country to Matchedash Bay on Georgian Bay, a distance of 13 miles, or follow the River Severn to its entrance into Georgian Bay.

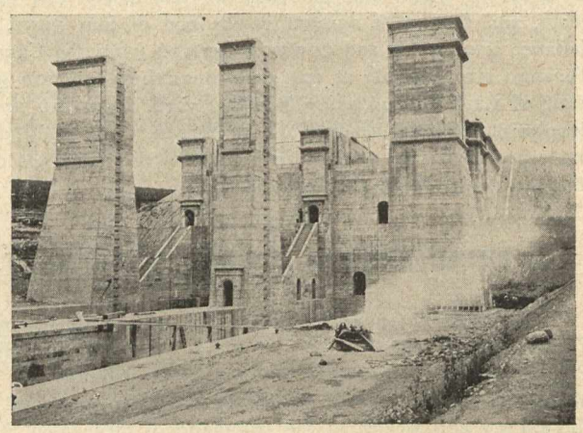
STRUCTURES.

All the structures recently constructed are built of concrete. No more suitable material for the construction of locks and dams could be wished for. The locks are of the ordinary type, with the exception of the hydraulic locks. The valves for filling and emptying the locks are placed in the gates. The apparatus for opening and closing the gates consists of a stiff steel beam fastened to the top of the gate. To either end of this beam is fastened the ends of a wire cable which passes around the corrugated drum of a capstan which is let into a void below the coping of the lock. Tile drains, encased in stone, are placed below the floor and at different levels at the back of the lock walls, in order to relieve the floors and walls of any hydraulic pressure that might arise. The hollow quoins are lined with cast-iron in order to make a smooth surface against which the gates may work. The gates are of the solid timber pattern. Owing to the great amount of lockage to be overcome hydraulic locks were introduced in order to save time. The smaller streams are carried below the prism of the canal where necessary by means of pipe culverts, and the larger streams by concrete culverts. Where at all possible the highways and railways are carried across the canal on high level bridges, which it is proposed in future to construct wholly of concrete. The head room allowed below the bridge to the surface of the water is 25 feet. Where it is not convenient to use high level bridges the highways are carried across the canal on steel swing bridges—the abutments and piers of which are of concrete. The first dams constructed were of timber with a wall or "cut off" of concrete on the upper side. Stop log openings are left in the dam in order to be able to regulate the spring freshets, which sometimes rise to ten times the ordinary flow. A timber slide is left in each dam for the passage of sawlogs and timber. All dams at the present time are built wholly of concrete.

HYDRAULIC LOCK.

A short description of the hydraulic lock at Peterborough may be interesting. There are two water-tight steel boxes, or chambers, 33 feet in width by 140 feet in length, with 8 feet of water in the clear, and closed at the ends by means of gates hung on the lower edge. Similar gates also close the ends of the reaches. These chambers are carried by means of heavy trusses supported on top of two rams 7 feet 6 inches in diameter, which work in two steel water-tight presses, one under each chamber. The presses are connected with each other by a pipe 12 inches in diameter, in the centre of which a valve is placed for the purpose of regulating the motion of the chambers. For the purpose of making up for the small quantity of water lost in the working of the main presses an accumulator is installed in one of the side towers. This accumulator has a ram 20 inches in diameter, with a stroke of 30 feet 6 inches, working at a pressure slightly greater than that of the main presses. Its pressure is also utilized to operate the gates, capstans and small pumps. The junction between the ends of the movable superstructure and the ends of the reaches is made water-tight by means of a continuous rubber hose, placed on the outer side of the ends and bottom of the gate of the reach. This hose is inflated with compressed air from a Taylor air compressor installed in the main wall.

The mode of operating the lock is as follows: Supposing both chambers are at a standstill, one up and the other down, both gates towards the reach open ready for the vessel to enter. When the chambers are thus, the bottom of the upper chamber will be about 10 inches lower than the bottom of the canal above, and has say 8 feet 10 inches of water on the sill. The bottom of the lower chamber will be just level with the bottom of the canal below, and will have 8 feet of water on the sill. Thus the upper chamber has 10 inches more water in it than the lower chamber, and consequently is so much heavier than the lower one (approximately 100 tons.) The valve in the connecting pipe between the two presses is closed. When it is desired to operate the lock gates at the end of each chamber, and the gates at the ends of the reaches are closed, the air is allowed to escape from the air hose—making the water-tight seal between the lock and the end of the reach—and the operator, who stands in his cabin on the top of the central tower, opens the valve in the connecting pipe between the presses. The upper chamber then commences to descend and the lower chamber to ascend till both chambers reach their new positions, the upper chamber being now level with the lower reach, and the former lower chamber being opposite the upper reach. The operator now closes the main valve in the connecting pipe, and inflates the air hose forming



End View of Hydraulic Lift Lock.

the water-tight seal at the end of the lock. When the chambers are in their new positions, the surface of the water in the lower chamber is ten inches above the surface of the water in the reach below, and the surface of the water in the upper chamber 10 inches below the surface of the water in the reach above. Communication between the water in the chambers and the reaches is now made by opening the valves in the gates nearest the reaches, and the water in each chamber is allowed to find its own level. The gates are then opened. When this is done the chambers are then in the condition they were on starting. Vessels are hauled in and out of the chambers by means of hydraulic capstans. The time allowed to lock and pass one or two vessels in and out of the lock will be from 12 to 15 minutes. The time required to raise or lower the lock chambers will be about three minutes. On the upstream side of the lock a guard gate will be placed which will be operated by hydraulic power, and will be closed when a vessel enters the lock. The substructure of the hydraulic lock is built of concrete. A general idea of the masonry can be formed from the drawings annexed. The natural surface of the limestone is at such an elevation that very little expense is necessary for the finishing of the floors at the lower reach level. The main retaining wall, 126 feet long by 40 feet thick, rests upon the limestone formation. Its height will be about 83 feet. The sides are carried up plumb for their whole height, the bearing pressure upon the rock being only about 6 tons per square foot. The steel superstructure is being built by the Dominion Bridge Company of Montreal.

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