

Imports and exports of sand and gravel.

Fiscal years ending June 30—	Imports.	Exports.	Fiscal years ending June 30—	Imports.	Exports.
1864		\$5,109	1877		\$10,803
1865		9,438	1878	\$31	17,017
1869	\$12	629	1879	212	8,482
1870	65	3,933	1880		11,266
1871	2,191	7,099	1881		15,076
1872	4,103	5,893	1882		22,080
1873	981	11,522	1883	274	25,708
1874	813	13,802	1884	16,360	19,399
1875	100	8,509	1885	12,798	15,071
1876		9,013			

CEMENT.

Kinds made.—No new varieties have been developed, the product still consisting primarily of the natural rock cements in by far the largest proportion, and also furnishing the base from which is made the artificial description commonly known as American Portland. Nor has the use of the domestic article extended to any new outlets, except, possibly, to be handled a little more freely as a mixture with imported cement in the production of drain and sewer pipe. The consumption of pipe thus made is not of a general character, and is confined principally to districts where the drainage waste is of a comparatively pure character and free from acids and other rapidly destroying agents. Quality has shown about the usual difference according to the locality in which it is made, but every manufacturer has sought to sustain his former standard, and improve it if possible, in order to compete with foreign supplies. All hydraulic cements require an especially pure dry atmosphere, yet even that will not effectually retard deterioration in quality. It has been shown by long and constant experience that both domestic and foreign cements, when allowed to remain in store for a long period, no matter how dry the location, are sure to absorb some moisture and undergo chemical changes that must gradually impair their setting and hardening qualities. On the other hand, however, there is danger that underburned cement, especially the artificial product, may contain an excess of free caustic lime that can only be removed by careful air slaking, and would seriously threaten the solidity of work upon which it might be used if it passed directly from the factory into consumption.

Production.—The production of cements during 1885 was somewhat irregular. The works in many cases opened the season almost without orders, and made, in consequence, quite an accumulation of stock, but subsequently the calls were so liberal as to exhaust all stores and force the mills to full capacity up to the period of frost. The loss of business during the first part of the year was, in a measure, due to successful competition on the part of the foreign product, yet the production was afterwards increased to such an extent as to bring the final results somewhat in excess of 1884. The value has averaged lower; so low, in-

deed, as to scarcely leave a margin to the manufacturer, yet no serious losses are known to have occurred, and the industry as a whole is apparently upon a sound financial basis. In making up the figures of production it has been found possible to reach desirable and reliable information at all the principal centers of manufacture, and the resulting estimate approximates as nearly as possible to exact returns. In the Rosendale district, Ulster county, New York, the output was 1,750,000 barrels; in the Louisville district, 850,000 barrels; in the Buffalo and Akron districts, 600,000 barrels; Utica, Illinois, 300,000 barrels; Milwaukee, Wisconsin, 250,000 barrels; and scattering, 250,000 barrels. This makes a total of 4,000,000 barrels, and compares as follows with the output of previous years:

Production of cement made from natural rock in the United States from 1882 to 1885.

Years.	Barrels of 300 pounds.	Average price per barrel.	Total Value.
1882	3,165,000	\$1.10	\$3,481,500
1883	4,100,000	1.00	4,100,000
1884	3,900,000	.90	3,510,000
1885	4,000,000	.80	3,200,000

With the exception of a small deposit upon the Potomac river, and additional works noted in the Rocky mountains, no new sources of supply have appeared, while one of the western firms has gradually gone out of production in consequence of its failure to preserve a merchantable standard of quality.

The artificial cements (American Portland) have followed the common course of nearly all structural materials during 1885, and have shown an increased production at a diminished cost. A natural expansion of the outlets and the introduction of new and improved machinery may be briefly mentioned as the main factors leading to the results noted, though at one or two new localities tentative efforts in the way of manufacture were sufficiently successful to add somewhat to the production and to promise continuation with further growth. While admission of a modifying cost was readily made by manufacturers, a great deal of reticence developed at every attempt to reach an exact figure, and an estimated valuation became necessary in consequence, and \$1.95 per barrel was finally decided upon as a conservative average representation of all views, the output of stock for the year on the closest indication obtainable showing about 150,000 barrels of 400 pounds each. The great bulk of artificial cement is made in the vicinity of Allentown, Pennsylvania, a fair quantity produced at South Bend, Indiana, not seeking an open market but going into local consumption for the manufacture of sewer pipe, etc.

Estimated production of American Portland cement from 1882 to 1885.

Years.	Barrels. of 400 pounds.	Average price per barrel.	Total value.
1882	85,000	\$2.25	\$191,250
1883	90,000	2.15	193,500
1884	100,000	2.10	210,000
1885	150,000	1.95	292,500

The total production of all kinds of cement during the past four years was about as follows:

Total production of all kinds of cement in the United States from 1882 to 1885.

Years.	Barrels.	Value.
1882	3,250,000	\$3,672,750
1883	4,190,000	4,293,500
1884	4,000,000	3,720,000
1885	4,150,000	3,492,500

Imports.—The additions to production of domestic cements did not check imports, but, on the contrary, the arrivals of foreign stock made further increase, and reached the highest point on record during the year 1885. The total amount for the United States will approximate 650,000 barrels of 400 pounds each. New York is the principal port of entry, and the only point at which reliable figures of imports could be found. These are given below with comparisons, and very fairly indicate the rapid development of the importation of cement during the past nine years. The average cost of importation during 1885 was, at a full estimate, \$2.05 per barrel laid down on the piers at New York, a decline much greater than upon any description of the domestic production.

It would hardly be fair to accept the liberal addition to importations of cement during 1885, in comparison with the preceding years, as a true index of corresponding growth in actual consumption. The foreign "Portlands" of good standard quality have undoubtedly grown in favor, owing to their adaptability and indeed superiority for numerous descriptions of work, besides as a matter of economy. Influences other than natural demand, however, had considerable force in stimulating importation during 1885, the most noticeable of which were: the removal of duty on packages, low ocean transportation charges, and very strong competition among the importers. The last was the most unsatisfactory feature, as it brought into the country a large quantity of low-grade stock, a considerable percentage of which remained unsold at the end of the year, and some was forced off at a heavy loss. The foreign producers are becoming convinced of the necessity for a standard test and grading, and are arranging for that end. Portland cements are receiving some very critical scientific attention and their properties are

becoming better understood than any other similar product, a suggestion that might be taken into account by the manufacturers of domestic cements. An English scientist, after a detailed statement of methods and tests applied, reaches the following deductions as indicating the pre-requisites of a first-class cement:

"1. *Fineness*.—To be such that the cement will all pass through a sieve having 625 holes (25 by 25) to the square inch, and leave only 10 per cent. residue when sifted through a sieve having 2,500 holes (50 by 50) to the square inch.

"2. *Soundness*.—That a pat made and submitted to moist heat and warm water shall show no signs of blowing in twenty-four hours.

"3. *Tensile strength*.—Briquettes which have been gauged, treated, and tested in the prescribed manner shall carry an average tensile strain without fracture of at least 175 pounds per square inch at the expiration of three days from gauging, and those tested at the expiration of seven days from gauging shall show an increase of at least 50 per cent. over the strength of those at three days; but the briquettes broken at the seven days' test shall carry an average tensile strain without fracture of at least 350 pounds per square inch.

"Such a specification meets all requirements, and satisfies the peculiarities of nearly all cements, except perhaps the very quick setting ones, for which a slight variation in the tensile strength and the percentage of increase between the dates named would have to be made."

Imports of cement at New York, in casks of 400 pounds.

Years.	From Great Britain.	From European continent.	Total casks.	Cost on pier per cask.	Total value.
1877	47,632	10,818	58,450		
1878	51,477	19,040	70,517		
1879	80,834	25,212	106,046		
1880	120,833	45,080	165,913		
1881	149,486	73,186	222,672		
1882	171,202	190,924	362,126	\$2.60	\$941,528
1883	158,602	143,363	301,965	2.70	815,306
1884	155,477	201,085	356,562	2.50	891,405
1885	187,955	250,860	438,815	2.05	899,571

The total imports (classed as "Roman" cement at the custom houses) into the United States since 1868 have been:

Roman cement imported and entered for consumption in the United States, 1868 to 1885, inclusive.

Fiscal years ending June 30—	Quantity.	Value.	Fiscal years ending June 30—	Quantity.	Value.
	<i>Barrels.</i>			<i>Barrels.</i>	
1868		\$10,168	1877		\$201,074
1869		9,855	1878		184,086
1870		18,057	1879		212,719
1871		52,103	1880		373,264
1872		172,339	1881		441,512
1873		209,097	1882	370,406	688,684
1874		286,429	1883	456,418	862,294
1875		261,741	1884	(a) 585,768	825,095
1876		247,200	1885	(a) 554,396	874,070

a Classed simply as cement; kind not specified.

Rocky Mountain division.—The works of the Denver Cement Company at Denver were run during a portion of 1885, but the production has not been very large. The cement produced by the company is of fair quality; it has been used in various buildings in Denver and has given very general satisfaction. The occurrence of the rock used in the manufacture has been given in previous issues of this report. Nothing of general interest developed in the business during 1885. Statistics of production could not be obtained from the manufacturers, and estimates are omitted as practically useless.

The Colorado Springs Stucco, Brick, and Cement Company, which manufactures plaster of Paris at Colorado City, is increasing the size of its plant, and proposes hereafter to produce hydraulic cement for the western markets. The material used in the production of the cement is found in abundance in the "Great Hogback" near Colorado City, and very convenient to the works. The combination of the manufacture of cement and plaster of Paris by one concern will probably enable the company to produce the former quite cheaply, so to compete with other Colorado companies, and with the Louisville and Portland cements.

Pacific coast.—Although a good hydraulic limestone has been found in California, and extensive works were put up near the town of Vallejo many years ago for manufacturing it into cement, very little of the latter has been made there for several years past, the English and eastern being preferred to the California article, for the alleged reasons that the latter has proved to be of an inferior quality. Some of the hydraulic limestone discovered a year or two ago near the town of Niles, Alameda county, has since been made into cement, which, it is claimed, equals the best made elsewhere. The quantity of cement received at San Francisco during a period of twenty odd years is shown by the table appended:

Imports of cement at San Francisco.

Years.	Barrels.	Years.	Barrels.
1864.....	13,322	1875.....	73,814
1865.....	28,270	1876.....	66,988
1866.....	34,360	1877.....	45,469
1867.....	31,666	1878.....	57,258
1868.....	31,954	1879.....	15,668
1869.....	54,697	1880.....	62,417
1870.....	42,377	1881.....	65,695
1871.....	32,602	1882.....	99,208
1872.....	54,746	1883.....	151,807
1873.....	61,911	1884.....	152,500
1874.....	79,435	1885.....	167,000

The prices of cement in the San Francisco market were at the beginning of 1886 as follows: California, \$2 per barrel; Rosendale, \$2.25 per barrel; and Portland, \$3.25 per barrel.