

UNITED STATES PATENT OFFICE.

CARL PONTOPPIDAN, OF BROOKLYN, NEW YORK, ASSIGNOR TO F. L. SMIDTH & CO., OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

TREATMENT OF SLURRY.

1,242,236.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, CARL PONTOPPIDAN, a subject of the King of Denmark, residing in the borough of Brooklyn of the city of New York, county of Kings, in the State of New York, have invented certain new and useful Improvements in Treatment of Slurry, of which the following is a specification.

It is well understood that in the manufacture of Portland cement by the wet process the slurry or mixture of chalk, clay, limestone, etc., with water must have a consistency which will enable it to flow somewhat freely and that the water content, which varies with the material from about 30% to about 50%, must be driven off in the kiln by heat, and that the greater the water content, the greater is the consumption of fuel required, with a consequent increase in the cost of production. The object of this invention is to secure the necessary fluidity of the slurry with a reduction of the water content and a consequent reduction in the cost of production. This result is accomplished by the addition to the slurry, usually by solution in the water employed, of a chemical reagent which increases the fluidity of the slurry. Research has shown that various chemical reagents may be used to accomplish this result and that the choice of one reagent or another depends somewhat upon its cost, upon its efficiency, and upon the nature of the material of which the slurry is composed. It is believed that all of the substances which can be used with practical success are included in the general class of electrolytes, although not all electrolytes tested can be used with equal success.

It is easy to understand what takes place in the use of some electrolytes with some materials but it is not easy to explain the action or the failure to act of other electrolytes, or other substances, and it is as yet impossible to lay down any law which governs the action of all electrolytes or other substances, or determines absolutely the choice of a particular substance to produce the required result in a slurry of a certain composition. The most that can be said now is that the consistency of the slurry is reduced by the addition of a chemical reagent and its fluidity increased without a corresponding increase in the water content.

It is found, moreover, not only that the desired consistency may be secured with different materials by the addition of different reagents, but that the maximum result may be secured with one material or another by the addition of a definite quantity of the reagent, the use of a lesser quantity or of a greater quantity having the effect of lessening the fluidity of the slurry.

By way of example it may be said that in a chalk slurry of normal consistency, without the addition of a reagent, the percentage of water is about 40, and that in a slurry of the same material, with the addition of 0.05 of one per cent. of sodium carbonate, the same consistency is secured with a percentage of water of only 29, while in the use of either a smaller percentage or a larger percentage of sodium carbonate, the percentage of water in a slurry of the same consistency is slightly increased. In this particular example, therefore, the use of the proper percentage of sodium carbonate shows the reduction in the water content, for a slurry of the same consistency, of about 39%. As another example it may be said that in a slurry of plastic clay containing about 29% of carbonate of lime the water content, in a slurry of normal consistency, without the addition of a reagent, is about 37%, and that with the addition of 0.6 of one per cent. of sodium carbonate a slurry of the same consistency is produced with a water content of only 27%. Again it has been found that with a raw mix containing 72% of chalk and 28% of clay, both ingredients being the same as in the examples just referred to, the water content at normal consistency, without the addition of any reagent, is found to be 38%, while the water content of a slurry of the same consistency and same materials, with the addition of 0.2 of one per cent. of sodium carbonate, is 27%. In a slurry made of a soft crystalline limestone containing 98½% of calcium carbonate, the water content of a slurry of normal consistency without the addition of any reagent was found to be 27%, while in a slurry of the same materials and of normal consistency, with the addition of 0.1 of one per cent. sodium carbonate, the water content was found to be 24.5%.

With slurries of the same materials it was found that the addition of sodium hy-

drate, potassium hydrate or potassium carbonate has nearly the same effect as the addition of sodium carbonate, and that the addition of sodium chlorid, potassium sulfate or potassium nitrate resulted in a lessening of the water content in a slurry of normal consistency, but not to as great a degree as when sodium carbonate was used. So far, therefore, as tests have thus far shown, it would appear that sodium carbonate is the most efficient reagent with the materials mentioned and that the cost of the necessary quantity of this reagent is negligible in comparison with the saving in fuel consumed in the evaporation of the greatly reduced water content.

It is found that the presence of even a small amount of calcium hydrate tends to stiffen the slurry and it is easy to see that the presence of sodium carbonate in the water employed precipitates the calcium hydrate as calcium carbonate and forms sodium hydrate.

It is found also that the effect of the various reagents employed is increased by permitting the slurry to stand and by heating it, and that although clay slurries, which have had their fluidity increased by the addition of a reagent, become stiffer by standing, their fluidity is restored by stirring.

It will be understood that when sodium carbonate is mentioned specifically in the

claims, it is intended to include therewith any substantial known equivalent for sodium carbonate.

I claim as my invention:

1. The improvement in the treatment of slurries for use in the production of Portland cement, which consists in increasing the fluidity and reducing the water content for a given consistency by the addition of an electrolyte.

2. The improvement in the treatment of slurries for use in the production of Portland cement, which consists in increasing the fluidity and reducing the water content for a given consistency by the addition of sodium carbonate.

3. The process of preparing slurry for the production of Portland cement, which consists in adding to the material and water an electrolyte by which the fluidity is increased, whereby a slurry of given consistency is obtained with a smaller content of water.

4. The process of preparing slurry for the production of Portland cement, which consists in adding to the material and water sodium carbonate by which the fluidity is increased, whereby a slurry of given consistency is obtained with a smaller content of water.

This specification signed this 15th day of September, A. D. 1915.

CARL PONTOPPIDAN.