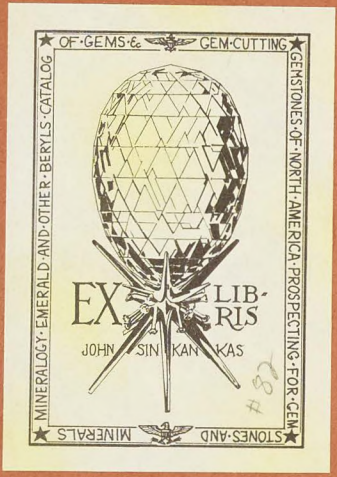
FACTS

ABOUT THE

Diamond



J. Sukanka
Colo USN Apr. 1953

Compiled by

J. R. W. & SONS

DIAMOND CUTTERS

Facts About the Diamond.

DIAMONDS. Diamonds were first found in India. This was the sole source of supply until the Portuguese discovered the gem in Brazil in 1728. Little time elapsed before the output of the new fields rivaled that of the old. The quantity found, however, was very limited, and stones of large size were exceedingly expensive, if flawless and of fine color.

SOUTH AFRICA. In the spring of 1867, in South Africa, Daniel Jacobs' child found a bright pebble on their farm on the bank of the Orange River, about 30 miles above its junction with the Vaal River. This pebble was given by the child's mother to a neighbor named Schalk van Niekart, who in turn gave it to a traveling trader, one John O'Reilly. O'Reilly sent the stone in an unsealed envelope to Dr. W. Guybow Atherstone, the foremost mineralogist of

Cape Colony, who pronounced it a diamond. The stone was afterward bought by the Governor of Cape Colony for 500 pounds ($2,500.00).

The news of the finding of diamonds spread like wild-fire. Thousands of people began seeking for them, mostly in the river beds of the Orange and Vaal rivers and their tributaries, and during the next few years quite a quantity were taken out.

KIMBERLEY. In August, 1870, diamonds were found in the district where now stands the City of Kimberley and the mines called Dutoitspan and Bultfontein located. In July, 1871, the famous mines of "Kimberley" and "De Beers" were found. The mines are in reality the craters of volcanos, long since extinct. They are filled with what is called "blue ground"—it is really lava—while scattered through this blue ground is found the diamond.

CRATERS. These craters are simply huge holes in the solid rock. Kimberley measures about 1,000x600 feet between walls. De Beers is smaller. These two mines, with the Wesselton mine.

supply 95 per cent. of all the diamonds found to-day.

The lava or "blue ground" has been forced up from the bowels of the earth through these craters in some past age. It does not seem to have overflowed to any extent, though probably the diamonds found in the river-beds came originally from these or other craters.

AREA. These mines differ only in size and richness of diamonds. Their area is as follows: Kimberley, 33 acres; De Beers, 22 acres; Dutoitspan, 45 acres; Bulfontein, 36 acres. The Wesselton mine, area 24 acres, was not located until 1890. Kimberley and De Beers are in the City of Kimberley, Bulfontein one mile, Dutoitspan two miles and Wesselton four miles away.

CLAIMS. At first no man was allowed to own more than one "claim," measuring 31x31 feet. (Kimberley mine contained 470 claims.) These were subdivided and sold by the owners. (There were at one time 1,600 separate holdings in Kimberley mine, some as small as 6x10 feet.) Mining meant simply getting out the blue ground with a pickaxe, taking it to the

side of the mine, pulverizing it, and abstracting the diamonds. Of course, some claims were worked faster than others. Soon the surface became so uneven that the difficulty of transporting the blue ground to the edge of the mine was extreme. It became necessary to allow one man to buy out his neighbor, or men to acquire more than one full claim, and companies began working on a larger scale.

TROUBLE. As the holes became deeper and deeper, another trouble developed: The side of the mine exposed to sun and rain began to cave in, carrying with it great quantities of surface soil and the blue ground lying on the edge that had already been "worked."

RUIN. Claims near the walls of the mine became unworkable. Still the cavings-in continued, until millions of tons of debris covered the diamond-bearing ground (The mines at this time were some 400 to 500 feet deep.) More consolidation was necessary in order to work at a profit, as the only way to reach the diamond-bearing lava was to sink shafts through the covering of debris.

CONSOLIDATION. Finally, in 1889, all the claims in the four mines—Kimberley, De Beers, Dutoitspan and Bulfontein—were consolidated into one company. This had originally consisted of 3,600 separate claims, 31x31 feet. These mines represented at that time a market valuation of £23,434,250 (about $117,000,000.00). The shares of this new consolidation—called the De Beers Consolidated Mines—were held as follows: Barnett I. Barnato, 6,658 shares; Alfred Beit, 4,439 shares; Cecil J. Rhodes, 4,439 shares; F. S. P. Stow, 4,439 shares; all other holdings, 25 shares; total issue, 20,000 shares.

CECIL J. RHODES. This consolidation was effected by Cecil J. Rhodes, who remained practically the head of the company until his death. His place is now filled by another one of the original men in the company—Alfred Beit (who is probably to-day the richest man in the world).

MODERN MINING. As soon as consolidation was effected, systematic mining began on the Kimberley and De Beers mines. The other two, Bulfon-

tein and Dutoitspan, were closed, nor have they been worked to any extent since, as the ground is not nearly so rich in diamonds. A shaft was sunk through the rock at the side of the mine and an entrance made into the crater from below the debris. The blue ground is taken out from under the debris, which is then allowed to fall down, and work begun again at a lower level.

SEPARATING DIAMONDS. When the blue ground, which is as hard as sandstone, is taken from the mines it is spread out about a foot deep in immense inclosures that have fences around them and are roofed over with a fine wire netting, to prevent diamonds being thrown outside. The action of the sun and rain in six months disintegrates this lava to a fine sand. It is then carefully examined, and the diamonds extracted.

THE MINER. The men who work in and around the mines are not allowed at any time outside the high fence, which surrounds the entire plant, until their term of contract has expired When this time arrives they are

stripped naked, passed into another room, thoroughly searched, then given other clothes. After remaining in confinement two or three days (diamonds may be swallowed) they are permitted to depart. There are employed in these workings, Kimberley and De Beers mines (including the Wesselton mine, discovered in 1890 and acquired by De Beers Consolidated Mines in 1891), about 10,000 men—one-half below, one-half above ground.

RESULTS. There were taken from these mines during the year ending June 30, 1901, 3,840,114 "loads" (a "load" is 1,600 lbs.) of blue ground. There were found 2,447,895 carats of diamonds. This 3,840,114 loads equals 6,144,182,400 pounds, while 2,447,895 carats of diamonds equal less than 1,500 pounds—1 carat of diamonds to $1\frac{1}{4}$ tons of blue ground—truly the needle in the haystack

VALUES. These diamonds sold at the mines for £3,570,214 ($17,800,000) to a syndicate of five London firms, who take the entire output of the mines at a price of 38 shillings per carat. This London syndicate divides the dia-

monds into 400 different classifications in relation to the size, shape, color and imperfection of the stones. These different lots all have a fixed price, running from 8 to 10 shillings to £12 or £14 per carat ($2.00 to $2.50 to $60.00 or $70.00).

PERCENTAGE. All the diamonds found can not be made into the large, brilliant, sparkling gems, so much admired, as will be seen by the following: Of the entire output

5 per cent. will make good to fine color, perfect (flawless) stones which, if properly cut, will weigh ½ carat or more.

10 per cent. will make good to fine color, perfect, or nearly so, that will weigh when cut less than ½ carat.

60 per cent. are thin flat stones (not thick enough to make properly cut large stones) or imperfect (full of black spots) or broken or cracked stones.

Of this 60 per cent. some are made up into large stones, if the imperfection is slight,

but most of them are split (cleaved) and made into little stones, weighing from ¼ to 1-100 of a carat; 25 per cent. are rejection —too poor quality to make even the poorest grade polished stones, fit only for mechanical purposes, or used to polish fine diamonds.*

Of all the diamonds found in South Africa less than 10 per cent. of the weight, but representing nearly 50 per cent. of the value, are brought to the United States, via London, in their rough state to be polished. The United States uses more diamonds than all the rest of the world put together.

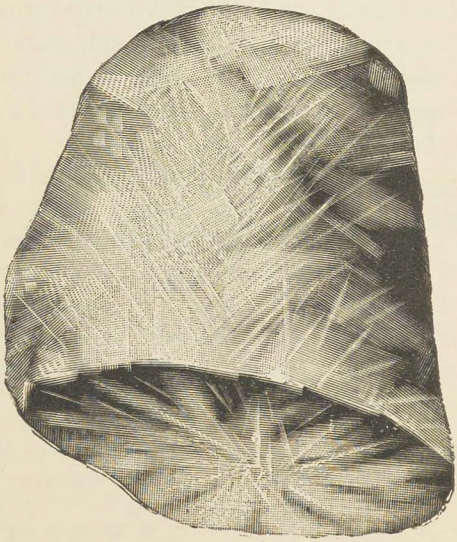
JAEGERSFONTEIN. Mention should be made of the only other mine in South Africa of any importance —Jaegersfontein—discovered in 1870, eighty miles from the City of Kimberley, lying in what is now called Orange River Colony. This mine produces in small quantities the finest stones found in

*We are indebted for these statistics to Mr. Gardner F. Williams, M.A., general manager of the "De Beers Consolidated Mines."—

J. R. W. & SONS.

South Africa. The ground is not rich, running an average of 1 carat of diamonds to 6 tons of blue ground. Many of the stones are brown in color or imperfect, but a few are flawless, and of a beautiful bluish hue.

One of the largest diamonds ever found in South Africa was taken from this mine. Its size is shown here; weight 969½ carats.



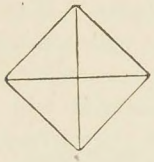
Diamond Cutting and Polishing.

CARBON. The diamond is pure crystallized carbon. It is the hardest known substance. While it is readily broken, nothing will scratch it but itself. Years of constant friction against any other known material will not show the slightest wear on the surface of a diamond. In the power of refraction, reflection and dispersion of light it excels. No acid will affect it, no solvent dissolves it, but it can be destroyed by heat.

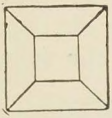
ROUGH DIAMOND. While the diamond in its rough state is of various shapes, we will, for the purpose of illustration, take a well-formed crystal, which is an eight-sided figure as shown (reverse side being the same).

Rough Diamond.

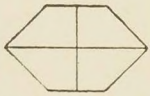
When, in years gone by, men found that "diamond would cut diamond," polishing was attempted. At first all that was done was to smooth and polish the original surfaces of the stone, thus:



OLD CUTTING. Later, more ambitious polishers ground away the top and bottom of the stone and polished the surface. This was called India cutting.



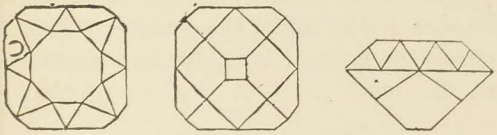
Top and same for bottom.



Side.

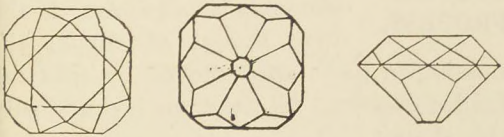
It was afterward found that greater brilliancy was attained by adding new

facets to the original form, and the shape of the cut diamond became this:



Top. Bottom. Side

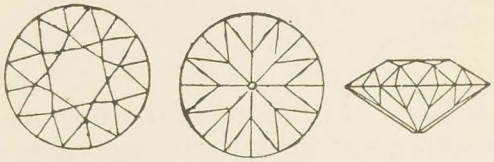
In later years this was further improved by adding still more facets, and until as late as 1870 all diamonds were cut practically as follows:



Top. Bottom. Side.

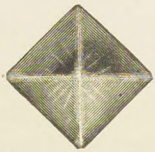
Slight deviations in shape were often made on account of the original form of the stone, to lessen the loss of weight in cutting.

MODERN CUTTING. The present style of cutting then came into vogue, and, while this has been improved by making the stone thinner and reducing the size of the table, the number of facets remain the same. We show here a modern cut diamond:

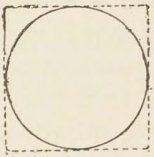


Top Bottom. Side.

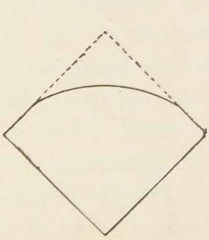
CUTTING PROCESS. The present method of cutting diamonds is as follows: If the stone is out of shape, the misshapen parts are removed by splitting (called cleaving) till the stone is practically this shape:



The stone is then cemented to the end of a revolving spindle, and as it goes round, another diamond is held so that the corners of the turning stone touch it. Gradually the stone on the spindle becomes round, an essential feature of the properly cut diamond.



The other one is worn thus:



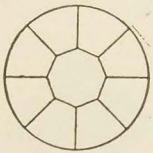
The fine powder which results from this process is carefully saved. The stone which is round is now used to make

another stone round, and the top worn off. This work is done by a man called a "cutter."

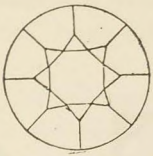
The stone now goes to the "polisher." It is imbedded in a lead holder, by heating the lead till it is soft and then inserting.

The stone thus held is pressed with a five-pound weight to increase friction, on a steel wheel, revolving horizontally at a speed of 2,500 revolutions per minute. The powder resulting from the "cutting" process being used, mixed with olive oil, wears the stone away, making one of the fifty-six facets.

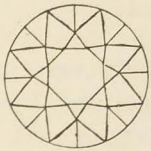
Every time a facet is put on, the lead holder must be reheated, the diamond removed and turned to lay the next one. First the table is polished on, then the large facets that run from the table to the girdle, thus:



Then the little ones around the table are put on, thus:



Then the facets around the girdle which finishes the top of the stone:



The bottom of the stone is polished in a similar manner.

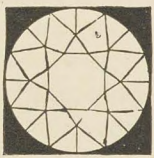
The stone is always three-fourths buried in the lead, yet the facets must be put on with the greatest exactness.

It takes about sixty hours on the wheel to polish a rough diamond weighing two to three carats.

A two and one-half carat rough diamond will only finish a one-carat polished stone,

so the loss in weight is 60 per cent. in producing a modern cut diamond.

These cuts show how much is lost in cutting a diamond:



Top.

Side.

COLOR. Diamonds vary in color and are distinguished by the diamond-cutter as follows:

1. Blue White.
2. Crystal white (best white).
3. Cape white (very slightly off color).
4. Bye water (poorer color).
5. Yellow (poorest color).
6. Brown (brownish cast).

Each of these six grades is subdivided into three classes, representing the best, middle and worst color of each class.

Only the first three grades are cut in the United States, the three lower qualities

being unsalable on account of their poor color.

Certain rare shades of yellow and brown, classed under the head of "Fancy," are very valuable.

BRILLIANCY. The brilliancy of a diamond is due almost entirely to the cutting. Brilliancy, brightness or snappiness, as it is differently called, is light entering the stone and being reflected out again. The most brilliancy is obtained by having the facets on the top and bottom of the stone laid at such an angle that the light entering from all sides is deflected and passes up and out through the top of the diamond. Diamonds should be perfectly round, for if they are not the facets do not bear the proper relation to one another.

GIRDLES. The stones should have sharp girdles; if the girdle has thickness, a line of unpolished surface is left around the stone, diminishing the brilliancy, besides adding unnecessary weight, as it makes the stone too thick, even if otherwise properly cut, to the extent of the unpolished surface.

FACETS. The larger facets of a diamond, extending from the table (top) or the culet (bottom) of the stone to the girdle, should extend clear to the girdle; also, the smaller facets should be laid evenly, and the corresponding facets around the stone be the same size, to give the most brilliancy to the stone.

If the back or bottom of the stone is too deep or too thin, the light does not go straight up through the top of the stone, as the angle of reflection makes the lights cross, or not meet.

If the top or front of the stone is too thick, or too thin, the reflected light does not pass up straight through the stone, but is deflected.

To get these facets laid properly and evenly and the stone the right thickness requires the most skilled diamond polishers.

AMERICAN. The American market exacts the finest cutting obtainable. (In Europe they are not nearly so particular, their product often being not round, too thick or too thin, with facets carelessly laid.) To get this fine cutting the best

polishers who were in Europe are now here, and only their most painstaking work accepted. So to-day American factories are turning out the finest-made diamonds in the world.

DIMENSIONS. A stone with the table two-fifths of the spread (diameter through the girdle) and the spread almost twice the thickness (diameter from top to bottom or table to culet), with the thickness divided one-third above the girdle and two-thirds below the girdle. This gives the greatest brilliancy, most spread, combined with least possible weight.

The Birth of the Diamond.

CHAOS. When this earth of ours was cast asunder from some celestial body and hurled into space, it was a mass of seething, molten matter.

Gradually the surface cooled and solidified, a hard outer crust imprisoned the glowing interior, which, in the process of cooling and hardening, began to expand with such terrific force that the outer shell, or earth's surface, burst, and volcanoes belched forth lava.

BIRTH. In some sections of the world this lava contained little sacks of carbonic gas, which, as the lava gradually cooled, while passing through this outer crust, and under the tremendous pressure, solidified into crystals of pure carbon.

Thus do we account for the birth of God's most exquisite gem—the diamond.

ARTIFICIAL. Man has endeavored to repeat nature's process by artificial means One of the successful attempts is

as follows: A crucible is filled with soft iron and brought to the point of fusion, at which state sugar of carbon is plunged into its center. The whole mass is then immersed in cold water. As soon as a hard shell forms on the outside, the iron is taken from the bath and exposed to the air, giving the interior ample time to slowly cool. As was the case with our planet, the iron mass, still molten inside, expands with great force, as it gradually becomes solid, and the enclosed carbonic gas changes, under this pressure, in cooling into tiny carbon crystals, much too small for commercial use.

These diamonds are dislodged by eating up the iron incasement with acids, but on brief exposure to the air the stones crumble to dust.

This breaking sometimes happens to nature's diamonds when they are first exposed to the air on being mined.

VAST WEALTH. An immense fortune awaits him who perfects the process by which diamonds of commercial fitness can be produced.

A fact, not well-known, is that the hardest steel contains myriads of microscopic diamonds (carbon crystals).

Coal, charcoal, lampblack, and graphite are other forms of carbon, but vastly different in appearance.