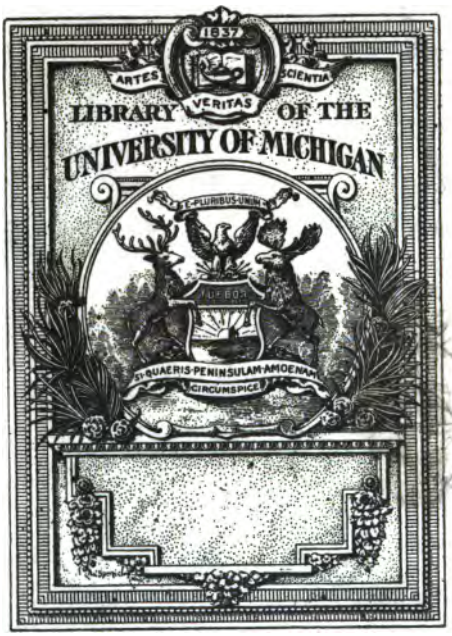
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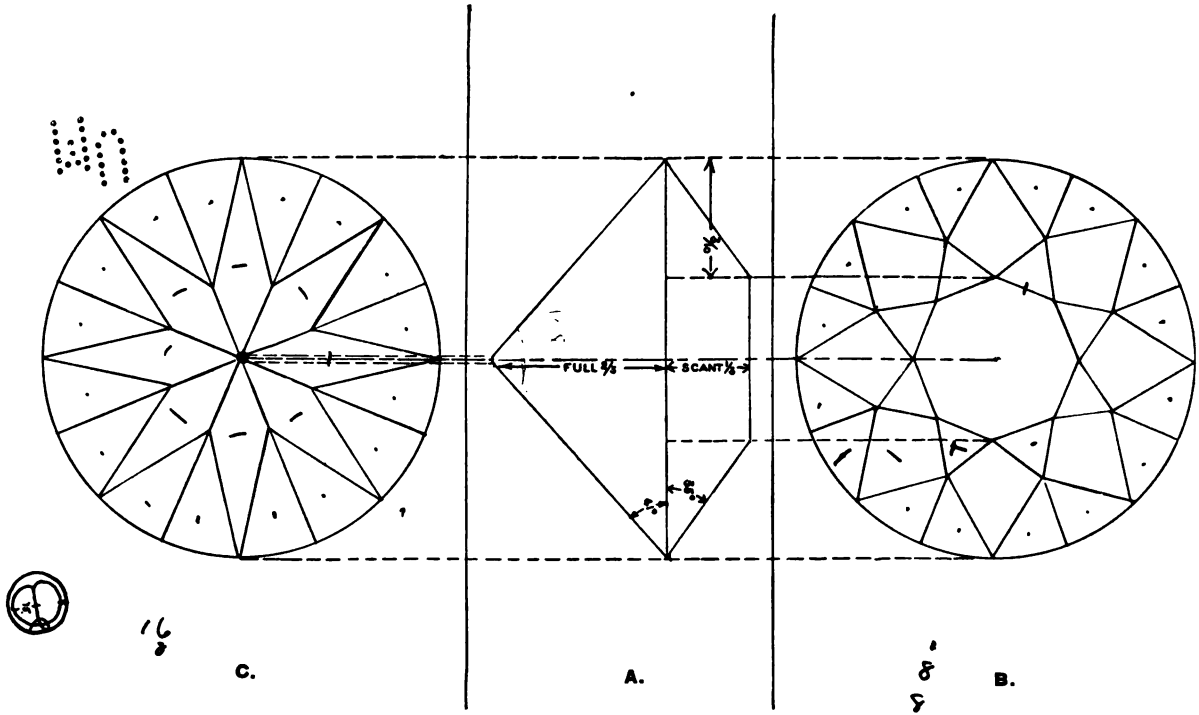

A. Profile of a Well Made Brilliant
B. Top
C. Back

The drawing on the opposite page is intended to represent a finely cut diamond. It shows a top view, a vertical section, and a back view of the brilliant. The type of brilliant shown is known as a full-fashioned stone and it requires a well shaped rough diamond to yield such a stone without a large loss in cutting. When rough diamonds are sawn or cleaved, the resulting brilliants usually have shallower tops and relatively deeper backs than shown in the cut, and the table is considerably broader. The full-fashioned brilliant is probably more desirable as it has considerable brilliancy as seen from the side as well as when viewed full in the face. The top angle should be very nearly 35° and the back angle slightly over 41° to produce the maximum brilliancy. Such are the angles represented in the drawing.

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DIAMONDS

A STUDY OF THE FACTORS THAT GOVERN THEIR VALUE

BY

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G. P. PUTNAM'S SONS
NEW YORK AND LONDON
The Knickerbocker Press
1916

The Knickerbocker Press, New York

"I shall speak a little more of the diamonds, that they who know them not may not be deceived by chapmen who go through the country selling them, for whoever will buy the diamond, it is needful that he know them, . . ."—Chap. XIV., *The Voyages and Travels of Sir John Maundeville.*

FOREWORD

IN writing this little monograph on factors that govern the value of diamonds the author has attempted to put, within limits not too wide to be covered by the busy diamond merchant, much of the experience he has gained during the past fifteen years, as a student of diamonds. Some of the information contained in this volume is the common property of all who have given attention to the subject. Part of it is to be found already in print, in larger and more pretentious works. A modest portion of the material is the result of original study at first hand, especially such part as attempts to analyse various effects and to determine and explain their causes. While most of the technical information

contained in the following chapters might be learned of men who are now in the business, many such have no time or taste for writing down what they have learned, and others, unfortunately, regard some of these matters as trade secrets to be kept from the buying public. The writer therefore feels that there is a place for such an essay, and hopes that many who are serving their apprenticeship in the jewelry business and perhaps a few who are already recognized as diamond merchants may profit by the close study of this handbook.

In preparing these pages, the author has also had the great American diamond-buying public in mind and has even given over a short chapter to advice to the intending buyer of a diamond. No other people buy diamonds so largely as Americans. They buy the best and are usually at pains to inform themselves more

thoroughly than other nationalities as to the points that determine the value of diamonds. There is nothing within the pages of this book which a merchant who is conducting an honest business in diamonds need fear to have become the property of the public. The more discerning and intelligent the buying public becomes, the better customer it will be, in the long run. In conclusion, the author would extend his thanks to the many jewellers and diamond men who have courteously extended to him opportunities to study diamonds at first hand. Most of the jewellers of Indianapolis should be included and, in addition, the author wishes gratefully to acknowledge much assistance from Mr. Edward E. Stone and Mr. John O'Hanion of Boston and Mr. John H. Baker of New York. The admirable treatise on diamonds by W. R. Cattelle has also furnished much

interesting information and confirmed much that was gathered at first hand. The drawing from which the frontispiece was made was the work of one of my pupils, Mr. Elmer Frankel.

F. B. W.

INDIANAPOLIS, IND.
November 27, 1915.

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Diamonds

CHAPTER I

COLOUR AND ITS EFFECT ON THE VALUE OF DIAMONDS

"As for the water of the stones, I must say that, instead of using daylight, as we do in Europe, to examine the rough stones, and to judge well of their water and of the imperfections that may be found in them, the [East] Indians work at night, and in a one foot square hole in a wall they put a lamp with a large wick, by the light of which they judge of the water and of the perfection of the stone, which they hold in their fingers." Vol. iv., Book 2, *Voyages de Tavernier.*

MOST transparent minerals have, when pure, no colour at all, and diamonds are no exception to this rule.

The cause of colour in transparent minerals is not thoroughly understood.

Colour is, however, believed to be due to the presence in the mineral of relatively small amounts of foreign substances, usually metallic oxides. Iron oxide is one of the commonest of these and especially is this true of diamonds. Sir William Crookes, the noted scientist, tells us that the ash left when a diamond is burned in oxygen is largely iron oxide. The oxides that cause colour in precious stones are thought by some to exist in very minute particles, suspended, as it were, in the crystalline material (in colloid solution, a chemist would say). So small are the particles that they are invisible under the microscope, but they cause a selective action upon white light that attempts to pass through the material, so that it comes out more or less coloured; that is, light of certain colours is held up or absorbed, more than light of other colours, with the result that the light

which emerges from the material is no longer white, as when it entered.

Iron as a colourant commonly produces yellow or brown in minerals (sometimes red), and diamonds, especially, run to yellow and brown tints, a truly white diamond being very rare. Diamonds of a very light blue tint (probably caused by the presence of traces of some other metallic oxide), while scarce, are perhaps more abundant than really snow-white stones.

Now the presence or absence of colour in diamonds exerts a very great effect upon their commercial value, and the merchant who deals in diamonds cannot be too well informed or too well trained in the matter. While it is true that parcels of stones from reliable importers or cutters are usually very finely graded, yet that merchant who is best trained in detecting faint differences in colour, and who insists on buying only the better grades, will, in

the long run, be shown only the best goods and will gain a reputation in his community for carrying only fine goods that will be of value to him. Again, when goods are purchased in small or irregular lots that are less carefully graded, or when stones are taken in trade, the merchant has need for trained discrimination in the matter of colour.

Aside from those diamonds which have a pronounced and beautiful colour (so-called fancy stones), the tints of colour in diamonds are pale and pass by almost insensible graduations from a yellow or brown that is obvious, but not deep enough to be pretty, to such faint shades that the presence of colour would not be detected at all by the average person, and perhaps not even by one trained to observe colour in diamonds, unless by direct comparison with stones known to be perfectly white.

It is in the ability to detect these faint differences and to correctly determine just how much of colour a stone (or parcel of stones) carries, that success in judging stones, as to colour, lies. The commercial value that attaches to each of the numerous grades may be readily learned in the trade, and the names that are applied, while not always used in exactly the same way by different dealers, may speedily be learned, but the chief difficulty is to always be able to say definitely in just which class a certain stone or parcel belongs.

A few words indicating some artificial helps in grading may not be out of place.

One must, in the first place, be free from colour-blindness and also from the common fault of lack of vivid perception for certain colours. Much practice and training will also be necessary before great skill can be acquired. Taking for

granted these necessary prerequisites, how should one proceed to get the best results in grading?

In the first place see that you have a good *north* light, unobstructed by buildings or other objects. There must not be any coloured surface near by to reflect tinted light, as a false estimate might easily result.

In the second place, do not attempt to judge stones at all closely except in the middle of the day, say between 10 A.M. and 2 P.M. Very erroneous results may easily be had by neglecting this precaution.

Dark or dull days should be avoided also. One must have plenty of good neutral light to make fine comparisons.

It is almost impossible to make fine distinctions by artificial light. A stone that is positively yellow, even almost a fancy gem canary, in colour, will appear

almost as white as a good Silver Cape by some kinds of artificial light. If any decision must be made in the evening, by all means use a tungsten filament light, as that gives the nearest approach to daylight of any of the kinds of artificial lights for indoor use.

Again, do not attempt to make decisions that count largely, in unfamiliar surroundings. If possible, always use the same place for your study of colour in stones.

Another essential is to have by you for comparison, stones whose colour you are sure of. One cannot "carry colour" in one's eye, although some people seem to think it possible. Rough distinctions may doubtless be made by those who are experienced, without the aid of a standard of comparison, but when it comes to deciding between two very fine stones or parcels of stones the absence of such

aids makes the task almost impossible.

In judging the colour of diamonds it is necessary to obscure the prismatic play of colours in order that the true colour of the material may be seen. This is best accomplished by dimming them with a quick, light puff of the breath and then studying the colour while dim. It must be remembered also that diamonds frequently have in them, while rough, faint differences of colour, and that the diamond cutter always tries to cut the stone so that it will "face up" to the best advantage. Consequently it is always necessary to view a stone on edge, in the paper, as well as face up, for frequently a stone will face up with a better colour than it reveals when on edge. These differences affect values and one must be aware of such differences in order to profit by them.

Some stones have so marked a variation

in colour according to their positions that they are styled "false colour" stones. They may be very blue when faced up, yet brownish or yellowish when seen at some other angle. Such stones are likely to command prices beyond their real worth unless the defect in colour is detected, and dealers should be on their guard against them. Very few, even of the high-priced, fancy blue gems, are really blue in body colour. Most of them owe their blueness to a bluish fluorescence which becomes more marked the stronger the light. In clear sunlight on a bright, dry day or by the light of an arc light, they are very beautiful, yet, the body colour being frequently slightly "off," some of these stones are inferior in beauty to pure white stones when viewed under a light which does not cause them to fluoresce. Here again caution should be exercised lest more be paid for a stone than all the cir-

cumstances, taken together, would warrant.

Another point that deserves attention is that large masses of stones appear deeper in tint than smaller masses or single stones. As is sometimes said in the trade, "Large parcels 'draw' colour." This really means, of course, that white light that has had to pass through a number of stones, all of the same tint, has had more of the light that is unlike the stones absorbed than has the light that has passed through but a single stone. Hence the light that emerges and reaches the eye appears deeper in colour. It is well to divide large lots into several smaller ones for study and comparison.

A good lens is also an essential aid in studying the colour of diamonds. By means of it one may still see clearly when the object is within an inch or less of the eye. Hence the true colour of a diamond

is more apparent when viewed under a lens, as the light from the stone is caught before it has had a chance to scatter widely. A lens of one-inch focal distance is best for all-round work. A higher power is neither necessary nor satisfactory and a much lower one is not as efficient as the one-inch.

While most diamond dealers use, as they did in the past, simple lenses, uncorrected for chromatic aberration or for spherical aberration, better results may be had from the newer triplets, which consist of three lenses, balsamed together as one, and having six polished curved surfaces so arranged as to correct all colour defects; as a result pure white light passes the lens untinted. They are also corrected for spherical aberration so that, instead of being sharply defined only in the centre, the field of view is clear from edge to edge. These triplets, while

costing a little more (about $4 list), are so much more satisfactory that no one who has used one would ever wish to depend on a glass of the old style. The new lenses are seldom sold mounted like a watchmaker's glass, but if it is thought desirable, they can be so mounted by any one with a little ingenuity. As pocket lenses they are unsurpassed. The optical houses usually call the type referred to "aplanatic triplets."

Stones should be judged when unset, so far as is possible, and if the colour of a set stone must be determined, every caution should be observed that colour which has been reflected from the mounting be not mistaken for the true colour of the stone. Such an error might, according to circumstances, make the stone appear either better or worse than it really was. A detailed account of some of the effects of the mounting upon the colour

of the stone will be given in a later chapter.

It will be noted that no attempt is to be made here to describe the colour of "fancy" diamonds. They are much less numerous than the so-called "white" diamonds, and their price is largely a matter of what can be secured under the circumstances. There is no such stable demand for them as for the white stones. The "fancies" are really coloured diamonds and include all the well-marked colours of desirable shades. Red and apple green, violet blue and rather pale sapphire blue, absinthe green and golden brown, orange and canary yellow are some of the colours represented.

The vast majority of the diamonds that are fit for jewelry are, however, of the various tints known as white with some adjective intended to describe the amount of departure from pure snow white. As

was said above, very few diamonds are really white, most of them being more or less tinted with yellow or with brown. If these tints are not too pronounced, the diamonds having them are beautiful and valuable stones, and are surpassed only by the few stones of still greater whiteness, which command exceptional values. It is in the close grading of the many tints as to quality and depth of colour that one needs to make use of the helps cited above.

Unfortunately there is no hard and fast standard of colour to which one can refer doubtful cases. There is, however, a pretty generally accepted series of names of grades which are supposed to describe definite degrees of colour according to their value. These names are not always used by different dealers to describe the same grades of stones, and with the increase in the prices of diamonds during

the past ten years or more, there has been a well-marked tendency to degrade the grading, that is, to sell stones by a name that would formerly have been applied only to a better grade of stone than that offered.

This tendency to shift the grading, coupled with the great difficulty of adequately describing in words just what depth of colour is covered by any particular name, makes rather doubtful any attempt to give and define the system of names used in grading.

However, that those unfamiliar with this part of the business may have what help a description can give, the following list of grades and description of each grade will be ventured.

The list begins with the higher grades and proceeds through grades that are of less and less value, other things being equal:

1. Rivers. 2. Jägers. 3. Blue Wesseltons. 4. Wesseltons. 5. Top Crystals. 6. Crystals. 7. Very light brown. 8. Top Silver Capes. 9. Silver Capes. 10. Capes. 11. Yellow. 12. Brown.

Probably the finest white diamonds are those classed as "Rivers." These stones are either snowy white or bluish white in their body colour as well as when faced up. They are exceedingly snappy and brilliant when well made. The finest of the old Indian and Brazilian diamonds, when recut to proper proportions, belong in this classification. A small percentage of the African stones, especially some of those from the "river" diggings, grade with these. To test the colour of a stone in order to see if it is really in the River class, put it beside a cut piece of purest rock crystal. It should not suffer in the least by the comparison, whereas the best Crystals, or even Wesseltons, will

hardly stand the comparison. Such diamonds owe their remarkable brilliancy to the fact that they absorb very little of the light that enters them, passing most of it on to dazzle the beholder. A simple test of this property of absorption may be made by holding a diamond in forceps with the table of the stone close to the eye and observing the filament of an incandescent electric lamp through the stone. If now a second diamond is held opposite the other eye and the filament observed simultaneously through both stones, a direct comparison of the absorption of the two stones is secured, the degree of brightness of the filament giving a means of telling which stone absorbs more light. Those stones which would be rated as Rivers will be found by this test to pass far more light than stones of inferior colour; and it is largely to this fact that the River stones owe their superior

brilliancy. This being the case, one may by using this test judge somewhat of the fineness of a stone even by artificial light.

Another similar test may be made by daylight. Standing, perhaps, ten feet from a window that opens into a well-lighted space, hold the two stones to be compared close to the two eyes and turn the stones about until the sash of the window is seen clearly through each stone (the direction in which the sash appears may be very far from its actual position, the cut stone acting as a prism through which the edge of the sash is viewed). The image of the edge of the window sash will appear in rainbow colours—that is, we have in such a case a spectral image of the object. Now a very fine stone will display under such circumstances a much more vivid colour image than an inferior stone, and by using two stones at one time before the two

eyes there may be had a direct comparison of the stones with respect to the quality of the prismatic play which they reveal. Some little patience and steadiness of nerve will be required at first to get the knack of thus comparing two stones, but once the skill is acquired, speedy results may be obtained.

A third, and perhaps simpler, method of comparing the degree of absorption and the vividness of spectral display of two stones is to hold them both in direct sunlight and to throw the prismatic colours from each onto the same *opaque* white card held in the direction of the sun. By gently moving, now one and now the other stone, the source of any particularly attractive group of coloured images may be ascertained, and thus one may promptly learn which stone will, under all conditions, probably be the more pleasing and snappy.

Next after the Rivers, come, perhaps, the so-called "Jägers." These, named after the Jägersfontein mine, which yielded some especially fine stones, are bluish white stones (even in their body colour). They are, perhaps, a bit more steely and less snowy in the *quality* of their colour (not in *degree* of colour) than the Rivers, but there is really very little difference between some blue-white Rivers and some fine Jägers, and values are closely similar and very high for either class. Stones that have in them a faint tint of yellow are sometimes called Jägers, but the term should properly be reserved for stones of pale, steely-blue body colour, not deep enough to be classed as a "fancy blue."

After the Rivers and Jägers come the Blue Wesseltons and Wesseltons. These would not appear to have any yellow if by themselves, and they even appear bluish

beside the lower grades of diamonds, but comparison with a River stone may make them appear the least bit yellowish in body colour as seen on edge in the paper. They are, however, exceedingly desirable stones and command very high prices. The public would call them the finest of blue white diamonds, and comparatively few are stocked, except by large dealers, in large cities, as the values are so high. As the order of the grades suggests, the finest of the Wesseltons are called Blue Wesseltons. The name is derived from that of one of the South African mines, which furnished some stones of this character, but stones from any other source, when of sufficiently good colour, would be similarly named.

After the Wesseltons come the two grades of Crystals. These are the "fine white" or "blue white" stones of the retailer. In this instance again, however,

many dealers use these terms to describe stones less fine than standard Crystals. The tint in Crystals is yellow and it is sufficiently marked to be readily noted by any one with a good eye for colour, when compared with rock crystal, or synthetic white sapphire, in the paper and dimmed. Faced up and undimmed, however, good Crystals appear white and they are highly desirable stones. The prices they command are now so high, when perfect and well made, that they represent about the best stones that the general public can afford.

After the two grades of Crystals (the finest of the Crystals being separated as "top" Crystals) would probably come the very light brown stones. Brown is a colour that is very undesirable if it is deep enough to be perceptible, as brown stones absorb so much light that they appear dark under artificial lighting. Hence

stones with a perceptible amount of brown colour are usually valued at a lower rate than any others. The very light brown stones which we have just listed as being next to Crystals in desirability have so slight a brown tint, however, that they do not thus absorb light. They are very lively and pretty stones. Faced up they appear white; on edge, in the paper, when beside a fine Wesselton, it would be seen that the body colour was slightly off and that it was off on the brown rather than on the yellow. As most people who are looking for colour in diamonds are expecting to find yellow, the very light brown stone often passes for better than it is and such stones are thus sometimes more easily sold than those that are perceptibly tinted with yellow.

After the very light brown stones come in value those called Silver Capes.

These are divided into Top Silver Capes and Silver Capes. The amount of yellow in these stones is such that a well-trained eye will perceive it even when faced up and undimmed, yet the general public would regard them as nice white stones, and probably more stones of this grade than of any other are sold in this country. They are not too expensive for the public and they are not yellow enough for the colour to be perceptible to the ordinary person unless on close inspection or on comparison with the finer grades.

After the Silver Capes comes the grade known as Capes. These are sometimes known to the public as "commercial white" stones. They are perceptibly off colour to any one who has an ordinarily good eye for colour. By artificial light, however, they appear nearly as well as whiter stones, and as diamonds are worn more in the evening than at other

times, especially by women, many such stones are marketed. That is becoming increasingly the case with the advance of prices. As many kinds of artificial light are rich in yellow rays, these yellowish stones are sometimes more brilliant under such conditions than fine blue stones. The latter do not find by such artificial light the conditions which set them off to the best advantage.

Stones poorer in colour than Capes do not find a ready sale in this country. The next grade would be called yellows, or by-waters, and when it is thus admitted in the title that there is yellow in the stone, one may expect to find considerable colour in evidence. These yellow stones are yellow enough for the colour to be markedly and undesirably perceptible and yet not yellow enough to be pretty. Many of them have yellow of a muddy, murky tint, not of a clean, clear tint such as is

seen in a fine canary diamond. It may be said here that in the case of each of the grades above mentioned one should be as careful to seek a clean, clear *quality* of yellow as to exactly determine the quantity that is present. Avoid the muddy yellows. A stone of deeper tint, but of cleaner quality of colour, would be more desirable.

Last among the "white" stones, if white is still applicable, come the "browns." This grade usually is made to include stones of all degrees of brown except the very light browns mentioned already, and the deep, fancy browns, which are in a class apart. Of course, values vary with the degree of brown, but in general brown stones are cheap and undesirable, because dark by artificial light and dirty looking by daylight. They would not be carried at all in a high-class stock, and the American customer,

who is the most critical of any nationality, will not buy them largely, even in these days of high prices for diamonds.

We have now completed the description of the principal grades of white diamonds. It may be added that great care should be used by the jeweller not to mix the various grades in his stock or in the show window, lest an observant customer of moderate means be made dissatisfied with a stone the price of which is within the maximum he had decided to expend and with the quality of which he would have been entirely content if he had not seen the brilliant beside one of a higher grade. Similarly, in displaying stones, try to find out about what the customer has in mind, and, if anything, begin slightly below his price and work up in quality rather than reversing the process.

In all that has been said it has been assumed that perfection and make were

equal in all cases. We will next consider the effect upon values of the presence of imperfections and will attempt to describe the various kinds and degrees of imperfection. In a later chapter "make" will be discussed.

CHAPTER II

THE EFFECT OF FLAWS ON DIAMOND VALUES

"They will hardly bring you a single paper of stones containing as many as a dozen but that there will be found therein four or five with some flaw, or some spot, or some defect in a corner."—*Voyages de Tavernier.*

"The safest and most efficacious criterion for detecting flaws in brilliants, or, in a word, faulty diamonds, is *tact*, resulting from vigilant attention and habit."—*A Treatise on Diamonds*, by John Mawe, 1823.

IN the preceding chapter the effect of colour upon the value of diamonds has been discussed without mention of the presence of flaws or other defects in the stones. This was done in order to give as good an account as possible of the influence of colour upon value.

In actual practice, however, defects are almost always present and their influence

upon value has to be taken into account along with the influence of colour. For example, a stone may have superb colour, yet it may be so imperfect as to have far less value than an off-colour stone.

In the present chapter an attempt will be made to describe some of the more usual types of defects in diamonds, to define the various degrees of imperfection, and to give some of the trade names that are supposed to designate these several degrees of imperfection. The effect upon value of the different degrees and kinds of defects will also be discussed briefly, and some account of what may be honestly represented as a "perfect" stone will be given.

Just as it was said that a truly colourless diamond is very rare, so it may be stated that one perfect in crystallization is also seldom encountered. A perfect crystal of any sort is rarely found in

nature. The diamond cutter uses all his skill to remove (without prohibitive loss in weight) as many of the natural blemishes as possible, but even when he has done his best, the great majority of cut diamonds still retain imperfections.

One of the most common and conspicuous types of imperfection is known in the trade as "carbon" or as "carbon spots." Diamond, as everyone knows, is one of several varieties of carbon, graphite being a second variety and amorphous carbon (such as charcoal, coke, lampblack, etc., consist largely of) being a third.

Now there is no very hard and fast line of demarcation between the various forms of carbon. Artificial attempts to make diamonds have yielded both genuine diamond and also very hard, black, opaque carbon in the same lot, and even in the same crystal, and apparently in the natural formation of diamonds some

of the material is frequently left in a black and opaque, but very hard, condition. Masses of such black carbon are sometimes found in Brazil and are sold under the name of "carbonado," to be used in rock drills and for other mechanical purposes where great toughness as well as great hardness are necessary. While such masses are not yielded by the South African mines, yet many diamonds from South Africa and from other mines contain minute specks and spots of black opaque carbon which, when at all conspicuous, constitute very undesirable defects in the stones.

It will be remembered that the huge Cullinan diamond had a black spot in its interior which prevented its being cut into one large gem. It was cleaved through the defective spot and the fragments cut into a number of smaller gems.

Very many less sizable stones are thus

continually being cleaved (or sawn) by diamond cutters to eliminate carbon spots. One of the serious effects of the conspicuous nature of these black defects is due to the fact that if they lie in certain parts of the finished stone, they are many times reflected and thus appear to be more numerous than they really are. Here the skill of the cutter is taxed so to place the defects that they will be as little apparent as possible. For example, if the stone is so cut that a carbon spot is behind the edge of the girdle (or if it is where it can be covered by the setting), the stone will have a greater value than if the spot is beneath the table of the finished stone or in a prominent position under one of the top facets.

When conspicuous to the unaided eye, carbon spots constitute a bad defect and greatly depreciate the value of diamonds. If, however, such defects are

few and slight in a stone, it may be a beautiful and valuable gem, even more valuable, if its colour is fine, than a perfect stone of bad colour. Many of the whitest diamonds seem to be afflicted with carbons.

As a diamond merchant said to me recently: "Blue seems to follow carbon," meaning that many fine blue-white stones have such defects, while diamonds of the poorer colours are less likely to have carbons.

A defect that may resemble a patch of carbon sometimes results from the absorption into a tiny crack, of diamond dust and oil on the polishing wheel. This makes a bad defect when it happens. It may be avoided to a considerable extent by using a nearly dry wheel when working near a crack.

In estimating the effect upon value of the presence of carbon spots (as of other

types of defects) the ease or difficulty with which they may be detected counts largely. It may be said once for all that no stone in which a defect is serious enough to interfere largely with the passage of light, so as to decrease materially the brilliancy and play of colours, is of any considerable value. Such stones should be used for mechanical purposes and not for gems. I have known of several attempts to cut something from "bort" (stones rejected to be used for mechanical purposes) and they have never been successful. The material must give the light a chance.

Besides the imperfections due to carbon there are others due to cracks or open cleavages in the crystalline material. If the little breaks go across the grain of the stone, they are irregular; if with the grain, they are flat and straight. Such imperfections, when large, are very bad,

as they bring about reflection of light from the broken surfaces within and thus cause serious loss or misdirection of light. If tiny and not numerous, they are less objectionable. The larger ones are called "cracks," the lesser ones "feathers" or "flaws."

Some stones so abound in cracks that they are disdainfully called "cracked ice" by dealers who will not handle such imperfect goods, and the name is fairly descriptive.

The minute feathers, however, being colourless, are not as noticeable as carbons of similar size, and many fine stones have in them these tiny defects, which were, perhaps, caused by the wear and tear of the pounding of a turbulent stream if the stones were from river diggings or the nearly as rude processes of recovering the diamonds from the "blue ground."

Small defects may also be due to

unskilful handling during cutting and polishing. Tavernier, the great French gem dealer and traveller of the 17th century, tells us that in India such feathers were prevented from forming on the wheel by the free use of diamond dust and oil and by the use of a lower speed; although he further tells us that much greater weights were placed upon the stones while on the wheel in India than in Europe, a thing that would tend to cause defects if it were not compensated for by the free use of diamond dust.

In addition to carbons and feathers or cracks, diamonds sometimes contain minute cavities either empty or filled with liquid. Some have thought the liquid to be carbonic acid (which we know as carbon dioxide gas, but which easily becomes liquid under pressure). These bubbles are serious defects if of any size, as stones containing them may burst owing to

increase of pressure within on becoming warmed. The cutter usually prevents any large cavities from being left in finished stones.

Another type of imperfection in diamonds results from leaving unfinished places on the surface of the cut stone. These are most frequently seen on the girdle (edge) of the brilliant. They are bits of the natural surface of the rough diamond that were not polished off in making the brilliant, and such defects are frequently spoken of in the trade as "naturals." It is often desirable to leave tiny spots of "natural" surface on the girdle, as to completely remove them would necessitate making a smaller stone or one that was not of good contour. The stone of larger size and greater weight would have more value than the smaller but better-made stone that might result from complete removal of the natural surface.

When such defects are large, so that they cause a visible indentation of the edge of the stone, or when they occur on any part of the stone other than the edge, they are objectionable. The irregular surface gathers dirt and is hard to clean, and thus hurts the appearance of the stone.

Another type of surface imperfection which should be avoided, if possible, consists in small nicks or chipped places, usually on the girdle. These should not be present in newly cut stones, but stones that have been set by careless setters are apt to have them. Although extremely hard, diamond is also brittle, and it has a pronounced cleavage in certain directions. As a result, it is easily harmed by the careless use of a file or other steel tool, which, while less hard, is much tougher. Thus stones that have not come recently from the cutter should be examined for such mechanical injuries.

Some diamonds, while apparently free from any of the defects already described, have within their substance a sub-microscopic irregularity of texture, or possibly they have within them some finely divided substance. At any rate, when viewed at right angles to the path of a strong beam of light falling upon them, they appear milky. This defect is most apparent in direct sunlight. Some such stones are very blue, so that they would be very valuable if clear and free from milkiness. Such a cloudy character must be accounted a serious defect in a stone, even though it be free from flaws of other types.

There are many degrees of imperfection in diamonds. The lightest of these (sometimes called v. v. s., or very, very slight) can be detected by an expert only with the use of a good lens. Such stones are usually sold to the public as perfect,

and indeed for all practical purposes they are perfect. There has been a lack of understanding on the part of the public, of the exceeding rarity of really perfect diamonds, and along with this lack of understanding has gone an unreasonable demand for perfection without a willingness to pay what such a rare thing is really worth.

This condition has perhaps led to defensive measures on the part of the trade. Thus a dealer, realizing the situation, has felt justified in representing a stone as perfect when in reality it may have had microscopic defects in it. The term "perfect," like the term "white," has thus come to have a special meaning in the diamond trade, and in both cases it is a meaning at variance with the true significance of the words.

Such representations may easily be carried too far, and the only defence of

the purchaser is to confine his dealing to reputable dealers, who, while they may legitimately regard as perfect a diamond that has nothing in it that could be seen under a low-power lens, will not stretch a point beyond that. Nor will they cover a defect with a clamp without stating the fact to the customer and making a price that takes this into consideration.

With these few words on the ethics of dealings in imperfect stones, let us consider some of the grades that are less perfect than those sold by the cutter or importer as v. v. s. Another term which describes, perhaps, a slightly more defective condition than v. v. s. is "piqué." This grade is divided into first, second, and third piqué, according to the degree of imperfection. Piqué lots are, however, only slightly defective. The tiny carbons or "feathers" that such stones contain are few in number and are in-

conspicuously placed. A person might wear one all his life and never detect the imperfection. Such trivial imperfections in nowise diminish the beauty or the durability of the diamond. Aside from purely sentimental considerations, a fine piqué brilliant is as good as an absolutely perfect one.

Most of the stones owned by the public are not as perfect as this. Many of them come in the next class—called "slightly imperfect." If a diamond is acknowledged to be "slightly imperfect" in the trade today, it will not take one familiar with the study of diamonds long to discover the defects that led to such a classification. They will be fairly obvious, yet probably not conspicuous, and a person not accustomed to the examination of diamonds would probably not readily notice them, especially if the stone be not dimmed.

After the "slightly imperfect" stones come those that are frankly "imperfect." These have defects—such as large carbons or numerous carbons, or large flaws or numerous flaws—which would be at once apparent to the ordinary observer even without a glass, and they are sufficiently bad to hurt the appearance of the stone when viewed closely, and especially if compared with a fine gem. Yet, at a little distance, such stones may have considerable brilliancy, and many are sold to people who want a lot of show for a little money and who are not oversensitive regarding perfection.

It may be remarked in this connection that, aside from the greater satisfaction of possessing them, it is better policy for the ultimate consumer to purchase only the better grades of diamonds, for if it is ever necessary to dispose of them, they are almost certain to be examined and ap-

praised by those who are trained in detecting flaws and bad colour, and a much more ready sale and a much more satisfactory price will result if the stones are in the better classes. While large numbers of poor stones are somehow moved in the trade, they never move themselves. A really fine diamond, however, will seldom lack a purchaser if offered a little under the market.

As to the effect upon value of the different degrees of imperfection it is very hard to give any definite rules. Values vary fairly definitely for size, and also for colour, and, within certain rather loosely defined limits, there is also some definiteness in the change of value with change in degree of imperfection. There are, however, so many factors entering into the problem that no attempt will be made to give actual values in dollars per carat. The

best way to learn such values is to actually deal in the stones, and those for whom this book is written have every opportunity to learn these values. It may be said that where fine colour is accompanied by great perfection, values are greatly increased because of the rarity of such a conjunction of fine qualities. If, in addition, the stone is of some size, that is another reason for its commanding a high per carat price. In small stones, however, especially in mêlée, while degree of imperfection is much less carefully scrutinized, many very perfect stones are to be found, as nature makes many perfect, or nearly perfect, small crystals to one large one.

A few words as to the best means of detecting flaws in diamonds may not be out of place. A good lens is a necessity, and one such as was described in the chapter on colour in diamonds is almost

ideal for the purpose. A good light must be obtained, and the stone should be held so that the light falls freely upon it. In using a lens it should always be held close to the eye (a watchmaker's lens will, of course, be thus placed if employed in the usual fashion), and the stone should then be brought up into such a position that it is in clear focus.

Diamond forceps should be used to hold the stone—the fingers are too clumsy, and also soil the stone, which should be carefully cleaned before examination if at all dirty.

Always examine a stone unset, if possible, as the mounting may hide imperfections. Make the examination systematic and thorough. Many a dealer has found flaws in a diamond only after weeks and months of ownership and after frequent examination. Begin with the back of the stone, first dimming it

with the breath. If there are flaws of any size, they will be at once apparent, and by reflection may appear more numerous than they are. In attempting to make the stone "face up" well, the cutter frequently leaves flaws in such a position that they are much more conspicuous from the back than from the front. This is a good reason for beginning the examination from the back. If nothing appears at first glance, examine the stone through each of the rear facets in turn, slowly turning the stone enough to do this.

Then reverse the stone, dim it, and look quickly at the front for flaws. If none are seen, examine the stone through each of the front facets in turn.

Make sure that an apparent defect is not the reflection of some small spot of dirt adhering to the opposite surface of the stone; also, be careful not to mistake a

reflection of thick spots on the girdle for flaws. Stones which are cut with too shallow a back frequently show such reflections through the table, and they are, therefore, less desirable, as, in addition to a certain lack of brilliancy, they may seem to be imperfect when in reality they are perfect in crystallization, although not in "make."

If no defects are noted, rest the eye a few minutes and again go all over the stone, hunting for even minute specks or feathers. Watch the reflections from the surface, as well as those from the interior, as cracks that reach the surface may thus be discerned, as well as badly polished facets, if such exist.

Sometimes diamonds have "knots," or spots where the grain is confused instead of regular, and these places are very difficult to polish properly and are frequently left with a lack of true flatness. This

condition should be discovered if it exists. Again, the brass fingers of the mechanical dop used in holding the diamond on the wheel sometimes mar the polish because of the working in of oil and diamond dust. These defects are very trifling sometimes and they would probably never be noticed by the public, and perhaps not even by dealers; yet, if one is to be as thorough as possible, all these points should be noted. If a very fine and valuable gem is in question and time is not pressing, it is a good rule to make no final decision until after a second examination on another day.

Of course, in purchasing closely graded lots from reliable houses no such minute examination is necessary; still, it is well even then to satisfy one's self as to the average condition of the lots and to find out about what per cent. of the stones in a lot approach perfection. A dealer who has diamonds to sell is apt to take an

optimistic attitude in regard to their merits, and it is a human necessity to find out for one's self the facts of the case. Even the optimistic salesman will have more respect for the dealer who finds out just what the salesman *already knows* about his own goods, than he will for the dealer who accepts as gospel truth all that is said about them.

CHAPTER III

CUTTING OR "MAKE" AND ITS EFFECT ON THE VALUE OF DIAMONDS

"There are at this mine ([Raolconda]) many diamond cutters, and each has but a single wheel, which is of steel and of about the usual size of one of our plates. They place but one stone on each wheel, and water it incessantly until they have found the grain of the stone. The grain being found, they take oil, and do not spare diamond dust because of its high price, in order to cut the stones more rapidly."—*Voyages de Tavernier.*

UPON the geometric form of a diamond, or the "make," as it is called in the trade, more depends than most people realize, and many jewellers even, although aware of some of the principal points respecting "make," might well be still better informed.

In this chapter an attempt will be made first to describe briefly the more usual

forms of rough diamonds and to give a brief account of some of the stages in the development of the modern cut. A few words will be devoted to the methods of the diamond cutter and the theory of the effect of the modern brilliant upon light will be outlined. The remainder of the chapter will be devoted to some account of the various types of make, good, bad, and indifferent, that abound in the market today.

Rough Diamonds.—Like common salt, the diamond crystallizes in what is known as the cubic system; but unlike salt, it seldom takes the form of a simple cube, although some Brazilian diamonds occur in that form. More usually the diamond is found in the form known as the octahedron. If one will imagine two Egyptian pyramids placed base to base, he will have an idea of the usual crystal form of the rough diamond. It is only occasion-

ally that the octahedra are regular and perfect in form; more often they are a bit distorted or, oftener still, they have lost edges or, rather, certain edges have failed to develop. As a result the diamond cutter has at times to deal with some very irregular shapes. Twin crystals occur and broken fragments also are found, adding to the task of the cutter. Sometimes the diamond crystallizes with twelve faces (like a very usual crystal form of the garnet), and often much more complicated crystals result. These are always, however, members of the cubic system of crystals. Now, John Ruskin to the contrary notwithstanding, even the best of these diamond crystals of nature is a dull and comparatively lustreless object beside a well-cut brilliant. The history from early times down to the present of the slow progress that has been made in the art of improving the appear-

ance of the rough diamond is exceedingly interesting.

However, but few words can be devoted to this subject here. While in very early times diamonds were used in the rough as adornments in India and while a few well-formed octahedra (known as "naifes") are still so used today, the natives of India very early learned to smooth up the rough natural surfaces by rubbing one diamond crystal upon another. In this manner some improvement was made in the appearance of the rough stones. They became more symmetrical and, if serious defects were present near the surface, they were thus removed, but the East Indian has always had a strong tendency in his gem cutting to sacrifice symmetry and to put up with defects, in order to save weight. The early attempts to cut diamonds did not, therefore, greatly improve the appearance of

the stones. It was only when someone discovered that diamond dust applied with oil to a metal plate would, on rapidly revolving the plate, attack the surface of a rough diamond and leave a brilliant polished plane or facet that much progress was made in the art of diamond cutting.

The earlier facetted stones were frequently very similar in general shape to the rough piece from which they were made. Tavernier, the French gem merchant and traveller of the latter part of the 17th century, tells us that it was only when a defect had to be covered up that the East Indian cutter applied many small facets to the stone, and in Tavernier's interesting account of his travels we find cuts made by his father and brother, who were map makers, showing a considerable number of facetted diamonds, among them the blue stone which Tavernier sold to Louis XIV and which was

stolen during the French Revolution. This gem was very simply facetted for so large a stone (nearly eighty carats). Other diamonds, pictured by Tavernier, which had evidently been found as octahedra, show the first crude approaches to the modern brilliant form. On top, one of the points of the octahedron had evidently been rubbed off, making a square "table," and the four slopes had become polished facets. The under side of the stone still kept very much the same form as when rough, a small culet having been formed by slightly rubbing down the corner of the crystal. One would have only to rub down the four edges of such a stone above and below the girdle to have what is now seen in cheaply cut mêlée, an "eight cut" brilliant. A considerable time elapsed, however, following Tavernier's day, before much progress was made in the development of the brilliant. The rose

cut, which lent itself to the cutting of thin, broad pieces of diamonds, first had its day, and a well-made, rose-cut diamond, having a thickness of about one half the spread and with twenty-four triangular facets on it, is a fairly brilliant stone. Its colour-flashes, while scattering as compared to a well-made brilliant, are, nevertheless, very beautiful, and being usually direct spectra, rather than reflections of spectra, they are often more intense in colouring than many of the flashes from a brilliant. In fact, when the brilliant form was first introduced (the old, square, thick "old-mine cut"), many people of taste are said to have preferred the well-made, rose-cut stones.

As the brilliant was gradually improved however, by rounding it up and thinning it, the brilliancy was increased very greatly, and when Henry Morse, of Boston, made a really scientific study of

the effect of the brilliant upon the light which entered it and found out the angles which gave the best possible results, and then religiously cut his diamonds in accordance with what he had found out, little room for improvement was left. A fine five-carat Morse cut stone which the writer has seen is about as handsome as any diamond to be found among stones more recently cut. There has been some further refining of the lines and angles, but the ideal brilliant is not far from the shape that Morse gave his stones. The necessity of sawing the rough, in order to save weight and thus cheapen the finished product, has brought us a flatter-topped stone with deeper back. It is very good, but certainly no better, everything considered, than the full-fashioned brilliant of the Morse type.

The *methods of the diamond cutter* have not changed so much since Tavernier's

time as has the shape of the finished product. Advantage is still taken of the "grain" of the rough stones, to rapidly cleave them in case the shape thereby may be improved or imperfections removed or the size made more salable.

The rubbing together of two stones is no longer done by hand; instead, one of the stones is set in wax in a handle to be used as a tool while the other is rotated at a moderate speed in a specially constructed, lathe-like machine. Thus the rough shaping of the brilliant is accomplished. The facets are then polished on in much the same fashion as in the seventeenth century, except that a special grade of rather porous iron takes the place of the steel lap and an ingenious mechanical holder or clasp displaces the soft solder-like alloy of earlier times. Instead of negroes, such as Tavernier saw, laboriously turning a large, wooden

wheel, belted to a small pulley on the spindle of the lap, neat electric motors now drive the even faster flying laps of today.

THEORY OF THE BRILLIANT

The object of the slow and laborious process of cutting and polishing the rough stones is really to obtain as nearly as possible a total reflection of all the light that falls upon the front of the stone. It is thus thrown back to dazzle the beholder.

At the same time that the brilliant serves to refract and reflect the light that falls upon it, there also takes place dispersion of white light into prismatic colours.

While there is no definite form which will totally reflect light falling upon it from every direction equally well, there has been worked out, both from theoretical considerations and from experience, a

shape that gives the maximum possible effect for light that enters the stone from the front. Departure by more than a very few degrees from the angles of this ideal shape results in a decrease of the brilliancy of the stone. Within the limits of one or two degrees there is little variation in brilliancy, but frequently greater variations are made with the object of retaining weight or spread, and then the product, while perhaps passably brilliant, would suffer by comparison with a finely-made diamond.

To obtain total reflection of light within the brilliant, the back slope must be laid at such an angle that no considerable amount of light shall strike it more steeply than about 24 degrees from a perpendicular to the surface at the point where the light strikes. Outside of that limit all light will be as completely reflected as though the back of the stone were silvered.

Moreover, the light thus totally reflected must again be totally reflected, in most instances, from the opposite back slope of the stone, and the path of the light must be such that, on emerging from the front, it will proceed for the most part somewhat nearly straight out. Since the angle at which light strikes a reflecting surface always equals the angle of reflection and since the amount of bending or refraction suffered by the light on entering the stone is definitely known for diamond, anyone with a little knowledge of geometry and trigonometry can calculate what angle the back slope should have after a definite angle has been chosen for the top slope. This latter must be chosen flatter than the back angle, for it must not reflect light across to the opposite side, but rather pass it out to the front. A calculation made by the writer gives as about the best angles for a

diamond 35 degrees for the top angle (angle of the top slope to the plane of the girdle) and 41 degrees for the back angle (angle of the back slope to the plane of the girdle). These angles accord very nearly with the best practise.

A brilliant that is cut much thicker than this is likely to leak light in the centre and thus to have the dark appearance known as a "well" in the region of the culet. If cut much thinner, it will also leak light in the centre, but in this case it will be mostly light that fails to be totally reflected at all. The resulting central weakness is known technically as a "fish-eye" effect. The light that is lost in the overthick stone has mostly been totally reflected from the first facets that it struck, but, on crossing to the opposite side, it struck the surface too squarely (that is, within 24 degrees of the perpendicular) and was thus able to penetrate

and be lost. Also, in the case of the overthick stone, light that strikes the top perpendicularly to the sloping facets may pass directly through the stone and out through the almost parallel opposite back facets. This makes the brilliant that is overthick appear somewhat "sleepy," as it is called in the trade; that is, there will be dark areas in it in certain positions when viewed from the front, whereas the well-cut diamond lights up almost equally all over, even when viewed from different distances and in different positions.

With this very brief and incomplete account of the bearing of the shape of the stone upon the passage of light through it, we pass on to consider the actual condition of things in the trade with regard to "make."

Although such stones are, for the reasons outlined above, less brilliant than well-cut ones, the market abounds in

"lumpy" (*i.e.*, overthick) stones. There are several reasons for this. In the first place, diamonds are sold by weight and have been increasing in price in recent years and anything that will permit a dealer to quote a lower price per carat makes sales easier. If a rough diamond is made to yield a little greater weight of finished product by cutting it 37 degrees and 43 degrees, instead of 35 degrees and 41 degrees, a lower price per carat can be quoted, both on account of the gain in weight and also on account of the slightly lessened labour which is involved.

The "spread" of a one-carat stone cut thus is not quite as great as that of a one-carat stone of good "make," but a customer cannot carry this slight difference of size in his eye from store to store while a quoted price per carat can easily be carried and compared with others. Thus there has been considerable temptation

to cutters and to dealers to make and to handle "lumpy" stones.

Such stones are, however, not as good a "buy" from the customer's standpoint as well-made stones at a higher per carat price, for it will be found in most cases that the well-made stone of the same spread, even at the higher per carat price, will weigh enough less so that the price for the piece will be less than that of the lumpy stone and at the same time the well-made stone will be more brilliant and will actually look larger at a little distance than the lumpy stone of greater weight. The lumpy stone is also apt to show the colour of the mounting through it and thus may appear of a poorer colour than it is.

Dealers should, therefore, consider pretty carefully whether it is not better business in the long run to look out for the customer's best interest and seek to sell him the well-made stone. If the

customer then indicates that he is seeking something at a lower per carat price, it will be time enough to show the lumpy stone and it will probably be wiser, on the whole, to explain frankly to the customer why it can be sold at a less price per carat. It is probably better policy to enlighten the public as much as possible in regard to gems rather than to seek to conceal knowledge. More critical customers may result, but also more appreciative ones, and demand will in the long run be greatly stimulated by the spreading of knowledge about precious stones. People cannot demand that of which they have never heard.

In connection with the subject of "lumpy" stones it may be added that "old-mine" stones show in an exaggerated degree the effect of using too great thickness for the spread. They are, therefore, lacking in brilliancy as

compared with modern-made stones. While they do not give as many or as closely packed reflections as the newer type of brilliant, the "old-mine" stones throw a few large and vivid spectra, as can be seen by holding one in the sunlight and receiving the reflections on a white card held in front of the stone. The superiority of the "old-mine" stone in this respect is due to the fact that a considerable number of its spectra have never been reflected, but are formed from white light as it emerges from the stone after having been reflected as white light, without previous refraction, from an inner surface of the stone. The shape of the modern stone is such that many spectra are reflected before emergence and so are weakened somewhat in their colour brilliancy. The increased number and the closer massing of the reflections (as can be seen by use of the sun-

light and a card), however, more than compensate for the loss in vividness that results from the modern "make." It may be added here that there are a few cases in which it is not only justifiable, but even necessary, to cut a diamond thick. Such is the case when a tint of desirable colour—say, for example, blue—is to be retained, or if possible, enhanced. Here the slight loss in brilliancy is more than offset by the gain in colour, and many "fancy" diamonds are on this account cut rather thick. In fact, it is sometimes possible to cut out all the colour by making such a stone too thin. The thinking reader will at once perceive that a trace of undesirable colour may also be removed by thinning a brilliant, and cutters make use of this device in improving the colour of the rough that they receive where the gain in colour will compensate for the loss in weight.

In case the rough stones to be cut are thin in shape, or in cases where they have been cleaved or sawn to thin-shaped pieces, a lumpy stone cannot be fashioned, on account of the loss of weight that would result. Nor would it always be practicable to shape finely-made brilliants from such material. Here we have the explanation of the origin of so many overspread stones that appear on the market.

Now, as was before explained, the overspread stone, like that which is overthick, leaks light and is thus less brilliant than the well-made stone, especially in the centre. The term "fish-eye" is applied to designate this weakness when it is pronounced. Such greatly overspread stones are very undesirable and should be sold only when great spread for little money is desired, and then only after an honest explanation of the matter.

Where the overspreading is less exaggerated, however, the resulting brilliant may be a fairly desirable stone, more so probably than the lumpy stone, as diamonds are bought for their effect, and more effect may be had for a given price in a somewhat overspread stone than in a lumpy one. The finely-made stone will, however, shame the overspread one if placed beside it, for the centre of the "spread" stone will appear weak at one distance or another from the eye, while the finely-cut stone will perform well at all distances. In addition to the central weakness in thin stones, there may be visible through the table a reflection of any thick places on the girdle if the thinness is due to deficient depth back of the girdle. This is bad, for the reason that such reflections look like flaws in the stone.

This trouble is avoided in sawn stones by distributing such thickness as is

left after sawing, so that rather more than two-thirds of it is behind the girdle, thus giving a sufficiently large back angle, but making it necessary to give the stone a very wide table, in order to make a good top to the stone. The facets on the crown of the stone then become short and broad, but sufficiently steep in slope to give good brilliancy to the finished stone, especially when viewed from directly in front. Seen as tipped to one side, however, such shallow-topped stones are not equal to full-fashioned stones. Here again the dealer has a chance to inform his customer as to desirability and values, and then let him make his own choice.

Another common fault in "make" arises from the fact that more weight can frequently be saved by not cutting a stone perfectly round. Most stones are fashioned nearly enough round to deceive the average eye, when mounted, but

even those in the trade will be surprised at the large number of stones that would fail, on accurate measurement, of showing true roundness. If the defect is slight, it is of little moment, but the price should not be quite the same as that for a perfectly round stone. If the lack of roundness is apparent, the value is considerably reduced and the stone should then be used in connection with some design that is artistically adapted to its special shape. In the case of the round stone, if the angles of the brilliant are correct at *any* point, they are correct at *every* point. The maximum brilliancy thus results. In the case of a square stone, if the angle from a corner to the culet is correct, then the angle from a side to the culet cannot be quite correct. Thus, fancy-shaped stones frequently lack somewhat in brilliancy, and the further the shape departs from the round, the less brilliant

the gem is likely to be. Elongating the culet to match the shape of the stone contributes somewhat to reduce this lack of brilliancy. Stones in the navette form for marquise rings are on this account frequently cut with a long, narrow culet.

Having described some of the principal faults in "make," it remains to describe more definitely the well-made stone and to tell how it may be recognized. As was said above, the finely-made brilliant does not depart by more than a degree or so from the 35-degree and 41-degree relation of front and back angles. Most dealers, however, are not provided with suitable gauges (goniometers) for the accurate measurement of the angles of small objects, like diamonds, nor have they the requisite skill to use them. The best and most careful American cutters, those who work only on fine goods, are constantly

testing the make of their brilliants as it develops on the lap, and they have gauges of various types for this purpose.

For the dealer a few simple measurements will serve nearly as well, but it will not do to trust altogether to the eye, as very few people have sufficiently well-trained eyes to obtain accurate results in that manner. One who is expert in the business can tell at a glance whether a brilliant is or is not well made, but when it comes to telling whether it is as finely made as it might be, some sort of accurate measurement is necessary.

A measurement of the angles being impossible to the dealer, the measurement of the spread and thickness, taken together with a measurement of the proportion of the stone above and below the girdle and that of the width of the table, will give nearly as good results, for these dimensions virtually measure the angles

of the stone. The standard dimensions for a finely cut stone are as follows:

First.—The spread should be not quite twice the thickness. A ratio of 5 is to 3 gives very nearly the correct proportions. On measuring a stone it is well to make a proportion in which 5 is related to 3 in one member and the actual spread (say 20, for example) is related to the unknown value X in the other member, thus:

$$\frac{5}{3} = \frac{20}{X}$$

$$\text{solving, } 5X = 20 \times 3$$

$$= 60$$

$$\text{whence } X = \frac{60}{5} = 12.$$

Accordingly, a brilliant measuring 20 in spread should measure about 12 in thickness.

Second.—The position of the girdle should be such that very nearly one-third of the thickness (a very little less) lies

above it, with just a bit more than two-thirds below.

Third.—The width of the table should be about four-tenths that of the stone. It will then very nearly equal the length of each of the principal top facets (or the slope of the crown).

The measurement of these dimensions might be made with any accurate calipers, but the Moe diamond gauge, which every pawnbroker uses, but which too few jewellers use, is perhaps more convenient than any other instrument. The numbers on it are arbitrary and not simply related to the metric system; but, as the relation of the different dimensions to each other is all that is needed, this is immaterial. Aside from its use in measuring brilliants with a view to the study of their make, the Moe gauge is a means of finding the weight of a brilliant, even when set, to within a very few hundredths, and in this

connection (this is what it was designed for) it should prove invaluable to the retailer who frequently has to estimate weight and who is too often seen to do so by considering only the spread, using one of the common devices for determining the sizes of stones, a very inaccurate method.

It has taken much longer to indicate how one may measure a brilliant and what measurements to consider desirable, than it would take actually to make such measurements. When purchasing, especially when comparing the make of two different cutters or dealers, it will well repay one to make these measurements and thus find out exactly how things stand. It is very easy to be mistaken in the diamond business. Mistakes cannot always be passed along to the less informed customer, and they are sometimes likely to be costly.

In conclusion, a few words as to *finish* in connection with make should be added. The well-cut stone must be perfectly symmetrical. All the facets of a given set should be alike in size and shape. No additional facets should appear. It is a common practice to add a few tiny extra facets in order to finish the entire surface without undue loss of weight. This is especially likely to be done near the girdle. While not a bad defect, it counts a little against the stone in the matter of value. Such a stone is worth more than the slightly smaller one that would have resulted had it been cut to complete symmetry but less than one of the same weight perfectly made.

The make of the girdle should be especially scrutinized, as a good deal depends upon it. If too thick, one has to pay for weight that is worse than useless, for, if unpolished, the dull gray edge may be

reflected within the stone, hurting the colour and brilliancy. The very best stones have either a knife-edge girdle or one that is polished. Commercial stones seldom have either. Too thin an edge may result in chipping during setting. Of the stones with polished girdles some have a curved polished surface and some have a series of tiny facets polished on them. Optically the latter are to be preferred, as curving surfaces do not give the sharp reflections given by perfectly plane ones.

The finish of the surface of each facet on a brilliant should, of course, be perfect. The facets, as formed on the wheel, have lines on them, owing to a lack of perfect flatness of the wheel. These lines are polished out at the last by giving the stone a rapid but slight lateral motion while it rests on the wheel. If this is not done thoroughly, lines may remain on the finished stone.

CHAPTER IV

REPAIRING AND RECUTTING AND THEIR EFFECTS ON THE VALUE OF SOME DIAMONDS

"They are square and pointed of their own kind, both above and beneath, without work of man's hand; and they grow together, male and female, and are nourished by the dew of heaven; and they engender commonly and bring forth small children, that multiply and grow all the year. I have oftentimes tried the experiment, that if a man keep them with a little of the rock, and wet them with May-dew often, they shall grow every year, and the small will grow great; for right as the fine pearl congeals and grows great by the dew of heaven, right so doth the true diamond; and right as the pearl of its own nature takes roundness, so the diamond, by virtue of God, takes squareness."—*The Voyages and Travels of Sir John Maundeville.*

THE previous chapters on colour, flaws, and make in connection with the value of diamonds have been of general application. The present chapter, dealing as it does with *repairing*

and *recutting*, does not apply to every diamond, but only to the few stones that come to grief or to those which for one reason or another were not well made when originally cut.

Notwithstanding the fact that it is only occasionally that a dealer in diamonds is called upon to use his knowledge of what may be done in the way of repairing or recutting, there is considerable need of an adequate knowledge of the matter for use on such occasions. Many jewellers have suffered unnecessary losses through lack of a complete understanding of the possibilities.

Some attempt will therefore be made to acquaint those who may lack experience, with the usual kinds of injuries that occur to diamonds and with the possibilities as to the repair of such injuries and the effect upon the value of the stones. The remainder of the chapter will, then,

take up the recutting of diamonds, and in this connection an effort will be made to indicate clearly when recutting is necessary and justified. The probable loss in weight, cost of the work, and increase in value per carat will be considered.

Perhaps the most common sort of injury to diamonds that is met with in the trade is the chipping of the edge, or girdle, of the brilliant during the operation of setting the stone. The popular opinion that the diamond is too hard to suffer mechanical injury seems to be shared by some setters whose careless use of a file frequently results in lifting a tiny flake from the upper surface of a brilliant. While the diamond is much harder than a file it is not as tough, and might actually break under the tiny blows that result from the passage of the rough file. More often, however, a thin layer of diamond *splits* off, owing to the very perfect cleav-

age of diamond, which causes it to split easily in certain directions. When this happens, the appearance of the brilliant is sometimes badly affected, the rough cleavage surface being reflected from every part of the stone and giving the impression to one not familiar with this type of injury that the stone has been ruined.

The writer well remembers the panic-stricken condition of a jeweler friend when he first encountered a case of this kind. A valuable stone was thus flaked in being set and a trip was at once made to a near-by city, where a diamond cutter was available, the jeweler being all this time in a very unenviable frame of mind. As the jeweler entered the shop of the diamond cutter, his long face at once attracted the attention of the cutter who asked the nature of the trouble. The damaged stone was produced, where-

upon the cutter laughed in the jeweler's face and told him to cheer up, for in a half-hour's time the stone would be as good as new and would weigh within a few hundredths of its former weight. The cost of the repair was in the neighbourhood of one dollar, and the jeweler's car-fare was the largest loss suffered that day.

In this case the injury was really very slight, the chip that flaked off being very thin. It concerned but two or three facets, and the repolishing of these did not noticeably alter the symmetry of the stone, or appreciably decrease its weight.

When such injuries are deeper, the loss may be more serious. If the edge of the stone is nicked, it should be rubbed down, and this may in turn destroy the roundness of the brilliant, thus making it somewhat less desirable. If the break is of

appreciable depth, it may be necessary completely to recut the stone, and in most cases this causes quite serious loss of weight.

A case of this sort occurs to the writer. A perfect brilliant of 2.25 carats and rather overspread was somewhat deeply damaged on its upper surface. The flaked place extended from girdle to table and indented the girdle perceptibly. On recutting, a perfect, well-made brilliant of 1.87 carats resulted, the loss in weight being but .38 carats. In this case there was considerable loss of spread; but, as the brilliant was originally overspread, the resulting stone was much finer than before it was injured.

Another case that was recently observed will suffice to show about what proportion of loss may be expected in case of fairly extensive injury. A brilliant of 1.50 carats and as finely made as

possible was struck against a radiator and a chunk knocked out of the upper surface. The injury was in the nature of a channel-like groove running from table to girdle. It necessitated an almost complete remaking of the stone to a smaller size. When finished, the resulting brilliant was not nearly as well made as before. It was not quite round and was somewhat lumpy. It weighed nearly 1.25 carats, however, so carefully had the cutter avoided loss of weight.

Whenever a stone that is owned by a jeweler or by his customer is injured, it should be sent at once to a competent diamond cutter, who, unless he is instructed to remake it to the ideal proportions, regardless of loss of weight, will use his best judgment in repairing the injury so as to leave the stone in the "best salable" condition. The former method of treatment is seldom justifiable. In

the case of a gem diamond it would probably be the better policy.

When an injured diamond is offered for sale, there may not be an opportunity to have it studied by an expert cutter, and in that case a jeweler must become his own expert and estimate what sort of stone will result from the repairing of the damaged brilliant before he can make an intelligent offer for it. The tendency of jewelers who are not experienced in such matters is always to make a very low offer, so as to be on the safe side. A little study of the stone with a Moe's gauge will speedily give one a very close idea as to the weight of the remade stone, and then an offer can be made that will leave sufficient profit to pay for the skill required in estimating and for the risk that is taken and yet give the unfortunate possessor of the damaged stone a much fairer return than he would secure if the result was arrived

at by guessing. It would be fairer still to advise the owner to intrust the stone to the jeweler's care in order that it might be sent to a cutter and be repaired or recut, and on this transaction the jeweler would, of course, realize a reasonable profit.

Apart from those injuries that result from blows, either at the hands of the careless setter or while being worn as jewels, diamonds may be more or less damaged in other ways. For example, if a "lot" of brilliants is carried in a wallet in the pocket of a salesman for a long time and much exhibited the stones may become somewhat "paper worn." By this is meant the abrasion of one stone on another, which will in time, even in the case of the diamond, wear down the sharp edges, giving a slightly dulled effect to the brilliants. A prominent diamond-cutting firm estimated their loss for a single year

from this cause at $1200. This sum included both the cost of repolishing the stones and the loss of weight involved. It is a case of "diamond cut diamond." The Arabs have a legend to the effect that the diamond is an angry stone and that it must not be kept in company with other stones or it will scratch them. It might be added that it should be kept in solitary confinement, lest it injure its own kind.

When brilliants have become "paper worn," a light repolishing will, of course, remedy the defect.

A similar condition is sometimes seen on very old diamonds as a result of wear. While they may never have been rubbed against other diamonds, yet as a result of many light knocks or blows the sharp edges especially the more exposed ones around the table, may have yielded minutely, producing thereby a slightly dulled condition.

Here, again, repolishing will restore the brilliancy.

A condition somewhat resembling that of the paper-worn stone is sometimes seen in brilliants which have too large a back angle. "Old mine" stones frequently show this condition on the back edges. Here the defective state is due to the fact that the edges of the facets lie parallel to the grain of the diamond. It is almost impossible to put a good polish on a surface or edge that lies exactly parallel with the grain of any mineral having a pronounced cleavage. The modern cut brilliants, being flatter, never have facets exactly parallel to the grain unless they are cut very lumpy. When a brilliant is found to be suffering from this condition, it should have the back recut sufficiently, so that the new facets will cross the grain obliquely. A perfect polish will then result.

Another kind of injury which might at first sight occasion despair, sometimes results from the exposure of a diamond to the heat of a fire, as when a house burns. In one such case a pair of brilliants of about one carat each was apparently ruined. The appearance was much like that of old, worn "white stones." The oxidation of the surface had left it rough and snowy in appearance and all brilliancy was lost. This particular pair of diamonds was repolished and made as good as new with a very trifling loss in weight. The damage was entirely superficial.

The too-prolonged use of a very hot blowpipe flame, as in platinum working, may similarly affect the surface of diamonds. While difficult to burn, diamonds will actually unite with the oxygen of the air if heated sufficiently while exposed to it, and care should be taken, there-

fore, not to overheat them. Repolishing will, of course, remedy the blemish, but most of the injuries of this sort that the writer has met with have been in the case of *mêlée* and it will not pay to repolish small stones in this country.

RECUTTING

Having considered the principal kinds of injury to diamonds and having shown how these injuries may be remedied, the complete recutting of poorly-made diamonds is the next subject to occupy our attention. Aside from the remaking of badly damaged stones, to which consideration has already been given, the need for recutting is usually due to one of three causes: (1) Antiquity of the existing make; (2) overthickness, or, as it is sometimes called, extreme *lumpiness*; (3) an *overspread* condition. Perhaps the

first among these in point of importance is the antiquity of the existing make.

Diamonds in the old-fashioned square or cushion shape, with overthick make and with a large culet are known in the trade as "old-mine" stones. The name is doubtless due to the fact that all such stones came either from the old Brazilian mines or from the East Indian mines. Since the discovery of the South African mines the style of cutting has been more modern than the true old-mine cut.

Considering, first, the old-mine stones, it may be said that they are becoming somewhat scarce, for most of the best and largest ones have already been recut to modern form. There are still many fine old-mine stones scattered over the country, however, and jewelers occasionally have an opportunity to pick them up at bargain prices. Too frequently this opportunity is lost to the jeweler through

a lack of appreciation of just what can be done in the way of recutting them, and then the old-mine stone goes the natural route to the pawnbroker's office, where it frequently receives more consideration than it secured from the jeweler. The pawnbroker is almost invariably equipped with a Moe's gauge, which he knows how to use, and he can generally tell to within a few one-hundredths of a carat what an old-mine stone will yield on recutting. By gauging the width at the narrowest point and allowing for a thickness which is to that width as three is to five; then, looking up the weight of a thin-edged brilliant of those measurements in the tables that accompany the gauge, one can tell to within a very few hundredths what the old-mine stone will return when well made. Too frequently more thickness is kept than should be and a lumpy stone results. Such stones are

bound to have a "well" in the centre, and it will usually pay better to have a reasonably well-made stone cut from the old-mine brilliant. This is especially the case if the colour and perfection are fine, and among old-mine stones one will often find superb colour and perfection. The South African mines, while yielding occasionally gems as fine as nature ever produced, do not average as well as did the Indian and Brazilian mines. The latter produced "river" stones, and even in South Africa the stones from the "river" or "wet" diggings average better than those from the mines. This is probably due in part to the survival of the fittest stones in the rude struggle of the turbulent streams. In part, the purity of colour may be due to long extraction with water. At any rate, the old-mine diamonds are frequently harder, purer in colour, and more bril-

liant than most of the modern African stones.

Now the writer has abundant evidence that many jewelers are not as well aware of their opportunities in this matter as they might be, and the lack of knowledge is not confined to the small dealers of limited experience. For a concrete example, let us consider an actual case that occurred in a large eastern city. A pair of diamond eardrops having been left by the will of a very old lady to her grandson, the latter took them to one of the largest and best-known jewelers in the East to have them appraised, along with other diamonds in order that the inheritance tax might be paid. The eardrops contained two perfect old-mine diamonds of cushion shape and of a combined weight of 4.50 carats. They were perfectly matched and well cut for old-mine stones. The colour was at least top crystal. The diamond buyer

of the firm in question, after appraising several modern cut stones of smaller size than the old-mine stones, took up the latter, looked at them casually, and tossed them aside, remarking that they were old-timers and that $300 was all that they were worth, and that one of the smaller but more modern brilliants was worth more than both of them!

Somewhat later the owner of the old-mine stones wished to sell them, and on the advice of the writer permitted the careful recutting of the stones before exposing them for sale. The cost of recutting was six dollars per carat and they yielded a perfectly matched pair of finely-made brilliants weighing four carats for the pair and so well were they matched that they balanced each other perfectly on a fine diamond balance. The colour was improved by the recutting to a good "Wesselton." They were sold

to a diamond cutter for over $700, and when their gem character is considered, the purchaser got them cheaply. While it is true that such cases are only occasional, and while the diamond man was doubtless up to the minute on values as they concerned modern stones, yet there are opportunities every now and then for those who will study the remaking of diamonds which in a dull month may make the difference between profit and loss.

Another case from the writer's experience may give further point to the lesson. On this occasion a stone of still more ancient make was in question. It was a "rose" cut diamond of three-quarters of a carat, and of a pink-white colour—a "fancy" pink in fact. It was mounted in a stud and exposed for sale for $20 in a jeweler's window in the Middle West. What an interesting tale that old "rose"

could have told of its experiences since it had been cleft from the rounded cheek of a great Indian diamond from the Golconda mines, perhaps in Tavernier's day! But it was soon to undergo a more humiliating experience than any it had met with in its long career.

A student of gems peering into the jeweler's window in search of experience noted the ancient make and the extraordinary price and dove into the shop in search of hidden treasure. Within was the proprietor, a man trained by years of experience in the almost exclusive dealing in diamonds and who occasionally visits the diamond-cutting centres of the Old World to purchase gems. With him was a diamond man from the East, seeking to sell an order from his extensive stock. The student of gems asked to see "that $20 diamond," and it was passed to him. A moment's look assured him of

the genuineness of the material, and a little further study near the door, where the light was good, revealed the unusual colour of the stone. It was practically perfect, and the minute imperfection was superficial and would have to be removed in recutting the "rose" to a brilliant. The thickness was extraordinary for a "rose" and would make possible a fairly well-made, round brilliant of nearly as great a spread as that of the "rose."

Bent on having a little quiet fun, the student asked the dealer if he was sure it was a diamond. The dealer, instead of replying himself, turned the stone over to the diamond salesman, saying: "This gentleman is an expert diamond man from New York. We'll see what he calls it." The salesman looked at the "rose" carelessly, tossed it across the counter contemptuously, and said: "White sapphire!"

Perhaps the pink in the cheek of the old rose deepened a bit at that remark; at any rate, the pink is still there. A swift test by scratching a bit of carborundum crystal confirmed the student's opinion that the stone was real, though unappreciated, and a reduction of a couple of dollars in the price being offered by the dealer as an offset to the New Yorker's bad opinion of the stone, the rose changed owners. It made a perfect pink-white fancy gem of one-half carat and it took six weeks on the wheel to do it; as, being a cleavage from a larger stone, the grain lay parallel to the table as remade, bottom up, and all of the top facets had to be cut largely against the edge of the grain. Those old Indian stones are harder, too, than the African diamond dust that was used, hence the time required to "make" the brilliant. Of course, the product was worth somewhat more than eighteen dollars plus

the very moderate charge made by the cutter for so arduous a task.

Such "bargains" do not occur every day, but the dealer can well afford a little study outside of his every-day line, not only that he may keep for himself the "bargains" that he comes across, but also that he may become a more intelligent and interesting salesman. Such salesmen can do a profitable business with wealthy but informed customers.

In addition to the ability to determine what weight an old-mine stone will return, there is need for a very expert knowledge in order to tell whether defects in the old-mine stone will or will not remain in the product that is recut from it. It is a hard matter at times to say whether defects are deep or superficial. If deep, they will, of necessity, remain in the recut stone, and in such cases it may be inadvisable to purchase the stone or to recut it. So great is

the refraction of diamond that a speck may be a long way from the spot where it appears to be just as a fish is never where it appears to be when seen through the water obliquely to its surface.

Now if one looks straight down upon the surface of a transparent medium, whether water or diamond, any object within appears to be just where it is. The depth below the surface, however, remains unknown. To ascertain this, one should next view the stone exactly at right angles to the first line of sight. To do this is seldom possible, however, with a cut diamond. When in the rough, the cutter can "open up" the stone; that is, polish a tiny spot on the surface through which to study the interior and then, if a defect is seen below, he can polish another spot on one side exactly at right angles to the first, through which he can determine the depth of the defect.

In the case of the cut stone, when no line of sight can be had that is perpendicular to a facet and also to a previous line of sight, much can be done toward determining the depth of a defect by using a high-power lens, say, one of one-fourth inch focal distance. First getting the *surface* above the defect into sharp focus, next move the stone toward the eye or the glass toward the stone until the *defect* is in sharp focus. The amount of motion necessary measures the depth of the defect below the surface. Having determined the exact position of any defect, it remains to construct in the imagination the recut stone within the old-mine stone and thus to decide whether the defects will or will not be included in the finished brilliant.

A concrete example in this connection may not be without interest:

There was once in a certain pawnshop a little old-mine diamond of about

.75 of a carat which was so blue that it might be called a deep fancy violet stone, but, when seen in a certain position, a brownish tint appeared within. The owner doubtless believed it to be a "false colour" stone, although he did not mention that fact when he offered the old stone to the writer for a moderate price. On close examination it was noticed that there were several tiny cracks within the stone and that each of them had within it some brownish colouring matter. The brown tint that appeared in certain positions was due to the presence of these defects and was not inherent in the transparent material of the stone. A careful study of the position of the defects showed that they would one and all come out on recutting the stone, and it was confidently expected that nothing but violet material would remain. This proved to be true and a superfine fancy violet

cushion-shaped specimen-cut brilliant of .42 of a carat resulted. It fluoresced to a surprising depth of violet in sunlight or in the light of an arc lamp. It phosphoresced markedly in the dark after exposure to a strong light. In fact, it was an exceptional gem and it finally became the property of a wealthy connoisseur at a price which afforded both parties a good bargain.

It must not be thought that such cases occur very frequently or that one may not have bad luck or use bad judgment in such matters. Several losses have taught the writer that not every old-mine stone has the makings of a gem. It will, however, pay almost any jeweler to study the remaking of diamonds, for, even if he gets little chance to use his knowledge in the actual recutting of old-mine stones, it will certainly make him more expert in detecting faulty make in modern cut stones.

This suggests the need for recutting

that is sometimes met with in modern cut stones, and, as was suggested earlier in this chapter, such stones usually fall into one of two classes—first, those that are *overthick*, and second, the *overspread* stones.

It is surprising what a difference in appearance a slight alteration in the angles of a brilliant will sometimes make. One case that comes to mind was that of a perfect brilliant of .87 of a carat that was too lumpy, and consequently "sleepy" in the centre. The colour was about that of a good "Cape." On recutting, the stone returned .78 of a carat, losing only .09 of a carat. It was of ideal brilliancy and had improved in colour, as faced up, to a good "Silver Cape." The few dollars that were paid for the recutting and the slight loss in weight were more than compensated for by the increased value per carat. The spread in this case was left

just as it was before recutting, but the stone actually looked considerably larger after recutting because of its increased brilliancy.

Another case shows in even a more striking manner the effect that may be had in some instances from a slight change. A perfect brilliant of .54 of a carat was sleepy-looking. The jeweler who had it did not like the looks of it, but did not know what was the matter. He offered it for sale at a low price. On studying the make of the brilliant it was noted that the culet had been left overwide, thus leaving the back angle too steep, just as though the stone had been made too thick. It was *not* too thick for the spread, as careful measurements showed. Probably the stone had been recut from an "old-mine" stone with a broad culet and the culet had been left broad from a mistaken reluctance to lose weight.

Even a skilled diamond cutter, to whom it was submitted, at first made the mistake of judging it to be too thick. When asked to measure it, he had to admit that the relation of spread to thickness was just about what it should be. His attention was called to the width of the culet and its effect on the back angle. A measurement of that angle showed it to be about 45 degrees instead of 41 degrees, as it should have been. By recutting the back so as to leave only a very tiny culet, and by failing to extend the principal back facets quite up to the girdle, a back angle of 41.5 degrees was obtained. The recut stone was exceedingly brilliant, its colour, which was blue Wesselton, was made more obviously fine, and the loss in weight was but .04 of a carat.

It must not be thought that such results can always be had with so small a loss in weight, and in many cases of somewhat

lumpy stones recutting would not pay, but whenever there is a marked "well," especially if the quality of the stone as to colour and freedom from flaws is good, recutting to more nearly the ideal form will pay.

In the case of *overspread* stones the central weakness or "fish-eye" effect can be corrected by recutting to reduce the spread. As spread is a very desirable feature in a diamond, care must be used not to reduce it unnecessarily. If the central weakness is not marked, more money can be had for the slightly overspread brilliant than could be netted, after paying for recutting and taking the loss in both weight and spread, from the well-made recut stone. When the central weakness is notable, recutting should be resorted to if the material is fine. In such case the recut brilliant should be left slightly overspread, or at least very well spread, for

such a product will yield more than a finely made stone in such a case, unless one is dealing with gem material. Fine gem material deserves the best possible make, and it will usually sell for enough to justify any loss in weight incurred in making it to the correct angles.

As an example of what one may expect to lose in recutting an overspread stone, the case of a 2.25-carat brilliant, which was obviously but not grossly overspread, may be mentioned. It yielded a gem of 1.87 carats. Had it not been very fine in quality, it would probably have been better to leave it as it was and sell it to some one demanding a big show for relatively little money.

A final word in regard to recutting may be of service to some who will, perhaps, on rare occasions meet with a broad, thin rose-cut diamond. Hardly ever do these justify recutting to brilliants. An at-

tempt of the author in his early experience yielded from a rose of the spread of a 2-carat brilliant and with a weight of about one carat, only a poor fish-eye brilliant of .37 of a carat. Sometimes it would be impossible to make anything better than a one-eighth carat brilliant from a 1-carat rose of flat shape. A measurement of the thickness of the rose with a Moe gauge and a comparison with the tables (allowing for a relation of 3 is to 5 between the thickness and the remade spread) will tell one what may be expected from a remade rose. It should also be remembered that most roses were cut from cleavages and that the grain will usually be found to lie parallel to the flat back of the rose, so that the cutter will have to do most of his work directly against the edge of the grain, making progress very slow.

An account of an interesting experiment that was tried by the writer with an

old flat rose will conclude this chapter on recutting. The shape of the base of the rose was about like that of an almond. It was recut to resemble the part of a drop-shaped brilliant that appears above the girdle. From a piece of rock crystal a back was cut to fit this diamond top, and the two were balsamed together, making a diamond doublet in which real diamond formed the upper part or crown of the stone. The resulting product was disappointing. It had the correct surface lustre, but did not have the snap of a diamond. Both the white brilliancy and the colour play were defective. On holding the doublet in the sunlight and letting the reflections fall on a white card it was noted that *double* images of each of the reflecting facets appeared, the quartz being feebly doubly refracting. A reflection of the back surface of the diamond top also appeared on the card

(this gives a very good method of detecting a doublet even when close set, for both the table and the back surface of the diamond top produce bright *white* reflections of large size on the card).

A new back was cut from "paste"—which is singly refracting and which has a higher index of refraction and a greater dispersive power than quartz. The doublet thus constructed was better than before. It would have passed as a rather lifeless diamond with the public, but any one familiar with diamonds would have wanted to know what was the matter with it. Of course, its chief optical failing, aside from the loss of light occasioned by the reflection from the back surface of the diamond part, was the comparatively low index of refraction of the "paste." It leaked light through the back facets, as could be seen by holding it between the eye and a light and tipping it slightly to

either side. A finely cut diamond leaks only directly through the culet, which is of course, very small. The author has ceased to hunt for anything that "looks just like a diamond."

CHAPTER V

MOUNTING AND ITS INFLUENCE ON THE APPEARANCE OF DIAMONDS

". . . . to arrange, display, and set the gems so as to produce the best effect, and present the most striking and captivating appearance."—*A Treatise on Diamonds*, by John Mawe.

IN describing some of the effects of mounting upon the appearance of diamonds, the author will treat the subject from the optical side. He will try to show how and why the mounting influences the apparent colour of a diamond.

It will be remembered that it was suggested in the chapter on colour in diamonds that tinted walls or other coloured surroundings must be avoided if a correct judgment of the colour of a diamond was

desired. The reason for this precaution was that diamonds reflect the colour of their surroundings to a surprising extent. It is related in Cattelle's very complete treatise on diamonds that the painting of the wall of a building in the Maiden Lane district in New York once precipitated a lively dispute between the owner of the building and the diamond dealers in the vicinity. The latter could no longer judge or grade diamonds accurately because of the reflection of coloured light by the tinted wall. The offending surface was finally repainted to a neutral colour and peace was restored.

Now a diamond can similarly reflect coloured light that has first been reflected from the material of its mounting. While the area of the latter may be slight, nevertheless it is placed relatively near to the stone, and hence may have a powerful effect upon the apparent colour of the

diamond. As slight differences in colour make considerable differences in value, there is need for great care in mounting stones lest a brilliant of fine colour be made to appear mediocre, or one of fair colour be made to appear off-coloured. In addition, it is possible by skilful mounting to improve the apparent colour of stones, which gives the dealer an opportunity to offset to some degree the slowing up of sales, due to the continuous advance in prices of the last eight or ten years.

OPTICAL CAUSES OF APPARENT COLOUR CHANGES

If one hold a diamond in front of a window composed of several different colours of stained glass and move the stone until it has been placed before each of the coloured panes in turn, he will realize clearly what a vast difference in

apparent colour is made by the character of the light that falls upon a diamond. Now metal surfaces, especially if polished, reflect light of what we call their own colour. In point of fact the individual colour of any particular metal is due to the selective power of its surface to reflect only light of certain colours, while absorbing the remainder. Light that is thus reflected acts exactly like light that has been strained, so to speak by passing through the coloured window-panes in the experiment suggested above. Such light may then be further reflected in a diamond and emerge, still coloured, giving the impression that the diamond is of the same tint as the metal in which it is mounted.

The well-cut diamond is so shaped that light does not readily enter it from the back, but is, instead, reflected away from its outer back surfaces laterally, and thus

never appears in front, to prejudice the observer as to the colour of the stone. This effect, however, is not complete, and some light may get into even a well-made stone, especially if it approaches the back surfaces somewhat perpendicularly. A *lumpy* stone is prone to admit light that has been reflected from the mounting and to permit its escape to the front. Perhaps a simpler way to state this fact would be to say that a lumpy stone is more transparent than a well-cut one (not in substance, but owing to its shape), and that, therefore, the mounting is more easily visible through the stone. An *overspread* stone would also permit the passage of reflected light from the rear to the front, but in this case only the centre of the stone would be likely to offend, and there is seldom any metal close enough to make much difference. It is the nearly parallel relation of the

upper and under facets in the lumpy stone that permits the direct passage of the light between front and back. This suggests the expedient of so placing the stone and its mounting that no metal is directly in line with a perpendicular to the facets that are thus so nearly parallel. A spreading Belcher mounting, for example, would have no metal in the incorrect position and would, therefore, be less visible through a lumpy stone than a mounting which tapered the other way and hence kept close to the rear facets of the stone.

Aside from the need of so shaping the mounting that no part of it is directly visible through the stone, it is also important to study the colour of the material of the mounting with reference to its being reflected in the stone.

The metals most in use for the mounting of diamonds are 14-karat gold and platinum. Considering first the gold,

it may be said that the character of the surface, as to whether it is left dull or polished, makes some difference in the apparent colour of a diamond. A dull finish is probably less likely to hurt the colour of a stone than a very bright one, for the former is a poorer reflector. If in addition to being left dull, the surface is coloured with very pure gold, or Roman finished, the very yellow metal may cause even a somewhat off-coloured diamond to appear white in comparison. A really blue diamond might, by contrast of the complementary colours, blue and yellow, have its blueness enhanced by being mounted in a dull, pure gold surfaced setting. Caution should be observed, however, not to violate the rules already set forth as to shape of mounting, lest yellow reflections by blending with the blue of the stone neutralize the more valuable colour. The contrast sought is between

the top surfaces of the metal and the face colour of the stone.

As an example of what the mounting may do to prejudice even an expert judge of diamonds, I may cite the case of a splendid, fancy blue, old-mine diamond which was inadvertently mounted in a Roman gold mounting of such shape that reflections of it were visible through the stone. A very skilful diamond cutter on inspecting this stone pronounced it to be of poor colour, with a suggestion of brown in it. The stone was later recut and mounted in a platinum setting and indirectly submitted to the same man for an estimate of its colour. He then pronounced it to be of very fine colour, which was correct. The bad mounting had on the other occasion deceived him.

A stone that is set high in long cramps is usually less likely to reflect the colour

of the metal than one that is set too low. The reason is that the weakest direction in the stone does not bear so directly on the metal of the high setting as on that of the low one. By weakest direction is meant the direction of greatest transparency.

Of course, no metal should ever be left close to and behind the culet of a diamond. A dealer once offered to the writer a diamond of very bad colour at a low price. The stone was perfect and fairly well made, but it had a queer colour, with a brownish suggestion in it. On close study it was noted that the mounting (the stone was in a screw stud) had had a gold wire soldered *in contact with the culet* of the rather deep stone, as a support for the spiral wire of the stud. On removing the stone from the improper mounting it was found to be of very fair colour. The colour of the gold wire that lay against the culet

had been visible through every front facet and had hurt the appearance of the stone.

The use of platinum in diamond mountings has become very extensive in recent years. While not a truly white metal, platinum is, perhaps, the whitest of the metals that are suited to the purpose. Its resistance to tarnishing and to acids, its sufficient toughness and hardness (when properly alloyed with iridium), and its scarcity and consequent value make it a desirable metal for use by the jeweler. It is not a very pretty metal. Pure silver shames it when it comes to whiteness, but unfortunately silver blackens so readily by union with sulphur compounds that it is no longer in use for mounting diamonds, although John Mawe in his treatise on diamonds, published early in the last century, speaks of dissolving away the *silver* cramps of a mounting with nitric acid to avoid danger of damaging the

diamond while attempting to remove it by mechanical means.

It is undeniable that platinum or platinum-lined diamond mountings flatter a large number of stones. Much judgment must be used, however, lest the opposite effect result from the use of platinum. A light tint of yellow, as, for example, that found in a Crystal, or perhaps even that of a Silver Cape, may be fairly well neutralized by a platinum mounting. A deeper shade might fail to be neutralized by the reflections from the platinum, and in that case the chance directly to compare the colour of the metal with that of the stone would make evident the off-colour of the latter.

A very fine white or a blue stone deserves a platinum mounting, not because of any need for neutralizing colour but in order that no suggestion of off-colour be

imparted to it by reflections from a gold mounting.

Some diamonds, however, seem to be harmed in colour by being set in platinum. The effect in this case is usually a leaden appearance. This may be due to the shape of the stone. A lumpy stone would reveal the dull leaden colour of the platinum which was visible through it.

Aside from the effect of the mounting upon the apparent colour of diamonds, there is another matter that should be considered, namely, the effect of the colour of associated stones upon the apparent colour of diamonds. A brief discussion of this topic will conclude this chapter.

Just as in grading diamonds one may have his judgment harmed or helped by gazing fixedly for a time at deeply coloured stones just before attempting to pass on the colour of diamonds, so the

colour of diamonds may be enhanced or hurt by the association with them of colour stones in a common mounting. The blue of a fine sapphire would make any but the whitest of *mêlée* look dirty, for blue and yellow, being complementary colours, contrast very strongly. A sapphire would also depreciate the blueness of a blue diamond that was set beside it. A yellow sapphire, on the contrary, or a topaz, would tend to make even a Cape white diamond appear white if closely associated with it, as, for example, in a twin stone ring. Similarly a fine canary diamond is beautifully set off by being associated with blue diamonds, and the latter also gain by the partnership.

The caution should be added not to associate fine white *mêlée* with larger diamonds of inferior colour. This is sometimes done, and the chance for direct comparison is so good that even the un-

trained eye of a customer should see colour in the large stone that is placed under this disadvantage.

Similarly, it is inadvisable to display clusters of fine white *mêlée* in close proximity to solitaires of a less degree of whiteness. A glance into many a show window will reveal the prevalence of this error.

CHAPTER VI

BUYING THE ENGAGEMENT RING

"Caveat Emptor."

AS the above quotation suggests, the buyer should beware in every case, and especially does the caution apply to the purchasing of diamonds. The preceding chapters of this book have presented a detailed account of what the merchant should beware of in his larger dealing in diamonds. It is the purpose of this final chapter to give to the buying public the friendly counsel of one who has familiarized himself with many of the intricacies of the trade, in order that satisfaction may follow upon the purchase of a diamond. It may be

said at once that unless the buyer is willing and able to apply himself diligently to the many matters already considered in this volume, it will be absolutely necessary for him to trust to the skill and integrity of some dealer who has mastered the diamond business. Moreover, a personal and concrete study of large numbers of the stones themselves must supplement what can be learned of books before one can trust his own judgment in the purchase of diamonds.

Recognizing the need of thus relying upon one's dealer, there remains much that one can do to make himself a more intelligent customer of the diamond merchant. An appreciation of the fact that nature furnishes few absolutely white and even fewer absolutely perfect diamonds will go a long way toward establishing frank and cordial relations with the dealer of one's choice. It will then not be

necessary for the dealer to explain that if an absolutely perfect, snow-white diamond is expected (and there could not be a finer thing for an engagement stone), a very high price must be paid in view of the scarcity of such gems. Or, if something less choice is sought, the customer should be aware that minor and imperceptible defects are present in nearly every diamond, and that they do not in the least hurt the appearance or threaten the durability of the stone. They do, however, reduce the cost to a certain extent, and for any purpose where sentiment does not demand absolute perfection, they are probably the thing to buy, as they afford all the beauty of the more perfect stones, together with a larger size for the same price, or a smaller price for the same size.

Here, however, it is time for the buyer to beware that no imperfection that he

himself can find with a low-power glass is present in the stone. Where imperfections are large enough or conspicuous enough to be easily found by the public, the value is considerably diminished. Moreover, the salability of such stones is vastly less than that of the more perfect sort (though the latter may not be absolutely perfect), so that if the buyer entertains the idea of ever converting the gem into cash, it is much wiser to buy only the better grades as regards perfection.

In colour, too, the buying public will probably do better to select, not the very finest grades, the price of which is almost prohibitive, but rather some one of the less rare tints. Never buy so low a grade that the off-colour, whether in yellow, or in brown, is perceptible to the average eye, unless by direct comparison with the highest grades. Such stones as

are here suggested for purchase, everything considered, will be found among the "Crystals" and "Silver Capes," as those terms are defined in Chapter I, page 21. The average retail dealer will probably call them "blue white" and "fine white" respectively, although there is a certain amount of looseness among jewelers in the use of these terms. The thing for the customer to beware of in this connection is any trace of colour perceptible to his untrained eye, when the stone is dimmed by quickly puffing the breath against it, while it is cool enough to condense the moisture in the breath upon its surface. A stone that is set in a ring will not thus become dimmed if the ring has just been handled, as the warmth of the hands is conducted to the diamond by the metal of the ring. In such a case allow the ring to cool and then handle it with forceps or by means of the hand-

kerchief. It is necessary to suggest here that fine distinctions of colour cannot be made by artificial light, and a clear, bright day should be chosen for the important purchase. The time for the test should be somewhere between ten o'clock and two o'clock, if the best light is to be had. A north light is best, and there should not be any brightly tinted walls or buildings near by, to reflect their colour into a stone. On no account select a diamond by artificial light, or in a dark store. Insist on seeing it in good, bright daylight.

What was said with regard to visible defects is also true of visible off-colour. Stones having either are much less rare and also less desirable than the better grades. It is only when much display is sought for relatively little money and no thought of future sale is entertained that one is justified in pur-

chasing noticeably imperfect or off-coloured diamonds.

Having now decided that in most cases approximately perfect stones of pretty fair colour should be demanded, let us consider the matter of "cut," or, as it is called in the trade, "make," which, more than any other factor, determines the brilliancy of the finished stone. This matter of "make" is vastly important, for, without brilliancy (and this includes both the perfect reflection of white light and the prismatic display of coloured lights), a diamond is nothing. Here the public has some chance of judging by the appearance of a stone whether it is well made or not, and a fair degree of success may be had in this offhand way without recourse to the measurements suggested in Chapter III, page 77. The principal thing to beware of here is this—a diamond when somewhat poorly cut may be

brilliant at a particular distance from the eye, but may be much less brilliant at some intermediate or greater distance. Hence it is necessary to view your stone at different distances, say from ten inches, up to twenty feet from the eye. At no distance should the well-made stone appear weak or less brilliant in the centre. The overthick stone will appear dark, or vacant, or sleepy, in the centre, while the stone that is too thin will have a ring of brilliancy around a black and empty centre producing the so-called "fish eye" effect. Both the overthick and the overthin stone should be avoided, and only a fairly well-made stone accepted. It is only fair to add that the absolutely well-made stone, like the absolutely perfect and the absolutely white diamond, is rare, and justly commands a higher price than the fairly well-made one, both on account of the greater skill and care required

in its making and on account of the greater loss in weight entailed in shaping it from the usual form of the rough material.

To compensate for the higher price in this case, however, we get the maximum possible brilliancy and also great apparent size for a given weight. The well-made stone will have a diameter not quite twice its depth. The ratio, five is to three, very nearly expresses the proper relation between diameter and depth. The girdle or edge of the well-made stone should be very nearly one-third the way from top to bottom of the stone. If not exactly one-third below the top, it should be slightly less rather than any more than one-third. Stones with too shallow a back are very likely to show the edge, or girdle, reflected within them, making them appear to be flawed, and diminishing their brilliancy somewhat.

In addition to viewing your intended

purchase at different distances, view it under different lights. Very fine white stones are brilliant under any kind of light. Yellowish stones are less brilliant under bright daylight than fine white ones, but may be very brilliant under yellowish artificial light. Brownish stones frequently look dark and ugly under artificial light and they should, therefore, be avoided. Beware of any tint of brown that is deep enough to be distinctly perceptible.

The buyer should also scrutinize the finish of his stone. All the facets of a given set should be symmetrically related to each other, and to their associated sets of facets. The facets above the girdle should match those below, in position. If such is the case, the sharp edges in which the upper girdle facets meet each other will exactly line up with the sharp edges of meeting of the lower facets of

the stone. This will be true no matter at what point on the girdle the comparison is made. The girdle itself should be fairly thin and regular, not thick or of widely varying thickness at different points. A knife-edge girdle adds slightly to the sharpness of the brilliancy but is liable to chipping while being set, or in wear, and such extreme girdles should probably not as a rule be sought. Some very fine stones have polished girdles and such a finish adds slightly to their beauty, but the cost of such stones is large, and comparatively few are sold. A search should be made for any chipping or roughness of the surface of the stone, and such roughness is especially likely to be found near the girdle. Unless such defects are of a very trifling nature, any stones with them should not be chosen.

Only a stone that appears perfectly round to the eye should be accepted, as

other contours are much less salable. This is largely a matter of prejudice when the deviation from a true circle is small, but the prejudice exists and hence the value suffers if a stone is not quite round. The intending buyer should be aware that the price per carat advances rather rapidly with increase in size up to somewhat over one carat. Little diamonds are much more abundant in the mines than large ones, so that the law of supply and demand forces even the strong diamond syndicate to make the price of small stones relatively less than that of larger ones. Very large stones, however, because of the small demand for them may sometimes command little more per carat than the more desirable sizes between one and two carats.

Well-matched stones, when of adequate size, are worth more per carat than similar stones if purchased singly. This is, of

course, due to the skilful service rendered by the dealer who seeks out and selects such a match.

With such knowledge as has been imparted in this chapter, a buyer will be in a position not only to assist in selecting his purchase, but more important still, he will be in a position to select wisely the merchant who appears to have most knowledge of diamonds, and who is most frank and truthful in setting forth the merits and defects of his wares. Finally, if the purchase is to be an engagement stone, let the lady of your choice help in selecting the gem she will have to wear, for women as a rule have keener appreciation of fine colour distinctions than men, and in buying an engagement stone, get the best you can afford even if its size has to be somewhat less than you would like to give her.

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A Selection from the Catalogue of

G. P. PUTNAM'S SONS

Complete Catalogue sent on application