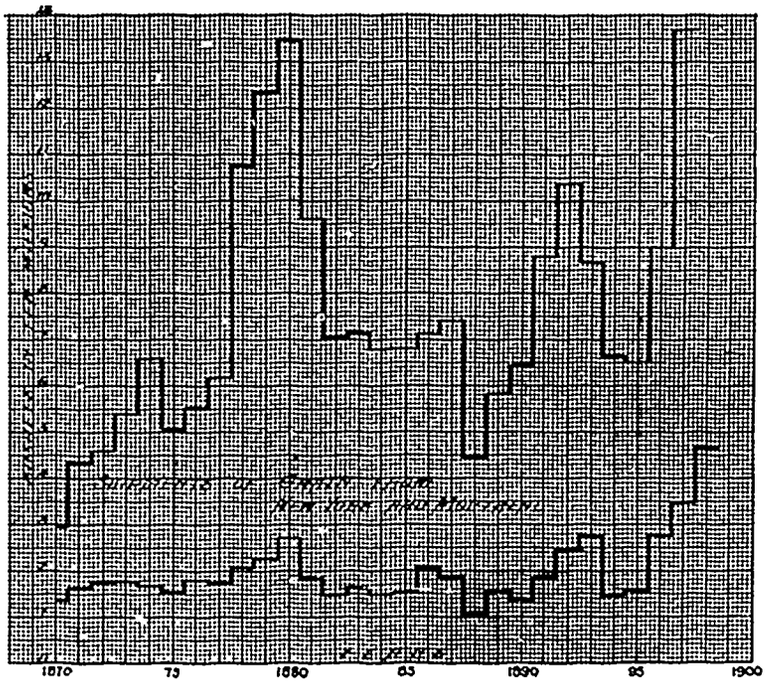
to our commerce until after 1870, for in spite of all improvements and enlargements it was not until that date that the cut was excavated to such a depth that the Erie level could be carried through.

The Soulanges canal may be taken as the most advanced type of canals proper. It is a built canal for its entire length of 14 miles, and has a waterway 100 feet wide at the bottom, with side slopes of 2 to 1. The banks of the canal near the water line are protected from the wash of the swell of passing vessels by a layer of broken stone. The excavation of the material for the waterway involved enormous quantities, but the perfection of modern contracting plant rendered it easy to handle the material at rates that would never have been thought of in the construction days of the Rideau; and, although its route did pass through material well nigh as unstable as that on the Welland, the great slips that have occurred have been readily taken out by the contractors. The Soulanges canal has no lack of water to fear, for its summit level is that of Lake St. Francis, and like all the St Lawrence canals it has the great river to draw from. But though the flow of the St. Lawrence may be ample its depth is not always so, as the shippers of Montreal well know from recent experiences in the ship channel, and in this particular the engineers of the Soulanges have made more ample provision for unprecedented low water than has been made at Lachine and Cornwall, for on those canals of nominal fourteen feet draught, the water has sometimes been less than thirteen feet deep. There is also grave reason to fear that the opening of the Chicago Sanitary Canal will divert so great a flow from the St. Lawrence that in low water seasons the river level will sink lower than ever before, and that the efficiency of our most important canals will be seriously impaired by this local American work, for unfortunately, the time of low water is coincident with the time of heaviest trade, and then every inch of draught means much to our forwarders. As in the Rideau, the heavy fall of the Soulanges comes at one point, but here in order to avoid a flight of locks short stretches of canal with large equalizing basins are built in between the separate lifts. The locks themselves are built of concrete, and faced with cut stone. Their magnitude can only be realized when standing in them, for the size of a wall 22 feet thick, and 41½ feet high, is not easily grasped from the figures alone.

There are several details that are worthy of note in these locks. The breast walls at the upper end are reintroduced, as it is found that the most fruitful cause of accident in canals is the collision of an upcoming boat with the upper gate, and breast walls will prevent this. The gate valves for letting the water in and out of the locks, and that we are all so familiar with, have been abandoned, and the water flows through great culverts in the heart of the wall. The flow through these culverts is regulated by vertically moving valves called Stony sluices, a device adopted from the Manchester Ship Canal. The familiar winches for operating the gates will also be missing for these, themselves nothing but a pile of great beams of British Columbia fir solidly bolted together, will be moved by heavy struts attached a little above the centre of the gate and working in recesses in the walls. The power for all this movement, and for the lighting of the canal from end to end at night will be electricity, and will be obtained from a special power-house, built in the bank of the canal, and utilizing its surplus flow.

Special channels or by-passes are built around each of the locks by means of which water for the reaches below can be supplied without flowing through the locks themselves. These by-passes are spanned by stone bridges at each end, and the discharge through them is controlled by a set of automatic Stony sluices built directly across the by-pass at the centre. Long walls of cribwork run out into Lake St. Louis and Lake St. Francis at either end of the canal, but there is a novelty in their design also. For the cribwork is only carried up to within a foot of low water, and above that these quay and anchorage walls are all concrete.

The line of the canal is intersected in several places by roads and streams, and provision has had to be made for their crossings. The roads are carried on swing bridges as is customary, but these are specially designed so that there is no masonry to interfere with the clear waterway of the canal, and an extra channel is excavated around the swing pier of the bridge. The opened draw is completely on one side of the canal proper. The piers are of concrete and the scaffolding in the slide is typical of that used for all the structures. It is not an easy matter to cross a large stream with a canal, for the level of the canal is usually about that of the stream, and although the latter's low water flow might be a desirable addition to the resources of the canal, its flood tide would be far too strong to be accommodated in so artificial a channel. The main stream that crossed the Soulanges location had a flood discharge greater than that of the Rideau at the time of the Hog's Back disaster, but it and all other streams have been quietly passed under the canal by means of lines of cast iron pipes, set in concrete. The Delisle River required 4—10 ft. pipes to give it free passage. The St. Lawrence canals are all built to the same general dimensions, but the details of the Soulanges are more complete than those of the earlier finished canals. The locks are much larger than those of the Ottawa and Chambly canals, but are after all only modern developments of the original type which they well illustrate.



Turning now to consider the canals from the point of view of the commercial public, it must be admitted at the outset that they have failed to fulfil the expectations of their designers. In the case of the smaller canals the reason for this is not far to seek. In England and in the United States no stocks have