

## HURON AND ONTARIO SHIP CANAL.

(From London Engineer, Jan. 10.)

THE proposed ship canal in Western Canada, across the isthmus which separates Lake Ontario and the Georgian Bay will, when completed, rank among the most important engineering works yet undertaken. It possesses more than ordinary interest at the present time, inasmuch as Mr. Hawshaw and Mr. Rendel, who, we need hardly say, are among the most eminent members of our profession, have examined the plans of the work, and report favourably, although in general terms, upon them. Pending the negotiations with the Canadian Government for a grant of ten million acres, or 16,625 square miles, of land in aid of the undertaking, it is being examined also with special interest by capitalists, engineers and contractors in England. No work could possibly possess greater importance to the Dominion of Canada, unless it were the formation of a great line of water and railway communication across the Continent, and wholly through British territory, to the Pacific Ocean.

The city of Chicago, now numbering about 250,000 inhabitants, although nearly 1,600 miles inland from the Atlantic, and at an elevation of 585 ft. above its surface, is nevertheless one of the great shipping ports of America, and it is said, upon the authority of statistics which there is no reason to doubt, that it exports more grain, more sawn timber, and more salted meat than any other port in the world. Vessels of moderate tonnage have already sailed direct from Chicago to Liverpool, and it is hoped to one day make the trade between the two ports as regular at least as between Hull and St. Petersburg. The astonishing growth of the commerce of Chicago has been very lately brought airily to public notice in this country, by Captain Tyler and Mr. C. W. Elworth's report upon the Grand Trunk Railway. The export commodities, not only of Chicago, but of other large and rapidly growing commercial towns in the North-Western States of America, are sent eastward either by rail or through the great chain of lakes, Michigan, Huron, St. Clair, Erie, and Ontario, the greatest lake of all. Superior, an American Mediterranean being furthest to the north, and off the route. From Chicago to New York, by way of the lakes, the Erie canal, and the river Hudson, is 1,615 miles, although by rail it is but 955 miles. From Chicago to Quebec, by water communication, is 1,634 miles, and Quebec is 478 miles nearer Liverpool than New York; the respective distances being 2,562 miles and 2,680 miles. In sailing or steaming from Chicago to Quebec, however, a great detour of more than 500 miles must be made around the extensive peninsula which forms the south-western portion of Canada, a peninsula bounded by Lakes Huron and St. Clair, the river Detroit, and Lakes Erie and Ontario. Lakes Michigan, Huron, St. Clair, and Erie are all upon the same level, viz. 574 ft. above the Atlantic. But from Erie to Ontario there is a fall of 34 ft. in the river Niagara, one-half of this fall being at the great cataract of that name. Vessels descend from Lake Erie to Lake Ontario through the Welland canal, in Canadian territory, to the west of, and nearly parallel with, the river Niagara.

The extensive peninsula which forms the south-western portion of Canada is joined to what we may call the continent of Canada by an isthmus hardly more than 60 miles across, more distinctly marked by the valleys of two or three rivers—one, the Humbler, discharging into Lake Ontario, and the others, the Holland into Lake Simcoe, and the Nottawasaga into Georgian Bay, the latter an extensive indentation of Lake Huron. The least elevation of the country between the lakes is 670 ft. above Ontario, and 330 ft. above Huron. On the line of this isthmus is Lake Simcoe, a sheet of water 660 square miles in area, and as wide as the narrowest part of the Straits of Dover. This lake is 470 ft. above Ontario and 130 ft. above Huron, and it drains into the latter. The proposed ship-canal will follow the valleys of the three rivers—a ready-made, and will be fed at its summit level by the practically inexhaustible waters of Lake Simcoe, and nearly twenty-five miles of the length of this lake will be utilized as a part of the navigable route. By means of the canal 428 miles of the present distance by water from Chicago to Quebec and Liverpool will be saved, the distance from Chicago to Liverpool being reduced from 4,168 miles to 3, 88 miles, and from Chicago to Quebec from 1,634 miles to 1,238 miles. By the present route, through the existing Welland Canal, from Lake Erie to Lake Ontario, only vessels of small size can pass; but by the proposed canal, and with enlargement to be made in the locks of the St. Lawrence canal, vessels of 1,200 tons could sail or steam direct between London or Liverpool and Chicago. The lowest freight for grain between Chicago and Liverpool is now 5d per bushel, or say, £2 13s per ton, whereas by the proposed canal, and with much larger ships, the freight would be it is estimated, be lessened by one half equal to a reduction in the price of wheat of 5s. 8d per quarter. The line of the proposed canal was surveyed in 1856 by Mr. Tully, of Toronto, who reported upon the scheme in considerable detail. It has been more recently re-surveyed by Mr. William Sykes, of the same place, who, with Mr. F. Capreol, the president of the provisional company formed for carrying out the work, is now in London, and has submitted his plan and report to Mr. Hawshaw and Mr. Rendel, who, if the canal is begun, will be the engineers, they having accepted the appointment. It is by Mr. Capreol's indomitable energy and perseverance this project has been brought to its present stage.

Mr. Sykes's plans are for a canal 100 ft. in width and 13 ft. in depth, but it is possible that in the execution of the work these dimensions would be somewhat exceeded. We believe, however, that 15 ft. is the limit of the permissible draught of vessels navigating the St. Lawrence and Lake Ontario. The locks, of which forty-two will be required—viz., thirty-one south of

Lake Simcoe and eleven to the north—are planned of the following dimensions, viz., 250 ft. long, 33 ft. wide, and with 13 feet of water upon their sills. The average lift of these locks would be 15 ft.

As already stated, the lowest point in the summit-ridge between Lakes Ontario and Huron is 670 feet above the level of the former, and 330 ft. above that of the latter, or 200 ft. above the intermediate Lake Simcoe. It would be manifestly desirable to make the latter the source of supply in the ordinary manner of gravitation for the whole length of the canal. By doing this, too, a continuous summit level of nearly 48 miles out of the whole length of 64 miles would involve a cutting 83 miles long and 184 ft. deep at the deepest point, but the average depth of this would be only 80 ft. This would extend from the 22nd to the 34th mile from Toronto, however our engineers may have resorted, before now, to heroic treatment, we are not sure that they will proceed to mound a work like this—at any rate unless the ground had been thoroughly bored and found to be favourable every point. This cutting was, however, proposed by the original projectors of the work, Mr. Tully, and it now appears to the plan of Mr. Sykes, who has tested the ground to considerable depths and found it to consist of indurated clay and gravel, similar to that found in ends not far distant which have stood for many years at steep slopes. Mr. Sykes, indeed, in the cutting as a work of magnitude, merely, and not as one of an emergency. If made, four arched bridges of large span, viz., of from about 200 ft., would be required to carry roads over the cutting, and at an elevation sufficient to clear the topsides of vessels passing beneath.

The plans of the work may, however, be considerably modified before they are finally carried into execution, and it is not improbable that the engineers who are expected to assume the responsibility of the works may recommend a much shorter and shallower cutting even at the expense of increased lockage, and that of pumping the water, say, 100 ft. to the summit level. The power required to pump the whole lockage water 100 ft. high would not, as shown by calculation, be excessive, even if ships were passing the locks every twenty minutes during the twenty-four hours. Which ever mode may be adopted for passing the summit, it is satisfactory to know that Mr. Hawshaw in his preliminary report upon a general examination of the plans, has pointed out no special difficulties, this report being based upon the necessary assumption that the soil is favourable for the execution of the proposed works.

From the northern end of the summit cutting to Lake Simcoe is 14 miles, and the route lies in flat marshy land, and for much of the way in the bed of Holland river. The proposed length of the summit level, including the 24 miles of navigation through Lake Simcoe, is 48 miles nearly or eight hours steaming at an average rate, in the canal and on the lake of 14 miles an hour.

Beyond Lake Simcoe will be one more heavy cutting, 53 miles long and 8 ft. deep at the deepest point, but only 50 ft. on the average. At its northern end the canal will be fed down to it, by six locks of 15 ft. lift each, and five more locks of 8 ft. lift each occur at various points before reaching the Georgian Bay, near which, also, the canal will pass through a cutting about three miles in length. The gates and sluices of the locks are to be opened by hydraulic power, and the swing bridges over the canal are to be moved by steam power.

The harbours both on Lake Ontario and the Georgian Bay are sheltered, and capable of being easily rendered available for vessels.

It is proposed to take the canal over the Great Western Railway, near Toronto, by an aqueduct of three spans, and to reconstruct the bridge of the Grand Trunk Railway at Weston, seven miles from Toronto, so that vessels may pass beneath it. Both these are important works.

The whole length of the canal proper is nearly 72 miles, or including the navigation through Lake Simcoe, 96 miles from Lake Ontario to the navigable waters of the Georgian Bay and Lake Huron.

Mr. Sykes has estimated that the work will comprise 10,000,000 cubic yards of dredging, 61,000,000 cubic yards of excavation, and 1,500,000 cubic yards of puddling. The estimate is very full in its details of retaining piers, slope protection, locks, dams, waste weirs, bridges, hydraulic main (25 miles), towing-paths, culverts, inlets, fencing, terminal harbours, wharves, machinery, &c. and the whole estimated cost with 10 per cent for contingencies, is \$3,989,840, or about £2,250,000. This, however, is for a canal of but 13 ft. depth, and it is probable that 15 ft. of water would be finally fixed upon before commencing the works, in which case the cost might prove to be upwards of £3,000,000.

A mass of statistical information, collected from the best resources, has enabled an estimate, apparently well justified, to be formed that nearly 5,000,000 tons of freight yearly in both directions will be ready to take advantage of the proposed canal, if completed in 1875. Of the immense importance of the work to the Dominion of Canada those who know that country and the Great North-Western States of the American Union cannot entertain any doubt, and we trust before long to announce that it has been begun in earnest.

**SHORT SESSION.**—The fifth Session of the fifth Parliament of the colony of Victoria lasted rather less than three-quarters of an hour. The Parliament, having been prorogued on the 8th of November, was convened on the 25th for the purpose of agreeing to an address to His Royal Highness the Duke of Edinburgh, presently expected. No other business was done except passing a Bill to continue the operations of the Scab Act. His Excellency the Governor, who had opened the Session with a short vice-regal speech, remained in an adjoining chamber during the debate, and then re-entered to give the Royal assent to the Bill.

## TRACTION ENGINES.

IN the Ontario Assembly on Monday Mr. Cumbe-land moved the second reading of the Bill (No. 66) respecting traction engines. He said, as some inquiries had been made as to the purpose of this Bill, he begged to offer a word or two of explanation. The name even "traction engines," seemed unfamiliar to some hon. members, and some were rather alarmed about it. A "traction" engine was simply a locomotive engine to run upon highways instead of railways. An application was made to him very shortly after the session opened by parties who were desirous of running such engines here, but who feared that they had not the power, and that they might be subject to annoyances possibly losses and law suits, if they attempted to work traction engines in this country. One firm, of high commercial standing in this city, had ordered a traction engine, but unfortunately on its way here, it was lost by the vessel being wrecked. Another party desired to start them on the road from Whitby to Port Perry, and requested him to introduce a Bill to incorporate a company for that purpose. He (Mr. Cumbe-land) suggested to that gentleman and to others that if the use of these traction engines was likely to become beneficial to the public, it would be better to embrace in a general measure, proper rules and regulations in respect to them. He had accordingly ventured to introduce this Bill. Everything that went to cheapen the cost of transportation was beneficial. There were localities in this Province where there were large accumulations of heavy freight outside the reach of railways, and for which traction engines were well calculated. It was true their use must be limited to tolerably good roads. He believed a good summer road, though not macadamized, might be available; but, as a general rule, a macadamized road would be necessary. The gradients ordinarily found on common macadamized roads would not interfere with the action of these engines. A six horse-power engine, weighing six tons, and costing £20, would draw a load of 15 tons on an ordinary level road, and a load of 10 tons up a gradient of one in twelve. An eight horse-power engine, weighing 8 tons, would haul 25 tons on a level and 15 tons up a gradient of 1 in 12. A ten horse-power engine weighing 10 tons would haul 30 tons on a level and 20 tons up 1 in 12. The gradients on the ordinary macadamized roads of the country would scarcely exceed 1 in 12. Such engines would probably be very useful to run from the villages tributary to Toronto, within a radius of 12 or 15 miles. Some of these villages were looking for railway service and might not get it. In that case, these engines would furnish an efficient way of largely diminishing the cost of transportation. He confessed frankly, however, that the matter was one of some difficulty, and he should be much obliged to any members who might point out amendments that might be made in his Bill. Some of the clauses he had proposed with considerable hesitation. For instance, with regard to roads owned by corporations or purchased by companies from the Government, it might not be acceptable to those parties to make it obligatory on them to straighten their roads, so as to fit them for being used by these engines. He believed, however, that the introduction of traction engines would be a great public benefit, and would largely increase the profits of the producer.

## GOLD ON THE ARTHABASKA.

A CORRESPONDENT at Red River says:—"The last summer was extremely unfavourable for mining. Early in May the thaws commenced in the mountains, the floods descended, carrying off sluices, rickers and all that was near the river, yet I think it overflows a few low-points—and does not extend into the plains as this river did in '23 and '62. When the water drove the miners from the bars and banks of the river, G. Gunn and a few others formed a party and set off to prospect on the Arthabaska river and on its tributaries. The first indications of gold all along, but the melting of the snow in the mountains at the heads of the Arthabaska filled the river, creeks and gulches, rendering their exploration very unsatisfactory; as they were not able to work on the bars. They passed Jasper's house and travelled over a non-aridiferous region a distance of 70 or 75 miles, beyond this they found the precious metal, a continuation or extension of the gold region of the P.-C. slope; but no where could they find the nuggets nor the gold-bearing rocks in situ. The miners were pretty successful in the fall, from the most reliable information that I could obtain a diligent miner may (during the early months of the summer and autumn) make from \$80 to \$150 or £200. But provisions are difficult to be got and dear. Flour, 7d. per lb; pemican, 6d; beef, 4d. All kinds of imported goods are, at the least, 100 per cent dearer than in Red River. Add to this that a few only of those who work in the mines in this open season can get employment during the winter. The buffalo are by all accounts, few and far away; and the Blackfoot Indians have pilaged and stripped the Hudson's Bay Company's servants last summer and last fall, wherever they met them. This will greatly increase the difficulty all who are there labour under, in procuring food. Some crossed the mountains last fall from the west, and if Dame Fame is to be believed greater numbers are to follow in the spring. We felt food will frustrate all their hopes. To obtain food they must hunt, and men, while hunting cannot be mining.