Gypsy or Flush

Roman

Rubbed Over, Band, or Clamp

Thread or Thread and Grain

### Claw Setting

The claw setting is the one most used for diamonds and other very brilliant stones because it allows the light to strike the lower part of the stone and add to

its brightness. It is made by cutting a strip of metal the proper size for the setting desired, and bending it into a ring which is soldered together. This is called the "collet." The collet is then put on the cement stick where it is held firmly while a tiny shelf or "bearer" is cut into the inner surface about one-sixteenth of an inch from the top. This shelf is for the stone to rest on just below the girdle. Some stones are shaped so that they do not require the shelf. Then the metal is cut out above and below this shelf, leaving the claws. A disk of metal is soldered on the lower claws to form a base and a hole is drilled in it for the point of the stone if it is a brilliant cut. The claws are forced apart to receive the stone. After placing it, the ends of the claws are bent down over the stone, shaped, and smoothed down.

### **Cut Down Setting**

A cut down setting is cut at first like the claw setting, but instead of having claws cut out it is left as a solid ring. The lower edge of this collet is beveled off to form the base. When the stone has been placed on the bearer the upper rim is pressed down over it and small sections of the rim are cut out so that it will fit perfectly.

### **Flush Setting**

A flush setting is made by drilling a hole in the solid



metal just large enough to hold the stone. The metal outside the hole is filed down so as to leave a narrow ring or bank extending above the edge of the stone. This bank is pressed down on the stone until the ridge has disappeared and then filed till it is true and level.

### **Roman Setting**

A Roman setting is made like a flush setting by drilling a hole for the stone, but in this case a groove is cut all around the stone and very near it. Then a smooth round tool is rubbed along the groove until the rim of gold next to the stone is pressed down on it. The groove is then smoothed down and the setting finished and polished.

### **Band Setting**

A band setting is made with a strip of metal bent into a ring which is soldered onto another flat piece of metal or on the face of the pin or other piece of jewelry. A smaller ring for the bearer is soldered inside of the band or the stone may rest on the metal at the bottom of the band. The top is pressed down over the stone. The clamp setting has part of the border filed away, leaving little points to bend over the stone.

### **Thread Setting**

A thread or "thread and grain" setting may be used

where a number of stones are set close together. Holes are drilled for the stones as in the flush or Roman setting but, as there are spaces between the stones to be filled in, little curls of metal are scooped out, pushed up against the stones, and rubbed over with the graining tool. They hold the stones fast.

### Settings for Special Stones

Stones cut en cabochon usually have closed settings. Enamels or cameos, which should not have any pressure for fear of damage, are set from the back by making a ring deeper than the enamel and bending over the upper rim before placing it. Then a ring is put in the collet back of the stone and soldered on with soft solder or secured with tiny pins.

Pearls have holes drilled in them and are secured by pins to the setting. Pearls may have plaster of paris put in the setting to form the desirable white background and other jewels may have metal foil back of them tinted to enhance their color.

Jewelers can buy the collets of stones already made, or they can buy "gallery" for claw settings with the claws already cut. This can be cut the right size, soldered together, and finished. Rings and other pieces are often made in the factory complete except for setting the stones and finishing.

## Chapter XIV

### ENAMEL IN JEWELRY

#### Characteristics of Enamel

On many pieces of jewelry we see colored decorations which look like precious stones or colored glass, we cannot tell which. Sometimes the color has fine lines of gold running through it. Sometimes it is clear and sometimes opaque. It may be even with the surface and polished or it may be uneven and unpolished. In jewelry from Hungary or Russia, we find that the colored material is enclosed by metal at the sides, but there is none at the back. We can see the light through it.

If it has metal at the back we can sometimes see fine patterns drawn underneath the color which give it golden lights, while some French jewelry has an effect of gray and black and white and just the faintest color.

All of these varieties and their cheaper imitations are called "enameled" jewelry. The decoration is made of melted glass which is poured or spread upon the metal in very small quantities and then put into a

hot oven to be "fired," or hardened onto it. Enamel color is not on or under the glaze, but *in* it and it must be annealed to the surface of the metal.

### Enameling

The name enamel is given to any hard, glassy outer coating. Enamel may be a coating fused on glass, pottery, metal, or any mineral surface that will stand enough heat to fuse it, but when we say "an enamel" we mean enameled metal.

There are seven different kinds of enamel:

1. Cloisonné
2. Champlevé
3. Repoussé
4. Baisse Taille
5. Plique à Jour
6. Encrusted Enamel
7. Painted Enamel

### Cloisonné

The name cloisonné is the one we know best because so many beautiful pieces come to us from Japan and China, but cloisonné enamel was known in Eastern Europe fifteen hundred years ago.

According to one story, an early queen of the Byzantine kingdom brought enamellers with her from the East, but the Greeks and Romans also made cloisonné enamels.

Cloisonné is named from "cloisson," which means a wall. Enamel is melted glass poured on metal, and hardened in the fire. But the goldsmiths who invented cloisonné found that the paste would not remain evenly spread on the surface but would become thicker in some places and different colors would run together. Therefore, gold wire is soldered on the surface of the metal first and then the enamel is poured into the little cells which have been made. The wire walls hold the glass in place until it is fired. Sometimes a piece has twenty layers of thin glass and needs to be fired twenty times. Then, when the glass is even with the top of the wire, the surface is polished and only shows the fine lines of gold running through the color.

### Champlevé

Champlevé is made in a different way. Instead of soldering wires on top of the metal, the jeweler digs out troughs in it and thus makes the hollows into which the glass is poured.

Cloisonné is a goldsmith's method because gold is not only too precious to be wasted but it is a very soft metal and easy to handle. Champlevé was invented by men who worked in copper and bronze. They could use thicker pieces and did not object to losing a part of the metal.

Champlevé is sometimes used for gold and silver,

especially in India, but it is more often used for copper and bronze. Craftsman jewelry is usually *champlevé* or *repoussé*.

### **Repoussé**

*Repoussé* enamel is made by beating up the ground and filling in certain hollows with enamel. In both *champlevé* and *repoussé* the metal may be seen in broader surfaces than in *cloisonné*. The jeweled brooches in beaten copper and aluminum in Figure 5 illustrate different forms of *champlevé* and *repoussé* enamel work, showing the broad surfaces of metal.

### **Baisse Taille**

*Baisse taille* is a translucent enamel on a ground which has been chased or engraved in patterns which can be faintly seen through the color. Sometimes the uneven lower surface allows the enamel to be heavier in certain places which gives it a deeper color and a shaded effect.

### **Plique à Jour**

*Plique à Jour* is like a screen of metal with enamel in the spaces. It may be compared to a stained glass window as the enamel is held by the metal just as panes of stained glass are held by the leads. It is often called Russian enamel because it has been used so much in that country. It is like the open setting of



A



B



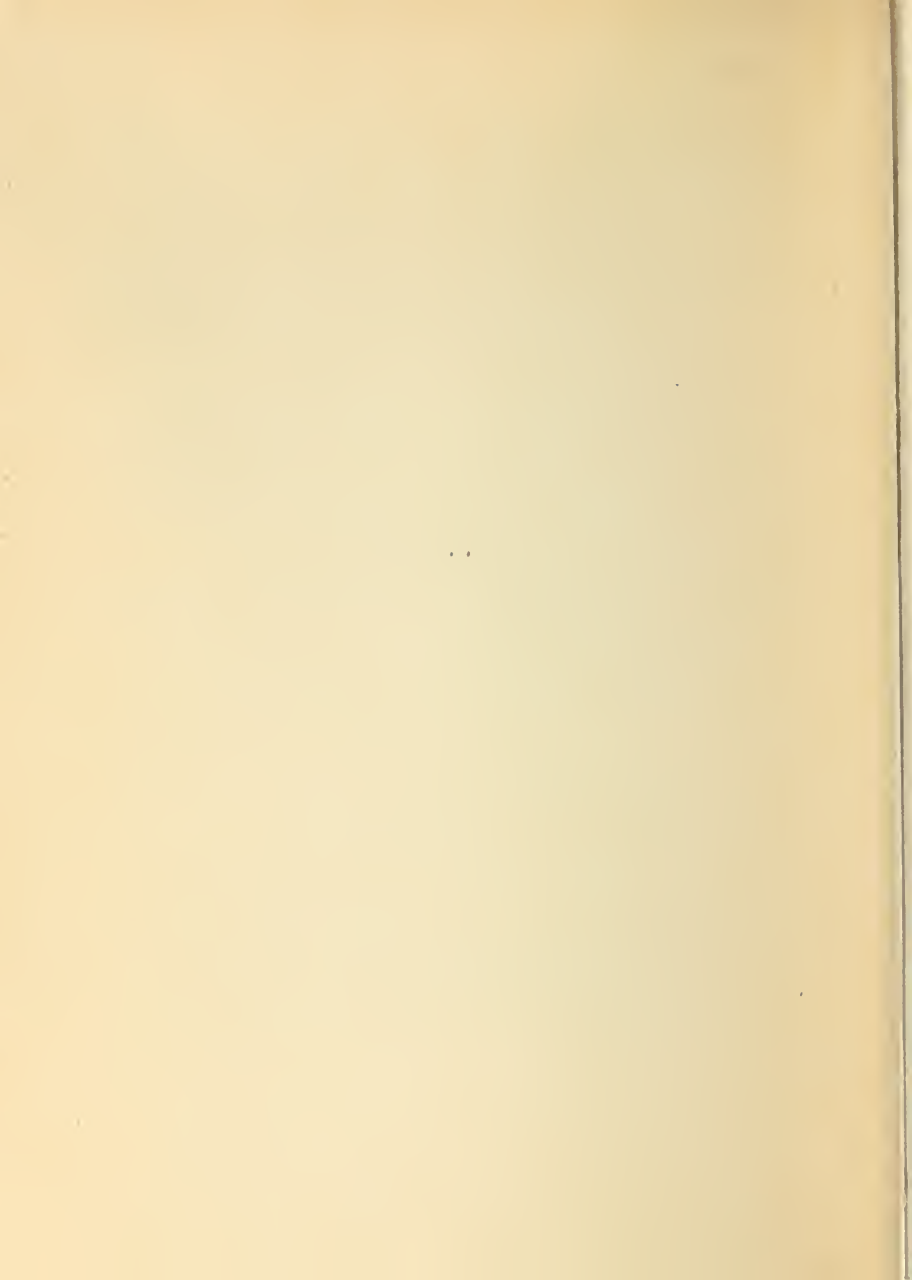
D



C

Courtesy of International Studio  
A and B—Beaten Copper. C and D—Beaten Aluminum

Figure 5. Jeweled Brooches





stones and, with the Russian wire enamel, made of twisted filigree wire, may have been brought from Persia as a substitute for the glass imitations of jewels.

### Encrusted Enamel

Encrusted enamel is a fused glass coating on a raised pattern. Sometimes the enamel covers the entire surface and sometimes appears in drops or beads producing a jeweled effect.

### Painted Enamel

Painted enamel reached perfection in France in the city of Limoges where there were in the fifteenth and sixteenth centuries great factories for the making of enamels of many kinds. The most famous of these were those painted "en grissaille," or gray produced by painting many layers of white on a dark background, the shading being produced by the various degrees of thickness of the color and by black lines or hatchings. Blue and green were used for the background as well as black. This kind of enameling is not much used today as people care more for rich warm tones.

### Enamel Colors

Enamel may be either opaque or translucent. Gold is the best background for translucent enamels as its brightness shines through and enriches them. Silver,

however, is often used and sometimes copper, brass, or alloys of gold and silver.

Opaque color may be enameled on any metal which can stand the heat of firing.

The color of the glass is due to metallic oxides, some of which leave the glass quite clear and others destroy its transparency. Different colors are produced not only by the kind of oxide but also by the degree of heat applied. Different enamels require different degrees of heat and the hardest must be fired first. There is always a risk in firing. The artist can never be quite sure that some accident will not spoil his work.

### Transparent Colors

The transparent colors are produced as follows:

Sapphire-blue	by cobalt
Turquoise-blue	by copper with soda base
Emerald-green	by copper
Brownish-green	by iron
Ruby-red	by copper protoxide
Rose-pink	by gold and tin
Pale-yellow	by silver
Brownish-yellow	by iron
Purple	by manganese
Black	by mixture

### Opaque Colors

For opaque colors iron is used for red; antimony, lead, and iron for yellow; chromium for green; and oxide of iron for white.

### History

The first use of enamel was probably to take the place of precious stones or of colored glass in imitation of stones. The Hungarian and Russian enamels still show by their size, shape, and variety of colors that this was their original purpose.

The Egyptians did not make true enamels but they used colored glass inserted in gold and stone. The Greeks soldered designs in gold wire on their jewelry and vases and afterwards filled the hollows with enamel.

Germany and France have done enameling for many centuries as well as the countries farther east. Champlevé is said by some to have originated in Ireland where many arts were practiced during the early Christian centuries. Limoges, France, was the most celebrated center for enamels.

Modern enamels could be as beautiful as the older ones but workmen are not so willing to devote the length of time necessary to make their work perfect.

## Chapter XV

### DESIGN IN JEWELRY

#### Importance of Design in Jewelry

Design is becoming an increasingly important matter in the making and choosing of jewelry. The time has passed when a quantity of showy stones crowded together without thought of design or arrangement can be considered beautiful.

Jewelers are returning to the older styles of goldsmith's work in which precious stones or enamel become a part of a beautiful pattern.

Some manufacturing jewelers make a specialty of resetting the stones from jewelry made a few years ago, when designs were heavy and meaningless. One jeweler's catalogue says: "Never before has Dame Fashion been so exacting in her demands that jewelry shall possess true artistic merit as well as commercial value."

#### Relation of Design to Material and Purpose

The jewelry designer must consider three things:

1. His material.
2. The use of the article.

### 3. Beauty of form and workmanship.

Designs in metal differ from those in stone or wood or cloth because metal must be handled in a special way and also because metal has peculiar beauties which should be brought out by the design.

The color of the precious metals, their lustrous surface, the forms which they take when melted or drawn out into wire, are all important to the designer.

The use to which the article is to be put also affects the design. Designs for pendants should be different from those for rings and long chains are not made after the same patterns as necklaces.

Those who are constantly handling jewelry will find it fascinating to study different types of design and to discover for themselves why some pieces seem to grow more beautiful as they are better known, while others which at first seemed attractive after a while become tiresome and tawdry. They will sometimes find that the design is inappropriate for its use; sometimes that it is badly balanced or sprawling or heavy instead of light, graceful, and beautifully proportioned.

Platinum, gold, and silver are all dense, or fine grained. All are soft. Gold and silver melt at a moderate temperature but platinum requires intense heat. One may, therefore, see wire or filigree jewelry in all these metals, but grains are only found in the gold and silver.

Some of the greatest goldsmiths in the world have built up their designs from wire and rings and the round or flattened grains, which seem to form themselves into beautiful patterns almost without effort. Jewelers make "units of design" by cutting wire into small pieces and bending them into fancy shapes. One designer<sup>1</sup> gives 700 different forms which can be made from pieces of wire an inch long. These tiny pieces can be combined in chains or shaped into ornaments to form rhythmic patterns more easily than they could be drawn on paper.

Filigree jewelry is like lace work, yet the tiny wires are not quite like threads of lace. Their stiffness suggests a different kind of material and their luster gives an added beauty.

The color and luster of metals add greatly to the variety and beauty of design. Polished surfaces reflect white or colored light in such a way as to give not only brightness but different tones of color in the different planes of surface. The deeper, concave parts of gold ornaments look redder than the convex parts. One of the greatest charms of wire or filigree ornaments is the play of light on the fine twists and coils.

Modeling, casting, and chasing also give this variety of color and brightness and, if finely finished, the work seems to need no further decoration.

<sup>1</sup> R. L. B. Rathbone.

### Use of Gems in Design

Precious stones or enamel, however, usually complete the ornament. They can be used vulgarly, that is, without any thought except to display the size of the stone, or their beauty may be increased many times by art in cutting and setting. An irregular or imperfect stone which forms part of an artistic design is far more beautiful than a perfectly regular stone in a setting which has no character. Figures 2 and 3 illustrate good and poor use of precious stones in a design.

Sometimes individual stones are so large and so beautiful that the jeweler fears to add anything in the way of goldsmith's work but even such splendid gems will shine more brilliantly against a background of appropriate enamel, chasing, or modeling which give depth, contrast, and variety. In this case the color and design of the background should lead up to the principal feature and not away from it.

A diamond should not be surrounded by brightly colored stones as their color distracts attention. It may be most effectively displayed against dark blue enamel or black onyx as the dark, retreating colors give it depth and contrast. Platinum forms a more beautiful background for diamonds than gold because its bluish-white brilliancy reflects and increases the same characteristic in the stone.

Nearly all colored stones gain in beauty by being sur-

rounded by diamonds, because the clear, white stones do not call attention from the colored ones but apparently add to their luster. Sapphire and pearl jewelry is particularly rich in effect because of the contrast between the rich blue and the pearl-white.

### **Form and Line in Design**

The one feature of design which is most important yet least understood by the makers of our commercial jewelry is beauty of form and line in the construction of ornaments.

A straight line is the simplest form but the hardest to make beautiful. Bar pins may be artistic because they have beautiful detail in the decoration, but many of them are simply stupid even if they are set with a row of fine stones.

### **Curves**

Curving lines are more graceful, but they may be sprawling and not restful. *L'Art Nouveau* jewelry often has beautiful lines and forms in it but the general impression is not satisfactory. It lacks dignity because it seems to wander without a proper sense of balance and restraint.

### **The Foundation of Good Design**

Good design must first be built on a well-proportioned geometrical figure as a foundation. The lines of this



figure may not show but they must be in the artist's mind. Even the bar pin, if it is designed at all, must be treated not as a simple line but as a narrow rectangle.

The most common figures are the circle, square, oblong, diamond, and ellipse, all of which may have irregular edges or be bent in such a way as to suggest a variety of shapes. Heart shapes are only modified triangles and crosses are made of two oblongs. Flower designs and scroll patterns, properly proportioned, will be seen to fit into a geometrical framework, and even horseshoes and wish-bones, which are happily less common than they used to be, owe their attraction to their graceful elliptical shapes rather than to their suggestions of horses or chickens.

The French comb shown in the Frontispiece is an example of perfection of balance in a design. The geometrical figure upon which the design is built is an equal-sided triangle. However, the graceful curves do not follow the line so closely as to seem stiff. This comb also illustrates the effective use of gems in completing a design.

Pendants are more graceful when the length is greater than the width. Pear shapes, which are ellipses drawn out to a point, as well as crosses and dropping ornaments which give a long pointed effect, are beautiful when they emphasize the fact that they are hang-

ing ornaments. The elongated shape is better for scarf-pins because it suggests vertical lines which correspond with the general lines of the tie.

Brooches and rings with a markedly pointed effect are less satisfactory. The abnormally long marquise rings worn a few years ago looked badly proportioned and uncomfortable. For both brooches and rings, radiating designs are best, although designs moving around the border are also good.

### Types of Decoration

The motives or elements of decorative design may be either natural, conventional, or abstract.

Natural designs imitate nature as much as the material will permit.

Conventional designs suggest nature but are simplified and adapted to the purpose of the ornament or the pattern.

Abstract designs are made up of repeated lines and patterns which have no intentional resemblance to natural forms, though sometimes it is hard to draw a clear line between very much conventionalized nature and abstract patterns.

Natural designs in jewelry are such ornaments as coral roses, ivory jewelry tinted in the natural colors, or flowers, birds, and insects enameled to imitate nature. Such jewelry, however, is usually of the novelty type.

Fine jewelry is more or less conventionalized even when it suggests nature. There is something a little bizarre in trying to represent so fragile a thing as a flower in hard metal and stone. The designer therefore makes his rose or butterfly exquisite in its own way but does not try to change the character of his material. Figure 6 is an example of a design in which the flower and leaf forms have been well-adapted to the material.

He must know his plant well in order to simplify it without losing all its character. Too often the reason that designs suggest no definite flower or leaf is that the artist has not studied the one he wishes to represent in such a way as to bring out its characteristics.

### Elements of a Design

Pattern designs are made up of lines, forms, and spaces.

1. There must be a center of interest. In jewelry this may be a precious stone or some feature of the workmanship.

2. The pattern should be well-distributed and have proper balance. One side, for instance, should not seem too heavy for the other. It should follow the shape of the ornament.

3. The parts of the design must harmonize and be well bound together. It should not be too much broken

up, and if the ornament has several sections some feature of the design should cross from one to the other. Designs may radiate from the center outward or from the rim toward the center. They may move around the border — with attention on the outer edge, with attention on the inner edge, or with attention equally divided.

The kinds of lines to be used depend on the use and shape of the ornament as well as on its material. Filigree and enamel work have fine tracteries, while modeled or carved work, cameos or intaglios, have bolder outlines. Straight lines steady a design while curving lines give it grace and lightness. Formality adds dignity to design.

### Design in Different Countries

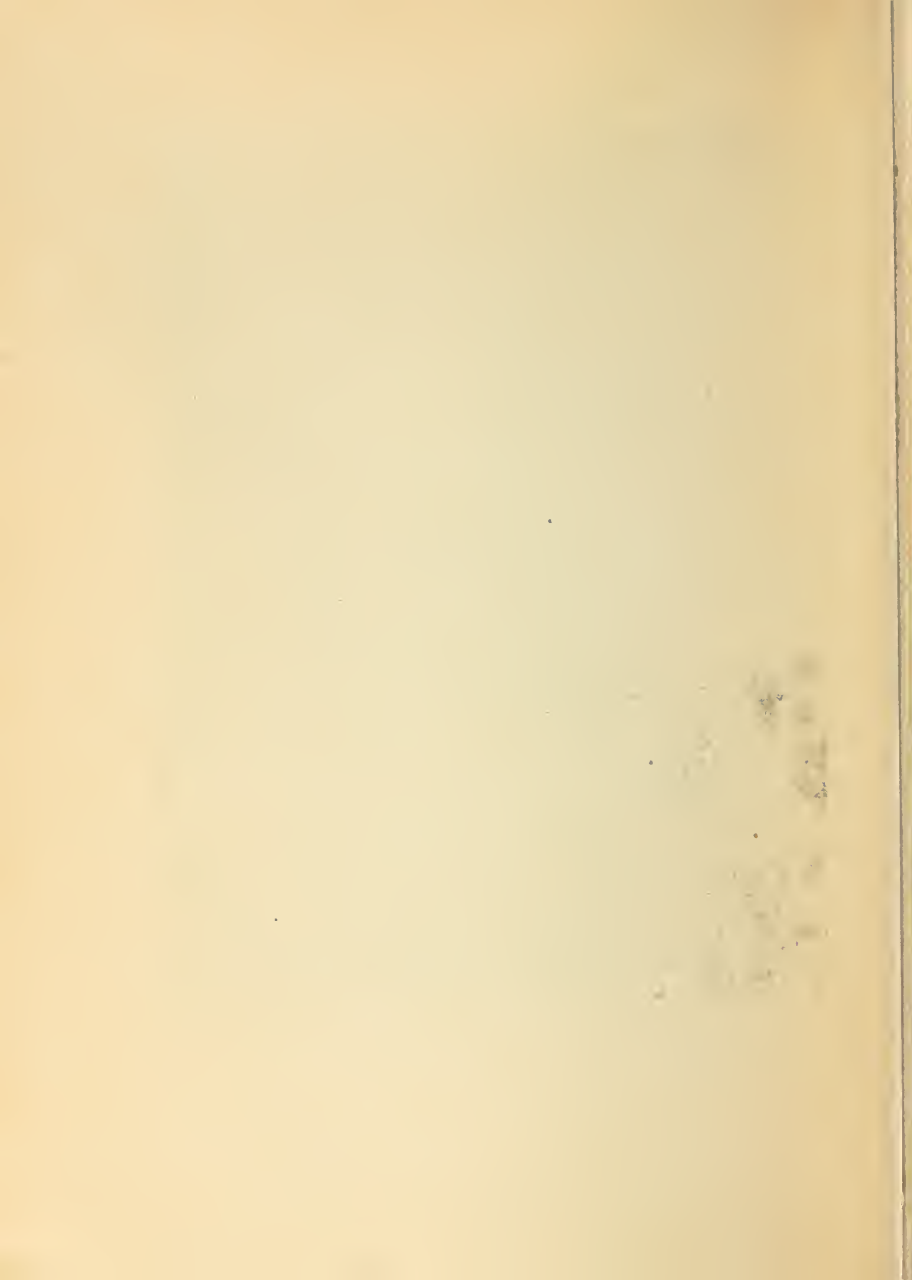
Masters of decorative design were found in the East — in Persia, Syria, India, and Damascus. The artists of the Far East have been careful followers of tradition and have rigidly obeyed the rules of art as they were worked out by earlier craftsmen. Their lines are smooth and flowing and their details perfect.

Japanese art is very naturalistic and often rugged. The older art is wonderfully beautiful as the Japanese are most keenly alive to the subtle beauty of natural forms. They represent in art fine differences in texture and in form which other people have not noticed.



Courtesy of International Studio

Figure 6. Necklace and Earrings of Brilliants (Austrian Design)



Chinese art is more conventional. The designs are more purely ornamental and not so close to nature. The Chinese have not allowed their art to be cheapened to suit Western demands as the Japanese have, but both these countries have lost something characteristic.

Of Byzantine design, which is the background of Russian and Italian jewelry, Walter Crane says: "Whether in building, carving, mosaic, or goldsmith's work, it impresses one with a certain restraint in the midst of its splendor; a certain controlling dignity and reserve appears to be expressed even in the use of the most beautiful materials as well as in design and the treatment of form."

Egyptian art is being revived in the figures of the scarab or winged beetle. It always has dignity and orderly simplicity.

Benvenuto Cellini was a very noted Italian goldsmith and artist of the sixteenth century. Writing of the Italian designers he says: "In Italy we have several different ways of designing foliage: the Lombards, for example, construct very beautiful patterns by copying the leaves of briony and ivy in exquisite curves; the Tuscans and Romans . . . imitate the leaves of the acanthus with its stalks and flowers curling in divers wavy lines, and into these arabesques one may excellently well insert the figures of little birds and different animals." The Italians excel in mosaics and

cameo cutting as the French have always excelled in enamel work.

One of the most delightful writers on jewelry and jewelry-making was the old monk, Theophilus, who lived in the eleventh century. He told designers that they must be very humble and look to God for inspiration. This chapter may well close with his quaint words: "Whatsoever thou art able to learn, understand, or devise in the arts is administered to thee by the grace of the sevenfold spirit, the Spirit of Wisdom, the Spirit of Understanding, the Spirit of Counsel, the Spirit of Fortitude, the Spirit of Piety, and the Spirit of Fear of the Lord."



## Part IV—Articles of Jewelry

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### Chapter XVI

#### STANDARD ARTICLES

##### Rings

Rings are the most typical and common forms of ornamental jewelry. They may be of several varieties:

1. A cylindrical band, plain like a wedding ring, or carved and set with stones or otherwise ornamented.
2. The upper side broadened for ornament, usually with stones.
3. Spiral or serpentine form with several coils.
4. Signet ring.
5. Open on one side.

Wedding rings are sometimes cut from a bar of metal in order that they may be equally strong at every point. Other simple band rings are made by soldering the ends of wire together.

The broad top type may be made by flattening the

band or soldering on another piece. Gem settings are usually put on in this way.

When open on one side, the ends of the wire are carved in ornamental shapes. Spiral rings are coiled wire.

A cheaper method of making rings is to stamp the metal with a die or to melt it and run it into molds.

Rings for men are heavier than those for women and when set with gems and stones are usually set lower, sometimes having the top of the stone little above the surrounding metal. Men's rings are sometimes encrusted with small stones forming part of a design. Signet rings, rings bearing the emblems of masonic or fraternal orders, and class rings of special design are more common than those worn merely for ornament.

### **Pins**

The pin serves a useful as well as an ornamental purpose. There are three general types:

1. The scarf pin, which has a stem pointed at one end and a knob or ornament at the other.
2. The brooch or safety pin, which has two parts. The upper part is of various shapes, usually ornamented. The pin is attached on the under side by a hinge or spring and fits into a catch or sheath at the other end.

### 3. Double pins, which are connected by chains.

Scarf pins are generally made of round gold or silver wire. The wire may be steel or brass plated with gold or silver, but if it is solid, the head or ornamental top may be shaped from the end of the wire. Usually the top is soldered on. The shape of the top is more often rounded or conical than flat.

Brooches and bar pins may be round, oval, oblong discs or various fanciful shapes. Pins for lingerie or collars are simple in shape and design, but brooches offer an unlimited field for decoration with goldsmiths' work, gems, or enamel.

Pins were used in ancient times in place of buttons for holding the folds of garments together and resembled buttons in shape.

Hairpins are split into two prongs. Those found in the Jewelry Department may be of tortoise shell, perhaps carved and ornamented, or of horn or shell with gold, silver, or jeweled tops.

## Chains

Chains are of two general types :

1. Chains made of finely twisted or plaited wires.
2. Chains made of links, balls, or small pieces joined together.

Twisted and plaited chains are made flexible by the twist of the wire which acts as a spring.

Link chains have pieces or sections in endless variety. The principal ones are :

1. The cable link, an ordinary oval or round ring.
2. The curb link, the cable link twisted. An open curb has the sides pushed slightly together. A close curb has the sides pushed close together. Trace links have the curb elongated.

These may be modified or ornamented by hammering or chasing.

Fancy chains are made with bent, coiled, and twisted pieces of wire made into small patterns and connected by rings. Ball or bead chains are also made by stringing perforated balls on a flexible wire.

There are three types of men's watch chains.

In one type the chain is worn across the vest, between the two pockets. On one end there is a swivel for the watch, and on the other a spring ring for a knife, cigar cutter, etc. This is a very popular style.

Another type also has a swivel on one end and a spring ring on the other, but in the center of the chain there is a bar for holding the chain in the vest buttonhole, and a drop chain for a charm.

The third style goes to one pocket only and has a bar for attaching to the vest buttonhole and the drop chain for the charm.

The links or sections of ordinary chains are made

and put together by machinery but hand-made chains are stronger because of the annealing of the wire.

### Necklaces

Necklaces are made in four general forms:

1. The close fitting collar-like band made of numerous stones, beads, filigree, or ornamental tablets.
2. The chain with single pendant as the lavalier.
3. A row of beads, usually graduated in size, on a wire or chain. The beads may be of stones, as pearls, amethysts, amber, coral, or of plain or filigree gold.
4. Several chains or strings of different lengths worn one above the other.

The pearls used for pearl necklaces may be large or small and may be either graduated or of equal size. The clasps may be studded with diamonds or other precious stones, but otherwise the pearl necklace is an example of perfect simplicity. The gems are pierced and strung on a wire or cord without pendants or ornamental treatment of any kind. Chains for lognettes or fans which are made of seed pearls may have small diamonds or other stones set between.

Unless made of pearls or ornamental beads, necklaces almost always have pendants. The chain is often

very light and simple; all the attention is directed to the pendant or row of pendants.

Clasps for necklaces are either spring rings or barrel clasps.

### Pendants

Pendants may be suspended from any kind of chain or ornament, but are most used for necklaces. There are many kinds, among them :

1. The locket to hold a picture.
2. The miniature.
3. The cross or medallion.
4. Single gems or cameos.
5. Lavalier ornaments.

This list does not exhaust the possibilities of the pendant as it is the thing upon which the goldsmith may use his greatest skill.

The locket may be plain or ornamented with precious stones or enamel. It may have but one piece or be made in two parts hinged and clasped together.

The miniature is painted on ivory or porcelain and usually set with small brilliants which make it very ornamental.

The cross is a favorite form of pendant, although its religious meaning is often forgotten in the ornamentation and the gems with which it is set. Medallions

or other more massive pendants are ornamented with enamel, gems, or pearls.

Single gems or cameos form beautiful pendants when hung on slender chains.

Lavaliere ornaments which are named for a famous French beauty, are the most popular form of pendants at this time. They are made of very delicate filigree work of beautiful design and set with precious stones. The lavaliere pendant is an effort on the part of jewelers to make the goldsmith's work contribute to the beauty of the stones instead of merely forming a background.

Necklaces and pendants are most popular when fashion decrees the open neck style of dress, which requires some little ornament at the neck.

### **Bracelets**

Bracelets are rings worn on the arm. They may be :

1. Closed rings or bands.
2. Open on one side.
3. Spiral coils.
4. Hinged and closed with a clasp.
5. Flexible bands made of links.

The simplest form is the closed ring which is made of wire or tubing drawn through a draw plate to the desired size. After annealing it is bent into shape and the ends soldered together.

The open bracelet is made in the same way but the ends are finished and ornamented instead of being soldered together.

Spiral coils are also made of wire and are usually finished with a serpent's head.

Hinged bracelets are usually made of tubing though they may also be solid. They are made in two pieces connected with a hinge at one side and with a hook or clasp at the other.

Flexible bracelets are made of links or tablets so connected that they may be bent at each joint. The flexible bracelets made for wrist watches have springs in each of the sections so that they may be pulled apart when drawn over the hand.

Bracelet makers buy the wire tubing already drawn and then cut, join, and design the bracelet as they wish.

### Earrings

Earrings are ornaments for the ears. They are of two kinds:

1. Ornaments which are set against the lobe of the ear.
2. Hanging drops or pendants.

The use of earrings was formerly supposed to require the piercing of the ears and as this was considered a barbarous custom, earrings went out of fashion, but at present, by means of a fine screw at the back of



the ring they are quite secure and therefore the fashion has revived.

The favorite form for the ornament set closely against the ear is the single large pearl, either real or artificial. Pendant earrings have a tendency to be long and rather oriental in effect.

### Collar Buttons

Collar buttons differ in the length of post and shape and size of the head.

For the front of the collar a longer post is required than for the back.

The head may be ball-shaped, dome-shaped, or elongated. The latter type is very useful in holding the necktie in place in the back.

The buttons made in one piece are very strong. The soldered ones are more liable to break.

### Cuff-Links

Cuff-links are of two varieties :

Stiff bar buttons have ends of unequal size, connected by a stiff bar. The end which does not show is usually bean-shaped to enable it to be inserted easily. These are very strong, especially suitable for use in stiff cuffs.

Loose links, with the two ends alike, are joined by flexible connections. These may be worn in all styles of cuffs, and are especially desirable for the soft styles.

Cuff-links for evening wear are of mother-of-pearl, either all pearl, or with a tiny rim of platinum or gold.

### **Studs and Vest Buttons**

Studs are of two varieties:

Rigid, like small collar buttons, the backs being smaller and the posts shorter than in the regular collar button.

Flexible, small balls of gold or mother-of-pearl mounted on an adjustable back.

Vest buttons made of mother-of-pearl for wear in white vests are mounted on adjustable backs.

### **Evening Sets for Men**

Evening sets for men are made of mother-of-pearl and consist of either studs and links, or studs, links, and vest buttons.

### **Other Articles**

Many other little articles are found in the Jewelry Department which are affected by changing fashions.

Buckles and clasps for belts and metal girdles are made of gold and silver and often beautifully carved and ornamented with precious stones or enamel.

Smelling bottles, powder boxes, chatelaines for holding a number of small articles, and other trifles are always subjects of interest.

## Chapter XVII

### FANS

#### Types of Fans

One of the sections of the Jewelry Department is usually devoted to fans. Their ornamental character and the beautiful materials of which the finer ones are made suggest this department as the natural place for their display.

The principal types of fans used today are:

1. The Fixed
2. The Radial
3. The Brise or lamellar
4. The Folding

The fixed fan has a leaf immovably fastened to the stick. It is usually found in the simpler materials, such as the palm leaf fan or those made of printed gauze.

The radial fan is made of a strip of material pleated together and fastened to the handle with a pin so that when spread out it forms a circle with this pin at the center.

The Brise or lamellar fan is made of strips or blades

of thin wood or other stiff material fastened together at one end. When folded it forms a narrow oblong; open, a semicircle. The free ends of the sticks are laced together with ribbon or cord.

The folding fan has sticks or blades similar to the lamellar, but with a folded strip of paper, silk, or other material connecting the blades and extending about half the depth of the fan. When opened out this folded piece forms the leaf of the fan.

### Materials

The sticks of fans are made of wood, ivory, bone, celluloid, tortoise shell, and mother-of-pearl. Most of these materials are described elsewhere in this manual. The wood used is light and easily splintered, except sandalwood, which is close grained, may be exquisitely carved, and has a delicate and permanent fragrance. Mother-of-pearl is composed of calcium carbonate, the same substance as the pearl. It is the inside surface of many varieties of seashells and occurs in the most beautiful iridescent colors. The pieces are usually cut in very thin layers which are glued or cemented to the wood forming the foundation.

The leaf of the fan may be made of gauze, silk, or satin, specially prepared skins, as parchment, vellum, kid (sometimes called chicken skin), of lace, quills or ostrich feathers, or of paper. These materials are all

described in the manuals for the Stationery, Silk, or Leather Goods departments.

### Manufacture

Paper fans are made chiefly in Japan and China. Labor is so cheap in these countries and the workmen have become such adepts in handling the thin light wood, in making the tough rice paper, and in sketching their effective designs that other countries do not try to compete with them. The Japanese also make many fans of gauze and the Chinese of ivory and sandalwood exquisitely carved.

France is the European country from which we have obtained the greatest number of fans. Watteau and other French artists excelled in painting miniatures and other beautiful pictures upon them. The French have also made fans of lace, of embroidered and spangled gauze or silk, and have set mirrors in them. Vernis Martin invented the fine varnish or lacquer which is used on certain fans of the Brise type.

We have also Spanish, Italian, and English fans decorated characteristically with painting, gilding, and etching or printing.

The design of the lace fan shown in Figure 7 has many excellent features. The floral pattern is conventionalized in such a way that the flower form is preserved, and yet, at the same time, is well-adapted

to the material. The design is also so proportioned that it is effective, that is, does not appear fragmentary when the fan is only partly spread.

### History

The fan originated in hot countries where it was used as a shield from the sun as well as for the purpose of creating a current of air and brushing away insects. It was a badge of rank and a luxury, and was usually carried and swung by slaves. On ceremonial occasions fans were carried by poles as flags or banners. These ceremonial fans were very large with long handles or standards beautifully decorated. The Egyptians used fans made of ostrich feathers; in India the feathers were from the peacock; in China, fans were sawed out of ivory nearly a thousand years B. C., the works being within the palace at Peking. Oriental fans had beautiful handles of gold and silver filigree, enamel, tortoise shell, and mother-of-pearl.

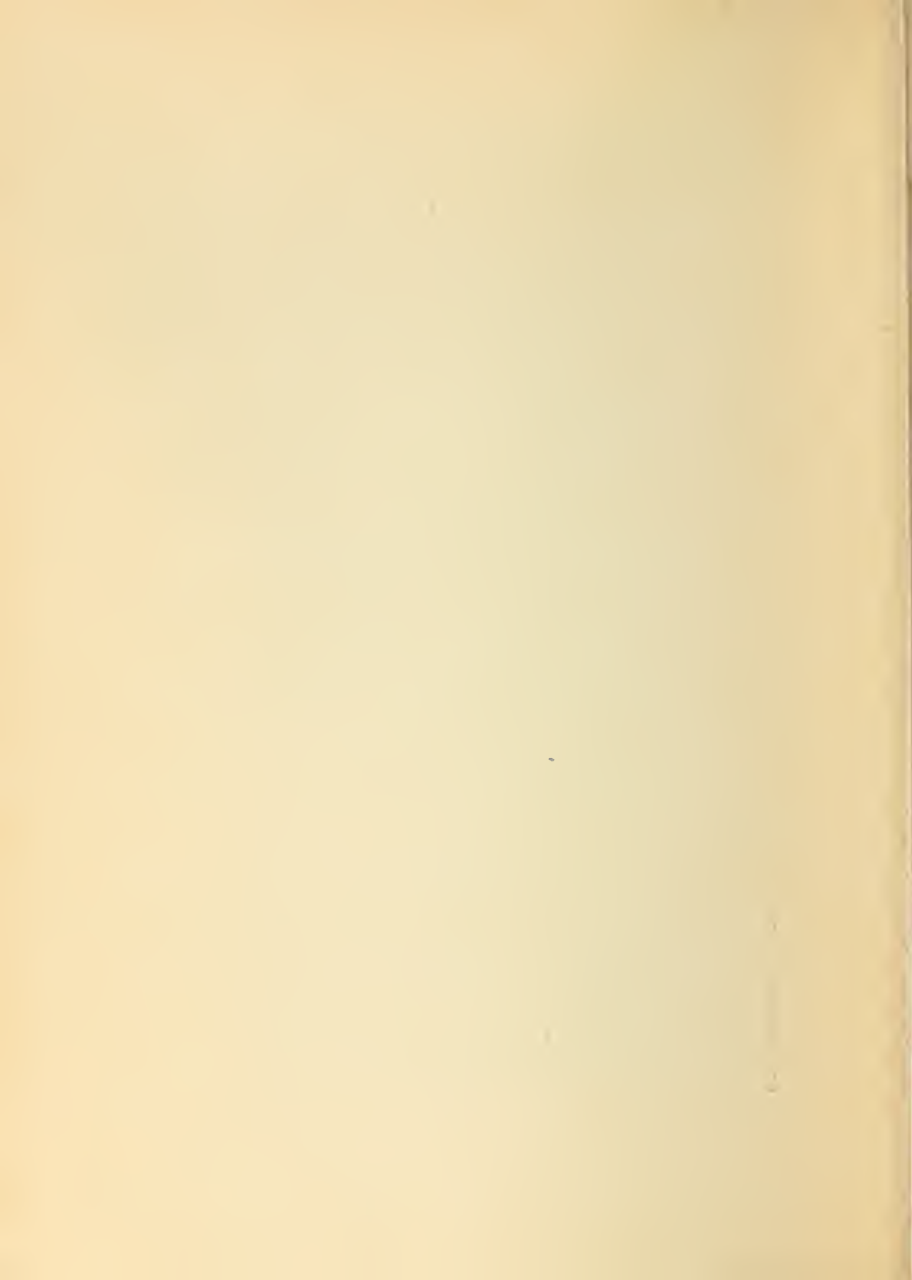
Spanish women have been noted for their coquettish use of the fan which is made by them to speak a sort of sign language. The Spanish fan may vary from an exceedingly small to a very large size.

The North American Indians use fans made of eagles' feathers.



Courtesy of International Studio

Figure 7. Design for Lace Fan





## Chapter XVIII

### COMBS AND HAIR ORNAMENTS

#### Types

Combs and barrettes are used to ornament the hair as well as to hold it in place. They may be classed as :

1. Back-combs
2. Side-combs
3. Ornamental hairpins
4. Bandeaux
5. Barrettes

Hair ornaments and combs are made of tortoise shell, amber, jet, silver, silverite (a composition metal), celluloid, and hard rubber. They may be ornamented with gold, silver, enamel, precious stones, and imitation stones. They are made in many shapes and sizes and form a large division of the Jewelry Department materials. The styles vary with the prevailing fashion for dressing the hair.

#### Tortoise Shell

Real or imitation tortoise shell is the most approved material for the foundation of all hair ornaments.

Tortoise shell is composed of the scales or outer shell of the hawksbill turtle which grows to a very large size. The color is brown or amber, more or less mottled or clouded. Clear amber shells are the most valuable and the red brown comes next. The dark brown shells sell for less than half the price of the amber. After the plates have been removed from the turtle's back the animal is put back in the water.

The best tortoise shell is found in the Indian Ocean but the center of the tortoise shell industry is Naples, Italy. There and in some other Italian towns the shells are scraped with knives and files and polished with olive oil or rottenstone. The scales are then softened by boiling them in oil or water and molded into shape. They may be welded together after being boiled, by the pressure of hot irons.

Tortoise shell has been used for ornamental purposes for many centuries.

Tortoise shell may be imitated in horn or celluloid, but the imitations lack the brilliant polish and clear color of the real shell.

### **Amber**

See Chapter IX, "Description of Stones," for a description of amber. Amber combs are very effective and beautiful for golden hair.

## Jet

Jet is a form of dense coal, tougher and more compact than common coal, which can be carved and polished. It is also called black amber because it produces electricity when rubbed. The softer kinds are sometimes called bastard jet. The finest varieties of jet come from Whitby, England. Some of it is mined but at times it is washed up on the shore near Whitby. Jet is also found in Spain but it is not so lustrous or so durable. Spanish jet contains sulphur which is affected by extreme heat and cold and will chip and break.

Rough jet is covered with a hard blue or brown shell which must be removed with a large chisel. The block is then sawed into pieces of the required size. These are shaped on a grindstone, and the surfaces ground, after which they are ready to be carved. Beads, heads of hat pins, etc., are made from the smaller pieces, although Spanish jet is more commonly used for such articles.

Jet is spoken of in old Saxon poetry and was used for beads, buttons, and other kinds of jewelry before the Romans conquered Britain. It was used for rosaries by the priests of Whitby Abbey probably as early as the fourteenth century, and in 1598 there was a regular trade in jet.

### Horn

Horn, as its name implies, comes from the horns of the ox, buffalo, sheep, and goat. It may resemble tortoise shell and is used as a substitute for it, but it is less brilliant and more brittle so that it cannot be carved. Horn has streaks of color and mottled spots which are often beautiful in their shading.

### Celluloid

Celluloid is composed of vegetable fiber, cellulose, which has been treated with acids, camphor, and other substances until it has become plastic and capable of being molded into permanent forms. While it is still soft it may be colored to imitate ivory, amber, shell, horn, or even pearl.

For imitation tortoise shell, the mass is dyed a light yellowish-brown and then sprayed with color in spots, or thin sheets of different colors are passed under heated rolls which blend them together. Sometimes it is colored by hand.

For amber, yellow dyestuff is dissolved in the solution of camphor used in the process. Translucent or opaque patches of natural color are imitated by rolling small pieces of the deeper colored material with the amber-colored sheets.

The effect of horn is given by building up layers of celluloid sheets having spots, colors, and lines in them,

and by heat and pressure combining them into a variegated mass which can then be carved or molded.

### Manufacture of Combs

Like all other processes, that of making combs, cutting the teeth, welding the parts together, and decorating them, was originally done by hand. The first machine for making combs was invented in 1798. The teeth were then cut by a fine saw, but in 1814 a machine was invented to cut combs at one operation. Some machinery is so delicate that it will cut one hundred teeth to an inch.

The tops of tortoise shell and amber combs and barrettes are often beautifully carved. This is especially the case when large Spanish combs are in fashion. Celluloid is pressed to look like carving. Gold, rhinestones, and silver filigree and enamel are also used but rhinestones are the most popular decorations because of their brilliance which is shown to the greatest advantage against dark hair. Cut steel is less brilliant though it also makes a glittering decoration.

Because of their plastic material, combs of all these materials can be mended by welding the pieces together under heat and pressure.

### History

Combs made of boxwood were used among the Egyptians. The ancient wooden combs shown in

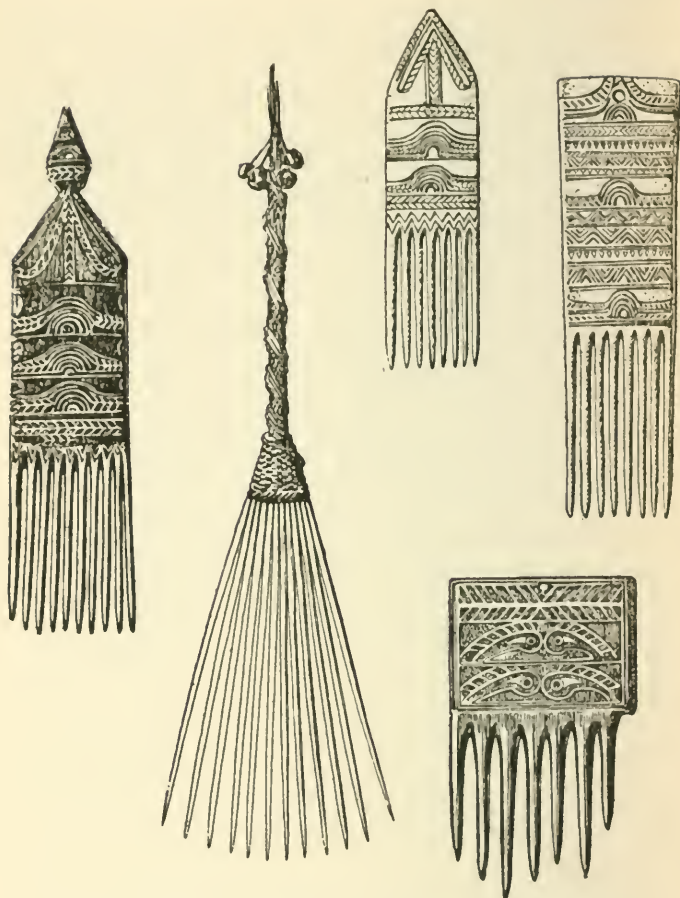


Figure 8. Primitive Wooden Combs  
(Courtesy of International Studio)

Figure 8 are illustrations of this type. Roman ladies plaited and crimped their hair and filled it with ornaments. During the Middle Ages combs were made of ivory, precious metals, and horn handsomely carved and decorated with jewels. In Spain and Mexico the comb is the most elaborate ornament of women. These combs are very large and costly as they are carved in the most exquisite lacelike filigree. The first factory in the United States for the making of horn combs was opened at West Newbury, Mass., in 1759.

## Chapter XIX

### HISTORY OF JEWELRY

#### **Jewelry Among Savage Tribes**

One of the first signs that men have developed a sense of beauty is their desire for decoration. Even the lowest groups of savages paint their bodies and wear strings of beads, stones, or other ornaments. Their tools may be very crude and their clothing scanty, but they find some way of making themselves attractive in their own eyes. Early metal workers were largely engaged in making ornaments as well as useful articles, and these ornaments were usually worn by men rather than by women.

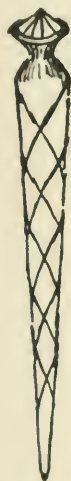
#### **In Ancient History**

We cannot read any accounts of the life of ancient people without finding descriptions of their jewelry, and when buried treasures are dug up from the ruins of ancient cities the remnants of jewelry are among the most frequent discoveries.

Egyptian jewelers had attained a high degree of skill in the handling of the precious metals and in carving



precious stones. All oriental countries have paid much attention to jewelry. Oriental beauties are loaded with



Irish Pin



Graeco-Roman



Egyptian Hairpin

Figure 9. Ancient Pins

rings, bracelets, chains, and ankle ornaments. Greek jewelry was as perfect in form and proportion as other ornaments. The Greeks excelled in embossing, engraving, and filigree work. Roman jewelry was heavier, with less grace and more magnificence. The pins in Figure 9 illustrate the characteristics of jewelry of these various periods.

The peasants of European countries have kept the old types of silver and gold jewelry which have been handed down for many generations and are often very quaint and of fine workmanship, though much of it is rather monotonous, because of the repetition of a few traditional designs.

Renaissance jewelry was very gorgeous and elaborately ornamented with enamel and precious stones. It was often worked up in symbolic designs of large size and many parts.

### **Centers of Modern Industry**

London and Paris have been the centers of jewelry manufacture, but large amounts of cheap jewelry are now made in various parts of England, France, and Germany. Garnet jewelry is made at Prague, filigree work and mosaics at Florence, Venice, and Rome, while tortoise shell jewelry is made in Naples, Rome, and Florence. Holland has been the center of the diamond-cutting industry, but diamonds are now cut in America. A large part of the solid and plated jewelry used in this country is manufactured here, the center of the industry being the New England States.

### **History of American Jewelry**

The use of jewelry was not approved by our Puritan forefathers, and gold and silversmiths were only al-

lowed to make belt buckles and shoe buckles for men and wedding rings and simple brooches for women. Today Massachusetts, Rhode Island, and Connecticut make a large percentage of the jewelry and ornamental silverware for the entire country.

Nehemiah Dodge was the pioneer among American jewelers. He began to manufacture jewelry in 1794, at first making ornaments from 18 karat gold. Later he introduced rolled plate by which he soldered a thin sheet of gold on a thicker sheet of copper and then hammered and rolled the combined sheet still thinner.

He was able to reduce the cost of manufacture and therefore began to sell jewelry to other goldsmiths, becoming the first manufacturing jeweler. Out of this enterprise grew the great jewelry industry, centering in Providence, R. I., and in Attleboro, Mass. Jabez Gorham, the founder of the Gorham Company, was apprenticed to Dodge.

In 1821 filigree jewelry was introduced by a Frenchman. In 1846 Thomas H. Lane, who came to Providence from Birmingham, England, began to make rolled plate by sweating the thin sheet on the base metal instead of soldering it on. This method was simpler, better, and more economical than the soldering process.

The discovery of gold in California added a strong impetus to the manufacture of jewelry. The Civil

War checked it for a time, but it has had a steady growth for the past forty years.

### History of Various Articles

The history of different articles of jewelry is most interesting as it is connected with religious and social customs and political history.

Brooches and pins were necessary for holding garments together, as they were used before buttons. The brooch is merely an ornamented safety pin, while the more simple stick-pin is only a development from the thorn, which savages used for holding things together.

Rings are among the most ancient ornaments, often having a religious or mystical meaning. Signet or seal rings are of oriental origin, but were also used by the Romans to seal documents. Engagement or betrothal rings were originally large and curiously wrought. The custom of wearing them on the third finger of the left hand is supposed to have originated in the belief that a vein ran from that finger directly to the heart. They were only worn at the ceremony and then kept as mementos. Wedding rings were also highly decorated. They are of very ancient origin. The use of wedding rings was considered a pagan custom, and was not adopted by Christians until about 860 A. D.

Chains of massive links were worn by kings and

nobles until a comparatively recent period. They were considered one of the badges of rank. Bracelets and ankle ornaments have always been worn in profusion by women in oriental countries. At one time a broad band of gold worn on the upper part of the arm was considered a suitable ornament for men.

The use of elaborate jewelry is no longer considered good form for men and jewelry for women is tending more toward artistic and dainty designs rather than great display; but the love of beautiful ornaments of gold and precious stones seems to be a permanent instinct that will always make jewelry a field for the artist and manufacturer.

## Chapter XX

### BIRTHSTONES

#### Origin

The term birthstone or natal stone is given to the precious stone which is popularly assigned to the month in which one is born. The custom of associating certain gems with certain months of the year is of very ancient origin, but the custom of wearing the stone belonging to the month of one's birth has only developed during the last few centuries.

The Romans had many traditions about precious stones and in each month one or more stones were supposed to have peculiar power, especially in warding off disease or danger.

Early in the Christian era these traditions began to be effective. The stones selected for the months did not exactly follow the Roman order, but were almost identical with the order of the twelve stones in the breastplate of the Jewish high priest and the stones of the New Jerusalem. The changes in the lists were probably due to changes in the names of the stones or uncertainty as to the stone referred to.

**The Original List**

The following list of natal stones is given by so eminent an authority as Mr. George Frederick Kunz as the one believed in for the past five hundred years :

January	Garnet	July	Turquoise
February	Amethyst		Onyx
	Hyacinth	August	Sardonyx
	Pearl		Carnelian
March	Jasper		Moonstone
	Bloodstone		Topaz
April	Diamond	September	Chrysolite
	Sapphire	October	Beryl
May	Emerald		Opal
	Agate	November	Topaz
June	Cat's Eye		Pearl
	Turquoise	December	Ruby
	Agate		Bloodstone

**The New List**

The National Association of Jewelers which met in Kansas City in August, 1913, adopted a list of birthstones in which they made certain important changes as follows :

January	Garnet	March	Aquamarine
February	Amethyst	April	Diamond
March	Bloodstone	May	Emerald

June	Pearl	October	Opal
	Moonstone		Tourmaline
July	Ruby	November	Topaz
August	Sardonyx	December	Turquoise
	Peridot		Lapis Lazuli
September	Sapphire		

Nearly all the months have at least one of the traditional stones still associated with it, but as the whole subject is one of sentiment rather than convenience it seems strange that any arbitrary changes should have been made, especially such drastic ones as the transfer of the turquoise from June and July to December and of the ruby from December to July.

In suggesting birthstones to customers salespeople should know the real traditions concerning them as many people would prefer the fiery ruby to the cold turquoise for a December birthday, and in any case would prefer to follow the traditional custom.



## Part V—Suggestions to Salespeople

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### Chapter XXI

#### SELLING SUGGESTIONS

##### Arrangement, Display, and Care of Stock

No department of the store will repay careful arrangement and display so well as that containing jewelry, as not only the individual pieces but the beauty of the whole is the basis of appeal to the customer.

Arrangement should include suitable backgrounds (black or purple velvet is best for gold; silver-gray or sapphire-blue for platinum), careful lighting, and combinations which will enhance rather than lessen the artistic effect of individual beauty.

Jewelry should be kept free from dust which not only detracts from its appearance but scratches the polished surfaces. In addition to a jewelry brush the salesperson should always have chamois or selvyt and soft canton flannel for wiping the articles after they have been handled.

The salesperson's hands should always be kept clean and dry and articles should be handled by their edges so far as possible. All moisture should be immediately removed as it injures the finish.

Locketts, vanity cases, and other articles which close with clasps or snaps should be opened and cleaned on the inside to prevent the accumulation of dust and moisture. The hinges or springs should be given special attention.

Some materials and finishes are unusually perishable and should be given special care. Roman gold must not be rubbed but wiped carefully. Gun-metal will rust and therefore must be kept free from all moisture.

Enamel is scratched by polishing powders and care must be taken when rubbing up enameled jewelry. Jet is very perishable and must be handled carefully to prevent chipping.

### **Materials**

A knowledge of the relative values and characteristics of gold and platinum will help to make good sales. Some "pure" gold is sold which contains so much copper that it will leave a greenish stain on the skin in hot weather. This explanation may be made so that the customer will not think she has been cheated.

Precious stones are so interesting that almost every customer will gladly receive information with regard to their colors, relative values, most effective placement, etc.

The difference between synthetic stones and imitation stones should be clearly in a salesperson's mind as

the first are real stones, though not so valuable as naturally formed ones.

### **Manufacture**

Since the making of jewelry is one of the fine arts, a knowledge of the hand work involved, and of the way in which designs are built up, especially a knowledge of the principles of design as shown in metal work, can give a salesperson most effective and legitimate selling points.

Customers usually know very little of enameling or how cameos and intaglios are made. They will be interested in comparing the goldsmith's method with the coppersmith's.

Practical questions as to durability and suitability may be also answered from a knowledge of manufacture.

The advantages of soldered links over those which are merely pressed together, different types of clasps and hinges, and the strength and security of each should be known and explained. Stone cutting and setting are not less important.

### **History**

Many telling points can be made if one is familiar with the history and customs regarding jewelry. Nearly every precious stone and every kind of ornament has its romantic or practical story; sometimes

they have both. The symbolism of precious stones often appeals to the sentiment of the customer. Scarabs may remind one of the Egyptians, cameos of the Roman emperors, or perhaps of Queen Elizabeth.

The life of the coral builder, and the way in which the color varies under different conditions, is another absorbing story.

The saleswoman will not always have a chance to go into these things, but the choice of an ornament or jewel is usually made with some care, and if one is personally interested and full of the subject some little remark may be made which holds the attention of the customer. A longer story will depend on circumstances, but the customer always wants to be waited on by "one who knows."

### Suitability

Jewelry is very often purchased for gifts. Probably a very large percentage of all such ornaments is not intended for the use of the purchaser, but for some one else. Customers are therefore peculiarly dependent on the judgment of the salesperson, because they are trying to satisfy another person's taste and wishes. The mischoice of gifts is shown by the number that come back after Christmas, and many more would come back if the recipient had the courage to return them!

It is not possible to know the peculiar tastes of people whom we have never seen, but care and good sense would prevent many an utterly inappropriate one such as a highly ornamented shoe horn for a young baby, a vanity case for a child of six, or gold beads for an old lady. Yet such gifts have been made many times.

The salesperson may very properly inquire as to whether the one for whom the gift is intended is young or old, the favorite color, and perhaps the color of hair and eyes. Turquoises are more likely to be worn by blondes and topazes by brunettes.

Many people now adopt their birthstones, and salespeople should know the stone or stones for each month, especially if it is to be a birthday present. If advice as to design or style is asked, a conservative opinion should be given. It is unsafe to suggest the latest novelty unless it is for a young girl, as good jewelry is a permanent possession and novelties lose their interest. In cheaper jewelry novelties are very acceptable.

Gifts for special occasions acquire an added value when they have some relation to it. Friendship brooches or bracelets are appropriate for bridesmaids or girl graduates; pendants as the groom's gift to the bride.

Wedding rings are now not always the plain circlet of gold, but are often carved with orange blossoms or

other symbolic devices. It is becoming customary for the bride and groom to wear matched rings.

Mourning jewelry has its own conventions. The amethyst, and diamonds set in black onyx, or with black enamel and platinum or gun-metal are appropriate.

For people who "have everything," but are to receive one thing more the salesperson should be well informed as to artistic and unusual things, both in the better and the less expensive grades. Under these circumstances the novelty is appropriate, especially if it suggests a new convenience or satisfies an undiscovered want.

Jewelry for men should be distinctive and handsome rather than dainty. The Japanese have been very successful in giving jewelry the masculine touch. Men wish "correct form" in dress more than artistic effect, as a rule, and a salesperson should keep in touch with the best in current fashions.

Style in jewelry is always affected by style in dress and it is well to watch the style movement as shown in shop windows or on the street as well as in the goods which come into the department.

Suggestions as to jewelry appropriate for morning, afternoon, or evening wear will often help to define the purchaser's idea of the ornament desired. Jewelry for morning or street wear should be simple and rather

severe. For afternoon it may be more ornate, while for evening dress there is no limitation except the personal taste of the wearer. Sparkling stones like the diamond are more beautiful under artificial light, as well as more appropriate for the evening.

### Care

Suggestions as to the care of precious stones are very gratefully received. The following are important:

Pearls should never be put in hot water and soap or chemicals, which will dissolve them. They must always be handled carefully, as they are soft and easily scratched. Their beauty is permanently affected by ink, grease, or perspiration, and they will actually dissolve in acids. Extreme heat will ruin them. Pearls should be wiped with a soft cloth after being worn or exposed and should be kept wrapped in a tightly closed box or casket.

The same rules apply to opals, moonstones, and turquoises.

Turquoises should not be put in water as they lose their beautiful color.

Extreme heat affects the color and texture of nearly all gems, the harder ones being less injured than soft stones.

Light oxidizes the softer stones and causes them

to fade. Dirt and grease scratch them. Acids will change their color.

Pearls and opals, which are rather soft stones, must be carefully set, so that the claws will not cut into them.

Jewelry should be kept scrupulously clean and should be frequently taken back to the jeweler for cleaning as well as for examination of settings and clasps. Pearls need to be restrung once in three months as they wear upon each other and upon the string.



## Chapter XXII

### CLASSIFICATION OF STOCK OF A TYPICAL JEWELRY DEPARTMENT \*

#### DIVISIONS

- A. Jewelry (Gold and Platinum ; Plated and Novelty)
- B. Fans and Fancy Bags
- C. Combs and Hair Ornaments
- D. Toilet Articles
- E. Sewing Equipment

#### A — JEWELRY

##### I. Articles

##### (a) Rings

Wedding

Seal or Signet

Solitaire

Two, Three, and Five Stones

Cluster

Filigree

Cameo

##### (b) Pins

Scarf

Brooch

Bar

\* This classification does not include Watches, Optical Goods, or Novel-  
ties.

Lingerie

Spot

(c) Chains

Watch

Lorgnette or Fan

(d) Necklaces

Pearl

Bead

Dog Collars

Lavaliere

Sautoir

Festoons

(e) Pendants

Locketts

Crosses

Lavaliere

(f) Bracelets

Clasp

Bangle

Flexible

(g) Men's Jewelry

Rings

Pins

Chains

Cuff Buttons and Links

Studs

Collar Buttons

Tie Clasps

Dress Sets

Belts and Belt Buckles

2. Materials

(a) Metals

Platinum

- Gold
  - Silver
  - Gun-Metal
  - Copper
  - Nickel
  - (b) Stones
    - Precious
    - Synthetic and Reconstructed
    - Imitation
  - (c) Enamel
  - (d) Ivory
  - (e) Mother-of-Pearl
  - (f) Coral
  - (g) Amber
  - (h) Jet
3. Manufacture
- (a) Metals, Combined or Pure
    - Platinum
    - Gold and Platinum
    - Solid Gold
    - Gold-Filled
    - Gold-Plated
    - Sterling Silver
    - Silver-Plated
    - Silverite (Composition)
    - Silver and Copper
    - Copper and Brass
    - Gun-Metal
  - (b) Methods
    - Distinctive from Special Designs
    - Jewelry "Sets" Finished by Hand
    - Commercial Jewelry
  - (c) Styles
    - Filigree

Repoussé  
Modeling  
Engraving  
Carving  
Enameling  
Niello  
Inlaying  
Stone Setting  
Cameo Cutting

B — FANS AND FANCY BAGS

I. Fans

- (a) Types  
Rigid  
Folding  
Collapsible
- (b) Materials  
Gauze  
Parchment  
Feather  
Paper  
Celluloid  
Tortoise Shell  
Ivory  
Mother-of-Pearl  
Lace (Real and Imitation)  
Princess  
Duchess  
Spider Web  
Point Appliqué  
Carick-ma-Cross  
Venise  
Rose Point  
Renaissance

## (c) Decoration

Lace

Painting

Printing

Embroidery

Feathers

Carving

Inlay

## 2. Bags

## (a) Kinds

Mesh

Bead,

Crochet

Silk and Velvet

Leather

## (b) Materials

Gold

Silver

Gun-Metal

Steel

Brass

White Metal

Silk

Velvet

Velveteen

Linen

Leather

## (c) Decoration

Beads

Embroidery

Lace

Engraving

Studding with Stones

Enamel

Filigree

## C — COMBS AND HAIR ORNAMENTS

1. Kinds
  - Side
  - Back
  - Barrettes
  - Bandeaux
  - Tiaras
  - Hairpins
2. Materials
  - Tortoise Shell
  - Celluloid
  - Aluminum
  - Silverette (Composition)
  - Amber
  - Jet
3. Decoration
  - Pressed
  - Carved
  - Studded
    - Rhinestones
    - Bohemian Garnets
    - Imitation Stones
  - Gold Inlaid
  - Aluminum
  - Gold Bands
  - Crystal or Claire
  - Cut Steel
4. Colors
  - Shell
  - Amber
  - Black
  - Gray

## D — TOILET ARTICLES

(See "Manual for Toilet Goods Department.")

## E — SEWING EQUIPMENT

(See "Manual for Notion Department.")



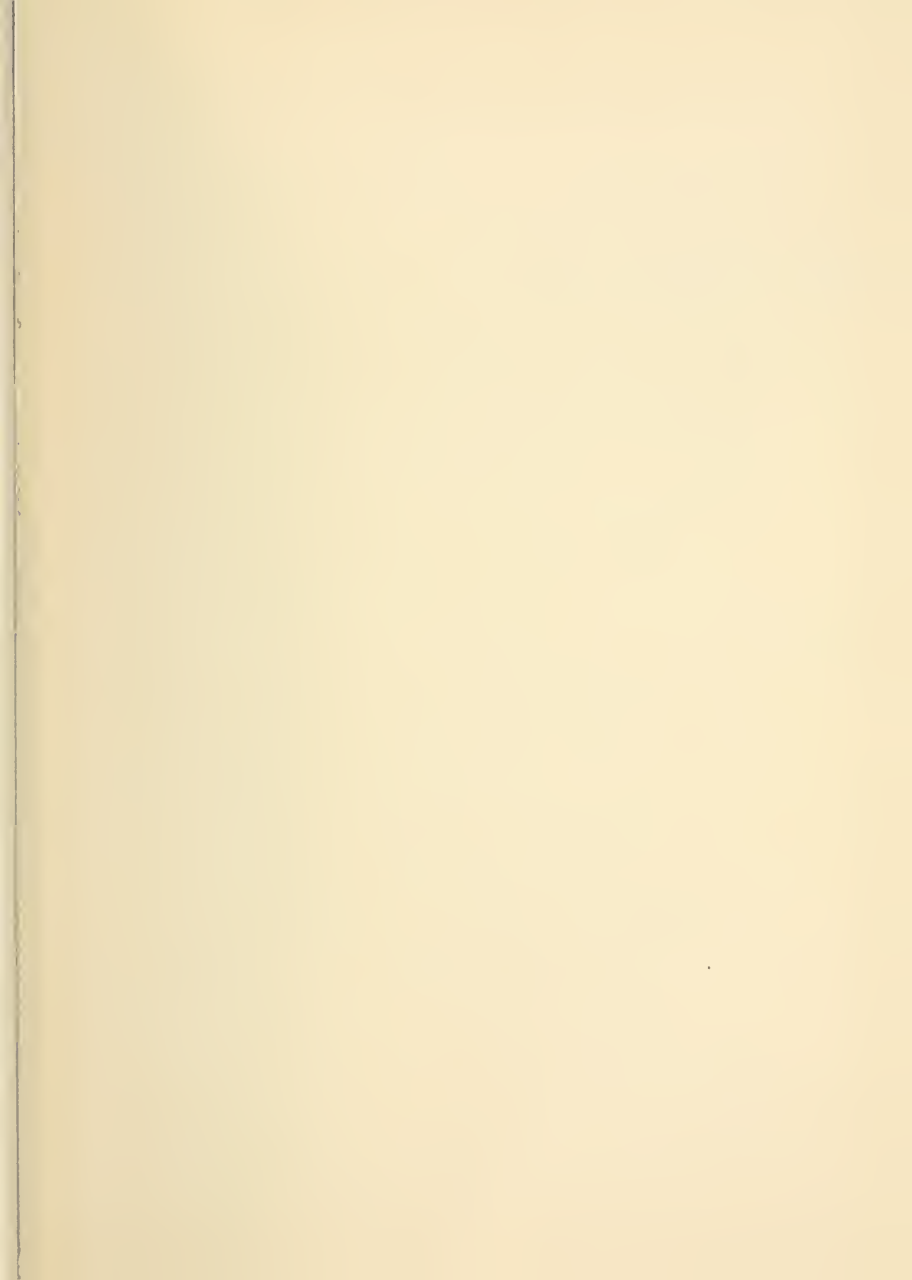


## Appendix

### BOOKS FOR REFERENCE

- Gem Stones, G. F. Herbert Smith. Pott, \$2  
Book of Precious Stones, J. Wodiska. Putnam, \$2.50  
The Curious Lore of Precious Stones, George Frederick  
Kunz. Lippincott, \$5  
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The Pearl, W. R. Cattelle. Lippincott, \$2  
The Diamond, W. R. Cattelle. Lippincott, \$2  
The World's Minerals, L. J. Spencer. Stokes, \$2  
The World's Gold, L. DeLaunay. Putnam, \$1.75  
Silverwork and Jewelry, H. Wilson. Appleton, \$1.40  
Simple Jewelry, R. L. B. Rathbone. Van Nostrand, \$2  
Jewelry, H. Clifford Smith. Putnam, \$7.50  
Jewelry, C. J. H. Davenport. McClurg, \$1  
The Art of the Goldsmith and Jeweler, T. B. Wigley. Lip-  
pincott, \$2.75  
Enamelling, L. F. Day. Scribner, \$3  
Handbook of Ornament, F. S. Meyer. Hessling, \$3.60  
Nature and Ornament, L. F. Day. Scribner, \$3  
Pattern Making, L. F. Day. Scribner, \$3  
Line and Form, Walter Crane. Macmillan, \$2.25  
Bases of Design, Walter Crane. Macmillan, \$2.25  
Autobiography, B. Cellini. Dutton, 35 cents  
Metal Work and Enamelling, Maryon. Scribner, \$3  
Art Metal Work, Arthur Payne. Manual Arts Press, \$1.50  
Metal Working, P. N. Hasluck. McKay, \$2.50  
Divers Arts, Theophilus. (Out of Print)  
Chats on Old Jewelry and Trinkets, M. Percivale, Stokes, \$5  
American Watchmaker and Jeweler  
Great Industries of the United States (Trade Journal)  
The National Jeweler and Optician (Trade Journal)





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