

Reference to the table and diagrams will show that the evaporation increases and the strength diminishes with the increase of sand in the mixture. This is, of course, almost self-evident, but the striking difference in the amount of evaporation for different cements neat is unaccountable. This difference disappears as the admixture of sand increases, and we are led, therefore, to conclude that there is something inherent in the cement itself, which aids it more or less in holding particles of water in suspension. The natural cements show high evaporation neat, so also does the No. 3 Portland, which has a high specific gravity (see general tables), and the cubes of which weighed more than those of the No. 10, which evaporated least; we cannot account for it on the ground of Portland and natural, but one thing is evident, that that same quality which enables it to hold water in suspension also aids it in holding particles of sand together, but not particles of itself. The third diagram showing the convergence of lines on the 1 to 1 mixture is very striking. The product of the crushing strength of a 1 to 1 mixture and the evaporation per cent. under conditions named is practically CONSTANT. This is for one condition only, namely, 32 days, with access of water and 2 days drying. This means in plain words that we may possibly be able to test with a balance instead of a crushing machine.

It is probable that the microscope would reveal a decided difference of structure in various cements. It is, of course, well known that the underburnt natural cements have softer, rounder and more easily pulverised grains than that produced by the highly burnt clinker of the Portland. It is possible, therefore, that the evaporation qualities of a neat cement would indicate more closely than anything else the degree of burning practised, independent of the fineness. It will be noticed, by Table II, that the residues on sieves afford no clue to the density of the mixture and no guide to determine beforehand the evaporation. Neither does the weight of the specimens vary at all regularly either with the crushing strength or evaporation.

It would seem that the coarse, angular laboratory sand had its interstices just about filled up with a 1 to 1 mixture, and the strength of the mixture depended directly on the amount of evaporation, in an inverse ratio. The—Evaporation diagram No. 4 is the same as No. 3, except that this product is referred to a uniform section density (i. e.)  $(\frac{1}{\text{weight}})^2$ ; the diagram is practically the same, showing that the variation in weight of test pieces made practically no difference in the results, i. e., the per cent. of evaporation determines the strength in 1 to 1 mixtures, but is no criterion in neat ones.

(b) Evaporation and tension tests.

