and the owners of sd mill on their part agree to allow the sd David R. Sloper for the term of one year from and after this date the sum of Twenty-five cents for each and every Ton of water cement manufactured from Lime stone taken from his sd Land as a compensation for taking sd stone—and if after the expiration of one year the parties cannot agree upon the sum which the sd Sloper is to receive for the Lime stone taken from his sd Land, the price of the same is to be fixed by such indifferent person as the parties shall agree upon—and the sd proprietors of sd mill further agree that no unnecessary damage shall be done to the crops which may from time to time be growing upon sd Land."

This firm evidently operated under the name of L. Barnes & Co. and but few records have been located to throw any light upon their enterprise. The site of their mill has been located and several of the grinding stones from this mill still exist. That this firm was still producing cement as late as 1854 is evidenced by a bill presented by D. Judd to D. R. Sloper under date of Jan. 22, "To Bill of Work on Cement Mill". I have also found a statement dated Feb. 4, 1850 by W. N. Shaddick of Middletown accounting to L. Barnes & Co. for sales of cement during 1849.

So far as I have been able to ascertain, the first Andrews kiln was built on the west side of Andrews Street at the foot of Woodruff Street (location 6 on map); the second kiln in the triangle formed by Andrews Street and Carey Street (10) and the other kilns near the mill at (9). There is also the remains of a kiln north of Woodruff Street (7). Eli Moore, a son of Roswell and brother of Sheldon, writing of his recollections of the cement industry in the History of Southington describes three kilns, the first of which were evidently Andrews' kilns but whether the third was an Andrews kiln or a Moore kiln, I am at present unable to verify.

"First kiln was built between the roads west of the brook at Mrs. Millers in the autumn, I believe, of 1829 (location 10), held ninety bbls., the dimensions are not recollected exactly,

Length of bottom say about	7 feet
Width of bottom say about	6 feet 6 inches
Breadth of swell	9 feet 6 inches
Height	11 feet 6 inches
Size of top	5 feet 6 inches

"The above kiln was built in the shape of an egg small end up, was rather thought I believe to be wrong end up, I am pretty sure we thought too high.

"The second kiln was built in the same place held about seventy bbls., built I believe in 1834, in the spring.

Length at bottom	6 feet 9 inches
Width at bottom	7 feet 16 inches
Height	9 feet
Size at top	6 feet 10 inches

"The above is a pretty good kiln but is thought to be rather large at top and perhaps it would do to raise it a little in height, enough to bring the top within six feet. Shape of an egg butt end up.

"Third kiln south of roads in 1834, calculated to hold about one hundred bbls. Little end down.

Length at bottom	7 feet 7 inches
Width at bottom	6 feet 9 inches
Breadth of swell	9 feet 8 inches
Height	11 feet

The Andrews mill was in a gully not far from Carey Street toward Kensington (9). The foundations of this mill, with location of head race and dam still visible, are in a fair condition. Six or eight of the old mill stones were lying around partly buried and in a location evidently where the cement was spilled in packing the barrels, I obtained a good sample of this early cement, where it had lain, protected by an earth covering for over eighty years. Its composition compares favorably with that of a sample of natural cement from Bonneville, Pa. which was analysed by the Watertown Arsenal in 1901:

	Andrews Cement*	Bonneville Cement
Silica	30.00	30.40
Alumina	10.03	10.36
Oxide iron	2.60	2.60
Oxide lime	51.88	52.12
Oxide magnesia	2.65	.21
Sulphur trioxide	.67	1.24
(Calculated to water-free basis)		

Let us now turn to the records of the Moore family. In an autobiography written by Nelson A. Moore, dated Sept. 12, 1899, he says, "I will here state that in the manufacture of hydraulic cement my grandfather (Roswell Moore and father of Sheldon Moore) first made and introduced it in this country although a neighbor, Mr. Merriman, first

*The analysis of the Andrews cement was made through courtesy of William P. Gano, Chief Chemist of the Pennsylvania-Dixie Cement Corporation, Nazareth, Pa.

discovered its lime properties and at first, I believe, tried to manufacture it but did not succeed until my grandfather took hold of the business, had the cement analysed by Professor Silliman of Yale and succeeded in introducing it to the markets until it grew to be the most important branch of their business."

Before the discovery of the water-lime, Roswell Moore and his sons were operating, near Kensington (18), a saw mill, grist mill, and a mill for expressing linseed oil and drying the cake; all operated by water power, the remains of which mills still exist with many old mill stones lying around. Thus Roswell was already equipped with stones for grinding and ample water power and he was an experienced manufacturer and familiar with methods for selling his products. The Moore firm became actively interested in the cement business when, about a mile north of the Andrews' kilns, another pocket of water-limestone was found on Moore land and this proved to be the "most valuable and extensive quarry opened." (11). A kiln was constructed in the hillside across at the road (12) and a mill for the exclusive manufacture of cement was built at (16). This necessitated quite a long haul from the kiln to the mill.

Luman Andrews, Jr., in his recollections written in 1915 gives the following vivid picture of the early cement business, "So long as the price of five dollars was maintained, the profits were immense, about five hundred dollars being produced from each kiln. With the exception of the barrels, the cost represented nothing but labor and that was cheap, abundance of help could be procured at from eight to twelve dollars a month including board and, as the necessities of life, flour and meat, were mostly produced upon the farm, the expense of living was reduced to a minimum.

"Transportation was another factor to be considered, as railroads were not available; teams of horses or oxen were the only means of getting their products to market; in transporting their cement to New York and Philadelphia, the nearest available place was Middletown. At this time, Waterbury and Naugatuck were beginning to feel the necessity of more water power and many dams were being constructed; this of course made a large demand for this cement, at a comparatively easy hauling distance. At times, the demand was so great, that the following plan was adopted; in the early morning two teams were started for Waterbury, the horse team moving faster went ahead with five barrels while the oxteam, which moved slower with six barrels, only reached the top of the mountain, there unloaded and returned home; the horse team coming from Waterbury to the top of the mountain, reloaded the six barrels and returned

to the city, thus delivering *eleven* barrels in one day. Large quantities were also used in Hartford and New Haven, which places could be reached by teams.

"Much trouble was experienced in constructing a kiln to procure stone for the structure that would withstand the fierce heat; they even went to the expense of hauling a species of radiated talc from Burlington, but with no better success. Under this heat, trap would crumble and they finally went back to the red sandstone formerly used, replenishing when necessary.

"The first thing to be considered in building a kiln was the location, a steep hill was necessary in order that the top could be reached with teams for filling, while the front should be lower for fireing. In building,

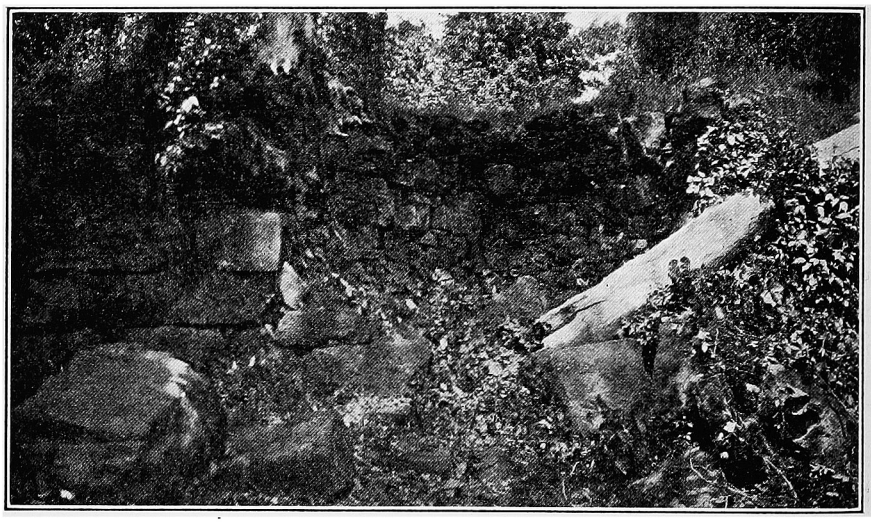

FIG. 2. REMAINS OF MOORE KILN.

this plan was adopted; a strong foundation was laid, with two ash pits extending across the bottom, a wing wall about a foot wide was carried all around the inside of the kiln and a stone partition was built between the ash pits, when these pits were covered with iron gratings, a level substantial floor was formed ready for the limestone.

"At this point, the kiln was ready for filling with limestone. This filling was truly a work of art, only experienced workmen being employed. Gad Andrews was especially skilful in this work.

"When quarrying, the best stone was assorted out for constructing the sides of the flues, and an especial lot was reserved for covering them.

Around the sides of the kiln and over the stone partition, a stone formation was raised making two flues about two feet wide and two feet high, gradually narrowing at the top. When these walls were finished, the larger stones were placed over the flues on edge to give the necessary strength for the great weight to be placed upon them and also to form a draft. After this, the smaller stones were thrown in from the top until the kiln was filled; no stones were allowed to be dumped into the top from a cart but each load was placed upon the ground and then thrown in by hand; this plan kept out all dirt and foul stuff.

"When filled and well rounded over at the top, they were ready for fireing, about eight cords of wood were needed for a kiln and this had already been placed about the opening of the flues within easy reaching distance, as it took two days and one night to burn a kiln. In fireing,

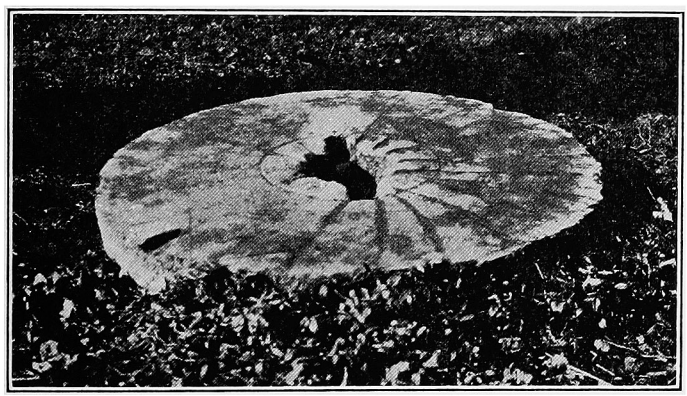

FIG. 3. LOWER OR BED STONE.

great care had to be used not to get too strong a heat at any one time, as too much might result in melting about the flues, thereby choking the draft, or worse still, breaking down the arch of the flue and dropping the whole structure.

"After fireing, it took three or four days to cool the mass sufficiently for handling before it could be taken out and wheeled into the upper story of the mill, a short distance away. The mill was constructed with three stories, the upper in which the burned stone was placed, contained what was called a cracker. This cracker was composed of two heavy iron disks about two feet in diameter with corrugated faces; the lower disk was stationary while the upper revolved slowly while in operation. The whole structure was built firmly into the floor and broken burned stone was shoveled about it. The attention of the miller was mainly devoted to

keeping the cracker in operation and watching the filling of the casks in the basement; the most of his time was spent going up and down stairs.

"After the stone had been crushed into pieces about the size of a hazelnut, or smaller, they were carried down a chute into a hopper on the next floor; this hopper hung loosely over the two huge millstones used for the final grinding. As usual, the lower millstone was stationary, while the upper, which was circular, about five feet in diameter and ten or twelve inches in thickness, probably weighing two tons or more, revolved rapidly over it. These two stones were grooved upon the smooth surfaces and the upper was so adjusted that it could be raised or lowered as the work required. The shaking hopper kept a continual stream of crushed stone running down into the aperture in the center of the upper mill stone.

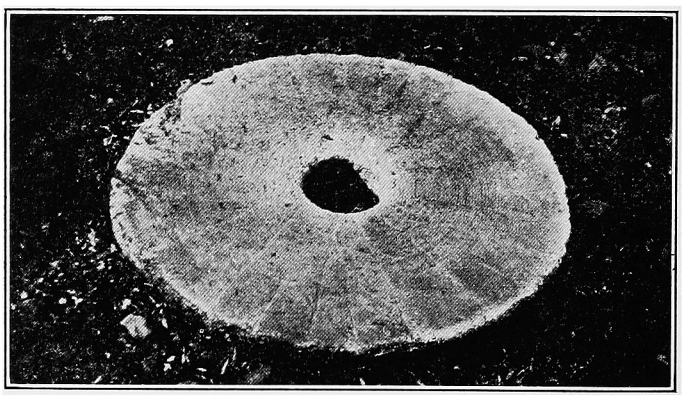

FIG. 4. UPPER OR RUNNER STONE.

"The finished material from this room ran down into the basement into well-papered barrels. The barrels always held a certain weight, about three hundred pounds, and when this amount was in, they were rolled away and another placed for filling."

The firm of R. Moore & Sons prosecuted their cement business with vigor and aggression. R. Moore made many trips to New England cities to interest dealers in masonry supplies to stock this new cement. I have found a fairly complete record of the correspondence and invoices of the Moore firm from 1829 through 1850. During 1829, shipments of cement in casks and half-casks (a cask or barrel containing 300 pounds) were made on consignment to firms in New York, Philadelphia, Boston and to most of the seaport towns from Portland, Maine, to Baltimore, Md. Handbills were printed and sent out with shipments with the

request also that dealers advertise in their local papers; the cost of advertising to be borne, of course, by the Moore Company.

Such an advertisement was published each week in the Columbian Register of New Haven from October 2 to November 20, 1830 and is probably one of the first advertisements—if not the first—of cement in the United States:

CONNECTICUT CEMENT OR HYDRAULIC LIME

Manufactured by R. Moore & Sons, Berlin, Conn. and constantly on sale, on reasonable terms, in large or small quantities, at the manufactury.

For sale, also, by J. Darrow & Co., New Haven, Ct.; Matthew Hale & Co., 243 Front St., New York; Peter Morton, Hartford, Conn.; R. & D. Rand & Co., Middletown, Ct.; Seth Adams, Jr., Providence, R. I.; C. W. Curtiss & Co., Avon, Conn.

The reputation of this Cement, wherever used, and the rapidly increasing demand, are sufficient evidence of its superior quality. Satisfactory proofs may be had by reference to the Agents above named. Orders either direct or through the Agents will be promptly attended to, and the Cement will be shipped, if desired, to any port in the Union.

Berlin. Sept. 30 6w33

Mention is frequently made of a "showboard which you will please put up conspicuously." The selling price was usually suggested by Mr. Moore and the price on half-barrels was to be "25 cents each higher than half the price of a barrel or more if you think best as we make no additional profit on them at that price." Mr. Moore wrote many letters encouraging dealers to keep sufficient supply on hand. In a letter to John Wood at Newburyport, dated July 5, 1830, he wrote, "We have already shipped between 500-600 casks this season to our different agents, most of which is sold." He sent some handbills to D. Moore & Co., Salem, Mass. and wrote, "We trust they may somewhat increase the demand for the cement in your place." To S. B. Collins, 8 Burling Slip, New York, he wrote on Aug. 24, 1830, "to account to us for what you sell at retail at $2.50 per cask, Four Months from delivery, and for what you sell to dealers or wholesale at $2.37½. It will be understood you are not to retail it at less than $3.00 the single barrel."

Jona. Whitney, 15 Commerce Street, Boston, was one of his most dependable agents. Under date of Aug. 7, 1830, Whitney writes, "Mr. Andrews has a lot of cement here which we might have obtained to have supplied our deficiency but thought it most prudent not to use it as it would probably be a means of introducing the sale of his manufacture which we understand from Hastings, Marsh & Co. is very limited now."

To this, Moore replied, "We are glad you did not get the Andrews cement. I hope you will not in any case." In 1830, Whitney sold Moore's cement for repairs to the old State House and in the same year made a shipment to the West Indies. From April, 1837, to Sept. 1838, Whitney sold 425 barrels to the U. S. Government at Boston, 37 bbls. to City of Boston, 355 bbls. to Land & Water Power Co., and small lots to House of Industry, States Prison, Boston Sugar Refinery, McLean Asylum and Amoskeag Co.

The early introductory shipments were all made on consignment, shipment being made by schooner from Middletown. After all charges had been deducted, there was not always much left for the producer, as is evidenced from a statement made under date of April 27, 1837 by Ralston & Lyman of Philadelphia on a shipment of 12½ barrels received in 1834 by Schooner Mail:

Sales: 12½ barrels		$ 37.25
Charges:		
Freight	$ 4.38	
Porterage	1.75	
Storage (6c. per bbl. per month)	6.87	
Advertising	9.00	
Postage	.63	
Commission at 5%	1.86	24.49
		$ 12.76

While records still in the possession of the Moore family give a fairly complete history of the marketing of Southington Cement, very few records have yet been found which would throw light upon the history of the Andrews product. At first the demand for this new material was slight and it was accepted by masons with extreme caution but soon its superior hydraulic qualities were recognized and the demand rapidly increased.

One of the first important structures in which Southington cement was used is the Main Street Bridge across Mill River (now Park River) in Hartford to replace the old wooden bridge on each side of which overhanging the water were built stores or markets. The new bridge was designed by Bishop Horatio Potter, a professor at Washington (now Trinity) College and it was constructed by Elias Rathbun. The bridge is a single arch, on rock foundation, and is 100 feet wide, 7 feet thick at base and 3 feet 2 inches at center; the chord span is 104 feet and it is 30 feet 9 inches from bed of river to top of arch. It cost $31,526. The first stone was laid June 18, 1833; the keystone inserted Nov. 21

and the entire bridge completed early in December of the same year. On Dec. 30, 1833, A Town Meeting "Voted thanks of the Town to the Building Committee for their skillful and faithful services gratutiously rendered in construction of said bridge which combines strength with elegance of architecture and is alike honorable to the Town and to said Committee."

Sometime after the death of Luman Andrews in 1839, the competition having become keen between the Andrews firm and the Moore firm, the younger generation decided to combine the businesses under the name of Moore & Andrews. This was probably about 1850, as I find invoices by R. Moore & Sons as late as 1849 and one in 1850 by Moore & Andrews. Roswell Moore died in 1847, aged 85 years. In the Statistics of the Condition and Products of Certain Branches of Industry in Connecticut for the year ending October 1, 1845, it is reported that in the town of Berlin was "1 cement factory, employing 3 hands, with an invested capital of $600 and produced during the year 1350 barrels valued at $2500." It is also reported that in the town of Southington "cement was manufactured with a value of $2000, employees 10, and stone quarried to the value of $68."

Bennett J. Andrews was the youngest of the firm and he and Eli Moore were probably the most active in the business. Eli's brother Roswell died in 1857 and in the same year the firm of Moore & Andrews was dissolved. Gad Andrews had retired some years previously to devote his time to his genealogical researches for which he had a wide reputation; he died Aug. 28, 1878. The business was continued for a short time by Bennett Andrews but, after a visit to one of the Hudson River mills, he decided that competition was too strong and reduced his operations to the requirements of the local demand. About 1864, Nelson A. Moore, a grandson and brother of Roswell, 3rd, decided to build a masonry house in Kensington, just north of his father's home. He had one of the old kilns repaired, some rock quarried and produced about 150 barrels of cement for mortar. In 1865, the Moore mills were purchased by the Moore Manufacturing Co. and used for the manufacture of steelyards and floral tools until about 1879 when the business was practically closed.