FERDINAND HOTZ

*Jeweler*

CHICAGO

# *THE STORY OF*

# DIAMONDS

BY

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AND

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PREPARED FOR THE
CENTURY OF PROGRESS COMMITTEE
OF THE
CHICAGO JEWELERS' ASSOCIATION

*With 125 Illustrations*
*Art Work by Percy Hale Lund*

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# Preface

*Here is the story of the story:*

1931 FIVE members of the Chicago Jewelers' Association conceive the idea that "A Century of Progress" Exposition should contain a colorful, educational account of that most fascinating, but little understood gem—the diamond.

1932 The Museum of Science and Industry in Jackson Park, Chicago, lends the services of a staff member. In Europe, he succeeds in securing the financial and material assistance of the diamond interests.

1933 The Diamond Exhibit is opened at the Exposition. It presents the complete story of the diamond from the time it is fashioned by Nature until it glitters in the jeweler's window, or performs some useful task in industry.

*Spring*, 1934 Another trip to Europe. The Exhibit is revised and improved.

*Autumn*, 1934 The great Exposition is drawing to a close. The Diamond Exhibit has been visited by a throng of people equal in number to the population of Chicago, coming from every state in the Union and from many foreign lands. Many of these visitors are engaged in educational pursuits; many others are fascinated by the diamond as a commodity and a thing of beauty. All are interested in securing literature pertaining to the life history of the diamond. Literature which is concise, *readable*, authentic and up-to-date.

1935 This little book is published in answer to these requests, and to a host of similar requests from those who were unable to visit the exhibit. The book is not a scientific treatise, a commercial discussion, or a historical romance. It aims to combine the features of all three things, so that the reader may sense something of the solid worth of diamonds, and the colorful story of their life.

*Chicago, Illinois*
*February, 1935.*

# Contents

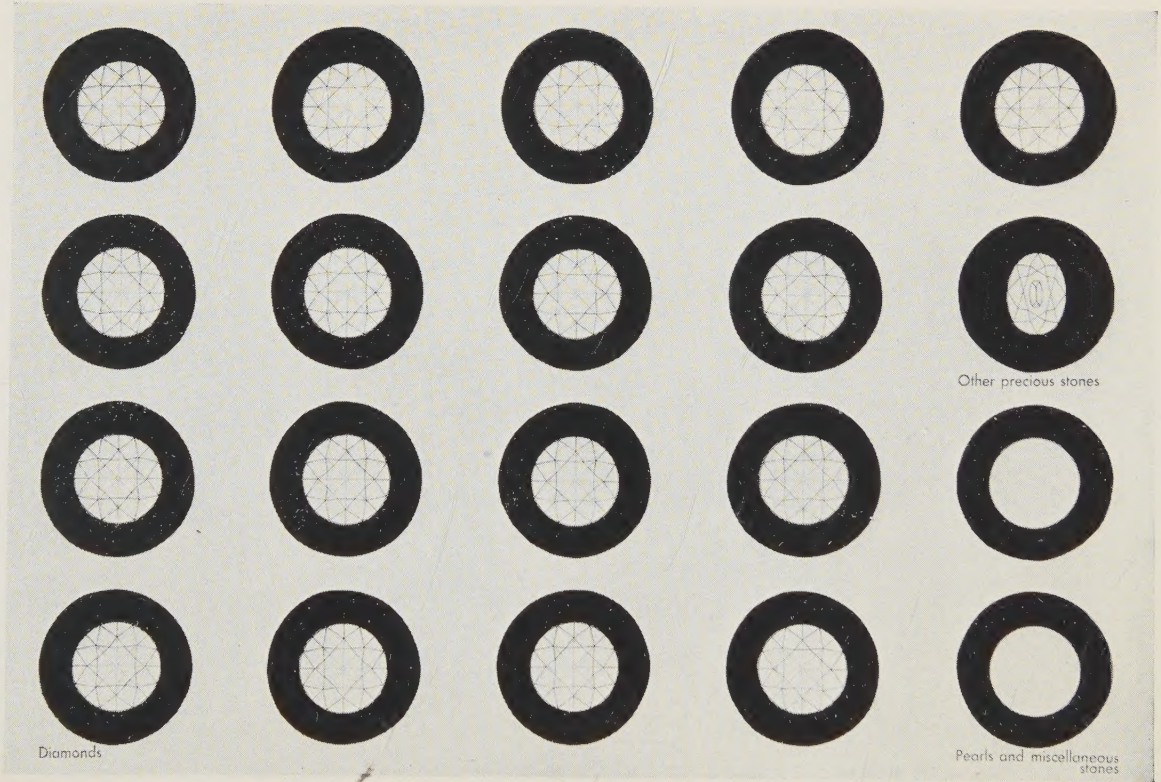
*DeBeers Consolidated Mines, Ltd.*

RUSHING TO A NEWLY-OPENED DIAMOND FIELD IN SOUTH AFRICA
(GRASFONTEIN, LICHTENBURG AREA, 1928)

# Introduction

THE literature on the subject of diamonds has been vast. Men have studied diamonds, treasured them, collected them, stolen them, fought wars over them and invented legends about them, ever since the dawn of recorded history. Why? The answer is found in the mind of Man himself. He has rightly decided that any inanimate object, in order to be valuable, must first be beautiful—so that his eye shall not tire of it. Second, it must be durable—so that it shall not crumble away or lose its beauty in his lifetime, or the lifetime of his son's son. And third, it must be rare—so that his neighbor and his grandson's neighbor shall envy the possession of it. As man studied the diamond, he became more and more aware that it fulfilled all three of these conditions, to a degree unsurpassed by any other substance in the world. The light of modern science has served to strengthen this conviction. What can compare with the diamond? Gold, the most precious of metals known to our forefathers, is not as beautiful, not as rare, and it is bulky and soft. Silver tarnishes and is less rare. Radium is extremely valuable and rare, but it deals death to those who do not understand it. Other precious stones cannot approach the diamond in beauty and durability. So, in studying the diamond, we study the substance most highly prized by the human race, for reasons which will be shown in detail.

At the outset, then, the authors' problem was not in finding books on diamonds, but in selecting the *best* books from which to cull the most interesting facts and stories. To the digested findings of others, has been added much original material. We hope that the scientific student will find here a few facts which are new to him, and that the reader who seeks romance will find it in the tales of the winning of diamonds, and of the jealous fury with which men have sought them.




*Chicago Jewelers' Association*

DIAMONDS LEAD IN VALUE OF PRECIOUS STONES PRODUCED

(Each circle represents five million dollars' value of production in a normal year)

## CHAPTER I

# The Nature of Diamonds

CHEMICALLY, a diamond is pure carbon. In other words, it is composed of the same material as lampblack, soot or graphite. How can this be? Nature herself withholds the answer. We know only that the diamond is *crystalline* carbon, formed under such terrific heat and pressure that man, for all his cleverness, has never been able to make diamonds in the laboratory.

*Carbon*

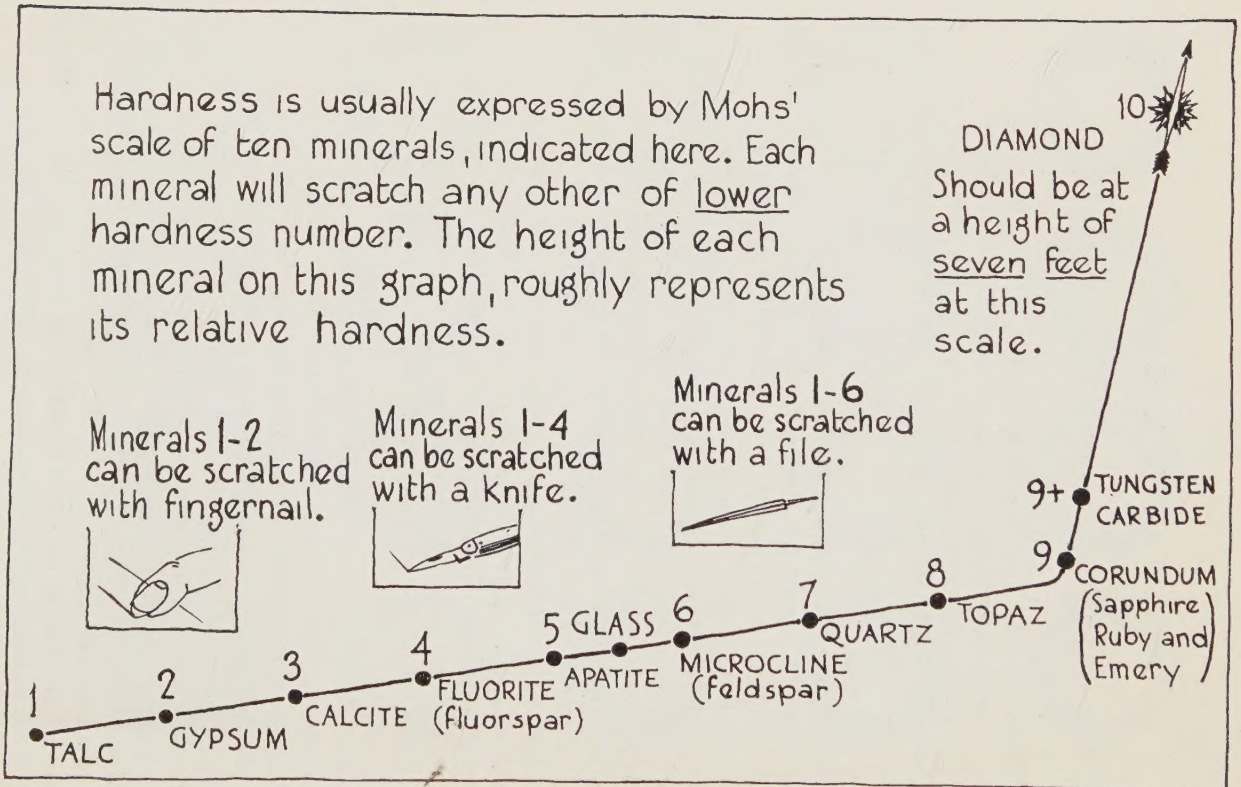
Let us consider carbon for a moment. Of the ninety-two elements which compose the earth's crust, carbon is one of the commonest and most familiar to us all. It is *everywhere* in nature. It occurs in all living matter. The human body is one-eighth carbon. Wood is about half carbon. The food we eat, the clothes we wear, the houses we live in—the very air we breathe—all contain carbon. Locomotives thundering past on the railroad; ships that pass in the night; thousands of automobiles on a busy boulevard—what makes them go? Coal, fuel oil, and gasoline all contain a very high percentage of carbon. Truly it is a wonderful substance! The most versatile of elements, it combines with other materials in *more than a million* ways, while of the other ninety-one elements, only about 25,000 compounds are known.

*Formation*

If carbon is so active and busy on this earth, then, why does it occur so sparingly in the diamond form? We have said that man has met with little or no success in making diamonds. Nature must find the task equally difficult. The carbon must be trapped in molten lava; the lava must be of a certain chemical composition; the heat and pressure must be tremendous, before a diamond can be born. The carbon, unwilling to undergo these conditions, too often escapes Nature's efforts and reappears in one of its commonplace forms.

*Hardness*

What are the distinguishing features of the diamond? First of all, it is the hardest substance in the world. Not only that, but it is *by far* the hardest. Let us compare it briefly to other hard




HARDNESS OF THE DIAMOND

*Chicago Jewelers' Association*

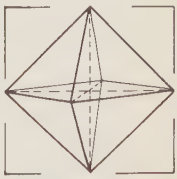
stones. Next to the diamond, corundum is the hardest natural substance. Familiar forms of corundum are the sapphire and the ruby. But the diamond is estimated to be *eighty-five times* as hard as corundum. Diamond-pointed tools are used to shape grinding-wheels made of emery, another form of corundum. If the diamond is properly set, such a tool can be used (on a lathe) to wear away two big emery wheels, a foot-and-a-half in diameter and an inch thick, before the diamond itself shows any wear, even to the keenest eye! Other substances, harder than corundum, have been made artificially in electric furnaces at terrific heat. The best-known of these is tungsten carbide, made at great expense for use in cutting-tools. Corundum cannot scratch tungsten carbide. Only diamond-pointed tools can be used to dress and cut it—and the process is done with ease.

*Alignment*

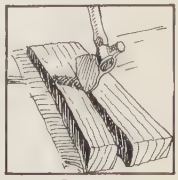
This quality of hardness is due, probably, to the conditions under which the diamond is formed. So great was the pressure at the time of formation, that the carbon atoms have been crowded together in a very compact mass, and have been aligned in definite patterns which add strength to the structure of the stone. The diamond, however, is brittle; if it is struck a strong blow in a certain direction it will shatter. For this reason, makers of diamond-pointed tools must study each stone and set it in the proper position; then the diamond will stand years of hard use.

*Crystallization*

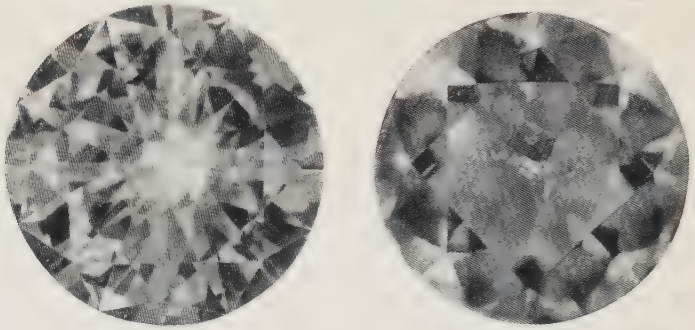
We have said that the carbon atoms are lined up in the stone in definite patterns. Most of the minerals in nature assume a definite crystal shape because of such an alignment. The crystal shapes of the diamond all belong to the "isometric" or "cubic" system, which has the most perfect symmetry known. The most common shape in diamonds is that of the octahedron, an eight-sided figure having the outline of the familiar "diamond" seen on playing cards. Other, more complex crystals are sometimes found, which may have as many as 48 sides. Perfectly shaped crystals, however, are the exception rather than the rule; but all diamonds have a definite cleavage or *grain*, much like a piece of wood. These planes of weakness are not visible in fine gem diamonds, except under the microscope; but they pass through the stone parallel to the crystal faces; and along these planes the diamond can be split. If cleavage is *too* well developed, the planes may appear as flaws.



*Octahedron*



*Cleavage*



*Process Patented by Frank Heitzler, Jamaica Plain, Mass.*

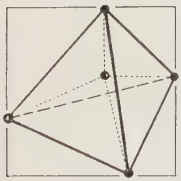
PERFECT FLAWED

MICROPHOTOGRAPHS OF DIAMONDS

Other types of flaws are often seen in rough diamonds, such as "knots," inclusions of other minerals, tiny spots of black carbon, or bubbles of gas or liquid.

*Structure*

The arrangement of the carbon atoms in a diamond was first determined by an English scientist about twenty years ago. He photographed diamonds with an X-ray apparatus (too complicated to describe here) and found that, basically, the structure of the diamond is due to an arrangement of the atoms in groups; one atom in the center of a four-sided pyramid or "tetrahedron," with four other atoms regularly spaced around it to form the corners. The atom in the center of one pyramid is, in turn, at the "peak" of the next one, and this arrangement is repeated countless billions of times in the smallest diamond. When this was discovered, the reason for crystalline shapes and cleavage became much clearer to all students of the diamond.



*Tetrahedron*

*Specific Gravity*

The diamond is a fairly heavy stone. Its specific gravity is about 3½, which means that a cubic inch (for instance) of diamond weighs three and a half times as much as a cubic inch of pure water. This is not a remarkable weight when compared to an equal amount of metal (such as iron), which is much heavier, but the comparison becomes more interesting when we consider that some of the common forms of carbon have a specific gravity of only 1½. Those carbon atoms were certainly crowded into a small space when the diamond was born! Diamonds are measured

by a tiny unit of weight called a carat. There are 2268 metric carats in a pound, or about 142 carats to the ounce. The name is derived from the carat seed, used in ancient India to counterbalance diamonds long before our present weight-systems were devised.

*Color*

The color of diamonds is due to small amounts of impurity in the carbon. In this quality (as well as crystallization) the jeweler is most concerned. Let us consider a number of diamonds, say 100 carats, coming from the mine. Of this amount, 50 carats are "bort"—they have defects in their crystal structure which make them unfit for jewelry. Of the other 50 carats, well crystallized, 25 carats will be unsuitable because of poor color. The usual shades in such stones are pale yellow, pale brown, grey or black—colors which detract from the beauty of the stone. Often, too, the color is spotted and streaky. A fine *gem* diamond is clear and limpid, like a drop of pure spring water, and usually has a delicate shade of color which delights the eye. Jewelers, with their trained eyes, classify these peerless gems (on the basis of color) as follows:

*Rivers*—Absolutely clear, without color.
*Jagers*—Pale steel-blue.
*Wesseltons*—Pale blue.
*Crystals* and *Capes*—Very pale yellow.
*Very light browns*
and *Premiers*—Stones which have a faintly "oily" appearance, and have the unusual property of appearing blue in sunlight, yellow in artificial light.

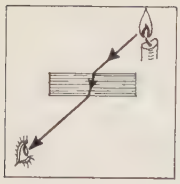
Occasionally, a diamond is found with pronounced color, and is known as a "fancy." Included in these are such colors as canary-yellow, golden brown, deep blue, green, pink, or even red.

*Optics*

The beauty of the diamond, aside from its color, is due to the optical properties of the stone—in other words, the "tricks" it plays with light. Let us consider, first, the properties of "refraction," "internal reflection," and "dispersion." Fearsome words, perhaps, but easily enough explained.

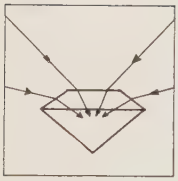
*Refraction*

Refraction, in gem study, means the bending of a light ray when it passes from the air into a dense substance such as water, glass, or diamond. Entering the substance from the top, at an



angle, the light is always bent downward. A common example of this is seen when you thrust a straight stick into a pool of water. The stick appears to be bent at the surface of the water. Every transparent substance bends light a different amount, and this property is measured by a number called the "index of refraction." Of all gem stones, the diamond has the highest index. Here is a comparison:

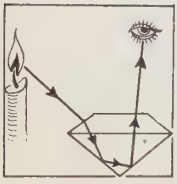
| | |
|---|---|
| Diamond | 2.42 |
| Zircon | 1.95 |
| Sapphire or Ruby | 1.77 |
| Topaz | 1.62 |
| Emerald | 1.59 |
| Flint Glass | 1.58 |
| Quartz | 1.55 |
| Ice | 1.31 |



How does this affect the brilliance of a gem? Any stone which is highly refractive has the power of gathering light; that is, light coming from all directions is bent into the center of the stone. Thus the diamond, with its high index of refraction, acts as a veritable magnet for light.

*Reflection*

What becomes of these rays which the stone gathers? If the diamond is properly cut, the light will be completely reflected from the under side of the stone. This is called "internal reflection." Let us explain this by referring again to a homely example. Did you ever lift up a glass of water and look at the surface from below? Sometimes you can see objects above the water, sometimes only a silvery sheen of reflection. This happens because the *under* side of the water's surface has the power of reflecting light —provided you look at it from a sharp enough angle. The same is true of a light ray trapped inside a diamond. If it strikes the other side too straight, it will pass through—but if it strikes at an angle of more than twenty-five degrees off the perpendicular (the "critical angle"), it will be reflected back. Of all gem stones, the diamond has the greatest power of internal reflection—the sharpest critical angle. Diamond cutters, through the centuries, have figured out the exact shape which takes the best advantage of this property. Theirs is the science of *diamond design*. You can-



not see through a well-cut diamond, except from the side. What you *do* see is a brilliant glow of light, gathered by the stone and transmitted directly to your eye.

*Dispersion*

But the diamond has another power which adds to its beauty, and this is the power of dispersion. Ordinary white light is composed of the six major colors of the rainbow: red, orange, yellow, green, blue, and violet. Each of these colors is a distinct ray, but they all vibrate so unthinkably fast that they are blended into a single white ray. Now, when such a ray enters a dense substance from the air, we find that each color is refracted a slightly different amount -the red ray being bent the least, and the violet one the most. Thus the light is *separated* into its component colors, and again we find that the diamond, of all gems, separates these colors the widest. Turning a diamond slightly under the light, you can see fiery little spots of rainbow color flashing from the stone. What a blaze of beauty has been created from a mite of carbon!

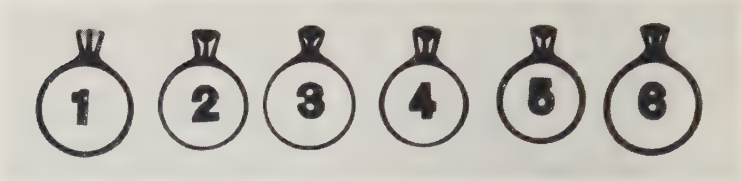
These are the tricks which the diamond plays with ordinary light. Now let us see what other qualities scientists have found in the laboratory.

*Fluorescence*

About thirty years ago Sir William Crookes, a noted English scientist, found that certain diamonds, if exposed to strong sunlight and then taken in a dark room, would glow in the dark. This had been noticed before, but Sir William, with his keen mind, determined to find out why. After a series of experiments, it was found that the effect was caused by ultraviolet rays (invisible short-wave rays which are found in sunlight, and, incidentally, are beneficial to the skin). These rays can be generated artificially by various types of electric arc, and the effect created is called "fluorescence." Very few diamonds are fluorescent (nine-tenths of them, in fact, are not), but when we expose such stones to an ultraviolet lamp, we can create a fairyland of glowing color. Freakish effects are also seen, such as pink diamonds fluorescing blue, and yellow ones turning green.

*X-Rays*

The X-ray has also been applied to the diamond experimentally. We have said that the arrangement of atoms was determined by this means. An *ordinary* X-ray photograph of a diamond shows that the rays pass through the stone rather easily, since it is pure



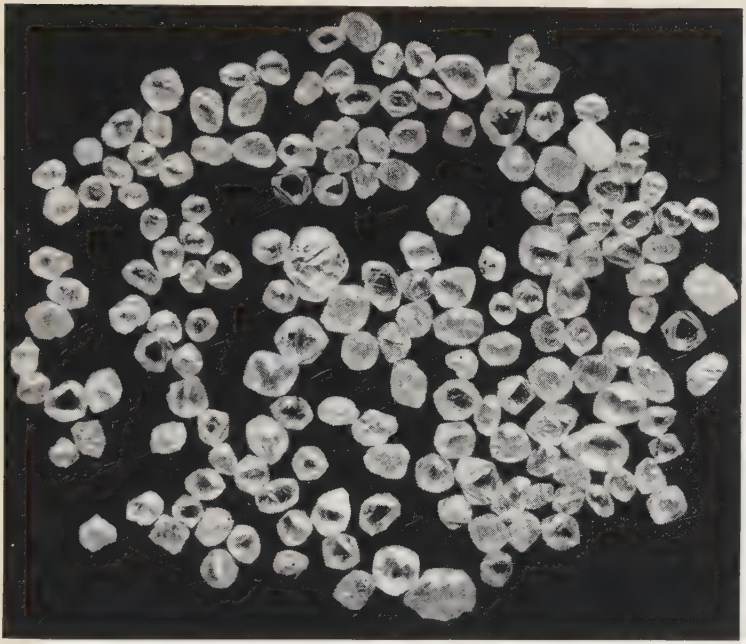

*General Electric X-Ray Corp., Chicago*

X-RAY PHOTO OF A DIAMOND AND FIVE IMITATIONS, SET IN RINGS
*Left to right:* DIAMOND, ZIRCON, WHITE SAPPHIRE (SYNTHETIC), WHITE TOPAZ, GLASS, QUARTZ

carbon and offers little resistance. Other stones used to imitate or substitute for the diamond (such as glass or white sapphire) are all *metallic* compounds or mixtures of some sort; the metal in them resists the X-rays, and they will photograph as black shadows. This is one means of distinguishing the diamond from imitations, although many easier tests are known, of course. (Hardness and refraction tests in particular.)

*Radium* Diamonds have been treated with radium, with some very interesting results. Some pale yellow stones, for instance, when left in contact with radioactive matter for some months, will change color—first to white, then to deep green. Others show no effect, and others still are marred by the formation of black spots on their surface. It was noticed, in the case of some of the diamonds turned green, that the color was only "skin deep" and could be removed by recutting—although it was otherwise a "fast" color, unaffected by heat or acid. This process may be useful some day in improving the value of off-color diamonds, though it is only in the experimental stage at present.

*Strain* Many diamonds show signs of strain; that is, their structure has yielded to pressure and has failed to attain perfection at the time it was formed. This is best seen through a complex microscope which "polarizes" light (breaks it down in a special way). Under such a light, the stone will show rings of color, which usually center about a tiny bubble or flaw, and indicate defective workmanship from Nature's shop. Indeed, stories are told that a diamond has been known to "burst" soon after it was mined, so great was the internal stress after the stone was released from its prison of rock. Many authorities, however, discount such stories.



*Asscher's Diamond Works, Amsterdam*

ROUGH DIAMONDS

*Roughs*

In concluding this chapter, we shall try to describe rough diamonds as they come from the mine. They are not particularly beautiful before they have gone through the cutter's hands. At best, a rough diamond looks like a "bright pebble." Some are clear, perfectly shaped crystals—but as a rule, the surface of the stone has a "glazed" or "frosted" appearance, and the crystal is a bit "lopsided," with rounded edges. To the touch, the diamond feels "greasy" and rather cold, since it is a good conductor of heat. Thus the diamond, hardest and most beautiful of all natural objects, requires the touch of skilled hands in order to bring out its dazzling splendor.

## CHAPTER II

# The Occurrence of Diamonds

DIAMONDS have turned up in many scattered parts of the world, but only a few fields of major commercial importance have ever been found: one in Asia, one in South America, and several in Africa, which is by far the greatest source in modern times.

*Bible* The diamond was known and recognized, apparently, in very ancient times. The first mention of it in early literature is in the Old Testament of the Holy Bible. In the Book of Exodus, which is said to date back to 1700 B.C., we find a description of the breast-plate to be worn by Aaron as high priest of the people of Israel:

(28:17) "And thou shalt set it in settings of stones, even four rows of stones: the first row shall be a sardius, a topaz and a carbuncle: this shall be the first row.

(18) "And the second row shall be an emerald, a sapphire, and a *diamond*."

*Beginnings* It is thought that diamond mining as an industry originated in India, sometime between 800 and 600 B.C. The oldest definite evidence of the use of the diamond as an ornament is a Greek statuette (now in the British Museum) which has two small diamonds for eyes, and is dated by experts at the 5th Century B.C. Some scholars think that the campaigns of Alexander the Great in the 4th Century B.C. may have quickened commerce with the Orient, and a few diamonds found their way to Europe in the next four hundred years. But at the time of Christ, the diamond was still a rarity. Pliny the Elder, the great Roman philosopher of the first Century A.D., describes six kinds of diamonds, commenting on their unspeakable hardness, and saying that they were so rare as to be owned "only by kings." He goes on to say that the diamond would withstand the test of being pounded with a hammer on an anvil, without breaking; and that the only way to soften one was to soak it in goat's blood. These two quaint, incorrect ideas persisted for many years afterward.

*India*

Peninsular India was the only known source of diamonds for about twelve hundred years. About 600 A.D., diamonds were discovered in Borneo. No new fields were found, then, until the Brazilian discoveries in the eighteenth century. Thus we can say that the Orient was the *only* source of diamonds for over two thousand years.

*Mme. Sorel*

The custom of wearing the diamond as a personal adornment (except in the trappings of kings) was not introduced in Europe until about the year 1430. A lady of the French court, one Agnes Sorel, is usually given credit for the idea. Following her leadership, fashionable women throughout the continent created a demand for diamonds, and the fifteenth century marked the beginning of a "boom" in the Indian diamond mines which lasted over three hundred years.

All the Indian and Borneo diamonds were found in alluvial fields; that is, in beds of river-gravel, either modern or ancient. The deposits along the Kistna and Godavari Rivers were the most productive sources in the past, and from there have come most of the famous large diamonds of history, such as the Great Mogul, Kohinoor and Orloff.

*Tavernier*

Most of our knowledge of the Indian mines comes from the writings of the celebrated French traveller Tavernier, a wealthy gentleman of the seventeenth century who made a hobby of collecting, describing and trading in diamonds. Visiting the Indian fields in the year 1665, he found the Parteal and Kollur districts (both located on the banks of the Kistna) to be beehives of activity. At the Kollur mines he found sixty thousand people—men, women and children –laboring in the blazing sun, and receiving wages so low that their lot was little better than slavery. The men dug pits in the gravel to a depth of a dozen feet, while the women and children carried the loose material away in baskets and washed it to recover the gems. The selling of the stones was done by small boys, who, with their sharp eyes and nimble wits, could drive as shrewd a bargain as any of their elders.

Tavernier also visited the other mines of India, and his accounts are vivid and accurate. But he was deterred from going to Borneo because the island, according to custom, was ruled by a woman. Hearing that this Queen was opposed to visits of dia-

mond traders, and accounting himself (apparently) not much of a ladies' man, he feared to incur her wrath.

Most of the Indian mines, at that time, were located in the kingdom of Golconda, which has since ceased to exist. Rough diamonds were sent to the capital city of Golconda (now in ruins) to be cut. The king kept the finest stones for his own treasury, and most of the rest were sent to Europe. The Portuguese port of Goa, on the west coast, was the chief export center.

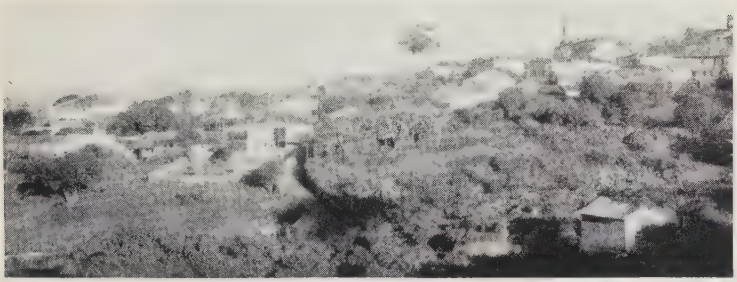
Indian diamonds, as we said, are all found in the river-beds. Geologists have tried to trace the source of these gravels in hopes of finding diamonds in their original matrix of lava, but have met with small success. Since the middle of the last century, the Indian mines have been practically exhausted. Only a hundred carats a year now come from this ancient source, which contributed twelve million carats to the world during its twenty centuries of life. Gone are the toiling thousands on the banks of the Kistna. But the ghost of Tavernier, could he walk today, would find glittering, priceless collections of diamonds locked in the vaults of modern Hindu princes. Handed down from father to son through the centuries, guarded at the cost of thousands of lives, the fortunes in diamonds held by the ancient royal families of India are inconceivably vast.

*Brazil*

The scene shifts to the other side of the world—to the jungles of Brazil. It is the year 1726. In this rough, undeveloped Portuguese province, men are panning for gold in the swift streams of the interior uplands. At night the miners, gathered around their campfires, play at cards, and for counters they use bright pebbles gleaned from their pans during the day's work. A certain prospector, Bernardo da Fonseca Lobo by name, has recently arrived from Goa, where he has seen the gleaming harvests from the Indian diamond fields being shipped overseas to European marts. The "bright pebbles" in the miners' hands are diamonds!

Borne across the sea in slow sailing ships, the news burst like a bombshell in Lisbon. It was celebrated by high mass, parades and feasting. The Portuguese crown took immediate steps to assume control of the fields.

The original discovery was made near the town of Tejuco, in Province Minas Geraes, and the town was immediately renamed



*Dr. R. T. Chamberlin, University o Chicago*

DIAMANTINA TODAY

Diamantina. The government's first move was to order the entire gold-mining population to move out of the area, and mining rights were placed in the hands of a few favored planters, using slave labor. This lasted about ten years, during which time it is said that many a diamond was taken from the region, unknown to the government, by ex-gold miners who resented their high-handed treatment. In 1740, a new system of mining was started, whereby a contractor, employing about six hundred slaves, was allowed the sole mining rights for a period of three to five years. He paid the government so much per slave, and sold most of his diamonds to the crown. This must have been a paying proposition, for we hear tales of the contractors building magnificent estates and maintaining large staffs of personal slaves and concubines.

Brazilian diamonds were not well received in Europe at first. Owners of Indian stones, fearful that their value would suffer, spread stories that the Brazilian product was soft, and of inferior grade. This the Portuguese traders cleverly eluded by sending the stones first to Goa, reshipping them to Europe as Indian diamonds, and breaking the news gradually to European buyers. Brazilian gem diamonds are today highly prized among jewelers for their excellence of crystallization and purity of color.

In the latter half of the eighteenth century, new discoveries extended the Brazilian fields gradually from Diamantina northward into the province of Bahia, westward into Goyaz and finally into the jungle province of Matto Grosso, almost to the Bolivian frontier. In all these fields the diamonds, as in India, are found in the beds of present streams, or in solid rocks formed by the com-

*Pan-American Union, Washington*

A CONVOY OF DIAMONDS FROM DIAMANTINA TO RIO
(FROM AN ETCHING PUBLISHED IN 1835)

pression of very ancient river-sands. Here, again, geologists have had little success in tracing the stones to their source.

The contract system was abandoned in 1772, and for more than fifty years the government itself operated the mines, very inefficiently and at high cost. The diamonds were sent in to Diamantina once a month, thence to Rio de Janeiro once a year. The latter shipments were always sent under military escort, in a box with three locks, the keys for which were sent by three separate messengers.

Meanwhile, the Portuguese crown jewels had grown to be a fabulously rich collection. No accurate estimate could be placed on its tremendous value, for the secret was jealously guarded. But this was not to last. In 1822, among the wave of revolutions sweeping South America, Brazil was reborn an independent empire; and a republic was established in 1889. Now mining is done by anyone who can afford to pay the taxes set by the republican government.

In the 1850's, the Brazilian mines were at their height. Slavery was still in vogue; men and women alike, black and white, worked under their masters' lash. It is interesting to note that rewards were occasionally given out to these wretched people for finding

a large diamond and surrendering it promptly to the landowner. For a stone of 8 to 10 carats, the prize consisted of a new suit of clothes, a hat and a knife. If the diamond weighed more than 17½ carats, the lucky slave was awarded his freedom. An American author, writing of the Brazilian fields in 1856, said that the unhealthful climate had taken toll of a hundred thousand lives since the discovery of the mines. Food and supplies were brought inland by traders and sold at a profit of 500 to 800 percent, over the prices prevailing in Rio de Janeiro. "Racketeering," it seems, is by no means a modern idea.

Today, after producing sixteen million carats, the Brazilian mines have declined, being eclipsed by the great African fields and by natural exhaustion. Production is about 20,000 carats a year, most of which comes from Bahia. This state is the only spot in the world where the carbonado, or black diamond, is found. True carbonado is a dull, lustreless, porous stone composed of tiny interlocking diamond crystals. Having no straight cleavage, it is tremendously tough, hence is highly prized by industrial users. Great quantities of this valuable material were thrown away by early miners, who did not realize its worth; but in recent years, it has brought a price comparable to that of gem diamonds.

*Richardson and Hanson, Chicago*

MINERS AT WORK IN BAHIA, BRAZIL

*South Africa*

India and Brazil are interesting only as historical fields. The capital of the diamond empire is on the "dark continent." In the last sixty-five years, the Union of *South Africa* has produced a hundred and eighty-five million carats—three-quarters of all the diamonds owned by the human race.

*Van Niekerk*

It was in 1866 that the children of a poor Boer farmer named Jacobs, playing near their hovel at Hope Town on the banks of the Orange River, picked up a bright pebble, carried it home and dropped it on the farmhouse floor. Schalk van Niekerk, a neighbor, asked Vrouw Jacobs next day if he might buy the stone, and she laughingly gave it to him. So van Niekerk gave it, in turn, to trader John O'Reilly, asking him to find out if it had any value. O'Reilly showed it to many of his friends on his way up-river, but none could tell him what it was. Finally he sent it to a noted geologist, Dr. W. G. Atherstone of Grahamstown, and it was pronounced a diamond of 21 carats' weight, worth $2,500.

There was an excited search, then, among the usually stolid Boers and their black servants, but ten months passed before another one was found—this time, thirty miles downstream from Hope Town, near the junction of the Orange and Vaal Rivers.

*DeBeers Consolidated Mines, Ltd*

DIGGINGS ON THE VAAL RIVER AT DELPORTS HOPE

The search went on for about two years without any remarkable reward, until, in March of 1869, a diamond of 83½ carats was picked up by a dusky witch-doctor on the banks of the Orange. The same Schalk van Niekerk bought this stone for 500 sheep, 10 oxen and a horse; he sold it again for $55,000, and it became the famous "Star of South Africa."

*Booi the Witch-Doctor*

Now the rush was on in earnest. Diggers of all ages and nationalities flocked to the fields in a frenzied, feverish search for the precious gems. It was found that the gravels in the bed of the Vaal were the richest, and the activity of the diggers centered, for a while, near the town of Barkly West, where many great flawless, shining diamonds were dug from the river's treasure-trove.

*The Vaal*

While the diggers were busy at Barkly West, someone unearthed a diamond at Jagersfontein, far to the south, in a peculiar greenish-yellow dry clay, miles from the nearest river-bed. A month later, at a spot near Barkly West, good farmer DuToit finished building a new house out of the same sort of clay, and noticed a diamond sticking out of the wall! Apparently, you didn't have to go near the river to find the stones! DuToit found that the clay lay in a great circular area, a quarter of a mile across, close to a pond or "pan" on his farm. Within a space of a year three more such clay-patches, known as Bultfontein, DeBeers and Kimberley, were found—all within a few miles of DuToit's pan. Here, in the center of these "dry diggings" was born the village of Kimberley, destined to be the hub of a great diamond empire.

Now it was the year 1871, and the diggers began to pour into South Africa by the thousands, drawn by the adventurous, luring vision of vast riches. Kimberley sprang up as a shanty-town of ten thousand souls, all busily engaged in digging in the earth like a swarm of ants.

*Kimberley Open*

It was found that the "yellow ground" in the great circular deposits could be worked to unheard-of depths. Fifty, one hundred, two hundred feet they went down—each digger working in a little claim thirty-one feet square and washing fortunes from the dirt. Activity centered on the Kimberley mine, which was to become the greatest of them all. Roadways of clay were left standing across the area, so that the diggers could hoist their ground

*DeBeers Consolidated Mines, Ltd.*

THE DISCOVERERS: JULY, 1870

*DeBeers Consolidated Mines, Ltd.*

1871: THE EARLIEST DIGGINGS

PICTORIAL HISTORY OF THE KIMBERLEY PIT

*DeBeers Consolidated Mines, Ltd.*

1872: INDIVIDUAL CLAIMS . . . ROADWAYS OF CLAY

*DeBeers Consolidated Mines, Ltd*

1873: "A SPIDER-WEB OF HAULAGE ROPES . . ."

PICTORIAL HISTORY OF THE KIMBERLEY PIT

*DeBeers Consolidated Mines, Ltd.*

1886: THE LAST OF THE OPEN PIT

*DeBeers Consolidated Mines, Ltd.*

1935: "A YAWNING ABYSS . . ."

PICTORIAL HISTORY OF THE KIMBERLEY PIT

and haul it away. But soon they were so deep that the roads caved in, and the hoisting windlasses had to be mounted around the rim of the pit. As the surface layers were removed, it was found that the yellow ground graded into a hard rock and took on a greenish-blue color—but still it bore diamonds, and still the diggers toiled away. Now the fastest diggers were working in the bottoms of little pits, the slowest ones on top of square columns of rock—and when the precious blue rock slid from a high claim to a low one, there was always a fight. Criss-crossing this great honeycomb was a vast spider-web of haulage ropes, with the buckets crawling up to the rim of the pit like trained fleas on a tight rope, drawn by horse-windlasses or steam engines.

*Boom*

Steam engines were used only by the wealthy, for there was no wood, and coal had to be hauled a hundred and sixty miles across the veldt in ox-carts—bringing a price of $65 a ton at the mine, with $150 haulage charge added on! But Kimberley, one of the greatest boom mining camps of all time, was peopled with rough, boisterous, free-spending men, who made fortunes and "blew them in" again without batting an eye. A few canny souls there were, who used their money to buy up their neighbor's claims, and gradually the Kimberley mine was brought under the control of a group of English pioneers who went to work in a more systematic manner.

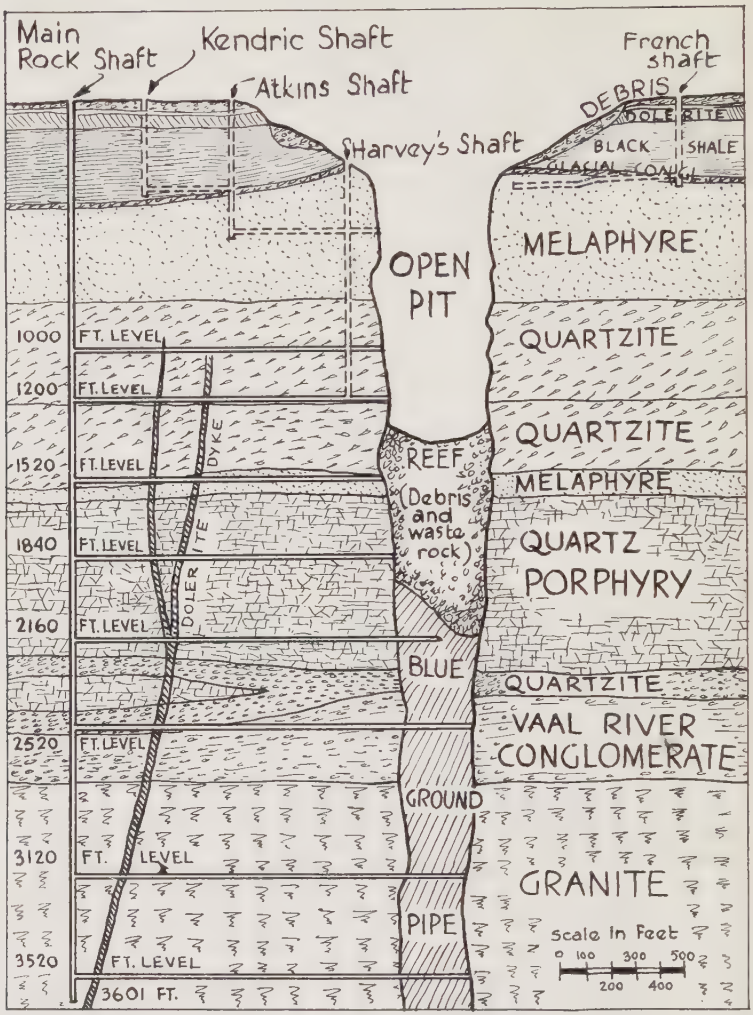
*Pipes*

In the year 1889, the Kimberley pit had grown to be a yawning abyss, a quarter of a mile across at the rim and thirteen hundred feet deep. Working in the bottom of this pit was extremely dangerous; slides of rock had already cost scores of lives. But still the blue "ground" lay within a 500-foot circle at the bottom, and still it bore diamonds. There was, apparently, no end to it!

Geologists had decided that this deposit was the neck, or root, of an old volcano—a mountain stripped away ages ago by the relentless hand of Time, and leaving no vestige of its presence except this "pipe" of blue rock underneath.

*Shaft*

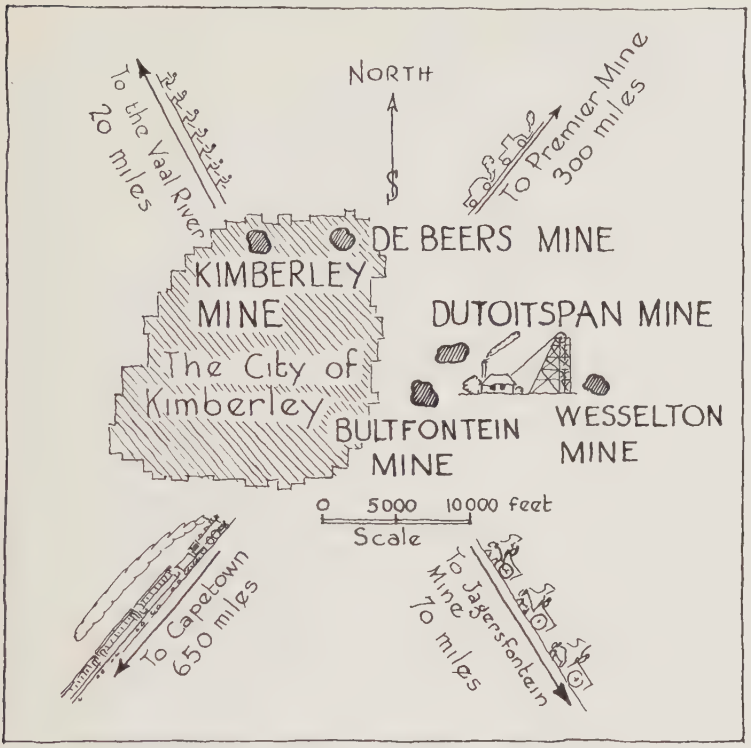
Before the Kimberley pit had reached such a great depth, the owners decided that the open style of mining was doomed. So they started a shaft, a thousand feet from the rim, where the rock was hard and would not cave. Straight down they blasted, driving the opening a few feet farther each day. Fifteen hundred feet—




*Chicago Jewelers' Association*

CROSS-SECTION OF THE KIMBERLEY MINE, SHOWING RELATIVE POSITIONS OF THE PIPE, PIT, SHAFT AND HAULAGE TUNNELS

two thousand -twenty-five hundred—month after month the work went on, lengthening into years. At intervals tunnels were bored to the pipe, below the bottom of the pit; and patient black




*Chicago Jewelers' Association*

KIMBERLEY IS THE HUB OF THE DIAMOND EMPIRE

men, burrowing like moles in the earth, sent thousands of tons of blue ground up the shaft. Today the Kimberley mine extends three thousand six hundred feet below the surface; the pipe is honeycombed with galleries below the pit; still the blue rock bears diamonds, and still has no bottom. Deepest diamond mine in the world, it stands as a monument to man's zeal for the King of Gems.

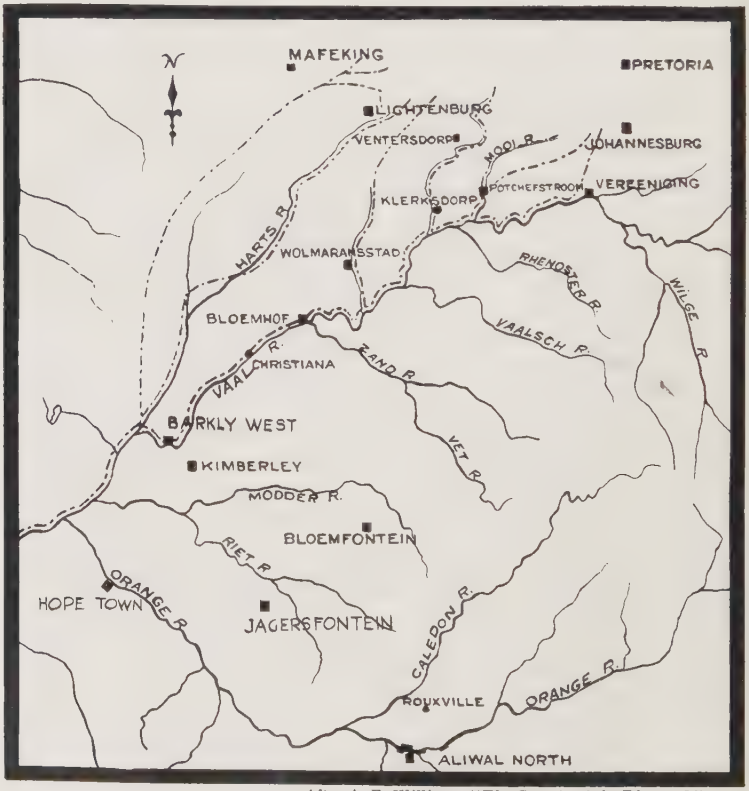
*Pipe Mines*

Each of the other pipe mines has had a similar history. Bultfontein, DeBeers, Jagersfontein and DuToitspan — each is a gaping hole in the ground, with miles of dark tunnels below. And new ones have been added—Wesselton mine, also near Kimberley, found in 1891; and the great Premier mine (near the northerly city

of Pretoria) which was started soon after the turn of the century. In all, these seven mines have produced well over a hundred million carats—and five of them are within a few miles of the flourishing, modern city of Kimberley. Other pipes have been found—in fact, more than two hundred of them are known in South Africa—but nine-tenths of them are barren of diamonds, and most of the rest are so "lean" that they cannot be profitably worked.

*Bloemhof; Luderitz*

But what of the river diggers throughout the years? They have not been idle. Picking up their story where we left off (at Barkly West), they moved up the Vaal River, finding rich new gravel-




*After A. F. Williams, "The Genesis of the Diamond," 1932*

MAP OF THE EASTERN RIVER FIELDS IN SOUTH AFRICA, SHOWING MODERN AND ANCIENT DRAINAGE SYSTEMS

beds at Bloemhof. Then in 1908 a new, unusual find was made at Luderitz Bay, on the west coast—in what was then German Southwest Africa. In this barren, bleak desert region which faces the broad Atlantic, diamonds were picked up in the *beach sands*—small stones, it is true, but numerous and of fine gem quality.

*Lichtenburg*

The richest finds of alluvial diamonds, however, have been made in the last ten years. In 1926 geologists, working in the headwaters of the Vaal above Bloemhof, found diamonds in the dry, abandoned channels of streams which had found new courses ages ago. Here were great "potholes," some of them a hundred and fifty feet deep, filled with rich diamond-bearing gravel and waiting to be dug. In this field, named after the town of Lichtenburg, the government assumed control, and mining rights were parcelled out in an unusual manner. Each would-be prospector bought a license and was given four stakes. On an appointed day, all were lined up near the new field on foot, and started to race at the firing of a gun. First come, first served, and the devil take the hindmost! To the fleet of foot went the best claims. As for the lame, the halt and the blind, each was allowed to have a proxy run for him. As many as 15,000 people ran in these "rushes,"

*A. F. Williams, "The Genesis of the Diamond," 1932*

RUIGTE LAAGTE POTHOLE, LICHTENBURG AREA, WHERE THE GRAVEL WAS 150 FEET THICK

*DeBeers Consolidated Mines, Ltd.*

LICHTENBURG: THE "LINE-OUT" WAITING FOR THE STARTER'S GUN

by means of which the field was opened up a little at a time. Lichtenburg field has yielded many fine diamonds, but is now practically exhausted.

*Namaqualand*

In 1927 geologists visited the west coast and examined the area around the mouth of the Orange River, in the Province of Little Namaqualand (south of Luderitz Bay). Here, in another wild, desolate desert, they found one of the richest diamond fields of recent years. In the parched, treeless cliffs which face the Atlantic are ancient beach-terraces, once washed by the waves, but now lifted high above the strand by a slow, steady buckling of the earth's crust. In these rounded, waterworn gravels they found great shining gems, given up by the sea ages ago. And so, sixty years after the Jacobs children played with their first bright peb-

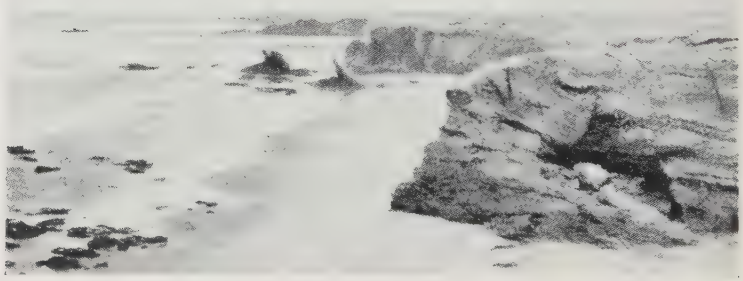


*Photo: Dr. W. Beetz. From A. F. Williams, "The Genesis of the Diamond," 1932*

LITTLE NAMAQUALAND: THE CLIFFS NEAR PORT NOLLOTH

ble on the banks of the Orange, is found one of the richest fields of modern times, near the mouth of the same swirling, turgid stream. South Africa, the land of diamonds, holds a record for all-time production which will probably never be equalled.

*Congo-Angola*

Other alluvial fields have come to light in recent years, in the steaming depths of the jungle, far to the north of Kimberley. The largest of these is in the Belgian Congo, near the equator. This field was discovered by a party headed by American geologists and is operated by a Belgian Company, the Société Internationale Forestière et Minière du Congo, popularly called the "Forminière." Development in the Congo typifies the way in which the search for diamonds has brought civilization to the darkest corners of the earth. Diamonds were known to exist in this unhealthy, fever-ridden jungle land as early as 1906, but development was undertaken slowly and carefully. At first, the only access to the area was by means of steam-launches puffing up the Congo River and its branch, the Kasai. All supplies had to be brought in by this means. Today, after twenty years of actual mining, scheduled airplane service links the camps with the

*S. I. Forestière et Minière du Congo, Brussels*

NATIVE QUARTERS IN A CONGO DIAMOND CAMP

*S. I. Forestière et Minière du Congo, Brussels*

MAN'S QUEST FOR DIAMONDS HAS BROUGHT CIVILIZATION TO THE CONGO JUNGLE

coastal cities; railroads and good roads have been built; the land has been cleared; the native workers live in neat, sanitary bungalows and are supplied with good food and medical care. The south end of the field extends into the Portuguese province of Angola, where the Companhia de Diamantes de Angola ("Diamang") carries on the work. Due to market conditions, the Congo-Angola field now produces over half the diamonds mined yearly, and has led the world in carats mined during the last three years. Congo diamonds, though plentiful, are of low grade. They consist largely of brown or grey bort, suitable only for industrial use. Gem diamonds are found, in quantity, only in the Angola end of the field.

*West Africa*

A similar field was discovered in the Gold Coast Colony, in West Africa, in 1919. Operated by an English firm, and dominated by American engineers, the field has had a meteoric rise as a


*Chicago Jewelers' Association*

ALLUVIAL DIAMOND FIELDS IN AFRICA

*Consolidated African Selection Trust, London*

EXCAVATING GRAVEL, AKWATIA, GOLD COAST

*Consolidated African Selection Trust, London*

PROSPECTING RIVER POTHOLES IN SIERRA LEONE

SCENES IN THE GOLD COAST AND SIERRA LEONE

source of industrial diamonds. Here, again, the operators have had to overcome problems of health and sanitation which were never so serious to their British cousins in the temperate South. Recently, geologists have pushed farther west along the coast, into the province of Sierra Leone, and have found new deposits which give promise of large production in a few years if actively developed. In contrast to the Gold Coast deposits, Sierra Leone gravels show a high percentage of fine gem diamonds.

*Others*

There are smaller fields in Africa, which need only a passing mention. One is in Tanganyika Territory, near the southern end of Lake Victoria; another in Rhodesia, farther south; and a third in the French Congo, north of the Forminière holdings. Together, these three fields have produced an amount of diamonds, in the last ten years, equal to that mined by the Forminière and Diamang diggers in two weeks.

We have described all the world's leading diamond fields. A few small fields, interesting for other reasons, remain to be sketched.

*Arkansas*

There is a diamond mine in the United States. It is located in the southwestern part of the state of Arkansas, and was discovered in 1906. Geologists, examining the rocks, found a pipe of blue ground surprisingly like that of South Africa. It was worked by surface methods for a number of years, and has yielded a fair quantity of small gem diamonds. The largest one recovered (in 1924) weighed over 40 carats; but on the average, it takes three or four Arkansas stones to weigh a carat. The mine has now been idle for a number of years, as it lacks adequate financial backing and could not possibly compete with African production.

Diamonds have been picked up, occasionally, in other parts of the United States. About twenty small ones have been found in the central states of Wisconsin, Michigan, Indiana and Ohio, in the debris left by glaciers ages ago. A few have turned up in California in the sluice-boxes of gold miners, and a few more in the eastern mountains from Virginia to Georgia. But such finds are so rare that they can be classed as "curiosities" only.

*Guiana*

The colony of British Guiana, on the north coast of South America, has been a small but steady producer of diamonds since the 1880's. The gravel deposits are similar to those of Brazil, oc-


*Chicago Jewelers' Association*

WHERE DO OUR DIAMONDS COME FROM?

(Each large diamond represents a half-million carats annually, 1929–31. Each large man means 2500 diamond cutters at work in 1928. Small symbols represent smaller activity)

curring in the headwaters of the rivers on the Venezuelan frontier; and the method of working them is much the same as in Brazil.

*Borneo*

We spoke of the fields in Borneo; these ancient mines are still being worked, and produce about 1500 carats a year. The labor is done by the natives of the island, or by Malays or Chinese. The wages received by these men are pitifully small—four to twenty dollars per year—and the native princes have never encouraged the industry to any extent. In fact, it was the custom for many years for the local rajahs to confiscate all good stones of over 5 carats for their own treasuries, paying the finder whatever they saw fit. It is interesting to note some of the customs among the Borneo miners. Extremely superstitious, they never start a new pit without offering proper prayers and sacrifices to their idols. No loud talking is allowed in the pits, for fear of arousing the wrath of the evil spirits. Such customs probably prevailed in India also, in the Middle Ages. Borneo diamonds are noted for their great hardness, and the large proportion of "fancy" colors among them.

*Australia*

In the 1850's, diamonds were discovered in the southeastern part of Australia, which has been a small producer ever since. Australian diamonds have a reputation among cutters for being the hardest in the world. It is said that they can be successfully cut, only with their own dust. Australia now produces less than a thousand carats a year, most of which is obtained as a by-product of the alluvial tin mines.

CHAPTER III

# The Geology of Diamonds

SOUTH AFRICA, as we have said, is the only place in the world where the diamond occurs commercially in its original matrix—in the rock where it was formed. So here is the happy hunting ground of the geologist—the man who tracks down the "why" and "wherefore" of everything in the earth's crust.

*Rocks* Let us go over, briefly, the elements of this interesting science. All the rocks in the earth's crust belong to three classes: igneous, sedimentary and metamorphic. Igneous rocks are those which have cooled from a molten, fiery mass, and include such types as granite and lava. Sedimentary rocks are laid down, grain by grain, under water, or by the wind. The tireless action of the rivers, or the waves of the sea, have broken off the particles from some solid mass, and have laid them down again in smooth, flat layers—cemented, later, by pressure and chemical action. Metamorphic rocks are those which belonged originally to one of the other two classes, but have since been altered by the action of heat and pressure. We need not consider them here.

*Minerals* All rocks are hodge-podge combinations of certain natural substances called minerals; and each mineral has a definite chemical composition. Geologists, poring over their microscopes, can classify each rock according to its mineral content. Certain minerals, they tell us, are valuable; and certain *combinations* of minerals mean that the rock has hidden value, which will come to light after a thorough search.

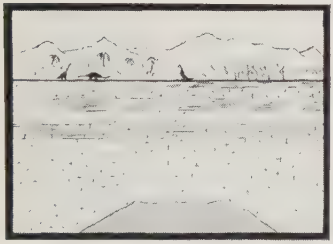
Igneous rocks, in general, are classified according to the amount of quartz they contain. Quartz is one of the commonest of minerals; each grain of sand on the seashore is made of it. If an igneous rock contains lots of quartz, it is said to be "acid"; if it contains little or none, it is "basic."

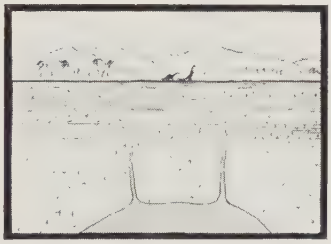
*Blue Ground* The "blue ground" of the South African pipes is a basic igneous rock; it contains no quartz whatever. This, it seems, is one of the many conditions to be satisfied before a diamond can be formed.

The blue ground was composed, originally, of large amounts of the glassy, grass-green mineral *olivine*, with smaller amounts of scores of others: notably garnet, bronze-colored mica and dark, heavy iron minerals. While this mass was cooling, the olivine was attacked by chemical solutions, and most of it turned into *serpentine*—a dark greenish-blue, rather soft mineral. Hence the color, and hence the name: "blue ground."

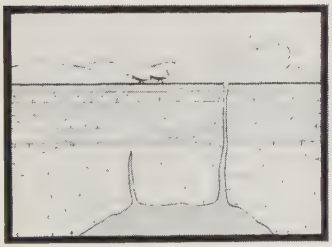
*Origin*

But what of the diamond? Let us go back to Kimberley mine,

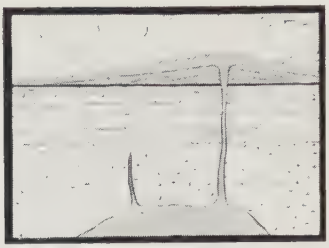


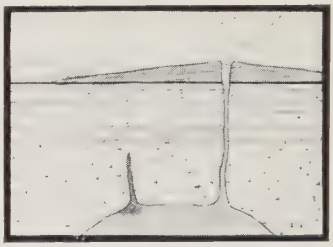


and see what happened. Ages ago, a mass of this molten rock existed in the depths of the earth, miles below the present site of the mine. It is thought that minute amounts of carbon in the mass were already beginning to crystallize out, under the terrific heat and pressure, as diamonds. Seething with gases, the fiery mass developed tremendous pressure, and began to work its way to the surface through cracks and fissures. One of these cracks,

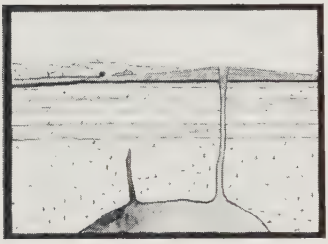


weaker than the rest, gave way, and a mighty explosion shattered the earth's crust, boring a clean, round hole to the surface. Molten rock began to well up in the hole and spread over the land surface,



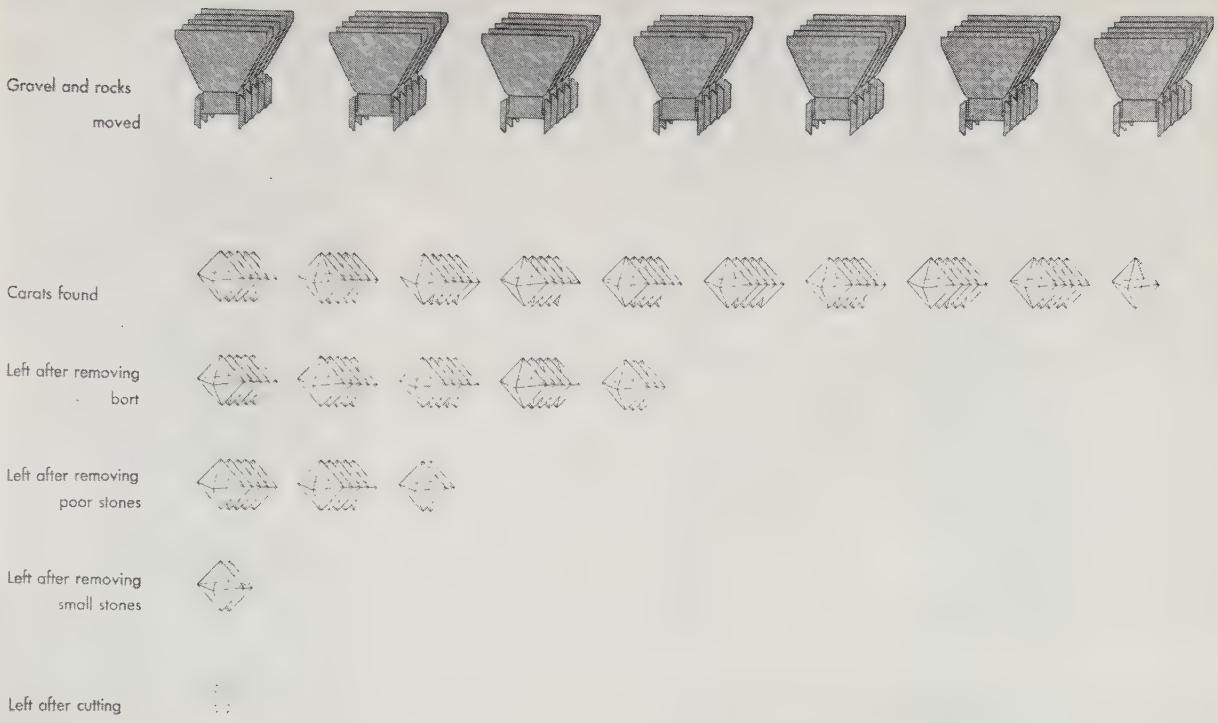


bringing diamonds with it. Layer on layer it built up, into the form of a mountainous volcano. Then the pressure was relieved;



the mountain cooled and hardened; and through countless millions of years the streams ate away its flanks until it was levelled off. So the pipe is the root of an old volcano. Where once the mountain reared its lofty head, is now the flat South African veldt; and the diamonds from its upper layers have gone down the Vaal and the Orange—some of them coming to rest on the desert coast of far-off Namaqualand.

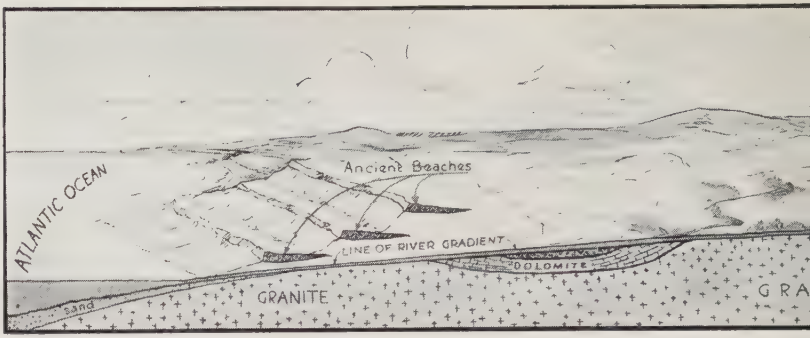
*Richness* We spoke of Kimberley and her six sisters as rich mines. And so they are. But do not get a mistaken idea of "richness" in a diamond mine. For every ton of blue ground taken out, only one-fourth carat of diamonds is recovered. In other words, only one part of the rock in *fourteen million*, by weight, is diamond. Of that one part, three-quarters of it is worthless for jewelry. And this is the yield from the *richest* mines! Consider the hundreds of millions of *tons* of rock, taken from those seven pipes in the last sixty years, to produce a quantity of cut gem diamonds which could easily be packed in an ordinary trunk!




*Chicago Jewelers' Association*

PRODUCTION OF A ONE-CARAT CUT DIAMOND

(Each group of cars represents 50 tons; each diamond, one carat)




A SECTION-DIAGRAM THROUGH THE ORANGE
TION OF DIAMONDS FROM THEIR SOURCE TO

*Rivers* Now, just a word about the river diggings. Flowing water is at work everywhere on the face of the earth, scouring away solid rocks and carrying off the loose debris in the form of mud and sand. Swift-moving streams can carry large boulders or gravel, while sluggish rivers carry only the fine muds. The Orange River in South Africa is an *intermittent* stream; that is, during the long dry spells it is a weak, slow-moving "trickle" of water—but the heavy summer thunderstorms transform it into a raging torrent. It is during these periods of flood that the river has its greatest scouring and carrying power. The Vaal and smaller streams, which feed the Orange, all act the same way. And so we find that the diamond-bearing debris which was stripped from the mountainsides, millions of years ago, has found its way down the rivers,

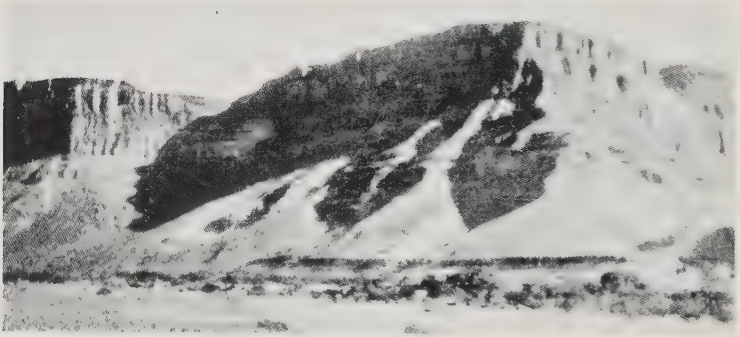
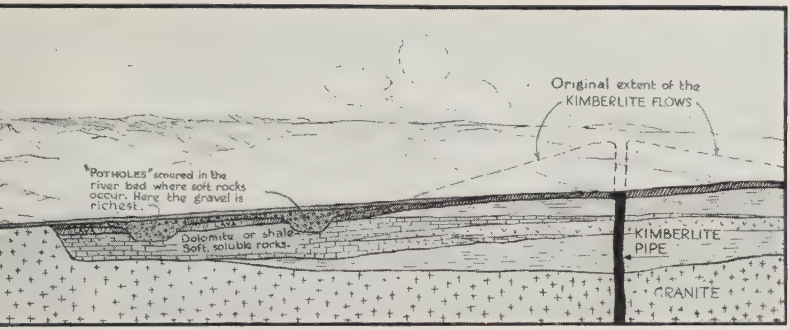


*Photo: Dr. W. Beetz. From A. F. Williams, "The Genesis of the Diamond," 1932*

ON THE WEST COAST



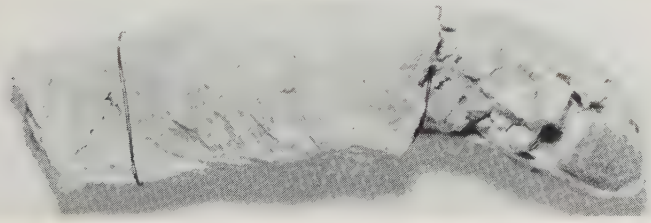

*Chicago Jewelers' Association*

ND VAAL RIVER SYSTEMS, SHOWING DISTRIBU-
IE RIVER-BEDS, AND EVENTUALLY TO THE SEA

being carried a few miles at a time. Wherever the rocks in the river-bed were soft, the churning, grinding action of the flood-waters scooped out great cavities, filled them with precious burdens, and departed. This was especially true at Lichtenburg—to the ultimate delight of the fleet-footed prospectors.

*Ocean*

In Little Namaqualand, six hundred miles from Kimberley, the long journey from the "land of pipes" is finally finished. But the "long-shore" currents of the ocean, in ages past, have picked up diamonds, carried them up the coast, and spewed them out again on the beach. The same beach, rising slowly above the waves during the course of a hundred thousand years, has become a dry terrace on the shore. Geologists, searching the terrace, found diamonds embedded in the gravels along with beds of fossil oyster shells. These oysters, like their pearl-bearing cousins in the South Seas, must have had expensive tastes.



*Walker Museum, University of Chicago*

"OSTREA PRISMATICA," THE OYSTER

*Diggers*

"Richness" in the alluvial fields is, again, but relative. The story is told of an aged digger, working on the Vaal, who was asked what luck he was having. He answered quietly that he hadn't found a diamond for three weeks! It is no job for an impatient man. The same digger may have turned up a stone the next day, worth thousands of dollars; or again he may have barely scratched out a living for years to follow. It is the age-old gambling instinct which lures men to such a trade. Consider the case of Jacobus Jonker, sixty-odd years of age, who had been working in the river-beds all his life for small returns. In January of 1934, not far from Premier Mine, he uncovered a 726-carat beauty (the largest in recent years) which brought him over $300,000. A "bright pebble," indeed, to bring sunshine into his latter years!

CHAPTER IV

# The Mining of Diamonds

WE have sketched elsewhere the development of Kimberley mine. It is an example of the success of modern engineering skill, applied to a difficult problem. And the others—DuToitspan, Bultfontein, Premier, Jagersfontein, DeBeers and Wesselton—have all had a similar history.

*Protection*

A visit to one of these great pipe mines is a thrilling experience. Barbed-wire entanglements, charged with electricity, surround the entire mining area. Armed guards patrol this barrier night and day. You are admitted to the company's property only after a careful questionnaire. Affable Englishmen talk to you at the office, satisfying themselves that you have come as an interested visitor only.

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ELECTRIFIED BARBED-WIRE ENTANGLEMENTS

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HEAD-FRAME; WESSELTON MINE

*Shaft* Once inside, you are taken to the shaft, where a great steel head-frame stands over a dark, uninviting hole in the ground. From a nearby building comes the chugging of a huge steam engine. Thick, trembling steel cables, vanishing into the darkness of the shaft, begin to roll smoothly over the big wheels on top of the frame high above your head. One cable goes up; the other one, down. They are hoisting "in balance." Soon a square steel cage is drawn out of the darkness and comes to rest at the ground level. You are ushered into it; there is a clanging of safety gates and a ringing of bells, and the descent begins. The men conducting you wear little brass lamps on their hats, and their tiny yellow flames cast a ghostly gleam in the darkness. Above the gate you can see the brown, dripping timbers whizzing by in a blur. Over your head is a strong roof of steel; the steel framework around you, the quiet confidence of the men behind their headlights, set your fears at rest. At intervals, a light flashes briefly above the gate, and you are told that you have passed another "level" of this great underground city. Finally the sickening, swishing

downward motion slows up; there is a glare of electric lights, more clanging of gates and ringing of bells, and you step out into the mine, two thousand feet down.

*Hoisting*

Here is a beehive of activity. A long line of little steel cars, each loaded with blocks of blue rock, stretches away on a little track in a rocky tunnel. Alongside of it is another train, of "empties." Grinning black men wheel up the loaded cars, one at a time, and dump them down a broad iron chute with a thunderous roar of falling rock, adding the empty "trucks" to the string on the other side. At intervals a new train arrives, rolling down the gentle incline of the tunnel and being brought to a stop by its attendant; similarly the empties are drawn away by being hitched to a rope which moves, mysteriously, along the side of the tunnel on pulleys. From the chute, we are told, the rock is dumped into "skips": big steel buckets about the size of the cage we just rode down in. But only the rock rides in the skips, for they are hauled up the shaft so fast that a man couldn't stand the speed.

*Haulage*

Walking back in the tunnel, and dodging the occasional black men with their trains of cars, we note that the solid rock in the

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LANDING THE CAGE, ON THE 1600-FT. LEVEL AT WESSELTON

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DUMPING TO THE SKIPS, ON THE "1600" AT WESSELTON

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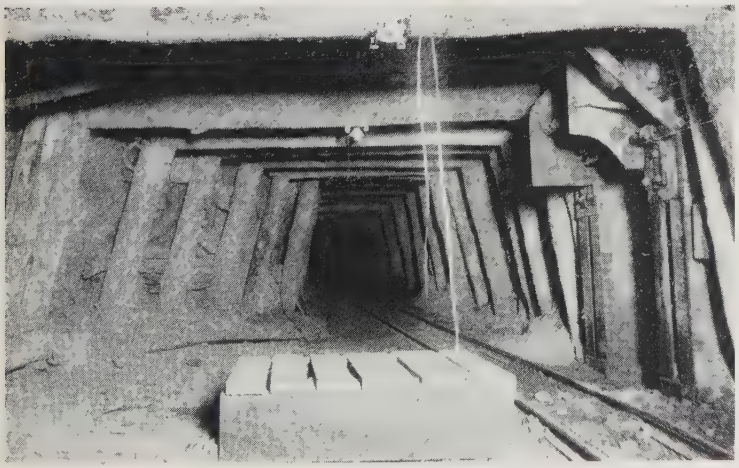
MAIN HAULAGE TUNNEL, ON THE "1600" AT WESSELTON

tunnel walls is not the same as that in the loaded cars. This is a haulage tunnel; we are not in the blue ground yet. Since the shaft is about a thousand feet from the pipe, we must walk this distance through hard, worthless rock in order to reach the workings.

Soon the tunnel divides; the "empty" track winds off in one direction, and we head the other way, toward the source of the loaded cars. Now we are in the pipe. The narrow, single-track tunnel is lined with massive timbers, for the blue ground is treacherous; it softens and caves easily if exposed to air or water for any length of time. Some of the timbers are dripping wet, festooned with fungus. The air, blowing in a breeze past our faces, is heavy and dank; it is driven by great whirling fans, located on the distant (to us!) surface of the earth. 'Round about us is the silence of the tomb, broken only by the hollow echo of our footsteps.

*Ore Pass*

Next is a wide spot in the tunnel, where some negroes are loading "blue" from a chute. We are relieved to hear the bustle of their work—to see the light gleaming on their shiny-black, muscular bodies. This is an "ore-pass," into which the rock has been dumped from "sub-levels" above. Every forty feet, above our heads, is a "drift," or blue-ground tunnel, exactly like the one we are in. But only the tenth one, four hundred feet up, is



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TIMBERED TUNNEL IN THE "BLUE" AT KIMBERLEY

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LOADING AT AN ORE-PASS, KIMBERLEY

*Chicago Jewelers' Association*

DRILLING AT THE FACE OF A DRIFT

connected to the shaft by a haulage-tunnel. So the rock from the other nine must come down the ore-pass before it can reach the skips.

*Drifting*

Beyond, the electric lights are gone, and we approach the working faces guided only by the ghostly yellow lights on the hats of our English friends. Here are numerous cross-tunnels; in one of them, two dusky miners are boring into the solid rock with a thundering compressed-air drill. They will load the holes, later, with dynamite cartridges, and blast the precious blue blocks away —patiently advancing the tunnel a few feet at a time.

*Stoping*

Here is the end of a finished drift. Under a protecting canopy of timbers, beside a great pile of broken "blue," is the inevitable black man with his little steel car. Where does his rock-pile come from? Nearby is a "pole-road": a hole in the wall, leading upward, with poles hitched in the rock for steps. We climb this strange ladder—twenty feet straight up—gasping for breath in the hot, heavy air. The flickering little flames finally pierce the darkness of a gloomy cavern, twenty feet wide, fifty feet long, and as high as a tall man. Here is the top of that rock-pile. Standing on it are two miners. One is drilling into the roof of solid rock, and his air-drill is hammering away with a chattering roar.

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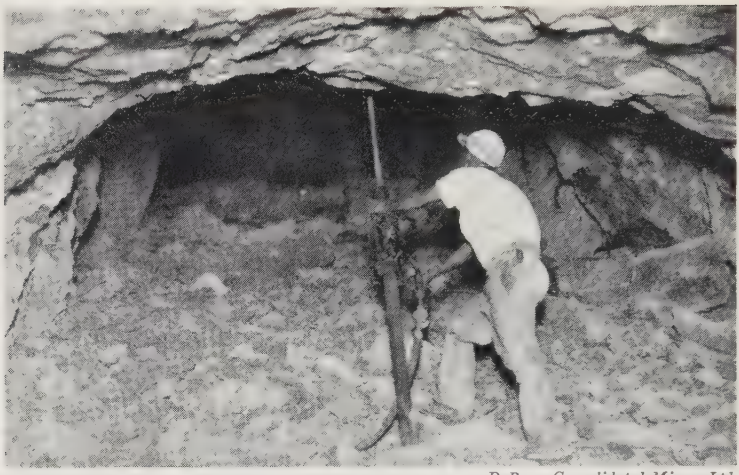
POLE-ROAD, ON THE "940" AT WESSELTON



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STOPING ON THE "1120" AT WESSELTON

You cannot make out his features; he is just a dark bulk behind a shining spot of light fixed to his hat. Now he is finished. There are a dozen small, clean holes in the roof. Each is carefully packed with the little cartridges of dynamite, wrapped in their neat wax-paper jackets. The drill is dismounted and taken down the pole-road. Wires are connected, and we consider it wise to retire to the drift below. The last to come down the ladder are our two dusky friends. They connect their wires to a strange-looking box with a handle on it. A sharp twist of the handle, a muffled thud from above, and a stream of acrid smoke coming down the pole-road. Now the black man with his car will have more work to do.

This is the operation of "stoping," and the stope is the dark cavern which the miners are hewing from the blue rock. Day after day they will repeat their work, until one day they will go up the pole-road after a blast and find that the roof has caved in, and the waste rock from the level above has filled up their stope. Then, all that remains is to load up the rest of the blue from below; the miners are sent to a new place, and start all over again.

*System* Everything is worked out systematically. The drifts are driven, a certain distance apart, to the far side of the pipe; the stopes are regularly spaced, leaving pillars of rock between. Then the pillars

are blasted out; and finally the rock over the drift is "sliced back" in such a way that no caving takes place between the miners and their avenue of escape—the shaft. And day after day the loaded cars stream to the shaft, and the skips race up and down like mad.

*Hazards*

The life of the black miners is not easy. In the early days, scores of these patient darkies lost their lives. Water, seeping down from the great pit up above, would eat away at the rock until it turned into a fluid mass—and a rushing wall of mud would sweep through the drifts to smother the men. Crude rock drills, not yet perfected, would stir up great clouds of poisonous blue dust, and send the men to a coughing, lingering death from miner's consumption. But now, the hazards are few. Humming electric pumps force the water out before it can do any damage. Dust is dampened with little streams of water running through hollow drill-bits. Timber —that greatest savior of miners' lives—is expertly placed and replaced wherever necessary. Each main level has an underground hospital, and *safety* is the watchword.

*Scarcity*

We have visited a diamond mine without seeing any diamonds. But do not be discouraged. Many of the miners, toiling under-

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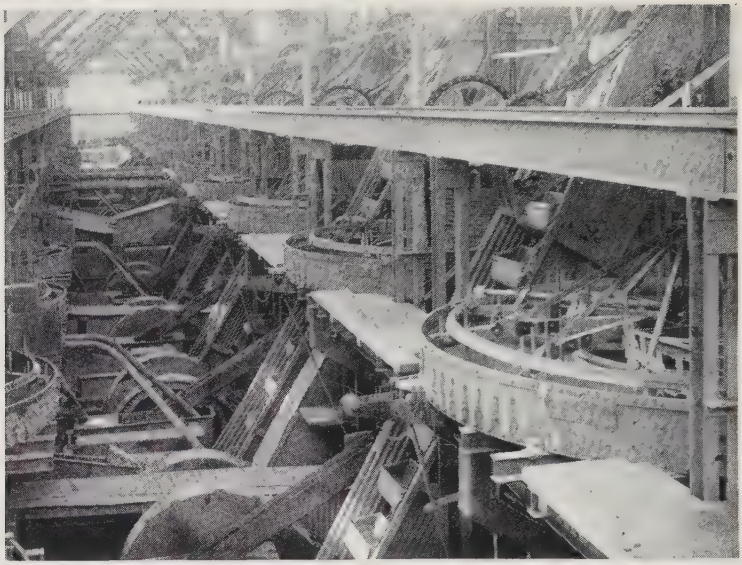
UNDERGROUND HOSPITAL, ON THE "980" AT WESSELTON



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ROTARY PANS AT BULTFONTEIN MILL

ground for *thirty years*, have never seen one, either! Sharp-eyed as hawks, they occasionally see a bright stone sticking out of a chunk of the blue; but how many, many times have they walked within a few feet of a fortune, and never have known it!

*Crushing; Washing*

Now we must follow a skip out into the bright sunshine, and see what becomes of its contents. Taken to the mill, the rock passes through a maze of machinery. Massive, fluted crushing rolls reduce it to the size of apples, then walnuts, then beans. It is shaken through flat screens and round screens, of all kinds and sizes. It passes into great circular pans, where it is mixed with mud and revolving, toothed arms sweep away the lighter particles. It goes into "jigs": vats of water sloshed up and down by plungers, where the light "ground" washes over the rim, and the heavy material is drawn off the bottom. And from these several machines, *ninety-nine percent* of this blue rock is sent to a mountainous "tailing" dump and thrown away. It is worthless!

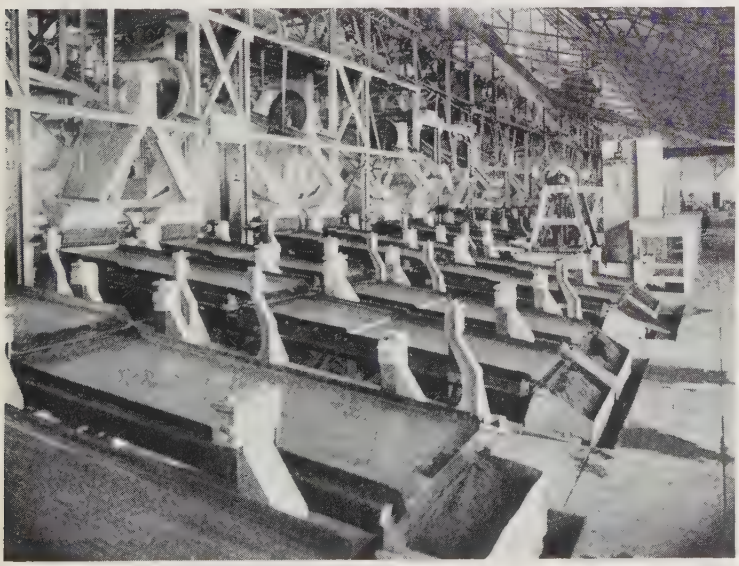
*Grease Tables*

The part which is saved is called the "concentrate," and consists of only the heaviest particles. And now we see the most

interesting part of it all. In a long room, under a maze of belts, girders and pulleys, are eighty or ninety strange-looking, oblong, inclined *tables*. Each is shaking from side to side, and has a coating of thick yellow vaseline on its surface. Here are the concentrates—the little black particles of rock—mixed with water, washing down the table-top, and falling off the lower end into a trough. Over the upper end of each table is a flat glass hood, hinged and padlocked. Here, at last, is the end of the trail. Through the glass we see the shining little spots that are diamonds, sticking to the grease, unmoved by the water or the incessant motion of the table. Strangest of stones, the diamond sheds water like a duck's back, and sticks fast to the grease while the last of the waste rock washes off.

*Finale*

Twice a day the tables are stopped, the hoods are lifted, and the grease and diamonds scraped off. The yellow mass is put into perforated iron pots, which are then immersed in boiling water. Away goes the grease, to be cooled and used over again. And so, at the end of the day, a handful of the bright little mites of carbon



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GREASE TABLES


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SORTING

is spread on a table, in a quiet room, to be sorted. This is the harvest from two thousand tons of the queer blue rock, fetched from the depths of the earth by the racing skips.

*Kaffirs* The native workers, emerging from the mine and mill by the hundreds, throng to their quarters at the end of the "shift." Some are small men, with light brown skin; others, tall, splendidly built and black as ebony; and between these two extremes are all manner and shapes of darkies. To our English friends, each kinky black poll, surmounting a flash of white teeth and rolling eyeballs, is just another "Kaffir boy." But some chatter in one dialect, others in another. About a dozen tribes are represented here. The tall, fine-looking black men are Zulus; the little brown ones "Cape boys"; and others go by such strange names as "Xosa" and "M'Pondo."

*Compound* All the boys must live together in a "compound," which looks, we confess, something like a prison. It is a walled enclosure of several acres' extent, with long sheet-iron bunkhouses facing inward on a great courtyard. Here they cook their simple meals of

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XOSA BOYS

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WESSELTON COMPOUND, FROM A WATCH-TOWER

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COOKING IN THE COMPOUND

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WAR DANCE

cornmeal and mutton, in iron pots on outdoor stoves. Here, on festal days, you can see the tribal dances, with a great flourishing of spears, bright blankets, shields and ostrich-plumes. And here, on less happy days, tribal jealousy flares up, and there may be savage fighting—especially if liquor (strictly forbidden by the white masters) is smuggled in. The gates are barred and locked, and guards overlook the scene from tall watch-towers.

The Kaffirs are child-like in many ways, and their life is very simple. Each boy agrees to work for the company for a set period of time—usually six months. During that time he works eight hours a day, six days a week; he is paid at the rate of about a dollar a day, and must spend all of his leisure time in the compound (reached by an underground passage from the shaft). There the company provides every comfort necessary to clean, healthy living.

*Stealing*

But the boys *must* be guarded, for they have been known to steal diamonds in every way under the sun. *Swallowing* was a favorite trick. One boy, many years ago, went to his "baas" complaining of a stomach-ache, and an operation brought forth six diamonds weighing, in all, over thirty carats! Others have

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IN A NATIVE'S INTESTINE


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IN THE SOLE OF A MINER'S BOOT

X-RAY PHOTOS: THE ENCIRCLED SHADOWS ARE DIAMONDS

cut themselves in the leg or arm, thrust a diamond in the wound and bound it up. (Usually, of course, it festered.) With diamonds in their hair, in their ears, between their toes or under the tongue, scores of boys were caught, in the early days, trying to smuggle them out for sale to illicit diamond buyers (known in South Africa as "I. D. B.'s").

At the end of his term, each boy is kept in "detention quarters" for a week, before being released. His effects are carefully searched, and he is subjected to a thorough physical examination. The X-ray has been used, in recent years, to detect stones concealed in a man's body. (The diamond, though "transparent" to the rays when compared to other stones, shows up well in the body tissue.) Stealing, however, is no longer common. The company pays a bonus to each boy who turns in a diamond of substantial size; and those who are caught stealing must work as convicts for several months without pay.

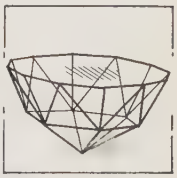
*Customs*

A Kaffir boy ending his term usually has most of his earnings intact, for the opportunities to spend have been small. The company "banks" money for many of the men, being careful always to return the *same* bills in the *same* parcel on demand; any other form of payment is viewed with suspicion! With the sum saved in six months, small as it may seem to us, a boy can buy trunkloads of trinkets—brass baubles, beads and colorful cloth—to take back to his native village and trade for two hundred head of livestock, a suitable hut, and five or six wives. Then he can lead a life of ease—letting the wives do all the work, according to an old jungle custom. Others, not so smart or so easily pleased, have learned some of the white man's bad habits, such as drinking and gambling; their little stake is soon spent, and they come back to the mine for another term. And others still, faithful for years, stay because they derive genuine pleasure from the comforts which the white man's civilization can bring.

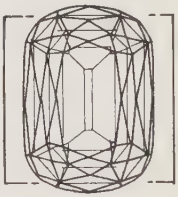
CHAPTER V

# The Cutting of Diamonds

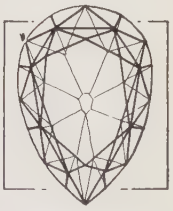
MAN'S skill is needed to bring out the diamond's beauty. The cutter's trade, a very difficult one, is nevertheless very old. Indian cutters of the Middle Ages knew nothing of optics; they simply took off the rough corners of the stone and tried to polish the glazed surface to make it presentable. With abrasives softer than the diamond itself, or by rubbing one diamond against another, this was a slow, laborious process. It did not occur to the ancients that the diamond could be reduced to dust, and that the same dust could be used to cut other diamonds at a reasonably fast rate of speed, and with great precision. The idea originated, it is said, with a Belgian lapidist by the name of Ludwig van Berquem, in about the year 1475. Van Berquem also had good ideas about diamond design; how to give the stone "depth" and "body" by cutting it "facet-wise" underneath, so that the eye could catch the bright flashes of light coming through a broad face, or "table," on top. And so the "rose cut" came into being. But still, one of the main objects in cutting was to preserve as much of the original weight as possible.



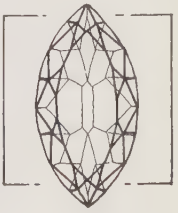
*Rose*



*Emerald*

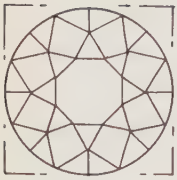


*Pendeloque*

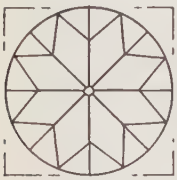


*Marquise*

About the middle of the seventeenth century, the science of optics became better known, and the "brilliant" cut was invented. This is the familiar round shape seen in engagement rings. This type of cut has now been developed to a point of scientific exactness. Each facet must be cut at a certain angle, in order to take advantage of the laws of refraction and reflection which apply to the diamond. There are variations of shape, of course, depending on the "fad" of the moment, or upon the shape of the rough stone. The "emerald" and "baguette" cuts are rectangular in outline; the "pendeloque" is pear-shaped; and the "marquise" looks like a little boat, pointed at both ends. But in all of these, the artisan has striven to cut the myriad facets at the exact slope which he knows will bring out the flashing points of light and color.



*Top*

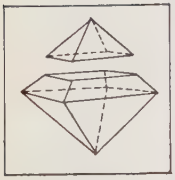


*Bottom*

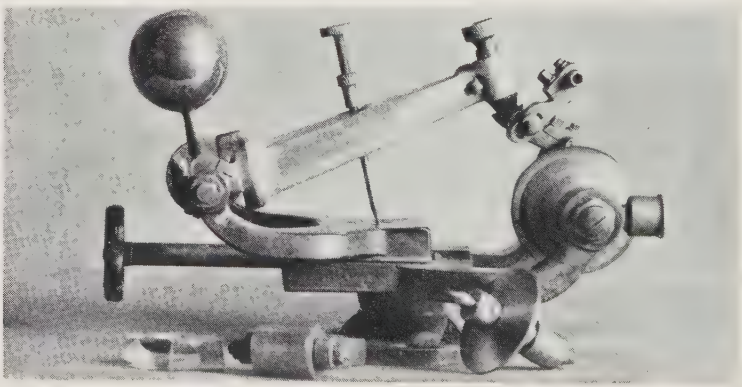
*Side*

Let us examine a diamond cut in standard brilliant style. It has fifty-eight facets. On top is the "table," and around it, sloping away at an angle of about 35 degrees, are thirty-two "top facets." The angle is measured on the eight large kite-shaped facets; the others, of course, vary a little according to the cutter's choice. The sharp edge, or rim of the stone is called the "girdle." Underneath are twenty-four "pavilion facets" eight of which are large ones, angling away from the girdle at 41 degrees and coming together in a point below. The point has been ground away slightly (to prevent its chipping off), making a tiny facet called the "culet." Consider, now, that diamonds smaller than a pinhead—weighing one-hundredth of a carat—are cut in this shape, with fifty-eight perfect facets! The cutter's trade is not for amateurs.

Let us watch the evolution of a brilliant. A rough diamond coming from the mine is first carefully examined, with a magnifying glass, to locate its cleavage and flaws. Then it is either sawed or split. Sawing is done with a paper-thin disc made of phosphor-bronze, spun around at high speed. Diamond dust, mixed in olive oil, is applied to the edge, and will slowly cut into the stone until it is sawed in two. The object of this is to divide the rough stone (usually an octahedron) into two pyramids, so that the sawed face on each can become the table of a gem.



*Sawn*



*Asscher's Diamond Works, Amsterdam*

DIAMOND SAW

CLEAVING *Asscher's Diamond Works, Amsterdam*

*Cleaving*

Another method of dividing a rough diamond is to *split* or *cleave* it. A groove is cut in the stone in the proper place, parallel to the cleavage; a steel blade is placed in the groove and struck a sharp blow; the stone divides, and all fragments are caught in a box below. Splitting can be done *only* parallel to the cleavage; and herein lies the advantage of the saw, as it will cut *across* the grain in any direction. Dividing the diamond, by either method, is often done to expose interior flaws, so that they can be polished off.

*Roughing*

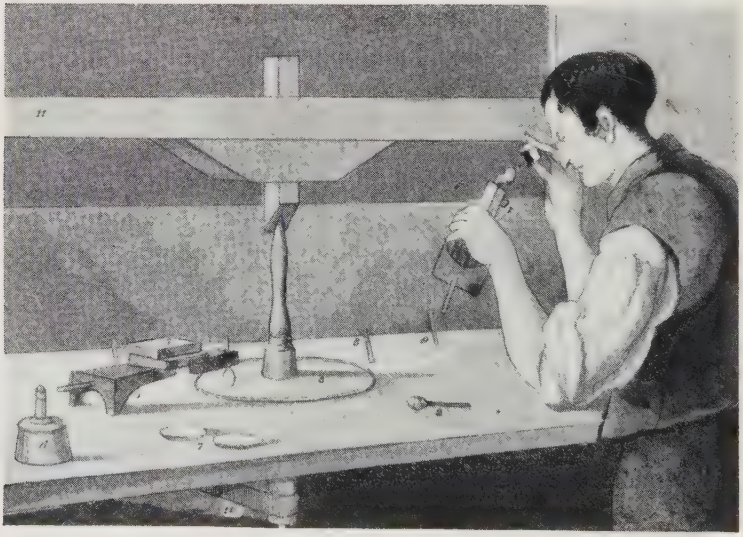
Next, the divided stone is ready for the "roughing" process. It is mounted on the end of a revolving spindle; the cutter holds another diamond against it, mounted in the end of a long stick held under his arm; and gradually the corners of the spinning stone are rounded off.

ROUGHING *Asscher's Diamond Works, Amsterdam*

*Roughed*

*Wheel* Then it is ready for the wheel. This is a flat, heavy iron disc, about a foot in diameter, which spins around 2500 times a minute. The iron is porous; diamond dust, shaken up in olive oil, is applied to its surface, and sinks into the pores. Now the stone to be cut is mounted in a "dop"—a ball of solder in a little metal cup, mounted on a holder. Sometimes a "mechanical" dop is used, in which metal prongs take the place of the solder; but this can be used only for large diamonds. The stone, turned so that the face to be ground is at the correct angle, is pressed on the wheel by hand or with lead weights, until the facet is flat, smooth and perfect. Forty to fifty times the solder must be melted, or the prongs loosened, and the stone reset at a new angle. And each time the whining, shrill noise of the wheel must start again, before the brilliant is finished. Cutting a one-carat stone takes from three days to a week; larger stones, proportionately longer. The cutter must always take care that his wheel is running *with* the grain of the diamond, not against it. It is impossible to cut a diamond across its grain. When the stone is finished, it weighs about half what it did as a sawn or split "rough"; but it is perfect in every detail.

*Finished*



*John Mawe, "A Treatise on Diamonds," 1826*

DIAMOND CUTTING, A HUNDRED YEARS AGO

Asscher's Diamond Works, Amsterdam

THE WHEEL

Chicago Jewelers' Association

DOPS, SOLDER AND MECHANICAL

*Asscher's Diamond Works, Amsterdam*

ASSCHER'S FACTORY IN AMSTERDAM TODAY

The cutting industry centers in the cities of Antwerp, Belgium and Amsterdam, Holland. Nine-tenths of the world's diamond cutters are at work there. They learn their trade in their early 'teens; it is their life work, and the technique has been handed down from father to son through the centuries. In years gone by, it was a home industry; each house contained its little shop. But in the last century, the trade has gradually been absorbed into great factories, whose names have become bywords in jewelry firms throughout the world. Stolid and phlegmatic, but with skilled hands, keen eyes and the patience of Job, these Dutch and Flemish folk find the trade to their liking.

In Antwerp today, it is the custom for diamond brokers to buy and sell their wares over the luncheon table, in their clubs. If you are privileged to be invited there, you can see them, with their little balancing scales on the table, solemnly weighing out the gems. Many a hard bargain has been driven by these stout burghers over their fragrant cheese and foaming steins of beer.

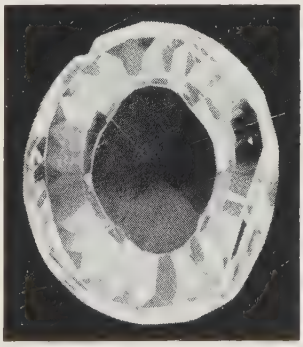
CHAPTER VI

# Great Diamonds Past and Present

CUT gem diamonds of over a hundred carats' weight, known to exist in the world today, can be counted on the fingers of both hands. As a matter of fact, *all* the cut diamonds of over thirty carats, which have ever been seen or reported, probably number less than four hundred. Diamonds of such weight are among the most cherished treasures of mankind; over most of them hang a shroud of mystery and a tale of bloodshed, treachery and lawless deeds in the far-flung corners of the earth.

We shall select twenty-odd of the most interesting of these great stones, and record the facts and fancies which history attaches to them.

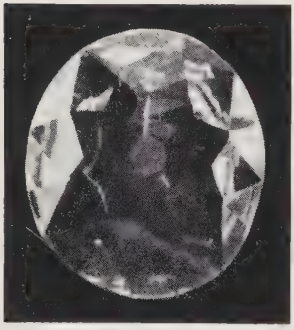
The Kohinoor is the Methuselah of famous diamonds. Its history is said to date back four or five thousand years, to the time when it was found on the Godavari River in India. It was in the possession of one of the ancient royal families, the Rajahs of Malwar, until the year 1304 A.D., when it was taken as part of the spoils of war by another ancient house; since that date, its story is better known. Sultan Baber, who conquered India in the early part of the 16th century and founded the Mogul dynasty, was the next owner, and the gem remained in the Mogul treasury until 1739. Then the Persian conqueror Nadir Shah dethroned the Mogul, and obtained the diamond by a cunning ruse. He heard that the ex-Mogul, whose life had been spared, carried the stone



*Kohinoor Then**

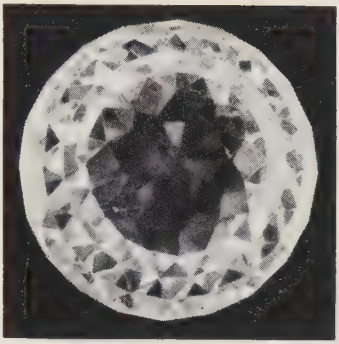
**All photos of the great diamonds are in natural size, and are supplied by the Chicago Jewelers' Association unless otherwise noted.*

concealed in his turban. With a great display of friendship, Nadir offered to restore the Mogul's domain to him, and to exchange turbans as a token of good faith—an offer which, according to Indian tradition, could not be refused. Returning to his tent, he unfolded the turban and the gem rolled out on the floor. "Kohinoor"! (mound of light) was the delighted phrase that burst from his excited lips; and so the stone was named. The diamond was then taken to Persia, and Shah Ruhk, grandson of Nadir, eventually inherited it. He was captured by a rival king and tortured by having boiling oil poured on his shaven head, in an attempt to make him tell where the stone was hidden; but he survived this horrible agony without giving up the secret. Soon afterward, he gave the Kohinoor to Ahmed Shah, king of the Afghans, as payment for military aid. Shah Zaman, grandson of Ahmed, was blinded by his own brother, who sought thus to get the stone; but Zaman hid it in the plaster of his cell-wall, where it was found a number of years later. From these devoted Afghan brothers, the gem was extorted (by starvation and imprisonment) by Ranjit-Singh, the "Lion of the Punjab," whose domains were finally annexed by the English in 1849. Taken to England, the Kohinoor was found to be a deep, rather greyish diamond—cut attractively (but somewhat unsymmetrically) in "old Indian" style, and weighing 190 carats. It was recut in London in an attempt to improve its brilliance, but the result was a thin stone of only 108.8 carats, flat and devoid of beauty. It was placed in the Queen's crown. One of its many traditions is the saying that it has never brought bad luck to a woman.



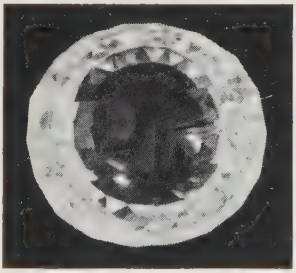
*Kohinoor Now*

Tavernier states, in the account of his travels to India, that he was granted an audience by the Great Mogul in 1665, and, as a special favor, was allowed to examine the biggest diamond in the world. It had been mined at Kollur (he says) in 1650, and weighed 787½ carats in the rough, but the cutter had done such a poor job, and had lost so much of the weight, that the king fined him in-



*Great Mogul*

stead of paying him. The stone seen by the portly Frenchman at this audience weighed 279$\frac{9}{16}$ carats. It was rose-cut, round and very high on one side, with a little notch and a slight flaw in the lower edge—otherwise, the mammoth gem was of the "finest water." The Mogul, Aurungzeb, had taken it from his father, Shah Jehan. Not only that, but he had clapped his aged parent into jail, and murdered his three brothers as well. (Nice people!) From Tavernier's account, this diamond has gone down in history as the "Great Mogul"; but it has not been seen or heard of, since that time. Some think that it was recut, and part became the Kohinoor; others, that it reappeared as the Russian Orloff diamond. But these contentions are rather fantastic, and very hard to prove. Streeter, the noted English authority, thinks that the Great Mogul was stolen when Nadir Shah sacked the city of Delhi in 1737, and was either cut into small stones or lost altogether. At any rate, all trace of it has vanished.

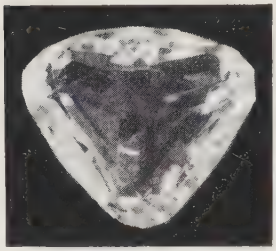


*Orloff*

The Orloff diamond is so named because it once belonged to Prince Orloff, in the court of Catherine the Great of Russia. Legend says that, early in the eighteenth century, the stone was one of the eyes of a Brahmin idol in an Indian temple. A French soldier, adopting the native religion, became guardian of the shrine, and took advantage of his position one night to steal the diamond and flee with it to Madras. There he sold it to an English sea-captain. It found its way to London, then to Amsterdam, where Orloff bought it in 1774. He hoped to regain the favor of his ex-mistress, the empress, by presenting her with this great gem; the gift was accepted, but it is not recorded whether he regained grace or not. The Orloff was

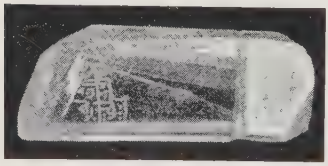
mounted in the Russian sceptre, and is now in the Diamond Treasure of the Soviet Government. It weighs 199.6 carats, is rose-cut, has exceptional purity, and "an agreeable, pale, bluish-green tinge."

The Nassak diamond, like the Orloff, originated in India. It was a votive offering to the goddess Siva, in a temple near Bombay. When the English took over that part of India in 1818, the stone passed into the hands of the Marquis of Hastings, leader of the army. It was taken to London as a "rudely facetted, lustreless, triangular mass" of about 85 carats' weight. European cutters skilfully remade it into a diamond of perfect brilliancy weighing 78⅝ carats. Its peculiar triangular shape is unique among the world's great diamonds. In 1837 it was bought by the Marquis of Westminster, and mounted in the hilt of his sword. His family retained it for many years. Recently it has been acquired by Mauboussin, the celebrated Parisian jewelry firm.



*Nassak*

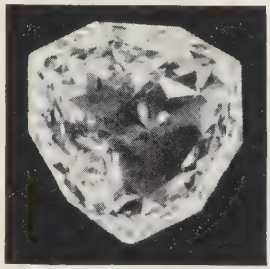
The Shah of Persia is another Indian diamond of great antiquity and peculiar shape. It is rectangular in outline, is imperfectly cut with very few facets, and weighs 88.77 carats. But the surface, on three sides, is wonderfully engraved in Sanskrit with the names and dates of three of its owners, and historians are guided by this script in delving into the records of the stone. 1591 A.D. is the date of the first inscription, and the name: "Burhan-Nizam-Shah II," ruler of one of the lesser provinces of India. About four years after that date, Burhan's province was looted by the Great Mogul, Akbar, who carried the gem away with him. Akbar's son was the celebrated Shah Jehan, whom we know already as the owner of the Kohinoor and "Great Mogul"—and the second inscription bears his name and date, 1651. When Tavernier visited Jehan's loving son, Aurungzeb,



*Shah**

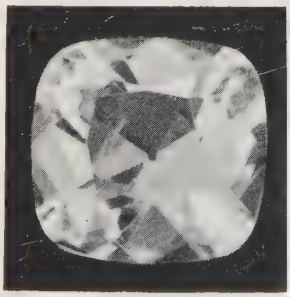
*Photo courtesy People's Commissariat of Finance, Moscow.

he saw a diamond of 80 or 90 carats hung by a silver thread in front of the Mogul's throne, where the occupant could always see it; and it is thought that this was the same stone we describe. At any rate, the Shah is encircled by a groove near one end, apparently cut for just such a purpose. Nadir Shah, the conqueror, took the diamond to Persia in 1739, and it remained there for ninety years. The third inscription is that of one of Nadir's descendants, and the date, 1824. In 1829 the Russian ambassador to Persia was murdered there, and to avoid a war the Shah sent the gem to the Czar as recompense for the deed. It is now one of the prized possessions of the People's Commissariat of Finance in Moscow. It is said to have a yellowish tinge, but to be of perfect transparency.



*Florentine*

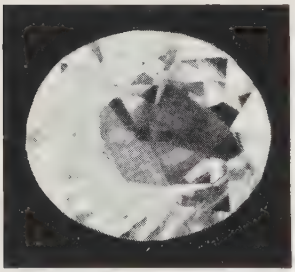
The Florentine is another of the great Indian diamonds of odd shape and unusual cutting. Pale yellow in color, it is double-rose-cut, has 126 facets, and has the form of a star with nine rays. Its weight is 137¼ carats. Tavernier saw it in 1657, in the collection of the Grand Duke of Tuscany, and it bears the name of his capital city, Florence. Later it was sent to Austria, after a barter of land and wealth, and became part of the Austrian crown jewels. Its history is not as exciting as its radiant beauty.



*Regent*

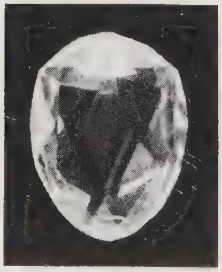
The Regent diamond, found in the Parteal mines, India, in 1701, could tell an interesting story. Its finder, a slave, slashed his leg with a knife and hid the 410-carat monster under the bandage. Escaping to the coast, he traded the gem to an English skipper for passage to healthier climes, and was rewarded by being thrown overboard as soon as the ship was out of sight of land. Putting in at the next port, the gallant captain sold the stone for $5000, dissipated the money and hanged himself. Soon it was bought by Sir Thomas Pitt, gover-

nor of the English fort at Madras. Rumors were started that Sir Thomas had obtained it by foul play, and the unfortunate governor, innocent though he was, went about for a time in fear of his life. It was probably a happy day for him when the stone was sent off to London to be cut. There it was reduced to a perfect brilliant of 143.2 carats—one of the finest in the world. It was sold by the Pitt family to the Regent of France in 1717. At the time of the French Revolution, it was stolen from the Garde Meuble in Paris; subsequently the Republican officials recovered it in an astonishing way. It had been hidden in a ditch on the Avenue des Champs-Elysées, and an unknown benefactor sent them a letter telling where to find it! Later, Napoleon wore the Regent on his sword-hilt, and today it can be seen on exhibition at the Louvre in Paris.



*Pigott*

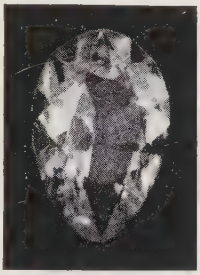
The Pigott diamond was a rather flat brilliant of 85.8 carats, brought to England by the Irish Lord Pigott, Governor of Madras, in 1775. After changing hands several times, it became the property of Ali Pasha, Khedive of Egypt, in 1818. Ali regarded the diamond and his wife, Vasilica, as his two greatest treasures. When he was assassinated in 1882, the aged ruler, in his last moments, ordered his men to strangle Vasilica and crush the stone to a powder—so that his assassin should not benefit by the possession of either. The lady escaped, but the diamond did not—so the Pigott is a thing of the past.



*Sancy*

The smallest, yet one of the most interesting of famous oriental diamonds is the Sancy, a double-rose-cut stone of 55 carats' weight. It was brought to France from Turkey in 1570 by the Seigneur de Sancy, French ambassador to the Ottoman court. Henry III of France wore it for a time in his cap. Later, M. de Sancy acquired it again. When the new king, Henry IV ascended the throne, he made de Sancy minister of finance, and asked him

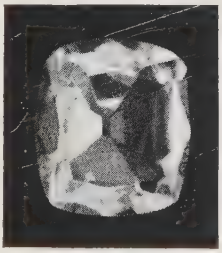
to send the diamond to use as security for a loan. The messenger, a trustworthy man, never arrived, for he was beset by robbers and slain. De Sancy, thinking of what steps the messenger could have taken to guard the stone, ordered his body dug up and the stomach opened. There was the diamond; the faithful fellow had swallowed it! Later, de Sancy sold it to Queen Elizabeth of England. Charles I and James II also owned it; then it went back to France, to be held by three Kings Louis: XIV, XV and XVI. The Sancy, like the Regent, was stolen from the Garde Meuble in 1792, but turned up again in Paris in 1828, to be purchased by a prince of Russia. In 1865 it went to Bombay; then back to Paris; then to Bombay again, in 1875, as the property of the Maharajah of Patiala. Some say that it is still in the possession of this family; others, that it belongs to Lady Astor.



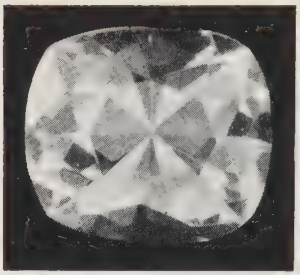
*Dresden Green*

Of rare colored diamonds, one of the best known is the Dresden Green. It is thought that this is also an Indian stone, but no proof has ever been found. It is a beautiful pendeloque of 49.8 carats, flawless and perfect, with a clear apple-green tint. King August the Strong of Saxony purchased it for his treasury in 1743, and it has been in Germany ever since. It is now on exhibition at the "Green Vaults" in the city of Dresden.

The Hope Blue is another famous colored stone, which appeared in London in 1812. It is a square-cut brilliant of 45½ carats, and has a pronounced blue color—a rarity in diamonds. It is, however, somewhat dark and lacking in reflective brilliance. Some time in the 1830's, it was acquired by Henry T. Hope, a London banker, whose name it bears. It left the hands of the Hope family in 1906 and was bought, five years later, by Mr. Edward B. McLean of Washington, D.C., for a reputed price of $300,000. Mrs. McLean still owns it. Its reputation as a harbinger of bad luck seems to be grossly exaggerated. Some think that the Hope is part of a blue diamond weighing 112¼ carats (rough),



*Hope*



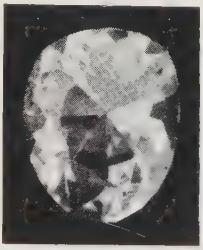
*Star of the South*

which Tavernier sold to the French crown in 1668. This was cut to a 67½ carat gem which also figured in the Garde Meuble robbery of 1792 and was never recovered. The connection between this stone and the Hope is quite possible, but difficult to prove.

Outstanding among Brazilian diamonds is the Star of the South, found by a slave woman at Bagagem (in western Minas Geraes) in 1853. The fortunate woman received her freedom and a pension for life. The rough stone was cut by the Costers of Amsterdam, to an oval brilliant of 128½ carats which has the remarkable property of appearing colorless from the top, but rose-tinted when viewed from the side. Bought by the Gaikwar of Baroda, India, this striking gem is still in the possession of that ancient line of Hindu princes.

*English Dresden*

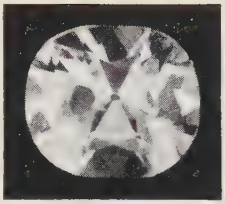
Four years after the finding of the Star of the South, the Bagagem mines yielded another great stone, of 119½ carats' weight. It was bought by Mr. E. Dresden of London, and cut to a blunt-pointed pendeloque of handsome proportions, weighing 76½ carats. From its owner the stone derived its name, the "English Dresden." Bought by a Bombay merchant in the '60's, it also found its way, eventually, into the treasury of Baroda.



*Empress Eugenie*

A third big diamond, of unknown origin, is also owned by this same Gaikwar of Baroda. It is the "Empress Eugenie," a perfect oval brilliant of 51 carats, blunt at one end and very beautifully cut. Its known history starts in the court of Catherine the Great of Russia (1762-96), who wore it in a hair ornament. Later it passed, through the hands of one of her favorites, to Napoleon III of France, who presented it to his wife, the Empress Eugenie. The House of Baroda bought it after the Franco-Prussian war of 1870.

A Brazilian diamond of remarkable purity is the Emperor Maximilian, a perfect blue-white brilliant weighing 42 carats.

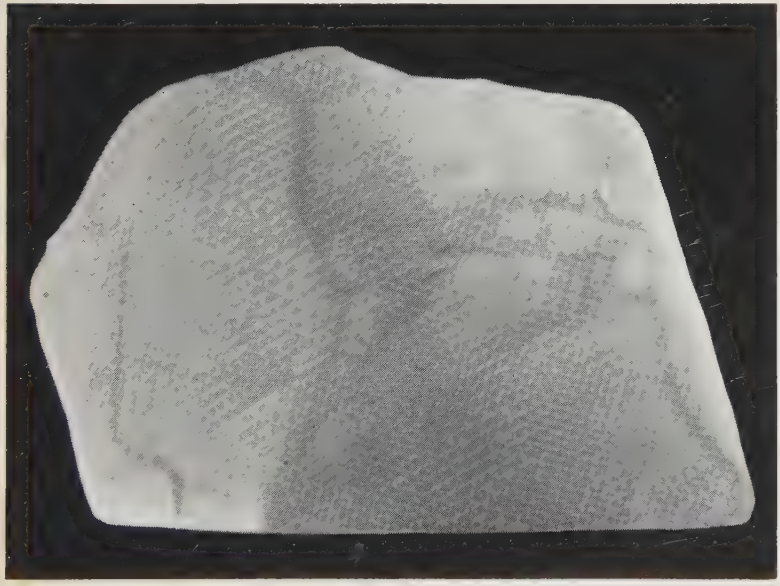


*Emperor Maximilian*

It was mined near Bagagem some time in the 1860's. Its first famous owner was a royal Austrian, Ferdinand Maximilian, who was sent by Napoleon III of France to be Emperor of Mexico in 1864. His pathetic reign as a "puppet" king lasted only three years, and was ended by a firing squad. Around the neck of the fallen monarch was a little chamois bag containing the great flashing gem, which he had intended to have set in his crown. It was sent to his wife, the Belgian-born Empress Carlotta, who had fled to Brussels the previous year. Carlotta went mad after that, and the diamond found its way into the collection of Czar Nicholas II of Russia. After the Russian Revolution, it returned to trade channels via Amsterdam. Its present owner is Mr. Ferdinand Hotz, a well-known jeweler of Chicago.

*Cullinan*

Largest of all known diamonds was the mighty Cullinan, a mammoth stone of 3106 carats (1⅓ pounds)—about the size of a man's fist! It was discovered in the Premier mine, South Africa,



*Chicago Jewelers' Association*

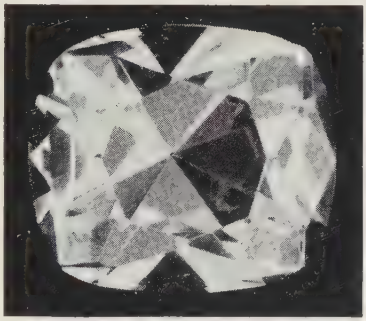
CULLINAN: ROUGH

*Asscher's Diamond Works, Amsterdam*
CLEAVING THE ROUGH CULLINAN

in January of 1905. Mine Captain Frederick Wells, returning from the day's work in the pit with a crowd of his "boys," noticed a bright object gleaming in the setting sun, partly embedded in a wall of the "blue." Rushing to the spot, he quickly dug the stone out with his pocket-knife, and ran with it to the office. Next day, word went out that the biggest diamond in the world had been found—and no other has ever approached it for size. Mr. Wells received a bonus of $10,000 for the find. It was named in honor of Sir Thomas Cullinan, president of the Premier Diamond Mining Company. Then it was sold to the government of Transvaal Colony, who sent it to England as a present to the crown—by ordinary registered post, in a tin box, with a dollar's worth of stamps affixed! The idea—that the safest mode of trans-

*Cullinan I*
*530 Carats*

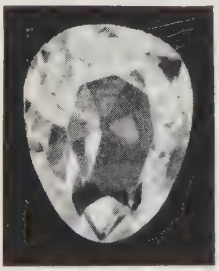
port was the least conspicuous one—proved true. The work of cutting was entrusted to the House of Asscher in Amsterdam. After months of study, making of wax models and a special set of oversized tools, the task was undertaken in 1908. The mammoth stone was first split into three pieces, then expertly cut into over a hundred gems, the two largest of which are now the biggest *cut* diamonds in the world. One is a pendeloque of 530 carats, and adorns the English sceptre; the other, a square brilliant of 309 carats, is mounted in the front of the Imperial State Crown. Among the "lesser" stones cut from the Cullinan are a pendeloque of 92 carats and a square brilliant of 62. All are flawless and of fine blue-white color, and can be seen among the British crown jewels exhibited in the Tower of London.



*Jubilee*

The third largest of known finished diamonds is the Jubilee, cut from a 650-carat rough found at Jagersfontein in 1896. It is a perfect brilliant weighing 245 carats, and derives its name from the fact that it was cut during the year of Queen Victoria's "Jubilee" celebration in London.

The "Star of South Africa" we have earlier mentioned as the stone bought by Schalk van Niekerk from a native witch-doctor in 1869. The London purchasers cut it to a fine oval, three-sided brilliant of 46½ carats and sold it to the Countess of Dudley, who had it mounted in a tiara. The significant point of its history was well expressed by a British colonial official sixty-five years ago: "This diamond, gentlemen, is the rock upon which the future success of South Africa will be built."



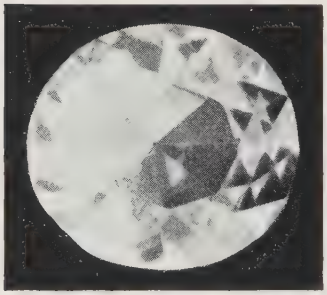
*Star of South Africa*

Of colored diamonds mined in South Africa, the greatest is the Tiffany. It has a gorgeous, orange-tinted, canary-yellow color, weighs 128½ carats, and is beauti-

fully cut with 86 facets (an unusually large number). This type of cut was originated by the late Dr. George Kunz, to give an effect of maximum reflection. The rough diamond, weighing 287.4 carats, was dug up at DeBeers mine in 1877. It was cut in Paris, and has been the prized possession of Tiffany and Company, the famous New York jewelers, for many years.

*Tiffany*

The Stewart is perhaps the most famous river stone coming from South Africa. The rough diamond, weighing 296 carats, was found at Waldeck's Plant on the Vaal River in 1872. The finder went out of his mind for three days, and could do nothing but laugh and cry, tossing the stone up in the air and catching it again like a child. It was reduced to a beautiful brilliant of 123 carats, and is now owned in England.



*Stewart*

We could go on at great length, describing some of the goliaths which have come out of South Africa: the Excelsior (969½ carats rough), the Porter-Rhodes (160), the Victoria (457½), the Arc (381), the recent Jonker (726), and a host of others. Some of these have been cut into large gems, others into a number of small ones. But all are really too "young" to have acquired the wealth of history and legend which is attached to the diamonds of ancient Golconda.

CHAPTER VII

# The Diamond in Industry

THE great mass of "outcast" diamonds which go to the industries present an interesting story, which, however, is rather too technical to be fully presented in a book of this kind. We shall do little more than list these uses, and let the pictures tell something of the tasks which these hard stones are performing in all corners of the globe.

*Grinding Wheels*

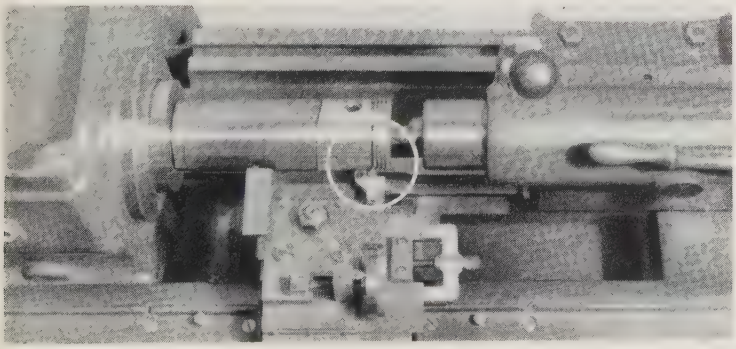
Fifty percent of all diamonds are used industrially, and two-fifths of these are applied to the truing of grinding wheels. To shape the hard surface of emery, of carborundum, and of tungsten carbide, *only* the diamond can be economically used.

*Machine Shop*

To turn machine parts of all kinds is another of the diamond's duties. The Ford Motor Company, for instance, uses about 1000 diamonds for this purpose. Aluminum alloy pistons, and other such parts, can be trued on a lathe with a diamond-pointed tool, to measurements varying less than *one ten-thousandth of an inch* from standard; and the diamond takes years to wear out!

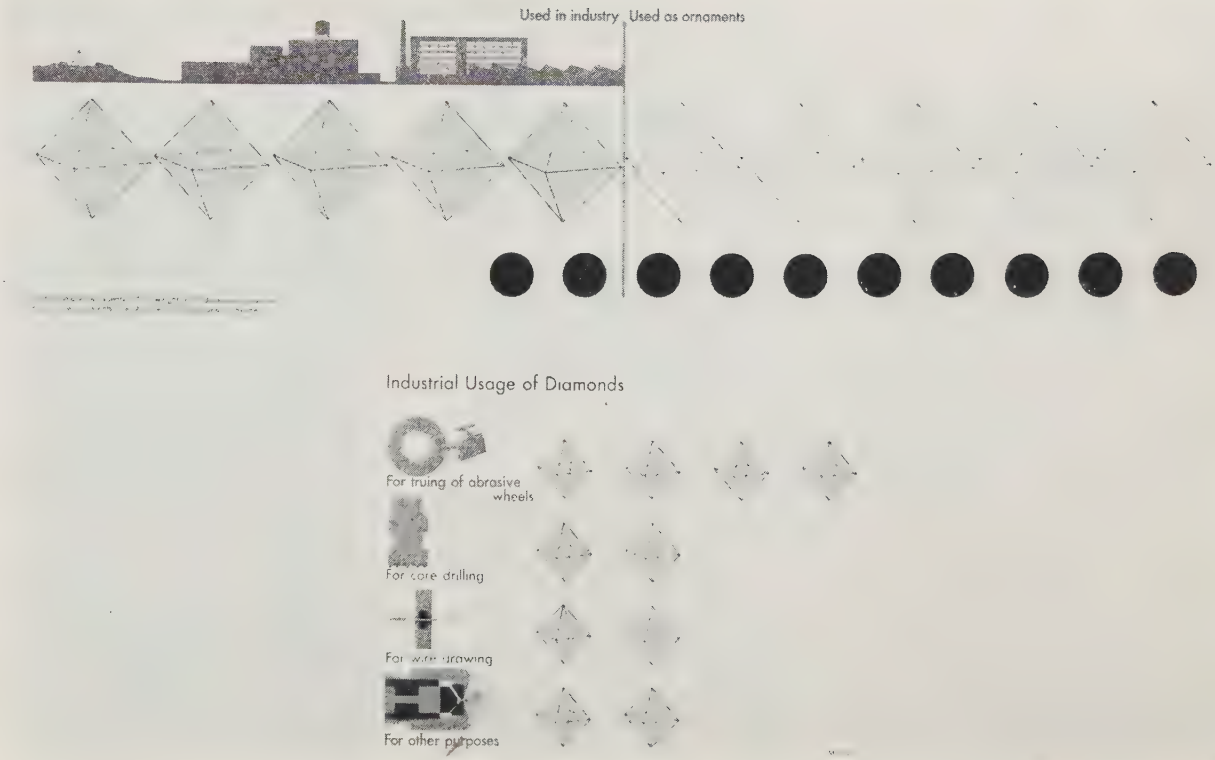
*Wire*

Another important use is in drawing wire. Here the metal is drawn through a round hole drilled in a diamond die. A series of



*Sundstrand Machine Tool Co., Rockford, Ill.*

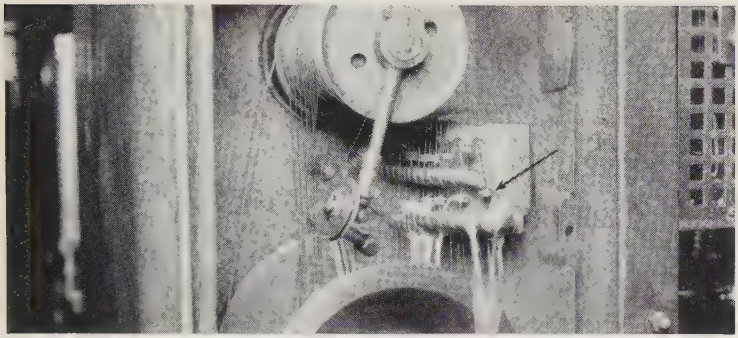
DIAMOND SHAPING A FORD V-8 PISTON




*Chicago Jewelers' Association*

ONE-HALF OF ALL THE DIAMONDS PRODUCED ARE USED IN INDUSTRY

(Each large diamond represents 10 per cent of weight of all diamonds consumed. Each circle represents 10 per cent of value of all diamonds consumed. Each small diamond represents 10 per cent of all industrial diamonds)



*Vaughn Machinery Co., Cuyahoga Falls, Ohio.*

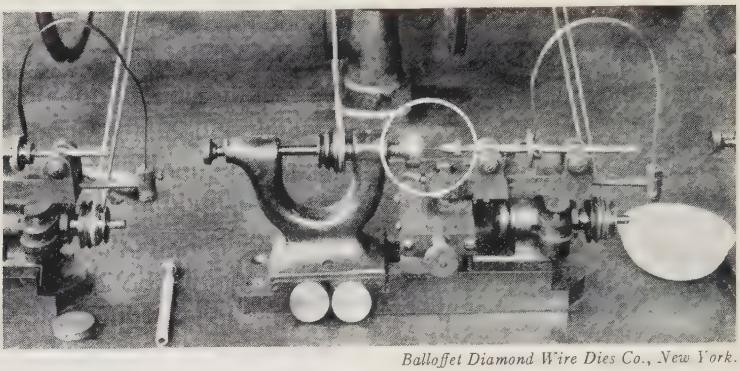
DRAWING WIRE. EACH BRASS DISC CONTAINS A DIAMOND DIE

such dies, with different-sized holes, will reduce the wire to the desired diameter. So hard is the diamond that 300 to 400 *tons* of copper can be drawn through such a die before any enlargement of the hole takes place. That makes a wire, of the size used in radio sets, long enough to *go around the world twenty times!* Gold, silver, platinum, iron and tungsten are also made into wire by this means. Tungsten is one of the hardest metals known. A billet of this metal, three inches long and three-eighths of an inch in diameter, is drawn into a fine wire (for electric light-bulb filaments) *fifty-eight miles* long! Other wires are drawn, so fine that you *cannot see them*, except with a magnifying glass! And all of these wires have the exactness of size which is so important in electrical work.

*Nozzles*

Diamonds with holes in them are also fitted into oil nozzles, to be used in the furnaces of our homes and factories. This is a rapidly growing use. By passing the oil through a diamond, a constant, correctly-shaped spray of oil is delivered and the efficiency of the nozzle is not impaired by the action of grit or acid in the oil, or by the high heat.

Boring the hole in a diamond for a die or a nozzle is an interesting process. A needle, impregnated with diamond dust, hammers away on the stone for about a week before the hole is bored. And this drilling operation costs seven times as much as the diamond itself!

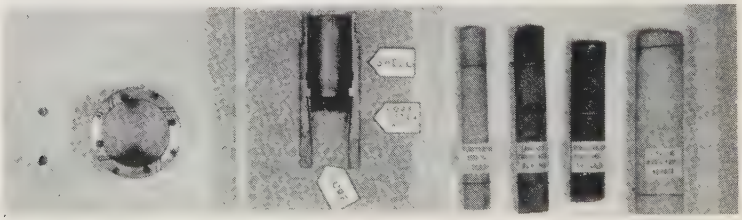


*Balloffet Diamond Wire Dies Co., New York.*

MACHINE FOR BORING HOLES IN DIAMONDS

*E. J. Longyear Co., Minneapolis*

DIAMOND CORE-DRILL TESTING THE FOUNDATION SITE OF THE GOLDEN GATE BRIDGE, SAN FRANCISCO BAY



*Sullivan Machinery Co., Chicago*

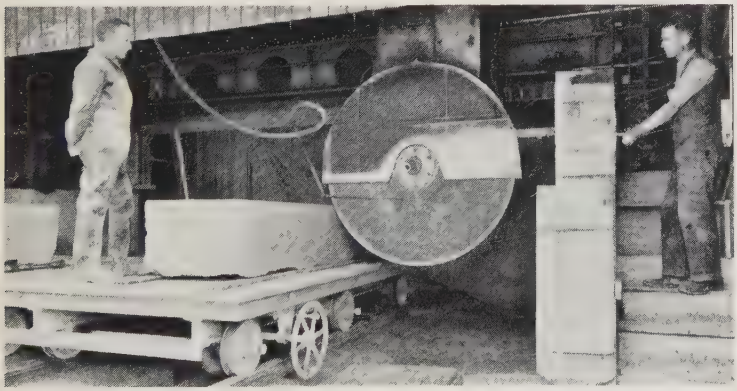
DIAMOND DRILL BIT. END VIEW, SECTION AND CORES

*Core Drills*

Diamond core-drills are in constant use by geologists and mining engineers. The drill-bit is a hollow steel cylinder, the bottom of which is studded with diamonds, to act as a "cutting edge." The bit is screwed to the end of a long column of pipe, and bores into the depths of the earth when the pipe is revolved. As the bit goes downward, a round core of rock rises inside the pipe and is held by a clip, so that a sample of rock is obtained every time the pipe is pulled out of the hole. Geologists, testing the rocks for oil, coal, or other minerals, thus have a complete record of the formations through which the drill hole penetrates. These drills are also most valuable to civil engineers, in testing sites for the foundations of buildings, bridges and dams. The Brazilian carbonado is ideal for use in core-drills, and is much in demand for this purpose.

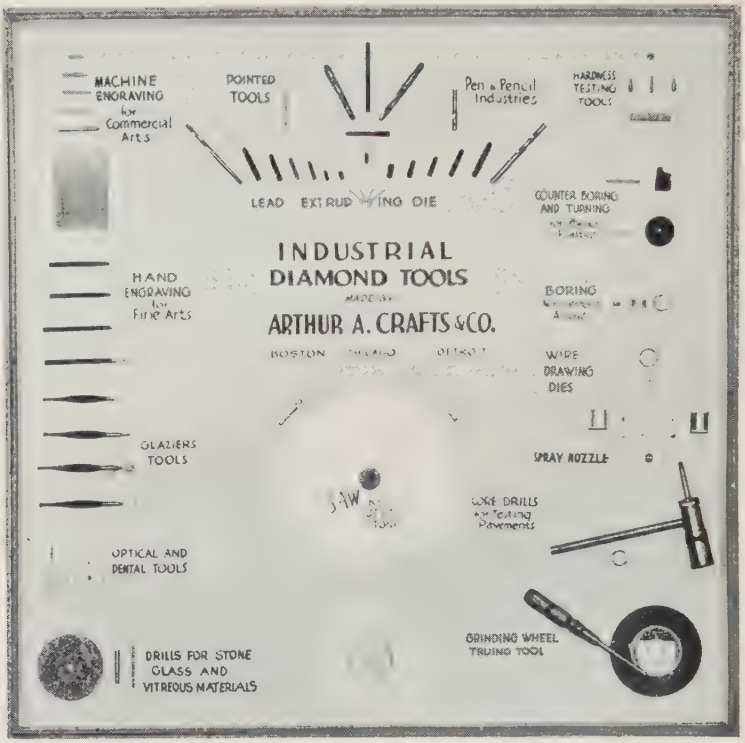
*Stone*

For sawing and drilling building stone, the diamond is invaluable. When you visit a modern stoneyard, you can see giant steel saws, their teeth studded with hundreds of diamonds, whizzing around and cutting the hard, massive blocks like so much cheese. A saw blade seven feet in diameter (the largest made) has more than a thousand diamonds embedded in its teeth. Such a blade has an average life of 2500 sawing hours (3½ months, night and day)—working in granite or marble—before the diamonds must be reset. In these machines, as in core-drills, the wearing action



*Anderson Grice & Co., Carnoustie, Scotland*
*L. M. Van Moppes and Sons, London*

DIAMOND-TOOTHED STONE SAW




DIAMOND-POINTED TOOLS FOR VARIOUS USES

has little effect on the diamonds, but care must be taken that the steel setting does not wear from around the stones, causing them to fall out and be lost. Thus the diamonds are set as deeply and solidly in the steel as possible.

*Glass* The glass-cutter finds diamond-pointed tools the best for his work, and thousands of carats are bought yearly for this everyday task.

Other industrial uses of diamonds are legion. They are used in phonograph needles, in optical and dental drills, for knife-edges in delicate scales, in tools for artistic etching on metal, in hardness-testing machines, as dies for extruding the "lead" in pencils, and for turning ivory, hardwood and bakelite into such things as billiard balls, bowling balls and doorknobs.

CHAPTER VIII

# Titans of the Past and Present

THE diamond industry has been described as one of the most highly organized in the world, in all of its phases—mining, cutting and marketing. It has not always been thus. Only in the last sixty years have modern efficiency and engineering talent been applied to the production and handling of this most concentrated form of wealth, eliminating the slipshod methods of the past. These ideas arose among the British titans who began their careers on the dusty veldt of South Africa in the 1870's.

*Rhodes**

Foremost in the development of the diamond empire stands the name of Cecil John Rhodes. He was born in 1853, the son of an Oxford clergyman, and went to South Africa as a young man. Tall and well-built, with blue eyes and curly blond hair, he was a fine figure of a man—possessing a fearlessness, a knack of leadership and an intense patriotism which were to make him an idol among his countrymen. He went to work as a digger in the fields, sharing the hardships and pleasures of that rough, motley crew—but always with an eye toward buying out his neighbors' claims and building toward greater financial strength. Another man was doing the same thing at the same time. This was Barnett Isaacs, who styled himself "Barney Barnato." Grandson of a Jewish rabbi, he was the opposite of Rhodes in background and training, and he possessed the shrewdness and foresight for which

*Barnato*

**Photo from Geo. Beet, "The Grand Old Days of the Diamond Fields"*


*DeBeers Consolidated Mines, Ltd.*

"ONE MEMORABLE JULY NIGHT IN 1889 . . ."

his race is famous. It was inevitable that these two men should come to grips; and their rivalry was the talk of the fields for some time. Finally, one memorable July night in 1889, Rhodes' Company (the De Beers Consolidated) bought out the Kimberley Central (Barnato's) for the staggering sum of twenty-five million dollars, paid with a single check, and Rhodes was master of the diamond region.

*Williams*

Rhodes had early employed many American engineers, to develop the system of mining. For this he received sharp criticism from many of his countrymen. But he was convinced that "Yankee" ingenuity could help to conquer the difficult engineering problems which arose in mining out the great pipes—and time proved the wisdom of his choice. His right-hand man was Gardner F. Williams, California-born, who had had world-wide mining experience. Like Rhodes, he was a strapping big man physically, and together, they made an unbeatable pair –Rhodes with his financial wizardry and political craftiness, Williams with his keen mastery of mining technique and efficiency in operation.

Rhodes died in 1902, Williams in 1906. Under their leadership, the De Beers Company had grown to be a giant in the world of diamonds, and since their time, their successors have carried it to

even greater heights. The financial reins have been held by Rhodes' London backers, foremost among whom was the great House of Rothschild. Williams' work as general manager was carried on for many years by his son, Mr. Alpheus F. Williams, who recently retired, bearing the reputation of one of the world's leading authorities on diamond geology and mining.

During the years since Rhodes' death, the De Beers Consolidated has gradually absorbed most of the smaller companies operating pipe mines and alluvial fields in South Africa; and the London financiers have organized a marketing agency, the Diamond Corporation, through which most of the world's diamonds flow to the channels of trade. In 1931, the Diamond Corporation and the De Beers Company joined hands, and the combined firms are recognized to be the masters of the diamond world.

*Today*

True, other mining companies have arisen: The Forminière in Belgian Congo (on whose directorate is M. K. Shaler of the U.S.A.), and the Consolidated African Selection Trust (directed by two Americans, A. Chester Beatty and C. W. Boise), independent operators in West Africa; but, realizing the value of a sustained market, these companies also send their wares to the Diamond Corporation to be sold.

So we find that new names, as brilliant as the old, have risen to replace the titans of the past. Chairman of the Diamond Corporation is Sir Ernest Oppenheimer, an astute executive whose guiding hand has organized the mammoth combine and made it a model of business efficiency. The genius and diplomacy of this one man are responsible for the present stability of the diamond market. Among De Beers engineers, we may mention another of Uncle Sam's nephews who has made his mark in the mining world: Mr. H. T. Dickinson, now chief consulting engineer for all the company's vast holdings.

There are uninformed people today who cry out against the ancient bugaboos of "monopoly" and "trust" when speaking of the diamond. It is true that recent finds in the Congo, West Africa, Lichtenburg and Namaqualand have unearthed quantities of diamonds which a depression-ridden market has not been ready to absorb. Without the strong hand of the Diamond Corporation, these diamonds would have been dispensed in a competitive,

cutthroat, wide-open market such as has demoralized so many industries in the last five years. And without the cooperation of the South African Government, in formulating proper laws to prevent such waste, even the corporation would have been hard-put to stem the tide. What is the reason for these efforts? Because the price of diamonds *must* be maintained. Again, why? Let the champions of an open market reflect again on the fact that all the gem diamonds held by mankind today have a value of *fifteen billions* of dollars, and that their value has been determined, *not* by Cecil Rhodes or the House of Rothschild, but by the human race itself, in the dim reaches of the past—in the days of Tavernier, of Agnes Sorel, and of Pliny the Elder.

There have been times when the value of diamonds has gone down to lower levels—especially in the 1750's, when Brazil was "booming," and in the 1870's, when the South African fields were young. But they have always recovered. Today, under the guiding hand of London, the value of diamonds is sound and firm as the Rock of Gibraltar. There are countless thousands of people in the world, in all walks of life, who cherish these gleaming gems as mementos of their happiest hours, or as an expression of artistic beauty and solid worth. To these people we say: there need be no fear that the value of your diamonds will sag to a fraction of their true worth. Through depressions and panics, the fat years and the lean, they are backed by a monument of financial strength and the exacting tests of three thousand years—by a program instituted by men whose vision extends beyond the lean years, into the centuries to come.

And so our story comes to an end—a story packed with educational appeal and the romance of the ages. The diamond is everlastingly the King of Gems. It is the perfection of Nature's handiwork, and Time cannot mar its eternal magnificence.

"And who can say that this wealth is unproductive, for does it not bring unfailingly, every day, dividends of joy, of happiness, and of beauty?"

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2. The best story of the South African fields:
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3. Two interesting old-timers, rather hard to get:
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   "A Treatise on Diamonds and Precious Stones, including their Natural and Commercial History," by John Mawe (who travelled in Brazil over a hundred years ago), London, 1826.

4. For students of Geology:
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   "The Geology of South Africa," by Alex. L. DuToit, Edinburgh, 1926.
   Also the works of P. A. Wagner and Hans Merensky, appearing in the "Proceedings and Transactions of the Geological Society of South Africa" (available at many large libraries).

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8. On the English Crown Jewels:
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9. On industrial diamonds, pamphlets issued by:
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# INDEX

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