

## CEMENT.

### PORTLAND CEMENT.

By SPENCER B. NEWBERRY.

#### PRODUCTION.

The product of Portland cement in the United States during the year 1896 amounted to 1,543,023 barrels, as compared with 990,324 barrels in 1895, an increase of 552,699 barrels, or nearly 56 per cent. It is probable, however, that the output for 1895 was somewhat underestimated, owing to the difficulty of securing reports of production from some of the most important factories. In order to obtain complete and accurate returns for the year 1896, the writer visited personally the chief centers of production soon after the close of the year, and obtained returns which are much more reliable than those of former years. This extraordinary increase is shown in all the chief producing districts, but is most marked in the region embracing Lehigh County, Pennsylvania, and Phillipsburg, New Jersey. The factories in that section have been greatly enlarged during the past two years, and several of them now show a production but little inferior to the leading factories of Germany and England. The cause of this rapid growth is probably to be found in the unlimited supply of natural cement material found at that locality. This is a limestone containing such an amount of clay as to be approximately a natural Portland cement mixture. The different strata are selected and ground together in such proportions as to give a material of correct chemical composition. Another advantage which the Lehigh County cement rock presents is its comparative freedom from magnesia.

The following table shows the product of Portland cement in the United States during the years 1895 and 1896, by States:

*Product of Portland cement in the United States in 1895 and 1896.*

State.	1895.			1896.		
	Num- ber of works.	Product.	Value, not including packages.	Num- ber of works.	Product.	Value, not including packages.
		<i>Barrels.</i>			<i>Barrels.</i>	
California .....	1	16,283	\$32,566	1	9,000	\$18,000
South Dakota .....	1	6,407	12,994	1	24,000	48,000
Illinois .....	1	750	1,325	1	3,000	5,250
Indiana .....				1	9,000	15,750
Michigan .....				1	4,000	7,000
New York .....	4	159,320	278,810	7	260,787	443,175
New Jersey .....	2	155,000	232,500	2	247,100	370,650
Ohio .....	4	136,698	239,221	4	153,082	267,892
Pennsylvania .....	7	504,276	756,414	7	825,054	1,224,294
Texas .....	1	10,000	30,000	1	8,000	24,000
Utah .....	1	1,500	3,000			
Total .....	22	990,324	1,586,830	26	1,543,023	2,424,011

The relative development of the Portland cement industry in different sections of the United States presents some interesting features. The following table shows the number and production of the factories located in the chief producing regions in 1890, 1894, and 1896; also the relative percentage of the total American product which each section contributed.

*Number of works and relative product of Portland cement at various localities in the United States during the years 1890, 1894, and 1896.*

	1890.			1894.			1896.		
	Num- ber of works.	Product.	Per cent.	Num- ber of works.	Product.	Per cent.	Num- ber of works.	Product.	Per cent.
		<i>Barrels.</i>			<i>Barrels.</i>			<i>Barrels.</i>	
New York .....	4	65,000	19.4	4	117,275	14.7	7	260,787	16.9
Lehigh County, Pa., and Phil- lipsburg, N. J. . . .	5	201,000	60.0	7	485,829	61.2	8	1,048,154	68.1
Ohio .....	2	22,000	6.5	4	89,633	10.1	4	153,082	9.9
All other sections.	5	47,500	14.1	9	115,590	14.0	7	81,000	5.1
Total .....	16	335,500	100.0	24	798,757	100.0	26	1,543,023	100.0

The above table shows that the Pennsylvania region, including Lehigh and Northampton counties, and the neighborhood of Phillipsburg, New Jersey, has for many years produced much more than half the Portland cement manufactured in the United States, and also that



the industry is increasing in that section more rapidly than elsewhere. New York and Ohio show a steady and considerable growth, while the production in other parts of the country, taken collectively, shows a marked decline in number of works and total product during the past two years, and but little gain over the figures of seven years ago. It may, in fact, be stated that the Portland cement industry has never yet found a secure footing in any sections of the country except the three above mentioned. This may appear remarkable, in view of the immense consumption of Portland cement in Chicago, St. Louis, and all other cities in the central and northern portion of the country. The explanation is probably to be found in the occurrence of abundant and suitable materials in Pennsylvania, New York, and Ohio, and also in the superior shipping facilities which these sections afford. Small factories are in operation in Illinois, Indiana, Michigan, California, South Dakota, and Texas, but these show little or no growth and find only a local market for their product. Suitable materials for Portland cement are, however, found abundantly in these and other States, and the development of the industry on a large scale in various parts of the country may be confidently expected within the next few years.

## IMPORTS.

The imports of Portland cement in 1896 were 2,989,597 barrels, a slight decrease from those of the preceding year. The amount of cement imported for the past six years has been remarkably uniform, the total of 1896 being almost exactly equal to that of 1891. The following table shows the imports, by countries, in 1895 and 1896:

*Imports of cement into the United States in 1895 and 1896, by countries.*

Country.	1895.	1896.
	<i>Barrels.</i>	<i>Barrels.</i>
United Kingdom .....	806, 884	742, 169
Belgium .....	708, 875	742, 237
France .....	22, 837	26, 714
Germany .....	1, 299, 919	1, 366, 909
Other Europe .....	141, 909	99, 184
British North America .....	10, 416	11, 334
Other countries .....	6, 555	1, 050
Total .....	2, 997, 395	2, 989, 577

The above table shows the continued increase in importation of cement from Germany and the decrease in the imports from Great Britain. During the past twenty years German cement has grown rapidly in favor in comparison with the English. This is due to the

more careful methods employed in German factories, which have resulted in a steady advance in quality, uniformity, and fineness of grinding. The English manufacturers, on the other hand, have clung persistently to the old methods of manufacture, and have only within the past two or three years made any effort to keep up with modern requirements. In the meantime the largest share of the American trade has been secured by the Germans.

Large amounts of Portland cement, chiefly of inferior grade, are also imported from Belgium. In that country vast deposits of natural cement material occur, consisting of limestone containing nearly the correct proportion of clay and practically no magnesia, similar to that found in Lehigh County, Pennsylvania. A large part of the deposit is of such composition that it may be burned direct to Portland cement without any preliminary grinding or admixture. The cement produced is, however, quite variable in character, owing to slight fluctuations in the composition of the raw material. The cement industry of Belgium has been well described in the report of Consul Roosevelt.<sup>1</sup> It is stated in this report that three different products are made from the same stratum of rock, namely, artificial Portland, natural Portland, and Roman cement. The artificial Portland cement is made by grinding together the different grades of rock in such a manner as to give a mixture of correct composition, and is a product of high quality, similar to that produced in Germany. The natural Portland cement is made by burning such strata of rock as have approximately the correct composition. The Roman cement is made by burning at a low heat such portions of the rock as contain an excess of clay. Many manufacturers grind cinders or limestone with the Roman or natural cement, and thus give these inferior products the appearance and composition of true Portland cement. Such adulterated materials are largely purchased by unscrupulous exporters and shipped as artificial Portland. This may account for the unsatisfactory results which many Belgian cements have given in this country.

It will be noted in the above table that a relatively small but increasing amount of cement is imported from Canada, chiefly at the port of Detroit. This is from factories located at Owen Sound and Napanee, Ontario. From France a small amount of Lafarge cement and Teil hydraulic lime are imported. These are produced at the same factory at Lafarge, on the Rhone River, the Lafarge cement being simply the vitrified portions of the hydraulic lime, which resist slaking, and are separately ground. This cement is light in color, and is claimed to be especially suitable for pointing white stonework, as it does not stain the stone as other Portland cements generally do. The "other Europe" in the above table represents chiefly Denmark and Sweden. The Aalborg cement, from Denmark, is highly esteemed in this country, chiefly on account of the great fineness to which it is ground.

---

<sup>1</sup> U. S. Consular Reports No. 192, Sept., 1896, p. 184.



## RELATION OF DOMESTIC PRODUCTION TO IMPORTATION.

Owing to the great increase in the amount of Portland cement produced in this country during the past few years and the almost unchanged amount of imports, the proportion of domestic to imported cement consumed shows a gratifying growth, which appears strikingly in the following table:

*Comparison of the domestic production of Portland cement with the imports.*

	1891.	1893.	1895.	1896.
	<i>Barrels.</i>	<i>Barrels.</i>	<i>Barrels.</i>	<i>Barrels.</i>
Production in the United States.	454,813	590,652	990,324	1,543,023
Imports.....	2,988,313	2,674,149	2,997,395	2,989,597
Total .....	3,443,126	3,264,801	3,987,719	4,532,620
Exports.....		14,276	83,682	85,486
Total consumption.....	3,443,126	3,250,525	3,904,087	4,447,134
Percentage of total consumption produced in the United States.....	13.2	18.2	25.3	34.7

In this table the figures given for "exports" include both lime and cement, and are therefore incorrect. The error caused by this is, however, unimportant. These two products are hereafter to be recorded separately by the Treasury Department.

The above table shows that the imports have remained nearly stationary for the past six years, and that the production of the American factories has been more than tripled in the same time. The consumption of Portland cement has therefore increased by practically the whole amount of the increase in home production, more than 1,000,000 barrels, or about 30 per cent. It should be remembered, also, that the period since early in 1893 has been one of great business depression and comparative inactivity in railway construction, public improvements, and private building operations. In view of this fact, the increased demand for Portland cement, which has absorbed all the added domestic product without lessening the importations, is certainly remarkable, and points to a still greater demand for this useful product with the return of prosperous times. From present indications the year 1897 will show a further marked increase in the American production. Established factories, especially in the Pennsylvania region, are again greatly enlarging their plants. In the central part of the country two new companies, with reputed extensive capital and unlimited material, are to build works, but these will hardly be in operation before the spring of 1898. On the other hand, large enterprises requir-

ing great quantities of Portland cement are being started at various points, and the building trade shows renewed activity. It is not likely, therefore, that the importation of cement will show any decrease during the present year, and it will probably be many years before our supply of Portland cement is wholly supplied by our own factories.

A strange state of affairs exists at present, however, in the cement market. The leading American manufacturers are competing so sharply among themselves that the best grades of American Portland are offered on large contracts at a price at least 50 cents per barrel lower than the leading imported brands. It is everywhere acknowledged that the best American cements are fully equal to the imported, and, in view of the immense demand, such competition appears quite unnecessary. Nevertheless, consumers are enjoying the benefit of this conflict, and are at present buying high-grade cements almost as cheaply as materials of the same quality are to be had in England or Germany.

#### THE PORTLAND CEMENT INDUSTRY IN THE VARIOUS STATES.

##### ARKANSAS.

The factory at White Cliffs, near Texarkana, is practically completed, and will be in operation early in 1897. The writer visited this locality soon after the close of the year, and inspected the materials and plant. The deposit of raw material consists of an immense bed of white, soft chalk, covering an area of 900 acres, and rising in cliffs to a height of over 200 feet above the Little River. The chalk is fairly uniform in composition, containing 88 to 90 per cent of carbonate of lime, 9 or 10 per cent of insoluble matter (clay), and less than 1 per cent of magnesia. It is in every way an excellent cement material, and the extent of the deposit is sufficient to supply an amount of cement equal to the whole present consumption of Portland cement in this country for more than a hundred years. The property of the company includes also 600 acres of fine-grained, yellow clay. The analysis of an average sample of these two materials resulted as follows:

*Analyses of cement material from White Cliffs, Arkansas.*

Chalk.	Per cent.	Clay.	Per cent.
Carbonate of lime .....	90.23	Silica .....	73.62
Carbonate of magnesia .	1.15	Alumina .....	19.30
Silica .....	5.33	Iron oxide .....	
Alumina .....	3.03	Lime .....	
Iron oxide .....		Magnesia .....	
Total .....	99.74		



The plant of the White Cliffs Portland Cement Company is modeled closely after modern German factories. The materials are ground together by the dry process, molded into bricks, and burned in Aalborg continuous kilns. The present capacity of the works is 300 barrels per day.

## MICHIGAN.

A factory is under construction near Bronson, Michigan, by the Monarch Portland Cement Company, to manufacture cement from the large deposit of marl which occurs at that point. At these works the rotary process of burning will be employed, as at Coplay, Phillipsburg, and Sandusky.

## OHIO.

The factory of the Art Portland Cement Company, near Sandusky, referred to in the report for 1895, is not yet in operation. It was proposed by this company to manufacture a white Portland cement for ornamental purposes, but it appears doubtful whether this plan will be carried out.

A company of Pittsburg capitalists have purchased large tracts of marl land at Castalia, near Sandusky, and propose to erect works in the near future.

The project of establishing large works at Harper, mentioned in the last report, has not been carried out.

The factory at Middle Branch was destroyed by fire in March, 1897. It is understood that the works will be rebuilt.

## MATERIALS.

Argillaceous limestone is still the chief cement material in this country, as shown by the following table:

*Comparative product from limestone and marl.*

	No.	Product.
		<i>Barrels.</i>
Factories using limestone.....	18	1, 208, 234
Factories using marl.....	8	334, 789
Total .....	26	1, 543, 023

## PROCESSES.

The Aalborg, or modified Shöfer, continuous kiln is coming rapidly into use in this country. It is employed at Glens Falls, New York, and at one of the largest factories at Coplay, Pennsylvania. At another of the large works at Coplay these kilns will be used in a projected extension of the plant. The Aalborg kiln has also been adopted at the new

factory in Arkansas. The great advantage of this type of continuous kiln is its great economy of fuel. Only about 2 tons of soft coal per day are required for each kiln, with a daily production of 75 to 80 barrels of cement clinker. This is only about 12 per cent of the weight of clinker produced, and with coal at \$2 per ton corresponds to a cost for fuel of only 5 cents for each barrel of cement produced.

The use of the rotary furnace is also rapidly increasing, as is shown by the following table:

*Amount of Portland cement made in kilns of various kinds.*

	1893.	1894.	1895.	1896.
	<i>Barrels.</i>	<i>Barrels.</i>	<i>Barrels.</i>	<i>Barrels.</i>
Rotary furnace .....	149,000	242,176	400,821	632,370
Vertical kilns (continuous and intermittent).....	441,653	556,581	589,503	910,653
Total.....	590,653	798,757	990,324	1,543,023
Per cent of total product burned in rotary furnace.....	25.2	30.3	40.5	41.0

One of the largest factories at Coplay, Pennsylvania, using the rotary furnace was increased by the erection of a second plant in 1896, and began operations in the new works in August. The total output of the two factories of this company is over 800 barrels per day, and further extensions are projected. It is probable, therefore, that the report for 1897 will show a still further increase in the relative product of the rotary furnace.

#### IMITATION PORTLAND CEMENTS.

Two of the chief companies engaged in the manufacture of common hydraulic cement are grinding the hard-burned clinkers separately, and putting the product on the market as Portland cement under several different names. This material shows no more than one-half the strength of true Portland. The presence of 15 per cent or more of magnesia is also a serious objection to these cements, as the most careful German work on the subject has shown that more than 4 per cent of magnesia causes cement to fall off in strength, while 8 per cent or over causes it to fall to pieces after long periods.

#### PROPOSED STANDARD SPECIFICATIONS FOR CEMENT TESTING.

The need of standard rules for testing cements has long been recognized by engineers, and the subject has been widely discussed in the columns of the engineering journals during the past year. The recom-



mendations of the committee of the American Society of Civil Engineers presented in 1885 have been accepted as a standard in this country for many years, but are not sufficiently definite for the needs of the present day. To the great satisfaction of those interested in cement testing, the subject has been taken up anew by the American Society of Civil Engineers, and at the annual meeting in January, 1897, it was voted to submit to letter ballot the proposition to appoint a new committee to draft a series of standard rules which shall be in keeping with the best modern practice in the United States and Europe. It is earnestly to be hoped that this plan will be adopted in the near future.

## ROCK CEMENT.

By URIAH CUMMINGS.

### PRODUCTION AND PRICE.

There has been a slight increase in the production of rock cement in the United States during the year 1896 over that of 1895, the increase being confined mostly to Illinois and eastern New York.

In view of the continued depression in the general business of the country, and the fact that Portland cement has declined considerably, the advance in the prices of rock cement, although slight, is encouraging.

The following table shows the price of American rock cement in bulk at mills from 1891 to 1896, inclusive:

*Price of American rock cement in bulk at mills, 1891 to 1896.*

Year.	Per barrel.	Year.	Per barrel.
	<i>Cents.</i>		<i>Cents.</i>
1891.....	47.26	1894.....	48.07
1892.....	48.61	1895.....	50.32
1893.....	43.87	1896.....	50.80

The following table gives the amount and value of the rock cement produced in the United States during 1895 and 1896. The values are based on the selling prices of the cement per barrel in bulk at mills. Approximately 65 per cent of the product is sold in paper or cloth sacks and 35 per cent is sold in wood packages.

*Product of rock cement in 1895 and 1896.*

State.	1895.			1896.		
	Num- ber of works.	Product.	Value.	Num- ber of works.	Product.	Value.
		<i>Barrels.</i>			<i>Barrels.</i>	
Georgia.....	1	8,050	\$6,038	1	12,700	\$9,525
Illinois.....	2	491,012	171,854	2	544,326	217,731
Indiana and Kentucky.....	14	1,793,000	681,400	15	1,638,000	654,400
Kansas.....	2	140,000	56,000	2	125,567	50,226
Maryland and West Vir- ginia.....	4	242,000	116,700	5	271,500	125,175
Minnesota.....	2	73,772	33,621	2	83,098	38,549
New Mexico.....	1	5,000	6,000	1	Closed.	.....



*Product of rock cement in 1895 and 1896—Continued.*

State.	1895.			1896.		
	Number of works.	Product.	Value.	Number of works.	Product.	Value.
New York:		<i>Barrels.</i>			<i>Barrels.</i>	
Erie County .....	4	556,754	\$269,089	4	550,851	\$275,426
Onondaga County .....	10	152,973	77,974	10	204,375	92,450
Schoharie County .....						
Ulster County .....	15	3,230,000	1,938,031	15	3,426,692	2,056,015
Ohio .....	3	38,000	22,836	3	28,565	17,139
Pennsylvania .....	5	600,805	300,447	6	608,000	304,000
Texas .....	1	10,000	17,000	1	12,000	18,000
Virginia .....	2	13,050	7,830	3	16,776	10,566
Wisconsin .....	1	476,511	190,604	1	450,000	180,000
Total .....	67	7,741,077	3,895,424	71	7,970,450	4,049,202

#### CONSUMPTION.

The use of cement is largely on the increase in this country, as may be seen by the following table, showing the number of pounds of American rock cement consumed per capita at the dates given:

*Consumption, per capita, of cement in the United States.*

Year.	Pounds per capita.
1850.....	6.46
1860.....	10.49
1870.....	12.77
1880.....	13.04
1890.....	33.93

The older States consume more cement per capita than do the younger States.

In the larger cities the brick and stone buildings are being laid in cement, whereas in former years quicklime was used for the purpose.

#### STANDARDS OF WEIGHT.

There are in this country three distinct standards of weight for a barrel of cement. The standard weight throughout the Eastern and Atlantic States is known as the "Eastern" weight for rock cement, while the "Western" weight is prevalent through the Middle and Western States. The Portland weight is the same throughout the country.

*Net weight of a barrel of cement in the United States.*

Standard.	Pounds.
Eastern .....	300
Western .....	265
Portland .....	380
Sand .....	300

#### TESTS.

The report of the committee on a "uniform system for tests of cement" to the American Society of Civil Engineers states that "the proportions of cement, sand, and water should be carefully determined by weight." This practice of determining proportions by weight in the making of briquettes for testing purposes is quite rigidly adhered to, but whenever cement mortar is made for masonry work there is a wide departure from the rules observed in testing. In the mixing of cement mortar it is customary throughout the country to use an empty cement barrel for measuring the sand that is to be mixed with the cement. This manner of measuring is a convenient one, yet it results in a disparity of proportions when weights are considered, which militates against the rock cements and correspondingly favors the Portland cements.

It will be seen by the table that, with equal mixtures of cement and sand, by the barrel measure, the Eastern rock cement is carrying 26 per cent and the Western 43 per cent more sand, by weight, than is the Portland. So long as it remains the prevailing custom to mix cement and sand by measure rather than by weight it is not strange that people are deluded into a belief that Portland cement will carry 50 per cent more sand than will the rock cements. It is due to the unfortunate establishment of the different standards of weights per barrel that has led to many errors in judgment concerning the relative values of the two classes of cements.

There is a very large question involved in the matter of bulk as between the two classes. The volume of 100 pounds of rock cement is 25 per cent greater than is that of 100 pounds of Portland cement, and, assuming that both classes are ground equally fine, it is difficult to disprove that 100 pounds of rock cement will not cover over the surfaces of 25 per cent more sand than the 100 pounds of Portland cement.

Herein undoubtedly is to be found the solution of a problem which has puzzled the cement world since the foundation of the present system of cement testing—namely, that as the proportion of sand is increased, the difference in the relative strength of the two classes of cements decreases. This fact would seem to indicate that the rock cement, by having the greater volume, has a greater capacity for coating over the surfaces of the gang in mortar or concrete.



It is a popular delusion concerning Portland cement that there is hardly a limit to its sand-carrying capacity, and oftentimes it is overloaded, producing a weak, dangerous mortar, which can in no manner compare, either in cost or quality, with a mortar made of rock cement and a lower admixture of sand. The ultimate strength of a neat Portland cement is reached in one year, and one-half of its strength is reached in seven days. The ultimate strength of a neat rock cement is reached in five years, and at seven days it has attained but one-eighth of its ultimate strength.

## IMPORTS.

The following table shows the imports of cement, by ports, during the fiscal years ending June 30, 1894, 1895, and 1896:

*Imports of cement, by ports, during the fiscal years ending June 30, 1894, 1895, and 1896.*

Ports.	1894.		1895.		1896.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<i>Atlantic Coast.</i>						
Aroostook, Me. ....	163,000	\$853	977,225	\$4,980	298,900	\$1,541
Baltimore, Md. ....	77,968,821	249,039	113,334,906	353,033	136,642,716	425,716
Bath, Me. ....	8,400	54				
Boston and Charlestown, Mass. ....	62,072,160	198,653	68,952,320	216,392	103,363,854	329,284
Charleston, S. C. ....	6,224,911	21,956	6,350,350	15,295	2,486,209	6,016
Georgetown, D. C. ....	165,345	655			96,865	369
New Bedford, Mass. ....			20,000	44		
Newport News, Va. ....	11,904,000	35,920	29,436,949	92,244	22,714,105	72,634
New York, N. Y. ....	384,406,068	1,251,090	429,254,171	1,419,216	414,354,220	1,350,114
Passamaquoddy, Me. ....			16,400	57		
Philadelphia, Pa. ....	111,829,516	348,062	106,658,722	336,788	100,788,476	308,573
Portland and Falmouth, Me. ....	1,699,608	5,246				
Richmond, Va. ....	200,000	613				
Savannah, Ga. ....	9,881,156	27,008	16,651,072	48,075	17,271,973	44,378
Wilmington, N. C. ....						
Total .....	606,522,985	2,139,749	771,652,115	2,486,124	798,017,318	2,538,625
<i>Gulf Coast.</i>						
Galveston, Tex. ....	19,207,393	58,681	23,703,800	62,879	22,820,243	73,053
Mobile, Ala. ....					3,660,649	14,205
New Orleans, La. ....	83,794,052	273,570	100,811,527	313,290	122,418,662	385,036
Pensacola, Fla. ....	1,315,559	4,005	1,480,000	4,591	5,970,400	17,084
Saluria, Tex. ....			3,800	11		
Tampa, Fla. ....						
Total .....	104,317,004	336,256	125,999,127	380,681	154,869,954	489,378
<i>Pacific Coast.</i>						
Los Angeles, Cal. ....	6,658,448	21,637	8,878,392	30,683	23,824,428	88,028
Oregon, Oreg. ....	399,980	1,277	817,000	2,555	419,630	1,415
Puget Sound, Wash. ....	21,706,002	66,665	6,156,340	12,892	11,253,968	36,194
San Diego, Cal. ....	14,761,600	48,802	18,450,800	61,275	29,120,800	95,681
San Francisco, Cal. ....	135,889,312	433,364	89,630,282	304,168	144,456,453	477,280
Willamette, Oreg. ....	47,560,684	155,222	27,102,654	91,814	21,150,728	64,196
Total .....	226,976,026	726,967	151,035,468	503,887	230,226,007	762,794

*Imports of cement, by ports, during the fiscal years ending June 30, 1894, etc.—Cont'd.*

Ports.	1894.		1895.		1896.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<i>Lake.</i>						
Buffalo Creek, N. Y. ....			4,000	\$46	380	\$2
Cape Vincent, N. Y. ....	76,450	\$245	43,750	193	17,500	120
Champlain, N. Y. ....			487,500	2,600	380,750	2,085
Chicago, Ill. ....	998,026	3,280	6,415,582	20,311	6,940,820	22,922
Cuyahoga, Ohio. ....	194,060	808	1,529,500	5,370	674,962	3,273
Detroit, Mich. ....	313,300	1,420	1,018,750	4,515	2,223,625	9,861
Huron, Mich. ....	2,700	20				
Miami, Ohio. ....	412,500	1,750	96,250	437	552,961	2,402
Oswegatchie, N. Y. ....	3,605	27	333,005	1,457	698,375	3,243
Oswego, N. Y. ....	74,000	400	232,050	1,044	56,250	290
Total. ....	2,074,581	7,959	10,160,387	35,973	11,551,643	44,197
<i>Interior.</i>						
Vermont. ....	* 5,600	26			37,500	165
Cincinnati, Ohio. ....						
Columbus, Ohio. ....					400	15
Indianapolis, Ind. ....	89,000	255				
Kansas City, Mo. ....	89,000	260			75,778	250
Louisville, Ky. ....	200,000	618			60,138	293
Memphis, Tenn. ....			200,000	639		
St. Louis, Mo. ....	14,877,677	52,997	824,496	3,133	993,915	4,039
Total. ....	15,243,277	54,156	1,024,496	3,772	1,173,731	4,762
Grand total. ....	1,015,133,873	3,265,087	1,059,871,593	3,409,937	1,195,838,653	3,839,756