

The Canadian Engineer

VOL. VII.—No. 1.

TORONTO AND MONTREAL, MAY, 1899.

PRICE, 10 CENTS
\$1.00 PER YEAR.

The Canadian Engineer.

ISSUED MONTHLY IN THE INTERESTS OF THE

CIVIL, MECHANICAL, ELECTRICAL, LOCOMOTIVE, STATIONARY,
MARINE, MINING AND SANITARY ENGINEER, THE SURVEYOR,
THE MANUFACTURER, THE CONTRACTOR AND THE
MERCHANT IN THE METAL TRADES.

SUBSCRIPTION—Canada and the United States, \$1.00 per year; Great Britain and foreign, 6s. Advertising rates on application.

OFFICES—62 Church Street, Toronto; and Fraser Building, Montreal.

BIGGAR, SAMUEL & CO., Publishers.

E. B. BIGGAR Address—Fraser Building,
R. R. SAMUEL MONTREAL, QUE.
Toronto Telephone, 1892. Montreal Telephone, 2589.

All business correspondence should be addressed to our Montreal office. Editorial matter, cuts, electrots and drawings should be addressed to the Toronto Office, and should be sent whenever possible, by mail, not by express. The publishers do not undertake to pay duty on cuts from abroad. Changes of advertisements should be in our hands not later than the 1st of each month to ensure insertion.

CONTENTS OF THIS NUMBER :

	PAGE		PAGE
Air, The Liquefaction of.....	5	Lubricator for Compound Engines.....	19
Amalgamating apparatus, A New ..	15	Literary Notes	39
Automobile Progress	22	Metal Polish	14
Beckett, The Late F. G.....	15	Maritime Electrical Association, The	
Borrowed Plumes.....	6	Second Annual Convention of the	20
Brief but Interesting	59	Marine News	26
Culverts and Bridges	7	Mining Matters	27
Canadian Society of Civil Engineers,		Practical Man, The	22
The	14	Personal	29
Dam Building.....	18	Railway Matters	27
Electric Fishes.....	23	Sewage Disposal, The Royal Com-	
Estimates, The	17	mission on	15
Fly-wheel design, Improvement in..	19	St. Lawrence Route, The Beginning	
Fires of the Month	30	of the.....	1
Iron Methods, Swedish or Canadian	11	Suspension Scales	23
Iron Production.....	19	Torsional Strain, Instruments for	
Industrial Notes	21	Measuring Swivel.....	9
Lake Navigation in Canada	6	Water	3

THE BEGINNINGS OF THE ST. LAWRENCE ROUTE.*

There is a river which contains more salt water than fresh, which has a seaport almost a thousand miles from any ocean, a river that twice in the day flows backwards. At one season it affords navigation to the largest vessels, and at another it has upborne upon its crystal surface a train of loaded cars, with busy locomotives. It flows past virgin woodland, past cultivated fields, and past cities, is sentinelled for hundreds of miles by the oldest mountains in the world, expands into vast lakes, swept by sudden storms, and contracts in narrow gorges, toothed with rock, where its wrath and strife are titanic. It penetrates a continent like a wedge, and makes a maritime people where the phenomenon of the tides is wanting. It has been the haunt of pirates, of smugglers, the route of heroes and of savages, the scene of wreck and the arena of glory. It is to the Canadian what the Tiber is to the Roman, the Nile to the Egyptian, the Rhine to the German; for that river is the St. Lawrence.

The St. Lawrence gives the Province of Quebec a sea-coast of 2,500 miles or 500 miles more than that of England. From the Straits of Belleisle to Duluth it has a length of 2,384 statute miles. Montreal, at the head of ocean navigation, is 986 miles from Belleisle, and the river is salt as high as

St. Thomas, 766 miles from the ocean, while the tides are regular as high as Three Rivers. The great lake system with connecting waterways has an area of 98,000 square miles, a coast of 2,112 miles and the basin area of the system is 330,000 square miles, a generally fertile country capable of accommodating 108,500,000 inhabitants if as densely populated as the United Kingdom. From the ocean to Quebec the river varies from seventy to ten miles in width, with a proportionate depth. It is, however, dotted with reefs and islands and subject to fluctuating currents and summer fogs, which render necessary the present magnificent system of lighthouses, sirens and buoys. From Quebec to Montreal the river is rarely less than two miles in width, and its depth is never less than thirty feet, except where a score of shoals aggregating fifty miles in length have had to be dredged, giving at present a navigable channel of 27.5 feet.

The current of the river is usually gentle, but in its descent of 235 feet from Lake Ontario it traverses a series of steps creating about forty miles of rapids, which have had to be overcome by the construction of some seventy odd miles of canals. The continuity of navigation on the great lakes is interrupted by the Niagara Falls, to overcome which a canal nearly 28 miles long has been constructed, and by the Sault Ste. Marie, where there is a canal, short, but otherwise on a gigantic scale, to accommodate vessels almost as large as those that brave the tumult of the Atlantic.

The St. Lawrence route in whole or in part is the natural outlet of the interior of the continent to the Atlantic seaboard. Its headwaters are equi-distant between the Atlantic and the Pacific, and engineering work of an easy nature might render continuous navigation possible from the foot of the Rockies to Montreal. The old canoe route by way of Georgian Bay, Lake Huron, French River, Lake Nipissing and the Ottawa, while studded with difficulties, is even shorter than the Great Lakes and St. Lawrence route for traffic originating west of Lake Huron, but would use the St. Lawrence from the mouth of the Ottawa downwards. A short distance below Montreal the Richelieu enters the St. Lawrence, giving access to Lake Champlain and the Hudson Valley, and to New York, the distance from Montreal to the United States metropolis being 457 miles by this route, of which 372 miles would be natural navigation. The present objections to the St. Lawrence route are several. In the first place there is no Canadian lake harbor sufficiently equipped or deep enough to compete for trade with the United States lake ports, many of which have been deepened at large expense. Secondly, the river cannot be said to be open more than seven or eight months in the year. And thirdly, the existence of tolls militates against the natural advantages of the route. The competition of railroads and of the Erie Canal, which is free of tolls, render the advantages of the St. Lawrence route almost useless to stay the tide of traffic by way of the United States. Of course, the Erie Canal is not navigable in winter.

Champlain's escapade on the lake named after him, in which he shot an Iroquois chief, closed the St. Lawrence

*Abridged by the author, Arthur Weir, B.Sc., from a lecture delivered before the Applied Science students of McGill University, Montreal, January, 1899, and published exclusively in THE CANADIAN ENGINEER.