erection outfit was the 30 ton two boom erection derrick, travelling on the top flanges of the girders, the trucks of the traveller running on 115 lb. crane rail, the base of which rested on timber temporarily secured to the girder flanges. This derrick was self-propelling by means of a chain and sprocket connecting the trucks with the erecting engine, which consisted of two 10 x 12 in. cylinders—2 drum—4 spool hoist. The 115 ft. booms were box section composed of 4 36 in. x ¼ in. web plates at centre section and tapering at the end, connected with four 3½ x 3½ x ⅜ angles. This section was found to weigh actually less than a latticed section and the combined unit stresses from compression and bending were very much reduced. The writer was told that the men working on the traveller, and assembling, were very enthusiastic over the ease with which the big machine handled its work. The wind at the deck of the trestle was very strong, and was generally blowing at right angles to the bridge, but the work was practically never held up on account of too much wind. The use of the erection struts is shown in fig. 2; after a tower and its girders were assembled the erection struts were removed and used again to stiffen the first bent of the next tower until it too was connected and self sustaining. The hook bolts temporarily connecting the ends of three struts with the columns proved very efficient.

Another important feature was the use of riveting bridges for convenience and safety of the men in assembling, riveting, and painting. By reference to figs. 6, 7 and 8, the method of handling them will be plainly seen. They were carried along the top of the trestle by the two boom yard derrick car, and after being secured to the top flanges of girders by hooks, the cages were

Fig. 8—Rivetting Gallery in Position at Top Tower.

lowered or raised by hand, as required. the free end of the tackles being on the platform, so that the riveters could slack away themselves.

The erection staff varied from 60 to 80 men, of which but 6 were employed on the big traveller, 1 subforeman and 14 men were used to assemble the steel work, and the rest formed from 2 to 6 gangs of riveters, also crew for derrick car used for unloading material in yard, and delivering same to traveller, and driver for light locomotive. The riveting gangs averaged 302 rivets a day of 10 hours per gang, a rate which would probably have been reduced by 50% if ordinary staging had been used, instead of the riveting cages.

The accompanying table showing progress of erection indicates rather remarkable time, considering the force employed. A pair of 100 ft. girders

Fig. 7—Method of Raising and Moving Rivetting Galleries.

were swung and bolted in their final position in 37 minutes, and floor beams and stringers assembled in half a day.

PAINTING.—One coat of black metalastic paint was used in the shop, with a coat on each contact surface before assembling. Two field coats were applied, the first metalastic brown, and the final coat acheson graphite. Rivet heads and shop marks were touched up before applying the field coats. The use of a different shade for the first field coat was a great help to the inspector, to enable him to see that the several coverings were properly applied.

THE INSPECTION of this work covers mill, shop, and erection inspection, all in accordance with the Dominion Government specifications of 1908. The bridge company, on being advised of the name of the inspection company, which is to do the inspection, is required to furnish it in triplicate with copies of all mill orders; one copy is furnished the bridge engineer, and one copy is sent to the inspection company's representative at the mills where the material is to be rolled.

The inspector then makes arrangements to be present at the rolling of the material which is being furnished on these orders, making complete surface inspection of every piece, measuring it for width and for length, and gauging the thickness. Specimens are then selected from the material so inspected by the representative of the inspection company, taken from each heat of steel which has been rolled into the material furnished on his particular order. These test pieces so selected are then forwarded to the machine shop to be properly prepared, that is to say, machined on both edges and straightened true. The test pieces so prepared are then sent to the testing laboratory at the mills, where the same are measured and broken in the testing machine, in the presence of the inspector. The results of this test piece have to conform with the requirements of the specifications, that is to say, the tensile strength has to be within the limits, also the elongation and reduction of area of the steel. The inspection company, in addition to witnessing the pulling of these test pieces previously selected by their representative, also secures from the rolling mills a certificate of the chemical analysis which may be found in the steel so tested. Frequently the inspector requires drillings to be taken from the test pieces at the mills, so as to check up the accuracy of the reports presented to him by the rolling mill company. Test pieces and material which they represent are identified by melt numbers.

As soon as the surface inspection of the material has been made, and the tests have proved satisfactory, the inspector then undertakes to see that the material is properly loaded in the cars ready for shipment to the bridge works. Full descriptive reports are then made out by the inspection company, showing the number of pieces and the size and length of each piece so shipped from the steel works, together with the results of tests. These reports are then sent forward to the bridge engineer.

SHOP INSPECTION.—As soon as the material has been received at the bridge works, the same is then unloaded, and when work is ready to commence, the various pieces of material which go to make up a full sized member are brought into the shop. The representative of the inspection company is present to see the laying off of the material, the first step in the preparation for punching. The punching is then witnessed by the inspector to see that punches and dies of the correct size are used, as required by the Dominion Government specifications. The inspector then further sees that the material, as soon as it is punched, is properly assembled, and that a sufficient number of bolts are used, so as to insure perfect fit and matching of all holes, prior to the same being riveted. The process of riveting is also supervised; and, lastly, the finished member is checked over to see that the measurements and clearances are correct, and that construction is in full accordance with the shop drawings submitted by the bridge com-

Fig. 9—Method of Erection.

pany and approved by the bridge engineer.

The painting, which is also a very important part of the work, is then closely supervised, to see that the temperature in which the material is painted is suitable for such painting, also that the material so painted is stored under cover until such paint has become thoroughly dry.

After all these several stages of con-