

The regulations for mixing and placing were precise. Concrete was not dumped from a height, but was lowered in buckets so as not to allow particles of mixture to become separated after mixing. It was deposited in layers nine inches deep and rammed with a fifteen pound rammer and at the same time prodded with a pointed bar so as to consolidate the mass. These operations were continued until moisture and cement appeared on top.

In second class concrete, stones, averaging nine inches diameter, were set in the concrete by hand, sufficient room being left between them to allow concrete to fill all vacancies, and particular care was taken in ramming it around them.

The method of mixing adopted was as follows: The sand and cement were measured out on a large platform and thoroughly mixed dry by being turned at least twice over with shovels. The corresponding quantities of broken stone and gravel were also measured out and mixed with the above. Then the whole was thrown by shovellers into a "gravity mixer," the water being supplied at the top of the mixer and controlled by a man operating it. The mixer is a steel box, of about fifteen inches by eighteen inches section, crossed by staggered bars, which seemed to rather intimately mix the mass in its descent.

No number of layers whose total depth would exceed twenty-four inches were allowed to be laid in one day unless for some special cause, and at least twenty-four hours were allowed to elapse before a succeeding layer was laid. No thin edges, to bring work up to the proper section, were allowed, and all layers were carried through the section so that each might be consolidated within itself before permanent setting took place.

The specifications for Portland cement were modelled on those of the Canadian Society of Civil Engineers.

The figures given below, although not up to the standard specified, may be taken as a sample of the results of the tests on one of the brands of cement used on the work.

#### TEST OF BEAVER CEMENT (NEAT).

Aug. 13.—Twenty-four hours in air six days in water.

1st. briquette broke at 434 lbs. per square inch.

2nd. briquette broke at 423 lbs. per square inch.

3rd. briquette broke at 436 lbs. per square inch.

4th. briquette broke at 438 lbs. per square inch.

5th. briquette broke at 334 lbs. per square inch.

Average 413 lbs. per square inch.

*Fineness.*—The residue on a 100 mesh sieve from a 10 oz. specimen was  $\frac{1}{2}$  oz.; on a 70 mesh sieve was practically nothing. The