

## ABRASIVE MATERIALS.

By E. W. PARKER.

### BUHRSTONES.

Buhrstones, or millstones, are made from a quartz conglomerate rock occurring along the eastern slope of the Allegheny mountains in New York, Pennsylvania, Virginia, and North Carolina. A similar rock is also found near Fair Haven, Vermont. It is known locally by various names. In Ulster county, New York, it is called Esopus stone; in Lancaster county, Pennsylvania, it is known as cocalico stone; in Montgomery county, Virginia, it is quarried as Brush mountain stone, and in Moore county, North Carolina, it goes by the name of North Carolina grit. During 1893 no millstones were made in North Carolina or Vermont. In fact production ceased in the former State about five years ago, and as the industry has shown a declining tendency elsewhere it has not been resumed there. In 1892 a small number of millstones were made in Vermont from stone quarried locally. No product was reported from that State in previous years, and there was no production there in 1893. The total product of the United States in 1893 was valued at \$16,639, a decrease, as compared with 1892, of \$6,778, and was less than at any time since 1880, with the exception of 1891, when the output was valued at \$16,587—\$52 less than in 1893.

The introduction of emery rock millstones will probably cause a still further decline in those made from quartz conglomerate.

The following table shows the value of buhrstones produced in the United States since 1880:

*Value of buhrstones produced in the United States since 1880.*

Years.	Value.	Years.	Value.
1880 .....	\$200,000	1887 .....	\$100,000
1881 .....	150,000	1888 .....	81,000
1882 .....	200,000	1889 .....	35,155
1883 .....	150,000	1890 .....	29,720
1884 .....	150,000	1891 .....	16,587
1885 .....	100,000	1892 .....	23,417
1886 .....	140,000	1893 .....	16,639

*Imports.*—The decline in the buhrstone industry has not been confined to stones of domestic production, as the following table of imports will show. These show an almost steady decline from \$125,072 in 1880 to \$24,007 in 1887. There was then a moderate increase in 1888 and 1889, but the business again decreased in 1890 and 1891, reaching in the latter year within \$32 of the low-water mark of 1887. As in the case of domestic production the imports showed an increase in 1892:

*Value of buhrstones and millstones imported into the United States from 1868 to 1893.*

Years ended—	Rough.	Made into millstones.	Total.	Years ended—	Rough.	Made into millstones.	Total.
June 30, 1868..	\$74,224	.....	\$74,224	June 30, 1881..	\$100,417	\$3,495	\$103,912
1869..	57,942	\$2,419	60,361	1882..	103,287	747	104,034
1870..	58,601	2,297	60,898	1883..	73,413	272	73,685
1871..	35,406	3,698	39,104	1884..	45,837	263	46,100
1872..	69,662	5,967	75,629	1885..	35,022	455	35,477
1873..	60,463	8,115	68,578	Dec. 31, 1886..	29,273	662	29,935
1874..	36,540	43,170	79,710	1887..	23,816	191	24,007
1875..	48,068	66,991	115,059	1888..	36,523	705	37,228
1876..	37,759	46,328	84,087	1889..	40,432	452	40,884
1877..	60,857	23,068	83,925	1890..	32,892	1,103	33,995
1878..	87,679	1,928	89,607	1891..	23,997	42	24,039
1879..	101,484	5,088	106,572	1892..	33,657	529	34,186
1880..	120,441	4,631	125,072	1893..	29,532	729	30,261

GRINDSTONES.

In 1893 the total value of grindstones produced in the United States was \$338,787, against \$272,244 the preceding year. The figures for 1893 include a small amount of whetstones made from sandstone in Ohio. The entire value is included in that of the sandstone product of Ohio and Michigan. During 1892 prices for this class of goods were very much demoralized, and while production itself decreased the value fell off much more, showing a total loss of over \$200,000 as compared with 1891.

The annual production since 1880 has been as follows:

*Value of grindstones produced in the United States, 1880 to 1893.*

Years.	Value.	Years.	Value.
1880 .....	\$500,000	1887 .....	\$224,400
1881 .....	500,000	1888 .....	281,800
1882 .....	700,000	1889 .....	439,587
1883 .....	600,000	1890 .....	450,000
1884 .....	570,000	1891 .....	476,113
1885 .....	500,000	1892 .....	272,244
1886 .....	250,000	1893 .....	338,787



*Grindstones imported and entered for consumption in the United States, 1868 to 1893, inclusive.*

Years ended—	Finished.		Unfinished or rough.		Total value.
	Quantity.	Value.	Quantity.	Value.	
	<i>Long tons.</i>		<i>Long tons.</i>		
June 30, 1868 .....		\$25,640		\$35,215	\$60,855
1869 .....		15,878		99,715	115,593
1870 .....		29,161		96,444	125,605
1871 .....	385	43,781	3,957.15	60,935	104,716
1872 .....	1,202	13,453	10,774.80	100,494	113,947
1873 .....	1,437	17,033	8,376.84	94,900	111,933
1874 .....	1,443	18,485	7,721.44	87,525	106,010
1875 .....	1,373	17,642	7,656.17	90,172	107,814
1876 .....	1,681	20,262	6,079.34	69,927	90,189
1877 .....	1,245	18,546	4,979.75	58,575	77,121
1878 .....	1,463	21,638	3,669.41	46,441	68,129
1879 .....	1,603	24,904	4,584.16	52,343	77,247
1880 .....	1,573	24,375	4,578.59	51,899	76,274
1881 .....	2,064	30,288	5,044.71	56,840	87,128
1882 .....	1,705	30,286	5,945.61	66,939	97,225
1883 .....	1,755	28,055	6,945.63	77,797	105,852
1884 .....					<sup>a</sup> 86,286
1885 .....					50,579
Dec. 31, 1886 .....					39,149
1887 .....					50,312
1888 .....					51,755
1889 .....					57,720
1890 .....					45,115
1891 .....					21,028
1892 .....					61,052
1893 .....					59,569

<sup>a</sup> Since 1884 classed as finished or unfinished.

#### OILSTONES AND WHETSTONES.

The production of oilstones, whetstones, etc., in 1893, was slightly less than in 1892, being valued at \$135,173, against \$141,050, a decrease of \$5,877. Included in this production are the two grades of novaculite from Arkansas, known as Arkansas and Washita stone; the fine-grained sandstone of Orange county, Indiana, known as Hindostan or Orange county stone; a gray sandstone, known as Lake Superior stone, from Cuyahoga county, Ohio; a similar stone, known as Labrador stone, from Cortland county, New York; chocolate stone from Lisbon, New Hampshire, and scythestones made from Indian Pond and Lamoille sandstones, quarried in Grafton county, New Hampshire, and Orleans county, Vermont, and from Berea, Ohio, "grit."

For several years prior to 1893 the output of finished stones has been practically controlled by the Pike Manufacturing Company, of Pike Station, New Hampshire, but during the past year the contracts with this company and some of the factories working for it were dissolved, and the factories resumed production on their own account. The factory of Mr. Geo. Chase renewed operations during the year, but the output was limited to Lake Superior whetstones, of which about 75,000 pounds, valued at \$9,275, were turned out. In the spring of 1894 Mr. Chase received several carloads of Washita and Arkansas stone, and his factory is at present running to practically full capacity. No stones were finished in Arkansas, the quarries sending the rough stones to the Eastern factories for manufacture. The Deer Lick Oilstone Company, of

Chagrin Falls, Ohio, made and sold whetstones and scythestones, as did Mr. J. A. Chaillaux, of Georgia, Indiana; and Mr. John J. Kirk, of Huron, and Mr. H. E. Welles, of French Lick, in the same State, manufactured whetstones.

The Pike Manufacturing Company has kindly furnished this office with a detailed statement of its product in 1893, which is given below, together with its statement for 1892, for comparison. Mr. E. B. Pike, president of the company, states that during the first six months of 1893 the domestic business increased about 33½ per cent. over that of 1892, but decreased about 60 per cent. during the latter half. A slight increase is noted in the export trade of the company, while the import trade decreased materially.

*Production of whetstones, etc., by the Pike Manufacturing Company in 1892 and 1893.*

Kinds.	1892.		1893.	
	Output.	Value.	Output.	Value.
Washita stone ..... pounds..	400,000	\$60,000	300,000	\$45,000
Arkansas stone ..... do....	20,000	12,000	12,000	12,000
Labrador stone ..... do....	500	50	200	20
Hindustan stone ..... do....	300,000	15,000	250,000	13,000
Sandstone ..... do....	100,000	2,000	100,000	2,000
Chocolate stone ..... do....	20,000	2,000	20,000	2,000
Scythestones ..... gross....	16,000	50,000	13,000	40,000
Total ..... pounds..	856,500	141,050	682,000	114,020
..... gross....	16,000		13,000	

*Estimated exports of whetstones, etc., in 1892 and 1893.*

Kinds.	1892.		1893.	
	Amount.	Value.	Amount.	Value.
Scythestones ..... gross..	8,000	\$20,000	8,000	\$19,000
Washita stone ..... pounds..	150,000	20,000	180,000	21,000
Arkansas stone ..... do....	9,000	12,250	8,000	10,500
Hindustan stone ..... do....	75,000	2,250	100,000	3,500
Sandstone ..... do....			50,000	1,000
Total value.....		54,500		55,000

*Estimated imports of whetstones, etc., in 1892 and 1893.*

Kinds.	1892.		1893.	
	Amount.	Value.	Amount.	Value.
Turkey stone ..... pounds..	1,000	\$200	1,000	\$200
Scotch stones (all kinds) ..... do....	8,000	800	4,000	400
Razor hones ..... dozen..	1,000	2,000	1,000	1,500
English scythestones ..... gross..	50	300	25	150
Norway Ragg scythestones.....		None.		None.
German emery scythestones.....	50,000	1,000	30,000	500
Total value.....		4,300		2,750



The following table shows the total value of all kinds of hones and whetstones imported since 1880:

*Imports of hones and whetstones since 1880.*

Years ended—	Value.	Years ended—	Value.
June 30, 1880 .....	\$14, 185	Dec. 31, 1887 .....	\$24, 093
1881 .....	16, 631	1888 .....	30, 676
1882 .....	27, 882	1889 .....	27, 400
1883 .....	30, 178	1890 .....	37, 454
1884 .....	26, 513	1891 .....	35, 344
1885 .....	21, 434	1892 .....	33, 420
Dec. 31, 1886 .....	21, 141	1893 .....	25, 301

#### EMERY AND CORUNDUM.

The production of these allied abrasives in 1893 was slightly less than in 1892, being 1,713 short tons, against 1,771 short tons, a decrease of 58 tons. The value, however, declined considerably more, or from \$181,300 to \$142,325, a decrease of \$38,975, or over 20 per cent. The production in 1893 was from Rabun county, Georgia; Macon and Jackson counties, North Carolina; West Chester county, New York, and Hampden county, Massachusetts. No corundum was mined in Chester county, Pennsylvania, during the year, the company formerly operating there having assigned. The output of emery and corundum is combined in these reports in order that individual statistics may be held confidential.

The following table shows the annual product of corundum and emery since 1881:

*Annual product of corundum and emery since 1881.*

Years.	Quantity.	Value.	Years.	Quantity.	Value.
	<i>Short tons.</i>			<i>Short tons.</i>	
1881 .....	500	\$80, 000	1888 .....	589	\$91, 620
1882 .....	500	80, 000	1889 .....	2, 245	105, 567
1883 .....	550	100, 000	1890 .....	1, 970	89, 395
1884 .....	600	108, 000	1891 .....	2, 247	90, 230
1885 .....	600	108, 000	1892 .....	1, 771	181, 300
1886 .....	645	116, 190	1893 .....	1, 713	142, 325
1887 .....	600	108, 000			

#### THE OCCURRENCE OF CORUNDUM AND EMERY IN NORTH CAROLINA.

The corundum is found in "pockets" and veins usually 4 to 12 feet wide, chiefly in gneiss, talc, chlorite, and mica-schists, in massive anthophyllite, and in olivine or serpentized rocks. Its occurrence at Corundum hill and Laurel creek has been ably described by Dr. T. M. Chatard in Mineral Resources for 1883 and 1884. North Carolina corundum is white, gray, pink, red, blue, green, brown, and brownish black in color, of various shades of depth, often banded. It sometimes possesses a chatoyant luster but is rarely sufficiently transparent for use as a fine gem.



Crystals have been found weighing as much as 375 pounds. The alteration products of corundum present a very interesting study. Frequently we find corundum wrapped in a layer of various minerals containing alumina and magnesia, and again we find these minerals surrounded by a layer of corundum. The above facts have led to an assumption, which may not always be well founded, that the corundum in these cases has undergone an internal, zonal, or external alteration. The minerals found thus associated are as follows: Margarite, prochlorite, ripidolite, vermiculite, damourite, lepidomelane, pleonaste, hercynite, diaspore, cyanite, zoisite, fibrolite, tourmaline, actinolite, smaragdite, albite, steatite, and kaolin. Within the last six months emery has been discovered on Skeena creek, 5 miles from Franklin, Macon county, North Carolina. This discovery has greatly stimulated prospecting in this region. The Fairview and Smoky mines are the best developed prospects. In both the ore is found to be more or less "pockety." It consists at the surface chiefly of hard emery rock, which continues 8 or 10 feet down and then pinches out or "runs into a flint seam," which may, however, lead to another vein-like pocket. The walls are decomposed chloritic, hornblendic, and talc schist or "soapstone." In the emery veins are found masses of red clay carrying manganese-stained sand-corundum, into which the hard emery rock seems to merge in shallow depth. An indication of the proximity of the emery or corundum veins is float rock from them, often near granite with coarse plated mica, and decomposed schistose rocks, carrying much magnetite. The emery seems to consist of a mixture of rather fine grained to medium coarse corundum and magnetite, often associated with chlorite, hematite, quartz, mica, garnet, and pyrite. About one ton of emery has been shipped from Fairview to be tested, it is said, at Chester, Massachusetts. Emery has also been reported as occurring at Cartoogaja Mountain.

The corundum mines of the Sapphire Valley Company are located in Jackson and Transylvania counties, North Carolina, on the southeast slope of the Blue Ridge mountains. In the Socrates mine, situated about 1 mile from the town of Sapphire, the vein is 2 to 6 feet wide, dips 45 degrees, and has been explored by means of shafts, tunnels, and crosscuts for a distance of about 1,000 feet. The deepest shaft is down 75 feet, and at its bottom shows rich corundum ore. This ore is known as "sand-corundum," and generally consists of white or gray corundum crystals about one-fourth inch in diameter, embedded in a matrix of decomposed chlorite and red clay. The walls of green chloritic schist often show slickensides and gradually become merged into a rock composed of radiately structured tremolite and anthophyllite. This last-named rock extends from 50 to 100 yards to each side of the corundum vein and is bounded by a fine grained granite or gneiss, which forms the usual country rock in this section. The vein material averages 15 per cent. corundum by a mill run. About 800 tons of ore ready for the mill are now on the dumps of this mine and the one next to be described.



The Bad creek mine is located 2 miles from Sapphire. The vein is a bedded one, 4 to 15 feet wide, and is exploited by means of tunnels, shafts, drifts, and open cuts. The ore shows white, pink, or blue corundum one-third inch to 1 inch in diameter, embedded in a gneiss consisting chiefly of black biotite or lepidomelane, chlorite, feldspar, hornblende, tourmaline, quartz, and garnet, sometimes associated with pyrite, margarite, autunite, molybdenite, kaolin, talc and asbestos. The vein averages probably 10 to 15 per cent. corundum. Surrounding the vein is frequently found a "walling" of chlorite 1 to 2 feet thick and then about 4 feet of hornblende schist, and beyond this anthophyllite rock extending 40 to 60 yards from either side of the vein to the country gneiss or granite. Another property, the Sapphire mine, is only partially developed, but shows very rich masses of corundum rock. The vein is about 7 feet wide, and contains a gangue of yellow decomposed mica and a fine-grained tourmaline gneiss, in which pink or blue-stained corundum crystals lie embedded. The Whitewater mine, 8 miles southwest of Sapphire, carries some highly crystallized and brilliantly colored corundum, of a decidedly resinous luster, besides much sand corundum. The mica here is decomposed and yellow, and occurs with white feldspar in various stages of alteration to kaolin. The Brockton mine, situated about 3 miles northeast of Sapphire, apparently consists of a series of pockets, in which are found very large dark brown crystals of corundum. From a single pocket about 75 tons of clean corundum were taken. The occurrence is peculiar in that the corundum crystals are wrapped in decomposed feldspar and margarite, mixed with a small quantity of tourmaline.

The Burnt Rock mine is located about 8 miles northeast of Sapphire. The corundum here is found embedded in dark green chlorite and decomposed yellow mica, and frequently occurs in large masses weighing from 25 to 50 pounds. The color of the corundum is mostly pure white, streaked with bands of deep blue. Rarely bronze colored masses are found with a chatoyant luster. Closely associated with corundum veins are deposits of large plated mica and long-fibered asbestos. The property of the Sapphire Valley Company embraces 15,000 acres, and extends about 21 miles along what is thought to be the three principal corundum leads found in Jackson and Transylvania counties.

Beside the above property, the company owns the Edison mine at Acworth, Paulding county, Georgia, 35 miles north of Atlanta. This mine is characterized by its beautiful blue and pink banded and striated corundum, occurring in large cleavable masses together with a much decomposed variety of quartz, feldspar, and chlorite. Although this mine is, as yet, only developed by a few shafts 25 feet deep, it has produced several tons of corundum, among which is, undoubtedly, the largest specimen of pure corundum ever mined, a specimen weighing nearly 100 pounds, which was exhibited in the Tiffany collection at the World's Fair. It is supposed that this variety of corundum contains a



little water, as it is somewhat less hard and more easily cleavable than the common variety known as sand corundum, and turns white upon heating with the blowpipe.

The company's concentrating mill at Sapphire is well adapted to the purpose of crushing and separating the corundum from the gangue, and has a capacity of about 10 tons of clean corundum per twenty-four hours. This clean corundum was shipped as unfinished material in 100-pound sacks by team 46 miles to Hendersonville, and thence north by rail to be finished ("refined") and put on the market. The first quality or coarse corundum was sold for 10 cents per pound, and the second or finer sized material for 7 cents. The production for 1892 was about 150 tons, and for 1893 about 400 tons, the mill only having been run during four months.

#### THE LUCAS MILL AT CULLASAJA.

At Cullasaja, the Hampden Emery and Corundum Company has a mill for the treatment of its corundum and emery ores. It is commonly known as the Lucas mill, from Dr. H. S. Lucas, president of the company.

Power for its operation is obtained from a turbine developing 40-horse power. The ore consists both of so-called rock corundum and sand corundum. The rock or lump corundum is carried to the mill by team, crushed in rock breakers, and ground down to size No. 12. The principal ore, sand corundum, is sent down from the mines upon Corundum hill in plank sluice troughs, a foot or two wide, a distance of  $1\frac{1}{2}$  miles to the mill. There are 3 sets of washing troughs at the mill, the ore and water being turned upon any one or all three at once by means of sluice gates with variable water feed. The pulp is fed to punched iron screens 3 feet wide and 8 long, with 7 or 8 holes to the linear inch. The "coarse" remaining on top of the sieve is reground in either vertical or horizontal steel rolls, and in the screw mill (the object here being to break off the chlorite from the corundum) and rewashed. All that part going through the washing sieves is separated into three sizes from No. 8 to No. 100 (the finest), dried in a furnace of 20 tons capacity in twenty-four hours, and shipped as unfinished corundum in sacks of 100 or 120 pounds to Chester, Massachusetts. Here it is sized more closely for the market. The maximum capacity of the above mill is 60 tons of ore, making not more than 20 tons of shipping corundum, as at least two-thirds of the ore is waste rock, such as chlorite and hornblende. Eight hands are employed in the mill when running full capacity, and 30 hands at the mines on Corundum hill. Generally a load of 8 sacks per wagon is sent to Dillsboro or Sylva and shipped from these towns by rail to Chester, where 8 or 10 grades of corundum are made, and the finished or "refined" product is put on the market. Dr. S. H. Lucas gives the production of the mill in 1893 as 304 tons and the average



price as 5 cents per pound. When the corundum is below the sizes Nos. 60 or 70, it is sold for about 1 cent less per pound.

*Emery imported into the United States from 1867 to 1893, inclusive.*

Years ended—	Grains.		Ore or rock.		Pulverized or ground.		Other manufactures.	Total value.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.		
	<i>Pounds.</i>		<i>Tons.</i>		<i>Pounds.</i>			
June 30, 1867.....			428	\$14,373	924,431	\$38,131		\$52,504
1868.....			85	4,531	834,286	33,549		38,080
1869.....			964	35,205	924,161	42,711		77,916
1870.....			742	25,335	644,080	29,531		54,866
1871.....			615	15,870	613,624	28,941		44,811
1872.....			1,641	41,321	804,977	36,103		77,424
1873.....	610,117	\$29,706	755	26,065	343,828	15,041	\$107	70,919
1874.....	331,580	16,216	1,281	43,886	69,890	2,167		62,366
1875.....	487,725	23,345	961	31,972	85,853	2,990	20	58,327
1876.....	385,246	18,999	1,395	40,027	77,382	2,533	94	61,653
1877.....	343,697	16,615	852	21,964	96,351	3,603		42,182
1878.....	334,291	16,359	1,475	38,454	65,068	1,754	34	56,601
1879.....	406,633	24,456	2,478	58,065	133,556	4,985		87,506
1880.....	411,340	20,066	3,400	76,481	223,855	9,202	145	105,894
1881.....	454,790	22,101	2,884	67,781	177,174	7,497	53	97,432
1882.....	520,214	25,314	2,765	69,432	117,008	3,708	241	98,695
1883.....	474,105	22,767	2,447	59,282	93,010	3,172	269	85,490
1884.....	143,267	5,802	4,145	121,719	513,161	21,181	188	148,890
1885.....	228,329	9,886	2,445	55,368	194,314	8,789	757	74,800
Dec. 31, 1886.....	161,297	6,910	3,782	88,925	365,947	24,952	851	121,638
1887.....	367,239	14,290	2,078	45,033	144,380	6,796	2,090	68,209
1888.....	430,397	16,216	5,175	93,287			8,743	118,246
1889.....	503,347	18,937	5,234	88,727			111,302	218,966
1890.....	534,968	20,382	3,867	97,939			5,046	123,367
1891.....	90,658	3,729	2,530	67,573				71,302
1892.....	566,448	22,586	5,280	95,625			2,412	120,623
1893.....	516,953	20,073	5,066	103,875			3,819	127,767

*a To June 30, only; since classed with grains.*

#### INFUSORIAL EARTH.

The value of infusorial earth produced in 1893 was \$22,582, but little more than half that of 1892, when the value was \$43,655. The product in 1893 consisted of 850 tons of earth from Maryland and Connecticut sold crude, or without any further preparation than drying and pulverizing, valued at \$10,902; 755 barrels (of 50 pounds) of refined material from New Hampshire, worth \$9,680, and \$2,000 worth of cleansing articles, made from earth mined in California in previous years, but not marketed until 1893. There were also some manufactured articles sold from earth previously mined in Nevada, but this has been included in the crude earth production of 1892, the year in which it was mined, and is not counted in the output of 1893.

The following table shows the annual production of infusorial earth since 1880:

*Production of infusorial earth from 1880 to 1893.*

Years.	Short tons.	Value.	Years.	Short tons.	Value.
1880.....	1,833	\$45,660	1887.....	3,000	\$15,000
1881.....	1,000	10,000	1888.....	1,500	7,500
1882.....	1,000	8,000	1889.....	3,466	23,372
1883.....	1,000	5,000	1890.....	2,532	50,240
1884.....	1,000	5,000	1891.....		21,988
1885.....	1,000	5,000	1892.....		43,655
1886.....	1,200	6,000	1893.....		22,582

## TRIPOLI.

Mention was made in the report for 1892 of the development of a deposit of a siliceous earth in Newton county, Missouri. To this product the term of "tripoli" has been applied, though it is in reality a distinct mineral, being a siliceous lime-stone from which the carbonate of lime has been leached out, leaving the silica in a very porous state. Work was continued on the property in 1893, and the output increased over that of 1892 about 25 per cent. The product is used for water filters in the form of discs, cylinders, tubes, etc.; for ink blotters, either in the shape of rollers or in rectangular blocks about  $5\frac{1}{2}$  inches long,  $2\frac{3}{4}$  inches wide, and three-fourths inch thick. It is very porous, absorbs fluids readily, and makes a very convenient as well as enduring desk blotter. When the surface becomes clogged by drying it is easily cleaned by rubbing gently over it a piece of ordinary sandpaper. The material is also ground into a fine powder for polishing metal surfaces and for manufacturing various cleansing preparations.

## CARBORUNDUM.

This interesting artificial material continues to attract the attention of scientists, mechanics and others interested in abrasives. Intelligent study has been given to it during the past year, and its properties and useful fields are becoming more clearly understood. Improvements have been made in the matter of binding, in the manufacture of wheels and discs, and there is no doubt of its continued usefulness in the arts. In glass-cutting and dental work it is particularly useful.

The present capacity of the Carborundum Company is 200 pounds per day, the power-consisting of 225 horse power and a battery of 210 horse power, and 112,000 Watt & Westinghouse alternating dynamos. During 1893, 15,200 pounds of carborundum was produced, varying from No. 30, determined by the number of threads in the sieve, down to the finest powder. This is principally made in the form of wheels, which are distributed through the dental, glass, and other trades, 200,000 wheels being used by the dental trade during 1893. The glass trade uses it for the purpose for which Scott stone was formerly used.

The Carborundum Company of Monongahela, Pennsylvania, reports that it has sold in the form of machine wheels, dental wheels, discs and points, powder and hones, \$35,933.21; goods manufactured and held in stock, \$24,280.75, making a total for the year's business of \$60,213.96.