TESTS OF BEAM CONNECTIONS.

A SERIES of tests on beam connections was recently made in the college of civil engineering, of Cornell University in co-operation with the American Bridge Company, on pieces, 18 in number, being 15, 12, 10, 8 and 6-inch I-beams, 4 feet long, with clip angles shop riveted to their webs. The clip angles, attached to two of the beams of each size, were the American Bridge Co.'s old standard connection angles. Two beams of each size except the 6-inch were fitted with special connection angles with simpler symmetrical web connections and fewer web rivets. The outstanding legs of the standard and special angles were in all cases the same for each size beam. Some of these special connections have since been adopted as standard by the company.

The purpose of the tests was primarily to determine whether or not satisfactory beam connections could be made with fewer web rivets than were required by the old standards. Numerous observations of deformation were made with an 8-inch Berry strain gauge at different points and the deflection of the beam itself was measured in order to determine the slip of the angles relative to the beam web and the support and to discover the effect of the deformation of the beam on the strength of the connection.

Twenty-four 8-inch gauge lines were laid out on each beam and the deflection apparatus was suspended from points at each end of the lower flange.

All web connections were made with ¾-inch shop rivets in 13/16-inch punched holes. The outstanding legs were connected to the supports by machined bolts turned to make what was practically a drive fit in the holes. The latter were punched 11/16-inch, and reamed to 13/16-inch. The beam supports were made of steel plates and angles riveted together to provide two rigid vertical faces between which the beam to be tested was bolted. These two supports were bolted securely to the cross-beam of the 400,000-lb. Riehlé testing machine.

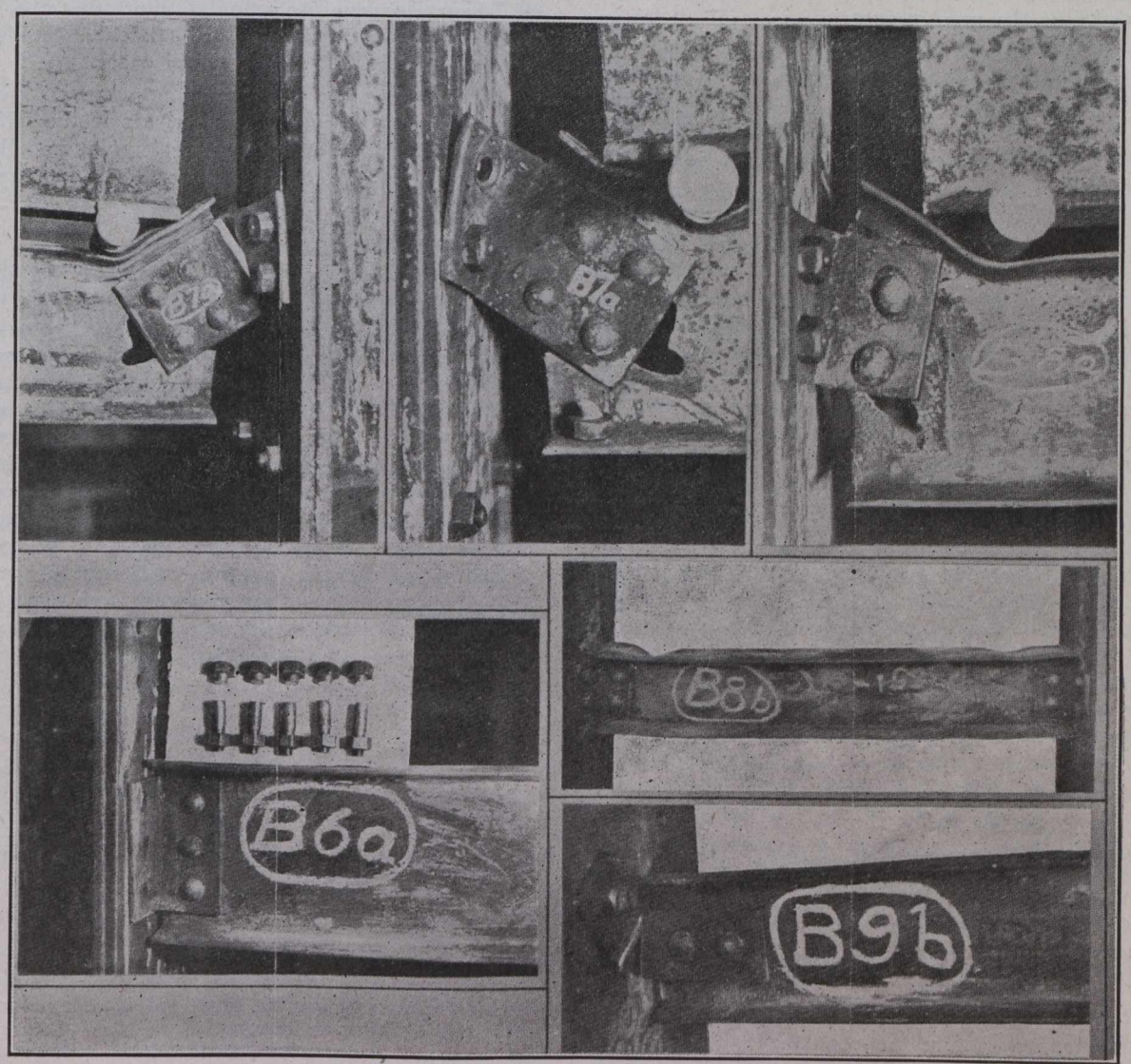

Fig. 1.—Showing Method of Applying Load and Manner of Failure of Test Pieces.

The load was applied to the upper flanges of the beams through 1½-inch steel rollers. In the majority of cases, steel bearing plates 6 inches long were placed under the rollers to distribute the load on the beam flange, and where they were not used the beam was badly buckled. Beam 7b was loaded at the quarter points, but it buckled under the load points without causing the connections to fail. All the other beams were loaded at points three feet apart, six inches from the ends. The load was applied in