ABRASIVE MATERIALS.

By Edward W. Parker.

SUMMARY.

The subjects considered under this chapter are buhrstones or millstones, corundum, emery, garnet, grindstones, pulpstone, infusorial earth, tripoli, oilstones and whetstones, and quartz used for abrasive purposes. The production of oilstones and whetstones includes scythestones, rubstones, etc. Carborundum and crushed steel, used as abrasives, being essentially manufactured articles, are not included in the mineral abrasives, but are treated in connection with this chapter.

The production of these various articles in 1898 and 1899 is presented in the following table:

Production of abrasive materials in 1898 and 1899.

Article.	1898.		1899.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Buhrstones		$25,934		$28,115
Corundum and emery	4,964	275,064	4,900	150,600
Garnet	2,967	86,850	2,765	98,325
Grindstones		489,769		675,586
Infusorial earth	2,763	16,691	3,302	25,302
Tripoli				11,730
Oilstones and whetstones		180,486		208,283
Quartz		23,960		39,000

The production of each article is discussed in more detail in the following pages.

BUHRSTONES OR MILLSTONES.

PRODUCTION.

Since the introduction of the roller process for making wheat flour the use of buhrstones for this purpose has practically ceased. Millstones for grinding the coarser cereals, paint ore, fertilizers, cement rock, etc., continue to be used, but this trade is comparatively limited. The material from which the domestic millstones is made is a quartz conglomerate rock occurring along the eastern slope of the Allegheny Mountains. It is quarried in Ulster County, New York, Lancaster County, Pennsylvania, and Montgomery County, Virginia. It was formerly produced in North Carolina, but no quarrying has been reported in that State for several years.

The total value of the millstone product of the United States has not exceeded $30,000 in the last ten years. During the decade from 1880 to 1889, inclusive, the average value of the millstone product was over $130,000 per year. In the decade from 1890 to 1899, inclusive, the average value of the product has been less than $22,000 per year. Sympathizing with the general business revival in 1899, the industry, if such it may be called, gained about 8 per cent over 1898, bringing the value of the product up to $28,115, which, while not large in itself, represents the value of the best year's business since 1889.

The production since 1880 and imports since 1868 are shown in the following tables:

Value of buhrstones produced in the United States from 1880 to 1899.

Year.	Value.	Year.	Value.
1880	$200,000	1890	$23,720
1881	150,000	1891	16,587
1882	200,000	1892	23,417
1883	150,000	1893	16,639
1884	150,000	1894	13,887
1885	100,000	1895	22,542
1886	140,000	1896	22,567
1887	100,000	1897	25,932
1888	81,000	1898	25,934
1889	35,155	1899	28,115

IMPORTS.

The following table gives the value of buhrstones and millstones imported into the United States each year since 1868:

Value of buhrstones and millstones imported into the United States from 1868 to 1899.

Year ending—	Rough.	Made into millstones.	Total.
June 30, 1868	$74,224	.....	$74,224
1869	57,942	$2,419	60,361
1870	58,601	2,297	60,898
1871	35,406	3,698	39,104
1872	69,062	5,967	75,029
1873	60,463	8,115	68,578
1874	36,540	43,170	79,710
1875	48,068	66,991	115,059
1876	37,759	46,328	84,087
1877	60,857	23,068	83,925
1878	87,679	1,928	89,607
1879	101,484	5,088	106,572
1880	120,441	4,631	125,072
1881	100,417	3,495	103,912
1882	103,287	747	104,034
1883	73,413	272	73,685
1884	45,837	263	46,100
1885	35,022	455	35,477
Dec. 31, 1886	29,273	662	29,935
1887	23,816	191	24,007
1888	36,523	705	37,228
1889	40,432	452	40,884
1890	32,892	1,103	33,995
1891	23,997	42	24,039
1892	33,657	529	34,186
1893	29,532	729	30,261
1894	.....	.....	*a* 18,087
1895	.....	.....	20,316
1896	.....	.....	26,965
1897	.....	.....	22,956
1898	.....	.....	22,974
1899	.....	.....	18,881

a Not separately classified after 1893.

CORUNDUM AND EMERY.

PRODUCTION.

A decrease in the production of corundum in North Carolina and an increase in the output of Chester County, Massachusetts, and of emery in Westchester County, New York, with a general decrease in values, were the principal features of interest in this branch of the abrasive-material industry in 1899, resulting as they did, in an increase of 22 per cent in the product and a decrease of 45 per cent in the value. Corundum production in North Carolina decreased from 539 short tons in 1898 to 500 short tons in 1899; the production in Massachusetts increased about 25 per cent, and that of Westchester County from 1,130 to 1,400 tons. From this it appears that the entire production was limited to the old, well-known localities. Discoveries of emery or corundum deposits have been reported in California, Colorado, and New Mexico, but no output was obtained from them in 1899.

The statistics of the production of emery and corundum since 1881 are presented in the following table:

Annual product of corundum and emery since 1881.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Short tons.			*Short tons.*	
1881	500	$80,000	1891	2,247	$90,230
1882	500	80,000	1892	1,771	181,300
1883	550	100,000	1893	1,713	142,325
1884	600	108,000	1894	1,495	95,936
1885	600	108,000	1895	2,102	106,256
1886	645	116,190	1896	2,120	113,246
1887	600	108,000	1897	2,165	106,574
1888	589	91,620	1898	4,064	275,064
1889	2,245	105,567	1899	4,900	150,600
1890	1,970	89,395			

IMPORTS.

The corundum used in the United States is exclusively of domestic production. Emery is imported from Turkey and the island of Naxos, one of the Cyclades group in the Grecian Archipelago.

The following table shows the imports of emery from 1867 to 1899:

Emery imported into the United States from 1867 to 1899, inclusive.

Year ending—	Grains.		Ore or rock.		Pulverized or ground.		Other manufactures.	Total value.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Value.	
June 30—	*Pounds.*		*Long tons.*		*Pounds.*			
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	97	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	496,633	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	[a] 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
1894	597,713	18,645	2,804	51,487	.....	.....	1,841	71,973
1895	678,761	25,066	6,803	80,386	.....	.....	27,586	133,038
1896	755,693	28,493	6,389	119,738	.....	.....	.....	148,231
1897	539,176	20,865	5,213	107,655	.....	.....	2,211	130,531
1898	577,655	23,320	5,547	105,269	.....	.....	3,810	133,399
1899	728,299	29,124	7,435	116,493	.....	.....	11,514	157,131

[a] To June 30 only; since classed with grains.

GARNET.

The varieties of garnet considered in this chapter include those only which are used for abrasive purposes. Ornamental or gem varieties are included in the chapter on precious stones prepared by Mr. George F. Kunz. The localities from which abrasive garnet is obtained are: Litchfield County, Connecticut; Essex and Warren Counties, New York, and Delaware County, Pennsylvania. The Delaware County

(Pennsylvania) product is known commercially as garnet sand, to distinguish it from the larger crystals and massive garnet from the other localities. The quality of the material from the several localities varies considerably, the price ranging, according to quality, from $20 to $45 per ton at the mines. The production as reported to the Survey for 1899 amounted to 2,765 short tons, valued at $98,325, against 2,967 short tons, worth $86,850, in 1898. The production since 1894, the first year for which statistics were obtained, has been as follows:

Production of abrasive garnet for six years.

Year.	Quantity.	Value.
	Short tons.	
1894	2,401	$90,660
1895	3,325	95,050
1896	2,686	68,877
1897	2,554	80,853
1898	2,967	86,850
1899	2,765	98,325

GRINDSTONES.

OCCURRENCE.

Grindstones of domestic manufacture are obtained from the sandstone deposits which extend along the shores of Lake Erie for some distance east and west of Cleveland, Ohio, and as far inland as Marietta, and on Lake Huron above Detroit, Michigan. In Mineral Resources for 1886 the methods of manufacture and use are given in detail, together with a tabular statement of the several varieties, foreign or domestic, that occur, with their special uses. Five varieties are produced in the United States—four in Ohio and one in Michigan. The four in Ohio are: (1) Berea, fine sharp grit, used especially for sharpening edge tools; (2) Amherst, soft loose grit, for edge tools and saws; (3) Independence, coarse sharp grit, for grinding springs and files and for dry grinding of castings; (4) Massillon, also coarse sharp grit, for large edge tools, springs, files, and dry castings. The Huron (Michigan) stone has a fine sharp grit, and is used for sharpening edge tools when a very fine edge is required.

PRODUCTION.

With the exception of 1882 the value of the grindstones produced in 1899 was the largest in the history of the grindstone industry. The statement of production in 1882 was based on "estimates" furnished

by correspondents familiar with the industry. It is probable that such estimates were exaggerated, and that the record for maximum production belongs to 1899. There is no way of correcting the estimates for the earlier years, however, and last year must stand as second to 1882.

Compared with 1898 the value of the grindstones produced in 1899 exhibits an increase of $185,817 or 38 per cent.

In making their reports of production to the Survey, some manufacturers use the ton as a unit of measurement and others state the number of grindstones made and sold, and until 1898 no separation of quantity was attempted. Last year the manufacturers who stated the number of grindstones sold reported a product aggregating 6,300 pieces, valued at $69,776. The product reported by weight amounted to 50,644 short tons, valued at $605,810. Reporting the imports of grindstones, the Bureau of Statistics of the Treasury Department also limits the statements to the value, no figures relating to quantities having been published since 1883. The value of the grindstones imported during the decade ending December 31, 1898, averaged 15 per cent of the domestic product; in 1899 it was less than 10 per cent.

In the following table is shown the value of grindstones produced in the United States since 1880:

Value of grindstones produced in the United States, 1880 to 1899.

Year.	Value.	Year.	Value.
1880	$500,000	1890	$450,000
1881	500,000	1891	476,113
1882	700,000	1892	272,244
1883	600,000	1893	338,787
1884	570,000	1894	223,214
1885	500,000	1895	205,768
1886	250,000	1896	326,826
1887	224,400	1897	368,058
1888	281,800	1898	489,769
1889	439,587	1899	675,586

PULPSTONE.

The manufacture of paper from wood pulp has called for a stone suited to the grinding of wood pulp, resulting in the production in 1899 of 288 tons of "pulp" stones, valued at $8,712.

IMPORTS.

The amount and value of grindstones imported into the United States since 1868 are as follows:

Grindstones imported and entered for consumption in the United States, 1868 to 1899, inclusive.

Year ending—	Finished.		Unfinished or rough.		Total value.
	Quantity.	Value.	Quantity.	Value.	
	Long tons.		*Long tons.*		
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	21,688	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	.....	.....	.....	.....	*a* 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
1894	.....	.....	.....	.....	52,688
1895	.....	.....	.....	.....	54,276
1896	.....	.....	.....	.....	66,195
1897	.....	.....	.....	.....	49,496
1898	.....	.....	.....	.....	62,973
1899	.....	.....	.....	.....	63,852

a Since 1884 classed as finished or unfinished.

CANADIAN PRODUCTION.

The Geological Survey of Canada gives the following statement of the production of grindstones in the Dominion since 1886:

Production of grindstones in Canada since 1886.

Calendar year.	Quantity.	Value.
	Short tons.	
1886	4,000	$46,545
1887	5,292	64,008
1888	5,764	51,129
1889	3,404	30,863
1890	4,884	42,340
1891	4,479	42,587
1892	5,283	51,187
1893	4,600	38,379
1894	3,757	32,717
1895	3,475	31,932
1896	3,993	32,810
1897	4,572	42,340
1898	----------	39,465
1899	4,511	43,265

INFUSORIAL EARTH.

The abrasives included under this head consist of those porous siliceous earths of organic origin known as tripoli, diatomaceous earth, and infusorial earth. They are used to some extent in the manufacture of polishing powders and soaps, for which reason they are included among the abrasive materials. Their field is not limited to that use, however. Owing to the porous nature of infusorial earth it has been found to make an excellent absorbent for the manufacture of dynamite from nitroglycerin, and its nonconductivity of heat recommends it as a packing for boilers, steam pipes, and safes. The production in 1899 was 3,302 short tons, valued at $25,302, an increase from 2,733 short tons in 1898, valued at $16,691.

The amount and value of the product of infusorial earth for the years they have been obtained since 1880 are shown in the following table:

Production of infusorial earth from 1880 to 1899.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Short tons.			*Short tons.*	
1880	1,833	$45,660	1890	2,532	$50,240
1881	1,000	10,000	1891	.....	21,988
1882	1,000	8,000	1892	.....	43,655
1883	1,000	5,000	1893	.....	22,582
1884	1,000	5,000	1894	2,584	11,718
1885	1,000	5,000	1895	4,954	20,514
1886	1,200	6,000	1896	3,846	26,792
1887	3,000	15,000	1897	3,833	22,385
1888	1,500	7,500	1898	2,733	16,691
1889	3,466	23,372	1899	3,302	25,302

TRIPOLI.

Including the product from Newton County, Missouri, which for want of a better name is called tripoli, the output in 1899 amounted to 1,032 short tons of crude earth. In addition to this, 300 pounds of refined material was produced at Framingham, Massachusetts. The total value of the product from all sources was $11,730.

OILSTONES, WHETSTONES, ETC.

PRODUCTION.

The rough material from which our oilstones, etc., are made is obtained from various localities in the United States. The finer grades of oilstones are made from two grades of novaculite quarried in the vicinity of Hot Springs, Arkansas, and known, respectively, as "Arkansas" and "Washita" stone. Fine-grained sandstone, called "Hindostan" or "Orange" stone, from Orange County, Indiana; Lake Superior stone, quarried in Cuyahoga County, Ohio, and a similar material, known as Labrador stone, from Cortland County, New York, and chocolate stone, from Lisbon, New Hampshire, are used for whetstones. Scythestones and rubstones are made from Indian Pond and Lamoille stone, quarried in Grafton County, New Hampshire, and Orleans County, Vermont; from Berea, Ohio, grit (which also furnishes grindstones), and from some of the Indiana sandstone.

The value of the oilstones and whetstones made in the United States was the maximum in our history. As compared with 1898, there was an accentuated value of $27,797, or 15 per cent.

In the following table, showing the value of the product of oilstones, whetstones, etc., from 1891 to 1899, inclusive, the value is given for the finished stones, that being the condition in which the materials are marketed. For the past nine years the industry, particularly in Arkansas, has been largely controlled by one concern, the Pike Manufacturing Company, of Pike Station, New Hampshire, who operate the quarries as owners or by lease, and manufacture the stones, so that there is for the greater part of the product no marketing of crude rock.

Value of oilstones, whetstones, etc., produced in the United States since 1891.

Year.	Value.
1891	$150,000
1892	146,730
1893	135,173
1894	136,873
1895	155,881
1896	127,098
1897	149,970
1898	180,486
1899	208,283

From 1880 to 1890, inclusive, the product and value of the rough stone has been published in these reports, exception being made in the case of the output for 1890, when the value for the unfinished product was given for the novaculite of Arkansas, and in all other cases the value of the finished stones is quoted. The annual production from 1880 to 1890 was as follows:

Product of oilstones and whetstones from 1880 to 1890.

Year.	Quantity.	Value.
	Pounds.	
1880	420,000	$8,000
1881	500,000	8,580
1882	600,000	10,000
1883	600,000	10,000
1884	800,000	12,000
1885	1,000,000	15,000
1886	1,160,000	15,000
1887	1,200,000	16,000
1888	1,500,000	18,000
1889	5,982,000	32,980
1890	.....	69,909

KINDS OF OILSTONES IN USE.

The Pike Manufacturing Company has issued a pamphlet containing a historical sketch of the oilstone industry and other interesting information on the selection and care of edged-tool sharpeners. The following description of the oilstones now commonly in use has been excerpted from the pamphlet as being of interest in connection with the statistics of production and consumption.

The oilstones commonly in use at the present time are the Washita, Arkansas, Turkey, and Hindostan.

ARKANSAS AND WASHITA STONES.

The Arkansas and Washita stones are quarried in the State of Arkansas, near the celebrated Hot Springs. They are found in parallel veins, or "mineral leads," and are quite similar in general appearance, both being white, or nearly so, but the Arkansas is much harder, more compact, and finer grained than the Washita. There are various grades of Arkansas and Washita rock, ranging from a perfect, fast-cutting grit to the vitreous, flinty rock that is practically worthless.

To the ordinary observer the appearance of the good stone and the worthless is nearly the same. At frequent periods since these stones first came onto the market inferior grades have been put out by irresponsible or inexperienced manufacturers, which has done serious injury to their reputation in some localities. For the past few years, however, on account of the care taken to select and manufacture only the best quality of rock, both reputation and demand have rapidly increased.

The Arkansas stone is found in two grades, known as hard and soft.

Hard Arkansas is composed of nearly 99½ per cent pure silica (one of the hardest, sharpest-cutting minerals) and is about 16 times harder than ordinary marble. Steel will not scratch it, but it, in turn, will cut the hardest steel rapidly. It is white or bluish white in color, and by reason of its fine, hard grit is particularly adapted to sharpening fine tools requiring keen, smooth edges, such as are used by engravers, watchmakers, die sinkers, wood and ivory carvers, surgeons, etc.

Owing to the limited supply of good Arkansas rock, and to the great difficulty in quarrying and manufacturing it (about 85 per cent being waste), it is necessarily high priced, a first quality stone being worth about $2.50 per pound at retail. A stone of extra large size or special shape is worth even more than this. Though these prices may seem high, they do not represent an unreasonable profit to the manufacturer who is careful to send out only the best quality of finished stones and who has to throw away many thousands of pounds of poor stones every year.

Soft Arkansas oilstone is of the same mineral composition as the hard, but is more porous; hence does not impart quite so fine an edge. It is used very largely by machinists, workers in hard wood, cutlers, and mechanics in general as a finishing stone. It is carried in stock by most tool dealers and generally sells at about one-third less price than hard Arkansas.

The Washita oilstone is the most widely used by carpenters and joiners. It has crowded the Turkey stone almost entirely out of America, and is fast superseding it in Europe and other countries. It is composed of nearly pure silica, but is much more porous than the Arkansas stone. It is stated that a cubic inch of perfectly crystallized Washita stone contains over 8,000,000 cavities or pores. It is the presence of this vast quantity of evenly distributed pores which enables the grit grains or crystals (the teeth of the stone) to work freely and thus make it the fastest cutting fine-grained stone in the world.

There is no oilstone for the proper selection of which greater experience is required than the Washita, for it can be found in all degrees of hardness and fineness. For ordinary carpenters' tools, such as plane bits, chisels, gouges, etc., a medium soft, even grained, fast cutting Washita should be chosen.

The difference between a hard and soft Washita can be told in several ways: First, by the sight; in a soft stone the minute pores are usually apparent to the eye and the surface of the stone will have an open, granulated appearance. Second, by scratching with a knife blade; a soft stone can be quite readily scratched on the edges, whereas a hard stone will show little impression. An experienced hand can tell also by drawing the thumb nail across the face of the stone, as the soft, sharp-gritted stone will "bite" or take hold of the nail much sharper than a hard stone. This is a good way to tell the coarseness of any oilstone, as a coarse stone will leave rough scratches on the nail, while a find one will cut it away smoothly. Third, by the sound; hold the stone loosely by one end between the thumb and forefinger and tap it with a knife, light hammer, or any metal substance. A soft stone will sound dead, like wood; whereas a hard stone gives forth a metallic ring. The dead, dull sound shows that the stone is porous, whereas the hard, metallic sound indicates a solid, more dense texture.

The Washita stone is put on the market in several qualities. The best is the lily white; next in order are the No. 1 and No. 2 qualities. Each of these qualities is made in all shapes and sizes required for sharpening different kinds of tools.

The lily white brand, or quality, is selected by experts from the very best rock; each stone is tested and labeled, to tell whether it is a soft, medium coarse or a hard, medium fine grit. Every lily white

stone, whether of the coarse or fine selection, is of uniform grit throughout, free from hard or soft spots or streaks, and of sharp cutting grit. Each stone is perfectly white, carefully finished, and bears two labels, one on the end, telling whether it is coarse or fine grit, and a guaranty label. The manufacturers warrant each stone to be just what it is labeled, and to give absolute satisfaction; hence neither the dealer nor the mechanic takes any risk on the stone, as it will be replaced free of charge, if not satisfactory.

The No. 1 quality Washita is a well-finished stone, free from cracks, quartz, or noticeable imperfections. It is the most largely used brand on account of its lower price, but as there are both hard and soft stones in this grade, and they are not labeled nor warranted, the stone should be selected by a thoroughly experienced judge.

The No. 2 quality Washita is, as its name would imply, a second quality stone. It usually contains some quartz streaks, sand holes, or other imperfections, but always has one or more serviceable faces, and many very excellent cutting stones can be found in this grade, if selected by an experienced hand.

In addition to the above-named grades of Washita stone, there is also a brand known as the rosy red, which is very similar in cutting qualities to the lily white, except that it is generally a little softer and coarser. This stone is streaked with orange or dull red color, which in no way affects the grit, but indicates a soft, porous nature. It is a guaranteed brand, and is well adapted for grinding down dull tools or wherever rapid work is required.

The prices of Washita stone vary widely in different sections of the country, but as a rule a No. 1 stone about 8 inches long by 2 inches wide and 1 inch thick, regular size, can be bought at from 50 to 65 cents, and the lily white from 75 cents to $1. The same stones are sold mounted in polished hard-wood boxes at an advance of 15 to 20 cents. It is better to buy them this way when possible, as a stone lasts longer and keeps in better condition in a box than loose. In buying an oil stone of any kind, price should always be a secondary consideration. A good stone will very quickly make up the difference in price over a poor one in its quicker, more efficient work. Furthermore, a good stone will last for many years if rightly used, whereas the sooner a poor stone is thrown away the better.

TURKEY STONES.

The Turkey oilstone was the leading oilstone for mechanics' tools for many centuries previous to the discovery of the Washita. It is bluish gray in color, with frequent white spots and streaks. It is composed of about 70 per cent silica, mingled with 30 per cent lime, clay, and iron. The white spots and lines are calcite, or lime, which wear away quickly, leaving holes and rough cavities in the stone. The stone

also frequently comes apart in these lines as soon as it is oil soaked. It is nearly impossible to get a perfect Turkey stone, that is, one which is free from these lime streaks or other imperfections. A good Turkey stone will impart a fine edge, but no finer than a fine-grained Washita, while it does not cut steel so fast. It sells for about the same price as lily white Washita, but very few Turkey stones are now sold in America.

HINDOSTAN STONE.

The Hindostan, although usually called an oilstone, can be used with water with equally good results. It is a very fine-grained sandstone, and is considered the best low-priced sharpening stone for mechanics' tools. Its cutting qualities are due to small grains of silica, which are remarkably uniform in size in this stone. It is a fast-cutting stone, but owing to its softness the powder or grit which is cut from the stone soon forms a mud that clogs the pores and makes it cut more slowly unless the stone is kept free by the plentiful use of water. By using a little oil and leaving this dust on top of the stone a surface is given the stone which produces a fine edge on the tool. It is a good stone for imparting a quick, medium-coarse edge, and is used largely by amateurs and those who do not have to use an oilstone very often. It is sold in three grades, as follows:

Export extra quality, which is the finest grained, hardest Hindostan, white or yellowish white in color; Washita-finish quality, which is well finished, grayish white stone; and the No. 1 quality, which is generally a very roughly finished stone and varies in color from a bluish gray to almost a yellow. Hindostan stones generally retail at from 10 to 35 cents apiece, according to size and quality.

OTHER OILSTONES.

In addition to those already mentioned, there are many other oilstones more or less known to the American trade. Among those now on the market are the Queer Creek, Chocolate, Deerlick, and several kinds of emery and corundum oilstones.

The Queer Creek is a hard, medium coarse-grained sandstone, quarried in Ohio, dark gray in color, and suitable only for grinding down dull tools or sharpening those intended for coarse work. It is inclined to glaze unless used with care, and works fully as well with water as with oil.

The Chocolate is a fine-grained mica-schist of a bluish-chocolate color. It is a little softer than the Queer Creek, and a very fast-cutting stone. It imparts a medium-coarse edge, and is especially adapted for sharpening leather and skinning knives. It is also used quite largely for sharpening cloth cutters' tools, kitchen and carving knives, pocketknives, and similar implements. It can be used dry, or

with oil or water, and is perhaps the best stone on the market where a quick, medium-coarse edge is required. It can be found in most hardware stores, and sells for about the same price as No. 1 quality Washita.

The Deerlick is practically the same as the Queer Creek in appearance and sharpening qualities. The Queer Creek and Deerlick are generally sold a little lower than the No. 1 Washita.

IMPORTS.

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

Imports of hones and whetstones since 1880.

Year ending—	Value.	Year ending—	Value.
June 30, 1880	$14,185	Dec. 31, 1890	$37,454
1881	16,631	1891	35,344
1882	27,882	1892	33,420
1883	30,178	1893	25,301
1884	26,513	1894	26,671
1885	21,434	1895	32,439
Dec. 31, 1886	21,141	1896	50,588
1887	24,093	1897	34,485
1888	30,676	1898	30,856
1889	27,400	1899	34,510

QUARTZ CRYSTAL.

The product of quartz crystal for wood finishing amounted in 1899 to 13,600 short tons, valued, crude, at $39,000, against 8,312 short tons, valued at $23,990 in 1898, and 7,500 short tons, worth $22,500, in 1897.

Production of quartz crystal since 1894.

Year.	Quantity.	Value.
	Short tons.	
1894	6,024	$18,054
1895	9,000	27,000
1896	6,000	18,000
1897	7,500	22,500
1898	8,312	23,990
1899	13,600	39,000

CRUSHED STEEL.

The production of crushed steel by the Pittsburg Crushed Steel Company in 1899 amounted to 675,000 pounds, valued at $47,250, against 660,000 pounds, worth $46,200, in 1898. The comparatively small increase in 1899 was due to the demoralized condition of the building trades during the greater part of the year, due to conflicts between the labor unions and the contractors. The bulk of the crushed steel sold is used in the stone-cutting trade, particularly by the marble and granite cutters, although considerable quantities are used by lens workers and other glass grinders. For the latter purpose the fine grades known as steel emery and rouge are used. The Pittsburg Crushed Steel Company reports that it has recently developed a trade with railroad and other machine shops who are using the material for throttle and other valve grinding.

CARBORUNDUM.

The production of corborundum, or carbide of silicon, by the Carborundum Company of Niagara Falls, New York, in 1899, was 1,741,245 pounds against 1,594,152 pounds in 1898. The value of the product in 1899 was $139,000 against $150,000 in 1898. The average price per pound in 1899 was 8 cents.