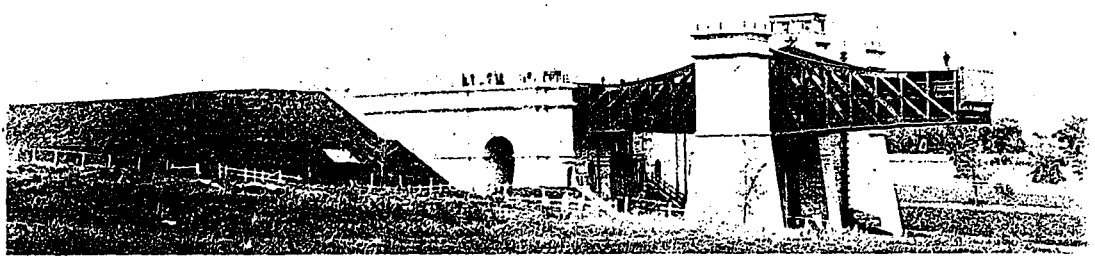


GENERAL SIDE VIEW OF TRENT CANAL HYDRAULIC LIFT LOCK COMPLETED.

Construction of Hydraulic Lift Locks

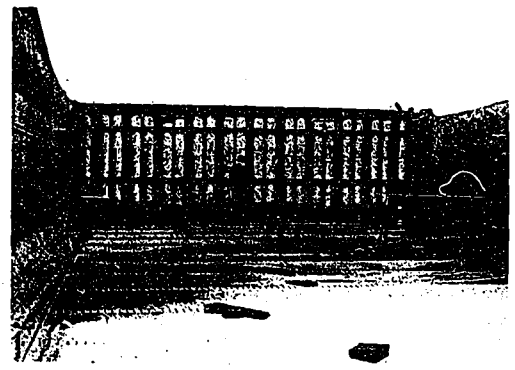
By Walter J. Francis, C.E., M. Can. Soc. C.E., M. Am. Soc. C.E.

Wherein is Given a Thorough Description of the Practical Engineering Methods Employed in Bringing the Greatest Canal Project, of its Nature, in the World to a Successful Completion

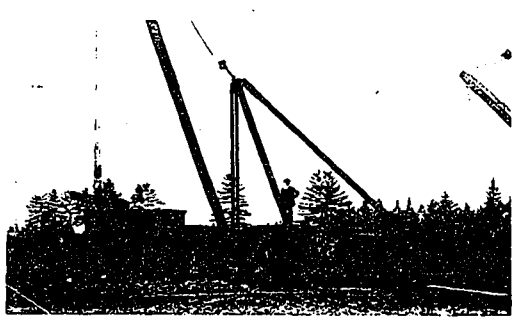
In the preceding number of this journal the Trent Canal Hydraulic Lift Lock at Peterborough was described by the author of this article from a constructional standpoint. We have received many flattering comments upon having secured this most ably written article, not only from members of the engineering craft, but from contractors and men whose association with construction work are quite remote from hydraulic engineering.

In this issue Mr. Francis has taken up, in detail, the gates and their mechanism, the main presses and rams, the tests to which the appliances were subjected and the machinery employed in carrying this magnificent work to completion.—Ed.

THE gates and their operating machinery are of a different type from anything that has hitherto been employed for this purpose. There are eight gates in all, one on each end of each chamber, and one on each end of each reach. Each gate is hinged along its lower edge, and is provided with galvanized air chambers of sufficient capacity to render it practically buoyant. As it is never necessary to operate any gate singly they have been arranged to work in pairs and to engage automatically. Each of the down-stream pairs is operated by a small three-cylinder hydraulic engine placed on the line of the axis of the reach gates in the small room provided for the purpose in the concrete walls between the gateways. A similar engine is employed for the upper gates. Through the chain motion is imparted to the pinion engaging with the segmental rack anchored to the wall. There is a similar rack on each side of the gateway, the top shaft being carried across the gate. When open both gates lie flat upon the bottom, leaving the full navigation depth of water above them. The gates are steel throughout, the framework consisting of a series of vertical I-beam posts, which connect to the top girder, giving a perfectly determinate system of stresses throughout, and bringing definite abutment loads where they can be readily cared for. The



GALVANIZED IRON TANKS IN LOCK CHAMBER GATES.



STEEL CAST PRESS SECTIONS.

plating is all on the outer edge of the gates (that is, the adjacent faces of any pair), is 5/16 in. thick on the upper parts, 3/8 in. thick below, butt-spliced and caulked in the same way as in the lock chamber.

Water-tightness is ensured between the gates and the chambers, or the gates and the reaches, by means of a rubber strip or flap, 2½ in. × ¾ in., fastened along the sides and bottom of the frame against which the gate closes. The pressure of the water keeps this strip tightly pressed against the gate, in this way preventing leakage. The edge against which the rubber bears is machined to a true surface.

There is a space of nearly 2 inches between either end of the lock chamber and the frame of the reach gate. When it is desired to connect the lock chamber with a reach, this clearance space has to be closed. This is done by having a collapsible rubber tube fastened to the frame of the reach gate and arranged so as to lie flat. When the lock chamber is in position for communication, the rubber tube is inflated with air at about ten pounds per square inch pressure, which causes it to expand and press against the end of the chamber.

THE MAIN PRESSES AND RAMS.

The main presses form the most interesting as well as the most important part of the whole structure. It is thought that they are the largest hydraulic presses that