

### SOME NOTES ON PORTLAND CEMENT CONCRETE.\*

By M. J. BUTLER.

In that quaintly written book "Scamping Tricks," by John Newman, under Concrete, occurs the following :

"Have you managed to squeeze any extra profit on the quiet out of concrete?"

"Yes, twenty or thirty years ago, but there is not much to be got now since a few engineers took to writing on the subject. They have reminded or informed others pretty well what to look after, but there were not many thirty years back that knew how it ought to be made, and you see, although one receives the materials, the concrete has to be made with them, manufactured, as it were, on the works, and you can spoil the best Portland cement that is, was or ever will be made in the proportioning, mixing and blending it with bad sand and gravel or dirty broken rock."

With the above quotations for a text, it will be attempted to show what good concrete is, how it is made and to what work it is peculiarly adapted. The first essential is to secure good Portland cement. It is believed that the following specification will insure good cement :

#### SPECIFICATION FOR PORTLAND CEMENT.

1st. Fineness : Not more than 10% residue will be retained on a sieve of 10,000 holes to the square inch, nor more than 25% on the silk sieve of 22,500 meshes per square inch, other things being equal ; the finer the cement is the better. The residue on the 22,500 sieve has no cementitious value.

2nd. Specific gravity shall not be less than 3.09 for freshly burned cement (it should be 3.13). This is the only known reliable test for tensile and proper burning of the clinker. Weight per bushel is unreliable and misleading, as a very slight or imperceptible difference in method of filling the measure seriously alters the result.

3rd. Hot bath test : For the purpose of testing the soundness of a cement, unsoundness being caused by the presence of an excess of Caustic lime. Samples are taken and made into thin pats on glass or other impervious material (as per samples submitted herewith.) These samples are left in the air from three to six hours or until set. They are then placed in a covered tank on a rack over water so as to be enveloped in hot vapor for from 6 to 12 hours, after which they are immersed in hot water at a temperature of 110 to 130°F. and allowed to remain for periods of from 12 to 24 hours. Sound samples will not crack or leave the glass. Note : If the sample is prepared with a large excess of water it is quite common to find a crack at the top of the little ridge

\* Paper read at the annual meeting of Ontario Land Surveyors.

due to the evaporation of the excess of water while in the air.

4th. Tensile strength : Usually this test is the one which receives the greatest attention and unless taken in connection with the preceding ones is apt to be misleading. The usual plan being to test neat cement, samples are prepared by careful weighing out a sufficient quantity to make five briquettes (about 26 oz.) to which is added 25 to 30% of its weight of water. The cement having been placed on a slab of glass or slate it is then rapidly worked up into a plastic mortar and the moulds are rapidly filled, taking care to press the mortar in carefully with the fingers so as to exclude the air ; the briquettes are then struck off evenly with the trowel, and are then left in the air until set, usually 24 hours, covered with a damp cloth, to check evaporation. They are then carefully removed from the moulds and should be immediately placed in the water until the period for breaking arrives. It is of more importance that a proportionate increase of strength be shown at periods of three and seven days than that a high test be secured at short periods. It is now an easy matter to secure Portland cement that will stand 400

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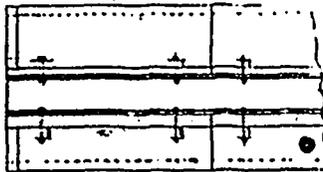
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