

THE MINERAL INDUSTRY

ITS

STATISTICS, TECHNOLOGY AND TRADE

DURING

1906

Property of
CHARLES HEAD & C

New York

NOT to be removed
from our library

FOUNDED BY RICHARD P. ROTHWELL

EDITED BY

WALTER RENTON INGALLS

*Editor of the Engineering and Mining Journal; Member American Institute of Mining Engineers;
Member Institution of Mining and Metallurgy; Member American
Chemical Society; Member Society of
Chemical Industry, Etc.*

VOLUME XV

SUPPLEMENTING VOLUMES I TO XIV

HILL PUBLISHING COMPANY

505 PEARL STREET, NEW YORK
6 BOUVERIE STREET, LONDON, E.C.

The Engineering and Mining Journal—Power—American Machinist

1907

Feb 27, 1924

AG
M665
1906

COPYRIGHT, 1907,
BY THE
HILL PUBLISHING COMPANY

Hill Publishing Company, New York, U. S. A.

PRECIOUS STONES.¹

BY GEORGE FREDERICK KUNZ.

As yet without result, at three distinct places in the United States prospecting for diamonds was carried on in 1906; in Wisconsin, in what apparently is glacial drift; in Kentucky, in the peridotite of Elliott county; and in California at Oroville. In Montana sapphires were extensively mined by three companies, very actively by one, partially so by another, while some development was done by another in Fergus and Granite counties. Sapphires have been found also in Idaho, and a number of stones, but none of fine color, have been locally cut as souvenirs. In North Carolina ruby was mined for at the Cowee Valley locality, and corundum was found in place, the rock being a decomposed pegmatite, although it differs somewhat from the redder ruby found in the regular alluvial soil. No emeralds were obtained during 1906.

Beryl and aquamarine were only slightly mined for in North Carolina, nearly all the material sold being from older workings, and the small development of a few local prospectors. A few fine beryls were found near New Milford, Conn., some of them yielding exceptionally fine material that cut into gems over 25 karats each. Of unusual interest were the large beautiful crystals of rose beryl found in San Diego county, Cal.; some of these crystals were 3 or 4 in. across, and one magnificent mass of pegmatite, on which were implanted several large crystals, has found its way into the Morgan Collection of the American Museum of Natural History at New York. A few of them have been cut into rose-colored gems, which are interesting, but not of great value.

Never have so many and so varied tourmalines been found as in 1906, at the several mines in the vicinity of Mesa Grande, Cal., as well as at the localities further south, near Pala. The former locality yielded some crystals weighing 4 to 6 lb. each, that gave little suggestion of being of gem value, but they were magnificent as mineralogical specimens, a number of them being doubly terminated. Fortunately the finest of these have gone to two of our best museums. Transparent portions in the interior of some of these crystals have furnished several

¹Copyrighted, 1907, by George Frederick Kunz.

thousand karats of rich red gems. Similar material was also found at other localities in the State; and probably never have more tourmalines been produced and disposed of than during 1906. Some beautiful interesting green crystals have been found, as well as a great variety of material that has been cut into cabochon stones, irregular beads, and other East Indian-like objects.

A new locality has been discovered for colored tourmaline, near East Haddam, Conn, and a number of interesting crystals and a few gems have been obtained. In Maine, also, near Paris, Auburn, Mount Black, and several other localities, tourmaline has been discovered.

Topaz, in some cases beautiful wine-colored crystals, has been obtained near Topaz, Utah; and also near Ramona, Cal. At the latter locality a single crystal weighing more than 1 lb. was remarkable as a specimen; and some small gems were obtained from the blue, green and white material found there.

Kunzite was worked at three or four mines in California, and some very interesting crystals were obtained, although the amount taken out may probably not exceed \$10,000 for the year. Of special interest is the finding of this mineral near Andover, Maine, although transparent only in spots. A remarkable fact is that not only is the lilac-colored variety obtained here, but the mineral is also found of a bluish-green color, like that of dilute sulphate of copper. Upon exposure to the heat I found that this variety lost its green tint and became pink. This same bluish aspect has been noted as a dichroitic property of the California material.

Of the 10 or more companies interested in mining turquoise, only three did much work during 1906, and the output did not exceed more than one-fourth that of 1905. An interesting feature was the finding of turquoise in one of the mines in even layers of veins in the rock. This onyx-like structure has been taken advantage of by the lapidaries, and some beautiful cameos have been made, one of which is nearly 3 in. across, showing a blue turquoise vein on a fawn-colored rock. The contrast of a sky-blue on a brown ground is so striking as almost to raise a doubt of their genuineness, of which, however, there is none whatever.

Fully 10 tons of rose quartz from the Black Hills, selling for about 10c. per lb., were cut up into beads, spheres, pear-shaped ornaments, and the like, for pendants and other uses. Moss agate from two localities in Utah also was worked. Amazon stone from Virginia and several other localities was cut into beads in great profusion during 1906, the green gems of all kinds being in favor. Great quantities of chlorastrolite from Isle Royale were obtained, varying in size from a small pea to more than 1 in. across. This beautiful green stellate material finds a ready sale, especially in the cities bordering on Lake Superior.

The year 1906 has never been equalled by any previous year, in the United States, in the importation of diamonds, pearls, rubies, emeralds and sapphires. The last is the only gem which has not been honored with special favor previously, but in 1906 this least of the precious stones has been appreciating in value as had the others already. A great demand existed not only for the regular precious stones, but also for aquamarine, topaz, peridot, and all varieties of the semi-precious stones, and especially for the rich green jadeite from near Bahomo in Burma. It is called Chinese jade by the celestials; in fact, they almost believe that it is of Chinese origin, because nearly all of the material passes through China and is generally there worked into all manner of ornaments. When of almost emerald green color this mineral sometimes brings very high prices, as much as \$10 to \$20 per karat being paid for exceptionally choice bits, and a long string of beads has been sold for more than one thousand dollars. Much of this material cut in China is now mounted in fine gold in the United States by Chinese workmen in absolutely correct Chinese designs. Great quantities of the New Zealand jade have been imported and cut into every variety of ornament. The demand for green stones also brought into general use the green aventurine, a rich pale or leek-green variety of quartz, scattered through which are particles of brilliant mica. This Indian material is unusually beautiful, and, like the New Zealand jade, is not expensive.

Malachite and a mixture of malachite and azurite from Arizona have been cut into a variety of forms, the latter being a pleasing mixture of spots of blue and green. Large quantities of artificially nickel-stained chalcedony have been sold under the name of chrysoprase. This is of a bluish green color and not of the rich golden green of the true chrysoprase which was mined to a considerable extent in California in 1906.

With the high price of emeralds in recent years, it has surprised many that stones of wonderful brilliancy and purity of color, with an almost entire absence of flaws, finer than they had ever seen before, were offered for sale. These emeralds were brought to the gem marts by the high price, the finest stones, belonging to many of the older families of Europe, being offered. Frequently a stone nearly 1 in. in diameter was sacrificed to be cut smaller for a pure spot that did not represent one-fifth or one-tenth of the original weight of the material, but from the fact that it was so much purer it was still advantageous to sacrifice the weight for the greater beauty.

During 1906 the price of diamonds was advanced by the syndicate 7 per cent. on the rough material, and three successive strikes led to advances being given to the diamond cutters equivalent to 7 per cent. more, but notwithstanding this, the output of cut material did not exceed the demand.

PRECIOUS STONES IN FOREIGN COUNTRIES.

BY REGINALD MEEKS.

Aquamarine.

Brazil.—Crystals of aquamarine having exceptional luster are found at Alegre, Bahia, Brazil. These deposits have superseded those of Porteirias and Boqueras, which were formerly centers of production. Two large stones have been found in Brazil. In 1814 an aquamarine was sold which weighed 15 lb., and in 1904 another, of equal weight was sold for \$4368.

Diamonds.

Australia.—Diamonds have been won at Vingara and in the neighborhood of Cope's creek, Inverell district, N.S.W. Until recently only small stones were obtained, the largest of which there is any authentic record weighing only 6.25 karats. The discovery is reported of a fine diamond weighing $28\frac{1}{8}$ karats, at Mount Werong, in March, 1905.¹

Brazil.—Up to 35 years ago Brazil furnished 90 per cent. of the diamonds of the world, but since the discoveries in South Africa the output has dwindled, until 10 years ago there were exported only about 3000 karats. It is reported that in 1905 the industry had begun to recover and 100,000 karats were exported. The estimated production of Brazilian diamonds up to date is over 12,000,000 karats, distributed as follows: From Diamantina, 5,000,500 karats; other mines in Minas Geraes, 15,000,000; Bahia (La Chapada), 2,500,000; stealings, etc., estimated, 2,500,000 karats.

Diamond deposits were recently discovered at Douradinho, district of Coromandel, Estrella do Sul, in the bed of the river. The diamonds are of fine quality and perfectly limpid. Good prices have been realized. The famous Estrella do Sul was found in this locality two centuries ago, which gave its name to the place. A French company recently explored the Boa-Vista mines, near Diamantina, and at present an English company operates the Agua-Suja mines, Bagagem, but operations are still in the installation stage. Lately several diamond-dredging claims of Brazil, on the river Jequitinhonha, the diamantiferous river, have been examined by American companies. On the river Coxipo, in Matto Grosso, many diamonds have been gathered with the gold, and with appropriate plant diamond dredging may offer very satisfactory results when competently directed.

Carbonado.

Carbonado, or black diamond, is obtained in the province of Bahia, Brazil, in La Chapada and Lavras districts, where it is mined from stream beds and other alluvion. The miners sell their finds to agents of exporting

¹From report by E. F. Pitman, Department of Mines, N. S. W.

firms in the city of Bahia. Previous to 1870, carbonado was practically valueless. From 1870 to 1872 it was employed as an abrasive for cutting and polishing the white gems, and thousands of karats were sold at 50c. per karat, to be crushed into powder for this purpose. A few years later, when carbonado was employed in diamond drilling, it sold at \$2 to \$4 per karat, and then rose gradually to \$10 per karat, at which price it remained until 1895, after which it advanced by leaps and bounds to \$50 per karat. The price fell back to \$25 per karat, but rose again to \$85 per karat, at which figure it now stands. The situation is due to the decline in the supply of carbonado during the last ten years, while the demand has increased. The carbon settings for a drill-bit are expensive. Bits as large as 1 ft. in diameter, set with \$5000 to \$8000 worth of carbon, are frequently employed in Europe.

*India.*¹—Diamonds are found at Panna, central India, in conglomerate resting directly on the upper surface of the Kaimur sandstone, at the base of the Rewa shales. Diamond mining in India is conducted in the crudest manner and is profitable only on account of the exceedingly cheap labor. By systematizing mining and introducing modern methods it is believed that the industry can be made profitable.

South Africa.—South Africa continues to be the world's main source of supply and the chief producers are, as heretofore, the De Beers Consolidated Mines Company and the Premier Diamond Mining Company. The combined output of these two companies was valued at over \$33,500,000 in 1906. The 18th annual report of the De Beers Consolidated Mines, Ltd., deals with the company's operations during the year ending June 30, 1906. In that period, £5,607,718 worth of diamonds was produced, while the expenditure amounted to £3,504,182; the net profit being £2,103,536 or £154,437 more than in 1905. Dividends amounting to £1,800,000 were disbursed, and a sum of £916,057 was carried forward. On Jan. 30, 1906, the contract with the diamond trust expired, but was immediately renewed for a period of five years.

PRODUCTION OF DE BEERS MINES.

Mine.	Output of blue ground for year.	Yield per load.	Value per karat.	Value per load.	Cost per Load.		
					Mining. (b)	Washing.	Total.
De Beers.....	<i>Loads. (a)</i> 2,253,988	<i>Karat.</i> 0.410	\$14.64	\$5.95	} \$1.13 1.72 0.63 0.79 0.99	\$0.58 0.73 0.35 0.52 0.72	\$1.71 2.45 0.98 1.31 1.71
Kimberley.....	2,433,905						
Wessleton.....	1,771,372	0.282	10.51	2.97			
Bultfontein.....	1,771,372	0.363	10.31	3.74			
Dutoitspan.....	1,685,714	0.245	1,943	4.77			
Average.....	8,144,979	0.325	\$13.72	\$4.36	\$1.05	\$0.58	\$1.63

(a) The "load" occupies 16 cu. ft. and weighs about 1600 lb. (b) Including cost of handling waste rock.

¹From report of E. Vredenberg. Geological Survey of India, Vol. XXXIII.

The blue grounds and lumps on the floors at the close of the year amounted to 6,769,126 loads, an increase of 2,519,387 loads over the stock similarly accounted for at the close of the previous fiscal year. The total quantity of blue rock crushed and washed during the year was 5,625,592 loads, an increase of 497,577 loads. Diamonds to the value of \$27,287,155 were obtained from the year's washing.

The total area of the De Beers Consolidated Mines, Ltd., is 4692 claims, made up as follows: De Beers, 622; Kimberley, 470; Wesselton, 1162; Bultfontein, 1753; and Dutoitspan, 1777. It is estimated that there are in sight in the various mines of the company 64,315,580 loads of blue ground as follows: In the De Beers mine, above the 2040-ft. level, 5,156,600 loads; Kimberley, above the 2520-ft. level, 1,367,080; Wesselton, above the 500-ft. level, 10,975,200; Bultfontein, above the 600-ft. level, 7,820,000; Dutoitspan, above the 750-ft. level, 31,900,000. This makes a total of 57,218,880 loads and with the ground on hand 64,315,580 loads. At the present rate of washing it is estimated that there is enough in sight to last 11 years.

The Voorspoed diamond mine was discovered in September, 1905, and a company was formed under the title of Voorspoed Diamond Mining Company, Ltd., with a capital of £400,000. The mine is situated on the Voorspoed farm, 20 miles north of Kroonstad, the nearest railway station being Honingspruit. The mine consists of 1200 claims and is proved to a depth of 500 ft. The workings consist of an open cut, and an inclined haulage track down to the 50-ft. level, the face of the cut forming a curve of, approximately, 300 ft. in length, the intention being to work the levels back to the limits of the pipe before attacking a fresh one. The mine is fairly clean and free from floating waste rock, locally known as "reef." The amount so far has not averaged more than 10 per cent.

A small temporary plant is now working, the intention being to erect one capable of handling between 1,500,000 and 2,000,000 loads per annum. Washing commenced in July, 1906, and the returns for four months showed 6723 karats from 28,523 loads of blue ground, or an average of 23.5 karats per 100 loads. The value is stated to be \$7.20 per karat.

The diamond production of the Transvaal in 1906 was 1,069,391 karats, valued at £1,563,141. During the year ended Oct. 31, 1906, the Premier Diamond Mining Company, near Pretoria, produced 899,697 karats, valued at £1,277,570, an increase of 54,000 karats over the previous fiscal year. Returns for the fiscal year inclusive show a recovery of 0.301 karats per load from 2,988,471 loads washed. The company's annual report states that the revenue derived from the mines for the year ended Oct. 31, 1906, amounted to £404,009. At the same time the ordinary shareholders in the company received £169,340 in dividends. Mining expenses amounted to £286,000, and sorting and washing to £183,000. Development work

cost £42,000, extra equipment, £55,000, and office expenses, marketing expenses, etc., brought the total for the year to £660,000. The water difficulty was surmounted by the recent completion of the pumping station on the Wilge river, and a water supply of 2,000,000 gal. per 24 hours is assured. Additional pumping plant is to be erected before long by means of which this supply will be doubled. New equipment is also under consideration in order to increase the output. It is not probable that this additional expenditure will be embarked on until the famous Cullinan diamond, weighing 3024 $\frac{1}{4}$ karats and valued at more than \$2,000,000, is disposed of. This diamond figures in the assets of the company at a purely nominal sum. When it is disposed of, the proceeds will provide the additional capital required for extending the plant. The company now disposes of its output itself, the original contract with Neumann's having expired.

Reports have recently emanated from South Africa to the effect that the De Beers Company is considering the establishment of a diamond cutting industry which will give employment to 15,000 diamond cutters. A correspondent of the *Diamond Fields Advertiser* points out that such an industry would be impracticable and impossible, and brings out some important facts regarding diamond cutting in Europe and elsewhere. There are about 14,819 men employed in the business, distributed as follows: Amsterdam, 9000; Antwerp, 4000; St. Claude, 700; New York, 400; Paris, 150; Hanau, 150; Idar, 125; Bienne, 100; Geneva, 75; Nemours, 50; Steinbach, 25; London, 24; Lucerne, 20. In Amsterdam and other European cities a rose-cutter (usually an apprentice) receives from \$4@6 per week, while a cleaver, generally an experienced workman, is paid about \$40 per week. The average weekly wage for all classes of work is about \$16. In New York the diamond cutter is able to earn from \$55@60 per week, but few workmen are attracted to this country on account of the higher cost of living.

Emerald.

Austria.—The most important emerald mines of Europe are in Austria, located in the Salzburg mountains, seven miles from Habach station on the narrow-gage railway from Zell-am-See to Humel. Until recently they were being worked in a dilatory manner and in 1902, the last year in which anything like active mining operations were carried on, about 68,000 karats were turned out by six miners in less than four months. These mines were thoroughly examined and more or less prospected in 1905 by Spargo & Sons, of Liverpool, for the Northern Mercantile Corporation, Ltd., of London and Manchester, which on receipt of report purchased them.

Colombia.—Most of the world's emeralds come from Colombia, where the mining is a government monopoly. Although found in various places near Bogota, they are mined only at Muzo, about three days' mule riding

north from the capital. In the past, short leases were made to parties who paid the Government a royalty of 80 per cent. of the stones they found, and even so, the leases were profitable.

The emeralds are found on a mountain side, the gem-bearing strata alternating with barren strata. Under short leases the only way a mine could be worked was by catching the rainfall in little reservoirs on the slope above, and as water was collected, at rare intervals, booming off the picked surface. As perfect emeralds are worth more than diamonds and the demand for the beautiful stones is constant, the Government has decided to modernize mining. A constant and abundant supply of water will be brought from a distance of 15 miles and a monitor installed, with sluices and all the paraphernalia for preventing the loss of any stones.

Jade.

Burma.—This country continues to be the only one producing jadeite, the mines being situated in the Myitkyina district of upper Burma. The output in 1905 amounted to 122 metric tons, valued at \$1,227,370, as against 171 metric tons in 1904. Canton is the chief center of trade in southern China and it is difficult to obtain jade in uncut form except from the Chinese. Jade is a favorite gem in China and is highly prized, especially the light green varieties. There are two distinct varieties included under the name. The first is known as nephrite and is a compact variety of hornblende. When the color is nearly white it is classed with tremolite; when a distinct green it is included under actinolite. The other is known as jadeite and is a silicate of aluminum and sodium.

Onyx.

Mexico.—For the exploitation and development of the large onyx deposits at Jimulco the French-Mexican Onyx Company was formed in Paris, with a capital of 2,550,000 fr. This company will also open up the onyx beds at Sombretillo, Durango. It is said that the company has contracted to sell its entire product at 32c. per cubic foot.

Opal.

New South Wales.—At the White Cliffs opal fields there were found several parcels of high grade opal which realized more than \$100 per oz. One specimen weighed 30 oz. and was won at a depth of 39 ft. from the surface. It is stated that the miners have organized a selling combination with headquarters in the United States and Europe to regulate the price.

Ruby.

Burma.—No new ruby-bearing locality was discovered in Burma in 1905.¹ The value of the Burmese stones that year was \$140,000 or prac-

¹*Indian Engineering*, Jan. 5, 1907.

tically the same as in 1904. Plague caused dulness in the Mandalay ruby market.

The Burma Ruby Mines, Ltd., made a comparatively small profit during 1905, distributing only £7475 in dividends, or at the rate of 5 per cent. During the year, 1,773,129 loads of earth were treated, at a cost of 17c. per load, as compared with 1,907,624 loads at 14c. per load during the previous year. The decrease in the quantity and the increase in the cost are accounted for by the fact that the Choungzone is nearly worked out. In the course of a few months it will be exhausted, and the company will then start operations on the adjoining Myntada mine, which is now being developed. The income of the company was £87,000 from sale of stones, and £12,595 from royalties received from native miners, the latter being one-half of that received two years ago. The great work in connection with the valley drainage tunnel is about half completed, and should be finished in 1908.