# STATISTICS OF CEMENT INDUSTRY IN 1906.[a]

By L. L. KIMBALL.

## INTRODUCTION.

### GENERAL CONDITIONS.

The cement industry, as a whole, in 1906 was in a very prosperous state. Prices continued good throughout all parts of the United States, and in several localities they increased materially over those prevailing in 1905. The market was steady, and though the supply was greater than that of any preceding year, the demand kept pace with it, and in most localities exceeded it. The year closed with a gratifying indication of prosperity in the immediate future.

The greatest and most prosperous branch of the industry is, of course, the Portland-cement branch. The phenomenal growth of the Portland product has been noted before in these reports; but it may be made more impressive to the general public by stating that twenty years ago, in 1887, when the Portland output of the entire country stood at about 250,000 barrels, as against a production of somewhat more than 6,900,000 barrels of natural cement, the first attempt was made in the United States to use the Ransome process of burning cement—that is to say, to introduce the rotary kiln for the manufacture of Portland, instead of the vertical, or dome-shaped, kiln used at that time. The attempt was made near Portland, Oreg., and although that effort was not successful, it resulted in the improvement and adoption of the rotary kiln in this country. One difference between the process as it was then and as it is now used is this: In 1887 the company exploiting the new process proudly claimed an ability to produce 30,000 barrels of cement per annum, which would be tripled as soon as the necessary machinery for grinding should be added. To-day a company does nothing extraordinary in announcing that its plant will produce 3,000, 4,000, or 5,000 barrels of Portland cement a day, while the per annum production of the large plants run well into millions of barrels. It was ten years later, 1897, before the production of Portland cement had increased to 2,500,000 barrels; but in the next decade it went forward with tremendous strides.

The quantity of cement exported by the United States to foreign countries is not yet as large as it should be. This condition may be due to the great demand for it in the United States. But with the continued increase in the number of plants, and the consequent increase in production, foreign trade can not long be neglected. There are a

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dozen States in which new plants are actually being built to be ready for operation late in 1907 or early in 1908, and more than that number in which plants are projected. When the plants that are in process of erection (not including those which as yet are but planned) begin to produce, the output for the entire country will be again greatly increased. In view of these conditions, it would certainly seem wise to make at least an effort to build up a profitable trade with foreign countries.

The decline of the natural cement industry has been gradual, but as steady as the increase of the Portland branch. In 1906 the effect of this decline seemed to be even more widespread than in the preceding year, extending far into States which have not before felt its influence as strongly as have the eastern centers of natural cement production. No new States appeared as producers of this variety of cement, nor were any new plants built for producing it. The owners have for the most part allowed their kilns to remain idle, apparently waiting for a turn in the tide. Some have turned their attention to the burning of lime and kindred employments, and a few have dismantled the old plants and put in buildings and machinery for making Portland cement. Since the limestone which is known as "cement rock," from which natural cement is made, sometimes forms an equally good base for Portland cement, the latter course seems to be the logical and wise one where the financial part of such transition can be arranged. The business affairs of the Louisville district are in the same condition as they were last year.

The growth of the slag, or puzzolan, branch of the cement industry is interesting because of its steadiness. For about twenty years it has been doing a little, but for the last three years one new plant in a new State has been built annually to produce puzzolan cement. New works are being erected in Pennsylvania at the present time, and those which were built in Kentucky and in New York are both profitable producers. Of course the process of making this kind of cement is not nearly so expensive nor so extensive as the process required for burning and grinding Portland cement.

The rotary kilns necessary for producing Portland cement have been increased in size and otherwise improved to an extent which precludes a low price for them. Whereas in earlier years a 60-foot rotary was considered excessively large, to-day the extreme length is 150 feet. The increase in diameter has been only small. In the manufacture of puzzolan cement rotary kilns are not used.

## ACKNOWLEDGMENTS.

In making acknowledgments for the courtesies so universally extended in 1905, the writer had occasion to call attention to the fact that the statistics of production in this report are based entirely upon the actual returns sent from the different cement plants in the United States and that those used in the preliminary statement issued in advance of the full report are also based on such returns; that, such being the case, it is impossible to issue the statement until practically all the returns are in; and that therefore the date of the issue depends largely on the manufacturers themselves.

Since the statement is requested at an early date by people who are not producers, each year, and since letters are always received by this

Bureau from cement makers asking for the statement as soon as possible, this matter is again touched upon. It seems as easy to send the information in response to a first request as to a third or fourth request. In other words, if the statement is to be sent in at all, it should not be delayed a day, because any delay prevents every other producer from receiving the earliest possible statement of the annual production.

The writer is indebted to cement producers in most of the States from New Jersey to California for many courtesies during personal visits to their plants, and these remarks are made solely with a desire to be able to comply with the wish of the producers and to issue the figures at an early date.

The returns for 1906 are particularly full and complete. In no case were the figures refused, and in most instances every question was answered. Such cooperation is productive of the best results, and for it much appreciation and hearty thanks are hereby tendered.

## PRODUCTION.

The statement made last year that 1905 was the record year thus far in gain in total production of hydraulic cements in the United States over a preceding year applies equally this year to 1906.

The increase for 1905 over 1904 was above 8,000,000 barrels in quantity and $9,000,000 in value; but the gain of 1906 as compared with 1905 is 10,898,137 barrels of cement in quantity and $19,370,744 in value.

The total production of cement in 1906 was 51,000,445 barrels, valued at $55,302,277; the total production in 1905 was 40,102,308 barrels, valued at $35,931,533.

The production of Portland cement in 1906 was 46,463,424 barrels, valued at $52,466,186.

The production of natural cement in 1906 was 4,055,797 barrels, valued at $2,423,170.

The production of puzzolan cement in 1906 was 481,224 barrels, valued at $412,921.

These amounts are somewhat greater than those given in the preliminary statement of cement production issued by this Bureau earlier in the year. The difference is due to the fact that some of the returns from plants were received too late for use in the first statement. Such preliminary statements, however, are always issued with the understanding that while the amounts reported will not be decreased they may be somewhat increased.

The prices at which cement was sold in 1906 were higher than those which prevailed in 1905. They were not inflated, however, but were on a healthy normal basis. The producers made no complaint of prices, but from nearly every State in the Union protests were made as to the grave difficulty of obtaining sufficient car service for the delivery of orders.

## PORTLAND CEMENT.

### PRODUCTION.

The following table is designed to show the quantity and value of the Portland cement made in those States which were producers in 1904, 1905, and 1906:

*Production, in barrels, of Portland cement in the United States in 1904–1906, by States.*

| State. | 1904.[a] | | | 1905.[a] | | | 1906.[b] | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of works. | Quantity. | Value. | Number of works. | Quantity. | Value. | Number of active works. | Quantity. | Value. |
| Alabama | 1 | | | 1 | | | 1 | | |
| Arizona | | | | | | | 1 | | |
| California | 3 | 1,014,558 | $1,446,909 | 3 | 1,225,429 | $1,671,816 | 3 | 1,310,435 | $2,110,294 |
| Colorado | 1 | 490,294 | 638,167 | 1 | 786,232 | 1,172,027 | 1 | 1,146,396 | 2,034,382 |
| Georgia | 1 | | | 1 | | | 1 | | |
| Illinois | 5 | 1,326,794 | 1,449,114 | 5 | 1,545,500 | 1,741,150 | 4 | 1,858,403 | 2,461,494 |
| Indiana | 4 | 1,350,714 | 1,232,071 | 6 | 3,127,042 | 3,134,219 | 6 | 3,951,836 | 4,964,855 |
| Kansas | 2 | 2,643,939 | 2,134,612 | 4 | | | 4 | 3,020,862 | 3,908,708 |
| Kentucky | 1 | | | 1 | | | 1 | | |
| Michigan | 16 | 2,247,160 | 2,365,656 | 16 | 2,773,283 | 2,921,507 | 14 | 3,747,525 | 4,814,965 |
| Missouri | 2 | | | 2 | 3,879,542 | 4,164,974 | 2 | 3,350,000 | 3,260,000 |
| New Jersey | 3 | 2,799,419 | 2,099,564 | 3 | 3,654,777 | 2,775,768 | 3 | 4,423,648 | 4,445,364 |
| New York | 11 | 1,362,514 | 1,257,561 | 11 | 2,111,411 | 2,044,253 | 9 | 2,414,362 | 2,725,744 |
| Ohio | 7 | 910,297 | 987,899 | 8 | 1,312,977 | 1,390,481 | 8 | 1,422,901 | 1,709,918 |
| Pennsylvania | 17 | 11,496,099 | 8,969,206 | 18 | 13,813,487 | 11,195,940 | 19 | 18,645,015 | 18,598,439 |
| South Dakota | 1 | | | 1 | | | 1 | | |
| Texas | 2 | | | 3 | | | 2 | | |
| Utah | 1 | | | 1 | | | 1 | | |
| Virginia | 1 | 864,093 | 774,360 | 1 | 1,017,132 | 1,033,732 | 1 | 1,172,041 | 1,432,023 |
| Washington | | | | 1 | | | 1 | | |
| West Virginia | 1 | | | 1 | | | 1 | | |
| Total | 81 | 26,505,881 | 23,355,119 | 89 | 35,246,812 | 33,245,867 | 84 | 46,463,424 | 52,466,186 |

[a] The States combined for 1904 and 1905 are mentioned in the text of the reports for those years.
[b] The States combined for 1906 are given in the text below.

As heretofore, the production of those plants which are the only ones in their States are so combined that the figures may not be published in a form which will reveal individual production.

The cards of request for figures and information annually issued by this office state that all facts and data sent in are regarded as confidential unless there is a special understanding to the contrary. Individual figures showing quantity or value of production are very seldom published, and if in rare instances such a publication is considered desirable it is never made without express permission from the producer.

In the foregoing table the outputs of Alabama, Georgia, West Virginia, and Virginia are combined; the production of Kentucky is given with that of Missouri; Colorado, Utah, Texas, South Dakota, and Arizona are combined; and in each instance the total sum of the combined figures is placed against the name of the State that contributed the largest quantity of cement to that total.

In 1906 there was great activity in the Portland-cement industry. States which have heretofore not produced cement began the erection of Portland-cement plants; mills that were making their initial runs did well; and some of the centers of activity increased their productive capacity, either by constructing new plants or by remodeling old ones.

Indian Territory, Iowa, and Arizona appear in 1906 for the first time in the list of cement-producing States.

In Kansas four new companies erected plants near the Iola center, which offers great inducements to capitalists by reason of its vast limestone deposit and its natural-gas belt. In addition to this fact the State is centrally located and can find a profitable market in any direction. In Pennsylvania, that great center of Portland-cement making, where the largest plants in the world are operating, five additional plants are now being built; Kentucky and Tennessee, in the South; Utah, Michigan, and Wisconsin, in the North and West; and Montana and Washington, in the extreme Northwest, are all either actively building or are planning to build new Portland-cement plants; while Missouri, which already has a large production, is now adding three plants to her present capacity. California has changed from being a large importer to being a large producer, and is increasing the capacity of present plants as well as constructing new ones.

The rank of the Portland-cement-producing States remains as it was in 1905 so far as place goes, though the record as to the proportion of the production that gave each State its place has changed considerably. Pennsylvania, of course, is at the head of the list; but while in 1905 her lead was a little above 10,000,000 barrels this year her surplus above New Jersey, her closest competitor, is well over 14,000,000 barrels, and in spite of the great increase in the output of the entire country Pennsylvania manufactures 40.1 per cent of the total product. This percentage is a little larger than it was in 1905 and in that year it was less than in 1904, but that falling off merely indicated a great increase in the total production, and not a decrease in Pennsylvania's output.

In 1906 New Jersey, although she has but three producing plants, still holds her place as second largest producer of Portland cement. Her lead over the other States standing next is not very large, however, and the increase in the capacity of the plants of the Western States may result in displacing her within a short time. Her production this year amounted to 9.5 per cent of the total output.

Indiana approaches New Jersey a little more closely in 1906 than in 1905, and leads Michigan by a diminished quantity. For the last few years the difference between the production of these two States has not been large. Indiana's output in 1906 was much greater than that for the preceding year, and her production was 8.5 per cent of the whole. These three States, which head the list, made more than 58 per cent of all the Portland cement produced in the country in 1906.

Michigan still holds fourth place, as in the previous year.

The table which follows shows the growth of the cement industry in the United States. Its form was originally determined by the fact that the cement production was confined mainly to certain well-defined centers, but changes in conditions since 1900 have necessitated a change in form.

Under "all other sections" is included the production of Alabama, Arizona, California, Colorado, Georgia, Illinois, Indiana, Kansas, Kentucky, Missouri, South Dakota, Texas, Utah, Virginia, West Virginia, and of other counties in Pennsylvania than Lehigh and Northampton counties.

*Development of the Portland-cement industry in the United States since 1890.*

| Section. | 1890. | | | 1900. | | |
|---|---|---|---|---|---|---|
| | Number of works. | Quantity (barrels). | Percentage. | Number of works. | Quantity (barrels). | Percentage. |
| New York | 4 | 65,000 | 19.4 | 8 | 465,832 | 5.5 |
| Lehigh and Northampton counties, Pa., and Warren County, N. J. | 5 | 201,000 | 59.9 | 15 | 6,153,629 | 72.6 |
| Ohio | 2 | 22,000 | 6.5 | 6 | 534,215 | 6.3 |
| Michigan | | | | 6 | 664,750 | 7.8 |
| All other sections | 5 | 47,500 | 14.2 | 15 | 663,594 | 7.8 |
| Total | 16 | 335,500 | 100.0 | 50 | 8,482,020 | 100.0 |

| Section. | 1905. | | | 1906. | | |
|---|---|---|---|---|---|---|
| | Number of works. | Quantity (barrels). | Percentage. | Number of works. | Quantity (barrels). | Percentage. |
| New York | 11 | 2,111,411 | 6.0 | 9 | 2,414,362 | 5.2 |
| Lehigh and Northampton counties, Pa. | 15 | 13,713,910 | 38.9 | 17 | 18,360,965 | 39.5 |
| New Jersey | 3 | 3,654,777 | 10.4 | 3 | 4,423,648 | 9.5 |
| Ohio | 8 | 1,312,977 | 3.7 | 8 | 1,422,901 | 3.1 |
| Michigan | 16 | 2,773,283 | 7.9 | 14 | 3,747,525 | 8.1 |
| All other sections | 36 | 11,680,454 | 33.1 | 33 | 16,094,023 | 34.6 |
| Total | 89 | 35,246,812 | 100.0 | 84 | 46,463,424 | 100.0 |

## THE PORTLAND-CEMENT INDUSTRY, BY STATES.

*Alabama.*—In 1906 there was but one active Portland-cement factory in Alabama, the new plant of the Standard Portland Cement Company not having been completed and started until just after the close of the year. The active plant ran continuously for the greater part of the year, having been idle for a short time only, owing to a lack of car service. The plant produced practically double the quantity of cement made during 1905. A project to establish a large plant for the manufacture of Portland cement at Ragland is reported, but the erection of the factory is not yet commenced.

*Arizona.*—The only cement plant in Arizona, that of the United States Reclamation Service is located at Roosevelt, and made its initial run in 1906, producing a quantity of Portland cement sufficiently large to fill the stock bins, when, by reason of that fullness, as well as of a shortage in oil for fuel, it shut down for a time. The success of the plant has apparently stimulated the hitherto unworked cement industry in this State, as a plant for the production of Portland cement, it is reported, is about to be established at Prescott.

*Arkansas.*—There is but one cement plant in Arkansas, and its latest production of Portland cement was made in 1903. A plan is now being formed to modernize the plant, beginning with a capacity of 1,500 barrels a day, and building with the expectation of doubling this output very soon after the mills are started.

*California.*—The cement industry in California was very prosperous in 1906, notwithstanding the earthquake. The three active plants reported in 1905 were in operation in 1906, and an additional plant was completed at Davenport, but did not produce any cement until the year had closed. One of the two plants near San Francisco ran ahead of its production for 1905, and the other fell slightly behind by reason of a strike among the workmen. Both of these companies suf-

fered the loss of their offices, which were located in San Francisco, but their factories were not injured. One factory installed ten additional kilns. The plant at Colton, which has offices in Los Angeles, ran far ahead of its production for 1905. Two of the three active companies in the State sold their product at prices in advance of those for 1905. One company in the State is about to build a large plant in Washington. The new plant at Davenport opened with a capacity of 6,000 barrels a day, which output is to be doubled after a short run. All cement manufacturers in this State use oil as fuel.

*Colorado.*—The single cement plant in Colorado ran on full time throughout the season. The overhauling and remodeling accomplished early in 1906 resulted in a much increased production, the figures showing larger results than those of 1905 as to both quantity and value per barrel. There is no immediate prospect that other mills will be erected in this State and no new projects are reported, the project attempted in 1905 having been abandoned.

*Georgia.*—Better prices, a greatly increased output, and a successful season formed the record in 1906 for the Portland-cement plant in Georgia. The company owning this factory made practically the same record in 1905, when it greatly increased its production over that of the preceding year. The output reported each year since the opening of the mill has shown an advance over that for the preceding year.

*Illinois.*—Four plants were engaged in the production of Portland cement in Illinois in 1906, and their output was nearly 2,000,000 barrels. The record in this State was in accord with the almost universal rule of better prices and increased output for 1906. The production of each of the four plants was greater than that for the previous year, although the increase was not in the same ratio.

In October the Universal Portland Cement Company took over the cement plants and cement business of the Illinois Steel Company. The new company is building an additional plant in Indiana and a new one in Pennsylvania, each of which will be in operation early in 1907. All the factories operated by this company make Portland cement from slag and limestone, which, after being thoroughly dried and ground together in proper proportions, are burned to clinker in rotary kilns.

The plant reported to this Bureau by the Sandusky Portland Cement Company as about to be erected at Dixon, Ill., is still under construction and will probably be in operation in 1907.

*Indiana.*—The Portland-cement industry is a growing one in Indiana. The production in 1906 was the output of six plants, and was sufficient to keep Indiana in the third place among the Portland-cement-producing States, a rank attained only in 1905. The new plant at Speeds was in operation, and the combined production of the State amounted to nearly 1,000,000 barrels more than that for 1905. Of the five older factories, all but two ran ahead of their output in 1905. One of these two reported the same production as for 1905, but the price obtained was greater. The second plant ran considerably behind its previous record. The other three made from 100,000 to 700,000 barrels more than in 1905. There were no important shut downs during the year, the necessary repairing being the greatest cause of brief delays in manufacture. Only one entirely new factory is reported for Indiana, though in 1907 there will be two, and possibly three, additional plants in operation. The first new mill is being erected by the Universal Portland Cement Company at Buffing-

ton near its No. 1 mill. This older plant was a part of the cement interests of the Illinois Steel Company, all of which were taken over in 1906 by the Universal Portland Cement Company. The second mill, located at Kimmel, Ind., which is just completed and now in operation, will report a production at the close of 1907. The third plant, which is a possible producer for 1907, is a nearly completed mill at Marengo.

*Indian Territory.*—For the first time Indian Territory appears in the text of the cement report. Two cement plants in this Territory are now being erected, one at Ada, by the Oklahoma Portland Cement Company, and one at Dewey, by the Dewey Portland Cement Company. The first company expects to have its mills in operation late in the summer or early in the fall of 1907. Both the plant and its main offices will be located at Ada. Machinery will be installed for a production of 1,000 barrels of cement a day; but the buildings will be erected to accommodate a 2,000-barrel plant. The factory is located only a short distance south of the Canadian River, in the southern portion of the State. The second company has built its plant at Dewey, and has constructed it with a capacity of 2,500 to 3,000 barrels of Portland cement a day. The mills will be in active operation in the fall of 1907.

*Iowa.*—Like Indian Territory, Iowa appears for the first time in this report as a cement-producing State. The Northwestern States Portland Cement Company is now constructing a large plant at Mason City for the manufacture of high-grade Portland cement. The factory is to have a capacity of 3,000 to 3,500 barrels of cement a day, and will be built in the general fashion of the mills owned by this company at Independence, Kans. Twelve large rotaries, 110 feet long, will be installed, and the grinding machinery will consist of ball and tube mills, Kent mills, etc. The plant will be finished and ready for work by October, 1907.

*Kansas.*—Each of the four Portland-cement plants in this State produced an output in 1906 which was in advance of that for the preceding year. One of these plants made more than eight times as large a quantity in this, its second year, as it made in 1905, while the other year-old plant made over fourteen times more than in its initial year. In 1905 the older plants naturally produced more cement than the new ones, and therefore their increase in 1906, although marked, is not so far in advance of the preceding year's output as that of the new mills. Three of the factories ran on practically full time during 1906, and one was idle for nearly six months repairing and remodeling. It is reported that six new cement plants will be in operation or completing construction in 1907. One is to be located at Iola, and will probably start during the fall or early in the winter. One is to be at Fredonia, and will perhaps be in running order by June at the latest. This company will start with two kilns, at least 110 feet long, and the buildings will all be constructed with a view to enlarging the capacity of the plant later. The third plant is to be at Elk City, in Montgomery County, and will have a capacity of about 2,000 barrels a day. Preliminary excavation and grading is now being done, but the mills will not be ready for work before 1908. The fourth plant will be erected about 3 miles east of Mapleton, in Bourbon County. It will start with a capacity of about 2,000 barrels of cement a day, with six kilns, 125 feet long by 8 feet in diameter; the mills will be in opera-

tion late in 1907 or early in 1908. The fifth plant is under construction at Yocemento, and is to begin producing Portland cement in November, 1907. The mills will start with two rotaries, each 125 feet in length. Oil will be the fuel used, and shale, lime, and chalk the materials. The sixth of the new plants is being built at Bonner Springs, and its first section, capable of producing about 800 barrels of Portland cement a day, will be in working order by January, 1908. The other section, which will exactly double the capacity of the mills, will be completed later in that year. With more than double her present number of plants, Kansas bids fair to reach a high place in the list of cement-producing States, for already she has risen from a record of no Portland-cement production prior to 1900 to the sixth place in the list in 1906, with over 3,000,000 barrels to her credit.

*Kentucky.*—Only one plant was actively engaged in the production of Portland cement in Kentucky in 1906, and it made a remarkably good showing for its second output. There was no cause for idle mills, and the plant was active all the year, using its four rotaries constantly.

A new plant is now under construction at Stanton, in this State, which will have its main offices in Lexington. It will not become active before the fall of 1907. The property of this company is nearly 1,000 acres in extent. The fuel for supplying light and power is to be natural gas, of which there is an abundant supply. Transportation facilities are excellent.

*Michigan.*—The Portland cement manufactured in this State in 1906 was produced at 14 plants, and the output amounted to nearly 1,000,000 barrels more than that of 1905. This advance was not sufficient, however, to restore Michigan to third rank in the list of Portland-cement-producing States, which was the position she held from 1900 to and including 1904. Many of the plants produced cement through the entire season, running on full time. Several closed down during the winter months for repairs; some of the mills were inactive for a short period because of inability to get coal, due to a coal strike. One plant increased its size, and one was reconstructed. The Hecla factory was reopened in July, and was in active operation through the rest of the year.

Of the remaining companies reporting from this State, four are erecting mills which are in various stages of construction. All of these four plants have heretofore been reported to this Bureau. One of these, it is expected, will be complete and ready for work next season. The other three are apparently not quite so far advanced, no dates for completion being mentioned. One plant which was active for a short time is now idle. Of the five other companies reporting, three state that they are still striving to attain tangible existence, one states that it has not yet sought to do more than organize but may build in a few years, and a third reports that the work of perfecting titles to land and erecting large Portland-cement plants in 3 other States, has thus far prevented the erection of a plant in Michigan. One entirely new company is building a plant in the northern part of the State, and expects to be in operation about 1908, with a capacity of 3,000 barrels of Portland cement a day.

*Missouri.*—In many respects the records of this State for 1905 and 1906 are similar, for in 1906 two plants produced the entire output of

Portland cement made in Missouri, and each of these increased its production over that of the preceding year, as in 1905. The plant located just outside of Kansas City was reconstructed to produce an output about three times as large as that originally intended, and it is still undergoing the process of enlargement. The mills of the Louisiana plant are not yet put up and the organizers are unable to give any indication as to when they will be erected or become active. A new plant at Courtney, about 10 miles east of Kansas City, on the main line of the Atchison, Topeka and Sante Fe Railway, will probably be put into active operation within a year. Seven kilns, 125 feet long by 8 feet in diameter, will be installed, with a minimum capacity of 2,500 barrels of Portland cement a day. The company will also install machinery of capacity sufficient to grind a week's or ten days' supply of raw material ahead, and the same provision will be made at the finishing end of the process. The continued yearly increase in production of the factory at Hannibal is notable. This year it fell only about 25,000 barrels below 1,000,000 barrels more than the output for 1905. Another new plant is being erected at a place about 4 miles west of Carondelet, a suburb of St. Louis, by a company that is now engaged in the manufacture of cement in one of the Eastern States. The plant is located on a tract of land covering about 150 acres, which is traversed by Gravois Creek. A well-known brick company of St. Louis has been making brick and quarrying stone on this property for years, and has stripped off quantities of clay, and opened a quarry face of large extent, thus making cement materials readily available. The rock is all above the level of the mills, and the materials will be moved to the factory by gravity. The plant will start with six rotary kilns, each 110 feet in length by 8 feet in diameter, and will have a daily producing capacity of 3,000 barrels. The power will be electrical.

*New Jersey.*—In 1906 New Jersey maintained the rank she has so long held, the second in the list of Portland-cement-producing States in this country. There were no additional cement plants opened, though projected factories were reported. The output was made, as heretofore, by the three large plants which have been manufacturing New Jersey's Portland cement for several years. The output of two of these factories was larger than in 1905, while that of the third ran far ahead of its previous production. The combined increase shows figures that are more than 750,000 barrels in advance of those for 1905. All the mills were in operation throughout the entire year.

*New York.*—The record of New York for 1906, so far as its production of Portland cement is concerned, practically duplicates its record for 1905. Nine plants were in operation, and nearly all of them manufactured a larger quantity than during the preceding year. One of the plants was shut down for several months in order to undergo extensive enlargement and improvement. Of the others, some ran almost continuously and some were closed down a short time for necessary repairs. One factory that has for years successfully produced Portland cement by burning it in the old-style dome or vertical kiln, changed its method of manufacture to the newer kiln, and installed large size rotaries, the result of the change being an increased production. Some of the plants increased their output over that of the preceding year; some of them decreased it slightly. One mill which has for many years reported a production of both Portland

and natural cement, in 1906, for the first time, made only Portland cement. No new Portland-cement factories are reported from this State in 1906.

*Ohio.*—The cement industry has grown and is growing in Ohio. All three of the varieties reported in this pamphlet are produced in this State, but the chief cement produced is Portland. Eight plants were active in 1906, and two new factories, designed to produce Portland cement in large quantities, were nearing completion at the close of the year. Seven of the eight active mills ran a few thousand barrels ahead of their production for 1905, and the eighth mill ran about 1,200 barrels behind. The variation from the record of 1905 was not marked, either one way or the other, in any plant, and the State total showed only a small increase over that reported in 1905. At one of the plants a fire caused a shut down for about forty days. At another mill production was suspended for about three months in order to make extensive improvements. The other plants ran on full time except for a few weeks when necessary repairs were being made.

One of the new plants is located at Portsmouth, and will be started up in the summer or fall of 1907, with a capacity of 1,500 barrels of cement a day. The kilns are 100 feet in length, and the plant is so arranged as to allow an immediate increase in capacity of 500 to 1,000 barrels a day. The other new plant is at Center Furnace, in Lawrence County, and will be put into operation during the summer of 1907. It is built with a capacity of 2,000 barrels a day and has four kilns installed, each 125 feet in length. At both plants the materials used will be limestone and shale. Of the eight active factories, five use limestone and three use marl.

*Pennsylvania.*—From 1890, when with six plants Pennsylvania produced less than 250,000 barrels of Portland cement, to 1906, when with nineteen active plants its record of production exceeds 18,500,000 barrels, this State has stood at the head of the Portland-cement-producing States in this country. It has inexhaustible deposits of limestone and cement rock—the materials most commonly used in the manufacture of Portland cement in this locality—and its production has this year gone ahead of that of any other State by more than 14,000,000 barrels. There were nineteen plants engaged in the manufacture of this output, of which fifteeen produced exclusively Portland cement, and the remaining four produced both Portland and natural cement. A mill owned by one of the larger companies in the State was damaged by fire, and its output was lessened by the lack of production during repairs. In another mill owned by the same company extensive alterations caused a shut down of several months. The company is now building another large and well-equipped plant at Fogelsville, which will be in active operation next year. Two companies suffered losses by fire and three others were idle for a part of the year because of alterations and improvements made in their plants. The majority of the mills ran steadily throughout the year with only the delays caused by necessary repairs. Satisfactory initial productions were made by the new mills that started in 1906, and five plants now under construction will be producing before or during 1908 if their present plans are carried out. One of these factories is being built at Nazareth by the Atlantic Portland Cement Company; another is the new factory to be erected by the Crescent Portland Cement Company at Wampum, which will be finished as soon as possible. The third plant is to be located at Chestnut Hill, in Mon-

roe County, and will be built by the Monroe Portland Cement Company. Its minimum capacity will be 1,000 barrels of cement a day, and the company now proposes to manufacture, in addition to Portland cement of the usual high grade made in this State, a pure white Portland of the same quality as any first-class Portland cement. This, it is specifically stated, is an entirely new product. The fourth new plant is that now being built by the Universal Portland Cement Company at Universal near North Bessemer. This factory will use the slag from the Carnegie Steel Company's furnaces at the Homestead works, whence also electric power will be transmitted to the plant. The rotary kilns will be 120 feet long by 7 feet 6 inches in diameter. All the buildings, including the bins for raw material, the dryer building, raw material mill, burner building, finishing mill, stock houses, and miscellaneous buildings—such as the office, laboratory, and machine shop—are being built entirely of steel and concrete. The cement made by this company goes through all the processes required for producing a true Portland cement, and the finished product meets all the requirements for such an article. It should not be confused with slag cement, which is not burned in rotary kilns and is not at all the same as Portland cement.

The fifth new enterprise reported from this State is the plant now under construction by the Conestoga Portland Cement Company in Lancaster County, about 7 miles from Lancaster, on the Conestoga and Cocalico rivers. The beginning of the building operations was somewhat delayed by the fact that the company was compelled to wait for a line to be constructed by the Lancaster and Northern Railway giving connection with the Pennsylvania and the Reading railroads. The factory will have a daily capacity of 2,000 barrels of Portland cement, and will be started with four kilns 100 feet in length by 8 feet in diameter; the buildings are to be so arranged as to leave space for additional kilns and machinery which will increase the output to 3,000 barrels a day. The company expects to be operating late in the spring or early in the summer of 1908.

One company which has reported a production for several years past was adjudged bankrupt and has sold its plant and holdings to a new company, which will continue the business under a new name in 1907. The present year was given to remodeling and repairing the plant.

In this State four factories were reported as idle during 1906.

*South Dakota.*—The plant which produced the Portland-cement output of this State in 1906 continues to be the only cement mill in South Dakota. Since it has been rebuilt its production has been considerably greater than in 1905, although the output for that year was more than four times as large as any ever before reported from this mill. The factory was in operation throughout the year.

The erection of a second plant has been postponed for a time by the promoters, who last year reported that the project was well under way.

*Tennessee.*—This State, which has not figured in the reports of this office on the production of cement since 1890, is about to become again a producer of Portland cement. Late in 1906 the erection of a plant was begun by a company having large interests in cement production in Kansas, and it expects to begin operating the new plant within a year from the time building was commenced. There will be ten rotary

kilns installed, each 110 feet in length by 8 feet in diameter, with about 4,000 horsepower of steam engines and boilers. In the vicinity of the plant, which is located near Copenhagen, there is an abundance of coal, and this will be the fuel used.

*Texas.*—In 1906 two plants in Texas were producing Portland cement. One of these manufactures a well-known brand of natural cement, as well as Portland, while the other is engaged exclusively in making Portland cement. The first plant reported a production of Portland cement which was very slightly less than its output for the preceding year; the second plant reported a large output, nearly double that for 1905, and many times greater than the Portland production of the other factory. This is only the second output reported from this plant since it was remodeled. It ran on full time throughout the year, and had only a few thousand barrels of cement in stock when the year closed.

*Utah.*—The construction of the new Portland-cement plant near Ogden, in Utah, was slower than the company expected, and therefore its first production will be reported for 1907 instead of 1906. The mills will be completed late in the spring and will be active the rest of the year. The one plant in Utah which has been a steady producer of Portland cement since 1891, when its first output was reported by this Bureau, is located in Salt Lake City. Its production in 1906 was greater than that for the preceding year. This record is the usual one, however, as the production of this plant has steadily increased for a number of years. Except for a few weeks during which the mills underwent the regular annual overhauling, this factory was continuously active during the year. The company formed in 1905 to build a second plant in or near Salt Lake City was dissolved and the project was abandoned in 1906.

*Virginia.*—In Virginia there is only one Portland-cement-producing plant, and that one is entirely successful. Its customary yearly increase in production was marked in 1906, and the mills were active throughout the entire year, except on several holidays. The company is now installing three additional kilns, 125 feet long, and the grinding machinery necessary to keep them active. When the alterations are completed, the factory will be capable of producing 1,000,000 barrels of Portland cement a year. The plant projected in this State by a cement company now active in Pennsylvania has not yet been carried far enough to permit building operations.

*Washington.*—The new plant built in 1905 and 1906 in Washington is now ready for use, but was not in operation last year. It is very favorably located, and the town that has grown from it is called Concrete. This is the first factory erected in the extreme Northwest, and its initial production will be of interest. Its nearest neighboring cement plants are in North Dakota, Utah, and California, to reach which, from Washington, either Montana, Idaho, or Oregon must be crossed.

*West Virginia.*—At the only active Portland cement-mill in West Virginia in 1906 the reported production decreased by reason of idleness during the installation of new machinery and additional kilns to increase capacity. The enlarged factory will have an output for next year much in advance of that for previous years, if nothing unforeseen occurs. Two other plants which were located in this State have been

discontinued. One has failed to produce any cement for several years, and the other was never wholly completed.

*Wisconsin.*—This state has long been a producer of natural cement, but until now has never had a plant for producing Portland cement. At present, however, such a plant is under construction near Baileys Harbor, in Door County. The material used will be marl of very high grade. This plant will have a capacity at the start of 2,000 barrels of cement a day. The increase of the plant's capacity depends on the success of the venture.

## NATURAL CEMENT.

The natural-cement industry in 1906 declined in production as compared with the output of the preceding year. This industry fluctuated between a production of 7,000,000 and 8,000,000 barrels from 1900 to 1904, when it fell to a little more than 4,500,000. In 1905 it decreased to a little less than 4,500,000 and in 1906 it stood at just above the 4,000,000 mark.

It seems unlikely that this form of cement making will ever revive to a very marked extent, because, although there will always be work for which natural cement can be used with perfectly satisfactory results, there are many kinds of work for which it is unsuited. Besides that, the result of the process of making natural cement is always uncertain, depending on chance to a great degree, while the result of making cement in rotary kilns, with the machinery which produces a scientific mixture of ingredients that varies only between well-defined limits, is nearly certain.

A number of natural-cement companies have changed their mills entirely, installing rotary kilns preparatory to Portland production; a few have added Portland mills to their natural-cement mills, and several plants that formerly produced both kinds of cement have abandoned, at least for the present, the production of the natural variety and in 1906 produced Portland cement only. A large number of plants which for years made big records as producers of natural cement, during the year even stood idle in the States where this industry has been most flourishing.

### PRODUCTION.

The total production of natural cement in the United States in 1906 amounted to 4,055,797 barrels, and had a value of $2,423,170. This quantity is less than 500,000 barrels below the production for the preceding year, but it shows a larger falling off than was then shown. However, although the quantity of natural cement produced was so much smaller than the quantity of Portland, yet the reports from the factories from various parts of the country seem to indicate that the percentage of natural cement left in the bins unsold at the close of the year was less, proportionately, than that which remained unsold of the Portland output.

The following table shows the quantity and the value of the natural cement made in the United States in 1904, 1905, and 1906:

*Production, in barrels, of natural cement in 1904, 1905, and 1906, by States.*

| State. | 1904. | | | 1905. | | | 1906. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of works. | Quantity. | Value. | Number of works. | Quantity. | Value. | Number of works. | Quantity. | Value. |
| Georgia | 2 | 66,500 | $37,750 | 3 | 89,167 | $51,040 | 3 | [a] 180,500 | $98,075 |
| Illinois | 3 | 360,308 | 113,000 | 3 | 368,645 | 116,549 | 3 | 365,843 | 118,221 |
| Indiana | 13 | 735,906 | 367,953 | 12 | 527,600 | 211,040 | 12 | 600,000 | 240,000 |
| Kansas | 2 | 210,922 | 79,456 | 2 | 230,686 | 110,750 | 2 | 238,311 | 129,781 |
| Kentucky | 2 | 264,104 | 132,052 | 2 | 207,500 | 83,000 | 2 | 170,194 | 95,539 |
| Maryland | 4 | 65,000 | 32,500 | 4 | 55,324 | 28,694 | 4 | [a] 63,350 | 32,675 |
| Minnesota | 2 | 138,000 | 65,620 | 2 | 115,314 | 57,643 | 2 | ..... | ..... |
| Nebraska | 1 | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... |
| New York | 19 | 1,911,402 | 1,138,667 | 16 | 1,926,837 | 1,332,809 | 16 | [a] 1,515,866 | 1,055,785 |
| North Dakota | 1 | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... |
| Ohio | 1 | ..... | ..... | 1 | 64,791 | 51,235 | 1 | ..... | ..... |
| Pennsylvania | 5 | 770,897 | 298,533 | 5 | 748,057 | 306,555 | 4 | 744,403 | 560,534 |
| Texas | 1 | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... |
| Virginia | 2 | 93,292 | 59,619 | 2 | ..... | ..... | 1 | ..... | ..... |
| West Virginia | 1 | ..... | ..... | 1 | ..... | ..... | 0 | ..... | ..... |
| Wisconsin | 2 | 250,000 | 125,000 | 2 | 139,128 | 63,737 | 2 | 177,330 | 92,560 |
| Total | 61 | [b] 4,866,331 | 2,450,150 | 58 | [c] 4,473,049 | 2,413,052 | 55 | 4,055,797 | 2,423,170 |

[a] As shown by the returns to this office, a small quantity of hydraulic lime was produced in Georgia, Maryland, and New York. The combined output of these States is 40,800 barrels, valued at $19,300, and is included in the total of natural cement production for 1906.

[b] The States combined for 1904 and 1905 are noted in the text of the reports for those years.

[c] The States wherein the cement product was combined with that of some other State for 1906 are given in the text below.

The combinations of figures for total State productions necessary to conceal individual outputs in 1906 are as follows:

Wisconsin, North Dakota and Minnesota are grouped together; Kentucky, Ohio, and Virginia form a second group; and Texas and Kansas complete the combinations. As is the custom, the State making the largest contribution to the total in these groups carries the entire quantity.

New York ranks first, as always, in this production, with Pennsylvania second, and Indiana third.

## THE NATURAL-CEMENT INDUSTRY, BY STATES.

The following statement includes only States which have plants that actually manufactured natural cement in 1906, or which have plants that are reported as likely to become active at any time. In a number of States that have for years reported productions of this oldest of all cements, only idle plants now exist; and in several States, as in Florida, the works are completely dismantled. Thus the States recorded do not include all those in which abundant materials for this and other varieties of cement may be or have been found.

*Georgia.*—There were three plants producing natural cement in Georgia in 1906, and they all had a prosperous year. Two of them were closed long enough to install new machinery and to make necessary repairs. Practically the entire output of these plants was sold, so that but a small number of barrels were left on hand at the close of the year, though they all ran ahead of their productions for 1905. No new plants were reported for 1906.

*Illinois.*—In Illinois there are three natural-cement plants, and all of them were active in 1906. Of the two older plants, one was a con-

tinuous producer throughout the year, but its production was not so large as that for 1905; and the other, though idle a part of the time because of a scarcity of labor, still ran slightly ahead of its 1905 output. The third plant produced more cement than was made in 1905. It was closed down three months for repairs, and had some of its stock left in the bins at the close of 1906.

*Indiana.*—The condition of the cement industry in Indiana remains practically the same as it was in 1905. Most of the mills in what is known as the Louisville district, which for many years was one of the great centers of production for natural cement, now find it more profitable to remain inactive and allow their "quota" to be burned and ground in one of the big mills, and handled by the general selling agent for the various companies, than to make and sell their product as individuals. There were, however, several mills besides those which made cement for the idle plants that were active in 1906, but none of them ran for more than a few months. The prospect of converting a number of these factories into Portland-cement plants is being seriously considered in this region. The quantity of natural cement manufactured in this State was slightly above that produced during 1905. The sale of the output was readier and less of it remained in stock at the end of the year than in 1905.

*Kansas.*—The natural-cement industry in Kansas is much older than the manufacture of Portland cement, and the two plants that produced natural cement in 1906 ran ahead of the output for 1905, though the increase was but slight. One plant was closed down for a few weeks in order to dispose of the stock on hand and avoid over production; and the other ran continuously. In each only a small percentage of the output was left on hand at the close of the year. One of these companies is contemplating the enlargement of the factory to produce Portland as well as natural cement, as an abundance of suitable material for such a production is available, but no final steps have yet been taken in the matter.

*Kentucky.*—The two mills in Kentucky which make natural cement were active in 1906. They are situated on a ledge of rock on the Kentucky side of the Ohio River, and are owned by the same company. Their output during 1906 was not quite equal to that of 1905. They ran continuously throughout the year.

*Maryland.*—Only two natural-cement mills were active in Maryland in 1906. Two others were idle, one of them reporting that it has closed down permanently. The other was idle because there was no demand for natural cement which it could supply. The active mills produced small outputs, and neither of them ran continuously throughout the year. One of the four companies in Maryland has under consideration the erection of a mill to produce Portland cement, but the plant, if built, will be located in a neighboring State.

*Minnesota.*—Owing to a lack of plants in neighboring States, the production of natural cement in Minnesota has continued to be profittable, even after the industry waned in other localities, but in 1906 there was but a small production in the State, and a lack of trade is reported. Both of the two plants were active, and their production ran a few thousand barrels in advance of that for 1905. Each of the mills was idle for a short period in the winter months, partly because of the severe weather and partly because the demand was not good.

*Nebraska.*—The plan to start up the single cement factory in Nebraska and make natural cement in 1906 was not carried out and the plant was idle through the year, because there was no demand for natural cement in this State.

*New York.*—The natural-cement output for the State of New York was made by nine plants in 1906, this fact showing very clearly the extent to which this branch of the cement industry has declined in the Rosendale district, which was for many years to the natural-cement production what Pennsylvania now is to the Portland output. Nearly every one of the nine active plants produced less cement than in 1905. One company was overhauling its mills throughout nearly the whole season; a number of the plants were idle during the winter months; another company reports that a shut down of one-third of the usual time of activity was due to lack of orders; still another reports several months' idleness for the same reason. The companies that were active ran their plants on about half time for at least a portion of the season. Six companies report that their factories were closed down throughout the year, and one company which in former years invariably recorded a large production reports that the plant has practically ceased to make cement and has turned to the manufacture of lime and other similar products.

*North Dakota.*—The single cement plant in North Dakota reported a small production in 1906, being idle part of the season on account of the scarcity of labor. No cement is produced here through the winter months, because of the severity of the weather.

*Ohio.*—Two natural-cement plants were idle and one was active in Ohio in 1906. One of these plants is idle because the owner does not desire to run his factory, neither does he wish to sell. The other plant stood idle through the year because of the small profit to be had by running the factory. The third plant was active through the entire year, except a short time for necessary repairs, made a fine production, and sold it all, closing the year with empty storage bins.

*Pennsylvania.*—In Pennsylvania there were no plants devoted exclusively to the production of natural cement in 1906. The entire quantity produced there was made by plants that were also engaged in manufacturing Portland cement, and at all of these the production of Portland was much larger than that of natural-rock cement. These plants, four in number, produced an output smaller than that of the preceding year by only a few thousand barrels. They were all active continuously, except where it was necessary to close down a few weeks for repairs, and the product was almost completely disposed of when the year closed. One plant that had a suitable equipment for the production of natural cement remained idle all the year, so far as that part of the plant was concerned. No new natural-cement plants are reported.

*Texas.*—The natural cement made in Texas in 1906 was manufactured by a plant which also had a production of Portland cement. In 1906 its production of natural cement ran ahead of that for 1905, though such was not the case with its other output. The remaining factory for producing natural-rock cement was idle throughout the year. It has not been active for several years, and it is doubtful if it will ever be fired again as it now stands.

*Virginia.*—In 1906 the natural-cement industry in Virginia was not very prosperous, though the output of its one active plant was but

little less than double its output in 1905. The plant was idle during some bad winter weather, and also by reason of the limited demand for this variety of cement. However, at the close of the year, only a small portion of the product was unsold. The other plant which was active in the early part of last year, became idle late in 1905 and remained so through 1906. It is reported that this factory has permanently abandoned the natural-cement industry. The total production of the State in 1906 was somewhat in excess of that for 1905.

*West Virginia.*—Neither of the plants in West Virginia which have in the past produced natural cement was active in 1906. One seems to have been abandoned completely and the other is reported to be involved in litigation.

*Wisconsin.*—Two natural-cement plants have been active in Wisconsin for many years until 1906, when one of them was idle continuously by reason of the lack of demand for this variety of cement. This plant may be offered for sale to a company projecting the erection of a factory to produce Portland cement. The other mill was active during the greater part of the year and made a large quantity of cement. This production, however, fell short of that for 1905 by a few thousand barrels. It was sold before the close of the year, but the failing demand for this variety of cement was apparent in Wisconsin as in other States.

## PUZZOLAN CEMENT.

The slag-cement industry continues to be of slow growth, for in 1906 only one plant for making puzzolan or slag cement was finished and started to work. It is located in New York State. This is the first time this variety of cement has been made in New York. An advantage of the slag-cement industry lies in the fact that it utilizes and consumes a product of steel and iron foundries which has for years been troublesome to dispose of and regarded as a waste product. The variety of cement known as puzzolan, or simply as slag cement, is not burned in rotary kilns, and should not be confused with Portland cement made with slag as a basis and burned in rotaries.

### PRODUCTION.

Although eight States were engaged in producing the 481,224 barrels of puzzolan cement, which made the total production in 1906, yet it is impossible to place the individual output against each State in the table, because six of the eight States have only one slag-cement plant. The other two States have each two plants, and so, in combination with another State production, their figures may be given without revealing individual figures.

The combinations made in the following table are: Two plants in Alabama, one in Kentucky, and one in Illinois, two plants in Ohio and one in Pennsylvania, and one plant each in Maryland, New Jersey, and New York.

The following table shows the total production of puzzolan or slag cement in the United States in 1904, 1905, and 1906, together with the number of plants in each State:

*Production, in barrels, of slag cement in the United States in 1904–1906, by States.*

| State. | 1904. | | | 1905. | | | 1906. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of works. | Quantity. | Value. | Number of works. | Quantity. | Value. | Number of works. | Quantity. | Value. |
| Alabama | 2 | 187,677 | $141,402 | 2 | ..... | ..... | 2 | ..... | ..... |
| Illinois | 1 | ..... | ..... | 1 | 106,236 | $80,616 | 1 | 175,942 | $168,160 |
| Kentucky | ..... | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... |
| Maryland | 1 | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... |
| New Jersey | 1 | ..... | ..... | 1 | ..... | ..... | 1 | 54,161 | 60,478 |
| New York | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... |
| Ohio | 2 | 115,368 | 85,249 | 2 | 276,211 | 191,998 | 2 | 251,121 | 184,283 |
| Pennsylvania | 1 | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... |
| Total | 8 | 303,045 | 226,651 | 9 | 382,447 | 272,614 | 10 | 481,224 | 412,921 |

## THE PUZZOLAN-CEMENT INDUSTRY, BY STATES.

The record of slag-cement-producing plants in the States which contributed to the quantity of this variety of cement made in the United States in 1906 is as follows:

*Alabama.*—There were two active puzzolan-cement plants in Alabama in 1906, and together they produced an output which was nearly twice as large as that for 1905. These plants are managed and run by one company, though but one of them is owned by that company. The people owning the second plant have leased it for the past few years to the company now running both plants. No idleness is reported in these mills, beyond the closing down for needed repairs, which comes to nearly all factories. Better prices, as well as an increased production, was the rule for these plants in 1906.

*Illinois.*—But one plant in Illinois manufactures slag cement, and its output in 1906 was considerably larger than that for the preceding year, as in that year, however, the entire quantity of puzzolan cement manufactured was consumed by the company itself in its construction work. Slag cement for commercial purposes is no longer made by this plant, and its whole period of manufacture for the year did not exceed five months.

*Kentucky.*—The single plant in Kentucky which produced slag cement in 1906 was started up in 1905; it was described in the report on cement for that year. This year the company reported a good production. Kentucky now contributes her quota to each of the three varieties of cement reported by this Bureau.

*Maryland.*—There has never been more than one puzzolan-cement plant in Maryland, and in 1906 it was active for only a short time, producing but a small output. It was then adjudged bankrupt, and a trustee was appointed.

*New Jersey.*—The one slag-cement plant in New Jersey was active in 1906 and ran continuously except for the three winter months. Its output was a little less in quantity than that for the previous year, but a higher price was obtained for it than could be had in 1905.

*New York.*—The plant of the Niagara Cement Company in New York began producing puzzolan cement in the spring of 1906, and ran

continuously during the rest of the year, except for such small shut-down periods as are incidental to initial runs. This factory is in Buffalo, and has a capacity of 1,000 barrels of slag cement a day. It is the first plant built in the State of New York for producing this variety of cement.

*Ohio.*—There were two plants for the manufacture of puzzolan cement in Ohio in 1906. Both of them were in operation, one running slightly ahead and one slightly behind the production for 1905. Each of these plants was shut down for a few months, and in one of them extensive improvements were made. Although one other State besides Ohio has two puzzolan plants, yet Ohio in 1906 produced more than twice as much of this kind of cement as any other State, and more than the combined product of any two other States.

*Pennsylvania.*—The plant which produces puzzolan cement in Pennsylvania is at Sharon, and its production in 1906 was more than a third larger than in 1905. It was idle during a part of the winter on account of the dullness of business incident to that season.

## IMPORTS AND EXPORTS.

### IMPORTS.

Hydraulic cement is recorded in the custom-houses in pounds when brought into this country from foreign places. Reduced to barrels, the total quantity imported in 1906 was 2,205,710, valued at $2,950,268. The total quantity withdrawn for consumption in 1906 was 2,274,677 barrels.

The following table shows imports of all hydraulic cements into the United States, by countries, from 1903 to 1906:

*Imports, in barrels, of hydraulic cements into the United States in 1903–1906, by countries.*

| | 1903. | 1904. | 1905. | 1906. |
|---|---|---|---|---|
| United Kingdom | 146,994 | 16,365 | 33,978 | 464,940 |
| Belgium | 737,576 | 394,368 | 335,154 | 563,590 |
| France | 14,866 | 34,912 | 18,864 | 64,227 |
| Germany | 1,377,414 | 585,563 | 456,325 | 871,579 |
| Other European countries | 27,415 | 7,538 | 602 | 49,770 |
| British North America | 4,421 | 566 | 417 | 9,589 |
| Other countries | 9,265 | 7,091 | 1,237 | 182,015 |
| Total | 2,317,951 | 1,046,403 | 846,577 | 2,205,710 |

## RELATION OF DOMESTIC PRODUCTION AND CONSUMPTION TO IMPORTS.

The following table is designed to show the yearly increase in the production of Portland cement in the United States, the fluctuations in natural cement, and the variations in imports for consumption of hydraulic cements into this country since 1901:

*Comparison of production of Portland and natural-rock cement, in barrels, in the United States with imports for consumption of hydraulic cement, 1901–1906.*

| Year. | Natural cement. | Portland cement. | Total of natural and Portland cement. | Imports. |
|---|---|---|---|---|
| 1901 | 7,084,823 | 12,711,225 | 19,796,048 | 922,426 |
| 1902 | 8,044,305 | 17,280,644 | 25,274,949 | 1,963,023 |
| 1903 | 7,030,271 | 22,342,973 | 29,373,244 | 2,251,969 |
| 1904 | 4,866,331 | 26,505,881 | 31,372,212 | 968,410 |
| 1905 | 4,473,049 | 35,246,812 | 39,719,861 | 896,845 |
| 1906 | 4,055,797 | 46,463,424 | 50,519,221 | 2,274,677 |

The puzzolan-cement production, which is not included in this table, and which has been recorded in these reports only since 1901, is as follows: 1901, 272,689 barrels; 1902, 478,555 barrels; 1903, 525,896 barrels; 1904, 303,045 barrels; 1905, 382,447 barrels; 1906, 481,224 barrels.

In the following table it is impossible to make comparison between domestic Portland cement and imported Portland cement, for the reason that the figures showing the imports or exports of cement to or from this country are not divided into classes, such as Portland, natural, or puzzolan cements, but are received at the Bureau of Statistics grouped under the general head of "hydraulic cements." Hence the table shows a comparative statement of the production of Portland cement in the United States with the entire quantity of hydraulic cement imported into and consumed in the United States, in 1891, 1904, 1905, and 1906.

*Comparison of domestic production of Portland cement with consumption of Portland and all imported hydraulic cements, 1891, 1904, 1905, and 1906, in barrels.*

| | 1891. | 1904. | 1905. | 1906. |
|---|---|---|---|---|
| Production of Portland in the United States | 454,813 | 26,505,881 | 35,246,812 | 46,463,424 |
| Imports (entered for consumption) | 2,988,313 | 968,409 | 896,845 | 2,274,677 |
| Total | 3,443,126 | 27,474,290 | 36,143,657 | 48,738,101 |
| Exports (domestic) | ..... | 774,940 | 897,686 | 583,299 |
| Consumption | 3,443,126 | 26,699,350 | 35,245,971 | 48,154,802 |
| Percentage of production of Portland to consumption in the United States | 13.2 | 99.2 | 100 | 96.49 |

The apparent decrease in the percentage of production to consumption in the United States in 1906 is explained by the fact that notwithstanding the greatly increased output of Portland cement, the demand exceeded the supply. On the western coast this deficit was most sharply felt, but it was a factor in nearly every State in the Union in 1906, and in many places during the early part of the year building operations involving the use of large quantities of cement had

to be suspended pending the arrival of that material from some other than the local market.

The result of this shortage was an unusual and pronounced increase in the quantity of cement sent to this country from abroad during the latter portion of 1906.

This increase is very clearly shown in the figures sent to this Bureau by the Bureau of Statistics.

## EXPORTS.

The fact that in 1906 the quantity of cement exported from this country amounted to but little more than 500,000 barrels, or but a trifle over half as much as was exported during the preceding year, marks the fact already stated, namely, that the supply of cement in the United States in 1906 was not equal to the demand.

The total quantity of hydraulic cement exported from the United States in 1906 was 583,299 barrels, valued at $944,886; decidedly less than the quantity exported in 1904 or 1905.

The following table shows exports of hydraulic cements since 1900:

*Exports of hydraulic cement, 1900–1906, in barrels.*

| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| 1900 | 100,400 | $225,306 | 1904 | 774,940 | $1,104,086 |
| 1901 | 373,934 | 679,296 | 1905 | 897,686 | 1,387,906 |
| 1902 | 340,821 | 526,471 | 1906 | 583,299 | 944,886 |
| 1903 | 285,463 | 433,984 | | | |

The following table shows the apparent total consumption in the United States of all hydraulic cements in 1906:

*Total consumption of hydraulic cements in 1906, in barrels.*

| | |
|---|---|
| Total production in United States | 51,000,445 |
| Imports withdrawn for consumption | 2,274,677 |
| Total | 53,275,122 |
| Exports | 583,299 |
| Total consumption | 52,691,823 |

The importance of cement as an item of export from America is not sufficiently considered in this country, though it receives some attention in the foreign markets.

In 1906 it was impossible to give this matter serious consideration, because of the shortage at home. But, as before suggested, with the rapid increase in the number of cement factories and the possibility of dull years in construction requiring cement, it seems only wise to seek to build up the export trade in American cement before the strain arrives.

The falling off during the last few years of the exports of Portland cements from other countries into the United States is being seriously considered in the foreign markets. Germany, from 1893 to 1896, sent us $1,261,000 worth of cement, which was almost half of the entire quantity exported, while in 1901 she could get orders for only $904,400 worth from this country, and in 1904 this amount declined to $616,300.

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In other words, whereas in the years from 1900 to 1903 the United States took about 38 per cent of Germany's export trade in cement, in 1904 less than 15 per cent was taken. Exports from Great Britain and from Belgium to the United States have experienced a similar decline. In fifteen years the total imports of cement into this country from abroad have been reduced about 66 per cent, and in Great Britain the exports of cement to America have fallen from 50 per cent to 5 per cent of the quantity sent out of that country.

## CEMENT IN FOREIGN COUNTRIES.

*Canada.*—A summary of the mineral production of Canada for 1906, issued in advance of the Annual Report of the Geological Survey of Canada, states that the total quantity of Portland cement made in Canada in 1906 was 2,152,562 barrels, as compared with 1,541,568 barrels in 1905, an increase of 610,994 barrels, or 39.6 per cent. The total sales of Portland cement were 2,119,764 barrels as compared with 1,346,548 barrels in 1905, an increase of 773,216 barrels, or 57.4 per cent.

Fifteen companies were operating plants in Canada during 1906, with a total daily capacity of about 10,500 barrels, viz, one in Nova Scotia, two in Quebec, eleven in Ontario, and one in British Columbia. At least four plants were under construction during the year, of which the total initial daily capacity will be about 4,700 barrels.

Detailed statistics of production in 1905 and 1906 are as follows:

*Production, in barrels, and value of cement in Canada in 1905 and 1906.*

| | Portland cement. | | Value of cement sold. |
|---|---|---|---|
| | Manufactured. | Sold. | |
| 1905 | 1,541,568 | 1,346,548 | $1,913,740 |
| 1906 | 2,152,562 | 2,119,764 | 3,164,807 |

The average price per barrel at the works in 1906 was $1.49 as compared with $1.42 in 1905.

The imports of Portland cement into Canada in 1906 were 694,503 barrels, valued at $778,706, an average of $1.12 per barrel. The duty is 12½ cents per hundred pounds, and the barrels of cement are reckoned at 350 pounds each.

Very little cement is exported from Canada, so that the consumption is practically represented by the Canadian sales and the imports. The total consumption of Portland cement in Canada for the past six years is as follows:

*Portland cement consumed in Canada, 1901–1906, in barrels.*

| | | | |
|---|---|---|---|
| 1901 | 872,966 | 1904 | 1,694,988 |
| 1902 | 1,139,548 | 1905 | 2,264,106 |
| 1903 | 1,401,419 | 1906 | 2,814,267 |

The quantity of natural cement marketed in 1906 was 8,610 barrels, valued at $6,052. The decrease in the value of natural-rock cement in 1906 as compared with 1905 was $4,222. The increase in the value of Portland cement for that period was $1,251,067, or 58.86 per cent in

quantity and 65.37 per cent increase in value. This increase in quantity and value of Portland cement is taken from a table prepared to show the mineral products which have had the greatest growth in output in 1906, and in the text preceding this table Portland cement is mentioned as showing a greater growth than any other product during that year. The relative importance of Portland cement in the various industries contributing to the total mineral output of Canada is shown by the fact that it contributed 2.75 per cent in 1905 and 3.96 per cent in 1906.[a]

*Germany.*—The cement industry in Germany was very profitable in 1906 in comparison with its condition for the last four or five years. Eight years ago companies engaged in the manufacture of cement in Germany were paying 14 per cent dividends. Four years ago these dividends had fallen to 4½ per cent. In 1906 they rose to 11 per cent again.

This increase was due, first, to the building activity throughout the country; second, to steadiness in prices; and third, to the increase in exports of cement to the United States by reason of the demand for cement on the western coast. The San Francisco and the Valparaiso earthquakes were important factors in creating a foreign market for German cements.

There are in all 320 cement mills in Germany, of which 117 manufacture Portland cement. In 1906 a number of new mills were put into operation, though the business is already overcrowded, and the margin of profit very small. In Berlin cement is often sold at a profit of only 50 pfennigs (11.9 cents) per barrel to the manufacturer. In 1906 prices in that city averaged about $1.35 per barrel of 170 kilograms or 375 pounds, including packing.

Germany has pushed her export trade into far-off markets, and now has direct communication with many of them in steamers flying her own flag. British and Dutch South Africa, Portuguese East Africa, British Molucca, Dutch India, China, France, Norway, Sweden, Russia, Mexico and both coasts of South America, British India, Hongkong, Kamerun, Australia, and the Philippines are all countries wherein German cement is marketed.

Any attempt on the part of the United States to compete in these markets should be made with a distinct knowledge of the excellent quality of the German product. Inferior cements, or badly packed barrels carrying superior cement, can not successfully compete with them. A letter from the American consul at Port Limon, in answer to the inquiry of an American cement company regarding shipments of cement to Costa Rica, says:

> The only reason why German and Belgian cements are preferred to the American article is the way they protect theirs, by using an iron drum instead of a wooden barrel, for all shipments to this coast. The reason for this is the climate. During a great part of the year it is so moist that clothing hung for a week in a wardrobe will mildew. Barrels of cement sometimes become broken and often have to stand on open cars or an uncovered dock for days. The cement becomes moist, hardens, and is worthless. Our largest importers claim that their sole reason for buying German instead of American cement is that the former stands the climate better, and not that it is cheaper; they prefer the American article.

The combination between German and Belgian cement makers made late in 1905 is framed in terms to include the French and English cement trade in Holland in its regulations. The general syndicate

[a] Summary of the mineral production of Canada for 1906: Geol. Survey Canada, 1907.

which now includes the whole German territory has succeeded in strengthening, to some extent, the confidence of the manufacturers in the maintenance of fair prices. This agreement of the cement association has, however, excluded the middlemen, in consequence of which there is much complaint, so that the union of German dealers in building materials, including 700 firms, which handle 1,300,000 tons of cement annually, planned a buying syndicate and demanded an extra rebate of from 6 to 10 per cent from manufacturers for its members. This being refused, further conflict threatens the cement industry in Germany, and the union dealers are discussing the erection of their own factories.[a]

*Holland.*—In the Netherlands tnere is only one very small cement mill, which produces not more than 2,000 tons (11,200 barrels) a year, and therefore plays but a small part in the cement trade of the Netherlands. The official statistics of the Government do not specify the quantity of cement annually imported into the Netherlands, but its use in concrete construction as applied to bridges, buildings, and tunnels is increasing from year to year.

Cement sells in Holland at about $1.45 per barrel, and the bags in which it is packed, if returned, are credited to the purchaser at 5 cents each. A reduction of 32 cents per 1,000 kilograms (2,204.6 pounds) is made to buyers of large quantities, and an additional reduction of 8 cents per 1,000 kilograms to those buyers who act in conformity with the rules of the German trust. This makes the actual cost of cement delivered at Rotterdam or Amsterdam about $5.80 per 1,000 kilograms, or a few cents more than $1 per barrel.

American cement of good quality could no doubt find a market in the Netherlands, provided the Dutch consumer could be induced to drop connection with the German trust by a guarantee of lower prices and of a supply in the quantities needed at stipulated times.[b]

*England.*—The many inquiries for cement to be used in rebuilding San Francisco have led the United States consul at Hull to give the following facts:

About 4,000 tons of limestone are brought to Hull each week, and the production of cement is about 5,000 tons per week. The supply could be increased under pressure. The cost of the barrels is larger than in America and adds materially to the price of the cement. Bags cost 25 cents extra each, but on the return of the empty bag most of this is refunded. Since the San Francisco earthquake the demand for cement has been exceptionally large, and it is difficult to fill orders now, as the supply is running short. The demand for British cement on the Pacific coast for the past five years has been light, and the British consul at San Francisco states that the cement trade there has during recent years been largely captured by Belgium and Germany.[c]

*South Africa.*—This country has presented, since the British occupation, one of the best markets in the world for cement, because of new activity in the public works department. During the past few years importations of cement have not fallen much short of $1,000,000, and in 1903 the records show $2,500,000 worth of cement imported into South Africa. America has had a very minor part in supplying this demand, shipping to the Transvaal less than $400 worth in 1903,

[a] Daily Cons. Repts. Nos. 2804 and 2818, February 27 and March 15, 1907.
[b] Daily Cons. Repts. No. 2545, April 23, 1906.
[c] Daily Cons. Repts. No. 2591, June 16, 1906.

and about double that in 1904, while Germany and England each supplied from $250,000 to $500,000 worth of cement in those years.

Before 1898 the United Kingdom furnished the bulk of all cement to Africa; but with the subsidizing of steamship lines, and cheap rates to seaports in Germany, that country began to supply cement and acquired about 16 per cent of the South African trade. In 1902 Belgium and Denmark began to compete, and the list was as follows: United Kingdom, 43.4 per cent; Germany, 37.2 per cent; Belgium, 18 per cent, and the remaining 1.4 per cent was divided between Denmark and other European countries, the United States not competing at all. In 1903 Austria, France, Italy, Holland, and Sweden were competitors, and acquired a part of the trade before held by Germany. Great Britain increased to 51.4 per cent and Germany fell to 23 per cent. From that time the United Kingdom has gradually increased its trade and advanced from 70 per cent in 1904 to about 90 per cent in 1905. In Great Britain the claim is made that this result is due to the firm and united action of the British manufacturers, to the uniform quality of their product, and to the customs preference, though it is also claimed that the subsidies paid to the steamship lines of the Germans offset this last item.

The one cement factory in South Africa is situated just outside Pretoria, and was a failure up to a year ago, when an American was placed in charge of it. An American kiln was immediately substituted for the one formerly used, and other American ideas were adopted. The result in 1905 was a production of 75,000 barrels of cement, which was marketed in Pretoria at $6.08 per barrel, and many times that quantity could have been sold in Johannesburg alone. The capacity of this factory is to be trebled, and other mills are being planned for location in the Orange River colony near Johannesburg.[a]

[a] Daily Cons. Repts. No. 2772, January 19, 1906.