gave every satisfaction. The beams turned out were of good shape and the surfaces were smooth. The beams were removed from the moulds after about four days, stored in tiers in the laboratory, and sprayed with water from day to day until required for test.

In all the tests the beams were supported at the ends and loaded at the third points, a condition which gives no shear between the loading points, but which gives a bending moment diagram approximating towards the parabolic form due to uniform loading. All the small beams (6-ft. centres) were tested in an Emery Testing Machine, and the large beams in a Buckton Machine. Plate XXIII shows a large beam in position in the latter machine, with the extensometers attached. Plate XXIV shows the extensometers attached to a wooden beam.

The portion of the beam between the loading points is subjected to simple bending, and extensometer measurements were made on it to ascertain to what extent the ordinary laws of bending are true in a reinforced beam. In most previous tests with which the author is familiar two extensometers only have been used, one being placed along the line of the steel reinforcement, and the other near the uppermost compression layer of the concrete. The position of the neutral axis has been then determined by *assuming* a linear law of straining to hold between these layers. In the tests here described, exact measurements of the strain were made at *five* horizontal layers of the beam, *viz.*, the two above mentioned and three intermediate ones. The strain curve is then obtained from five actual readings, and not from an assumed law applied to two extreme readings. In many cases the curves have been practically straight, in most cases they are slightly concave, while in one or two instances the concavity is very marked, especially on the tension side. These points will be evident from an inspection of the plates accompanying the paper, and will be noted as occasion requires. The movement of the neutral axis during test can also be seen clearly in the plates. The extensometers used were of the reflecting type, and were such that an alteration of length of 1/1000″ between the gauge points, which were 10″ apart, gave a movement of 2 cms. on the scale. By reading to millimetres only, a strain of 1/200000 could be measured. From the strain at the reinforcement line the stress in the steel can be found, on the assumption that the elongation of the steel and concrete is the same. The moment of resistance of the beam as determined by experiment may then be computed. An example of the method of calculation will be found later (p. 20).

The central deflection of each beam was determined by stretching a fine wire half way down the beam, over pulleys clamped to the beam over the points of support, and reading the movement of