

very largely to make up the difference in first cost. Then comes the difference in cost of operation of the two systems. One, the electric elevated, comparatively no dead weight of locomotives, and only the motor car, and less than half the dead weight of the cars to be hauled over the line; the staff of engine drivers and firemen with all the assisting staff at engine houses reduced; no haulage of coal and water over the line; no water stations, water pipes, and water pumping engines; coal stations and the staff—all will be reduced to three power stations per 100 miles, where its boilers, engines, and machinery are stationary; no cost for its haulage; also the engines, as already stated, use up the line with their heavy weight; all the heavy gear wears away much faster. No damage from fire caused from sparks of locomotives, and no more burning up of trains and passengers when trains are run off the track and down embankments or in collisions. Also by removing the passenger trains from the surface railways will give much more facilities to freight trains, which will also prevent many accidents and delay to the freight in transit. Now this is only a question of the first outlay, which cannot help but double itself in a short time, and be a blessing to the human race in its advance with the commercial progress of each year. I am quite sure that my system of elevated railway will accomplish all I claim here, and even more when all the details are fully considered.

Now, as to its possibility of revenue sufficient to warrant the outlay. Say that such a line should be built from New York to Chicago. The present time consumed to make that run is about 35 hours, while the time would be only 7 hours by the elevated, the distance being reduced to 700 miles, and the train running at 100 miles an hour, would be 7 hours in place of 35 hours, or 14 hours in place of 70 for the round trip; outside of the person arriving by the elevated perfectly rested and ready for business, in place of requiring six or eight hours to rest after one has travelled to Chicago by the present system. As to number of passengers, they could afford to go a distance of 300 or 400 miles, to start for Chicago from New York. Say passengers from Quebec, Montreal, or Boston, could reach New York in one night and take the elevated, they would still make the journey in about half of the present time, and the same in the vicinity of Chicago. An elevated line built now between these two points would be only a beginning of the new system, which would not only be a great rate of interest on the outlay, but a general benefit to the travelling human race.

#### PROPOSED IMPROVEMENT AT LACHINE RAPIDS WORKS.

The Lachine Rapids Hydraulic & Land Company is undertaking a considerable amount of work this year, at the Lachine Rapids, the experience of the past two winters having exhibited the action of the water and ice both at the head and tail races. Last winter, for instance, the water in the tail race was abnormally high, higher, it is said, than it has been for thirty or forty years, and while the head race was not materially affected, so far as the supply of water was concerned in the river, yet the ice entered the intake and would not permit of sufficient quantity of water entering, without drawing down, so that they had to meet the worst

conditions possible, namely, the highest back water and low head water inside the intake. Various schemes have from time to time been suggested for preventing the entrance of this ice into the head race, principally by means of large and deep booms.

W. McLea Walbank, the original promoter of the company, and one of its engineers, was decidedly against this principle, inasmuch as he contended it would be almost impossible to construct a boom that could be held there, and in addition to which, the current is so strong that even a deep boom would be of little or no use.

After the ice went out of the river this spring, Mr. Walbank had his assistants carefully sound the river above the intake, and submitted to the directors a scheme for the improvement of the works and suggested consultation with outside engineers. The result of the soundings taken in the river showed that there was a deep channel connecting with the main channels of the river at McDonald's Point, as shown on the accompanying plan. This deep channel continued down to almost in front of ice breaker, where the water was turned almost at right angles into the river. The result was that the current had a tendency to draw the ice from the river opposite McDonald's Point, following the deep channel and discharging between the shoal and ice breaker, and naturally depositing ice at the mouth of the intake, which gradually filled up and impeded the flow of water. The channel between this shoal and the ice breaker is somewhat over 20 feet deep. The plan proposed by Mr. Walbank was as follows: Raise the existing wing dam the level of the water in the head race during the month of December, so that there would be absolutely no water running over during winter; also extending the wing dam the same level about 1,000 feet further up the river. The result of this would be to make the intake, in place of 525 feet wide, nearly 2,000 feet wide, and the water in place of being 12 feet deep, would be between 30 and 40 feet deep. The current at present there would be destroyed and the river freeze over. The main direction of the river current would then be at an angle with the head race, rather than leading into it, as at present. For the improvement of the tail race, he suggested the raising of the guard pier about 4 feet, and the extending the same down stream, a distance of about 1,000 feet, and excavating of a deep channel between the guard pier and main shore, and removing the shoals. The object of the extension of the pier was to deflect the ice into the stream. The river below the rapids freezes over in some winters, and forms natural dams in the river itself, which raises the water very considerably, last winter coming one foot over the present guard pier. The object of raising it was to prevent a re-occurrence of this and to allow the tail water to take the discharge of the wheels only, without being influenced by the water in the river, except the natural backing up which occurs every year to a greater or less extent, and which is allowed for in the original plans. In addition to the foregoing, a glance pier from McDonald's Point, running completely down stream, was suggested.

T. C. Keefer, an engineer of very high standing in hydraulic matters, and well-known to our readers, was consulted by the company, and he has reported to the Lachine Rapids Company, endorsing the scheme