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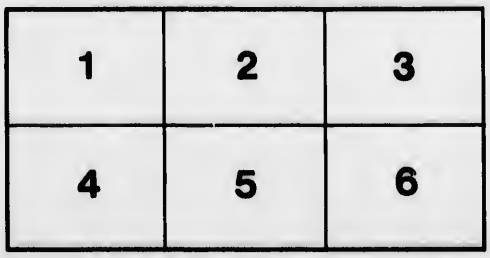

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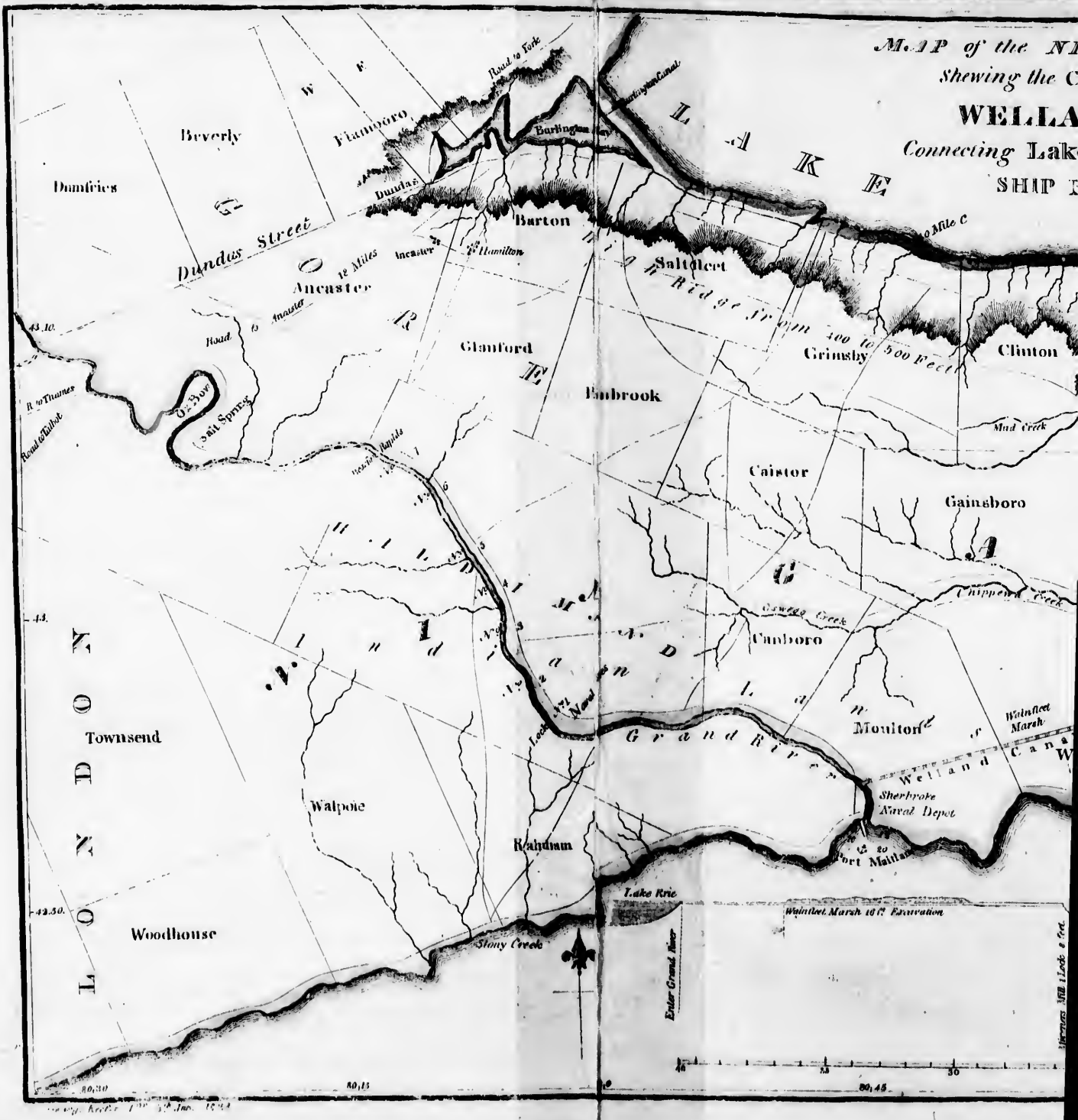
MAP of the NI
Shewing the C
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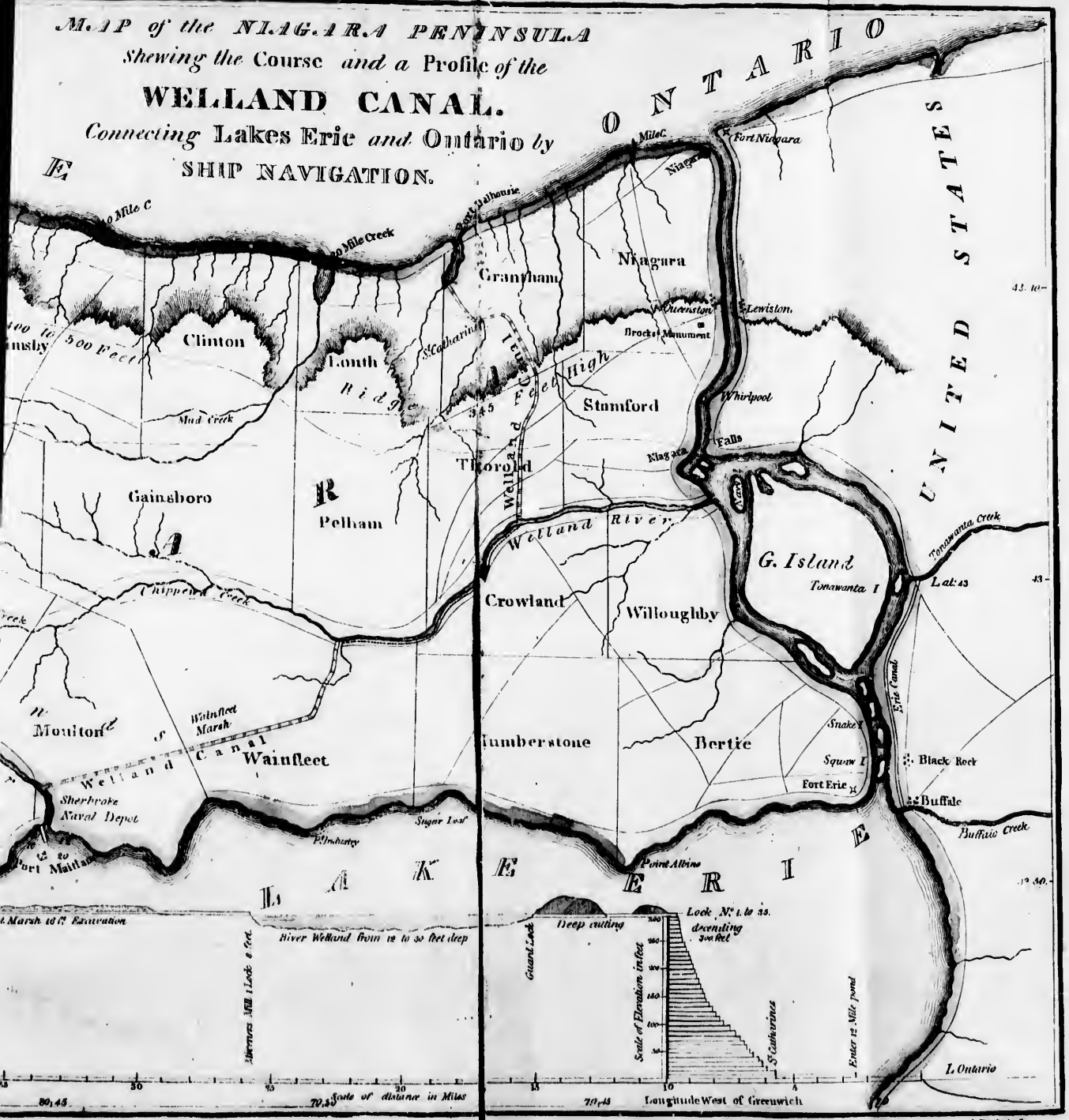
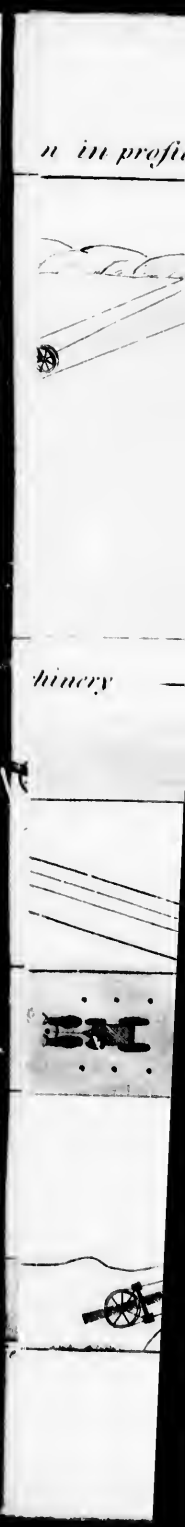
Burlington Canal
Road to Fork
Beverly
Flamboro
Dumfries
Dundas
Dundas Street
Barton
Hamilton
Ancaster
12 Miles
Saltfleet
Ridge from 400 to 500 Feet
Grimsby
Clinton
Road to Ancaster
Glanford
Binbrook
Mud Creek
Caistor
Gainsboro
Chippewa Creek
Oswego Creek
Cainboro
Moulton
Grand River
Welland Canal
Sherbrooke
Naval Depot
Port Maitland
Townsend
Walpole
Rainham
Woodhouse
Stony Creek
Lake Erie
Wainfleet Marsh
Enter Grand River
LONDON
HALDIMAND
Road to Talbot
R. to Thames
Old Spring
43.10.
43.
42.50.
80.30
80.15
80.45

MAP of the NIAGARA PENINSULA
Shewing the Course and a Profile of the
WELLAND CANAL.
Connecting Lakes Erie and Ontario by
SHIP NAVIGATION.

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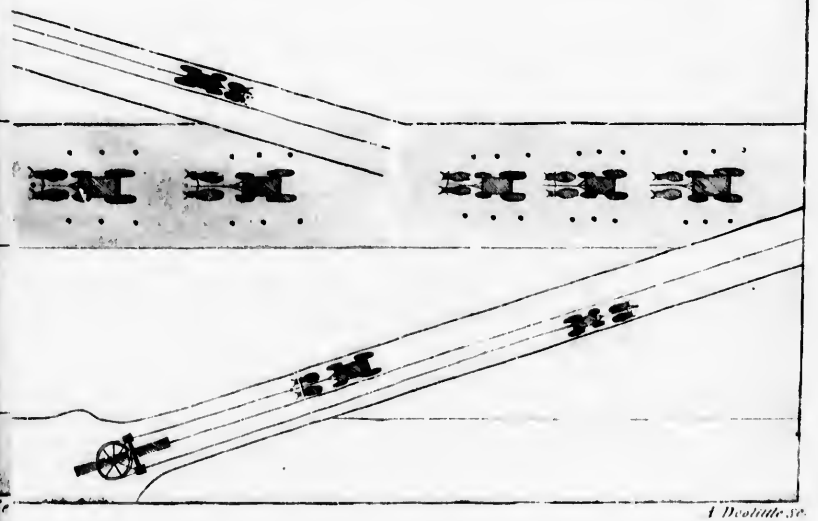
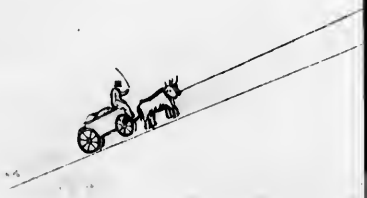
n in profile from the bottom of the Canal *By O. Phelps*

chinery — *Scale 10 Feet to an inch* —

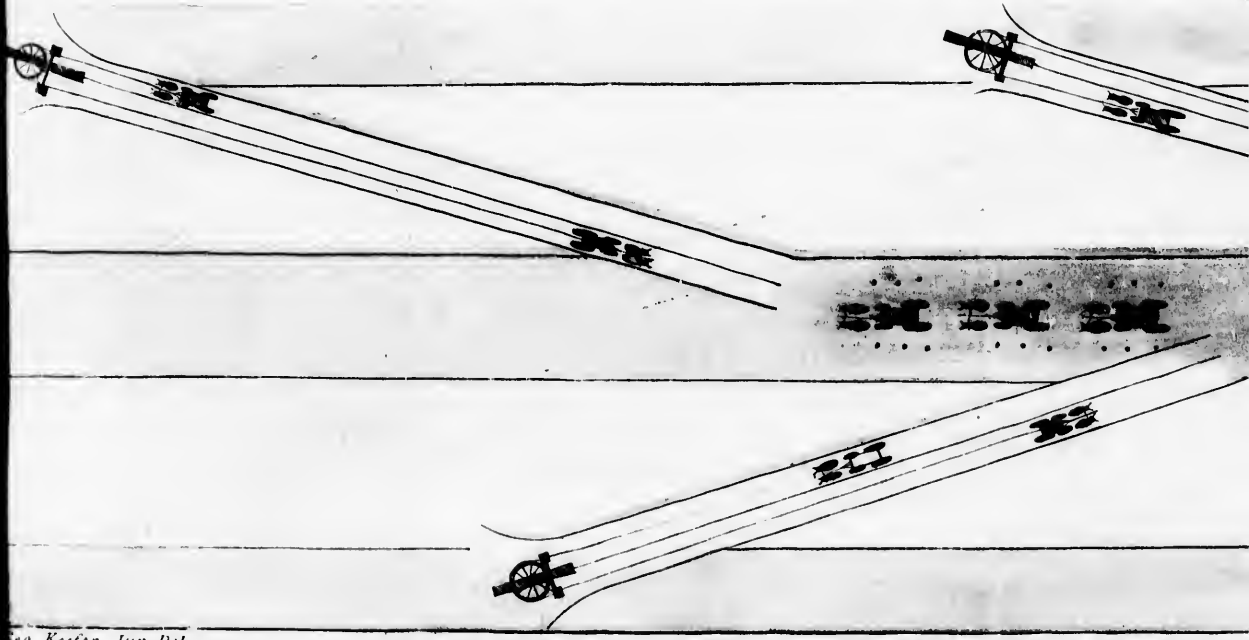


A Doolittle Sc.

Plan of an **IMPROVED MACHINE** *for removing Earth in deep Cuttin*

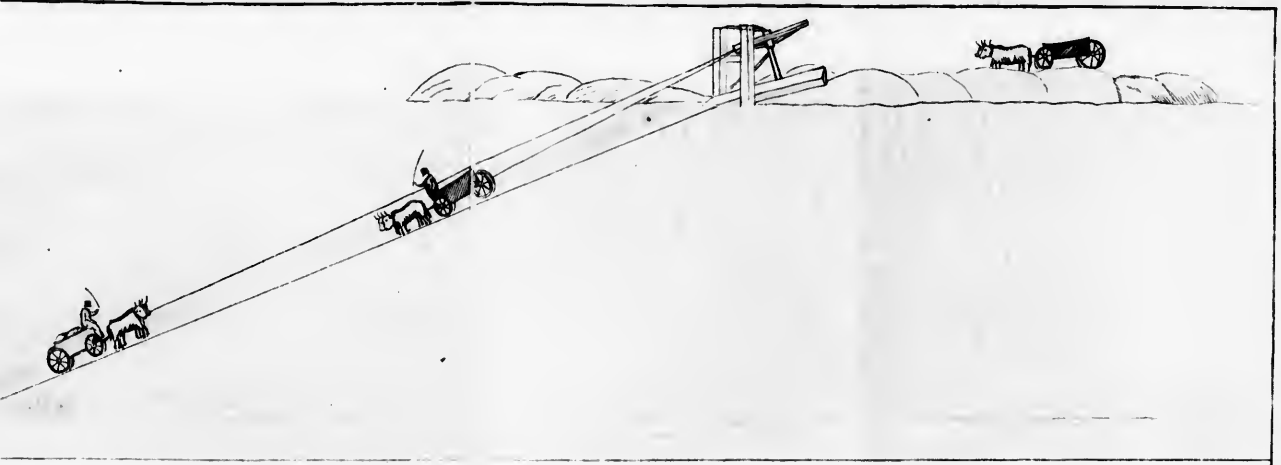


Section of the Deep Cut, shewing the manner of removing the Earth by me

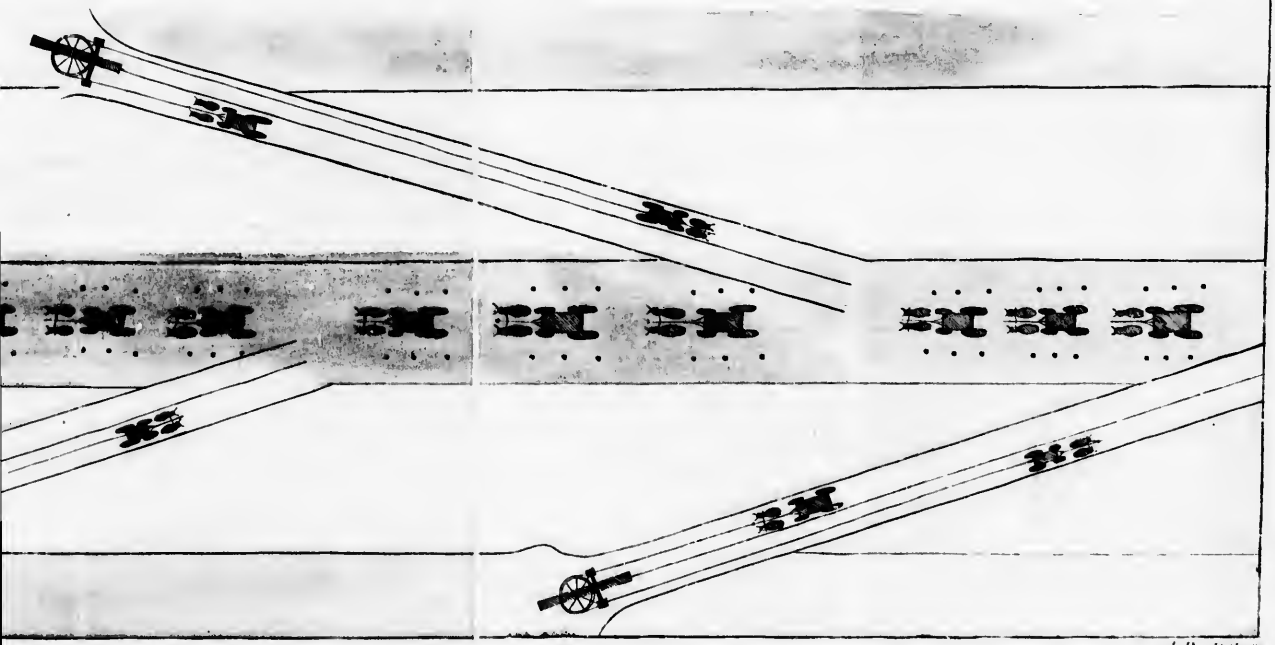


eo. Keeler Jun. Del.

ving Earth in deep Cutting – as seen in profile from the bottom of the Canal By O. Phelps



emoving the Earth by means of machinery. — Scale 40 Feet to an Inch —



A Doolittle Sc.

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ACCOUNT

OF THE

WELLAND CANAL,

UPPER CANADA.

BY WILLIAM HAMILTON MERRITT, Esq.

SUPERINTENDANT.

This canal is intended to connect Lakes Erie and Ontario, and thereby remove the natural barrier caused by the wonderful and well known falls of Niagara; it exceeds in magnitude any other yet constructed in America, excepting the short cut from the Chesapeake to Delaware Bay, and in the extent of the surface of its waters it exceeds any in the world.

By reference to the map of the Niagara peninsula, hereunto affixed, it will be seen that from the mouth of Grand river on Lake Erie, it continues up that stream by a towing path one hundred and twenty eight chains, thence up Broad creek seventy chains, thence by a thorough cut through an extensive marsh ten miles, thence down Mill creek two and

a half miles, until it intersects the river Welland, into which it descends by a ship lock of eight feet lift, thence a towing path or track way is constructed ten miles,* and thence the canal runs in a northerly direction to Lake Ontario, winding up a ravine about sixty six chains with from eight to twelve feet cutting. This part is finished and filled with water, together with a guard gate to control the admission of the waters of Lake Erie. Thence commences the deep cut, (as it is termed,) or dividing ridge, and a most formidable work it assuredly is. It commences with an almost abrupt height, of thirty feet above the canal bottom, then gradually rises to fifty six feet six inches in a distance of one hundred and six chains, then gradually descends in a distance of twenty eight chains to thirty feet, when it as abruptly breaks off in another ravine. The entire distance through this cut is one mile fifty four chains, averaging about forty four feet cutting; to the depth of from twelve to eighteen feet from the surface, it is composed of clay with a small mixture of sand, and below this, a tenacious blue clay.

This cut was commenced in Sept. 1825; it contained one million four hundred seventy seven thousand seven hundred cubic yards, and at the close of this last season, there remained to be removed, only three hundred seventy thousand yards. The bottom is removed from each end of the cut with scows, and the earth is deposited in the Welland river and in a large reservoir below bottom level at the other end. Between these points, the earth is removed with carts, wagons and machinery; being drawn to the top, where it is deposited on the bank, on either side. The machine in most general use, is a common wagon wheel, fixed on an upright post, about seven feet from the ground on the top of the bank; a rope, with a hook on each end reaching from the bottom of the canal to the top, is fixed round this wheel which hooks on the back of the descending cart and to the tongue of the one below, so that the return team assists in pulling up the loaded one, thereby, in effect, reducing the ascent to a perfect level, as the loads are drawn up with more ease than they are removed on the level to discharge.

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* This part of the canal, was placed under contract in October last; a number of men are now employed on the Marsh, which has to be excavated from ten to sixteen feet deep throughout. The contracts stipulate for its being finished, 1st Oct. 1828

From the termination of the deep cut, to that part where the mountain descends (or lock No. 1, as it is called, although it is properly No. 2,) the distance is four miles and twenty three chains. The land is undulating, and composed alternately of ridges and ravines, running from east to west, at right angles with the Canal; the ravines are generally below bottom level, and by throwing an embankment on the west side of the Canal, they afford large and spacious reservoirs, embracing in all about two miles in length. The cutting through these ridges is light, except one at the brow of the mountain, which, in a distance of twenty chains, averages near twenty feet. This part of the Canal is finished, except ten thousand cubic yards of excavation, which will be removed in April next; there are three small culverts of masonry on this summit, one with a span of five feet, the others of three feet each; four twin bridges will cross the Canal, the butments of which will be forty feet apart; the guard lock, and the one between the Grand and Welland rivers will be forty feet in width and one hundred and twenty five in length, so that any steam boat may approach this point by either route, that is, from lake Erie by the Niagara river and the Welland, or from lake Erie by the Grand river.

From lock No. 1, the Canal continues in a ravine fifty three chains, gradually descending by four locks of twenty two feet width—thence for one mile and fifty five chains it curves round the brow or break of the mountain to the left, and again to the right, for the purpose of extending the distance to admit a pound between each lock, and maintain the same gradual and convenient descent. There are seventeen locks in this distance, and sixty thousand yards of rock excavation, which is all removed, and is all that was met with between the lakes; the excavation is nearly all finished, and the locks in a forward state.

From this, the Canal enters another ravine to St. Catharines, a distance of two and a half miles, in which there are twelve locks of twenty two feet width; the banks are high, and the same easy descent is maintained throughout—the work on this part is likewise nearly all finished—this may be termed the mountain descent, as in a distance of four miles and seventy two and a half chains, from lock No. 1, there are thirty two locks, with a declination of three hundred and twenty two feet—their dimensions are one hundred feet length

and twenty two feet width in the pool, calculated to pass vessels of one hundred and twenty five tons burden.

From this to lake Ontario, a distance of five miles, the Canal continues most of the way in the bed of the main branch of the twelve mile creek; there are three locks in this space (including the one at the harbour,) thirty two feet wide and one hundred and twenty five feet long, for the purpose of admitting steam boats from lake Ontario. A large and commodious harbor is constructed at this place, by throwing an embankment seventeen chains long, between two high ridges and raising the water five feet, which covers an area of three hundred acres, capable of containing all the vessels or lumber which may be required for ages to come—the entrance is protected by two piers extending into the lake, one two hundred, the other three hundred and fifty yards.

This Canal is made by a company, incorporated by an act of the Provincial Parliament of Upper Canada, with a capital of eight hundred thousand dollars. The legislature of Upper Canada have authorized a subscription of two hundred thousand dollars, and have lent the company one hundred thousand dollars—and the government of Lower Canada has subscribed one hundred thousand dollars; the remainder is owned by individuals. The British government has likewise given one ninth of the amount of its cost, on condition that their stores pas[illegible]ec of toll, besides a donation of thirteen thousand acres of crown lands between the Grand and Welland rivers, through which the Canal passes.

That part of the line from the river Welland to Ontario is nearly finished, excepting the residue of the deep cut, which, although it is rather less than one fourth of the whole amount originally to be excavated, is still an arduous work. There has been expended, including the purchase of land, mills, machinery, &c. about seven hundred thousand dollars, and it is supposed it will require the full amount of capital to finish it, exclusive of the loan from government.

Its general dimensions are eight feet depth of water, and twenty six feet width at bottom, with a slope of two to one, which gives a surface of water of fifty eight feet.

The company's affairs are managed by a board of directors, elected annually, consisting of a President, Vice President, and five Directors, which situations are now filled by the undermentioned gentlemen:

The Hon. John Henry Dunn, Receiver General of the Province, President.

Henry J. Boulton, Esq. Solicitor General, Vice President. The Hon. Col. Wells, J. B. Robinson, Esq. Attorney General, D'Arcy Boulton, jun. Esq., George Keefer, Esq., and John Clark, Esq., Directors.

The immediate superintendance of the business is under the management of an agent,* and a secretary, who are appointed by the board. Alfred Barrett, of the state of New-York is principal engineer.

The first idea of all Canals is suggested by the direction of natural water courses, but in no instance have we ever seen the route of any Canal more plainly laid down than through this peninsula.

It affords geological information respecting this portion of the country, which we have never seen noticed. The lowest point between Lewiston and the Genesee river is at Lockport, where the mountain ridge rises thirty two feet above the level of lake Erie, extending, with a gradual descent seven miles to the Tonewanta creek, three miles of which is hard limestone rock, and caused by far the greatest expenditure on any part of the Erié Canal.

At this place the dividing ridge is situated near the river Welland, from which the water descends both into the Welland and lake Ontario—in the ravines formed by those waters is the location for this Canal—this ridge or barrier is only one mile and fifty four chains in length, and appears the only formidable obstacle in the whole line. From this the mountain takes a dip and at the brow three miles distant, at the falls of the twelve mile creek, it is from forty to fifty feet below the level of lake Erie, the mountain again gradually rising on each side from twenty to thirty feet above the level, as at Lockport—the streams from all the mountain above Burlington bay running eastward, and from the falls and near the Niagara river westward, although it contains no rock, neither is any met with until after a descent of eighty feet, in winding round the face of the mountain.

The Welland River is a large stream peculiarly adapted for an extensive navigation, being from twelve to eighteen feet in depth, and from three to four chains in width. It divides the peninsula discharging into the Niagara river two and a half miles above the falls, and extends with almost a dead level from thirty to forty miles into the country. The

* The gentleman who is named at the head of this article now occupies that situation.

company have power to construct a towing path on the Niagara river, from Fort Erie to the Welland, and thence up ten miles, until it intersects the canal by which vessels may enter, or return without any obstruction from lake Erie, by passing the ship lock now constructed at Black Rock.

The other entrance by the mouth of the Grand river, has been already described, and the advantages expected from this connexion will be mentioned hereafter.—In either case Lake Erie will serve as a feeder, which by coming in at one end of the canal will always afford an equal and abundant supply of water, and the same supply may be made use of on each level to any extent for hydraulic purposes, which will form a productive branch of revenue, as there are no mill seats on the peninsula except the Falls of Niagara.

The natural advantages which the route possesses, can be more fully understood by the following abstract of distances.

	Natural		Artificial	
	M.	C.	M.	C.
From lake Erie to the marsh on Grand river and broad creek, - -	2	38		
Entire cut through the marsh and mill creek, - - - - -	-		12	40
To River Welland, - -	10			
	12	38	12	40
From River Welland to Lake Ontario including reservoirs and ravines, -	11	26	6	15
Total,	23	64	18	55

The wide surface afforded by these ravines and reservoirs will make the canal appear more like a large river than an artificial navigation.

Another remarkable feature in this navigation is, that by throwing a dam over and constructing a lock in the Welland river below the entrance of the canal, and raising the locks two feet, the water may be raised throughout the canal to a depth of ten feet, with very little additional expense; the towing path is now raised four feet above the surface in situations where excavation is necessary, with a view to this extension, whenever it may be found desirable.

We have been thus minute in describing the geographical situation of this canal through the Peninsula and its progress and prospects, as it has seldom been noticed, and its utility is likely to be tested by actual experiment before it will be fairly before the public.

The extent of waters or countries which it will connect, can be realized only by looking at a map or chart of North America. Lake Erie is the natural outlet of St. Clair, Michigan, Huron and Superior, bordering on a country containing two hundred and six thousand square miles, besides the state and valley of Ohio, a part of which may fairly be included, as it will be connected with lake Erie by the Ohio canal, extending to the mouth of the Scioto river three hundred and fifty miles, which is two thousand miles from New Orleans and only nine hundred and eighty from New York by the Ohio and Erie canals, the produce from which will cost only one dollar per cwt.

The next question to be determined is, when property is once afloat on lake Erie, where will be its destination, as it must pass either through the Welland or Erie canal. For ourselves we consider all reasoning on this subject superfluous, for any person who fairly comprehends the extent of country lying on and above lake Erie, must be morally certain, that it will afford ample business for at least two channels.

The projectors of this canal maintain, that property can be conveyed to New York market, cheaper through the Welland, than the western part of the Erie canal, which opinion is supported by the following numerical calculation.

Distance from Buffalo to Syracuse, where the Oswego canal intersects the Erie, two hundred miles, which at 1½ cent per ton per mile for toll is - - $3

200 miles transportation 1½ cent per mile 3——$6
add 1½ cent per mile for additional toll up - - 3

$9

Distance from river Welland to Ontario 16½ miles,
Oswego to Syracuse - - 32

48½—$1 45

Same price as the Erie,
add 25 miles for Grand River, - - 75
From Welland canal harbour to Oswego 1 —3 20
Add additional 1½ cent for 73 miles up - - 1 10

which gives a gain in descending of $2 80 per ton, and ascending - - 4 70 $4 30

Besides which the following reasons are assigned. *First*, the principal expense in transportation by vessels, consists of port charges, loading and discharging—and as vessels

will pass through this canal without breaking bulk, the distance from Welland canal harbor to Oswego, one hundred and twenty miles, will be a mere continuation of voyage. *Second*, the peculiar formation of lake Erie which contracts to a very narrow space below Port Albino, and the prevalence of westerly winds, together with the current of the Niagara river, cause an accumulation of ice to take place every winter, which prevents the approach of vessels to Buffalo or Fort Erie, from three to five weeks, after the lake at the mouth of Grand river and above it is open. Every merchant is anxious to push his commodities to market on the first opening of the navigation, and the facility afforded by the Grand river in removing this natural and formidable obstruction is important.

It appears that the United States possess as great an extent of lake, as sea coast, and as the opposite side of those waters in the Upper province of Canada presents an equal extent—every philanthropist must dwell with pleasing anticipation, on the cheering prospects which are now opening to the citizens of this most extensive and heretofore secluded region.

It is a matter of little consequence to the grower in what part of the world, his produce is consumed, so long as he has to depend on a foreign market for a demand, or by what channel it reaches that market; his interest consists in the value of the articles at home, and any measure or any improvement which tends either to facilitate this foreign intercourse, or to lessen the expense of transportation, adds so much direct wealth to the grower, and consequently to the country.

The British government has established free ports at Kingston, Montreal and Quebec, where our merchants may deposit their commodities for exportation. We learn that an application will be made to Congress this present session, to make Buffalo and Oswego on lakes Erie and Ontario, free ports to enable the inhabitants of Canada to export their commodities by the port of New York on similar conditions —this will afford facilities to exports, and open a salutary and desirable competition.

A Steam Boat canal is likewise in contemplation from Prescott to Montreal, a distance of one hundred and thirty two miles, and from the short distance through which a canal is necessary, only about sixty miles with one hundred and ninety six feet lockage, we have no doubt it will be ac-

complished in a few years. In this manner lake Erie will be connected with the Ocean by canals of only seventy six miles in length—sixteen to Ontario, and sixty on the St. Lawrence, which will render this extensive lake coast a sea coast, to all intents and purposes.

It remains to be seen, whether produce can be shipped at once from thence to a foreign market, by the gulf of St. Lawrence on better terms, than by the Erie canal to New York where the market generally is preferred.

DESCRIPTION OF MACHINERY.

The facility with which the earth is removed in deep cutting, by means of the improved machine invented by Oliver Phelps, must be obvious upon the slightest inspection of the accompanying plan, and must necessarily supercede the use of any other method hitherto made use of for this purpose, both on account of the increase of power, and the simplicity and cheapness of its construction, which consists of nothing more than a common wagon wheel, with the addition of a rim for the purpose of fastening on the rope by which the carts are drawn up. This wheel is so placed, on an axle or upright piece firmly supported by a brace fastened in a piece of timber bedded in the earth, and two posts framed together and so placed as to keep the wheel steady, with two shives fixed to the sides to keep the rope in its place. A road is constructed in the side of the bank, in an oblong direction, forming an angle of about fifteen degrees from the top where this machinery is placed, to the bottom of the canal. The great advantage derived from this method is that no power is lost, for the empty team descending assists the one ascending—thereby reducing the ascent to a level. Six teams may be attached to each machine, and work without the least inconvenience or interruption.

GEORGE KEEFER, JUN.

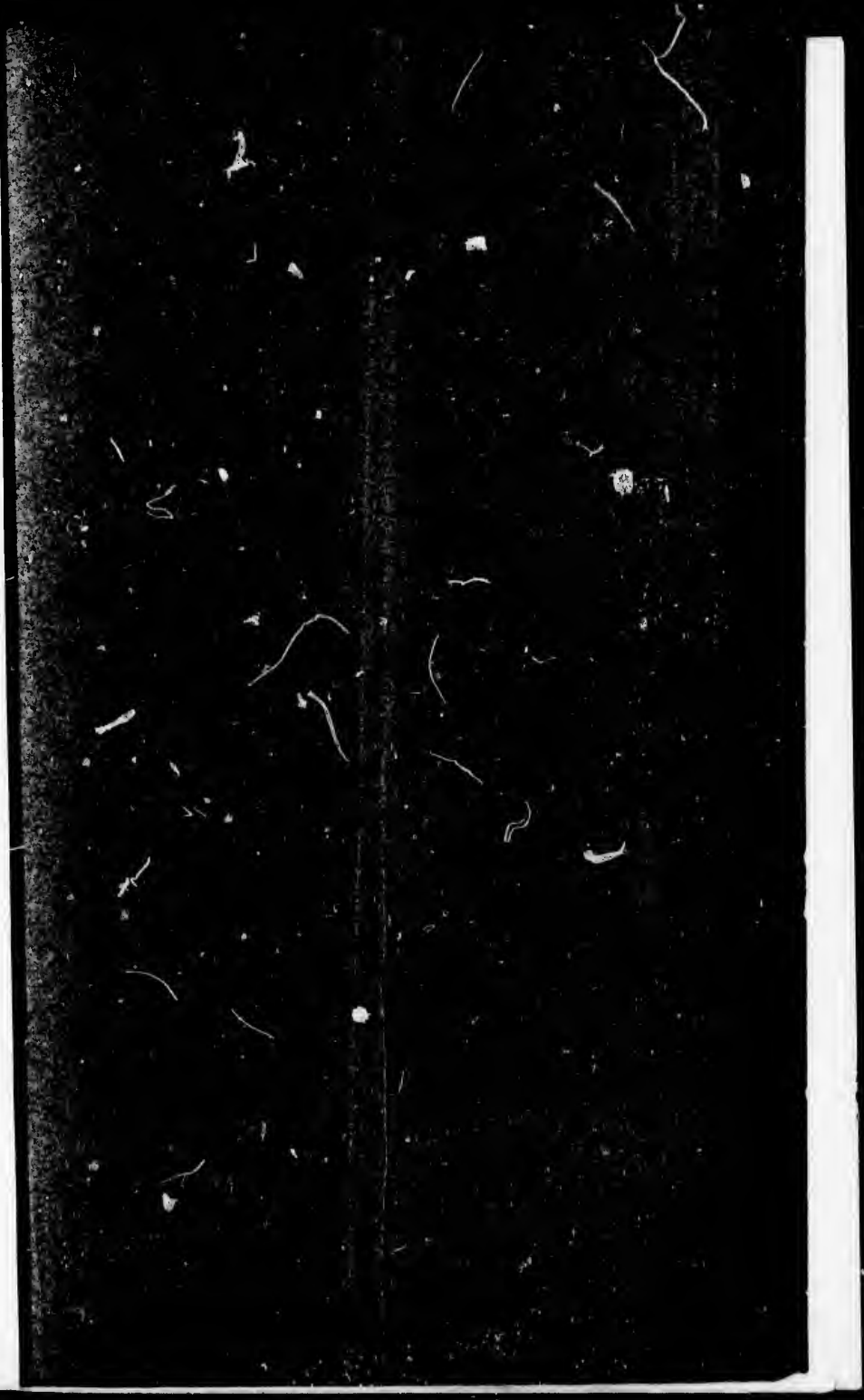
REMARKS.*

Having been gratified, during the late autumn, by a visit to the deep cut on the Welland Canal, we were, in common

* By the Editor of the American Journal of Science, from which work the above account is reprinted.

with our whole party, forcibly struck with the simplicity and efficiency of the machinery here described. Horses and oxen were driven rapidly down the inclined roads on the bank of the canal, dragging after them their empty wagons, and at the same time drawing rapidly up the loaded vehicles, which were guided by teams, soon to descend again, after depositing their loads. The unloading was an affair of only a few seconds. The body of the wagon being fixed on an axis, running longitudinally, was easily made to lose its balance, when the load dropped out by the turning of the body, while the wheels remained undisturbed, and in a twinkling, the empty machine was again running rapidly down the hill and drawing up its reluctant counterpart. The bottom of the canal was also a scene of great life and industry—hundreds of men and of animals were busily employed in the most active industry. The vast beds of tough tenacious and regularly stratified clay, presented decisive evidence of being a great diluvial deposit. We did not, however, learn that any organized bodies had been found in it.

From captain Basil Hall, R. N. F. R. S. to whose good offices we are indebted for this account of the Welland Canal, we received a printed copy of the regulations adopted for the government of the laborers and workmen. Their moral tendency is excellent, and being every way judicious, we understand they proved effectual for the promoting of order, industry and good morals.



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