

PRECIOUS AND SEMIPRECIOUS STONES (GEM MINERALS)

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Precious and semiprecious stones include minerals used primarily for personal adornment and decorative purposes. To be so prized the stones must have beauty and "fire" or play of color, must not be too common, and must be hard enough to withstand ordinary wear. Among the less regal members of the group fashion temporarily may determine the popularity of a gem stone. The quality of hardness also accounts for the many industrial uses of diamonds and, to a smaller extent, of rubies and sapphires.

Almost 100 mineral substances have been used for decorative purposes, and although there is no hard and fast division of precious and semi-precious stones, diamonds, emeralds, rubies, and sapphires usually are included in the former group and frequently, by courtesy, pearls, an organic substance. These gems, however, sometimes are equaled in beauty by exceptionally fine opals, aquamarines, tourmalines, spinels, chrysoberyls (including cat's-eye and alexandrite), and spodumenes (hiddenite and kunzite).

The diamond industry is organized much more highly than that of any other precious stone, and the diamond output represents almost 95 percent of the world's gem production.

HISTORICAL SUMMARY

Through the ages the precious stone industry has seen notable changes both as to the principal gem mined and the country of its source. From about 25000 to 3400 B. C. the Baltic amber mines dominated the industry. For the next 1425 years the turquoise

mines of the Sinai Peninsula were the most important gem mines in the world. From about 1925 to 800 B. C., the emerald mines of the Egyptian Red Sea coast were unrivaled. Thereafter, until 1725 A. D., India and Ceylon, with their diamond, ruby, and sapphire mines, were the world's leading gem producers. They lost this position to the Brazilian diamond mines, which in turn were supplanted in 1870 by the South African diamond mines. For the past 3 years closing of the South African pipe mines has perhaps shifted the weighted center of the world's gem production to northeastern Angola.

United States.—In contrast to its wealth in most mineral resources, the United States is notably poor in precious stones, having no deposits of first rank. The Montana sapphire deposits, the Southwest turquoise mines, the Maine tourmaline mines, and the southern California tourmaline and kunzite mines have produced gems, but no deposit has been found comparable to the Brazilian or South African diamond fields. A few diamonds have been discovered in Arkansas, but mining activity has been sporadic. Semiprecious stones occur near many resorts, but the tourist purchaser of the "local" product more than likely buys a South American stone cut in Germany and mounted in Providence, R. I.

In spite of the fact that no outstanding deposits of any one stone has been located in the United States, probably no other country has yielded such a wide variety of precious and semiprecious stones; more than 60 distinct species have been produced commercially. Gem mining is an old, if not important, American industry. When white men began their conquest of America they found that the Indians of North and South America used about as many decorative and precious stones as were known at that time to the people of Europe, Asia, and Africa. Certain deposits were worked at least 2,000 years ago; one turquoise mine was a major mining project before the Spaniards arrived in America.

Adequate statistics are available only from 1880 to 1924, and during those 45 years about \$9,800,000 worth of gems were produced; the peak year was 1909 (\$534,000) and the year of least production, 1923 (\$60,000); these figures cover the most active period of gem mining in the United States. Including estimates of production from 1925 to the present the total value of precious stones produced in the United States has been about \$10,500,000. Montana, the largest producing State, has been responsible for about 48 percent of the total value, followed by California and Nevada with 23 and 8 percent, respectively.

From 1883 to 1921 the United States produced sapphires (as well as a few rubies) valued at \$3,018,406; turquoise and matrix, \$2,088,262; quartz gems, \$1,894,289; tourmaline, \$822,955; garnet, \$173,979; beryl, \$138,186; and variscite, \$125,718.

The Mount Mica tourmaline locality in Maine has been worked in a desultory manner since it was discovered in 1820, but the first American gem-mining concern was the Emerald & Hiddenite Mining Co., which exploited the emerald and hiddenite deposit at Stony Point, N. C., from 1880 to 1888. However, its total production is said to have been valued at only \$22,500. Since then several other companies have been formed to mine emeralds in North Carolina.

About 1900, there were extensive mining operations at several turquoise mines of the Southwest, notably at Los Cerillos and in the

Burro Mountains, N. Mex. Good-quality material was recovered in appreciable quantities, and if turquoise should regain its former popularity the mines no doubt would be reopened.

Fifty years ago the agatized wood of Arizona was cut and polished on a scale that threatened to destroy the beauty of the petrified forest, but this menace disappeared when the forest became a national park.

Sapphires were found first in Montana in 1865 in the sluice boxes of placer mines along the Missouri River. From 1880 to 1890 several thousand dollars worth were produced annually as a byproduct of placer mining. Shortly after 1890 the gem was found to occur in a basic igneous dike, and in 1896 an English company began mining. The work was suspended in 1929, but production in some of the intervening years reached \$450,000 annually. Some brilliantly attractive, though rather pale, gems were recovered and sold in London, Paris, and New York, although 85 percent by weight of the production was shipped to Switzerland to be cut into jewels for watches.

In 1906 diamonds were found near Murfreesboro, Pike County, Ark., the source being a rock very similar to the kimberlite of the

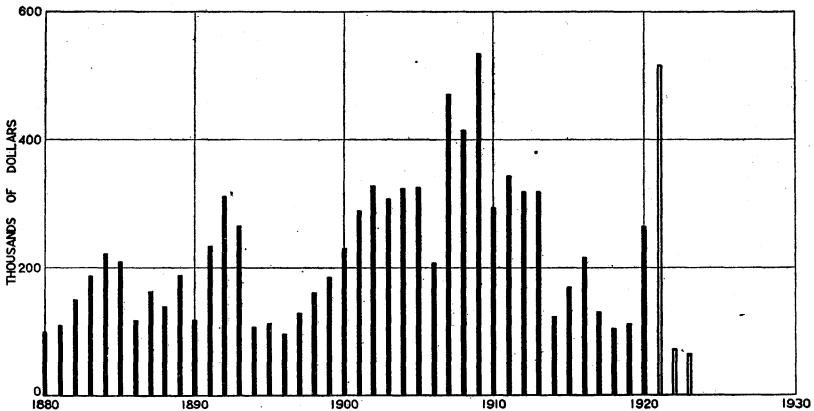


FIGURE 129.—Value of precious and semiprecious stones produced in the United States, 1880-1923.

South African pipes. Several companies were formed at once, but to date production has totaled only about 10,000 carats, and for the past 2 years none of the companies have operated.

Beautiful tourmaline of various colors has been produced at Mesa Grande, San Diego County, Calif., and the pink variety has been exported to China for cutting. Kunzite, the attractive, transparent, lilac spodumene, is obtained from the same district. The Virgin Valley, Nev., has produced some fine black opals and Latah County, Idaho, some attractive gem opals. The moss agates of Montana and Wyoming are as fine as any in the world. A number of other semiprecious stones of American origin come on the market from time to time, notably aquamarine and golden beryl, agates and other quartz gems, amazon stone, malachite, and azurite. The ornamental use of gold quartz originated in California over 80 years ago. The deep blue benitoite (California), the emerald-green hiddenite (North Carolina), the yellowish green variscite (Utah), and the rose-red rhodolite (North Carolina) are found only in the United States.

In addition to the output of gem-mining companies mineral collectors from time to time find gems worthy of cutting, and farmers near Hot Springs, Ark., collect and even mine considerable quantities of rock crystal. Other gems are byproducts of mica, feldspar, or corundum mining.

Canada.—Canada is perhaps even poorer in precious stones than the United States, and little gem mining has been done; however, there are deposits of amazon stone, albite (the iridescent variety, peristerite), sodalite, rose quartz, garnet, and agate, the product of which when cut makes attractive beads.¹ Small amounts of rose quartz are reported to have been shipped to Germany late in 1933 or early in 1934 from the Winnipeg River area, Manitoba.²

Mexico.—Mexico is almost equally poor in precious stones, although opals have been mined and cut for centuries. The opals, while attractive, scarcely are comparable to those of Hungary and Australia.

Production in the United States.—The value of precious stones produced in the United States in 1934 probably did not exceed \$3,000, including 2,000 pounds of rose quartz from South Dakota; amazon stone from Amelia Courthouse, Va.; variscite from Utah; vesuvianite from Tulare County, Calif.; topaz from Fresno County, Calif.; four diamonds from the California gold placers; and agatized wood from Arizona. Amateur lapidaries also collected and cut some semiprecious stones from other States. Spencer³ describes a new gem stone, pollucite (an acid silicate of caesium and aluminum) from Newry, Oxford County, Maine. The cut stone, a brilliant of 1.725 carats, is colorless and flawless with a brilliant luster.

Imports.—According to the Bureau of Foreign and Domestic Commerce, imports of precious stones into the United States in 1934 were as follows:

	Carats	Value
Diamonds:		
Rough, uncut.....	43, 754	\$2, 739, 278
Cut, but not set.....	208, 916	9, 900, 900
Glaziers', engravers', and miners', not set.....	520, 889	2, 810, 281
Pearls and parts, not strung or set.....		477, 018
Other precious stones:		
Rough, uncut.....		115, 333
Cut, but not set.....		774, 238
Imitation precious stones, except opaque.....		1, 051, 608
Imitation precious and semiprecious stones, opaque, including imitation pearls.....		24, 992
Marcasites.....		14, 956

The rate of duty on various types of gems and their imitations remains the same as that given in Minerals Yearbook, 1932-33, page 803.

Status of jewelry trade.—Judged by sales as well as number of employees and wages paid, the jewelry trade had an appreciably better year in 1934 than in 1933. Jewelry sales were larger than those of 1933, but only about 45 percent of those of 1929. The increase was largely in low-priced goods, but an occasional fine gem was sold, and toward the end of the year there was a distinct improvement in the demand for fine jewelry. Furthermore, for the first time in several years jewelers were able to mark up their inventories, due to an upward price trend. Manufacturing jewelers had a reasonably satis-

¹ Parsons, A. L., University of Toronto Studies 36: Contrib. to Canadian Mineral., 1934, pp. 13-21.

² Hutt, G. M., and Seibert, F. V., Bull. Canadian Min. and Met., June 1934, p. 330.

³ Spencer, L. J., Gemmologist, April 1934, pp. 263-264.

factory year, and from September to December many of them operated their plants to capacity.

Taxes and codes.—On May 10, 1934 the Federal Government removed the 10-percent sales tax on jewelry sold for less than \$25 and on materials for watches and clocks. For the fiscal year ended June 30, 1934 the tax was collected on sales of \$46,685,570, including those articles sold at a wholesale price of more than \$3. New York contributed 39.6 percent of the total, Illinois 12.3 percent, and Massachusetts and Pennsylvania 7.7 percent each.

The jewelry industry in 1934 operated under several codes. Although entailing an additional expense to the code members and meeting objection from a few individuals the codes in general have improved the morale of the industry. Provisions for adjusting certain discrepancies between the various codes would have been helpful.

Foreign tariffs and taxes.—On July 6, 1934, the Doumergue government suppressed the "luxury" tax, to the advantage of established French jewelers and the discomfort of jewelers who did not maintain their own establishments.

In South Africa most industries pay an income tax of 2s. 6d. per £1, but diamond mines pay 3s. and gold mines 4s.

The high Indian duties are bringing many smuggled stones on the local market, which is disadvantageous to honest jewel merchants.

On December 24, 1934, Italy prohibited the importation of all precious stones but in February 1935 changed to a plan of controlled imports. This measure hurts not only the diamond-cutting centers of the world but the 40,000 employees of the Italian jewelry industry as well. In the past, Italy has had a considerable jewelry export trade with South America and the Balkans, although imports of unmounted precious stones were double exports in 1934.

Czechoslovakia, in an attempt to preserve its trade balance, prohibited the imports of precious stones early in 1935. Jewelers therefore depend on stocks or on stones derived from old pieces of jewelry.

Imports into Germany are so complicated by government restrictions as to payment that the situation virtually amounts to an embargo.

Identification of jewelry.—At the conference of the International Association of Manufacturers, Wholesalers, and Retailers of Jewelry, Gold, and Silverware in May 1934 at The Hague it was proposed to mark all precious stones, an idea apparently sponsored by the Germans. Others considered that it would be vandalism to mark flawless gems but agreed that it might be a good idea to mark synthetic stones. Additional methods of identifying fine stones were considered, and it was reported that an English expert, P. Antrobus, has made plaster casts of some 50,000 of the finest pieces of jewelry owned in Great Britain, as well as detailed descriptions of the stones.

Fashions in jewels.—Bar clips, ear clips, long diamond pendant earrings, and solitaire diamonds for hair ornaments were popular adornments during 1934. Designs were inclined to affect the bizarre, with Hindoo, Cambodian, Egyptian, or Russian motifs. Diamonds and sapphires, the latter the stone of Princess Marina's engagement ring, were particularly popular. Toward the end of the year there was a distinct trend toward the use of single large jewels of fine quality. In diamonds, the brilliant appears to be gaining in favor over the square or emerald cut. In demanding large stones of the

finest quality, women of today in part may be activated by their investment value.

Traditionally the use of platinum is linked with fine diamond jewelry, the demand for which was subnormal in 1934. Due to the high price of gold, however, platinum was used in 1934 for rings and other jewelry, cigarette cases, and other personal ornaments customarily made of gold.

Century of Progress exhibit.—In 1934, as in 1933, diamonds were featured at the Chicago Century of Progress. The more important features of the 1933 exhibit were retained, and the addition of the exquisite La Favorite (50.28 carats) brought the value of large diamonds on exhibit—including the Tiffany Yellow (128.5 carats) and the blue-white Maximilian diamond (42 carats)—to over \$2,500,000. Diamond cutting was done in the streets of Amsterdam concession, and Mme. Sarah Bernhardt's jewels were displayed in Burma House in the English Village.

DIAMOND

Conditions in the diamond industry improved moderately in 1934. Real prosperity, however, depends upon resumption of normal business, particularly in the United States. Unification of the production and sales branches of the industry progressed during the year. Two factors were disturbing—a slight increase in production without, however, adding to stocks; and the tendency of the cutting industry, organized to meet great demand, to sacrifice present profits to maintain its existence.

A poor beginning in the first 5 months of the year was more than balanced by the reasonably good and at times excellent business of the last 7 months. Sales of rough diamonds by the corporation were appreciably higher than in 1933; exports from South Africa were 30 percent higher; imports into the United States increased 26 percent; and world retail sales were 20 to 25 percent above those of 1933. Stocks in the hands of retailers are now low, and provided conditions improve sales of rough should be large in 1935. Prices fluctuated considerably during the year. Rough was about the same at the end of the year as at the beginning; fine-cut stones increased slightly; and small polished stones, due to too keen competition among the cutters, dropped a little.

Share dealings.—Trading in diamond shares was of small volume during 1934 except in January, November, and December. Share prices advanced from the beginning of the year until mid-February; then the general price trend was downward until November. Prices, however, increased appreciably in December. Six of ten important diamond shares advanced during the year, notably West African Diamond Syndicate, Angolas (Diamang), and De Beers preferred; and four lost, Jagersfontein and Consolidated Diamond Mines being the heaviest losers. The net result for the year was an average advance of about 9 percent. At the end of 1934 five selected stocks were about 36 percent of the all-time high (1927) and 406 percent of the all-time low (June 1932). Of the 18 principal diamond-mining companies 10 paid dividends.

Market.—About 95 percent of the world's diamond production is purchased by the Diamond Corporation, London, which in turn sells to brokers and large cutters. In 1934, as usual, the corporation was

astute, keeping prices of rough firm and rarely selling rough except when the resulting cut product could be absorbed. By making no concessions as to the price of rough the corporation doubtless will aid in raising the price of cut stones to a level profitable to the cutters. During the summer polished goods were too low by 15 to 20 percent in comparison to rough, a differential since decreased.

The Diamond Trading Co., the new selling subsidiary of the corporation, made its first sale under the new sorting agreement on May 8, 1934. Although the corporation does not publish its sales they are understood to have been about £4,000,000, a relatively low figure, but considerably higher than in 1933. The large stock of rough held by the corporation decreased slightly for the first time in several years.

Contracts with non-South African producers terminated at the end of 1934, but new contracts have been negotiated. It is stated that the corporation is to make five-eighths of its sales from stones produced by the South African mines and three-eighths from the outside producers (Congo, Angola, and Gold Coast).

The market outlook inspired confidence at the beginning of the year due to the producers' agreement consummated late in 1933 and to expectation of a better American market. January and February sales were appreciable, but quantities of Russian "seconds" reached western Europe in the first 4 months of the year, and it was not until June and July that considerable sales of rough again were made. September, October, and November were months of large sales, the best the corporation has had in several years and much higher than seasonal. December, as usual, was a dull month, but large sales of rough were made early in 1935, so that the trade is inclined to face the future confidently.

The poor market for cut stones during the first 5 months was offset by distinctly better business for the balance of the year. The first 4 months were quiet to dull, with too much cut offered on a thin market. Improvement was noted in May and from then on confidence grew, culminating in large sales in September, October, and November with price increases in certain types and an actual shortage of supply in others.

In the United States more interest was shown in diamonds in 1934 than in 1933. Except from May to September wholesale sales in New York were appreciably greater compared with corresponding months in 1933. The average monthly gain over 1933 was 19.2 percent. For the first half of the year the increase was due to larger sales of cheaper goods. In October, American buyers in Europe bought heavily of good quality meleés and large stones in anticipation of the Christmas trade, and by December American buying reminded European centers of old times. The Christmas trade improved 25 to 30 percent over 1933, with much inquiry for and some buying of large stones.

Diamond sales in Great Britain in 1934 exceeded those of 1933 by perhaps 25 percent, the diamond trade evidently being slowly on the upgrade. The market was strong late in the year due to the marriage of the Duke of Kent and Princess Marina. Sales in other European countries improved, except in France, Germany, and Russia. For the past 3 years India has been even a larger buyer than usual.

Imports of precious stones into India, largely diamonds from Belgium, were about \$2,000,000 in the fiscal year 1933-34.

The purchase of precious stones, especially diamonds, as a hedge against inflation was more wide-spread in America in 1934 than in 1933. The stones purchased were fine, unset stones of 1 to 10 carats, the type of most stable price. Many sales of rough in December were to satisfy the desires of continental investors, as was also the demand for large stones from June to August. Germany, Hungary, and France undoubtedly bought many fine diamonds as investments during the year.

Following England's abandonment of the gold standard in the fall of 1931 India sent large quantities of gold to England. A large part of the proceeds of these sales was used in purchasing fine diamonds, rubies, emeralds, and sapphires.

Stocks.—The Diamond Corporation's stocks, as well as those of producers and cutters in Amsterdam and Antwerp, remained large, probably a little less than they have been for the past 3 years or approximately about \$100,000,000. In America, wholesalers' stocks are believed to have increased nearly 10 percent in 1934 but are still low. Retailers' stocks also are very small and if the present demand continues must be increased materially. This is equally true of retailers in England, Italy, Austria, and Hungary. Should real prosperity return to the trade large purchases must be made from the corporation and the cutters who buy from it.

Prices.—The price of rough began to sag slightly in February and did not recover until May, with the result that prices for the first half of 1934 were less than in the corresponding period of 1933 by perhaps 10 percent. From May to October prices were firm, and in October certain types were advanced from 5 to 7½ percent. In short, rough ended the year at about the same price as the beginning, but with promise of improvement in future. Prices for fine large cut were firm throughout the year. The price of large cut stones is determined by the price of rough, but due to the large amount of labor involved the cost of polishing is the major factor that determines the price of small stones. Due to the dumping of small cut stones by the German cutting industry, with its low labor costs, and also to the keen competition of Amsterdam and Antwerp cutters, the price of small cut fell from January to April, and in June such goods were selling in America at distress prices. In Europe, however, prices for certain classes of small stones became firm by May, and thereafter the price tendency was upward. The net result of fluctuations during the year was a slight increase in the price of large stones and a small decrease in that of small stones.

Imports into the United States.—In 1934 cut and uncut diamonds (not including industrial stones) comprised 84 percent of the imports of all precious stones, pearls, and imitation stones; excluding imitation stones as well, diamonds accounted for 90 percent of the total.

The value increased 126 percent from 1933, although it was equivalent to only 44 percent of the 1929 total. The price per carat of both cut and uncut exceeded the corresponding 1933 figure, and that of the rough was unusually high. The total value of imports of rough and cut diamonds in 1934 was \$12,640,178.

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Diamonds imported into the United States in 1934, by countries

Country	Rough, or uncut			Cut, but not set		
	Carats	Value		Carats	Value	
		Total	Per carat		Total	Per carat
Belgium.....	23,397	\$1,649,493	\$70.50	145,266	\$6,785,871	\$46.71
British Guiana.....	259	3,600	13.90	335	23,786	71.00
Canada.....	5,234	57,684	11.02	301	22,854	75.93
France.....	464	137,002	295.26	79	8,972	113.57
Germany.....				37	7,823	211.43
Italy.....				4	510	127.50
Mexico.....				62,523	3,023,815	48.44
Netherlands.....	3,862	257,757	66.74	2	172	86.00
Switzerland.....				66	6,796	102.97
Union of South Africa.....	6,903	407,557	59.04	303	15,301	50.50
United Kingdom.....	3,635	226,185	62.22			
	43,754	2,739,278	62.61	208,916	9,900,900	47.39

In 1934, Belgium with 68.6 percent and Netherlands with 30.6 percent accounted for 99.2 percent of the American imports of cut stones. The chief sources of rough were: Belgium, 58.7 percent; Union of South Africa, 14.5 percent; Netherlands, 9 percent; and United Kingdom, 8 percent.

The value per carat of cut imported into the United States reached a peak of \$100.07 in 1929. For the succeeding 3 years the value per carat fell, due in part to decreases in diamond prices but largely to the diminished purchasing power in the United States, resulting in purchases of smaller stones of poorer quality. The slight increase in the 1934 price per carat compared with 1932 and 1933 is encouraging.

Imports of rough vary greatly from year to year and normally do not depend directly on good or bad times. Imports reached their peak value in 1926, then decreased to 1932, but have increased somewhat in the past 2 years. The peak in total carats imported was reached in 1929. As indicated by the value per carat the quality of stones imported decreased from 1926 to 1930, picked up appreciably in 1931, fell again in 1932, and then rose sharply in 1933 and 1934.

As usual, the heaviest imports were in the fall in preparation for the Christmas trade.

Per-capita diamond consumption in Canada is about one-half that of the United States. In 1934 imports into Canada were valued at \$544,540, an increase of 64 percent over 1933.

Diamond cutting.—The diamond-cutting industry experienced difficulties in 1934. Few cutters made profits, and bickering was rampant, although unemployment was slightly less acute. The number of cutters now exceeds that in peak years, and the master cutters are inclined to polish goods without regard either to profit or world demand. Once a particular cut, size, or grade is desired all rush in to produce it, and a surplus with weakened prices frequently results.

Employment in Antwerp averaged about 42.5 percent of the union membership (41 percent in 1933) and in Amsterdam 33.5 percent (27 percent in 1933). Antwerp with 20,000 to 25,000 artisans, Amsterdam with 5,000, and Hanau and other German cities with 4,500, are the principal cutting centers. Kimberley, Capetown, Johannesburg, New York, Paris, London, Jura Mountains, Geneva, Rio de Janeiro and

Diamantina, and several cities in India and Borneo are minor cutting centers.

Antwerp suffers from German competition; furthermore the cottage industry now scattered throughout Belgium cuts small goods at ridiculously low prices and union hours are unknown. In May and again in October representatives of the Belgian and German industries met at Luxemburg, but the Belgians' efforts to equalize wages in the two countries failed. The Antwerp diamond clubs have forbidden their members to send rough to Germany to be cut, but diamonds are easily smuggled across boundary lines. On October 26 the Belgian Government attempted to stop German "dumping" by requiring all obligations to German manufacturers to be paid through the Belgian National Bank with marks at the regular exchange rate. A Belgian professional school in which young and old workmen will learn improved technique and in which mechanical methods of cutting are taught was founded on March 28, 1934. The Antwerp Diamond Corporation (Comptoir Diamantaire Anversois) formed late in January 1934 (capital 30,000,000 francs) will obtain a better distribution of credit, particularly in the diamond market but also in that of other gems as well as precious metals.

The Amsterdam industry was even less prosperous than that of Antwerp, as it had to compete not only with Germany but also with Belgium, where lower wages are paid than in Holland. The subsidy to cutting of small stones and the contribution by the Dutch Government and the city of Amsterdam of 10 guilders a week per man has, however, resulted in relatively less unemployment in Amsterdam in 1934 than in 1933. Under the circumstances, the diamond cutters union agreed to substantial wage cuts.

At Hanau, Idar, and Brucken, Germany, small stones are cut well and cheaply because the industry is highly mechanized and wages are low. Unemployment, however, has been high; only 10 percent of the cutters were employed early in 1934, but later the situation improved and about 30 percent were employed. Not only did the German Government assist the master workmen by permitting them to pay their men in depreciated currency but it flooded Antwerp with circulars setting forth the advantage of having cutting done in Germany and having the work paid in "dollar bonds." In future German competition may be even more severe, for the industry has been rounded out by the addition of sawing and grinding units.

The South African cutting industry is slowly dying. The number of employees has dropped from 676 in 1929 to only 250 in 1934. The government apparently has definitely abandoned additional fostering of the industry.

The increase of 65 percent of rough imported into the United States in 1934 compared with 1933 suggests that the American cutting industry may revive. In 1934, 60 to 75 artisans were employed spasmodically.

The Parisian industry is virtually at a standstill.

Attempts at artificial production.—Usually every year at least one chemist reports that he has made artificial diamonds. M. K. Hoffman, a German mineralogist, repeated Dr. Henri Moissan's famous experiments and produced synthetic "diamonds." Tests, however, showed that these minute carbon particles had a refractive index of but 1.74 (diamond, 2.4) and hence were not diamonds but apparently

some other form of carbon. Hans Karabacek, a Viennese inventor, claimed in 1934 (German patent 589144) to have made diamonds up to 0.25 carat. He melted iron filings, blast-furnace slag, and carbon under a pressure of 20 to 35 tons per square inch and at rather moderate temperatures (900° to 1,000° C.) and then added carbon monoxide or carbon dioxide.

World production.—World production of diamonds in 1934 was approximately 4,179,581 carats valued at \$18,469,923, an increase of 21 percent in quantity and 33 percent in value compared with 1933.

The following table gives, with the accuracy available statistics permit, diamond production for the past 5 years in carats:

Production of diamonds by countries, 1930-34, in carats

Country	1930	1931	1932	1933	1934
South Africa:					
Mines.....	2,242,460	1,470,376	307,431	14,149	430,897
Alluvial.....	918,706	647,044	488,096	492,404	9,413
	¹ 3,163,590	¹ 2,119,155	¹ 798,382	506,553	440,310
Angola.....	329,823	351,495	367,334	² 374,000	453,000
Brazil.....	115,000	80,000	34,000	² 30,000	² 30,000
British Guiana.....	110,042	63,479	61,780	48,569	² 44,818
Congo.....	2,519,300	3,528,200	3,990,069	1,604,700	1,992,865
Gold Coast ³	861,119	880,479	842,297	863,722	1,142,268
Sierra Leone.....			749	32,017	70,000
South-West Africa.....	415,047	71,532	17,944		1,100
Tanganyika.....	13,107	7,790	1,391	² 1,260	1,220
Miscellaneous ⁴	3,000	3,600	3,725	1,825	4,000
Grand total.....	7,530,028	7,105,730	6,117,671	3,462,636	4,179,581

¹ Includes a small quantity of diamonds recovered from re-treatment of tailings.

² Estimated.

³ Exports year ended Mar. 31.

⁴ 1930-33, includes India, Borneo, New South Wales, and in certain years Venezuela, French Equatorial Africa, United States (Arkansas), and Rhodesia; 1934, includes Borneo, India, New South Wales, Venezuela, Rhodesia, United States (California).

The increased production over that of 1933 came from Sierra Leone, a new and growing producer, Gold Coast, Angola, and Congo. The value of the 1934 production was only about one-fourth and the quantity about one-half that of an average predepression year due in part to lower prices now received by the producers compared to those of former years but mainly to the relatively large percentage of bort produced by one of the Congo producers and by the Gold Coast.

In addition to newly mined diamonds there is also available to consumers a considerable quantity of "seconds." A few diamonds come on the market for resale every year, but, in addition, for the past 8 years Russia has sent many diamonds to western Europe. In the first 4 months of 1934 the amount received was so great that it was a distinct menace to the stability of the market. Since then shipments from this source have been halted, at least temporarily, but further sales by the Soviet Government are to be expected in future.

South African sales agreement.—The agreement ⁴ entered into by the South African Government and the South African producers was signed in 1934. Parties to the agreement are the Union Government, the Administrator of Southwest Africa, the Diamond Corporation, and the Diamond Producers' Association, with a board composed of 2 representatives of the companies, 2 of the governments, and 1 of the

⁴ Minerals Yearbook, 1934, p. 1087.

Diamond Corporation. Stocks are sorted at a single office at Kimberley, and sales quotas for each producer, including the Government as one of the producers, have been established. Sales, including sales to South African cutters (at London prices less the export tax), are made through The Diamond Trading Co., Ltd., owned by the Diamond Corporation. The Trading Co. maintains offices in London and Kimberley. To maintain prices the board can purchase alluvial goods in the open market and can on the other hand fix minimum prices for the sale of its diamonds. Throughout the negotiations the representatives of the coalition government showed their desire to safeguard the stability of the diamond industry. Apparently, it is understood that for the time being the cutting industry in South Africa is not to be expanded, that few new alluvial fields are to be opened to exploitation during the depression, and that the Government accepts a quota for its Namaqualand mines present and future. The Diamond Corporation, to allay fear that its stock might be thrown upon the market, agrees to consider itself a producer and like other producers to accept a sales quota. In other words, the corporation stock will be liquidated over a period of years. Havenga, minister of finance for the Union, stated that once demand improved markedly the Government would forego its Namaqualand quota in favor of the Kimberley, Jagersfontein, and Koffyfontein pipe mines. The sales quotas are as follows: South African Government, 10 percent; Diamond Corporation, 31.5 percent; De Beers, 30 percent; Consolidated Southwest Africa, 14.5 percent; Jagersfontein, 6 percent; Premier, 6 percent; and Cape Coast Exploration, 2 percent. This agreement assures two basic needs of the industry—(1) control of South African production and (2) sales of South African diamonds through one channel.

Government officials state that they desire to improve the position of an industry which supports tens of thousands of miners and diggers. As proof they cite that in 1930 Government sales totaled 97,000 carats and those of South African producers 23,000 carats, whereas in 1933 the Government sold but 23,000 carats and producers 119,000 carats.

South African production.—In 1934 South Africa produced 440,312.57 carats of diamonds with an estimated value of £1,437,591. This quantity was equivalent to about 90 percent of production in 1933 but only about 8 percent of that in 1913, the peak year. Except for a few gems from mine tailings (9,413 carats valued at £5,474) production came from alluvial diggings.

Cape Colony furnished 64.1 percent of the production; Transvaal, 32.4 percent; and Orange Free State, 3.5 percent.

Production and sales of diamonds in South Africa, 1934

	Production		Sales		
	Carats	Estimated value	Carats	Value	Value per carat
Transvaal.....	313, 153	£648, 603	507, 745	£807, 371	S. d. 31 10
Cape Colony.....	120, 552	778, 091	655, 673	1, 598, 514	48 9
Orange Free State.....	6, 606	10, 897	98, 128	87, 263	17 9
	440, 311	1, 437, 591	1, 261, 546	2, 493, 148	39 6

Production of diamonds in South Africa in 1934, by alluvial fields

Field	Metric carats	Value	Value per carat	Field	Metric carats	Value	Value per carat
Transvaal:			S. d.	Cape Colony—Con.			S. d.
Klerksdorp.....	46, 859. 75	£192, 722	82 3	Vryburg.....	19. 25	£97	-----
Lichtenburg.....	240, 177. 75	359, 056	29 11	Taungs.....	27. 75	89	-----
Pretoria.....	26, 116. 25	96, 825	74 2	Gordonia.....	53. 75	459	-----
				Van Rhynsdorp.....	. 95	3	-----
	313, 153. 75	648, 603	41 5		115, 331. 77	774, 003	134 3
Cape Colony:				Orange Free State:			
Kimberley.....	5, 705. 00	32, 272	113 2	Boshof.....	1, 309. 25	7, 099	108 5
Namaqualand.....	68, 754. 25	550, 010	160 0	Winburg.....	979. 00	1, 823	37 3
Barkly West.....	30, 053. 22	141, 953	94 6	Hoopstad.....	3. 25	15	92 4
Herbert.....	6, 343. 50	27, 899	88 0	Kroonstad.....	6. 75	24	-----
Hay.....	20. 50	27	26 4	Vredefort.....	114. 80	550	-----
Prieska.....	876. 25	5, 337	121 10		2, 413. 05	9, 511	78 10
Hopetown.....	1, 888. 50	12, 088	128 0				
Mafeking.....	1, 588. 85	3, 769	47 5				

To December 31, 1934, South Africa has had a total recorded production (in addition to stolen and smuggled stones) of diamonds valued at some £311,637,600, or well over one-fourth of its gold production and almost one-fifth of its total mineral output. During the 15 years 1920-34 South Africa has produced 34,021,794 carats and sold 30,597,574, an excess production of 3,424,220 carats. The lack of balance between production and sales, first apparent in 1927, was due to the exploitation of the Lichtenburg and Namaqualand alluvial fields. Exports in 1932 were £1,955,523; in 1933, £2,131,000; and in 1934, £2,772,000.

The Namaqualand production was again small, virtually all of the valuable claims being owned either by the State or the Cape Coast Explorers, and each is working on a quota basis. Recent production has been as follows:

Year	Carats	Value	Value per carat
1929.....	265, 844	£1, 748, 465	£ 6 11 0½
1930.....	142, 125	1, 274, 364	8 19 4
1931.....	137, 895	940, 946	6 16 4
1932.....	99, 196. 6	643, 795	6 9 10
1933.....	50, 687. 45	393, 221	7 15 2
1934.....	68, 754. 25	550, 010	8 -- --

All the pipe mines were shut down in 1934, but to give employment De Beers began on a small scale in February 1935 to wash some of its stock-piled kimberlite. The mines, however, sold diamonds from stocks on hand, and De Beers, for example, made a profit of £768,683 (£128,589 in 1933).

Sir Henry Strakosch⁵ in an interesting article, after pointing out that money made in the diamond mines furnished much of the capital used in opening up the Rand (Transvaal) gold mines, adds the idea that these same Kimberley men, acquainted with the misfortunes arising from small diamond claims (31 feet by 31 feet) and lack of technical skill, determined that the gold mines would be operated as large units with the best technical ability available.

⁵ Financial News, Jan. 22, 1934.

New Vaal River, a producer of fine alluvial stones, made a small profit, as did Nooitgedacht Diamonds, Ltd. Carrig Diamonds, Ltd., which in the heyday of the Lichtenburg district paid dividends of 502.5 percent in a single year, acquired several new diamond-bearing properties. Cape Coast Exploration, although not operating, continued to pay dividends from selling diamonds on hand.

Central Africa diamond field.—The northern half of the extensive Central Africa alluvial field, which next to South Africa has produced more diamonds than any other field in history, is worked by five companies operating in the Belgian Congo; and the southern half across the frontier in Portuguese West Africa is worked by Diamang.

Belgian Congo.—Belgian Congo production continued to show the effects of the curtailment program begun in the fall of 1932. For the fourth year in succession, however, it was the largest diamond producer of the world, although surpassed in value by South Africa.

The Congo diamond-mining companies employ about 150 whites and 10,500 blacks. By the use of machinery, especially larger units, and the growing efficiency of labor, the companies are reducing both their costs and the labor force necessary for their operations. Much of the overburden is removed by hydraulic giants, and many of the plants are run by hydroelectric power. The companies keep a large gravel reserve blocked out ahead of exploitation, thereby insuring a long productive life. All five companies pay dividends apparently satisfactory to their stockholders.

In June 1934 the export tax on industrial stones was reduced from 6 to 4 percent, while that on gem diamonds remained at 6 percent. The government valuation placed on gem diamonds, however, was reduced from 70 to 60 francs, and that on industrial stones remained at 8 francs.

The Forminière (Société Internationale Forestière et Minière du Congo) is the original company in Central Africa and, besides its important diamond production, its large interests cover Congo tin and gold mining as well as plantation, trading, and ranching enterprises. Like other large Congo mining companies it is an important source of revenue to the colony. Diamond production for the past 5 years has been approximately as follows: 1930, 338,000 carats; 1931, 429,000 carats; 1932, 490,000 carats; 1933, 402,600 carats; and 1934 (estimated), 472,900 carats. Fifteen mines were operated in 1934.

Beceka (Société Minière du Beceka) produces industrial diamonds mainly, less than 10 percent of its production being suitable for cutting. Approximate production was as follows: 1929, 1,400,000 carats; 1930, 1,969,500 carats; 1931, 2,885,095 carats; 1932, 3,188,000 carats; 1933, 1,487,100 carats; 1934 (estimated), slightly under 1,400,000 carats. All the mines are now operated by hydroelectric power.

Kasai-Luebo-Lueta Companies (Société Minière du Kasai, Société Minière du Luebo, Société Minière du Lueta) exploit their concessions as a unit through the Forminière. Recent production was as follows: 1932, 192,691 carats; 1933 (estimated), 115,000 carats; 1934 (estimated), 132,000 carats.

A few fine diamonds are recovered as a byproduct by the companies operating gold placers in the northeastern part of the colony. Prospectors in 1934 reported the finding of isolated diamonds of no commercial importance in several different parts of the colony.

Portuguese West Africa (Angola).—The colonial government of Angola and Portuguese, French, Belgian, American, and English investors own Diamang (Companhia de Diamantes de Angola, known as “Angolas” on the London Exchange). The diamonds are shipped through the Belgian Congo to the corporation. Operating results in recent years were as follows:

Results of diamond operations in Portuguese West Africa, 1927–34

Year	Cubic meters treated	Carats produced	Carats per cubic meter	Net profit	Dividend per £ share
1927	203,492	201,511	0.99	£108,433	S. 1
1928	231,980	237,511	1.02	109,110	1
1929	284,323	311,933	1.18	122,032	1
1930	341,708	329,823	.97	109,480	1
1931	397,526	351,495	.88	105,949	1
1932	407,945	367,334	.90	107,908	1
1933	458,940	373,623	.81	109,386	1
1934 ¹	486,000	453,000	.93	(?)	(?)

¹ Estimated.

² Not yet available.

³ Probably at least 1s.; an interim dividend of 1s. was paid on Jan. 14, 1935.

The mines (18 are now operated) are in the northeast corner of the colony. About 12 years' gravel reserves are kept blocked out ahead of production. From the formation of the company in 1917 to the end of 1934 production has totaled 3,486,543 carats. About 110 whites and 5,750 blacks are employed.

To the end of January 1935, £797,360 had been loaned to the colony and £727,020 paid to it as participations in profits. The loan is to be repaid in 25 annual installments, beginning in 1935.

Gold Coast.—The Gold Coast diamond deposits discovered in February 1919 are said to extend over an area of some 20,000 square miles. The stones are small (15 to 25 per carat) but of good quality. The largest diamond yet found weighed 9 carats and was worth £15 5s. Total exports from 1919 to 1934 have been 6,143,728 carats valued at £4,572,537. The estimated gross production in 1934 was about 1,200,000 carats.

All exploitable deposits so far known occur in the Birrim Valley, although a few stones have been found at several other places in the colony. The diamonds occur in stream gravels and drift overlying pre-Cambrian schists, basic lava beds in the schists being considered the source. Operating costs per carat of the principal producers have been reduced appreciably. The producers in 1933 were the Consolidated African Selection Trust, West African Diamond Syndicate, the Holland Syndicate, and Cayco (London), Ltd. Morkwa, Ltd., subleased its five mining leases to a continental group.

The principal producer is the Consolidated African Selection Trust, with concessions covering approximately 54 square miles in the Birrim Valley. It also owns about 32 percent of the stock of Cape Coast Exploration in Namaqualand and all the stock of the Sierra Leone Selection Trust. The latter produces relatively large stones, so that the company hereafter will present for sale a good assortment in sizes. In the Gold Coast it employs about 18 whites and 1,200 blacks. The company does not release production figures

but in addition to storing some "rubbish" in Africa exports annually about 900,000 carats. The year 1934 is reported to have been satisfactory.

The West African Diamond Syndicate in 1933 produced 252,900 carats, a 15-percent increase compared with 220,000 carats produced in 1932. The company treats its concentrates in a two-stage magnetic separator and has decreased theft by concentrating all diamond picking at a single station to which concentrates are sent in locked containers.

South-West Africa.—The mandated area of South-West Africa has been hit particularly hard by the world depression, as it depended largely for its revenue upon the production of copper and diamonds, the latter usually comprising 45 to 60 percent of the exports. Production of diamonds in recent years is given in the following table:

Production and sales of diamonds in South-West Africa, 1926-34

Year	Production			Sales		
	Carats	Value	Stones per carat	Carats	Value	Value per carat
1926.....	683,801	-----	6.7	726,808	£2,050,688	<i>S. d.</i> 56 5
1927.....	723,877	-----	5.9	577,341	1,620,862	56 2
1928.....	503,142	-----	6.3	564,383	1,399,864	49 3
1929.....	597,187	-----	5.3	533,101	1,617,693	60 8
1930.....	415,047	-----	5.8	214,036	640,253	59 10
1931.....	71,532	£208,081	4.8	103,000	300,000	58 2
1932.....	17,944	85,503	.9	44,000	211,000	95 4
1933.....	2,674	-----	.7	9,113	57,860	126 11.8
1934.....	(1)	-----	-----	-----	331,980	-----

¹ No mines operated, but a few carats no doubt recovered during development.

The principal producer, Consolidated Diamond Mines of South-West Africa, closed its mine in 1932, although since then it has continued successful development work north of Orange River, where it began washing diamonds on a small scale on January 1, 1935. It made a fair profit (£82,155) in 1934 from sales of stones on hand. When times become better again this company no doubt will be one of the first of those participating in the Diamond Corporation to recover, as it has large reserves of a well-varied assortment of diamonds which can be mined cheaply.

Sierra Leone.—In 1930 diamonds were discovered in Sierra Leone by members of the Colonial Geological Survey in the gravels of Kenja River and in the Kono district near the French Guinea border. Prospecting was begun in 1931 by the Consolidated African Selection Trust, Ltd., the principal producer on the Gold Coast. In April 1934 this company formed a subsidiary, Sierra Leone Selection Trust (capital £150,000 in 5s. shares), which has a monopoly of the colony's diamond mining. The Government participates in the profits. The stones produced have a good range as to quality, shape, and size, which aids in marketing them. The development work accomplished so far suggests that the field is important. Production in 1932 and early 1933 was from Shongbo, but in July 1933 the Sefadu deposit was opened, and modern treatment plants are being installed. The estimated production for 1934 was about 70,000 carats.

Miscellaneous producers.—In 1933 British Guiana produced 48,568.88 carats of diamonds valued at \$526,486.55 or \$10.84 per carat (1932, 60,185.13 carats). An average of 7.5 stones weighed 1 carat and the biggest stone weighed 8.5 carats. Ninety-nine percent of the output came from the Mazaruni district. The 1934 production was 44,818 carats. As the colony's diamond output has decreased its gold production has increased, the "pork-knockers" finding gold mining more lucrative under present economic conditions.

Diamond production in Brazil in 1934 was presumably somewhat less than in 1933. Exports from Bahia in 1933 were 9,590.79 carats of gem stones and 9,397.46 carats of carbonados. A new American-financed company, the Brazil Gold & Diamond Mines Corporation, entered the Brazilian field in 1934.

The diamond production of Tanganyika Territory continued to decline and in 1934 amounted to only 1,220 carats valued at about £1,754. The principal producer of diamonds, Tanganyika Diamonds, increased its capital to £300,000 in 1934 and became the Tanganyika Diamond & Gold Development Co., Ltd., with gold mining its chief interest. Mining was continued at Mabuki on a restricted scale, and a number of good stones were recovered, notably one of 42 carats valued at £1,470. "Yellow ground" (weathered kimberlite) nearby is stated to contain, according to recent washings, diamonds at the rate of 8.04 carats per 100 loads. The company also announced the discovery of a pipe in the Shinyanga district, but its diamond content is unreported as yet.

In 1933 India produced 2,342 carats of diamonds, a considerable increase over recent years (1931, 639 carats; and 1932, 1,254 carats). Most of these came from the Panna State, Central India. India, once the chief source of all the world's diamonds, now imports annually \$1,500,000 to over \$3,000,000 worth of diamonds.

In 1934 Venezuela produced a few carats of diamonds, perhaps 1,000, from the gravels of the Caroni River. These either were smuggled out or were exported through British Guiana.

In August 1934 it was announced officially that a diamond had been found in placer mining near Birnin Gwari in Zaria Province, and another in the Sokoto River, Sokoto Province, Nigeria. The first stone weighed 0.5 carat and the second over 10 carats. A rush was about to start when the government prohibited further prospecting.

In 1933 New South Wales produced 123 carats of diamonds, the lowest figure in recent years (1930, 677 carats; 1931, 725 carats; 1932, 251 carats). The average price received was about \$5 per carat.

Southern Rhodesia again became a diamond producer in 1934 in a modest way, as 12 carats were recovered in November. Two diamonds are reported to have been found in the Limpopo River gravels north of Messina. Its total production has been 15,793.35 carats, worth about £75,273.

W. W. Bradley, State mineralogist, states that four diamonds were recovered in 1934 in California as a byproduct of placer gold mining. The largest (2.57 carats) was found by Robert Echols in Fig Indian Creek, Amador County. The other three were smaller and were found in the Yuba River, in Yuba County, near Smartville.

Borneo, once an important diamond producer, still produces a few stones, and its cutting industry imports a fair quantity of rough from

South Africa. During the past 10 years its production has averaged about 460 carats.

Industrial diamonds.—As industrial diamonds are used widely, not only in heavy industries but also for special precision purposes, their sales are a good business barometer.

World sales were relatively large throughout 1934 probably about 50 percent above 1933. Total sales in former years of greater business activity amounted to some \$10,000,000 annually. The trade receives its industrial diamonds from three principal sources: (1) From the Diamond Corporation, sold by it as industrial diamonds; (2) from cutters and brokers, representing that part of their purchases from the corporation not suitable for gem stones; and (3) from sources other than the corporation, including notably Brazilian carbonados.

Stocks of good industrial diamonds are now small, for the South African pipe mines responsible for over half the supply are closed and the Brazilian production of carbonados is far below average.

Imports of industrial diamonds into the United States during the past 8 years are given in the following table. The price per carat fell from 1929 to 1933 due to the larger imports of very small and hence cheap, off-color, gem stones for diamond drilling. Seventy-three percent of the imports come from Belgium, the United Kingdom, and the Netherlands.

*Industrial diamonds imported into the United States, 1927-34*¹

Year	Carats	Value	Value per carat	Year	Carats	Value	Value per carat
1927.....	34,645	\$2,149,912	\$62.06	1931.....	224,970	\$2,400,879	\$10.67
1928.....	38,342	2,756,895	71.90	1932.....	163,704	1,061,823	6.48
1929.....	46,901	4,060,577	86.58	1933.....	258,300	1,246,748	4.83
1930.....	145,958	2,756,630	18.89	1934.....	520,889	2,810,281	5.40

¹ Includes glaziers', engravers', and miners' diamonds.

Imports into Canada in 1934 were worth \$1,395,404, more than three times those of 1933.

The year 1934 opened with a price increase of about 20 percent and with a good demand for better-grade industrial stones. Throughout the year prices tended to increase, due to the scarcity of fine industrial diamonds; those of fair size reached predepression prices, as also did fine, off-color gem borts for diamond drilling. The supply of such goods is small, and substitution of lower-grade diamonds eventually will be necessary. With this in view, some producers have carried on extensive drilling campaigns in a number of mining districts, using "common industrial goods" instead of borts with apparent success. To indicate the extent of diamond drilling it may be added that in Ontario 265 drills employing 503 men drilled 179 miles of holes in 1934 (corresponding figures for 1933, 143 drills, 251 men, and 107.7 miles of holes). In 1934 this drilling consumed 35,968.44 carats of borts, 32.23 carats of ballas, and 2,004.42 carats of carbonados.⁶

The use of diamonds for dressing emery wheels, shaped diamond tools for factory use, and diamond dies for wire-drawing expanded during 1934.

Due to the rather depressed condition of the precious stone-cutting industry, diamond dust and its source, crushing bort, was low in price

⁶ Ontario Dept. of Mines, Toronto, Bull. 98, 1935, pp. 7-8.

throughout the year, although it was somewhat firmer in May and again in August. An ample supply of this grade also came on the market, much of it from the Congo and West Africa. The price was only one-tenth that of 1928, and while the low price did not increase consumption, a new use has been found for this material, and its future looks brighter. The leading abrasive companies are increasing their research as to employment of diamonds, thus in a practical way conceding the marked preeminence in hardness of diamonds over any other natural product or any artificial substitute. The General Electric Co., for example, is reported to have improved tungsten carbide as an abrasive by embedding diamond particles in it. In 1934 the Carborundum Co. exhibited its new diamond wheel at the National Metal Congress (New York, Oct. 1-5). Crushed diamonds accurately sized are embedded in a secret bond molded to the diameter desired; this is then backed by a composition wheel of the size desired. It is used for grinding and shaping hard alloy tools and should eventually find many uses, perhaps even in polishing diamonds, cutting glass, or similar purposes. The Norton Co., together with several European firms, is reported to be making similar wheels. In fact, in Europe wheels of this kind were on the market as early as 1933. This new use should increase the consumption of crushing bort greatly, for the larger wheels contain several hundred carats of diamonds.

Diamond-set tools for dressing abrasive wheels consist of a single stone or of a number of small stones in a proper binder, the latter innovation being one of the reasons for the larger imports of small stones and smaller consumption of black diamonds. The use of such tools has been increasing each year.

The demand for black diamonds or carbonados increased in 1934, particularly in small sizes. Carbonados still are essential for diamond drilling in badly fissured ground. Large-size carbonados, on the other hand, have not been cheaper for the past 40 years. The normal annual production, all from Brazil, is about 25,000 carats; in 1933 it fell to perhaps 8,000 carats but increased to about 18,000 carats in 1934.

OTHER GEM MINERALS

Amber.—Increased sales late in 1933 reduced amber stocks sharply, and mining was resumed in Prussia early in 1934, employing 375 men 40 hours per week. At Palmniken, the principal center, about 2,000,000 cubic meters of earth are reported to yield about 500 tons of amber, 20 percent of which is fit for ornamental purposes and the rest for lacquer. The sales of cheap imitation amber have been very detrimental to the trade, and in consequence a law was passed in Germany on May 3, 1934, confining the word "amber" to the natural product or to products of molten and cast amber scraps; even the use of such terms as "imitation amber" is illegal. An advertising campaign was begun stressing the superiority of the natural product, and stores displaying the products of the state amber manufactory were opened in several of the larger German cities.⁷

Emerald.—The Government emerald mines of Muzo, Colombia, were operated part of 1934; the value of production was reported as about \$238,000. Early in 1934 a Colombian law was passed that required all persons engaged in cutting or selling emeralds to register

⁷ Bureau of Foreign and Domestic Commerce, Foreign Trade Notes: Vol. 3, no. 8, Aug. 27, 1934, pp. 5-6.

with the Government. Emeralds found in the possession of unregistered persons are to be confiscated.

Opal.—In the fiscal year ended June 30, 1933, Australia exported unset opals valued at £15,365 (£21,254 in 1931–32), the United Kingdom taking 41 percent, Ceylon 22 percent, Germany 15 percent, and the United States 8 percent. Usually New South Wales is the largest producer, although in 1931 South Australia exceeded it; Queensland also is a minor producer. In 1933 the production of Lightning Ridge, New South Wales, was 4,231 pounds. R. S. Vincent, Minister of Mines, New South Wales, sponsored the idea that the opal be declared Australia's national gem.

Ruby.—Production of rubies in Burma in 1933 is reported to have been only 1,103 carats.

Sapphire.—The use of a fine square-cut Kashmir sapphire in Princess Marina's engagement ring has increased the popularity of sapphires in Great Britain. In 1933 Kashmir produced 1,434,285 carats of sapphire and corundum, the greater part of which must necessarily have been fit only for industrial use. In 1934 about 120 men worked the Anakie sapphire field, Queensland, particularly at Iguana Flat. One fine 886.5-carat stone was found early in the year. In 1933 sapphires sold were valued at £2,826 (1932, £1,982); 1934 sales probably were nearer those of 1932 than 1933. The Minière des Grandes Lacs Africains did not work its sapphire mines in the Eastern Belgian Congo in 1934.

Jadeite.—In 1932 Burma produced 3,026 cwt. of jadeite (2,765 cwt. in 1931), but the reported value was less than half that of 1931. Exports in 1932 were 3,654 cwt.

Madagascar produces many semiprecious stones, the reported production being 52.4 metric tons in 1932 and 131.6 in 1933.

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