STRUCTURAL MATERIALS.

By William C. Day.

THE BUILDING INDUSTRY IN GENERAL. (a)

The year 1887 was on the whole a prosperous one for the building industry, although the last quarter showed a falling off in the amount of building done in a number of important cities.

As compared with 1886, labor troubles exerted very much less detrimental influence directly upon building, and indirectly upon the production of structural materials in 1887. The most important hindrance resulted from labor troubles in Chicago in the spring of 1887, causing a falling off in the amount of building done in that city, and consequently affecting the local production of structural materials and the production of building stone in localities which supply that market. In considering the state of the building industry in the the entire country, however, this drawback can not be regarded as of great weight.

Considerable has been done during the year in the way of discoveries of new sources of supply and of new developments and additions to capacity of plants for the quarrying of natural material and for manufacturing it.

The following table has been constructed on the basis of statistics furnished by the building inspectors and commissioners of the various cities considered. The figures represent in general the number of permits issued during the year and the estimated values of the buildings for which permits were given. Although the buildings for which permits are issued may not all be completed during the same year, still this fact does not diminish the value of the figures as showing the comparative condition of the industry in different years:

a In the preparation of this report valuable aid has been rendered by the following gentlemen, to whom especial acknowledgments are hereby tendered: To Mr. Robert H. Dalby, of Slatington, Pennsylvania, for general statistics in regard to slate from the Slatington region, Pennsylvania; to Mr. U. Cummings, general superintendent of the Standard Cement Company, of New Haven, Connecticut, formerly of Buffalo, New York, for statistics in regard to the production of natural-rock cement in the United States; to the New York *Real Estate Record and Guide*, for statistics of structural materials in New York City.

Number and value of the buildings for which permits were issued in thirty-one cities during the years 1884, 1885, 1886, *and* 1887.

Cities.	1884.		1885.		1886.		1887.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Portland, Maine:								
Frame buildings	56	.....	67	.....	91	.....	109	$140.000
Brick, stone, and iron buildings	25	.....	14	.....	32	.....	33	225,000
Total	81	$210,000	81	$250,000	123	$300,000	142	365,000
Boston, Massachusetts: (a)								
Frame buildings	1,123	3,078,145	1,372	4,552,538	1,353	3,992,792	1,431	4,153,181
Brick, stone, and iron buildings	312	5,400,775	348	6,218,800	346	8,113,100	417	6,108,825
Total	1,435	8,478,920	1,720	10,771,338	1,699	12,805,892	1,848	10,262,006
Fall River, Massachusetts:								
Frame buildings	416	.....	200	.....	205	.....	273	.....
Brick, stone, and iron buildings	7	.....	12	.....	25	.....	27	.....
Total	423	866,450	212	330,975	230	666,750	300	831,450
Salem, Massachusetts:								
Frame buildings	60	.....	92	.....	90	.....	102	.....
Brick, stone, and iron buildings	5	.....	9	.....	4	.....	10	.....
Total	65	250,000	101	376,000	94	317,000	112	406,000
Providence, Rhode Island:								
Frame buildings	393	1,145,840	452	1,273,745	407	1,194,607	465	1,166,540
Brick, stone, and iron buildings	16	239,400	13	364,700	12	168,750	14	293,500
Total	409	1,385,240	465	1,638,445	419	1,363,357	479	1,460,040
Bridgeport, Connecticut:								
Frame buildings	240	360,000	280	420,000	350	630,000	.....	.....
Brick, stone, and iron buildings	20	100,000	25	125,000	34	170,000	.....	.....
Total	260	460,000	305	545,000	384	800,000	.....	.....
Brooklyn, New York:								
Frame buildings	1,304	.....	1,261	.....	1,774	.....	2,123	.....
Brick, stone, and iron buildings	1,435	.....	1,377	.....	2,216	.....	1,752	.....
Total	2,739	12,672,334	2,638	11,465,795	3,990	20,318,485	3,875	18,008,325
New York City:								
Frame buildings	655	1,331,906	580	1,416,683	650	1,505,735	840	2,151,765
Brick, stone, and iron buildings	2,242	40,148,402	2,788	43,957,330	3,442	57,233,998	3,504	64,917,805
Total	2,897	41,480,308	3,368	45,374,013	4,092	58,739,733	4,344	67,069,570
Wilmington, Delaware:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	326	730,225	280	668,590	192	622,983	.....	.....
Total	.....	.....	.....	.....	.....	.....	301	548,340
Philadelphia, Pennsylvania:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	.....	.....	.....	.....	.....	.....	.....	.....
Total	4,938	.....	6,326	.....	7,561	.....	7,695	.....

a Values estimated for completed buildings.

Number and value of the buildings for which permits were issued, etc.—Continued.

Cities	1884.		1885.		1886.		1887.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Pittsburgh, Pennsylvania:								
Frame buildings	.....	.....	795	.....	847	.....	1,173	$1,157,341
Brick, stone, and iron buildings	.....	.....	647	.....	568	.....	737	2,757,558
Total	.....	.....	1,442	$3,030,429	1,415	$2,401,809	1,910	3,914,899
Baltimore, Maryland:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	2,250	$3,107,472	3,237	4,340,125	2,305	3,587,900	2,464	3,244,750
Total	2,250	3,107,472	3,237	4,340,125	2,305	3,587,900	2,464	3,244,750
Washington, District of Columbia:								
Frame buildings	151	94,784	325	195,255	392	295,689	366	351,260
Brick, stone, and iron buildings	1,042	3,293,070	1,333	3,297,252	1,802	4,412,240	1,885	4,584,500
Total	1,193	3,387,854	1,658	3,492,507	2,194	4,707,929	2,251	4,935,760
Richmond, Virginia:								
Frame buildings	186	154,200	244	124,900	157	125,000	355	205,000
Brick, stone, and iron buildings	226	733,200	238	896,400	204	528,600	184	668,700
Total	412	887,400	483	1,021,300	341	653,600	539	873,700
Louisville, Kentucky:								
Frame buildings	669	.....	604	.....	570	.....	420	.....
Brick, stone, and iron buildings	301	.....	243	.....	340	.....	496	.....
Total	970	1,295,854	847	2,160,523	910	1,507,368	916	1,487,602
Saint Louis, Missouri:								
Frame buildings	620	371,136	510	456,825	491	405,892	648	555,370
Brick, stone, and iron buildings	1,989	6,945,549	2,160	6,919,694	1,732	6,624,927	1,842	7,607,544
Total	2,609	7,316,685	2,670	7,376,519	2,223	7,030,819	2,490	8,162,914
Kansas City, Missouri:								
Frame buildings	1,438	722,862	2,227	1,357,207	3,420	3,098,802	3,758	2,622,306
Brick, stone, and iron buildings	418	2,840,126	703	4,401,420	629	7,244,655	650	6,646,955
Total	1,856	3,562,988	2,930	5,758,627	4,049	10,343,457	4,408	9,269,261
Savannah, Georgia:								
Frame buildings	312	.....	278	.....	228	.....	190	.....
Brick, stone, and iron buildings	28	.....	55	.....	52	.....	28	.....
Total	340	.....	333	.....	280	.....	218	.....
Galveston, Texas:								
Frame buildings	.....	.....	116	177,630	181	394,400	.....	.....
Brick, stone, and iron buildings	.....	.....	7	123,500	6	229,000	.....	.....
Total	.....	.....	123	301,130	187	623,400	.....	.....
Topeka, Kansas:								
Frame buildings	572	.....	603	.....	696	.....	576	.....
Brick, stone, and iron buildings	103	.....	68	.....	75	.....	69	.....
Total	675	821,828	671	406,671	771	494,291	645	621,596
Evansville, Indiana:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	411	366,273

Number and value of the buildings for which permits were issued, etc.—Concluded.

Cities.	1884.		1885.		1886.		1887.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Cleveland, Ohio:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	1,932	$1,731,960	1,587	$1,564,200	1,537	$1,756,273
Columbus, Ohio:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	.....	.....	.....	.....	.....	.....	.....	.....
Total	984	$1,090,222	537	648,058	804	916,807	854	1,086,419
Toledo, Ohio:								
Frame buildings	.....	.....	.....	.....	436	324,580	342	520,000
Brick, stone, and iron buildings	.....	.....	.....	.....	108	298,515	374	736,000
Total	.....	.....	.....	.....	644	623,095	716	1,256,000
Detroit, Michigan:								
Frame buildings	.....	.....	1,328	1,437,819	1,533	1,561,864	1,326	.....
Brick, stone, and iron buildings	.....	.....	563	2,040,500	520	2,335,350	687	.....
Total	.....	.....	1,891	3,478,319	2,053	3,897,214	2,013	3,916,973
Marquette, Michigan:								
Frame buildings	6	24,251	8	19,829	4	16,492	10	34,190
Brick, stone, and iron buildings	3	27,317	6	53,351	2	21,600	4	98,793
Total	9	51,568	14	73,180	6	38,092	14	132,983
Chicago, Illinois:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	4,169	20,689,600	4,638	24,530,125	4,664	21,324,400	4,833	19,778,100
Total	4,169	20,689,600	4,638	24,530,125	4,664	21,324,400	4,833	19,778,100
Minneapolis, Minnesota:								
Frame buildings	.....	.....	.....	.....	.....	.....	.....	.....
Brick, stone, and iron buildings	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	3,075	7,718,668	4,485	9,179,522	4,620	9,731,068
Saint Paul, Minnesota:								
Frame buildings	2,075	1,667,035	2,964	2,238,026	3,017	2,488,271	3,780	6,452,807
Brick, stone, and iron buildings	269	2,387,490	385	1,921,182	553	3,567,571	675	6,486,407
Total	2,344	4,054,525	3,349	4,159,208	3,570	6,055,842	4,455	12,939,214
Fargo, Dakota:								
Frame buildings	.....	.....	11	35,500	17	29,000	13	31,300
Brick, stone, and iron buildings	.....	.....	4	120,000	4	49,500	2	104,000
Total	.....	.....	15	155,500	21	78,500	15	135,300
Omaha, Nebraska:								
Frame buildings	.....	.....	600	957,318	1,150	2,224,390	1,968	.....
Brick, stone, and iron buildings	.....	.....	62	1,908,145	145	2,950,750	226	.....
Total	.....	.....	662	2,865,463	1,295	5,175,140	2,194	9,000,000

In the following table are the figures (taken from the foregoing table) showing the values for all cities except those for which data are wanting, for 1886 and 1887, placed side by side for the sake of comparison:

Names of cities.	1886.	1887.
Portland, Maine	$300,000	$365,000
Boston, Massachusetts	12,805,892	10,262,006
Fall River, Massachusetts	666,750	831,450
Salem, Massachusetts	317,000	406,000
Providence, Rhode Island	1,363,357	1,460,040
Brooklyn, New York	20,318,485	18,008,325
New York City, New York	58,739,733	67,069,570
Pittsburgh, Pennsylvania	2,401,809	3,914,899
Baltimore, Maryland	3,587,900	3,244,750
Washington, District of Columbia	4,707,929	4,935,760
Richmond, Virginia	653,600	873,700
Louisville, Kentucky	1,507,368	1,487,602
Saint Louis, Missouri	7,030,819	8,162,914
Kansas City, Missouri	10,343,457	9,269,261
Topeka, Kansas	494,291	621,596
Cleveland, Ohio	1,564,200	1,756,273
Columbus, Ohio	916,807	1,086,419
Toledo, Ohio	623,095	1,256,000
Detroit, Michigan	3,897,214	3,916,973
Marquette, Michigan	38,092	132,983
Chicago, Illinois	21,324,400	19,778,100
Minneapolis, Minnesota	9,179,522	9,731,068
Saint Paul, Minnesota	6,055,842	12,939,214
Fargo, Dakota	78,500	135,300
Omaha, Nebraska	5,175,140	9,000,000
Total	174,091,202	190,645,203

It is evident from this table that for the twenty-five cities compared there was a total gain of $16,554,001 in 1887, or 9.6 per cent. over 1886.

In the report for 1886 a consideration of the kinds of building done and the kinds of materials used in quite a number of cities and towns in the United States was given. The following is a presentation of similar information in regard to other cities and towns, and also, in cases where changes have been made apparent by increased activity in building, the same towns as were treated of in the 1886 report.

ALABAMA.

Birmingham.—The marked increase in the last three years in the amount of manufacturing done in the city has, of course, increased largely the amount of building. The demand has been chiefly for business houses and a cheap class of tenement houses for the working people. At present, however, some attention is being directed toward dwellings of better quality. The stone used is chiefly limestone from the central and the southern part of the State; granite from Georgia, sandstone from Ohio, and oölitic limestone from Bowling Green, Kentucky, have also been used. The demand for roofing slate has decidedly increased. The increase in the amount of building done in Birmingham has exerted a very noticeable effect in stimulating the production of various kinds of structural material in that region.

Mobile and Montgomery.—One-story frame buildings for residences and brick buildings for stores are erected in these cities. Very little stone is

used; some of this is granite from Stone mountain, Georgia, and sandstone from Blount county, Alabama.

CALIFORNIA.

Los Angeles.—Building in this city received quite an impetus in the latter part of 1886, and great activity was shown during nearly the whole of 1887. Some fine business blocks were erected, the material used being chiefly brick with granite and terra-cotta trimmings. The granite is quarried in the foot-hills near the city, and sandstone from Ventura county, California, and from Flagstaff, Arizona. Slate for roofing purposes is very little used. That which has been used came from Pennsylvania. Dwelling houses are frame structures. Lumber was quite costly for a time; it is brought from northern California and Puget Sound.

San Francisco.—In this city granite, quarried at the Rocklin, Penryn, and Folsom quarries, is quite liberally used; also sandstone from the vicinity of San José and from Niles Cañon; slate is almost unknown, shingles and tin being the usual roofing materials.

DAKOTA.

Fargo.—There is at present in Fargo a demand for buildings of a better class than have thus far been built. Stone from Kasota, Minnesota, and Berea, Ohio, is used in buildings of the better class.

FLORIDA.

Towns in Florida use comparatively little of the ordinary kinds of building stone, but coquina is used more and more. The principal quarries are on Anastasia Island, opposite Saint Augustine. New quarries of this material are being opened near Rockledge, on the Indian river. Much of the brick used in Florida comes from Georgia and Alabama. Ornamental brick and tile are expensive, owing to high transportation charges, and are consequently used only in decorating fire-places, etc., in the best private dwellings.

ILLINOIS.

Chicago.—For foundations and ordinary work Joliet and Lemont (Illinois) limestone is used; for ornamental work the following are used: Brown sandstone from Connecticut; red sandstone from Long Meadow, Massachusetts; sandstones of all kinds from different sources in Ohio, the Lake Superior region, and, to a less degree and quite recently, from Colorado. Bedford (Indiana) limestone is quite popular. Georgia marble is being introduced with great satisfaction, particularly the pinkish gray variety. Granite from Maine, Missouri, and Minnesota is largely used.

Brick of all kinds is used in enormous quantities; ornamental materials in general are extensively indulged in.

A great variety of roofing materials is employed, particularly for flat roofs; for steep roofs, slate and tile are liberally used, with, however, considerable opposition to tile from architects.

There are agencies in Chicago for forty or more different kinds of stone from all parts of the country; all these varieties are used in buildings in the city. There is said to be at present a surplus of large tenement houses in Chicago, and the greatest demand now exists for small private dwelling houses. The demand for slate is very good and rapidly increasing, particularly for red and purple slate, the supply of which is not by any means abundant.

The strikes which occurred in the spring of 1887 in Chicago caused quite a falling off in the amount of building done as compared with 1886. Building was limited for quite a time to the absolute requirements of the population.

INDIANA.

Indianapolis.—For the foundations of buildings in this city limestone from Flat Rock and Saint Paul, Indiana, is chiefly employed; for superstructures Bedford (Indiana) oölitic limestone is very popular. The demand for ornamental brick, tile, and terra cotta is steadily increasing from year to year.

LOUISIANA.

New Orleans.—Very little stone is used in New Orleans; frame dwellings are chiefly built, while brick is used in business buildings; pressed brick is quite freely employed. Slate from the Bangor region, Pennsylvania, is used to a limited degree.

MASSACHUSETTS.

Boston.—The foundations of buildings are usually granite; for superstructures and for ornamental trimmings in brick buildings, etc., sandstones from Nova Scotia, Long Meadow, Massachusetts, and from Ohio are quite extensively employed. For roofing purposes, slate, tin, composition of tar and gravel, and recently copper, are used.

No increase over the present consumption of ornamental brick and tile is anticipated, since the present tendency is towards the use of stone for ornamental work, and toward greater simplicity in construction.

The Bedford oölitic limestone, from Bedford, Indiana, is being introduced and is meeting with encouraging approbation.

Holyoke.—Three-fourths of the buildings in this city are of brick, of which about 15,000,000 are annually consumed. Long Meadow sandstone is most freely used for trimmings of brick buildings of the better class. Vermont granite and marble are also employed. Slate is used on all steep roofs, and there is good demand for it, shingles not being allowed within the fire limits.

MISSOURI.

Kansas City.—The stone used for foundations is limestone quarried locally. Warrensburgh (Missouri) sandstone is more used than any

other stone for superstructures; Colorado sandstone is also used; Massachusetts sandstone finds a slight demand. The oölitic limestone of Bedford, Indiana, is well liked in so far as it has been used.

NEBRASKA.

Omaha.—Building in Omaha has been quite active during 1887. Sandstone from Warrensburgh, Missouri, and from Colorado has been quite freely used. Sandstone and granite from New England quarries are also in use.

NEW YORK.

Niagara Falls.—The utilization of the water-power of this city, and the consequent introduction of large manufacturing concerns, have done much towards advancing the rapidity of building, but the general character of the buildings is still rather behind other developments. Within the last two years, however, a change for the better has been taking place. Locally-quarried limestone, and granite quarried on the Canadian side, about 6 miles away, are the stones most freely used. Stores and offices and dwellings for working people are in greatest demand.

Rochester.—Long Meadow sandstone and sandstone from various New York State quarries is used for superstructures, while foundation stone is quarried locally. Ornamental brick and tile have not been extensively used, but are growing in favor.

Syracuse.—Building was actively carried on in this city during 1887. The stone commonly used is Onondaga gray and blue limestone, quarried on the Indian reservation 7 miles from the city. Pressed bricks, manufactured in the city, are abundantly used.

OHIO.

Toledo.—A great increase in the amount of building done in Toledo characterized 1887. Limestone locally quarried is largely used, and sandstone from the Cleveland and Berea districts. The consumption of brick was very liberal during the past year; ornamental brick and tile are considerably used in the best buildings, but the great demand has been for the more unpretentious dwellings.

OREGON.

Portland.—Building was brisk in 1887. The dwelling-houses are frame structures, and the business buildings are chiefly of brick; pressed brick is not much used; slate for roofing is practically unknown. Basalt from Saint Helen, on the Columbia river, near the mouth of the Willamette, is used more than any other stone. There seems to be a liberal supply of all the various kinds of building stone in the State, but little of it has been developed.

PENNSYLVANIA.

Philadelphia.—In addition to what was said in regard to building in this city in the report for 1886, it may be said that there seems to be

a falling off in the erection of the smaller houses in the city. Large banking and office buildings have been built in considerable numbers during the year. Suburban dwellings are receiving considerable attention.

TEXAS.

San Antonio.—Owing to the severe droughts which have prevailed in the region of this city for a few years past, and the consequent failure of crops, but little building has been done. Brick has been in use for only the past five years. Common brick of a light yellow color is made 150 miles from the city, and pressed brick comes from Saint Louis. Large beds of excellent brick clay, pronounced by some equal to the clay from which Saint Louis pressed brick is made, has been found 12 miles northwest of the city. The Bexar Brick and Tile Company has been formed to manufacture pressed brick.

An excellent quality of cement is manufactured near the city by the Alamo Cement Company; it has been used in a number of public buildings, including the State capital at Austin.

WISCONSIN.

Madison.—Sandstone quarried near the city and also from Ohio, limestone quarried 7 miles from the city and also from Waukesha and Joliet, are the building stones most used. Frame cottages costing from $1,600 to $2,500 have been in greatest demand. The climate does not favor roofs of either slate or tile; it is said that the hailstorms, which are prevalent, do much damage to slate roofs.

VIRGINIA.

Petersburgh.—The development of extensive granite quarries near this city has resulted in the adoption of this stone, but frame structures are chiefly erected. Virginia slate is used for roofing.

BUILDING STONE.

Production.—The value of the building stone quarried in the United States during the past six years is estimated in the following table:

Value of building stone produced in the United States, 1882 to 1887.

Years.	Value.
1882	$21,000,000
1883	20,000,000
1884	19,000,000
1885	19,000,000
1886	19,000,000
1887	25,000,000

As will at once be noticed, the figure for 1887 is decidedly higher than that for 1886. There was undoubtedly a decided gain in production

during 1887 over 1886, but it did not amount to as much as $6,000,000; the estimate for 1886 was somewhat too low.

The plan of obtaining information from the most important quarry regions over the country was carried out in much greater detail for the past year than for 1886, owing to increased facilities for correspondence.

The estimate for 1887 is entirely independent of former years and is based upon the data received for 1887 alone. It is extremely gratifying to note the interest and the spirit of co-operation shown by correspondents, who have in many cases put themselves to trouble and inconvenience in order to insure scrupulous exactness in their replies.

The year 1887 has been a prosperous one for producers of all kinds of stone for building and other purposes. Labor troubles have not materially interfered with the interests of the quarry industry when the country at large is considered, although the strikes which occurred in Chicago, in the spring of 1887, quite markedly affected quarry regions which contribute largely to that market; among them are included two or three of the eastern sources of granite and sandstone supply.

Among the new discoveries and developments which have been made during the year, those in connection with marble are perhaps most noteworthy, indicating that the demand for this product is increasing rapidly and substantially; this is true particularly with reference to its use for purposes of interior decoration in buildings.

The statistics furnished by Mr. John C. Smock, of the New York State Museum, Albany, New York, show a remarkable increase in the production of stone, particularly bluestone, in the State of New York since the census year 1880.

A large proportion of the granite produced in the country is used in the manufacture of Belgian paving blocks; its use for monumental purposes is quite rapidly increasing.

GRANITE AND ALLIED ROCKS.

The value at the quarries of the granite and allied rocks produced during 1887 is estimated at $7,440,000. The most important granite producing States are, in order of importance, Massachusetts, Maine, Rhode Island, Connecticut, Virginia, and New Hampshire. In all these States granite has been produced steadily for many years and the principal localities of production are well known to builders, architects, and consumers generally throughout the country. It is true, however, that in a number of States, among which may be specially mentioned Georgia, California, and Colorado, producers are making vigorous efforts to develop and advertise granite of a quality and character regarded as sufficiently good to justify bringing the stone into active competition with that from the older and better known sources of supply.

The use of granite for monumental purposes is increasing steadily and substantially.

The following statements, arranged in tabular form, give items of production, and such other information as has been received from some of the granite producing localities:

The production of granite in 1887.

States.	Localities.	Value of product.	Remarks.
Massachusetts	Quincy	$520,000	There are about ten firms at Quincy, employing an average of twenty-five men; there are also from twenty to thirty so-called quarry holes where three to five men each are employed. The stone is shipped to the principal cities over a large portion of the country, as far West as Nebraska. The production in 1887 was about 10 per cent. greater than that in 1886.
	Rockport	286,000	There are fifteen quarries in operation. The product is used for three different purposes; an amount valued at $147,000 is used for building and ornamental purposes; $100,000 worth is used for paving blocks, and the remainder is used for breakwater construction.
	Milford	75,000	This figure represents a gain over the production of 1886. The stone is sent to the principal cities of the Eastern and Middle States, and as far West as Omaha, Nebraska.
	Monson	.....	In 1887 28,700 tons of granite were produced. The quarries at Monson were opened and worked on a small scale in 1824; in 1839 commenced a progressive development, which has continued up to the present; the product is well known over the entire country.
Maine	Mount Desert	53,000	Of this amount $25,000 represents the value of paving blocks, used chiefly in New York City; the remainder is the value of stone used for building purposes; the building stone was used in Philadelphia, Pittsburgh, Boston, and Southport, Connecticut.
	East Blue Hill	.....	50,000 cubic feet were produced in 1887, used mainly in New York, Philadelphia, and Pittsburgh
	Deer Isle	150,000	The product of 1887 is estimated to be from one-third to one-half greater than that of 1886.
	Mount Waldo	300,000	
	Bristol	7,000	
	South Thomaston	30,000	
	Berwick	10,000	
	Norridgewock	15,000	This product was used chiefly in cities in Maine, excepting 20,000 feet which was shipped to Saint Paul, Minnesota.
Rhode Island	Niantic	15,000	Extensive quarries were opened in September, 1887, at Pascoag.
Connecticut	Niantic	60,000	
	Sterling	25,000	
	Greenwich	75,000	
	Bridgeport	50,000	
Vermont	Barre	225,000	The amount quarried is about 300,000 cubic feet. The granite industry at Barre has grown up within the past eight years. The product is largely used for monuments. The increase in production over 1886 is 25 per cent. Between seven hundred and nine hundred men are employed in cutting the stone into monuments. A railroad is about to be built, connecting the quarries with the main line. This will save a haul of 4 miles. These new quarries were opened in 1887.

The production of granite in 1887—Continued.

States.	Localities.	Value of product.	Remarks.
Pennsylvania	Chester county	$50,000	The quarrying of granite in Chester county dates back to 1885. The stone is used for building, monumental work, Belgian blocks, curbing, and flagging.
Virginia	Richmond	250,000	This figure represents the value of the product of five quarries in the vicinity of Richmond; $150,000 of this amount is the value of stone used for building and the remainder for paving blocks and curbing.
New Hampshire	Concord	135,000	This represents the stone quarried within 3 miles of Concord at sixteen or eighteen quarries; one-half was used for monumental purposes, and the other half for building. The building stone goes chiefly to Boston and several other New England points and New York City. Monuments are sent all over the country, chiefly to Ohio, Indiana, Pennsylvania, Michigan, and Illinois. The production for monumental work is rapidly increasing. Three quarries were opened in 1887; one was abandoned.
	Fitzwilliam	60,000	
California			The amount of granite quarried in 1887 at the places mentioned in last year's report is about the same as that of 1886, viz: Penryn, 10,000 tons; Pino and Rocklin, 5,000 tons; Folsom, 7,000 tons.
	San Bernardino county		It is estimated that 100,000 cubic feet of stone, for the greater part granite, was taken from three quarries, the New Westerly at Declezville, the Victor quarry at Victor, and the Casabianca, all in San Bernardino county. The value of the product is estimated at $75,000. The product was used chiefly at Los Angeles, a little in San Bernardino, Riverside, and Santa Ana. In 1886 only about 10,000 feet were produced. The stone from the New Westerly quarry is a fine, close granite used for fine building and monumental work.
Georgia	Atlanta	400,000	The quarrying of granite in the vicinity of Atlanta is carried on with the greatest activity. Paving blocks, curbing, and flagging took the greater part of the product. It was shipped to southern and western States generally.
Wisconsin	Marinette county	18,500	The production of granite in Wisconsin is comparatively new, as no mention of the production of granite in this State is made by the census returns of 1880. During 1887, $20,000 was expended on machinery for the further development of quarries at Pike. Paving blocks are chiefly produced at these quarries.

New discoveries and developments.—Early in 1888 The Old Dominion Granite Company was organized at Petersburg, Virginia, for the purpose of quarrying granite. The Petersburg Granite Quarrying Company of New Jersey leased quarries in the vicinity of Petersburg, Virginia, and proceeded with their development early in 1888.

The D'Alton Granite Quarrying Company is beginning the development of quarries in Dinwiddie county, Virginia.

At Elberton, Georgia, the development of granite quarries is proceeding actively. The Southern Granite Company of Atlanta, Georgia, bought several hundred acres of granite lands in 1887, and increased their operations very materially. At Griffin, Georgia, Mr. Andrew Taylor leased granite lands and began quarrying.

A new granite quarry was opened at New Bridge, South Carolina, by Mr. W. H. Pearce, of Greenville.

New granite quarries at Guilford, Howard county, Maryland, are being developed by Messrs. Smith & Johnson, of Baltimore.

The New Orleans, Birmingham and Notasulga Granite Company was organized at Birmingham, Alabama, in July, 1887; capital, $35,000.

Extensive quarrying was begun at the Brownville, Colorado, granite deposit in September, 1887.

COMMON LIMESTONE.

Production.—The value of the common limestone quarried in the United States during 1887 is estimated at $6,250,000.

The following tabular statements give the value of the limestone produced in some of the limestone regions during 1887:

Production of the principal limestone regions in 1887.

States.	Localities.	Value of product.	Remarks.
Illinois	Munroe county	$11,400	There is said to be considerable good building stone in Munroe county, but little of it is quarried on account of the lack of railroad facilities.
	Kankakee	100,000	The value of the product of 1887 is 25 per cent. greater than that of 1886. From a part of the product 20,000 barrels of lime were produced.
	Joliet	540,000	This represents the value of the product of eighteen quarries in what is known as the Joliet district. No great increase over the product of 1886 was made. Strikes in Chicago in the spring of 1887 caused reduction of out put; this was also the case in 1886. Two companies organized in the fall of 1887 will produce stone during 1888. This does not include the value of stone used for flux.
	Grafton	40,000	
	Lemont	300,000	
Indiana	Kokomo	10,000	The production of 1887 was decidedly greater than that of 1886.

Production of the principal limestone regions in 1887—Continued.

States.	Localities.	Value of product.	Remarks.
Indiana	Bedford	$332,250	The production of 1887 exceeded that of 1886 by 20 per cent. Strikes in Chicago in the spring of 1887 delayed business quite seriously. Two new mills with ten gangs of saws were built in 1887; three new channelers were bought and one new quarry was opened. In April, 1888, 1,102 cars were shipped; in the same month of 1887, 451. The demand for this stone is very good, and rapidly increasing.
	Wabash	10,140	The production of 1887 is 25 per cent. greater than that of 1886.
	Logansport	5,000	One new quarry was opened during the year.
Iowa	Cedar Falls	10,000	About the same product was yielded in 1886.
	Gilmore	8,000	
Kansas	Montgomery county	100,000	Product not so great as in 1886.
Kentucky	Louisville	70,000	The stone is all used in Louisville production no greater than in 1886.
Minnesota	Winona	17,000	
	Red Wing	6,000	Product largely used for lime burning; twelve new kilns were erected in 1887; this will largely increase the production of 1888.
	Lake City	10,000	
Missouri	Saint Charles	10,000	
Ohio	Greene county	8,500	Production is greater than that of 1886.
	Leesville	25,000	This figure represents an increase of 20 per cent. over 1886.
	Sandusky	15,000	
	Springfield	20,000	
Pennsylvania	Newtown	20,000	
	Conshohocken	72,000	This stone is largely used for foundations of buildings and heavy (bridge) masonry. It is not used in superstructures. The product of 1887 was not so large as that of 1886.
	Reading	250,000	
	Lancaster	19,250	
Wisconsin	Fond du Lac	75,000	

The following table, compiled by Mr. Thomas B. Bancroft, chief inspector of mines in Ohio, gives the production of all grades of limestone in that State for 1886:

Production of limestone in the State of Ohio in 1886.

Counties.	Weeks worked.	Men employed.	Burned for lime.	Used for fluxing.	Dimension stone.	Ordinary building stone.	For piers and protection purposes.	Flagging.	Paving.	Curbing.	For ballast and macadam.
			Short tons.	*Short tons.*	*Cubic feet.*	*Cubic yards.*	*Cubic yards.*	*Square feet.*	*Square feet.*	*Linear feet.*	*Cubic yards.*
Allen	24	67	7,969	.....	.....	10,857	310	17,000	.....	3,775	9,831
Adams	9	6	587	.....	.....	.....	.....	.....	.....	.....	.....
Butler	22	42	.....	.....	.....	7,307	730	4,850	.....	8,870	.....
Belmont	....	4	2,450	.....	.....	.....	.....	.....	.....	.....	1,055
Clinton	16	24	1,160	.....	13,000	1,553	280	....	.....	.....	370
Crawford	28	14	936	.....	.....	1,329	.....	8,640	.....	.....	.....
Clarke	37	126	19,591	23	22,632	17,912	480	2,845	.....	12,788	2,375
Clermont	10	13	.....	.....	.....	2,237	.....	.....	.....	.....	551
Delaware	30	35	23,949	.....	1,600	1,642	.....	2,000	.....	.....	500

Production of limestone in the State of Ohio in 1886—Continued.

Counties.	Weeks worked.	Men employed.	Burned for lime.	Used for fluxing.	Dimension stone.	Ordinary building stone.	For piers and protection purposes.	Flagging.	Paving.	Curbing.	For ballast and macadam.
			Short tons.	*Short tons.*	*Cubic feet.*	*Cubic yards.*	*Cubic yards.*	*Square feet.*	*Square feet.*	*Linear feet.*	*Cubic yards.*
Darke	27	9	1,460	.....	.....	.....	.....	.....	.....	.....	.....
Erie	38	101	30,350	28,430	.....	21,095	2,505	200	78,336	.....	1,720
Franklin	37	76	5,516	35,094	17,425	27,759	698	.....	.....	4,588	650
Greene	25	61	18,768	.....	23,077	3,354	740	5,250	.....	100	1,389
Hardin	22	52	315	.....	.....	1,193	140	60	.....	.....	10,762
Holmes	14	14	75	.....	.....	140	24	.....	.....	.....	611
Highland	30	66	11,192	.....	51,583	4,352	.....	21,811	7,200	5,000	61
Hamilton	33	452	11,006	.....	.....	63,972	.....	.....	54,000	.....	25,605
Hancock	32	41	3,406	.....	.....	11,928	926	125	.....	.....	2,453
Jackson	...	.....	.....	15,879	.....	.....	.....	.....	.....	.....	.....
Lucas	29	39	1,051	.....	12,900	3,843	4,700	426	10,800	.....	2,346
Logan	36	21	.....	.....	.....	5,427	2,000	.....	.....	.....	.....
Lawrence	...	.....	.....	67,669	.....	.....	.....	.....	.....	.....	.....
Mahoning	...	.....	.....	30,823	.....	.....	.....	.....	.....	.....	.....
Muskingum	31	51	3,265	14,344	10,475	1,892	37	.....	.....	1,250	1,116
Montgomery	37	141	4,683	.....	149,100	19,709	2,596	47,496	.....	3,000	392
Marion	44	133	56,400	45,489	4,550	16,866	2,981	14,200	.....	.....	25,742
Miami	35	152	5,813	.....	158,846	34,315	6,232	39,647	300	18,079	5,825
Ottawa	38	269	189,310	34,113	8,417	10,882	32,551	300	.....	2,700	28,736
Perry	5	20	.....	2,022	.....	.....	.....	.....	.....	.....	.....
Preble	22	64	8,342	.....	7,750	5,308	4,267	19,750	.....	.....	1,411
Putnam	4	17	.....	.....	.....	502	.....	.....	.....	.....	.....
Paulding	..	2	.....	.....	.....	355	.....	.....	.....	.....	.....
Seneca	30	67	14,036	.....	71,808	5,243	182	3,300	4,000	.....	32,618
Stark	23	12	3,530	.....	.....	.....	.....	.....	.....	.....	.....
Sandusky	35	65	28,450	.....	4,950	1,203	70	.....	.....	500	3,749
Shelby	28	10	4,620	.....	.....	.....	.....	.....	.....	.....	.....
Scioto	...	.....	.....	52,544	.....	.....	.....	.....	.....	.....	.....
Tuscarawas	...	.....	.....	1,650	.....	.....	.....	.....	.....	.....	.....
Van Wert	26	9	4,310	.....	.....	2,313	277	.....	.....	.....	1,040
Wood	31	86	47,415	.....	7,334	10,586	306	.....	.....	.....	23,351
Wyandot	22	22	7,315	.....	1,250	157	18	.....	.....	.....	2,551
Total	...	2,383	517,270	328,080	566,697	295,231	63,050	187,900	154,636	60,650	186,810

New discoveries and developments.—The Woodstock Iron Company, of Anniston, Alabama, and also the East Tennessee, Virginia, and Georgia Railroad Company propose to develop limestone quarries near Rock Mart, Georgia, during 1888.

MARBLE.

Production.—The value of the marble produced in the United States during 1887 was $3,100,000. The greatest activity is shown in the marble industry all over the country. All sources of production report considerable gains over 1886, and in most of them extensive preparations were made during the year for increased output during 1888. Comparatively little of the marble produced in this country is used for building purposes, but is chiefly consumed for monuments, tombstones, interior decoration of buildings, and in the manufacture of furniture. From present indications it seems probable that the production of 1888 will markedly exceed that of 1887

The production of marble at the most important localities in the United States is given in the following table:

Production of marble in the principal regions in 1887.

States.	Localities.	Value of product.	Remarks.
Vermont	East Dorset	$75,000	This represents the value of the product of four quarries in 1887. The production was about the same as in 1886.
	Brandon	200,000	It is estimated that the production of 1887 is double that of 1886. A new quarry, which is turning out to be very valuable, was opened during 1887.
	Rutland	2,000,000	The production of 1887 did not exceed greatly that of 1886. One new quarry was opened. The stone is used chiefly for monumental purposes; about $250,000 worth was used for building purposes.
Maryland	Cockeysville	160,000	The production of 1887 is 20 per cent. greater than that of 1886.
Tennessee	Whitesburg	150,000	Production about same as for 1886.
	Rogersville	150,000	This represents a gain of 20 per cent. over 1886.
	Mooresburg	100,000	
	Concord	120,000	
Georgia	Atlanta	150,000	The condition of the marble industry in Georgia is most flourishing. The production is $50,000 above that of 1886, and $150,000 was expended in increasing facilities for production.
New York	Tuckahoe	40,000	
	Pleasantville	20,000	
California	Amador county	5,000	The production of marble in Amador county was larger in 1887 than in 1886. The product is shipped principally to Oakland. Statements in regard to "new developments" will be found under that head.

New discoveries and developments.—The Orvillo Marble Company, of Rutland county, Vermont, has sold a marble quarry to persons from Maryland for $50,000. The quarry is on the line of the proposed Clarendon and Rutland railroad. Developments will be made during 1888.

The Oriental Marble Company was organized in the latter part of 1887, with a capital stock of $50,000, to work marble quarries near Knoxville, Tennessee. The principal office is at Washington, District of Columbia. This company will probably produce marble during 1888. Developments are promised during 1888 of a marble quarry on the property of Mr. H. D. Hardin, of Rome, Georgia. The American Marble Company, of Marietta, Georgia, has decidedly increased its facilities for the production of marble.

The Georgia Marble Company has expended $150,000 recently in adding to its facilities of production; the effects of this will probably be made manifest during 1888.

Discoveries of quarries of fine marble have been made near Fort Collins, Larimer county, Colorado; some attention has been drawn to these quarries from cities in the east; their development seems probable. During the summer of 1887 fine specimens of mottled marble were

taken from a deposit 17 miles from Glenwood Springs, Garfield county, Colorado. No developments have yet been reported. A marble quarry was opened in the fall of 1887 at Crested Butte, Colorado; it consists of white, black, serpentine, and variegated marbles. Fine marble specimens have been taken from deposits near Crystal, Gunnison county, Colorado; efforts are being made for the development of these quarries; at present transportation facilities are needed.

A quarry of marble, said to be of fine quality, has been discovered in Churchill Cañon, Lyon county, Nevada; the deposit includes white and variegated black marble.

The Parian Marble Company has been organized, with a capital of $1,250,000. The quarries to be worked by this company are located 4½ miles west of Nephi, Juab county, Utah; the main office of the company will be in Salt Lake City.

The Black Hills Marble and Mining Company has been organized, with a capital stock of $250,000, for the purpose of quarrying marble and other stone near Buffalo Gap, Custer county, Dakota.

Development of the Inyo Marble Company's quarries, described in the last report, in Owens River valley, Inyo county, California, has been pushed rapidly during the past year. The improvements made during 1887 were the construction of a mill containing a 30-horse power engine, saws, and rubbing bed for producing finished marble, and a railroad from the quarries to the main line. Enough has been done to develop partially the quarry of white marble, and to obtain a few blocks of the colored varieties. A considerable output seems probable for 1888.

At the marble quarries located 10 miles northwest of Colton, San Bernardino county, California, a mill for sawing and polishing was erected and put in operation during 1887. The product has met with ready sale in the adjacent towns, where it has given such general satisfaction that it is likely to exclude the imported stone in a short time. Some marble has been taken out during the year from the Victor bed in the same county. It seems probable that this stone will be actively worked hereafter; the Southern Pacific Railroad Company, anticipating such result, has laid down a track connecting the quarry with the main line at Victor Station.

Quarrying is going on at the quarry in Antelope valley, Mono county, California; the stone is sent to Reno, where the company has works for dressing it. Some of the stone makes a near approach to onyx, being of variegated color. A company was formed during 1887 to quarry onyx on Glover mountain, near Colton, San Bernardino county, California. It was found that the previously quarried marble was running into onyx as developments progressed. Contracts have been formed with builders in that region for the delivery of considerable quantities. From the mines in San Luis Obispo and Solano counties something less than the usual amount of onyx was quarried. Shipments to the East amounted to about 100 tons, chiefly from Solano county.

Wagon transportation from the quarry in San Luis Obispo county to the railroad has been an obstacle, but as a railroad is to be run to the quarry the prospects are that operations will be on a larger scale. The stone is of very fine quality.

The marble quarries in Loudoun county, Virginia, have been developed sufficiently to allow large orders for the product to be filled. It is said that other quarries will be opened during 1888.

During the summer of 1887 the Antique marble quarry, in St. Genevieve county, Missouri, was equipped with sawing machinery having a capacity to run 48 saws. It is shipped to Chicago, where finishing work is done.

SANDSTONE.

Production.—The value of the sandstone produced in the United States during 1887 is estimated at $6,500,000.

In connection with sandstone a paper on "Building Stone in the State of New York," by Mr. John C. Smock, issued as a bulletin of the New York State Museum, is of particular interest. As the result of visits to the quarries in New York State, aided to some extent by correspondence with the largest producers, it was found that in 1887 there were 342 stone quarries in the State. Of these 11 are granite and gneiss, 7 marble, 235 sandstone, 73 limestone, and 16 slate. The total number of laborers employed, including quarrymen and stonecutters at quarries, was 5,400, an increase of one-third over the number reported by the United States census of 1880. The value of the product, including all kinds of stone, is estimated at $3,500,000. The value in 1880 was $1,261,495. The value of the equipment or plant is estimated to be not less than $1,600,000. It represents the machinery, tools, and sheds necessary for quarry work, and excludes mills for cutting and dressing the stone.

The following statement is made by the Union Bluestone Company, of New York City:

Output of bluestone by Union Bluestone Company, New York City, for the year 1887.

Description.	Cubic feet.	Description.	Cubic feet.
Flagging	3,188,217	Axed, 20-inch curb	40,129
Platforms	29,019	Rubbed flagging and hearths	55,815
Rock	23,878	Planed flagging	100,311
Cut garden	25,793	Planed headers	57,252
Curb	877,424	Planed platforms	31,897
Gutter	126,539	Sawed and planed	58,734
Sills	426,671	Well stone	8,496
Coping	343,020	Elevated railroad foundation stone, 3,467 pieces	.....
Door sills	3,639	Corners, 1,340 pieces	.....
Steps	12,234		5,753,055
Belgian bridge crossings	150,920		
Rubbed sills	125,791		
Rubbed curb and lintels	67,276		

In addition to the above, $93,000 worth of manufactured stone was sold for building and other purposes. As these figures represent nine-

tenths of all the bluestone quarried in the State, the total output may be safely stated to be 6,400,000 cubic feet, and its value in round numbers $1,750,000.

The following is a tabular account of different localities in the United States producing sandstone in 1887:

Production of sandstone in the principal localities in 1887.

States.	Localities.	Value of product.	Remarks.
Connecticut	Portland	$540,000	This figure represents some increase over 1886. One new quarry was opened during 1887. Markets in the West were very much injured by the strikes in Chicago in the spring of 1887.
Massachusetts	Roxbury	10,000	
	Springfield	475,000	The product was 25 per cent. greater than in 1886. Stone from this region is shipped to the principal cities of the the East and as far west as Kansas City, Missouri, and Omaha, Nebraska.
	East Long Meadow	70,000	The product is shipped to the principal cities of the East and as far west as Omaha, Nebraska.
Ohio	Buena Vista	31,000	The production for 1887 is reported as 25 per cent. less than that of 1886.
	Bellaire	15,000	
	Leesville	25,000	The production of 1887 is from 15 to 20 per cent. greater than that of 1886. It is used principally at towns in Ohio and Indiana.
	Cuyahoga and Lorain counties.	700,000	Stone from these sources is shipped all over the East and South and as far west as Denver. Canada forms a good market. The production of 1887 represents a large increase over 1886. In this region 8 new channeling-machines, 5 gangs of saws, and other machinery for quarrying and hoisting.
	Lancaster	30,000	Production was somewhat better than in 1886. Two new quarries opened.
West Virginia	Wheeling	150,000	
Colorado	Entire State	813,680	The development of the sandstone quarries in Colorado advanced rapidly in 1887, the chief business being done by the Union Pacific Railway Company from its Buckhorn and Stout quarries in the Hogback. The business of carrying this stone in cars which would otherwise largely return empty to Missouri river points is an important one to the railway, but the margin of profit, after paying expenses and freight, is so small that it discourages small quarry owners from attempting to reach the Missouri Valley markets.

New discoveries and developments.—The Wadesborough Brown Stone Company, with a capital of $200,000, has purchased the property of the Atlantic Brown Stone Company, and will add considerably to the existing plant and open up a number of quarries, which will probably be producing in 1888.

A sandstone quarry of good quality has been opened up at Tempe, Maricopa county, Nevada. The close proximity of this quarry to the railroad is a great advantage, and it is expected that developments will be made.

SLATE.

Production.—The following table shows the production of slate for the years 1884 to 1887, inclusive:

Production of roofing slate in all sections during the years 1884, 1885, 1886, *and* 1887.

[Squares of 100 square feet each.]

Sections.	1884.	1885.	1886.	1887.
Bangor and Pen Argyl region, Pennsylvania	195,505	196,832	215,341	230,000
Slatington section, Pennsylvania	104,000	108,000	109,000	112,000
Vermont	85,000	130,000	111,385	120,000
Maine	41,000	34,000	36,000	37,000
Chapman's	29,499	26,328	24,464	28,439
Peach Bottom	10,000	14,500	12,000	20,000
Virginia	9,000	17,300	16,600	19,000
Michigan	7,000	10,000	12,000	7,200
Total	481,004	536,960	536,790	573,639

Total yearly production of roofing slate from 1879 *to* 1887, *inclusive.*

Years.	Number of squares.	Average price per square, delivered on cars.	Value.
1879	367,857	.....	.....
1880	382,867	.....	.....
1881	454,070	.....	.....
1882	501,000	.....	.....
1883	506,200	.....	.....
1884	481,004	$3.85	$1,851,865
1885	536,960	3.07	1,648,467
1886	536,790	3.00	1,610,370
1887	573,439	3.00	1,720,317

The year 1887 has been an active one for the roofing slate industry, and the above tables show a decided gain in production. The increase in production of 1887 over 1886 is due not only to the general advance in building operations over the country, but also to a steadily increasing demand for slate rather than other material for roofing purposes. In a number of cities fire-proof material is required by law for roofs, and in the case of steep roofs slate is, in the great majority of cases, preferred to roofing tiles on the score of less cost and weight, and in cold climates, greater durability.

The demand for slate seems to be increasing more rapidly in the west, south, and southwest than in other sections of the country.

Prices.—The prices of slate in New York for different times are given in the following table, which shows a more encouraging condition of business than last year.

Comparative prices of roofing slate at New York January 1.

	1885.	1886.	1887.	1888.
Purple	$6.00 to $7.00	$6.00 to $7.00	$5.00 to $6.00	$5.00 to $6.00
Green	6.00 7.00	6.00 7.00	5.00 6.00	5.00 6.00
Red	15.00	15.00	10.00	12.50
Black	4.50 5.00	4.50 5.00	3.50 4.00	3.50 5.00

Exports.—The exports of roofing slate from New York City for 1887, as well as for 1886, show a falling off as compared with the year previous; although the decrease in 1887 is small as compared with that of 1886.

Exports of roofing slate from New York for 1887.

	Pieces.	Value.
South America	79,800	$2,188
West Indies	82,910	3,240
Africa	6,300	172
New Zealand and Tasmania	51,500	1,378
British Australia	2,083,041	55,074
Total	2,303,551	62,052

Exports of roofing slate from the port of New York from 1876 *to* 1887, *inclusive.*

Years.	Tons.	Pieces.	Value.
1876	19,475	646,985	$377,233
1877	25,565	2,895,428	646,272
1878	12,320	1,834,225	308 852
1879	4,792	3,085,124	166,220
1880	11,267	1,698,522	220,292
1881	2,927	3,522,527	138,904
1882	864	4,337,801	153,318
1883	187	1,488,226	54,063
1884	50	2,776,236	90,262
1885	.....	4,113,204	115,206
1886	.....	2,825,246	79,064
1887	.....	2,303,551	62,052

Slate finds every year new applications which increase its consumption to a greater or less extent. Its use for various purposes in connection with interments is one which seems just now to be markedly increasing; these purposes are grave covers, coffin boxes, monuments, and slabs. Aside from the use of slate as a roofing material, the slate industry seems to be almost in its infancy when, in addition to the applications of it already made, are considered the numerous possible applications which may be realized in the future. The following table shows the shipments from the Slatington section during 1887 of slate for all purposes:

Comparative table of the annual sales in the Slatington section.

Articles.	1885.	1886.	1887.
Roofing squares	108,000	109,000	112,000
School slates, cases	39,872	42,388	40,740
Flagging, pieces	31,849	58,713	64,959
Flagging, cases	1,429	1,673	1,824
Flagging, cars	27	21½	15
Blackboards, cases	5,882	6,791	11,119
Mantels, pieces	8	.....	.....
Mantels, cases	24	21	.....
Hearth slate, do	2	1	.....
Rough, sawed, and shaved, do	46¾	32	.....

The amount of slate produced in Vermont during 1887 for milling purposes alone, entirely aside from roofing purposes, is 2,000,000 square feet, 1 inch thick, valued at $350,000. At Fair Haven, Vermont, 430,000 square feet, worth $38,700, were produced for purposes other than roofing.

In Virginia 350 tons of slate were used for milling purposes.

Improvements in machinery, by which the cost of manufacture is reduced, are reported from a number of localities.

The following table shows the exports of manufactured slate, largely school slates, from New York during 1887. The figures represent a large proportion of the entire exports for the year:

Exports of manufactured slate from the port of New York, 1876 to 1887 inclusive.

Years.	Cases.	Value.	Years.	Cases.	Value.
1876	10,612	$87,500	1882	14,625	$68,150
1877	8,675	68,437	1883	8,943	40,674
1878	13,274	88,215	1884	12,189	53,021
1879	17,505	74,251	1885	10,573	49,965
1880	15,674	76,709	1886	9,498	40,804
1881	14,414	62,109	1887	9,433	39,560

Exports of all kinds of slate from the port of New York, 1876 to 1887 inclusive.

Years.	Value.	Years.	Value.
1876	$464,733	1882	$221,468
1877	714,709	1883	94,737
1878	397,067	1884	143,283
1879	240,471	1885	165,171
1880	297,001	1886	119,868
1881	201,013	1887	101,612

New discoveries and developments.—The Anglo-American Bangor Slate Company, limited, has been organized in London with a capital stock of £120,000, shares £25 each, to acquire by purchase land in Northampton county, Pennsylvania.

A slate quarry has been opened up on the road between Colorado Springs and Cañon City. The slate is said to be of fine quality. No actual production has yet been reported.

A company, of which Mr. J. K. Barton is president, has been organized at Rock Mart, Georgia, for the purpose of mining and manufacturing slate.

It is reported that the California Slate Company is preparing to ship a large quantity of slate from quarries in El Dorado county to Oakland and San Francisco.

A superior quality of roofing slate exists in Antelope island, one of the islands of Great Salt Lake. No developments have yet been reported.

Quite a number of new quarries in seams of slate previously worked have been opened during 1887 at all the various slate sections heard

from; but they can hardly be regarded as new discoveries, being simply additions to the quarries previously in active operation.

The slate developments near Little Rock, Arkansas, given in the report for 1886 have not yet reached the stage of actual production, although about 50 squares were quarried as a sample in 1887. Tests of strength show this slate to be equal to that produced at Brownville, Maine.

In the same region another preliminary development is being pushed, and early in 1888 about 70 squares were made. This slate is about equal in quality to Northampton and Lehigh Valley slate. All slate in this immediate region appears to be well adapted for roofing purposes, but is not so good for school slates.

Nine miles west of Hot Springs some work has been done upon a purple vein of slate, which will answer for mantel and slab work. In addition to the places already named, there are others which show good surface indications. Mr. Alonzo Hull, of Little Rock, is able to give information in regard to all slate in this region.

Imports and exports of building stone.—The following tables show the extent of the foreign commerce of the United States in marble and other stone:

Marble imported and entered for consumption in the United States, 1867 to 1883 inclusive.

Fiscal years ending June 30—	Sawed, dressed, etc., not over 2 inches in thickness.	Sawed, dressed, etc., over 2 and not over 3 inches in thickness.	Sawed, dressed, etc., over 3 and not over 4 inches in thickness.	Sawed, dressed, etc., over 4 and not over 5 inches in thickness.	Sawed, dressed, etc., over 5 and not over 6 inches in thickness.	Veined and all other in blocks, etc.	White, statuary, Breccatella, etc.	Not otherwise specified.	Total.
1867	.....	.....	.....	.....	.....	$192,514	$2,540	$51,978	$247,032
1868	.....	.....	.....	.....	.....	309,750	4,403	85,783	399,936
1869	.....	.....	.....	.....	.....	359,881	3,898	101,309	465,088
1870	.....	.....	.....	.....	.....	332,839	3,713	142,785	479,337
1871	$5,973	$168	$77	$44	$28	400,158	1,134	118,016	525,598
1872	3,499	1,081	452	.....	318	475,718	4,017	54,539	539,624
1873	3,124	21	.....	.....	.....	396,671	4,148	69,991	473,955
1874	1,837	.....	.....	.....	.....	474,680	2,863	51,699	531,079
1875	1,456	427	96	.....	.....	527,628	1,623	72,389	603,619
1876	595	126	203	87	.....	529,126	1,151	60,596	591,885
1877	2,124	.....	.....	.....	.....	349,590	1,404	77,293	430,411
1878	198	11	8	.....	.....	376,936	592	43,915	421,660
1879	184	.....	.....	.....	.....	329,155	427	54,857	384,623
1880	.....	.....	.....	.....	.....	531,908	7,239	62,715	601,862
1881	339	.....	.....	.....	.....	470,047	1,468	82,046	553,900
1882	655	.....	.....	.....	.....	486,331	3,582	84,577	575,145
1883	619	.....	.....	.....	.....	533,096	2,011	71,905	607,631

During the last four fiscal years the classification has been as follows:

Classification.	1884.	1885.	1886.	1887.
Marble:				
In blocks, rough or squared, of all kinds	$511,287	$429,186	$410,843	$415,615
Veined marble, sawed, dressed, or otherwise, including marble slabs and marble paving tiles	12,941	43,923	81,497	109,866
All manufactures of, not specially enumerated	67,829	54,772	34,546	48,884
Total	592,057	527,881	526,886	574,365

Building stone (exclusive of marble), paving stone, and stone ballast imported and entered for consumption in the United States, 1867 to 1887 inclusive.

Fiscal years ending June 30—	Building stone, dressed.	Building stone, rough.		Sandstone.	Slate chimney pieces, mantels, etc.	Roofing slate.	Limestone.	Paving stones.	Ballast.	Total value.
		Quantity	Value.							
		Long tons.								
1867	.....	.....	.....	.....	$37,510	$85,204	.....	.....	.....	.....
1868	$59,081	.....	.....	.....	16,045	118,776	.....	$5,718	.....	.....
1869	61,408	.....	$8,237	$4,171	19,602	85,364	.....	467	$3,987	.....
1870	150,619	.....	.....	3,201	19,879	107,521	.....	2,034	10,518	.....
1871	145,759	1,455	16,982	3,660	21,381	117,484	.....	.....	34,703	.....
1872	162,614	10,723	39,515	7,680	25,925	107,192	$2,459	5,529	11,303	$362,217
1873	218,236	20,226	73,889	6,160	26,643	91,503	1,486	3,788	17,143	438,848
1874	238,680	19,658	81,645	8,534	27,519	80,519	1,639	7,246	21,882	467,664
1875	275,633	15,748	67,357	10,986	42,022	16,342	2,023	2,017	9,025	425,405
1876	316,404	8,199	34,124	7,174	44,266	2,051	1,938	1,005	9,350	416,312
1877	201,034	7,584	25,571	5,492	34,479	4	1,705	485	6,272	275,042
1878	153,693	10,197	37,878	7,136	39,935	275	2,614	1,950	6,989	250,470
1879	125,493	6,845	24,531	13,956	46,260	620	1,456	2,943	2,365	217,624
1880	75,501	11,035	43,997	10,220	51,165	72	2,560	2,383	7,572	193,470
1881	76,741	15,867	65,950	15,115	46,862	2	1,990	3,799	5,401	215,860
1882	104,296	16,778	75,369	.....	45,774	154	2,710	16,599	8,792	253,694
1883	127,476	14,324	64,767	.....	44,375	2,813	1,841	2,629	5,745	249,646
1884	122,463	12,198	50,860	.....	34,640	16,099	143	2,576	2,551	229,332
1885	145,344	13,183	64,680	.....	56,913	5,196	.....	.....	4,056	276,189
1886	171,840	13,084	65,459	.....	60,512	4,366	.....	.....	3,759	305,936
1887	220,585	13,513	63,690	.....	46,188	529	.....	.....	2,011	333,003

Marble and stone of domestic production exported from the United States.

Fiscal years ending September 30, until 1842, and June 30 since.	Rough.	Manufactured.	Total.	Fiscal years ending June 30—	Rough.	Manufactured.	Total.
1826	.....	$13,303	$13,303	1857	.....	$111,403	$111,403
1827	.....	3,505	3,505	1858	.....	138,590	138,590
1828	.....	3,122	3,122	1859	.....	112,214	112,214
1829	.....	2,647	2,647	1860	.....	176,239	176,239
1830	.....	4,655	4,655	1861	.....	185,267	185,267
1831	.....	3,588	3,588	1862	.....	195,442	195,442
1832	.....	3,455	3,455	1863	.....	138,428	138,428
1833	.....	5,087	5,087	1864	$57,715	144,647	202,362
1834	.....	7,359	7,359	1865	74,261	183,782	258,043
1835	.....	8,687	8,687	1866	89,703	112,830	202,533
1836	.....	4,414	4,414	1867	53,983	138,558	192,541
1837	.....	5,374	5,374	1868	60,399	105,046	165,445
1838	.....	5,199	5,199	1869	62,266	87,135	149,401
1839	.....	7,661	7,661	1870	42,227	138,046	180,273
1840	.....	35,794	35,794	1871	135,672	137,613	273,285
1841	.....	33,546	33,546	1872	156,976	165,311	322,287
1842	.....	18,921	18,921	1873	96,735	189,795	286,530
1843 (9 months)	.....	8,545	8,545	1874	126,669	168,977	295,646
1844	.....	19,135	19,135	1875	125,968	254,356	380,324
1845	.....	17,626	17,626	1876	95,480	236,255	331,735
1846	.....	14,234	14,234	1877	131,716	917,937	1,049,653
1847	.....	11,220	11,220	1878	142,661	597,356	740,017
1848	.....	22,466	22,466	1879	143,457	430,848	574,305
1849	.....	20,282	20,282	1880	199,051	453,912	652,963
1850	.....	34,510	34,510	1881	220,362	409,433	629,795
1851	.....	41,449	41,449	1882	180,774	433,656	614,430
1852	.....	57,240	57,240	1883	152,182	389,371	541,553
1853	.....	47,628	47,628	1884	188,245	415,015	603,260
1854	.....	88,327	88,327	1885	182,719	(a)330,786	513,505
1855	.....	168,546	168,546	1886	159,553	(a)445,708	605,261
1856	.....	162,376	162,376	1887	211,819	(a)348,533	560,352

a Includes roofing slate.

Marble and stone, and manufactures of marble and stone, of foreign production exported from the United States, 1872 to 1887, inclusive.

Fiscal years ending June 30—	Value.	Fiscal years ending June 30—	Value.
1872	$1,229	1880	$6,816
1873	4,571	1881	709
1874	1,928	1882	4,848
1875	3,428	1883	490
1876	13,371	1884	8,420
1877	8,475	1885	14,406
1878	3,448	1886	4,617
1879	6,364	1887	4,133

Summarizing the foregoing statistics, the movement during the fiscal years 1882 to 1887 may be stated thus:

Balance of trade in marble and stone.

Fiscal years ending June 30—	Imports.	Exports.			Excess of imports over exports.
		Of domestic production.	Re-exports of foreign production.	Total exports.	
1882	$828,839	$614,430	$4,848	$619,278	$209,561
1883	1,475,658	541,553	490	542,043	933,615
1884	821,389	603,260	8,420	611,680	209,709
1885	804,070	513,505	14,406	527,911	276,159
1886	832,822	605,261	4,617	609,878	222,944
1887	907,368	560,352	4,133	564,485	342,883

CEMENT.

Production.—The following table shows the production of the natural-rock cements in the leading districts during 1887.

Production of cement made from natural rock in the leading districts in 1887.

	Barrels of 300 pounds.		Barrels of 300 pounds.
Rosendale, Ulster county, New York	2,338,744	Howe's Cave, New York	150,000
Akron, New York	715,000	Eastern Ohio	100,000
Louisville, Kentucky	1,189,000	Onondaga, New York	250,000
La Salle, Illinois	165,000	Kansas City, Missouri	150,000
Utica, Illinois	160,000	Manhattan, Kansas	25,000
Mankato, Minnesota	160,000	Virginia, Georgia, Texas and New Mexico	200,000
Milwaukee, Wisconsin	340,000		
Lehigh Valley, Pennsylvania	600,000	Total	6,692,744
Potomac River	150,000		

The average value per barrel of the above natural-rock cement was 77½ cents, making a total of $5,186,877 as the value of the product of 1887.

The following table shows the production for the past six years:

Production of cement made from natural rock in the United States from 1882 *to* 1887.

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
1886	4,350,000	.85	3,697,500
1887	6,692,744	.77½	5,186,877

It is plain, from the above tables of production, that the natural cement industry is in a decidedly flourishing condition; it furthermore appears from inquiry that at none of the works above mentioned was the supply fully equal to the demand. If the rate of production attained during the spring of 1888 is maintained through the year a total of 7,500,000 barrels is indicated as the production of 1888.

Estimated production of American Portland cement from 1882 *to* 1887.

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
1886	150,000	1.95	292,500
1887	250,000	1.95	487,500

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

Total production of all kinds of cement in the United States from 1882 *to* 1887.

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
1886	4,500,000	3,990,000
1887	6,942,744	5,674,377

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
1886	261,464	301,887	563,351	.....	.....
1887	432,327	385,903	818,230	.....	.....

Cement imported and entered for consumption in the United States, 1868 to 1887.

Fiscal years ending June 30—	Quantity.	Value.	Fiscal years ending June 30—	Quantity.	Value.
				Barrels.	
1868		$10,168	1878		$184,086
1869		9,855	1879		212,719
1870		18,057	1880		373,264
1871		52,103	1881		441,512
1872		172,339	1882	370,406	683,684
1873		209,097	1883	456,418	802,294
1874		286,429	1884	(a)585,768	825,095
1875		261,741	1885	554,396	874,070
1876		247,200	1886	650,032	733,297
1877		201,074	1887	1,070,400	1,101,994

a Classed simply as cement; kind not specified since 1883. It is probable, however, that about 95 per cent. of the total imports is Portland cement.

Comparative prices per barrel of cement in New York January 1, 1884 to 1888.

	1884.		1885.		1886.		1887.		1888.	
Rosendale	$1.10 to	$1.20		$1.00	$1.10 to	$1.25	$1.20 to	$1.25	$1.15 to	$1.20
Portland	2.40	2.75	$2.50 to	3.00	2.25	2.50	2.00	2.25	2.25	2.50
Roman	2.75	3.50	2.75	3.50	2.75	3.25	2.65	2.85	2.65	2.85
Keene's common	5.00	6.00	5.00	6.00	4.50	6.00	4.50	5.50	4.50	5.50
Keene's fine	9.25	9.75	9.50	10.00	9.00	10.00	7.50	8.50	7.00	8.25

New developments.—The works at Akron, New York, Mankato, Minnesota, Saint Louis, Missouri, and La Salle, Illinois, all under the control of the Standard Cement Company, have been increased in capacity to 1,000,000 barrels during 1887. In the fall of 1887 construction was commenced upon a large plant at Jeffersonville, Indiana, and completed in the spring of 1888. The works of the Milwaukee Cement Company have been increased by the addition of a mill costing $150,000, with a capacity of 2,000 barrels per day.

Early in 1888 a company was organized at Pittsburgh for manufacturing cement, capital $50,000. The works are on the line of the Pittsburgh Junction railroad, and have a capacity of 50 tons per day. The annual output is expected to reach 12,000 to 20,000 barrels. The president of the company is Mr. John Q. Everton, who has patents pending for the process to be employed.

The Chicago Cement and Lime Works Company, with a capital stock of $500,000, has been incorporated at Chicago. Extensive works are to be established at Blue Island, where cement rock of good quality is to be found.

The Chattanooga Cement Manufacturing Company, capital stock $250,000, has taken steps toward the erection of cement works near the Citico furnace. The process to be used is the Broin process, involving the utilization of blast-furnace slag. The capacity of the works will be 600 barrels per day. The works of Messrs. Thomas Cooley & Co., of Erie, Tennessee, have been increased to a capacity of 2,000 barrels per month.

The Lawrence Cement Works, at Eddyville, New York, were burned in July, 1887. The loss was $140,000.

The first attempt in the United States to use the Ransome process of burning and grinding cement, already described in the report on cement for 1886, has just been made by the Portland Cement Company, of Portland, Oregon. These works have just commenced operations, and are located at Oregon City, Clackamas county. The material used is a natural Portland cement rock found in Douglas county, Oregon, and is said to be unlimited in quantity. The Ransome revolving cylinder is used, and the natural material is burned in a powdered state, using an ordinary gas producer to furnish gas as fuel, which is burned in the cylinder simultaneously supplied with air, the heat being thus under perfect control. The abundant water power of the Willamette river is utilized. The works have now a capacity for producing 30,000 barrels of cement per annum; but this capacity can be tripled by the addition of only the necessary grinding mills.

A very interesting paper on "Hydraulic cements, natural and artificial, their comparative values," was read before the Society of Arts of the Massachusetts Institute of Technology, Boston, in November, 1887, by Mr. U. Cummings, general superintendent of the Standard Cement Company. This publication gives some historical information of interest and discusses in a very thorough manner the relative values of natural and artificial, or Portland, cement from the standpoint of their methods of manufacture, their composition, the changes which take place during manufacture, and the tests which they have stood, both preliminary to their adoption in particular cases by engineers and after their use in structures for a greater or less length of time.

The superiority that can be claimed for an artificial cement over the natural product lies chiefly in the fact that it is possible to control the proportions of the ingredients in artificial cement, while in natural cement rock variations in the proportions of clay and carbonate of lime always exist, the lower layers usually containing more clay than those above, and the variation amounting in some deposits to as much as 20 per cent. Usually, however, a large percentage of the deposit is evenly enough proportioned to yield a good cement when all parts are mixed together. Very excessive variations are, however, occasionally met with. The following quotation from this paper will show the author's views in regard to the manufacture of Portland cement: "The Portland cement manufacturer has it in his power to control the proportions of the materials he uses, and renders it possible for him to make his product uniform. Careful attention to proportions and mixing and care in the matter of calcination will produce a cement that seemingly leaves little to be desired. But so long as these details are intrusted to the hands of ordinary laborers—and there seems to be no other way—so long as the natural cements sustain their present reputation, and through their very cheapness keeping down the price of Portland, none but the cheapest class of labor can be employed in the manufacture of artificial cements, and, no matter how vigilant the superintendent may be, there will be failures, and sometimes disastrous ones."

Mr. Cummings also enters a vigorous protest against the prevailing custom of basing conclusions, in selecting cements, upon the results of tensile-strength tests alone. He claims that the connecting link which ought to exist between general good quality and high tensile strength is concealed, and that "practical experience teaches that we can find both good and bad cements that will sustain a high tensile strain, and that we can find both good and bad cements that will test low."

The subject of properly testing and comparing cements was referred to in the last report as one to which more attention should be given, and the impression that tensile-strength tests alone do not tell the whole story in regard to a cement seems to be gaining in strength.

Interest in cement made with blast-furnace slag as one of the ingredients seems to be rapidly gaining ground. The following, taken from London "Engineering," is a brief account of some of the processes which involve slag as an ingredient:

"Three kinds of cement are made from blast-furnace slag. The first, which is really more of a mortar than a cement, is produced by grinding slag sand with 15 per cent. of lime and 15 per cent. of oxide of iron. The grinding is generally done wet, and the product requires to be used within a few hours after being made, so that its employment is quite local. The second cement is made by grinding 75 per cent. of dry slag sand with 25 per cent. of dry slaked lime, according to Mr. Larsen's patent. It is essential that the ingredients should be finely pulverized, and that they should be intimately commingled. For this purpose the inventor uses a machine which he calls a 'homogenciser.' The third cement is made according to a process brought out by Mr. Frederick Ransome. Equal weights of slag, sand, and chalk are ground together in a wet state, and after being dried are burned either in a kiln or revolving furnace, the process followed being similar to that used in making Portland cement. The following table gives analyses of two of the cements we have mentioned, and also of two examples of Portland cement:

Analyses of cements.

	Lime.	Silica.	Alumina.	Ferric oxide.	Ferrous. oxide.	Magnesia.	Water.
No. 1 slag cement	22.9	21.01	19.85	8.80	4	4.36	12
No. 2 slag (Larsen)	41.96	24.34	18.74	.14	.27	6.57	4.70
Portland (No. 1)	59.9	24.07	6.92				
Portland (No. 2)	55.57	22.92	8.0				
Middlesbro' slag	40	52.34					
Middlesbro' (No. 2)	36.88	51.12					
Middlesbro' (No. 3)	40.45	50.08					

The first and second analyses are by Mr. J. E. Stead. The non-essential ingredients are not given.

"From this it will be seen that the first two cements are widely different in their chemical constitution from Portland cement, and they are still more different in their physical condition, for the lime is mostly free, the materials not having undergone the incipient fusion which Portland cement experiences. Now, in the slag the proportion of lime

to alumina and silica is about as 39:51, while in cement it is as 58:31; therefore 100 parts of slag, including the inert matters, require the addition of 56 parts of lime, or of 100 parts of dry chalk or limestone, to provide the constituents of a good cement, and this is the mixture used in Ransome's process. The result gives a product which exceeds the strength of Portland cement, and which improves by age. Samples seven years old are in existence, and show no signs of deterioration. Of course, the process is only commercially feasible in districts where slag is produced, but there it offers a means of turning a useless product into a valuable material, and, if it be carried out by Ransome's revolving furnace, the expense for plant is comparatively small."

LIME.

The production of lime in the United States during 1887 is estimated at 46,750,000 barrels, worth $23,375,000.

For comparison with the production of previous years the following table is presented:

Estimated production of lime in the United States from 1882 *to* 1887.

Years.	Barrels of 200 pounds.	Average value at kiln.	Total value.
1882	31,000,000	$0.70	$21,700,000
1883	32,000,000	.60	19,200,000
1884	37,000,000	.50	18,500,000
1885	40,000,000	.50	20,000,000
1886	42,500,000	.50	21,250,000
1887	46,750,000	.50	23,375,000

In the preparation of this report correspondence with lime producers in all parts of the country afforded a sound and reliable foundation upon which to base the above estimate. Although the numerous replies received can by no means be regarded as making up an accurate census of the product, some of them are presented below in more or less detail merely to give a general idea of the condition of the industry as a whole, and fairly close estimates of individual localities:

States.	Localities.	Production, barrels of 200 pounds.	Remarks.
Alabama	Silura	175,000	Production increased by 10 per cent. over 1886; one new kiln established. There are nine kilns, but only six operated through the year.
	Calera	150,000	This amount represents an increase over 1886. Kilns were not operated to their full capacity.
	Long View	200,000	More lime made and better prices secured than ever before. One new kiln erected during 1887.
California	San Francisco	295,000	This figure represents an increase of 15 per cent. over 1886. A number of new kilns were erected, increasing the capacity by 100,000 barrels.
Connecticut	New Haven	115,000	Production increased by 10 per cent. over 1886. One new kiln erected.
	Canaan	105,000	Production 10 per cent. larger than 1886. Two new kilns were established in 1887, thus increasing the total capacity 25 per cent.

States.	Localities.	Production, barrels of 200 pounds.	Remarks.
Indiana	Huntington	420,000	This is estimated to be 20 per cent. higher than the production of 1886.
Iowa	Maquoketa	200,000	This figure is estimated as 10 per cent. higher than production of 1886.
	Wilton Junction	120,000	The increase in production over 1886 is 20 per cent.
Kentucky	Louisville	150,000	The production was about the same as that of 1886.
Maine	Knox county	1,987,000	There are about thirty-two producers of lime in the region for which this figure is given.
	Rockland	1,388,443	The production for 1886 was 1,282,000 barrels. There are twenty-one producers.
Maryland	Cockeysville	350,000	There was a falling off in the product of this region in 1887. A new quarry of limestone has been opened.
	Buckeystown	262,500	The production was 15 per cent. behind that of 1886.
	Baltimore	245,000	Production less than 1886.
Massachusetts	Adams	40,000	This is 1,000 barrels ahead of 1886.
Michigan	Detroit	84,000	This product is very little if any ahead of 1886. The producing capacity was increased 10 per cent. during the year.
	Bellevue	70,000	The lime made here is said to be quite pure.
Minnesota	Duluth	60,000	This figure is 40 per cent. above the production of 1886. All the limestone comes from Kelly's Island, Lake Erie.
	Red Wing	200,000	Production about same as 1886. Producing capacity increased by 17 per cent, two kilns being erected.
New York	Buffalo	100,000	This is believed to be no higher than the product of 1886. The competition with Canada is quite active and close.
	Elmira	14,350	The lime produced here is made partly from shell and partly from limestone from Le Roy, New York, and partly from Bellefonte, Pennsylvania.
	Glens Falls	1,000,000	This product includes that of Warren, Washington, and Saratoga counties. The production is less than in 1886. Competition with Canada has kept production down.
Ohio	Toledo	593,000	The production did not materially increase above that of 1886.
	Cleveland	350,000	This figure is about the same as that for 1886.
	Carey	35,000	About the same amount was produced in 1886. A new limestone quarry was opened, but not worked during 1887.
	Marion	252,000	This figure is 20 per cent. greater than that for 1886. The producing capacity was increased by addition to plants already existing by about 20 per cent.
Pennsylvania	Chester and Montgomery counties.	1,159,458	The product of 1886 was 1,017,500 barrels. Philadelphia and suburbs form the chief market for this product.
	Allentown	105,000	The production of 1887 was slightly in advance of 1886, but the producing capacity was increased by 10 per cent. during 1887.
	High Spire	105,000	About the same figure as for 1886.
	Keystone Junction	87,500	25 per cent. higher than the production of 1886.
Tennessee	Erin	100,000	The production at Erin has rapidly increased.
Texas	Austin	80,000	The production is said to be 25 per cent. above that of 1886.
Vermont	Saint Albans	180,000	There was no considerable advance over 1886.
Wisconsin	Milwaukee	1,000,000	Slightly increased production over 1886.

In New York City the price of Rockland lime was lower in 1887 than in 1886; this was due to a war between commission merchants in New York City, and also to stronger competition with the product from St. Johns, New Brunswick. According to the "Record and Guide" the total growth of supply in New York will approximate 160,000 barrels; of this increase 50,000 barrels came from Maine, 90,000 from New Brunswick, and 20,000 from other sources.

Comparative prices per barrel of eastern lime at New York on January 1, 1878 *to* 1888.

Years.	Common.	Fine.	Years.	Common.	Fine.
1878	$0.80	$1.00	1884	$1.00	$1.20
1879	.80	.90	1885	1.00	1.20
1880	.85	1.00	1886	1.00	1.20
1881	.90	1.00	1887	1.00	1.20
1882	1.25	1.40	1888	1.00	1.10
1883	1.10	1.40			

Lime imported and entered for consumption in the United States.

Fiscal years ending June 30—	Quantity.	Value.	Fiscal years ending June 30—	Quantity.	Value.
	Barrels.			*Barrels.*	
1869	----------	$10,800	1879	----------	$13,196
1870	----------	9,063	1880	----------	15,852
1871	----------	11,315	1881	----------	24,968
1872	----------	11,014	1882	73,093	36,879
1873	----------	8,260	1883	76,889	41,224
1874	----------	10,964	1884	53,505	26,370
1875	----------	7,328	1885	54,676	28,270
1876	----------	7,367	1886	82,855	41,307
1877	----------	12,823	1887	132,239	57,226
1878	----------	14,344			

Lime and cement of domestic production exported from the United States, 1864 *to* 1887.

Fiscal years ending June 30—	Quantity.	Value.	Fiscal years ending June 30—	Quantity.	Value.
	Barrels.			*Barrels.*	
1864	----------	$86,386	1878	82,507	$98,334
1865	----------	94,606	1879	60,657	74,097
1870	31,175	61,490	1880	41,989	52,584
1871	27,575	51,585	1881	57,555	83,598
1872	39,686	69,218	1882	67,030	100,169
1873	27,873	52,848	1883	74,687	120,156
1874	41,349	69,080	1884	65,768	108,437
1875	64,087	98,630	1885	79,627	127,523
1876	53,827	77,568	1886	81,465	123,103
1877	78,341	97,923	1887	71,282	107,770

BRICK.

Production.—In collecting the statistics of brick production in the United States for 1887 the plan of obtaining replies direct from producers as a basis for a final estimate was very much more completely and effectively carried out than for the 1886 report. The results of the large correspondence thus made necessary, are very satisfactory, and to indicate the extent of the ground covered it may be stated that the

aggregate number of brick actually returned by replies to letters of inquiry addressed to manufacturers in cities and towns all over the country was 4,050,465,000.

The year 1887 was an unusually brisk one in brickmaking; the total production of common brick is estimated at 5,790,000,000, valued at $30,976,500.

New developments.—The number of new brick-yards reported as established during 1887 is 204; this number, which is without doubt lower than the true figure, does not by any means represent the total increase in producing capacity, as in many places additions in the way of improved machinery and improved methods were made which largely increased manufacturing capacity, aside from the establishment of entirely new plants.

The production of pressed brick is estimated at 284,000,000. The year has been a prosperous one for fine brick. Philadelphia and Trenton pressed brick have been in particularly good demand. New developments and additions to capacity have been made at Zanesville, Ohio, and the demand for the product of this plant is steadily and quite rapidly increasing.

The following table gives the production of some of the more important cities and towns in thirty States. The figures in this table are estimates by the leading producers in the places named. In the majority of cases the agreement between the many independent estimates for one and the same place was very satisfactory:

Production of brick in the principal localities during 1887.

States.	Cities or towns.	Number.	Value.
Alabama	Montgomery	19,000,000	$95,000
Arkansas	Little Rock	12,000,000	84,000
Colorado	Denver	51,500,000	334,750
Connecticut	Berlin and vicinity, Middletown, Hartford, North Haven and vicinity.	62,000,000	372,000
Delaware	Wilmington	33,000,000	260,000
District of Columbia	Washington	100,000,000	750,000
Georgia	Albany	3,500,000	19,250
	Atlanta	40,000,000	250,000
	Columbus	8,000,000	40,000
	Macon	25,000,000	125,000
Illinois	Bloomington	15,000,000	90,000
	Chicago	450,000,000	2,796,840
		(a)23,000,000	505,000
	Lincoln	4,800,000	28,800
	Rockford	4,000,000	30,000
	Springfield	14,300,000	69,000
	Urbana	3,500,000	21,000
Indiana	Elkhart	5,500,000	27,500
	Evansville	21,500,000	107,500
	Hobart	4,000,000	24,000
	Indianapolis	28,000,000	168,000
	Porter	10,000,000	80,000
	South Bend	9,000,000	54,000
Iowa	Des Moines	18,000,000	90,000
	Muscatine	5,000,000	25,000
	Sergeant Bluff	3,500,000	17,500
Kentucky	Covington	18,000,000	90,000
	Lexington	8,000,000	56,000

a Pressed.