PRECIOUS AND SEMIPRECIOUS STONES (GEM MINERALS)

By SYDNEY H. BALL

SUMMARY OUTLINE

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

Almost 100 mineral substances have been used for decorative purposes, and while there is no hard and fast division as to precious and semiprecious stones, the diamond, the emerald, the ruby, and the sapphire are usually included in the former and frequently, by courtesy, an organic substance, the pearl. These gems, however, are sometimes 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 much more highly organized than that of any other precious stone, and the diamond output represents almost 95 percent of the world's gem production.

Production in the United States.—For well over 2,000 years gem mining has been a minor industry in America as the American Indian, no less than his white successor, was an admirer of gems. The industry, however, has never been an important one in the United States. Statistics are not at hand for recent years, but from 1880 to 1924 the American production was valued at $9,800,000, a yearly average of $223,000 with a maximum of $534,000 in 1909 and a minimum of $60,000 in 1923. In 1933 the value of the production was probably under $20,000 and consisted largely of rose quartz from South Dakota, agatized wood from Arizona, a small quantity of turquoise from the Southwest, a few sapphires and agate for the tourist trade

from Montana, amazonstone from Colorado, and a little rose quartz from California.

Virtually all of the known precious and semiprecious stones have been found in the United States, but important deposits are unusual. Among the more notable American occurrences responsible for a certain production are sapphires in Montana, diamonds in Arkansas, tourmalines in Maine and California, hiddenite in North Carolina, kunzite in California, amazonstone in Colorado, rose quartz in South Dakota and California, and turquoise in New Mexico, Arizona, and Nevada. The Montana sapphire mines have been responsible for the major part of this country's production, the gems being used partly in jewelry but largely industrially as watch jewels.

Trade in precious stones in 1933.—The year 1933 was slack in the precious-stone industry due to the world-wide depression and the shifting of currency values and high tariffs. On the whole, however, employment was better in 1933 than in 1932, and the sales trend is upward. In America, jewelry sales, judging from the excise tax from July 1, 1933 to March 31, 1934, were $37,239,917, a 57-percent increase over the corresponding period of 1932–33.

Imports and domestic tariff.—Imports of precious stones into the United States in 1933 were as follows:

	Value
Diamonds:	
Rough, uncut, 31,595 carats	$1, 662, 224
Cut, but not set, 178,937 carats	8, 360, 283
Glaziers', engravers', and miners', not set, 260,784 carats	1, 249, 200
Pearls and parts, not strung or set	776, 141
Other precious stones:	
Rough, uncut	76, 038
Cut, but not set	644, 475
Imitation precious stones, except opaque	932, 189
Imitation precious and semiprecious stones, opaque, including imitation pearls	11, 487
Marcasites	39, 884

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.

Codes under the NRA.—The jewelry industry is now operating under a number of codes; for instance, the diamond dealers and the diamond cutters each have their own codes. The Code of Fair Competition for the Precious Jewelry Producing Industry has rather drastic articles as to trade terminology, fair practices as to advertising, marketing, and sales terms. The definition of certain terms relating to precious stones in the Code of Fair Competition for the Retail Jewelry Trade is particularly interesting; the code forbids auctions except in case of dire necessity or for legitimate liquidation.

American jewelry tax.—The Federal 10-percent tax continued throughout 1933; it has netted the Government little revenue—only $3,068,494 was collected in 1932. There are indications that the tax is a difficult one to administer and that its effects are felt sharply by the jewelry business in the United States in which 1,261 houses failed in 1932 with liabilities of $35,627,308.

Resolutions of Fourth International Jewelers Congress, Rome, May 1933.—The congress, among other resolutions, refused to adopt the definitions of "perfect", "blue white", "commercial white", and other terms used by American diamond dealers; all diamonds are to be weighed in metric carats.

Synthetic and imitation stones must be offered and invoiced as such, and the words "synthetic" and "imitation" must be written in the same character as the name of the stone involved.

The congress also adopted certain definitions for various precious stones, eliminating the use of the word "olivine" for members of the chrysolite family and confining its use to the green garnet, uvarovite; also an identification service for diamonds, pearls, and precious stones will be fostered by the congress.

DIAMOND

All indexes of the diamond industry improved in 1933 compared to those of 1932. Among favorable factors were a curtailed production; a slight decrease in world stocks; better prices for rough and cut goods; larger sales of rough and cut goods, as indicated by increased American imports, and higher stock-market valuation of shares with several companies returning to the dividend list. The improvement is tangible, but the industry can only improve markedly provided prosperity returns to America, which normally should absorb over 75 percent, in value, of the world's diamonds.

The known reserves of diamonds are not excessive, being of the order of those of gold, zinc, and lead rather than of copper or coal. During the year no discoveries of importance were made, and as the world becomes better known, the possibility of finding new fields of importance that might greatly disturb the market becomes progressively less. The centralization and unification of the industry continued in 1933, and hereafter the production of the Government-owned South African mines is to be sold through the Diamond Corporation (see p. 1087).

The low price of small stones during the past 2 years has led many to become "diamond conscious" for the first time, and at some future date ideas of size, quality, and cut will improve to the benefit of the industry. As some small measure of prosperity returns it is expected that many will be disposed to satisfy their long-deferred desire for luxuries.

Share dealings.—Except in June and July, when sales were relatively large, 1933 was a year of small dealings in diamond-mining shares. This was due to continental buying, where such shares have always been popular. The appreciable advance of January was lost in February; from March to June prices rose; they receded in July, gained in August and September, and suffered a slight loss in the final quarter of the year. Diamond shares gained about 32 percent in price during the year. Five selected stocks at the end of the year were about 33 percent of the all-time high (1927) and 363 percent of the all-time low (June 1932). Of the 13 principal diamond-mining companies, 8 are paying dividends.

Market.—Some 95 percent of the output of the world's diamond mines is sold to the Diamond Corporation of London, and it in turn sells to brokers and larger cutters. In 1933, as usual, the corporation only put on the market such quantities of rough stones as could be readily absorbed and refrained from selling for several extended periods in the year. The corporation continued to assist in coordinating production with demand and in determining the quotas of each producer, also to lead in other matters pertaining to the good of the industry.

It further held itself ready to take off the market the production of the few independent producers still operating, provided this seemed desirable. When England, South Africa, and the United States went off the gold standard the corporation raised the price of diamonds, produced under the gold standard, in the currencies of those countries commensurately. When South Africa went off the gold standard the corporation, fearing the price structure might be injured by alluvial diamonds produced at depreciated currency costs, instructed its buyers to purchase alluvial stones at rates obtaining when South Africa was on the gold standard. In June the corporation decided to sort Congo goods in the same way as South African. Few sales agencies know their products better or handle their sales more astutely than the Diamond Corporation.

In 1933 the corporation's sales of rough stones, while by no means noteworthy, were appreciably greater than those in 1932. In January, June, July, and October sales were large, most of the other months being quiet. Prices were firm throughout the year, and the price of large, rough stones was increased 20 percent in June with a slight increase in the smaller sizes.

World sales of cut goods were relatively satisfactory and doubled those in 1932, due partly to spurts of investment buying in America, Germany, and France, as confidence in the currencies was temporarily lost. In January and February sales were satisfactory, and June to October were good months. In May the price of large stones was increased 20 percent and that of smaller stones raised, although late in the year the price of the latter dropped somewhat.

In 1933 investment buying was large due to disturbances in currency values, for in times of financial stress, as in those of revolution, diamonds, particularly fine stones, are among the commodities purchased to obviate loss through currency inflation. In the Paris "Vu", Lewisohn in listing the world's richest men emphasizes the relatively small losses sustained in the past few years by the leading Indian princes, who have always kept a substantial part of their fortunes in gold and precious stones, compared to the heavy losses sustained by western financial leaders with fortunes in stocks and bonds.

From July to the end of the year fear for stability of the dollar caused some Americans to purchase diamonds. The purchasers were favorably impressed by the unified control of production and sales in the industry, the relative stability of diamond prices during the panic, and the expectation of price appreciation provided currency depreciation took place. It may be that the substantial prices received for diamonds by friends forced to liquidate during the panic, as opposed to the smaller salvage value of other luxuries, also influenced purchasers. Provided the original purchase was made a decade ago (see fig. 106), the owner doubtless even profited by the distress sale. The diamond is a commodity largely immune to the fatal consequences of currency fluctuations, and the portability of the stones and their ready translation into cash in any market likewise are important considerations.

Investment buying in France became apparent in February and continued throughout the year. Investment buying also occurred in England during the summer. Such buying in America, France, Germany, Hungary, and England partly caused the shortage of fine goods, and price advances. It is reported that the Jewish emigrés from Ger-

many during the past year were not permitted to take gold out of the country; however, many had converted their fortunes into diamonds and were thus able to leave with part of their capital to start anew in other lands.

As already mentioned, the low price of small stones during the past 2 years has led to diamond consciousness; at some future date ideas of size, quality, and cut will improve, to the benefit of the industry. Moreover, many young people who have become engaged during the past 4 years have deferred purchasing an engagement ring until more prosperous times, and eventually the diamond merchant will benefit. With repeal, dining out is becoming more prevalent in the United States and with it the more frequent use of formal gowns and jewelry.

Stocks.—A year ago the writer estimated that the total diamond stocks held by the Diamond Corporation of London, the South African producers including the Government, producers in other countries, and the cutters in Antwerp and Amsterdam were worth about $100,000,000. It is believed that in 1933 about as many rough diamonds were sold as were produced and that the stock on January 1, 1934, is no greater in carats than it was a year ago; due to higher prices, however, the value has probably increased. Sales by the corporation are not made public, but in 1933 they are understood to have exceeded £2,000,000, a higher value than that for 1932, which in turn showed a gain over 1931.

In Antwerp and Amsterdam, American buyers found an unusually restricted assortment of cut goods; indeed, from time to time throughout the year there were shortages in certain lines. In the United States retail stocks continued very low; the same is true of stocks of the American importer and wholesaler. The British retailer likewise carried barely enough stock to transact business, as did retailers in other centers such as Budapest, Paris, and Rome. In 1933, therefore, world diamond stocks, including those of the corporation and those in jewelers' hands, decreased.

Prices.—Prices of both rough and cut stones were firm for the first 3 months of the year. In May good cut stones of 3 carats or more increased 20 percent in price, which, of course, reacted favorably upon the price of rough stones. In May "seconds" sold by the New York loan societies brought surprisingly good prices, a condition noted in London in March and April.

In consequence of the price advances noted and the depreciation of the dollar American buyers arriving in Europe in the summer found prices in American currency 50 to 70 percent above those in May. Such prices curtailed American buying but tended to mark up stones in stock in America. In America the recent low of diamond prices was reached in June 1932 and extended to March 1933. A fine 1-carat brilliant, which in 1928–29 sold for $750, in the period of low prices brought only $500; the price by September 1933, however, had increased to about $650. Figure 106 shows the price of a 1-carat cut stone of good quality from 1550 A.D. to date.

Century of Progress diamond exhibit.—The industry's exhibit was one of the major attractions at the Chicago Century of Progress; wide interest was shown in the diamond mine, the grease tables and the diamond-cutting exhibit, the diorama of the Kimberley opencut, and the painting of a Congo mine. Among the fine gems shown were the Tiffany Yellow and the beautiful Maximilian diamond; there was also

a rather complete assortment of rough gems. These stones were protected by the latest type of automatically controlled safes, tear gas, electric eye and burglar-proof glass, and heavily armed guards. The exhibit of the use of industrial gems was unusually complete.

Imports into the United States.—In 1933 diamonds, cut and uncut accounted for a little over 80 percent of the imports of all precious stones, pearls, and imitation precious stones; if the imitation stones are excluded diamonds accounted for 87 percent of the total imports.

Diamonds imported into the United States in 1933, by countries

Country	Rough or uncut			Cut, but not set		
	Carats	Value	Value per carat	Carats	Value	Value per carat
Belgium	10,432	$591,866	$56.73	131,942	$5,887,244	$44.62
Brazil	471	1,000	2.12			
British Guiana	190	1,900	10.00			
Canada				25	1,003	40.12
France				478	39,954	83.58
Germany	105	2,144	19.46	47	1,948	41.45
Netherlands	4,196	275,994	61.01	45,609	2,314,588	50.75
Switzerland				12	1,158	96.50
Union of South Africa	13,423	704,278	52.47	177	14,968	84.56
United Kingdom	2,015	63,974	31.75	647	99,420	153.66
	[1] 31,595	[1] 1,662,224	52.61	178,937	8,360,283	46.69

[1] Includes 763 carats valued at $21,068 not distributed by country of origin.

Total imports of all kinds of goods into the United States in 1933 were 32.5 percent of the average for 1923–25; the value of diamond imports in 1933 was only 18.9 percent of the 1923–25 average and 19.3 percent of the 1929 value but showed a gain of 107.3 percent over 1932.

In 1933 Belgium (70.4 percent) and the Netherlands (26.5 percent) accounted for 97 percent of the American imports of cut stones. The Union of South Africa accounted for 42.5 percent of the rough stones imported, and Belgium and the Netherlands accounted for 35.7 and 16.7 percent, respectively.

The value per carat of cut stones imported into the United States reached a peak of $100.07 in 1929. For the succeeding 3 years the value per carat fell, due partly to decreases in diamond prices but largely to diminished purchasing power in the United States which caused Americans to purchase smaller stones of poorer quality. The slight increase in the 1933 price over that of 1932 is encouraging.

Imports of rough diamonds vary greatly from year to year and normally do not depend on good or bad times. The value of imports reached their peak in 1926; since then the general tendency has been downward. In 1933, however, the value of imports slightly exceeded that in 1932. The high point in quantity of imports was reached in 1929. The quality of stones imported, as shown by price per carat, decreased from 1926 to 1930, picked up appreciably in 1931, fell again in 1932, but rose sharply in 1933 when unusually fine rough stones were imported.

As usual, August and September were months of large importation due to stocking up for the Christmas trade.

Canada is less "diamond conscious" than America but imports a small quantity of cut diamonds. Imports into Canada, which in 1930 were valued at $2,014,713, had fallen by 1933 to $331,878.

Diamond cutting.—The world diamond-cutting industry had a better year in 1933 than in 1932. Unemployment was less acute, and

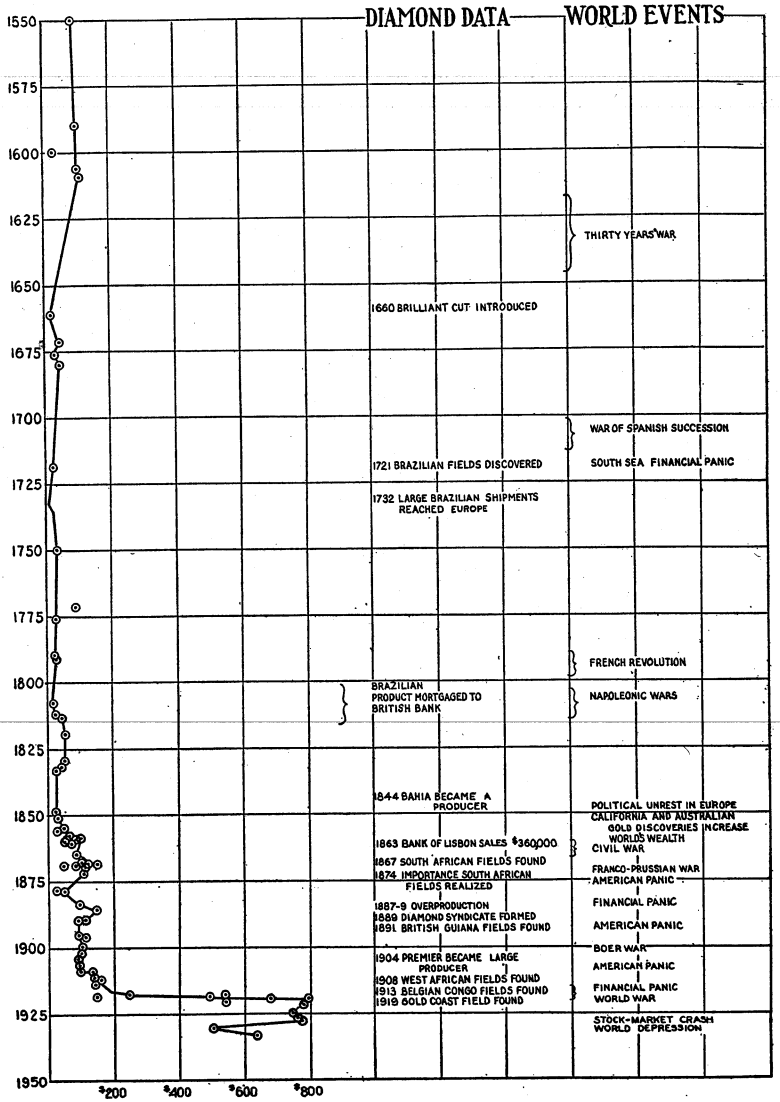

FIGURE 106.—Trend of diamond quotations, 1550–1933. Data represent the price of a fine 1-carat cut stone.

the master cutters did better financially, although the profit in cutting rough stones was still discouragingly small. However, cutters are partly the creators of their own troubles, for as soon as a particular cut, size, or grade is in demand all hasten to produce it, and a surplus with weakened prices too often results.

Employment in Antwerp averaged about 41 percent of the Union's membership (1932, 27 percent) and in Amsterdam about 27 percent (1932, 15 percent). In May, owing to the Nazi anti-Semitic attitude, the diamond merchants of Amsterdam and Antwerp, largely Jews, refused to send diamonds to Germany for cutting, thus benefiting the artisans of their own cities. In midsummer a number of German-Jew cutters fled from Germany and settled in Antwerp.

Antwerp with 20,000 to 25,000 artisans, Amsterdam with 5,000, and Hanau and other German cities with 3,500 to 4,000 are the principal cutting centers. Kimberley, Capetown, Johannesburg, New York, Paris, London, the Jura Mountains, and Geneva are minor cutting centers. There are also a few cutters at Rio de Janeiro and in cities of India and Borneo. In 1933 the South African subsidized industry continued on its stormy way. As the South African master cutters must purchase their rough stone at prices comparable to those paid by European cutters hereafter, less 10-percent export tax, their advantageous positions will largely disappear.

The Comptoir Diamantaire Anversois (capital 30,000,000 francs) has been formed to distribute credits better in the Antwerp market. The Hollanders likewise have formed a central organization (capital 6,000,000 guilders) for the purchase of rough stones and the sale of polished goods, which is also to subsidize the cutting of small stones. In 1933 the Germans set up a syndicate to buy rough stones to make their trade independent of Antwerp and Amsterdam.

World production.—The world's production of diamonds in 1933 was approximately 3,775,000 carats, worth about $14,100,000.

The following table gives, with the accuracy available statistics permit, the diamond production in carats for the past 4 years.

Production of diamonds by countries, 1930–33, in carats [1]

Country	1930	1931	1932	1933
South Africa:				
Mines	2,242,460	1,470,376	307,431	14,149
Alluvial	918,706	647,044	488,096	492,404
	[2] 3,163,590	[2] 2,119,155	[2] 798,382	506,553
Angola	329,823	351,495	367,334	[3] 374,000
Brazil	115,000	80,000	34,000	([4])
British Guiana	110,042	63,479	61,780	([4])
Congo	2,519,300	3,528,200	3,990,069	[3] 1,931,000
Gold Coast [5]	861,119	880,479	842,297	863,722
Sierra Leone			749	32,017
South-West Africa	415,047	71,532	17,944	
Tanganyika	13,107	7,790	1,391	[3] 1,250
Miscellaneous [6]	3,000	3,600	3,725	1,825
Grand total	7,530,028	7,105,730	6,117,671	[7] 3,774,367

[1] In 1933 Rhodesia disappeared as a producer, and Sierra Leone appears for the first time as a producer of some importance; Tanganyika Territory is now unimportant. As the South African pipe mines were shut down, the year's production came from the alluvial mines except for about one-fifth of 1 percent produced by debris washers (i.e., tailings treatment).

[2] Includes a small quantity of diamonds recovered from tailings re-treatment.

[3] Estimated.

[4] Figures not available.

[5] Exports year ending Mar. 31.

[6] Includes India, Borneo, New South Wales, and in certain years Venezuela, French Equatorial Africa, Arkansas, and Rhodesia.

[7] Includes estimates for Brazil and British Guiana.

In quantity and value the 1933 production was about 62 percent and 81.3 percent, respectively, of that in 1932. The value of the 1933 output was about one-fifth that of normal years; an unusually large percentage of the production was bort, and material suitable for cutting amounted to only about 55 percent of comparable production in 1932. Although the South African pipe mines were shut down and most other producers curtailed their production, further curtailment appears necessary. Even if world demand increases, there is a considerable stock to liquidate.

Diamond producers have been in a difficult position for the past 4 years; many companies have closed down, and a few weak ones have been liquidated. This has been due partly to loss of sales volume but largely to low prices received for the product, companies producing finer stones having suffered most. However, prices received by producers in 1933 were better than those obtained in 1932. Further "seconds" appeared on the market from time to time; for instance, in February and March 1933 old cut stones from Russia reached Paris and Antwerp, although this source must soon be exhausted.

South African conference.—On May 22, 1933, Patrick Duncan, Minister of Mines of the South African Government, Sir Ernest Oppenheimer, and other representatives of the larger South African mines began a conference which reached a provisional agreement in September, replacing the Inter-Producers' agreement and the latter's sales agreement with the corporation. Although still unsigned, its articles are now operative. The Union Government, the Administrator of South-West Africa, the Diamond Corporation, and the principal producers are to form a Diamond Producers' Association with a board composed of 2 representatives of the companies, 1 of the Union Government, 1 of the South-West African administration, and 1 of the Diamond Corporation. Stocks are to be sorted at a single office at Kimberley, and sales quotas for each producer, including the Government as one of the producers, are established. Sales are to be made through The Diamond Trading Co., Ltd., controlled by the corporation, including sales to South African cutters (at London prices less the export tax). The board, to maintain prices, can purchase alluvial goods in the open market. The first shipment under the agreement is to be shown in London in March 1934. The representatives of the coalition government throughout the negotiations 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. The Diamond Corporation, to allay fear that its stock might be thrown upon the market, agreed to consider itself a producer and like other producers to accept a sales quota. In other words, the stock will be liquidated over a period of years. Early in October Mr. 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 Koffiefontein pipe mines.

It is expected that the selling quotas will be as follows: South African Government 10 percent, Diamond Corporation 31½ percent,

De Beers 30 percent, Consolidated South-West Africa 14½ percent, Jagersfontein 6 percent, Premier 6 percent, and Cape Coast Exploration 2 percent.

South African production.—South Africa in 1933 produced 506,552.64 carats worth about £1,560,404. This is only 9 percent of the 1928 production. Outside of a few gems recovered from mine tailings (14,149 carats valued at £7,589) the production came from alluvial diggings, as all of the pipe mines were shut down.

The production during the last half of the year somewhat exceeded that of the first half due to better average prices. Transvaal and Cape Colony each furnished about 49 percent of the total value and the Orange Free State the remainder; Transvaal, however, produced about 73 percent of the quantity in carats and Cape Colony 23 percent.

Production and sales of diamonds in South Africa, 1933

	Production		Sales		
	Carats	Value [1]	Carats	Value	Value per carat
					S. d.
Transvaal	371,243	£757,433	414,686	£862,472	41 7
Cape Colony	118,548	776,622	170,084	952,812	112 0
Orange Free State	16,760	26,349	61,273	108,563	35 5
	506,551	1,560,404	646,043	1,923,847	59 7

[1] Estimated.

The only pipe production, that from debris washing, was from the Cape—3,022 carats, valued at £2,523 (16s. 8d. per carat)—and from the Orange Free State—11,127 carats, valued at £5,066 (9 s. 1d. per carat).

Production of diamonds in South Africa in 1933, by alluvial fields

Field	Carats	Value	Value per carat	Field	Carats	Value	Value per carat
Transvaal:			*S. d.*	Cape Colony—Con.			*S. d.*
Klerksdorp	57,057.75	£253,668	88 11	Taungs	22.75	£104	--
Lichtenburg	304,858.00	493,402	32 4	Gordonia	366.50	1,916	--
Pretoria	9,327.50	10,363	22 3	Kenhardt	15.25	52	--
	371,243.25	757,433	40 10		114,169.50	772,640	135 4
Cape Colony:				Orange Free State:			
Kimberley	8,482.75	47,148	111 2	Boshof	2,231.50	10,977	98 5
Namaqualand	50,687.45	393,221	155 2	Winburg	2,964.40	7,955	53 8
Barkly West	43,778.00	269,891	123 4	Hoopstad	194.00	1,170	120 7
Herbert	6,711.00	33,822	100 10	Kroonstad	153.26	709	92 6
Hay	61.50	360	117 1	Bethulie	9.50	30	--
Prieska	1,003.50	6,913	137 9	Vredefort	46.01	307	--
Hopetown	2,305.30	17,343	150 6	Philippolis	34.75	135	--
Mafeking	699.75	1,674	47 10		5,633.42	21,283	75 7
Vryburg	35.75	196	--				

To December 31, 1933 South Africa has had a total recorded production (in addition to stolen and smuggled stones) of diamonds valued at some £310,200,000, or well over one-fourth of its gold production and almost one-fifth of its total mineral output. During the

14 years, 1920–33, South Africa has produced 33,581,481 carats and sold 29,951,531, an excess production of 3,629,950 carats. The lack of balance between production and sales, which was first apparent in 1927, was due to the exploitation of the Lichtenburg and Namaqualand alluvial fields. Exports in 1932 were £1,955,523 and in 1933 about £2,075,000.

Due to better average prices 1933 was a less distressing year among the alluvial miners than 1932, and by midsummer higher prices increased somewhat the number of diggers. The Government has assured the industry that few new alluvial areas will be thrown open to mining until the depression is over, a policy generally followed in 1933. On April 28, 1933 claims, rendered void, on the Grasfontein diggings, Lichtenburg district, became relocatable to qualified citizens. On June 17 the farms Nooitgedacht and Winkelhoek in the Zwartruggens district, Transvaal, were proclaimed alluvial diggings. In addition to the owners' and discoverers' rights, 1,212 claims were to be allotted by ballot on July 14 to 606 diggers qualified by residence in the Lichtenburg, Klerksdorp, and Rustenburg districts. Late in 1933 a syndicate composed of Standerton people found diamonds on the farm Vaalbank on the Vaal River, east of Vereeniging.

On January 17, 1934 general interest was aroused by the finding of the Jonker Diamond at Elandsfontein near the Premier mine, the surprise being the greater as the field was considered a low-grade one. This egg-shapped stone, said to be flawless and of fine color, weighs 726 carats and is the fourth largest diamond ever found. It was sold to Sir Ernest Oppenheimer, representing the Diamond Corporation, for £63,000 or about $434 a carat, an extremely high price for rough stones, particularly as the loss in cutting will be high. That such a reward came to an old digger down on his luck is one of the romances of diamond mining. The state benefitted to the extent of £27,600 by the sale. A 287-carat stone had been found on the same diggings a few days before by another digger named Pohl. Naturally, a rush to the field followed, but most were disappointed as claims have been allotted only to those with residential qualifications.

To indicate how recent large-scale diamond mining is it may be recalled that Erasmus Stephanus Jacobs, who as a small boy in 1867 found the first South African diamond, died at Beaconsfield, South Africa, in May 1933.

During 1933 the South African Government Namaqualand mines were operated on a reduced scale; emphasis was centered on better recovery and prevention of theft and on development to areas covered by deep overburden. Recent Namaqualand production has been as follows:

Year	Carats	Value	Value per carat
			£ s. d
1929	265,844	£1,748,465	6 11 6½
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

De Beers Consolidated Mines, by far the most important unit of diamond production, Premier, New Jagersfontein, and the other underground ("pipe") mines of South Africa were shut down during the year, but most of them bettered their financial position through sales of stones on hand. New Vaal River, a producer of fine river stones, declared the first dividend in 1933 that has been paid since 1928. Nooitgedacht Diamonds, one of the newer alluvial mining companies, paid a maiden dividend. Cape Coast Exploration, while its Namaqualand property is temporarily down, made a reasonable profit in 1933 and paid an initial dividend on January 26, 1934.

Belgian Congo-Angola.—The Central Africa diamond field (Belgian Congo and Angola) began to show the effects of the curtailment program begun in the fall of 1932 and had a smaller production than in 1932, but for the third year in succession it was the largest diamond producer of the world, although the value of its production was surpassed by that of South Africa. In 1932 this field's total production passed the all-time production of India and in 1933 that of Brazil.

By the introduction of machinery the mines are reducing costs and the labor force necessary for operation. Giants sluice off the overburden at a number of mines. Late in 1933 the Belgian Congo export tax was reported to have been increased from 3 to 6 percent. All six operating companies are dividend payers and have a long life before them.

The Forminière (Société Internationale Forestière et Minière du Congo) is the original company; besides important diamond production, it has interests in Congo tin, gold mining, plantation, trading, and ranching enterprises. Since its foundation the company has paid the colony over 193,000,000 francs, and the stockholders have received about 82,500,000 francs. In addition, the company has spent over 47,000,000 francs in road building and in a sanitary campaign. Dividends paid stockholders have more than doubled their original investment. Diamond production for the past 5 years has been approximately as follows: 1929, 324,000 carats; 1930, 328,000 carats; 1931, 429,000 carats; 1932, 490,000 carats; and 1933, estimated 402,600 carats. In 1933 an average of 16 mines was operated compared to 23 in 1932.

Beceka (Société Minière du Beceka) produces industrial diamonds mainly, less than 10 percent of its production being suitable for cutting. Its production in 1929 was 1,400,000 carats, in 1930 about 1,969,500 carats, in 1931 about 2,885,095 carats, in 1932 about 3,188,000 carats, and in 1933 1,413,500 carats (estimated).

Kasai-Luebo-Lueta companies (Société Minière du Kasai, Société Minière du Luebo, Société Minière du Lueta) exploit their concession as a unit through the Forminière, an interesting example of profitable unit operation of three properties which if operated separately would be doubtfully profitable.

In the gold placers of northeastern and eastern Congo a few rather fine diamonds are recovered as a byproduct. To the west of the Kasai field the Sobemco (Société de Recherches Minières au Congo) late last year found diamonds in the upper drainage of the Wamba River.

In Portuguese West Africa the Forminière groups and English (the Oppenheimer group), French, and Portuguese financiers own

Diamang (Companhia de Diamantes de Angola). Operating results in recent years were as follows:

Results of diamond operations in Portuguese West Africa, 1927–32

Year	Cubic meters treated	Carats produced	Carats per cubic meter	Net profit	Dividend per £ share
					S.
1927	203,492	201,511	0.99	£108,433	1
1928	231,980	237,511	1.02	109,110	1
1929	264,323	311,933	1.18	122,032	1
1930	341,708	329,823	.97	109,480	1
1931	397,526	351,495	.89	105,949	1
1932	407,945	367,334	.90	107,908	1

The 1933 production is estimated at about 373,600 carats, notwithstanding curtailment begun about October 1, 1932. In 1933, 100 whites and 5,011 blacks were employed. From the formation of the company in 1917 to December 31, 1933 the production has been 3,031,250 carats. The Diamang field is in the northeast corner of the colony. Diamonds also occur, although not in commercial quantities, in the extreme southwest corner, the south-central part and the eastern part of the colony.

Gold Coast.—The Gold Coast diamond deposits, discovered in February 1919, are said to be known 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. The total exports from 1919 to 1933 have been 5,001,460 carats valued at £3,956,594. The estimated gross production in 1933 was about 1,100,000 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 members in the latter being considered the source. Costs of the principal producers per carat 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., and the Akim Ashanti Mining Co. Markwa, Ltd., owns five mining leases in the Birrim Valley.

The predominant 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 has valuable diamond deposits in Sierra Leone. The latter produce relatively large stones, so that the company 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 give out production figures but, in addition to storing some "rubbish" in Africa, it exports about 630,000 carats. The year 1933 is reported to have been satisfactory and the company is increasing its dividend.

The West African Diamond Syndicate in 1933 produced about 220,000 carats, a slight decrease compared to the 228,000 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 particularly hard hit by the world depression, as it depended largely for its revenue upon copper and diamond mining, the latter usually accounting for 45 to over 60 percent of the exports. Revenue from copper and diamonds, which was £240,000 in 1926, fell to £10,348 in 1932–33. Production of diamonds in recent years is given in the following table:

Production and sales of diamonds in South-West Africa, 1926–32

Year	Production			Sales		
	Carats	Value	Stones per carat	Carats	Value	Value per carat
						S. d.
1926	683,801	----------	6.7	726,808	£2,050,688	56 5
1927	723,877	----------	5.9	577,341	1,620,862	56 2
1928	503,142	----------	6.3	564,383	1,389,864	49 3
1929	597,187	----------	5.3	533,101	1,617,698	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

The principal producer, Consolidated Diamond Mines of South-West Africa, shut down its mine in 1932, although in 1932 and 1933 it continued successful development work north of the Orange River. When times again become better it will be one of the first companies participating in the Diamond Corporation to recover, as the company has large reserves of a well-varied assortment of diamonds which can be mined cheaply.

Miscellaneous producers.—Due to low diamond prices many persons have turned to gold mining; in consequence, British Guiana's diamond production was small in 1933. The colony has built a road into the Potaro River field and is to build a branch therefrom to the Mazaruni field. State aid is being given to some of the gold and diamond miners.

"Gemstones" (Imperial Institute, London, 1933) gives the following estimates of Brazil's diamond production:

Year	Gem (carats)	Low grade and bort (carats)	Carbonado (carats)	Year	Gem (carats)	Low grade and bort (carats)	Carbonado (carats)
1928	65,000	100,000	25,000	1931	30,000	50,000	10,000
1929	50,000	75,000	19,000	1932	15,000	19,000	3,000
1930	45,000	70,000	17,500				

Matto Grosso and Goyaz were the principal producers, followed by Bahia, Minas Geraes, and Parana. The 1933 production probably did not exceed that in 1932. In September 1933 it was rumored that stones of extraordinary size, said to be diamonds, had been found recently near the headwaters of the Saobento River, Minas Geraes.

One was said to weigh 2,700 carats and another 400 carats, and five other large stones were reported.

Diamonds were first found in Sierra Leone by members of the Colonial Geological Survey in 1930. They occur in the gravel of Kenja River and in the Kono district near the French Guinea border. Prospecting was begun in 1931 by the Consolidated African Selection Trust, the principal producer on the Gold Coast. Late in 1932 the company applied for a mining lease on 252 acres, and in 1933 the colonial government announced that an agreement providing for exploitation of the diamond deposits and marketing of the product was to be signed with the company. The colony is to participate in the profits of this monopoly. Consolidated will form a separate company to work the Sierra Leone deposits. The first stones, which are of excellent quality and good size, were exported in October 1932. Exports in 1932 amounted to 749 carats valued at £1,565 or £2 1s. 10d. per carat. The 1933 production was 32,017 carats worth some £82,000 or about 53s. per carat. The production for the first 9 months came from Shongbo, but in September a second deposit was opened up. An average of about 125 men was employed in prospecting.

The 1933 production of Tanganyika Territory, a declining producer, was about 1,250 carats valued at about £2,730. The principal production has come from the Mabuki gravel deposit. Kimberlite occurs near Mabuki and in the Shinyanga district some 60 miles to the south, and of the 20 known occurrences some are slightly diamondiferous. The colony's total production has been about 100,000 carats, the largest stone weighing 92.5 carats. The principal producer has been the Tanganyika Diamonds, Ltd., which more recently has turned to gold mining.

The first diamond in French Equatorial Africa was found in 1915 near Ippy in the Oubangui-Chari region, but the discovery was unimportant. In 1928, however, a geologist of the Compagnie Equatoriale de Mines found somewhat more important deposits north of Bria.[1] Other reports suggest that the deposits owned by the Equatoriale or its subsidiaries are of small yardage and not of high content. In 1930 washing tests were begun, and in 1931 diamonds were recovered in prospecting. Production has been as follows: 1930, 34 carats; 1931, 1,260 carats; and 1932, 1,644 carats. French official sources report that due to low prices the mines were shut down in 1932. The stones are of good quality, averaging about one-fifth carat each. The stones now found in the stream gravels were components of a conglomerate lens in sandstone, resembling the Congo Lubilash formation. The original source of the diamond is unknown, but Dr. Polinard considers its derivation from a basic igneous rock improbable. The geologic, although not the commercial, similarity to the Kasai (Belgian Congo) deposits is striking. Other stones are reported to have been found in French Equatorial Africa about 120 miles farther north.

Diamonds have been reported to exist on the Ivory Coast. A small stone or stones have been found in the Kakamega gold field, Kenya.

India, once the premier diamond producer of the world, now has a production of only about 675 carats a year. In 1931 it produced 639 carats, worth £2,569 (80s. 5d. per carat), and in 1932, 1,254 carats. For some time the Penna State, central India, has been the principal

[1] Middleton, J. L., Diamonds in Equatorial Africa: Eng. and Min. Jour., May 1932, p. 285.

producer. India now imports a considerable quantity of diamonds, recent imports being as follows:

1928	£654, 259
1929	654, 413
1930	377, 936
1931	304, 529
1932	428, 855

Borneo, once an important diamond producer, still furnishes a few stones, and its cutting industry imports a fair quantity of rough stone from South Africa. During the past 10 years its production has averaged about 460 carats. The 1931 production was 294 carats worth £1,663 (113 s. per carat) and that of 1932, 274 carats.

New South Wales in 1930 produced 677 carats (worth £714); in 1931, 725 carats (worth £694); and in 1932, 251 carats (worth £252). The price, about 20 shillings per carat, does not indicate very fine stones.

Rhodesia had produced from the year of discovery, 1903, to December 31, 1933, some 15,781 carats, worth £75,253. In 1932 and 1933 there was no production, and the only commercial deposit, Samabula Forest, appears to be about exhausted.

Production from near Murfreesboro, Ark., United States of America, was about 300 carats of diamonds and bort in 1932. The mines were not operating in 1933.

Venezuela presumably produced a few hundred carats of diamonds in 1933 from the region contiguous to British Guiana.

Industrial diamonds.—The demand for diamonds for industrial purposes is a good barometer of business activity, and the increased sales in 1933, first noted in Germany and later in America and England, indicate world revival of business. There is a scarcity of industrial stones, as the South African pipe mines are shut down and Brazilian carbonado production was only one-third of normal. Demand became good in March and continued rather strong throughout the year, with shortages in better grades.

Imports of industrial diamonds into the United States during the past 8 years are given in the following table. The price per carat has fallen from 1929 to date due to the larger imports of very small and hence low-priced, off-color gem stones for diamond drilling.

Industrial diamonds imported into the United States, 1926–33 [1]

Year	Carats	Value	Value per carat	Year	Carats	Value	Value per carat
1926	41, 475	$1, 939, 735	$46. 77	1930	145, 958	$2, 756, 630	$18. 89
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

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

Several makers of oil-burning furnaces find the best possible atomizer is a diamond with a hole bored in it. Ordinary nozzles have a short life, but even without resetting a diamond nozzle will last 5 years. In laboratory tests under high temperature, oil charged with carborundum and containing 1 percent sulphuric acid was forced under pressure through the orifice in the diamond. Such a test, together with the fact that diamond tools are used in truing carborundum wheels, shows

the great difference in hardness of the two substances. The diamonds used are off-color gem stones, and holes in them are generally from 0.013 to 0.0025 inch in diameter. As several important makers of oil burners have standardized on such nozzles and as about 1 family in 30 in the United States has an oil burner, the quantity of industrial diamonds likely to be consumed in this new use may be large.

For a number of years attempts have been made to introduce diamonds more generally in the superabrasive field. A great deal of experimental work has been done in an effort to shape diamond dust or grains held together by a suitable binder into grinders, lapping wheels, tools, etc. Until recently, attempts to find a suitable binder have been unsuccessful, but at present Swiss and German manufacturers are marketing such products, which are reported to be giving satisfactory service.

The use of diamonds in the automobile industry is expanding, as it is in many scientific processes, such as testing heat-hardened metal parts, testing smoothness of metallic automobile parts, and preparing microscopic slides.

The demand for black diamonds (carbonado) was much less in 1933 than a couple of years ago owing to the use of small gem stones in diamond drilling. The price of carbonado has decreased markedly in the same period; 2-carat stones selling for $175 per carat in 1929 now are worth about $75 to $90. Carbonado, which once brought $65 a carat in the Bahia fields, late in 1931 brought $30 a carat and in 1933, $12 to $20 a carat. Brazilian production and exportation has decreased greatly, and small shipments only reach the Amsterdam market. As carbonado has a definite place in truing wheels and other industrial uses, there is always a certain demand, and available stocks are small.

AMBER

Sales of amber increased greatly in 1933 and as stocks were reduced the German amber-mining industry expanded markedly early in 1934. At Palmmicken, East Prussia, the principal center, 375 men are employed, and they are working 40 rather than 20 hours a week.

The South Manchurian Railway engineers estimate that the coal deposits of Fushun contain about 435,000 tons of amber. At present about 4 tons a day are being produced. The amber is used almost exclusively in making lacquer and suffices for about one-half of Japan's requirements.

AMETHYST

Early in 1933 a Mexican company began to exploit amethyst deposits northwest of Taxco, Guerrero. Some of the material is reported to be fine and is in demand among local jewelers.

EMERALD

Colombia for centuries has been the source of the world's finest emeralds. In 1933 the Muzo mine, which has been shut down for some years, was reopened with a production worth about $25,000. This was done under the direction of P. W. Rainier, Government mining engineer, who also sampled the debris from former mining with favorable results. An American group markets the production

of the Government mines by contract on a commission basis. The Colombian Emerald Co. produced from its Chivor mine about 4,000 carats in 1933.

SAPPHIRE

A number of miners worked the Anakie (Queensland) sapphire fields in 1933, the most active center being Iguana Flat. The production approximated £4,000. First blues in the rough sold for £7 per ounce and second blues for 7 shillings per ounce. Most of the product was exported to France and Switzerland. Among the more notable finds were a blue sapphire of 498 carats and a zircon of 259 carats.

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