The Cement Market

Conditions of Manufacture and How They Benefit the Consumer

By Allen E. Beals

STRANGELY varied is the picture presented to us when we summon up before our mind's eye the many uses to which cement is put to-day. The American farmer uses it to make hen's nests that give no harbor to insect pests, that can be scrubbed and baked, thus insuring absolute disinfection. Of cement are made such varied structures as a pig sty, a freight barge, and the rampart of a fortress. Science has shown that a nest egg made of Portland cement is cheaper and more permanent than a china one, and with the same material a great government is building the world's greatest waterway. Like electricity, cement seems to be destined to render to mankind services whose extent can hardly be properly realized; and the public mind weaves a romantic future for it.

Imagination almost quails at the vast amount of capital invested in this industrial prodigy. The investment in the United States alone is roughly estimated at \$600,000,000, and the industry is only two score years old in America. Graphic illustration only can give the layman an idea of its phenomenal growth.

Between 1870 and 1879 the total output of Portland cement in the United States was 82,000 barrels. This does not include output figures for Puzzolan and natural cements. American mills alone turn out 6,000,000 barrels a month to-day. This contemplates a daily consumption of 200,000 barrels, assuming that construction work, as cement manufacture, continues uninterrupted seven days in the week. This represents a total output in 1910 of 74,000,000 barrels. One company shipped a daily average of 5,500 barrels to the Panama Canal, or a little more than 2,000,000 barrels in 1910.

If nine trains, each ten miles long, aggregating to a total of 14,000 freight cars, could be procured to handle this great 1910 shipment, they would barely be able to haul the total shipment in one load. If this vast quantity of Portland cement were to be placed in a single barrel proportioned exactly as an ordinary cement barrel is patterned, it would measure 294 feet high. Its weight would be 800,000,000 pounds, or 400,000 short tons. Some idea of the size of this barrel may be gained by stating that the "Mauretania," with its 32,500 gross tonnage, would have to make several trips to carry the contents of this great cask of Portland cement, or, were it imperative to move it in one journey, it would be necessary to hitch three of these giant ocean greyhounds together abreast to make room for the machinery to propel the vessels.

Picture to yourself a barrel of Portland cement reaching to within a few feet of the top of the Eiffel tower, the top of the lantern of which is 984 feet above the street level, or so high that the famous Flatiron Building in New York city would have to be placed upon the top

of the Metropolitan Building, the world's tallest inhabited structure, before an engineer could reach the top to get at the contents of the barrel. This will give a fair idea of the size of the receptacle that would be required to contain the total output of Portland cement in the United States in 1910. This barrel would weigh 29,600,000,000 pounds on the basis of 400 pounds gross to a barrel (the weight of a barrel of cement being computed at 380 pounds net to the barrel, and the barrel itself weighing 20 pounds).

One cannot conceive of such a weight until it is stated that if every man, woman and child in the United States weighed 150 pounds, the total weight of our portion of humanity, based upon the 90,000,000 of population at the last census, would be only 13,500,000,000 pounds, and our barrel would still have 16,100,000,000 pounds to its advantage.

These totals are staggering when the output for the nine years between 1870 and 1879 is considered. The total output for that period would have gone into a barrel only 100 feet high or as tall as a six and one-half story building. The rate of growth and corresponding decline in prices and indication of bulk by periods in the industry are shown in this table:

Year.	Quantity Manufactured, Barrels.	Price per Barrel Represented in 25-Cent Pieces.	Height of Imaginary Barrel
1880	42,000	12	81 feet
1890	335,000	8	163 feet
1900	8,413,000	4	476 feet
1910	74,000,000	3	980 feet

One would suppose that under such wonderful strides in development cement producing companies would be reaping tremendous profits. Here is the tragic side of the industry.

The prospects of quick returns upon investments and the exploiting of production figures have been a source of much profit to the promoter, whether the same be true of the investor or not. There are 103 plants in this country to-day. More will start this spring. Each company is producing just as much as it can regardless of market conditions. In consequence many companies were sorely squeezed last year, when competition was conscienceless.

The following statistics show the wonderful growth of the industry and also the decadence in prices:

	Number Barrels Produced.	Value.	Price per Barrel at Mill.
1870 to 1879	82,000	\$246,000	\$3.00
1880	42,000	126,000	3.00
1881	60,000	150,000	2.50
1882	85,000	191,250	2.01

	Number Barrels Produced.	Value.	Price per Barrel at Mill.
1883	90,000	\$193,500	2.15
1884	100,000	210,000	2.10
1885	150,000	292,500	1.95
1886	150,000	292,000	1.95
1887	250,000	487,500	1.95
1888	250,000	480,000	1.95
1889	300,000	500,000	1.67
1890	335,500	704,000	2.09
1891	454,813	967,429	2.13
1892	547,440	1,153,600	2.11
1893	590,625	1,158,138	1.91
1894	789,575	1,283,473	1.73
1895	990,324	1,586,830	1.60
1896	1,543,023	2,424,011	1.57
1897	2,677,775	4,315,891	1.61
1898	3,692,284	5,970,773	1.62
1899	5,652,266	8,074,371	1.43
1900	8,483,020	9,280,525	1.09
1901	12,711,225	12,532,360	.99
1902	17,230,644	20,864,078	1.21
1903	22,342,973	27,713,319	1.24
1904	26,505,881	23,355,119	.98
1905	35,246,812	33,245,867	.96
1906	46,463,424	52,466,186	1.13
1907	48,875,310	53,992,551	1.11
1908	51,072,912	43,547,679	.85
1909	62,508,461	50,510,385	.81
1910*	74,000,000	55,500,000	†

It will be observed that the quantity of cement manufactured in 1910 showed an increase in production of 21.3 over 1909, but the price was lower than it has ever gone.

FINDING NEW OUTLETS.

Many companies were forced to sell their product below cost during 1910 as a result of a culmination of conditions which had been foreseen but treated with more or less indifference for several years. The curtain went up on the tragedy early in 1908, when manufacturers began to feel the tremendous impetus in the market. Instead of the producers being satisfied with modest profits, interterritory selling kindled fires of business antagonism, and in 1909 this was forced to a head by the youngest rival in the field.

The United States Steel Company found it somewhat difficult to get rid of the great piles of slag from its

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* Estimated.

† An estimate of the average price last year is not obtainable until after the first of April when the U. S. Geological Survey makes its report. The probabilities are that it will be between 75 and 80 cents, however.

To Panama Canal in 1910: 2,100,000 barrels of cement which would fill nine trains each 10 miles in length and consisting of 1400 cars.

To Florida-Key West Railroad: 800,000 barrels of cement. Three trains each over 10 miles long, To Ashokan dam: 1,000,000 barrels. Four trains over 10 miles long.

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In Fig. 3 is shown the proper method of arrangement for the flashing and counter-flashing. The flashing is shown at *a* and it should be turned up against the parapet wall for a distance of at least eight to ten inches. The counter-flashing, which preferably is of metal, should project into the wall as shown at *b*. It should start at about twelve inches from the surface of the roof and should be allowed to project over the flashing to within about two inches from the surface of the roof. The inner section of the parapet wall above the flashing should be given a good coat of waterproof paint, so as to protect it from the weather. This is important, for if not done, water will get in and percolate down through the wall. If the parapet wall is not too high the counter-flashing can start from under the coping as shown at *A*, Fig. 3, in which case the waterproof coating may be omitted.

Very often, in new work, the waterproofing course is extended through the entire thickness of the parapet wall, as shown in Fig. 3 at *B*. This eliminates any trouble that might arise from leakage due to moisture coming in above the flashing, or from any water that might get into the wall through the joints in the coping.

Aside from the roofing materials mentioned above, there are plastic roofing compositions which have given excellent results. These are applied with a trowel like mortar and are more or less elastic in their nature, and thus allow for a certain amount of expansion and contraction. Aside from their being waterproof they are fireproof as well, but as in the majority of ready-roofing materials the ingredient used in their composition is held as a secret.

For the waterproofing of concrete swimming pools, tanks, etc., a course of tar and felt or asphalt and felt may be employed, using the same general methods for application as described for the waterproofing of foundations. If the tanks are well reinforced, so as to provide against expansion cracks, and a good rich mixture of concrete is used, the integral method of waterproofing, however, will produce good results.

If leaks should develop owing to small expansion cracks, they can be completely sealed up by a liberal coat of asphaltic paint applied to the inside of the tank. Another method employed is to build the tank with a more or less lean mixture of concrete and, when this is completed, to apply to the inside surface of the walls a good rich cement mortar troweled hard and smooth. Many incorporate into this coat one or the other of the many liquid or powder forms of waterproofing compounds. This method has proved most successful, not only for tanks, but also for the repairing of leaky cellar walls and floors. In waterproofing, always remember that the waterproofing, no matter of what material, should always be applied to side of the walls nearest the source whence the water comes. This in foundation walls is generally from the outside, and in tanks is always on the inside of the walls.

In conclusion, it should be said that weather conditions, as well as thorough workmanship, have much to do with the final efficiency of waterproofing. Better results can always be obtained in warm weather than in cold. So bearing this fact in mind, never have waterproofing applied in winter time, unless it is absolutely essential.

The Cement Market

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blast furnaces. This was in 1901, in which year a process was discovered for making of this material a very good grade of Portland cement. It could be produced cheaper than the regular product, and the younger company was able to come into the market below its competitors. In 1901 this company turned out 200,000 barrels of Portland cement. Last year its output was 7,000,000 barrels. The addition of new machinery now being installed will enable this company to turn out 10,000,000 barrels this year, and by 1912 its annual output will have reached 12,000,000 barrels.

This competitor had for its field the entire Middle West. Peace reigned as long as the eastern companies kept out of that field. Finally trouble began to brew. Eastern companies could not logically enter the western field. Freight rates would not permit it except at a loss. But Atlantic coast cement did go into that territory, and it was not long before the young giant was forcing its ways into the eastern market. Prices were slashed right and left after

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that, and the result was a combination of eastern manufacturers who decided to keep their territory to themselves and to discipline the minor companies who had stirred up the trouble. So the Association of Licensed Portland Cement Manufacturers was organized in the financial section of New York, and it planned to remedy existing conditions. Some companies who had very advantageous locations regarding factory site and freight rates to the neighborhood of New York State dam construction and water works developments refused to enter the association, although they gave their moral support to the movement. Others would not join because competitors did not. About a dozen companies went in, however, and they were pledged to hold together until February 1st, 1911, but the association disbanded on the thirty-first day of December, thirty days prior to the time it was scheduled to expire.

Prices immediately fluctuated. First they were cut, then they were advanced ten cents a barrel, and finally about the end of January they held firmly. Indications now point to a firm hand keeping the refractory companies in line so as to prevent them from plunging themselves into the abyss of failure. One factor in the early disbanding of this association was an adverse decision in the courts affecting the Hurry and Seaman patents under which there was an attempt made to claim that practically no natural Portland cement is made in this country. This case is still pending, and a final decision will help to clear the atmosphere in the whole trade.

During this period the cement companies were hard pushed to find profitable business. The Panama Canal work and the Ashokan and Catskill dams, the Seaboard Air Line's railway over the Gulf from the Florida mainland to Key West, all took large quantities, but the great need was for a steady outlet taking small quantities at a time, but large quantities in the aggregate of a year's business.

The secret of success in the Portland cement industry is to keep the entire equipment busy to its full capacity. This reduces cost of manufacture. The question then arose, "How shall we get this small business?"

It is a far cry from a sale totalling 2,000,000 barrels to the sale of a 100-pound bag of cement, but the manufacturer is just as keen after the latter as he is for the former. To this business instinct of the cement producers must be largely ascribed the credit of having created the improved American farm. Here, then, is the required new outlet. It works out about this way:

The farm used to be a dilapidated place. Any old thing would do; a stick for a fence post, boughs for a culvert bridge, an old tin roof for a pigsty and a shed for a cow barn. The farmer himself lived in a shanty, or a house without comforts, cold in winter and baking hot in summer. The cultivator of the soil spent most of his winter days whittling clothespins at the country store and idly gossiping about his neighbors.

To-day he reads in the free book of how cement may be used on the farm. He is convinced and orders a bag of cement from the general store in his town. He decides he will try the experiment of making a concrete fence post. He follows the rules in his book and he discovers how easy it is. Besides, he argues, "It puts my winter days to good use." Then he buys a barrel to build a ratproof corn crib and discovers how easy and how cheap the new-fangled idea is. Discharged farm hands cannot burn down his barns at night because they are fireproof. Sanitary concrete cow sheds make healthier cows that fetch more on the market. His loss from mouldy oats and wheat are diminished or eliminated, with accompanying gain to the health of the horses. He preserves his decaying shade trees by the use of cement filling. The warmth afforded his chickens in their new concrete hen houses insures winter eggs, and soon he can afford a fine automobile for that concrete garage he has been planning as a sort of farm luxury. His children can be taken ten miles to the nearest town to school, instead of going to the district school, and when they come home they walk from the front gate to the front door on a snowy white concrete walk and not through mud ankle deep. The manufacturer comes in for his profit in thus helping the farmer, by selling fifty carloads of cement to a small, isolated country town in a single season, whereas he formerly sold from five to ten carloads a year.

The book on how to make cement roads, that which tells how to make cement telegraph poles, and others which tell how to make concrete coal pockets, and so forth, are all doing their work, but the supply of cement is not yet on a level with consumption. The mills can make more than the people can use. It costs a great deal of money to keep a plant running. It is practically ruin to let the concern's organization disband. The plant must be operated day and night; week day and Sunday. To cool the kilns means heavy losses, so they have to be kept hot.

LOOKING TO THE FOREIGN FIELD.

American cement ranks with the best of any other country, but American manufacturers cannot place it outside of this country. The exports last year were 2,340,000 barrels. This is based upon a shipment by one company of "a little over 2,000,000 barrels" to the Panama Canal. (The exact figures are computed at 2,100,000 barrels.)

Of this amount only 340,000 barrels, approximately, went to foreign ports. As the Panama Canal work is an American operation on American soil, this company's shipment cannot be correctly classed as foreign business. There are 103 companies in the country, which gives an average of only 2,200 barrels export business for each. Germany alone sent 99,714 barrels into this country during eleven months of 1910, and 200,197 for the same period in 1909. The value of the 1910 shipments totalled \$144,477 and the 1909 shipments \$307,924. Note the difference in these values as compared with American values.

The imports of Portland, Puzzolan and other cements during the eleven months of 1910 are shown in the following table:

	1909		1910	
	Barrels.	Value.	Barrels.	Value.
Unit'd King- dom	6,584	\$9,262	26,364	\$29,894
Belgium . . .	95,112	120,207	116,002	151,525
Germany . . .	200,197	307,924	99,714	144,477
Canada	48,342	92,625	6,193	9,006
Scattering . .	34,781	52,636	22,345	31,657
Total	385,016	\$582,654	270,618	\$366,559
Foreign ce- ment ex- ported	4,197	6,312	16,970	23,653
Net total . .	380,819	\$576,342	253,648	\$343,906

Decrease in imports during eleven months in 1910 over same period in 1909, 127,171 barrels.

American exports should greatly exceed any of the totals for other countries. The German Portland Cement Manufacturers' Association has a membership representing 29,600,000 barrels for the country's output last year, with 96 registered factories. America had 103 factories last year, an output of 74,000,000 barrels and an actual export business for eleven months of not more than 126,000 barrels.

Portland cement probably never will advance above the present current price at mill, but the cost of manufacture will be considerably lessened. This will come only by increased capacity. If this increased capacity does not find an outlet the law of supply and demand will affect prices and cement will be cheapened to the home consumer at the expense of the manufacturer until he is forced to go out of business.

The One-piece House

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type of house, but does not carry the high quality that an all-concrete home does. Its cost is low in small houses. Where several practically alike can be put up at the same time costs have been obtained which were nearly the same and in some instances less than a first-class frame house.

The construction of these concrete wall houses is a matter of careful study and experimentation by small local builders, and by architects who are enthusiastic and interested in trying to do away as far as possible with the terrific fire loss in this country. Mr. Edison's much-talked-of cast iron forms for the workman's home have not as yet been found practicable. There has never been an Edison house built, and in the opinion of most practical concrete men, none ever will be built. The problems of handling concrete as proposed by Mr. Edison seem insurmountable. The initial cost of preparing such a set of forms as proposed by Mr. Edison entails all told, including contractor's plant, materials and all other items entering into the financial outlay, about one hundred and seventy-five thousand (\$175,000) dollars. The Morrill house, which won the prize at the Tuberculosis Congress a year or so ago, has been successfully built in several instances at costs which are very low. It is essentially

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