UNITED STATES PATENT OFFICE.

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PROCESS FOR CONTROLLING THE SETTING OF CEMENT PRODUCTS.

1,379,204. Specification of Letters Patent. Patented May 24, 1921.

No Drawing. Application filed December 4, 1917. Serial No. 205,387.

To all whom it may concern:

Be it known that I, CHARLES L. NORTON, a citizen of the United States of America, residing at Boston, county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Processes for Controlling the Setting of Cement Products, of which the following is a specification.

My invention relates to the manufacture of slabs or sheets of hydraulic cement and compositions thereof and is more especially applicable to fairly thin sheets or slabs of such material known as cement shingles such as are made, for instance, by the machines and processes described in my U. S. Patents Nos. 979,547 and 979,548, dated Dec. 27, 1910, and Nos. 1,140,702, 1,140,703, and 1,140,704, dated May 25, 1915. These shingles usually have a thickness of less than a quarter of an inch, and are approximately 18 inches square. After being made on the apparatus described in my above mentioned patents and being subjected to heavy pressure these shingles must be allowed to stand for a period of days to give the cement an opportunity to complete the setting operation.

If, during the curing or setting process, the shingles are not supported and restrained at substantially all points on both faces, they warp badly. Apparently they do not dry out evenly, and the setting operation varies in rapidity at different points in the same shingle. As both the drying and setting processes produce a contraction of volume, wherever either proceeds with more than average rapidity on or near one surface of the shingle there is a consequent excess of contraction at such point which produces a tendency to twist the shingle so that said surface is rendered slightly concave and the opposite surface convex.

The simplest way in which to prevent this warping action during the drying and setting operation, and the only practical one by reason of economy and reduction of costs of handling, is to assemble the shingles in tall stacks one upon another. The weight of the superposed pile then holds the constituent shingles flat and they mutually support and confine one another so as to prevent warping during the curing process.

When, however, such stacks are allowed to stand in an ordinary storeroom atmosphere during this curing or setting operation, another difficulty arises because the cement at the exposed edges of each shingle dries out or sets more rapidly than does the inner, main portion thereof which is protected from the action of the atmosphere by the shingles next above and below it in the stack. As these edges then contract more rapidly than do the inner portions of the shingle, tensile strains are created along and near said edges greater than the tensile strength of the material can withstand, and a series of incipient cracks develop in those portions of the shingle's surface. This local rapid drying is further aggravated by the internally generated heat of the cement setting process, and the cracks so created render the shingle unmarketable by reason of its defective appearance and the resulting structural weakness.

My present invention supplies the best method known to me for overcoming these difficulties and has been devised after prolonged experimentation in connection with the commercial manufacture of shingles of asbestos and hydraulic cement mixtures. It consists in carrying on the drying and setting operations in the tall stacks above described while checking the tendency to dry too rapidly at and near the shingle edges by maintaining an atmosphere of controllable humidity about the stacks of shingles. This may be accomplished through the use of any suitable humidifier or mechanically operated water vaporizing device. The characteristic feature of the correct degree of humidity in the atmosphere for this purpose is that the moisture shall condense slightly upon the walls of the compartment in which the shingles are stacked but not upon the shingles themselves.

If an excess of humidity is produced such as for instance would result from the use of steam, which excess will produce a deposit of moisture on the exteriors of the stacks of shingles, such deposited moisture is by capillary action drawn into the thin spaces between the superposed shingles, and, by there dissolving out a portion of the lime or other constituents of the cement, causes the discoloration of the shingle surfaces by deposits of lime and some silica compounds. This will also render the shingles unmarketable, and must be avoided.

The maintenance of an atmospheric humidity which will be just sufficient to cause

moisture to condense on the walls of the compartment but not on the stacks of shingles therein is possible because the heat liberated by the cement setting action always keeps the shingles at a slightly higher temperature than that of the surrounding atmosphere or that of the compartment walls. I have found in practice that with the ordinary room temperatures of from 60 to 80 degrees, Fahrenheit, a humidity of approximately 90 per cent. produces the best results.

Cement shingles cured or dried in accordance with the above described process are of nearly uniform density throughout their entire area, and possess a more nearly uniform capacity of water absorption throughout their entire areas and are entirely free from incipient edge cracks.

While the above described treatment is effective on widely varied hydraulic cement compositions, I have secured the best results in treatment of mixtures of approximately 75% cement and 25% asbestos, by weight.

Having described my invention, I claim:

1. The method of producing a flat relatively thin stonelike body of hydraulic cement of uniform exterior appearance and water absorptive capacity which comprises confining the same during the setting operation between two opposite restraining surfaces and maintaining an atmosphere of approximately 90 per cent. humidity about the edges thereof.

2. The method of producing cement shingles of uniform exterior appearance and water absorbing capacity which comprises arranging a series of such shingles in a tall stack in a closed compartment and maintaining an atmosphere of such humidity in said compartment during the cement setting operation as will deposit moisture upon the walls thereof, but not upon the stacked shingles.

3. The method of producing an even hardening of hydraulic cement products which consists in maintaining them during the setting process in an atmosphere the humidity of which is approximately 90 per cent.

4. The method of producing an even hardening of hydraulic cement products which comprises placing them in closed compartments and mechanically vaporizing jets of water into said compartment at a rate sufficient to maintain the humidity therein at approximately 90 per cent.

5. The method of producing an even hardening of hydraulic cement products which comprises placing them in closed compartments and mechanically vaporizing jets of water into said compartments at a rate sufficient to maintain the humidity therein at a point which will during the cement setting operation produce a slight deposit of moisture on the walls of the compartments but not upon the contained cement product.

6. The method of producing stone-like shingles which comprises forming a series of thin, compressed sheets of asbestos, hydraulic cement, and sufficient water for setting the cement, stacking said sheets in a closed compartment, and maintaining an atmosphere of approximately 90% humidity in said compartment during the period of setting of the cement.

CHARLES L. NORTON.