feet long, leaving a large air space at each end. These spaces are used as machinery chambers, and in them are placed the motors, valves, valve controls, drains, etc., necessary to either float or submerge the gate.

It will be noted that the two ends are tapered to meet the stem pieces—in a somewhat similar way to a ship's bow, but the lines are not at all easy, being straight and rather blunt. This was done, of course, to aid the fabrication of the gate, as very few bridge companies have facilities to handle a large amount of curved plate work—so easily accomplished in a modern ship yard.

Passing now to the top, there is installed within a watertight box, a 15-h.p., d.c. motor used to drive a long horizontal countershaft from which are actuated, through floor stands, the various main valve stems. The motor is controlled from the outside of its box by an extended controller shaft, and it will be at once seen that the operation is practically identical with that of the rolling caisson.

Above the valve-operating devices is located the traffic bridge provided with folding rails. At the ends of this bridge cantilever brackets are used to support its corners enabling the bridge to terminate with its clear width. In order that the gate may swing in to its berth under all

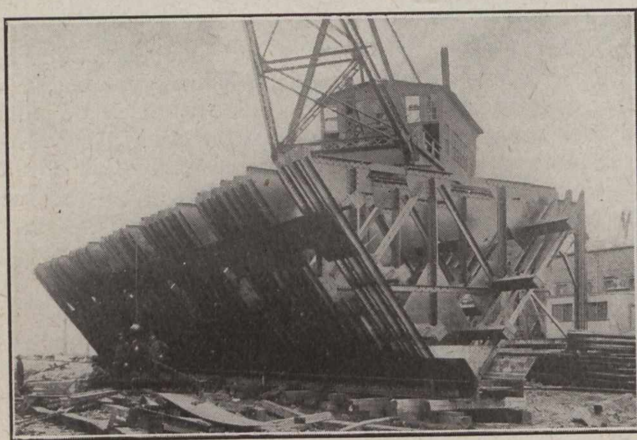

Fig. 2.

variations of tide, the masonry coping has been moulded to the necessary clearance.

The structural design of many parts of this caisson presented certain features rarely encountered, but before going into any detail, a short resumé of the general design may not be out of place. As in the rolling caisson, the department had proposed a general scheme upon which bidders were asked to tender, with the clear understanding that a certain amount of latitude to suit their own particular fabricating requirements would be given. Messrs. M. P. and J. T. Davis, the successful tenderers, submitted a fairly general design of their own; and this design was accepted, after a few changes had been agreed upon, in order to satisfy the requirements of the department of public works. The most important of these changes was the substitution of flared stems instead of vertical ones. On this amended layout the Dominion Bridge Co. then tendered to Messrs. M. P. & J. T. Davis, and on accepting the tender Messrs. Davis required the Dominion Bridge Co. to check all stresses and sections. During the course of this work certain changes were recommended, chief among which may be mentioned the increase of the width of keel and stems from 18 inches to 4 feet. This point will be touched upon a little later.

As in the rolling caisson, the main stress unit required by specification was 12,000 lbs. per square inch; and these specifications also required that the whole gate should be reversible.

The hydrostatic loading against the caisson when acting as a gate was assumed to be triangular with a depth of 46.25 feet, making a unit stress at the bottom of 2,885 lbs. per square foot.

This loading is, of course, applied directly to the skin plates which in turn deliver it to the frames of which there are two kinds—"strong frames" and "light frames"—corresponding to the ribs in ordinary ship construction. The light frames, placed at 1-foot 9-inch centres, pick up their portion of the skin load and deliver it through longitudinal pieces to the strong frames, which load the main

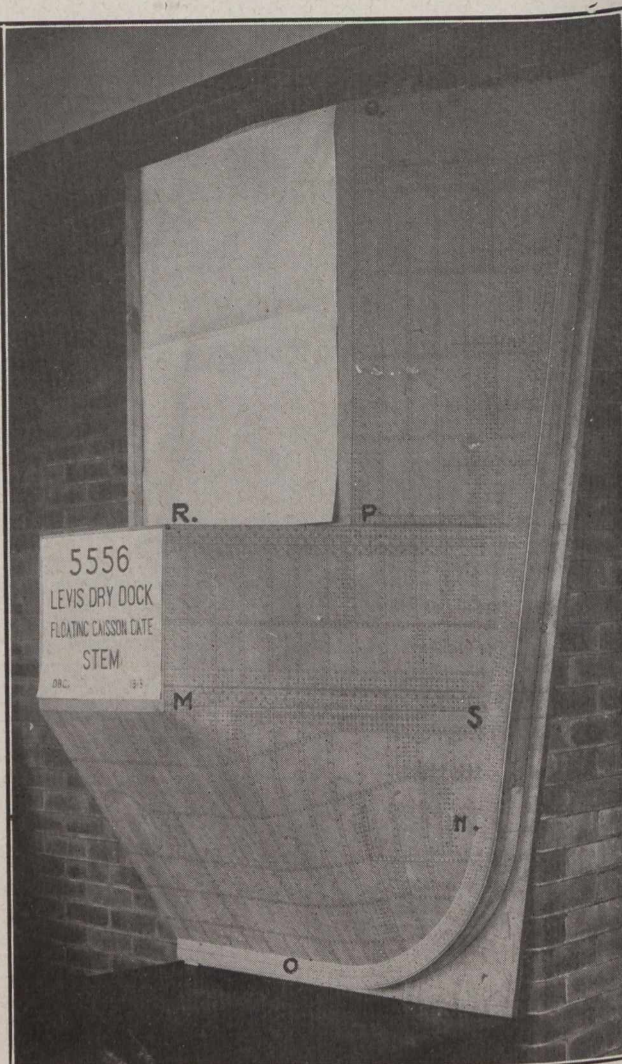

Fig. 3.

horizontal plate girders constituting decks E, D and B. The distribution of the actual loads to these respective girders was accomplished in an exactly similar manner to that used in figuring the loading of the trusses of the rolling caisson, illustrated in Fig. 1 of the article on the rolling caisson. On this basis, then, the loading to deck B is 4,260 lbs. per lineal foot; to deck D, 14,760 lbs. per lineal foot; to deck E, 25,680 lbs. per lineal foot, and the keel sill, 21,900 lbs. per lineal foot.

The design of the stems afforded one of the most interesting features of the whole gate. The reactions of the girders are as follows: B, 281,000 lbs; D, 930,000 lbs.; E, 1,590,000 lbs., and it is the duty of the stem girder to distribute these high concentrations over as much of the