

Gems & Gemology

GEMS & GEMOLOGY is the quarterly official organ of the American Gem Society, and in it appear the Confidential Services of the Gemological Institute of America. In harmony with its position of maintaining an unbiased and uninfluenced position in the jewelry trade, no advertising is accepted. Any opinions expressed in signed articles are understood to be the views of the author and not of the publishers.

VOLUME II

SUMMER, 1937

NUMBER 6

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Published by

THE AMERICAN GEM SOCIETY

555 South Alexandria

Los Angeles, California

"MOONSTONE" AND "DYED OPALS"

Recently a number of transparent colored cabochons have appeared in the market under the name of "dyed opal." Several of these have been tested in the G.I.A. laboratory and all have been found to be glass. Also colorless transparent cabochons with milky sheen very closely resembling true moonstone, and sold as such, or as "opal," have been tested in the G.I.A. laboratory and have been found to be either a good quality of glass or of milky quartz. Gemologists are advised to test any stones represented as colorless or dyed opals, or as moonstone before purchasing or selling them.

SEAL SAPPHIRE

In our issue of January, 1934, we asked for information on a series of trade names, one of which was *Seal Sapphire*. Reliable information as to the true nature of this stone has finally been received from several sources. Two interpretations of the term have been given. The first is that it is the usual blue sapphire, cut with a large, flat top which may be carved with a seal, or the same cutting with the seal already carved. This is apparently the usual American trade interpretation of *Seal Sapphire*. In the Orient, the term probably refers more often to a brown corundum which is translucent because of silky inclusions and somewhat resembles the color and sheen of seal fur.

BLACK STAR SAPPHIRES

A few grey star sapphires so dark in tone as to be added to the classification of gem corundum as black star sapphires have recently appeared in the market.

IMPORTANT GIFT TO INSTITUTE

In the nature of a memorial tribute to Godfrey Eacret, and to further the work of the Institute, of which he was the first chairman, the Retail Jewelers Research Group recently made a gift of \$250.00 to the Gemological Institute in appreciation of its constructive results to the trade.

List of members of the Precious Stone Dealers Association contributing stones to the Gemological Institute of America for research purposes.

- C. Frederick Loch, 48 West 48th Street.
- Dreher Bros. & Wider, 48 West 48th St.
- A. Mastaloni, 17 John Street.
- Edward Starke, 65 Nassau Street.
- Wm. V. Schmidt Co., 22 West 48th Street.
- James A. Drilling, 87 Nassau Street.
- Sol Gordon, 68 Nassau Street.
- Belgard & Frank, 31 West 47th Street.

Gem-Stone Identification by Emission Spectroscopy

by

DAVID H. HOWELL

Certified Gemologist, Claremont, Calif.

A few months ago a red gem-stone was presented to the G.I.A. laboratory for identification. The usual gemological tests, including the observation of absorption bands using a Gaertner spectrometer, gave results which were not entirely satisfactory for positively identifying the specimen. The stone had a density and a refractive index which could be a value for either garnet or spinel. X-ray spectrograms made at the California Institute of Technology, through the courtesy of Dr. L. Pauling, gave lattice values

Shipley, Jr., communicated with me suggesting a method which was thought possible and together we tested the procedure. The results were quite satisfactory. Subsequently the method was extended to the separation and identification of certain mineral specimens which could be confused when using only the simple gemological tests¹.

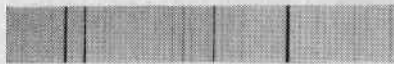
Briefly, the method is the spectrographical recording of the emission spectra employing a minute sample of the gem-stone in question. The results show the principal chemical

TOURMALINE



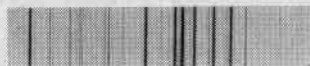
B

JADEITE



M M M S
g g g i

ANDALUSITE



B

NEPHRITE



M M M S
g g g i

Figure 1

Figure 2

B—Boron; Mg—Magnesium; Si—Silicon

of spinel. Inasmuch as X-ray spectrograms are quite expensive, the G.I.A. wished to find a method less costly, yet positive. Robt.

¹A full account of the specimens examined, technique employed and the results obtained in this series of experiments is appearing soon in the *American Mineralogist* under the title, "Identification of Certain Gem-stone Materials by the Emission Spectra."

elements present in the specimen examined and thus the chemical composition is obtainable.

In the initial experiment cut and polished specimens of the spinels, one garnet and a stone which had given unsatisfactory physical and optical data for conclusive identification were examined spectrographically. A corundum hardness point was applied to a back facet of each of these specimens and the material removed, by a few strokes of the "point," was loaded directly upon the spectrographic electrodes. Each sample was ignited in the arc and the emission spectra produced was photographed in the ultra-violet region. The two known spinels gave the typical spectral lines due to the elements magnesium and aluminum while the garnet gave these lines plus those of manganese, iron and silicon. The spectrum of the questionable gem-stone was similar to the spectra of the two known spinels and thus indicated the chemical composition of spinel. These results likewise agree with the X-ray data.

Extension of this initial experiment, employing the same general technique, was carried on with specimens of jadeite, nephrite, epidote and sillimanite comprising one group and specimens of tourmaline and andalusite making up the second. Again the results were quite conclusive in identifying each mineral species which might be confused and difficult to identify by simpler gemological tests alone. The accompanying illustration shows portions of the spectra produced by tourmaline and andalusite (Figure 1); jadeite and nephrite (Figure 2). Tourmaline is readily identified by the strength of the boron lines at 2496.77 Å and 2497.73 Å, being a boro-aluminum silicate while these

same lines are decidedly weaker in the case of andalusite and indicates that boron is present only as a trace. Similarly the relative intensities of the magnesium lines, in Figure 2, jadeite and nephrite, are markedly different. In the spectrum of nephrite the characteristic group of five magnesium lines between 2777 Å and 2783 Å appear showing a relatively large amount of magnesium to be present. The amount is sufficient that magnesium can be considered an integral part of the mineral. Spectrograms made of the same material in the visible region confirm the identification for in this portion of the spectrum the sensitive sodium and calcium lines appear. Intense sodium lines are characteristic of jadeite, a sodium aluminum silicate, while calcium and magnesium are indicative of nephrite. It is found possible to separate and identify jadeite, nephrite and other minerals sometimes confused with them by comparison of the aluminum, magnesium, silicon and iron contents of each whereby ratios can be established which are characteristic of each species.

In conclusion, this method has been shown to be applicable in furthering a positive identification of cut and polished gem-stones or ornamental stones which may be rather difficult to identify and which may thus require chemical analysis. The minute amount of material employed, yet giving satisfactory results, is indeed small, being not more than 0.2 mg. The results may be quantitatively as well as qualitatively interpreted. Work is now in progress employing this method to study of certain species and their sub-groups, as for example the garnets and feldspars.

A GEMOLOGICAL ENCYCLOPEDIA

(Continued from last issue)

HENRY E. BRIGGS, Ph.D.

The metric gram is equal to .03527 of an avoirdupois ounce. One gram would also be equal to five carats. Some of the foreign countries sell gems by the pennyweight and gold is almost always sold by the pennyweight.

Pearls and a few other gems are sold by the grain. Where this word is used in connection with diamonds it shows the fraction of the carat. A carat is about equal to four grains; thus a "one grainer" would be a quarter carat, a "two grainer" a half carat, etc.

Very cheap gems, in cabochons especially, are usually sold by the size in inches or millimeters. This is a common practice both in America and in Europe.

VALUATION OF GEMS

Gems are often an article of commerce which is difficult to value fairly. Gems, like humans, are all different. Some may be of the same kind, they may even look so nearly alike that the unaided eye cannot tell them apart, and yet each gem has its own peculiarities. So to say each gem has a character and personality all its own and which is not found exactly duplicated in any other gem. Any student who makes an intensive study of gems will find this to be a fact, and it will be brought home more keenly to the man who is called upon to value gems. The opal is a fine example of this point, although the quality is shared to a greater or lesser degree by all gems. Of the many thousands, even millions, of cut opals existing in the world, there cannot be two stones found which are exactly alike in every way. This difference may not be evident to the amateur, yet to the experienced gemologist there exists that difference which gives a certain individuality to all gems.

The word "perfect" is used today with such carelessness that it is indeed marvelous that we still know the meaning of the word. As far as gems are concerned there are none which are perfect. Indeed it is said "There is no perfection under the sun." This, it seems, will hold true as far as the gems are concerned also, despite the many, many thousands of gems sold as perfect. It is true indeed that many gems are so nearly perfect that it is difficult to see their imperfections. Yet they are there and can be very plainly viewed with the aid of the proper optical instruments. The perfection of commerce is no doubt a quality bordering on perfection, or, putting it another way, we would say as perfect as seem to exist. However, in the true sense of the word such a thing does not exist in gems. A gem to even border on perfection must be free from all internal flaws, bubbles, inclusions or opacities even when viewed through an eye loupe of the ordinary strength used for such examinations (about one inch focus). The color, whatever it be, must be evenly distributed. The cut must be

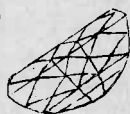
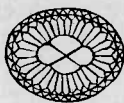
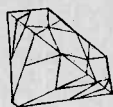
optically perfect and correct and, as well, it must be perfect in symmetry. The polish must be such that no grain marks are visible even when the eye is aided with the loupe mentioned. And all these qualities will only constitute a gem of "near perfection."

The matter of color is another factor which will enter into the valuation of a gem to a very great extent. In certain gems one color may be in demand, and in the event the supply is limited, as is usually the case with fine gems of any kind, then the price may soar high. Then a change of fashion and public favor may place this color in the cheap class again and select some other which will be sent to dizzy heights in price. Thus it is impossible for the author to give any tables of color or comparative prices, for the prices of most all gems are affected by the whims of fashion and also by the inflexible rule of supply and demand. An example of supply and demand is clearly seen in the alexandrite (green chrysoberyl). A few years ago it could be bought for a very nominal price, and today it commands ten times what it did in 1892. Just forty years, yet the stone has climbed from a comparatively cheap stone to one which will command a good price if it be of fine quality.

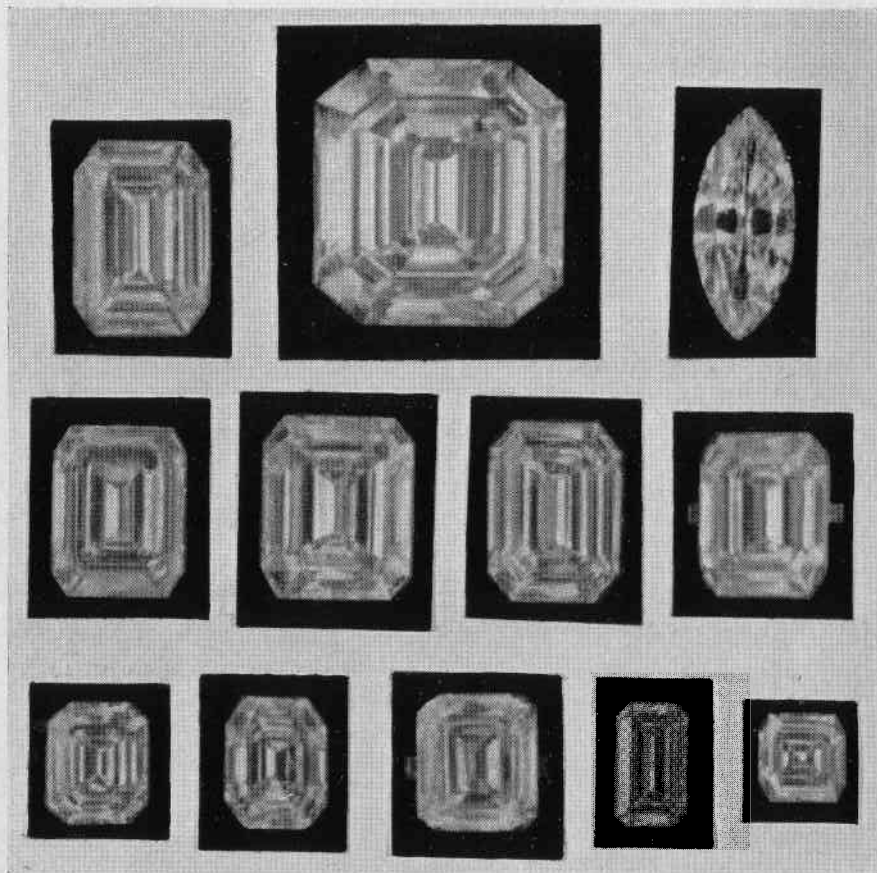
Size is another factor which is very important in the valuation of gems. Considering that gems be of equal quality, and a one-carat stone will cost \$20, then a two-carat stone of the same kind and quality would cost from \$50 to \$80, depending. In some gems which are less in demand and in which larger sizes are more plentiful, the increase in the value per carat is less with the increase in weight, than it is in gems where large sizes are in good demand and where they are not readily obtainable. Thus, in garnet, we would find that a large stone would not be so much higher in the cost per carat for a six-carat stone than it would be in a two-carat stone. Yet in the pearl we will find that the weight is usually squared and then figured on the base price. Thus we will assume that a one-grain pearl is offered at \$2, then a four-grain pearl would be worth \$32. Here we have a tremendous increase in price with very little increase in weight. Again it is difficult to give any table which would serve for any length of time to use as a standard. An example of the changing supply is clearly seen in the case of zircons of large size. A few years back zircons were quite rare in large, fine stones and thus the large stones commanded a very good price (if fine colorless or of fine color). Today the larger stones in very good color are readily obtainable and the price is moderate. In the matter of size, however, it must not be forgotten that a large, imperfect stone is often of less value than a fine quality stone of much smaller size. In fact, in the valuation of gems one must consider all points affecting the value, and so to say "balance up" before any real valuation can be placed upon a gem. A gem may be, so to say, perfect, and yet if it is not in popular demand and is to be had in plenty then the value must necessarily be low. On the other hand, a gem may not be in demand but yet be so exceedingly scarce as to have a great value even though it is not in demand. The value of such gems, then, cannot be readily established, for there is no market by which to judge, but the value must be a matter to be settled between the buyer and seller.

(To be continued)

Important Diamonds of the World



Robert M. Shipley



The twelve magnificent gems fashioned from the rough Jonker are shown here in actual size. See next page for story.

The Jonker Diamond

For actual-size photographs of the gems cut from the Jonker, see page 103.

Almost two years since it was found (in January, 1934) the cutting of the 726-carat Jonker into 12 magnificent stones has been completed. The rough diamond was found on the claim of Jacobus Jonker, a 62-year-old miner, who before its discovery had earned little more than a living wage from his claims. The stone was bought from Jonker for a reputed price of approximately \$315,000 and later was sold to Harry Winston, New York diamond merchant.

Winston entrusted the cutting of the stone to Lazare Kaplan, a New York diamond cutter, who is from a family of Antwerp, Belgium, diamond cutters. Kaplan produced 11 step-cut stones and one marquise-shaped stone, with a total weight of 370.87 carats. 355.13 carats of the original 726 were reduced to powder during the fashioning processes. The weights of the stones follow: No. 1, 142.90; No. 2, 40.46; No. 3, 35.45; No. 4, 30.84; No. 5, 25.66; No. 6, 24.91; No. 7, 19.76; No. 8, 15.77; No. 9, 13.55; No. 10, 11.43; No. 11, 5.70; No. 12, 5.30. Seven of these gems are now reported to have been sold. The Jonker No. 2, a 40.46-carat gem, is said by representatives of Harry Winston to have been sold to an unnamed purchaser in Paris. Jonker stones No. 5 (25.66 cts.), No. 7 (19.76 cts.), No. 11 (5.70 cts.), and No. 12 (5.30 cts.) are said to have been sold to the young Maharajah of Indore, three of them through Brock & Co. of Los Angeles. The purchaser of the 24.91-carat Jonker likewise has not been named. The 11.43-carat stone was purchased by Marcus & Co., New York jewelers.

The No. 1 Jonker is probably not the third largest diamond to have been cut, as has been stated in some American trade journals. Schlossmacher¹ lists large diamonds from which were cut six finished gems larger than the 142.90 carats of the Jonker No. 1. These are: (1) The Cullinan I; the 530.20-carat pendeloque which is in the scepter of the King of England; (2) The Cullinan II, a 317.40-carat step-cut which is in the State Crown of the King of England; (3) The Red Cross, a stone found in Africa in 1917 and from which a 250-carat finished stone is said to have been cut; (4) The Jubilee, a cut gem of 245.35 carats; (5) The DeBeers, with a cut stone reputed to be 234.5 carats; and (6) The Victoria, with a reputed 184.5 carats. Of the last four stones first mentioned, no definite information is available today, although the Victoria is said to have been purchased by the Nizam of Hyderabad, and the DeBeers also is said to have been bought by another, unspecified, Indian Prince.

The stones cut from the Jonker are fine examples of the diamond cutter's art, having very nearly ideal proportions and exhibiting a beautiful, truly blue-white color. Indeed few diamonds of any size equal them in color.

¹Bauer's *Edelsteinekunde*, revised by Prof. Dr. Karl Schlossmacher.

BOOK REVIEWS

Jade Lore, by John Goette. Published by Kelly & Walsh, Ltd. Shanghai, 1936.

In his bibliography, the author states that he has attempted to continue the study of jade where the famous Dr. Barthold Laufer, author of the monumental *Jade*, which appeared in 1912, left off. Dr. Laufer's *Jade* is a very thoroughgoing text, but it applies particularly to students of archeology and religion, whereas the work of Mr. Goette is more general in its scope.

Jade Lore is a book of 321 pages full of valuable information. The book is profusely illustrated with reproductions of photographs of all kinds of worked jade. The frontispiece is a color plate, titled "A Partial Jade Spectrum," of 35 colors. These include several of the red-browns ("rust reds") sometimes seen in true jade, but do not show the bright reds which many authors—and dealers as well—claim to be true jade.

The author tells the history of the evolution of jade objects from their first applications such as axes and hammers, and continues down through the use of jade for musical instruments and ceremonial objects, to the purely ornamental purposes such as in jade mountains. These mountains are great masses of jade, weighing several tons, and beautifully carved in allegorical studies. Among more recent practical uses of jade listed are the well-known jade bowls and snuff boxes, vases, fans, and even protectors for the long finger nails of the high-class Chinese of a few decades ago.

The symbolism (meanings) of the most important jade carvings is covered in a fairly comprehensible manner, furnishing a record which we have often wished to secure. An interesting comment in this chapter is the author's opinion that the much-used dragon of China probably was derived from the crocodile. Many of the carvings are in the nature of puns. The Chinese word "Fu," for instance, means both the bat and happiness; therefore, a carved bat symbolizes happiness. The great importance of jade in Chinese life and customs and even the tremendous influence of the character Yü (which means *jade*) as a root of much of the language is fully described.

It is supposed that some five thousand years ago nephrite jade was found in what is now the Kansu Province of China; but no jade source is now known in Kansu or any neighboring province. For some two thousand years, it is definitely known that nephrite was obtained from Chinese Turkestan. Jadeite, however, is comparatively new to the Chinese, having been imported from Burma in quantities for perhaps less than two hundred years.

A very complete bibliography and an unusually accurate index complete *Jade Lore*, making it both a valuable text for reference by the gemologists interested in jade and an extremely fascinating book for general reading.

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(To be continued)

A GEMOLOGICAL GLOSSARY

(Continued from last issue)

- Landscape Agate.** White or gray chalcedony with inclusions of manganese oxide irregularly arranged and bearing fanciful resemblance to a landscape.
- Lap.** Cutting or polishing wheel used by the lapidary or diamond cutter. See also Skief.
- Lapidary** (lap'i-dae-ri). One who fashions colored stones.
- Lapidist** (lap'i-dist). One who has a special knowledge of minerals and their preparation for use as gems or ornamental objects.
- Lapis** (lape'is). Meaning a stone, but used only in phrases. Used in the trade as an abbreviation for lapis-lazuli.
- Lapis-Lazuli** (lape'is laz'ue-lye). A gem material composed largely of the mineral lazurite in the form of a granular crystalline aggregate. One or more of the following are almost invariably included in the aggregate: diopside, amphibole, mica, calcite, pyrite. The most desirable color is an intense blue of medium to dark tone.
- Lapis Matrix.** Lapis Lazuli containing prominent patches of calcite.
- La Tausca Pearls.** Trade-marked name for both solid and wax-filled imitation pearls.
- Lattice.** The pattern in which atoms or molecules are arranged in a crystal structure.
- Lava** (la'va). An igneous rock which has solidified on the surface of the earth.
- Lazulite** (laz'ue-lite). A translucent to opaque, light to dark blue mineral. Deeper colored varieties resemble lapis-lazuli and are sometimes called "False Lapis." Lighter color specimens more nearly approximate turquoise in appearance. R.I. 1.62; S.G. 3.1; Hardness 5-6.
- Lazurite** (laz'ue-rite). A mineral; the principal constituent of lapis-lazuli. Lazurite itself contains molecules or grains of haüynite, ultramarine, and sodalite.
- Lead Glass.** Any glass which contains a large proportion of lead oxide; the inclusion of this oxide raises the refractive index and dispersive power over that of ordinary glass. The lead glass most often used for gem imitation is flint (or Strass) glass, with R.I. around 1.61 and S.G. around 3.4.
- Leakage.** The escape of light from an optically denser substance (as a gem) into air; opposed to total reflection. See also total reflection.
- Lechosos Opal** (la'choe'sis). According to strictest definition, a colorless opal showing green play of color. Also any colorless or fire opal with green, dark blue, dark violet, or purple play of color.
- Lennilite** (len'i-lite). Greenish feldspar.
- Lenfil** (len'til). A form of cabochon cutting, approximately symmetrical about the girdle plane, with comparatively thin top and base. This style is used especially for fashioning opal.
- Lenticular** (len-tik'ue-lar). Lens-shaped; of tabular form, thick at the middle, and thinning toward the edges.
- Lepidolite** (lep'i-doe-lite). A mineral.

- Leptology (lep-tol'oe-ji). The science of the fine or crystal structure of substances. See also Crystal Structure.
- Leuco-Sapphire (lue'co). Colorless Sapphire.
- Light Brown Diamonds. A trade grade usually placed between crystals and top capes. Shows a very light brownish tinge rather than the yellowish tinge commonly associated with top capes.
- Light Yellows. One of the less desirable color grades of diamonds. Between cape and yellow qualities.
- Limestone. A rock composed chiefly of calcium carbonate (calcite). See also Marble.
- Limonite (lye'moe-nite). An important ore of iron.
- Limpid, Limpidity (lim'pid, lim-pid'i-ti). Refers to relative transparency, especially of diamonds. The transparency of absolutely pure water is usually taken as a standard, hence the formerly-used terms "first water," etc.
- Lingah. Oriental pearl from the Persian Gulf. May also refer to pearl shell.
- Liroconite (lye-rok'oe-nite). A translucent to opaque blue to green mineral rarely used as an ornamental stone. R.I. 1.65; S.G. 2.9; Hardness 2-2½.
- "Lithia Amethyst" (lith'i-a). Light purple to violet spodumene (kunzite.)
- "Lithia Emerald." Green spodumene. Properly called hiddenite.
- Lithomancy (lith'oe-man'si). Divination by minerals or gems.
- Lithoxyle or lithoxyl (li-thok'sil). Wood silicified by opal, showing woody structure.
- Lithoxylite (li-thok'sil-ite). Opalized Wood.
- Liver Opal (Menilite). Brown or dull gray, opaque, banded, or concretionary variety of common opal.
- Lode-Stone. Magnetite.
- Loop. See Loupe.
- Loss of Color. Becoming lighter or darker in tone, as when blue becomes darker when observed under artificial light. (Either change in tone results in lowered intensity of a hue, hence the "loss").
- Loupe (also loop, loup, lupe). (From the German *lupe*, a magnifying glass) any small magnifier for use in the hand or mounted in a cup to be held in the eye-socket.
- Love Arrows. Sagenite (quartz). "Love Stone." Aventurine quartz.
- Lower Girdle Facets. The triangular facets adjoining the girdle on the pavilion of a brilliant cut gem.
- Lozenge (loz'enj). A style of cutting.
- Lucky Stone. Fairy stone (stauro-lite).
- Lumpy. Refers to a diamond (rarely to another gem) cut with too great depth in proportion to its width.
- Lumpy Girdle. A too-thick girdle.
- Lunaris (lue-na'res). Roman name for moon-stone.
- Luster. The appearance of a surface in reflected light. It depends principally upon the relative smoothness (texture) of the surface and upon the refractive index, which governs the amount of light reflected. The body appearance of a gem may also have some effect upon its luster, as the fibrous body appearance of tiger-eye causes even a plane-polished specimen to have a somewhat silky cast.
- Lydian stone (lid'i-an). See Basanite.
- Lynx-eye (links). Green labradorite (feldspar).

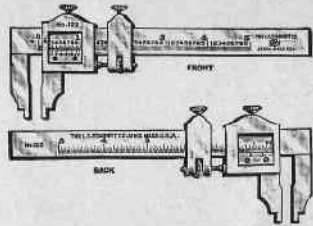
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Gauges for Diamond Proportions

In connection with the term "measurement," the average person's thought is of a simple ruler which is laid against an object to be measured, and read directly. This, of course, is the simplest method of measurement and is the basis of all. However, for calibrating the proportions of a diamond in order to judge whether or not it is cut in such a manner as to give the maximum brilliancy and dispersion, it is not possible to use a simple ruler. Because the distances are so very small and because their exact relation to one another is extremely important, some device which very greatly improves over the accuracy of the simple ruler must be used. In order that the efficiency of the cutting of a diamond may be calculated to best advantage, four measurements on the stone must be made. These are: (1) table diameter, (2) girdle diameter, (3) depth of crown (top), and (4) depth of base (pavilion). The last two measurements (3 and 4) total to give the depth of the stone from table to culet. All of these obviously are too small to be measured by the usual "yard-stick" method unless an extremely large stone is under consideration. Because the jeweler's stock usually consists of diamonds which average a carat or less, distances on the order of thousandths of an inch are quite important.

Several different instruments are manufactured for the accurate measurement of small distances. For calibration of diamonds it is preferable to be able to measure in millimeters rather than in fractions of an inch. Careful calibration of a diamond

should require a gauge which will measure $1/100$ of a millimeter, equal approximately to $1/2500$ of an inch. Accurate measurements may be made by several types of instrument, the simplest of which is probably a millimeter caliper such as is



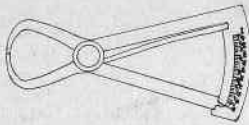
*Starrett Vernier Calipers
Figure 1*

illustrated in Figure No. 1. This caliper reads millimeters directly, and by means of the Vernier, tenths of a millimeter; and in some types of this instrument, twentieths of a millimeter may be read. With the simple Vernier attachment on a sliding rule, a twentieth of a millimeter is about the smallest unit which can be accurately measured.

The reading of a Vernier gauge is simple once its operation is learned. The sliding portion of the gauge is divided into 10 equal units whose total is 9 of the units on the fixed scale. By observing which of the lines on the sliding bar exactly corresponds with one of the lines on the fixed scale, tenths of a millimeter can be measured with accuracy.

The next most accurate type of measuring gauge is perhaps the so-called *compass calipers*, which are represented by the Moe Gauge (Figure No. 2). Because the scale arms

are much longer than the arms composing the measuring jaws, the readings on the scale are more accurate than is possible with the simpler type of sliding micrometer described above. When a Vernier attachment is added to the scale of a compass caliper, still greater accuracy is obtained and fairly reliable measurements to 1/100 of a millimeter are possible.



Moe Gauge
Figure 2

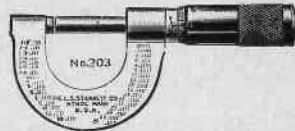
The most accurate type of micrometer caliper suitable for use with diamonds is the screw micrometer, as is illustrated in Figure No. 3. By means of this instrument, accurate measurements to 1/100 of a millimeter are easily made between any two points which the jaws of the caliper can encompass.

Still a third type of accurate reading gauge is the dial type such as is illustrated in Figure No. 4. The finer dial micrometer also will read to 1/100 of a millimeter, though it tends to be less accurate than the screw micrometer; the usual dial micrometer such as is used in the jewelry trade will read only tenths of a millimeter.

The great objection to all of the above measuring devices is that, although they will measure 1/100 of a millimeter, they must make a contact across a stone (on two opposite surfaces) in order to measure accurately. They will, therefore, read the girdle diameter and

the total depth of a diamond with great accuracy. But with them, the table diameter can only be estimated, and the depth of the crown and the depth of the base cannot be measured at all.

If the table diameter can be measured with fair accuracy and the angles of the bezel and pavilion facets can be read, the proportions can be secured fairly closely. These angles can be measured to approximate values with a contact goniometer (angle measurer) if the diamond is a large one. However, on any stone smaller than a carat, the contact goniometer is quite difficult to use. An optical or reflecting goniometer will measure these angles with great accuracy, but it is a complicated instrument to use and an unnecessarily great amount of time is spent in securing each angle. Even after the angles are secured it is necessary to make trigonometric



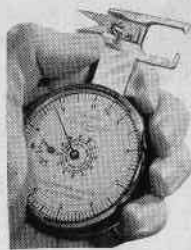
Starrett Screw Micrometer Calipers
Figure 3

calculations in order to secure the linear dimensions of the base and crown.

The ideal type of instrument for measuring the proportions of diamonds is probably the optical micrometer. This instrument furnishes a magnified image of the surface to be measured and superimposed on this image gives the image of a scale which reads directly in some known unit as, for instance, in hundredths

of a millimeter. The objection to the simpler form of optical micrometer is that its accuracy is less even than that of the dial type micrometer, though it can be relied upon to read accurately to about $1/20$ of a millimeter. By means of the optical micrometer measurements, even including the width of the table, the height of the crown, and the depth of the pavilion (base) of a diamond can be obtained and from these approximate figures, the proportions can be secured with considerable accuracy. For still greater accuracy a screw type of micrometer can be used to check the values obtained for total depth and girdle diameter of the stone by the optical micrometer.

The accuracy of the optical micrometer can be increased very greatly by the use of filar micrometer eyepieces. This eyepiece has a fixed hair mounted in it and parallel to this is a movable hair which is shifted very accurately, over the smallest distances, by a micrometer



*The New A.D. Leveridge Gauge
Figure 4*

screw which is attached outside the eyepiece. By means of moving the two hairs until they exactly correspond with the two points the distance between which is to be measured, and then reading the micrometer screw, distances as small as even $1/100,000$ of an inch can be measured. However, the filar micrometer is very expensive and gives great efficiency only when used with the eyepiece of a fine microscope. Therefore, it is not practical for the ordinary measurement of diamonds.

CELLULOID EYE LOUPES

In stocks which seem recently to have been imported from France, a number of low-powered eye loupes with *celluloid* cases have appeared. Celluloid is inflammable almost to the point of being explosive. The use of such a loupe is extremely dangerous if flame or unusual heat is near. We recommend that anyone using such a low-powered lens, in a composition case, test this to be sure it is not celluloid. One Los Angeles repairman was seriously burned when the case of his loupe exploded.