

American Cements . .

BY

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BOSTON :
ROGERS & MANSON.
1898.

STATISTICS.

From the year 1818, when the Rock cement industry was first established in this country, until 1882, no public statistics were kept to show the extent and growth of this branch of the building trade.

Since 1882, however, such records have been faithfully kept by the United States Geological Survey, Washington, D. C., and have been published yearly in *Mineral Resources of the United States*, which is issued by the Survey.

The author has prepared several of these yearly reports, and, having a natural taste in that direction, he has let no opportunity pass to add to his little storehouse of knowledge concerning the statistics of the Rock cement industry from the date of its birth in this country near the little village of Fayetteville, in Onondaga County, N. Y., in the year 1818 until the present time.

During the past thirty years the author has been adding little by little to the items bearing on this subject, either by correspondence or in conversation with the oldest persons engaged in the industry,

by gathering bits of family history, and in ways too numerous and uninteresting to record.

The difficulties encountered in the compilation of these statistics during the period named have been much greater than would readily be believed by a person who has never attempted such work.

Information seemingly reliable would accumulate in the course of years, and be found at last to bear but a slight resemblance to the truth.

But by dint of persistent effort and careful gleaning and sifting, the author has been enabled to form a table covering the entire history of the industry in this country, which he feels assured will be accepted as being practically accurate, and in the entire absence of any other known effort in the same direction, authoritative.

Production of Rock cement in the United States during the time since the industry was established in 1818 to Jan. 1, 1897.

TIME.	Years.	No. of barrels.
To 1830	12	300,000
To 1840	10	1,000,000
To 1850	10	4,250,000
To 1860	10	11,000,000
To 1870	10	16,420,000
To 1880	10	22,000,000
1880	1	2,030,000
1881	1	2,440,000
1882	1	3,165,000
1883	1	4,190,000
1884	1	4,000,000
1885	1	4,100,000
1886	1	4,186,152
1887	1	6,692,744
1888	1	6,253,295
1889	1	6,531,876
1890	1	7,082,204
1891	1	7,451,535
1892	1	8,211,181
1893	1	7,411,815
1894	1	7,563,488
1895	1	7,741,077
1896	1	7,970,450
Totals	79	151,990,817

The following table gives the number of barrels of Portland cement imported into the United States, and the number of barrels of that class of cement manufactured in this country during the years named.

YEARS.	Imported.	Domestic.
1878	92,000	28,000
1879	106,000	39,000
1880	187,000	42,000
1881	221,000	60,000
1882	370,406	85,000
1883	486,418	90,000
1884	585,768	100,000
1885	554,396	150,000
1886	650,032	150,000
1887	1,070,400	250,000
1888	1,835,504	250,000
1889	1,740,356	300,000
1890	1,940,186	335,000
1891	2,988,313	454,813
1892	2,440,654	547,440
1893	2,674,149	590,652
1894	2,638,107	798,757
1895	2,997,395	990,324
1896	2,989,597	1,543,023
Total	26,567,681	6,804,009

PRODUCT OF ROCK CEMENT IN UNITED STATES, 1895 AND 1896.

STATE.	1895.			1896.		
	Number of works.	No. of Barrels.	Bulk Value at Mills.	Number of works.	No. of Barrels.	Bulk Value at Mills.
Georgia	1	8,050	\$6,038	1	12,700	\$9,525
Illinois	2	491,012	171,854	2	544,326	217,731
Ind. and Ky. . .	14	1,703,000	681,400	15	1,636,000	654,400
Kansas	2	140,000	56,000	2	125,567	50,226
Md. and W. Va..	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	idle
New York . . .						
Erie County . .	4	556,754	269,089	4	550,851	275,426
Onondaga } Co.						
Schoharie }	10	152,973	77,974	10	204,375	92,450
Ulster County .	15	3,230,000	1,938,031	15	3,426,692	2,056,015
Ohio	3	38,060	22,836	3	28,565	17,139
Pennsylvania . .	5	600,895	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

The foregoing tables afford a wide field for speculation as to the uses to which this enormous amount of cement has been applied.

One can hardly realize the value of the properties which have been constructed with mortars and concretes made with this cement.

Among those which seem most prominent to the mind may be mentioned the almost innumerable number of tunnels, bridges, culverts, and buildings connected with the 235,000 miles of railroad track in this country, the improvements made in all cities in the line of waterworks, in the construction of aqueducts, reservoirs, and dams, and in the street pavements, concrete foundations, sewers, and sidewalks.

The amount of American Rock cement which has been used in the construction of cisterns by the farmers and planters of this country, and in the villages having no waterworks, is almost inconceivable.

We append hereto a list of a few of the notable engineering and architectural structures which have been laid in American Rock cement.

It is difficult, if not impossible, to estimate the cost of these improvements, the permanence and stability of which depend so much on the cement used in their construction.

Important as these structures may be, they are absolutely insignificant when compared with the immense body of work done with American Rock cements, of which no complete record can ever be made.

STRUCTURES LAID IN AMERICAN ROCK CEMENT.

CUMBERLAND, MD., CEMENT.

Washington, D. C.—Boundary Sewer, Bureau of Engraving and Printing, New Patent Office, National Museum, New Pension Office, New Navy, State, and War Department, New Library Building, Tiber Sewer.

Federal Buildings.—Pittsburgh and Harrisburg, Penn., Baltimore, Md.

U. S. Government Work.—Kanawha River Locks, W. Va.

Bridges in Pennsylvania.—Altoona, Columbia, Harrisburg, Millersburgh, Johnstown, Williamsport.

Centennial Buildings in Philadelphia, Penn., and Johns Hopkins Hospital Building, Baltimore, Md.

ROUND TOP CEMENT, HANCOCK, MD.

Washington, D. C.—United States Capitol, Washington Monument, War, State, and Navy Building, Washington and Potomac Tunnel, New Washington Reservoir, Boundary Sewer $2\frac{1}{2}$ miles long, 20 ft. internal diameter, Long Bridge over the Potomac River, and Cabin John Bridge, which is the largest stone arch in existence. It was built by General Meigs in 1866, and has one span of 220 ft., with a rise of 57 ft. 3 ins., and is 20 ft. wide. This bridge is only exceeded in the world's history by a bridge built in 1377 by Barnabo Visconti over the Adda at Frezzo, Italy, which was destroyed in a local war in 1416. It was a segmental arch, with a span of 237 ft. and a rise of 68 ft.

Baltimore, Md. — Gunpowder Waterworks, City Hall Building, Gas Works.

HOWARD CEMENT, CEMENT, GA.

Two bridges across Tennessee River at Chattanooga, Tenn.; Kimball House, Atlanta, Ga.; Georgia Central Railroad Bridge at Columbus, Ga.; Fulton County Jail and Seaboard Air Line Depot, Atlanta, Ga.; Times Building, Chattanooga, Tenn.; the Vanderbilt residence, Biltmore, Asheville, N. C.

JAMES RIVER CEMENT, GLASGOW, VA.

Waterworks in Virginia. — Richmond, Lynchburgh, Staunton, Charlottesville, Liberty, Lexington, Danville, also in Durham, N. C.

Richmond, Va. — New City Hall, Church Hill Tunnel, bridges across James River at Snowden and Joshua Falls, high bridge at Farmville, Va., Washington Monument foundations, Capitol Square, Richmond, Va.

HOWE'S CAVE, N. Y., CEMENT.

State Capitol Building, Albany, N. Y.; Federal Building, Albany, N. Y. *Waterworks* at Albany, N. Y., at Plattsburgh, N. Y., at New Milford, Conn., at Cobleskill, N. Y., at Ware, Mass. County Court House, Scranton, Penn. Used exclusively in the walls of the Hotel Holland, Fifth Avenue and 30th Street, New York City, and in the Postal Telegraph Building, New York City.

BUFFALO, N. Y., CEMENT.

In City of Buffalo. — Iroquois Hotel, Niagara Hotel, Buffalo Library, St. Louis Church, Church of the Seven Dolors, Board of Trade Building, Bank of Buffalo, Bank of Commerce, German Insurance Building, Erie County Penitentiary, Erie and Niagara Elevators, Trunk Sewer, and Hertel Avenue Sewer, both 8 ft. diameter, New York State Asylum, Inlet Pier and Waterworks tunnel under the Niagara River, one of the most difficult under-water constructions in the world; Buffalo General Hospital, Erie County Almshouse, Buffalo Medical College.

Towers of Suspension Bridge, Minneapolis, Minn.; Kokomo Gas

Works, Kokomo, Ind.; Court House, Dansville, Ill.; Court House, Hamilton, Ont., State House of Correction, Ionia, Mich.; piers of Erie Railway Bridge, Portage, N. Y.; Soldiers' Home, Bath, N. Y.

Federal Buildings.—Post-offices, Buffalo, N. Y.; Cleveland, Ohio, Pittsburgh and Alleghany, Penn.

U. S. Government Work.—Falls of St. Anthony; Mississippi River, Minn.; Rock Island Arsenal, Rock Island, Ill.

The dams in the Missouri River at Great Falls, Mont.

AKRON, N. Y., CEMENT.

Bridges.—Railroad bridge over the Hudson River at Poughkeepsie; cantilever and suspension at Niagara Falls, N. Y.; Connecticut River, Windsor Locks, Conn.; Mississippi River at Burlington, Iowa, at St. Louis, Mo.; Red River at Fulton, Ark.; great viaduct over the Cuyahoga River at Cleveland, Ohio; waterworks tunnel under Lake Michigan at Chicago, Ill.; elevated tracks and bridge over the Genesee River at Rochester, N. Y.; waterworks reservoir, Buffalo, N. Y.; City and County Hall, Buffalo, N. Y.; Grand Central Depot, New York, N. Y.

UTICA, ILL., CEMENT.

Chicago Buildings.—Armour & Dole Elevators, Central Elevators A and B, Hough & Galena Elevators, Chicago Board of Trade, Pullman Works, Rialto Office Building, Pullman Office Building, Rookery Office Building, Home Insurance Building, Chicago Public Library Building, Woman's Temple, Illinois Steel Company, South Chicago.

Indianapolis, Ind.—Big Four Round House, Home Brewing Company Building, Park Theatre, New Hospital, Indiana State Prison, Michigan City, Ind.

Kansas City, Mo.—Y. M. C. A. Building, Keith & Perry Building.

Saint Joseph, Mo.—United States Government Building.

Omaha, Neb.—New York Life Insurance Building, City Hall, Paxton House, Murry House, Millard House.

Denver, Col.—State House, Union Depot, The Windsor, The Albany, The Equitable Insurance Company Building.

Pueblo, Col.—Opera House, Board of Trade Building, Union Depot.

Des Moines, Iowa.— State Capitol, Y. M. C. A. Building, Dam in Des Moines River.

St. Paul, Minn.— Ryan Hotel, New York Life and Germania Life Insurance Company Buildings, Manhattan Building, Pioneer Press Building, Globe Building, Lowery Arcade, Union Depot, Gas Works, Endicott Arcade, Germania Bank Building.

Minneapolis, Minn.— Union Depot, New York Life Insurance Building.

Duluth, Minn.— Hotel Saint Louis, Spalding House, Board of Trade Building, Court House and Jail.

MANKATO, MINN., CEMENT.

Federal Buildings at Duluth, St. Paul, and Mankato, Minn.; Ashland, Wis.; Fort Dodge, Cedar Rapids, and Sioux City, Iowa; Fremont, Neb.; Sioux Falls, So. Dak.; Fargo, No. Dak. Bridge across Mississippi River at Redwing, Minn.; across the Blue Earth River at Mankato, Minn. State Insane Asylum, Independence, Iowa, and at Fergus Falls, Minn. Railroad Bridge crossing the Mississippi River at Plattsmouth, Neb. Waterworks, Minneapolis, Minn. Irrigation Canals at San Bernardino and Riverside, Cal., and State Capitol Building at St. Paul, Minn.

CUMMINGS CEMENT, AKRON, N. Y.

Federal Buildings.— Jackson, Tenn.; Macon, Ga.; Aberdeen, Miss.; Waco, Tex.; Port Royal, S. C.; Clarksburg, W. Va.; Harrisonburg, Va.; Detroit, Mich.; Youngstown, Ohio.

United States Government Work.— Sacket's Harbor, N. Y., and Buffalo Harbor, Buffalo, N. Y.

Trumbull County Court House, Warren, Ohio; Dana's Music Hall, Warren, Ohio; Otis Steel Company and Cleveland Rolling Mill Company Buildings, Cleveland, Ohio; New City Hall, Goodale Block, Burdick Block, Flower Block, Watertown, N. Y.; Herrin & Sons Paper Mills and Dam, Great Bend, N. Y.; Dexter Paper Company Buildings and stone arch raceway, Dexter, N. Y.; Globe Paper Mills, Brownville, N. Y.; Bridge at Black River, N. Y.; Ursuline Convent of the Sacred Heart Buildings, and the Episcopal Church Building, Youngstown, Ohio; the Great Eads Bridge, St. Louis,

Mo.; County Alms House, Rome, N. Y.; Diamond Match Company Buildings, Oswego, N. Y.; Faxton Hospital, Utica, N. Y.; Hoosac Tunnel, Mass.; Niagara Falls Paper Company Buildings, Niagara Falls, N. Y.; Erie County Savings Bank Building, Buffalo, N. Y.; City and County Hall, Buffalo, N. Y.; waterworks standpipe at Delphos, Ohio, and Akron, N. Y.; reservoir waterworks, Fredonia, N. Y.; Atlanta Brewing Company, Atlanta, Ga.; Chattanooga Brewing Company, Chattanooga, Tenn.; Sebald Brewing Company, Middletown, Ohio; Gerst Brewing Company, Nashville, Tenn.; Brenner Brewing Company, Covington, Ky.; old and new Croton Aqueducts, New York (613,000 barrels); Grand Central Depot, New York, N. Y.; N. Y. C. & H. R. R. bridge over the Hudson River at Albany, N. Y. Waterworks dam at Willimantic, Conn.; the great International bridge crossing the Niagara River at Buffalo, N. Y., and the suspension and cantilever bridges at Suspension Bridge, N. Y.

Buildings in New Castle, Penn.—The New Castle Steel and Tin Plate Company (largest tin mill in the world), the New Castle Wire Nail Company, Shenango Valley Steel Company, New Castle Tube Company, Arethusa Iron Works, Atlantic Iron and Steel Company, Shenango Glass Company, Lawrence Glass Company, New Castle Water Company, Pearson Building, Boyles' Block, St. Cloud Hotel.

Heavy stone masonry on the new Erie Canal improvements, and for concrete pavement work, over 125,000 barrels yearly.

FORT SCOTT, KAN., CEMENT.

Federal Buildings.—Kansas City, Mo.; Atchison, Fort Scott, Salina, Fort Leavenworth, Fort Riley, Kan.; Camden, Ark.; Pueblo, Col.; Fort Crook, Neb.

Buildings in Kansas City, Mo.—New England Life, New York Life, Insurance Buildings, Union Depot, Kansas City Journal, Board of Trade, American National Bank, Hotel Brunswick, Coates House, Public Library, Gibraltar, Massachusetts, Nelson, Bayard, Baird, Peet Bros., Kansas City Star, and Waterworks Buildings. The Dold, Fowler, Allcutt, and Armour Packing Company Buildings.

State Capitol Buildings at Topeka, Kan., and Austin, Tex., County Court Houses, Fort Worth and Dallas, Tex.; Warrensburg,

Chillicothe, and Clinton, Mo.; National Soldiers' Home, Leavenworth, Kan.; Union Depot, Omaha, Neb.

Waterworks. — Lamar, Boonville, and Kansas City, Mo.; Parsons, Coffeyville, St. Mary's, and Horton, Kan.; Yocum and Cisco, Tex.; Missouri River Bridge, Jefferson City, Mo.

MILWAUKEE, WIS., CEMENT.

Minneapolis, Minn. — Stone arch bridge over Mississippi River, Hennepin County Court House and City Hall, dams and retaining walls of the St. Anthony's Falls Water Power Company, the Exposition Building, Guaranty Loan and Trust Building, Union Depot.

St. Paul, Minn. — Ramsey County Court House and City Hall, Robert Street Bridge, and the Chicago and Great Western Railway Bridge over the Mississippi River, Globe Building.

United States Government Locks at Sault Ste. Marie, Mich.

Milwaukee, Wis. — City Hall, City Library, Pabst Building.

Omaha, Neb. — Bee Building, City Hall, American Waterworks' Basins.

Duluth, Minn. — Masonic Temple, Lyceum Building, Union Depot.

Chicago, Ill. — Chamber of Commerce, Rookery Building, Home Insurance Building, C. B. & Q. General Office Building.

Federal Buildings. — Milwaukee, Wis.; Omaha, Neb.; and Duluth, Minn.

LOUISVILLE, KY., CEMENT.

UNITED STATES-GOVERNMENT WORK.

Locks and Dams. — On Muskingum River; Muscle Shoals, Tennessee River; Warrior River; Kentucky River; Kanawha River; Big Sandy River; Illinois River; Ohio River below Pittsburgh; Monongahela River, Pittsburgh; Sault Ste. Marie; Canal around Falls of the Ohio at Louisville.

Custom Houses. — Cincinnati, Ohio; St. Louis, Mo.; Louisville, Ky.; Memphis, Tenn.; Chattanooga, Tenn.

Bridges. — P. H. R. R. connecting bridge over the Ohio at Pittsburgh; B. & O. R. R. bridge over the Monongahela above Pittsburgh; P. H. R. R. at Steubenville, Ohio; N. & W. R. R. at

Kenova, W. Va.; L. & N. R. R. at Cincinnati, Ohio; C. & O. R. R. at Cincinnati, Ohio; Suspension Bridge at Cincinnati, Ohio; Cincinnati & Newport Bridge at Cincinnati; Pennsylvania R. R. Bridge at Louisville, Ky.; Kentucky & Indiana Bridge at Louisville, Ky.; Louisville & Jeffersonville Bridge at Louisville, Ky.; L. & N. R. R. at Henderson, Ky.; I. C. R. R. at Cairo, Ill.; K. C. & M. R. R. at Memphis, Tenn.; Tennessee River Bridge at Chattanooga; Eads Bridge at St. Louis; Merchants Bridge at St. Louis; C. B. & Q. R. R. Bridge at Alton, Ill.; C. B. & Q. R. R. Bridge at Bellefontaine, Mo.; C. B. & Q. R. R. Bridge at Leavenworth, Kan.; Illinois Central R. R. Bridge at Yazoo River, Miss.; Northern Pacific R. R. Bridge at Minneapolis, Minn.; N. C. & St. L. R. R. Bridge at Bridgeport, Tenn.; Bridge over Missouri River at Sioux City, Iowa; Railroad Bridges at Dubuque, Davenport, Clinton, Fort Madison, Burlington, and Keokuk, Iowa.

Waterworks, Dams, etc.—Chattahoochee River Dam, Columbus, Ga.; Hot Springs Waterworks Dam, Hot Springs, Ark.; Little Rock, Ark., Dam; Covington, Ky., Reservoir; Nashville, Tenn., Reservoir; Minneapolis, Minn., Waterworks; St. Anthony Falls Tunnel; St. Louis, Mo., Waterworks; Little Falls, Minn., Dam.

Public Buildings.—State House, Indianapolis, Ind.; State House, Springfield, Ill.; State House, Lansing, Mich.; State House, Atlanta, Ga.; State House, Austin, Texas.

Tunnels.—Tunnel under Chicago River, Chicago, Ill.; Cleveland Waterworks Tunnel; Sanitary Drainage Canal, Chicago, Ill.; Sea Wall Foundation Lincoln Park, Chicago, Ill.; Lake Shore Drive Sea Wall, Chicago, Ill.; Palmer House Gas Receiver, Chicago, Ill.; Farwell Block, Chicago, Ill.; Dock, San Diego, Cal.

ROSENDALE, N. Y., CEMENT.

New York, N. Y.—High Bridge, Harlem River; New York & Brooklyn Bridge; Washington Bridge, Harlem River; Madison Avenue Bridge, Harlem River; Second Avenue Bridge, Harlem River; American Museum of Natural History; Astoria Hotel—Largest in the World; Washington Life Insurance Building; Columbia College—New Buildings; New Park Row Office Building—Thirty Stories; New York University Buildings; Astor's New Exchange Court Building; Post-Office; Custom House; Equitable

Building; Mutual Life Insurance Building; Public School Buildings; New York Athletic Club Building.

Boston, Mass.—Subway; State House, Bulfinch Front; Tremont Temple; Parker House Extension; Suffolk Bank Building; Austen & Doten Warehouse; Brookline Sewer Work; Metropolitan Sewerage Extension; Metropolitan Water Board—Nashua Aqueduct; Sewer Department; Water Board Department; Paving Department; Sudbury Building; Warren Chambers; Metropolitan Warehouse Company; Conduit Work by West End Street Railway Company; Boston Electric Light Company; Edison Electric Company; West End Power Station, Charlestown; Edison Power Station, Atlantic Avenue; Union Terminal Station.

Pittsburgh, Penn.—Post-Office; Court House; Carnegie Mills; Davis Island Dam; Monongahela Bridge.

Washington, D. C.—Capitol; Bureau of Engraving and Printing; New Patent Office; New Pension Building; Navy, War, and State Department Building; Washington Waterworks; Treasury Building.

United States Government Work.—Fortifications: Fort Delaware; Fort Montgomery; Fort Jackson; Fort Adams; Fort Sumter; Fort Trumbull; Fort Taylor; Fort Warren; Fort Jefferson; Fort Wadsworth; Fort Preble; Fort Monroe; Fort Hamilton; Fort Washington; Fort Knox; Fort Morgan; Governor's Island; Tybee Island; Amelia Island; Fisher's Island; Garden Keys; Hawkins' Point; Pensacola; North Point; San Francisco; Gull Island; Sandy Hook; Newport Harbor; Plattsburgh; Portland, Me.; Key West; Finn's Point.

Navy Yards.—Brooklyn; Norfolk.

Rivers.—Allegheny; Ohio; Kanawha.

Dams and Waterworks.—New Haven, Conn.; Holyoke, Mass.; Mechanicsville, N. Y.; Rochester, N. Y.; Pottstown, Penn.; Pen Yan, N. Y.; Canandaigua, N. Y.; Dunning, Penn.; Kittanning Point, Penn.; New Milford, Conn.; New York City, Jerome Park Reservoir; Boston, Mass.

South Carolina Cotton Mills.—Spartan Mills, Spartansburgh; Pacolet Mills, Pacolet; Pelzer Mills, Pelzer; Clifton Mills, Clifton; Columbia Mills, Columbia; Reedy River Mills, Mauldins; D. E. Converse Mills, Glendale; Union Mills, Union; Pelham Mills, Mauldins; Fingerville Manufacturing Co., Fingerville.

This is indeed a wonderful record, and it is but the culmination of four thousand years of successful usage of Rock cements.

It is the refutation of all the baseless theories, false reasoning, and untenable analogies which have been evolved from the high short-time tests of Portland brands.

This marvelous record is the final justification of American Rock cements, which, setting slowly at first, nevertheless, owing to their smooth and pasty consistency and greater volume per pound, attain in time a stone-like durability impossible to the brittle, quick-setting, and glassy Portlands.

The latter are an experiment begun seventy-three years ago, and the history of it is strewn with failures.

The former have been made through centuries which disclose no recorded failure, and time but adds to the proof of merit.

If long experience is to be a guide, the conclusion is irresistible that for substantially all the manifold purposes for which a cement is used, none has yet been produced equal to the AMERICAN ROCK CEMENTS.