THE LACHINE RAPIDS POWER PLANT, MONTREAL.*

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The problem of utilizing the power of the St. Lawrence River at Lachine Rapids, near Montreal, is one which has for many years engaged the attention of engineers and capitalists. Their almost unanimous opinion has been, however, that although considerable power could be obtained during the summer months, the drowning of the rapids during high water would so reduce this that any scheme requiring continuous power the whole year round would not be feasible. Support was given to this idea by facts observed during the running of a small grist mill erected on the site, for which power was obtained by throwing out a small wing dam. This mill was compelled to shut down during a part of the winter, owing to back water. Another serious objection was that great quantities of frazil or anchor ice run through the rapids almost all winter, and it was thought impossible to prevent its filling up the head race and wheels.

About five years ago Messrs. T. Pringle & Son and W. McLea Wallbank, of Montreal, after a careful study of the question, came to the conclusion (which has been proved since the river bed has been laid bare) that the backing up of the water and drowning of the rapids was caused by the great bars of rock which rise out of the river bed at an acute angle, facilitating the collection of frazil and the formation of natural ice dams.

The Lachine Rapids are probably the most famous of the series of rapids along the St. Lawrence River from Lake Ontario to Montreal. Every one who bas ever taken the steamer trip down them, which is one of the most enjoyable experiences of every pleasure-seeker's visit to that city, will recall the rock barriers, which make their presence manifest to the practiced eye by the turmoil of the waters, even when wholly submerged.

Above the rapids the river widens into a broad expanse, known as Lake St. Louis, some six miles wide and 14 miles long The rapids themselves are about five miles in length, and their total fall is about 30 feet. Briefly stated, the plan for power development which is being carried out by the Lachine Rapids Hydraulic & Land Co., is to project a dam into the stream at a point about one mile above the foot of the rapids, and by a dike parallel to the river bank and extending up stream 5,000 feet from the river end of this dam, to make a broad head race, which will take water from a point where the water on the rapids is about 11 ft. higher than the dam. Below the dam there is a further fall of about 10 ft. in a distance of about a mile to the foot of the rapids.

The works are designed to utilize 15,000 cubic feet of water per second, which will be about 10 per cent. of the entire flow of the river at low water

The general map of the rapids shown gives a good idea of the location of the company's power plant with reference to the rapids and the city of Montreal.

GENERAL DESCRIPTION OF WORKS.

By reference to the general plan (Fig. 2) it will be noted that the present scheme, as now being carried out, will consist of: (1) A head race 3,705 feet long, formed by a wing dam composed of a 40-foot masonry ice breaker at the entrance, 3,305 feet of overflow cribwork, and 360 feet of cribwork carried up square to the same level as the top of the piers of the main dam. (2) A main dam of 43 masonry piers on concrete foundations, the piers being 4 feet thick and 17 feet high above the level of the floor of the flumes and the top of the foundation The piers form 36 flumes, three waste weirs, and the foundations for three power houses. (3) A guard dam forming the tail race, consisting of 300 feet of cribwork 10 feet wide and 900 feet of embankment formed of rock taken from excavations. (4) A system of booms and cribwork piers designed to keep the wheels clear of floating ice, driftwood, grass, etc.

The head race is to be excavated to a depth of 12 feet below the top of the overflow dam, and is at the narrowest point near the entrance 525 feet wide, with a sectional area of 6,300 square feet, so that, allowing a discharge of 200 cubic feet per second from each wheel, or a total of 14,400 cubic feet for 72 wheels, the velocity of flow past this point will amount to about 2.3 feet per second. As the head race widens out to nearly 1,000 feet at the flumes, this velocity will, of course, be much reduced, so that there will be little, if any, lost head due to an excessive speed of current

The current in the river just above the entrance to the head race runs at the rate of about six miles per hour, and this striking a body of water moving at the rate of only two-thirds mile per hour will give it a tendency to strike almost directly outwards, carrying with it most of the frazil, driftwood, etc., that it may contain. It is also a fact that the current has always had a tendency to strike outwards at this point, owing to a curve in the river bank just above the head-race entrance.

The water in the head race will freeze over completely in winter; and, as is well known, no frazil will form under the ice; but should any commence running before the ice forms, the racks are so hinged and arranged that they can be lowered to the bottom, or taken out completely, allowing it to run through the wheels. The crib piers and booms are so arranged that there will be no danger of the ice shoving down on to and destroying the racks. The greater part of whatever ice forms in the head race will go over the overflow dam, and the small balance will go through the waste weirs without trouble.

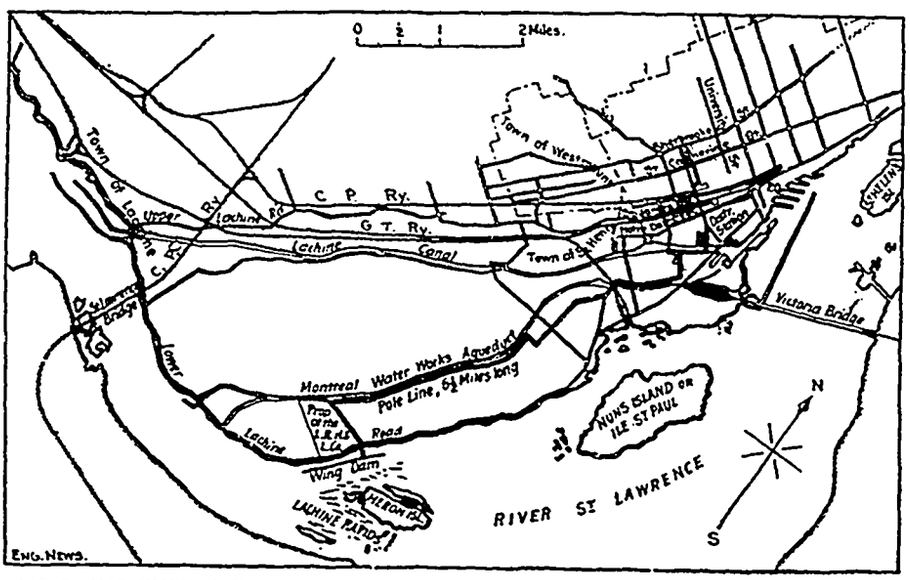

FIG. 1.—MAP SHOWING THE LOCATION OF THE POWER PLANT AND POLE LINE OF THE LACHINE RAPIDS HYDRAULIC AND LAND CO.

CONSTRUCTION OF FALSE DAMS.

Work was commenced in the fall of 1895 by throwing out a false dam (Figs. 2, 3 and 4) of stone and earth at right angles to the shore; then by running a short wing dam down stream, enough of the river bed was made bare (Fig. 5) to enable the contractors to get sufficient stone by excavation to grade to continue the dam further out into the river, and to commence running a wing dam down to the site of the main dam, on which are the wheel houses. Every foot added to the wing dam down stream, laid more of the river bed bare and allowed excavation to be made down to grade. This work was carried on during most of the winter by means of steam drills, and the rock taken out was used to construct another dam (Fig. 2) at right angles to the shore, 150 feet above the extreme upper end of the proposed wing dams. These two false dams were connected during the past season, and when they were sufficiently advanced an opening was made in the lower dam and the water in the upper portion drained out, enabling the whole of the work to be done on a comparatively dry river bed.

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