and it is these latter that are carrying the real loads of the caisson.

The girder serves to divide the interior into two water-tight compartments, the upper one to be described as the tidal chamber and the lower one to be known as the ballast chamber. This division is placed at a height of 23 feet 6 inches above the bottom of the caisson, and marks the approximate load water line of the gate. Consequently, under normal conditions the large weight on the rollers is greatly relieved by the buoyancy, and the power necessary for rolling the gate is thus materially reduced. As the tide rises above this 23-foot line, it is allowed free access to the tidal chamber, and in this way the complete flotation of the gate is prevented by the automatic introduction of the requisite amount of water ballast. The foregoing is the operation during the summer. In the winter no water is allowed in the tidal chamber, but the ballast chamber is completely flooded and the enclosed water, heated by steam, serves to counteract the buoyancy of the caisson.

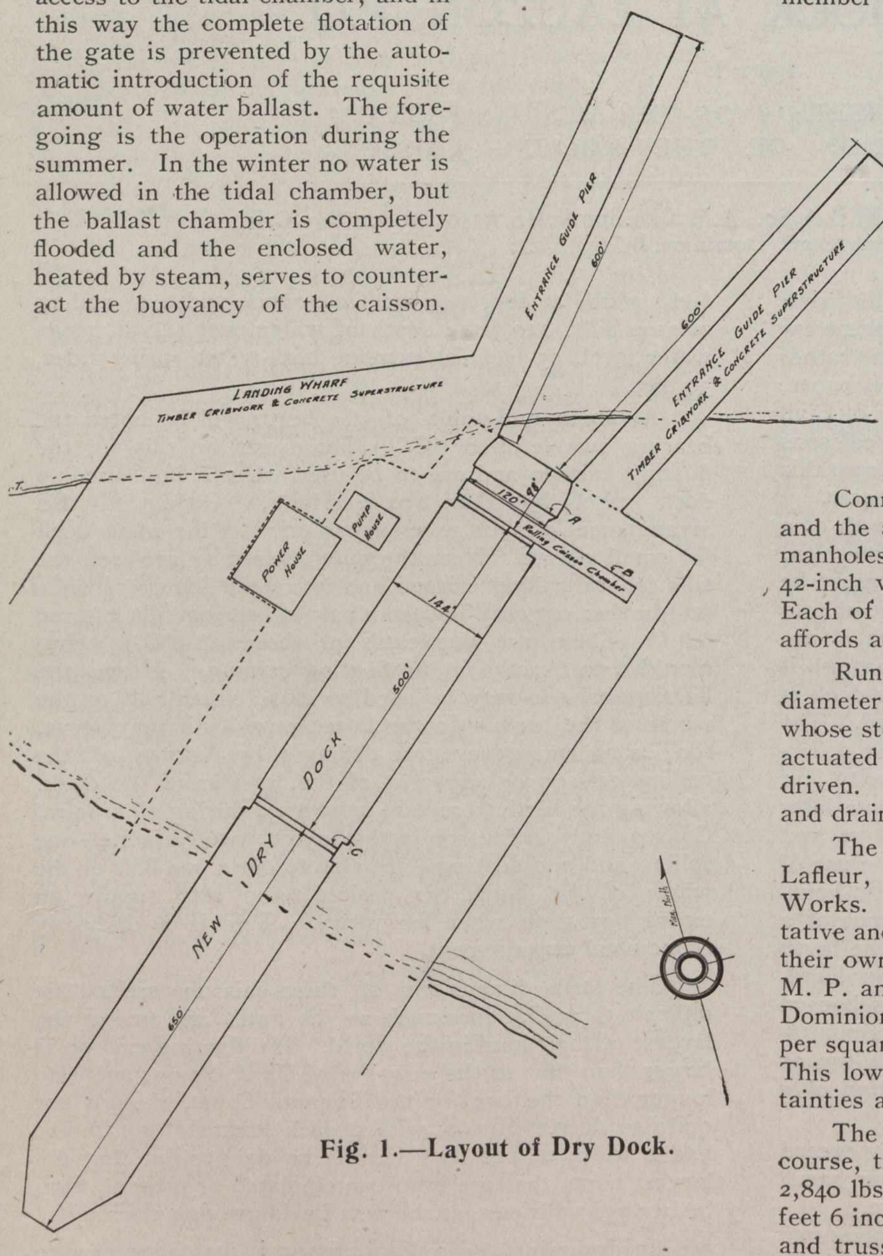

Fig. 1.—Layout of Dry Dock.

The gate is operated by means of flexible cables fastened to each end of a large yoke attached to the inner end of the caisson, which during its longitudinal movement travels on two lines of steel rollers set in the floor of the berth at about 8-foot centres. These rollers bear upon two steel rails on the bottom of the gate, each rail being 6-inch x 9-inch sections of solid medium hard steel, in lengths of about 15 feet. The seal is accomplished by the hydrostatic pressure forcing the caisson against the sills, the actual bearing pieces being 7-inch x 18-inch white oak strips on vertical edges, and 7-inch x 12-inch white oak strips on the horizontal or bottom line.

The skin plates are ¾ inch on the bottom and sides to the height of about two-thirds of the caisson, when ½-inch plate was used. All horizontal seams are single lap joints, all vertical seams are butt joints (D.R.). The vertical skin plates are stiffened by short I-beams and angles placed at 2-foot 10-inch centres, running between bottom and truss A, truss A and girder, girder and truss B, and truss B and top.

The vertical sway bracing is placed between the trusses and the girder, and between truss A and the bottom at every panel point (17-foot centres) except at the top where it is placed at 8-foot 6-inch centres. Each member consists of two 6-inch x 4-inch x ½-inch angles with gussets between for connection to the main material.

The horizontal lateral bracing is placed at the top of the caisson only, at the level of the operating sidewalk. It is designed to provide rigidity against any racking effect that might result from one corner coming into violent contact with the sill.

At the top of the caisson is a folding bridge designed to carry traffic between the two sides of the berth when the caisson is in place, but so arranged that when the caisson is in its recess the bridge is completely folded underneath the roof of the chamber. The operation of this bridge is automatic.

Connection at all times between the ballast chamber and the atmosphere is maintained by means of two oval manholes, each large enough to permit one of the main 42-inch valves being lifted through it to the outside air. Each of them is provided with a ladder inside and thus affords access for inspection, etc.

Running from face to face of caisson are six 42-inch diameter filling culverts controlled by 42-inch gate valves whose stems are taken up to the operating level and there actuated mechanically by a horizontal countershaft, motor driven. There are, also, hand-operated valves for filling and draining the tidal chamber, ballast chamber, etc.

The rolling caisson was designed primarily by Eugene Lafleur, chief engineer of the Department of Public Works. The design proposed, however, was only tentative and the tenderers were given the privilege to submit their own designs. The successful bidders were Messrs. M. P. and J. T. Davis, who turned the work over to the Dominion Bridge Company. A unit stress of 12,000 lbs. per square inch was adopted for the structural steel work. This low stress was in order to take care of any uncertainties as to loading or unavoidable eccentricities.

The loading of the whole gate was assumed, of course, triangular with a unit pressure on the bottom of 2,840 lbs. per square foot, corresponding to a head of 45 feet 6 inches of water. The centres of truss A, the girder and truss B were fixed as 12 feet 6 inches, 11 feet, 10 feet and 12 feet, and on reference to Fig. 2 these are seen. The water pressure of each main division was assumed to act through its own C. of G. and the position of this point determined the proportion that was distributed to each truss or girder. The only point about which any interest might centre is the loading of truss B. It would clearly take its due proportion of W-3 and, owing to the absence of any support at the top of the gate, all of W-4. In addition to these quantities, however, there is an overturning effect due to W-4 that must be resisted. The location of W-4 is 4 feet above truss B; hence, bending moment is 4,500 × 4 = 18,000 lbs. per lineal foot. If