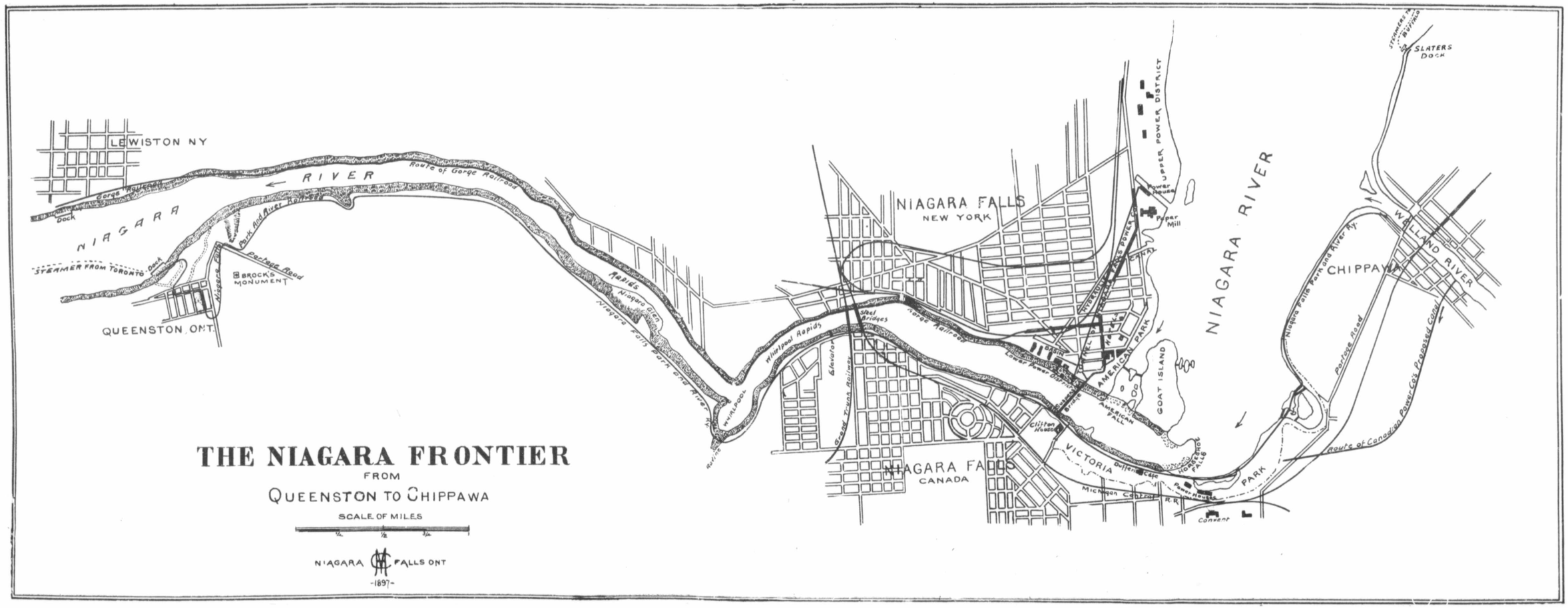
The British Association for the Advancement of Science.

At Niagara Falls, Saturday, August 21st, 1897.

Issued by the Local Committee
Niagara Falls, Canada.



THE NIAGARA FRONTIER

FROM

QUEENSTON TO CHIPPAWA

SCALE OF MILES

NIAGARA FALLS ONT

-1897-

Day's Itinerary.

Queenston 9:45 A. M.

Brock's Monument.

Niagara Glen.

Whirlpool.

Whirlpool Rapids.

BRIDGES—

Steel Arch.

Cantilever.

Suspension.

Lunch at Dufferin Cafe 1–2 P. M.

Victoria Park, opposite Falls.

Before or after luncheon visit—

Power Station Electric Railway,
Dufferin Islands and Chippawa.

Suspension Bridge crossed 3 P. M.

Hydraulic Power Co. Station.

Niagara Power Co. Station.

Prospect Park.

Goat Island.

Rendezvous at Canadian end of Suspension Bridge for return to boat at Queenston via Electric Railway. 6:30 P. M.

VILLAGE OF QUEENSTON, FROM BROCK'S MONUMENT.

VILLAGE OF QUEENSTON, FROM BROCK'S MONUMENT.

THE VILLAGE OF QUEENSTON is one of the oldest settlements in what was formerly known as Upper Canada, being at the foot of the Old Indian Portage around the Falls, from the village of Chippawa, a few miles above the Cataract. In early days Queenston was a flourishing commercial centre, but since the construction of railways and canals the place is no longer prosperous. It is, however, still interesting for its picturesque situation and as the scene of one of the chief battles of the war of 1812-15, when the British leader, Lieut.-General Sir Isaac Brock, was killed at the moment of victory. A handsome monument 190 feet high on the brow of "Queenston Heights" was erected in 1853 in honor of General Brock and to commemorate the event.

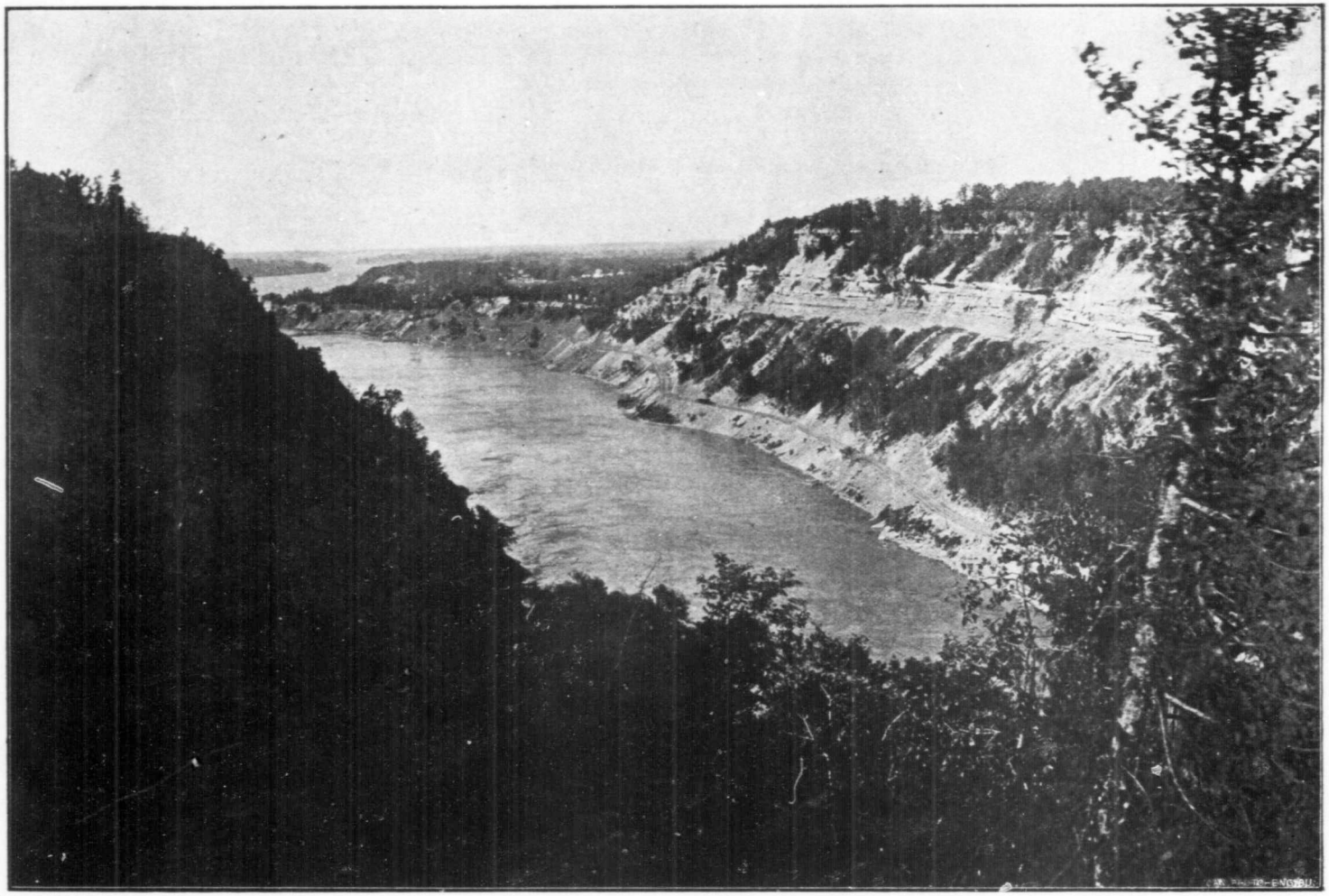
Below the escarpment, the exact spot where General Brock fell in action is marked by a cenotaph erected in 1860 by the Prince of Wales. On the Heights, in rear of the monument, in evidence of the war, still remain in a fair state of preservation, two earthworks, constructed during that period by the Royal Engineers, under Lieut. Jenoway, but evacuated and partially blown up on the approach of a large American force in July, 1814.

BROCK'S MONUMENT.

BROCK'S MONUMENT rests upon a substantial foundation of masonry, forty feet square and ten feet below the level of the ground; upon this foundation there is a two-story vaulted basement measuring thirty-eight feet square at the ground level, and attaining a height of twenty-seven feet. Upon the four corners of the entablature of this basement are the armorial bearings of Brock carved out of stone. The massive basement is surrounded by an enriched pedestal, the die of which is sixteen feet square, and the height, including the cornice and base, thirty-eight feet.

On the pedestal stands the exquisitely proportioned mammoth column of the composite order, measuring ninety-five feet in total height, with a fluted shaft ten feet in diameter, and enriched capital and base. Above the column, and resting on a cippas or statue base, is a colossal statue of General Brock in military costume, and the right arm extended with a baton in the hand, and the left hand resting upon his sword. The total height from ground level to the top of the statue is 190 feet.

From the ground level a circular stone staircase winds up through the centre of the shaft to the top of the column, where from small openings in the cippas a view may be had of the surrounding landscape at a height of over 500 feet above the level of the river.

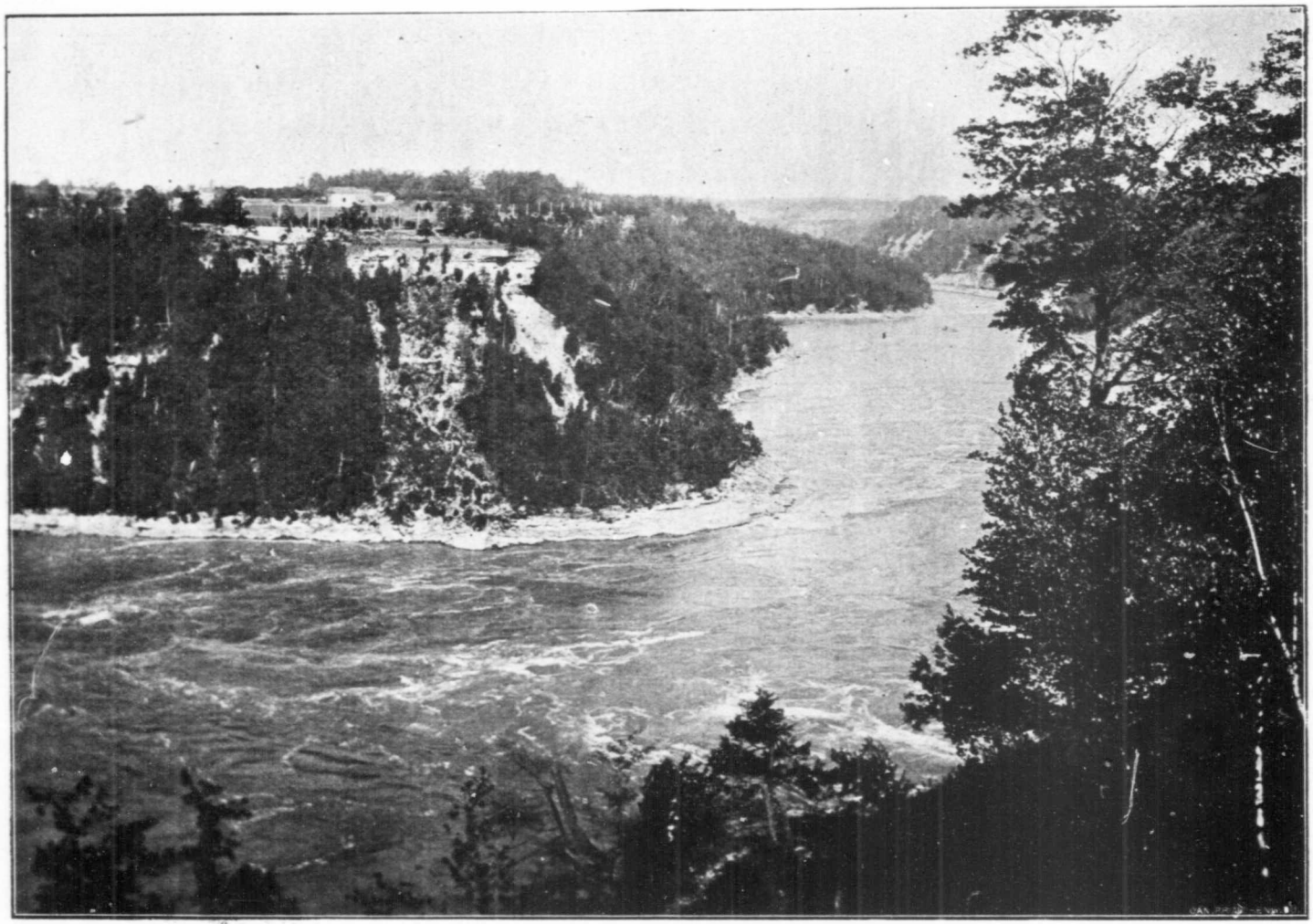


NIAGARA GORGE NEAR QUEENSTON.

BELOW the Whirlpool is a most interesting feature of the lower river, known as "Niagara Glen," sheltered by the high cliffs on either side. This picturesque spot possesses a splendid variety of flora, and has in consequence a reputation among botanists. The glen is reached by an easy stairway down the cliff, at the base of which a pathway winds down through a wildly beautiful glen to the edge of the river, where sweeps the mighty rapids of the lower Niagara.

On the opposite side of the stream, lower down, is a rugged irregularity in the cliff, known as the "Devil's Hole." At this spot a detachment of British troops, marching from Fort Niagara to Fort Schlosser, above the Falls, in pre-secession days, were attacked by Indians in ambush and driven over the cliff. Only one, a drummer boy, survived to tell the fate of his companions in arms. For an interesting geological description of the river reference is made to the monograph of Prof. Gilbert.

It may be stated that Prof. Macoun, the Dominion Botanist, is authority for the statement that Queenston Heights, the valley of the Niagara River and the neighborhood of the Falls, form the best botanical ground in Canada. So far there have been found in this field 107 families, comprising 487 genera and 1,101 distinct species growing without cultivation.



NIAGARA GORGE AT WHIRLPOOL.

THE WHIRLPOOL is formed by an abrupt change in the course of the river, the channel being deflected at right angles. The river compressed by the encroaching cliffs into the famous rapids above the pool rushes into the basin on the right side. The current then turns to the left and up stream until it reaches the entrance to the basin where it passes under the in-rushing torrent and on towards the escarpment. It has been thought by many geologists that the river originally pursued a southward course on the line of the river and there are many evidences of the existence of an old channel.

Mr. Frederick Law Olmsted quotes the words of William Robinson, F.L.S., as follows:

"The noblest of nature's gardens that I have yet seen is that of the surroundings and neighborhood of the Falls of Niagara; grand as are the colossal Falls, the Rapids and the course of the river for a considerable distance above and below possess more interest and beauty.

"As the river courses far below the Falls, confined between vast walls of rock, the clear water of a peculiar greenish hue, and white here and there with circlets of yet unsoothed foam, the effect is startlingly beautiful, quite apart from the Falls. The high cliffs are crested with woods, the ruins of the great rock walls forming wide, irregular banks between them and the water, and also beautifully clothed with wood to the river's edge, often so far below that you sometimes look from the upper brink down on the top of tall pines that seem diminished in size. The wild vines scramble among the trees; many shrubs and flowers seam the high rocks; in moist spots here and there a sharp eye may detect many flowered tufts of the beautiful fringed gentian, strange to European eyes; and beyond that, and at the upper end of the wood-embowered deep river bed, a portion of the crowning glory of the scene—the Falls—a vast cliff of illuminated foam with a zone towards its upper edge as of green molten glass."

NEW STEEL ARCH BRIDGE.

At the Whirlpool Rapids the descent to the water is made down an inclined railway and the grandeur of the view there obtained is scarcely to be surpassed, except by the Falls themselves. It was here that the famous swimmer Webb, who swam from Dover to Calais, lost his life in attempting to swim through the Rapids. A short distance upstream is the new steel arch bridge lately built for the Grand Trunk Railway. This bridge, built upon the parabolic principle, took the place of the old Railway Suspension Bridge.

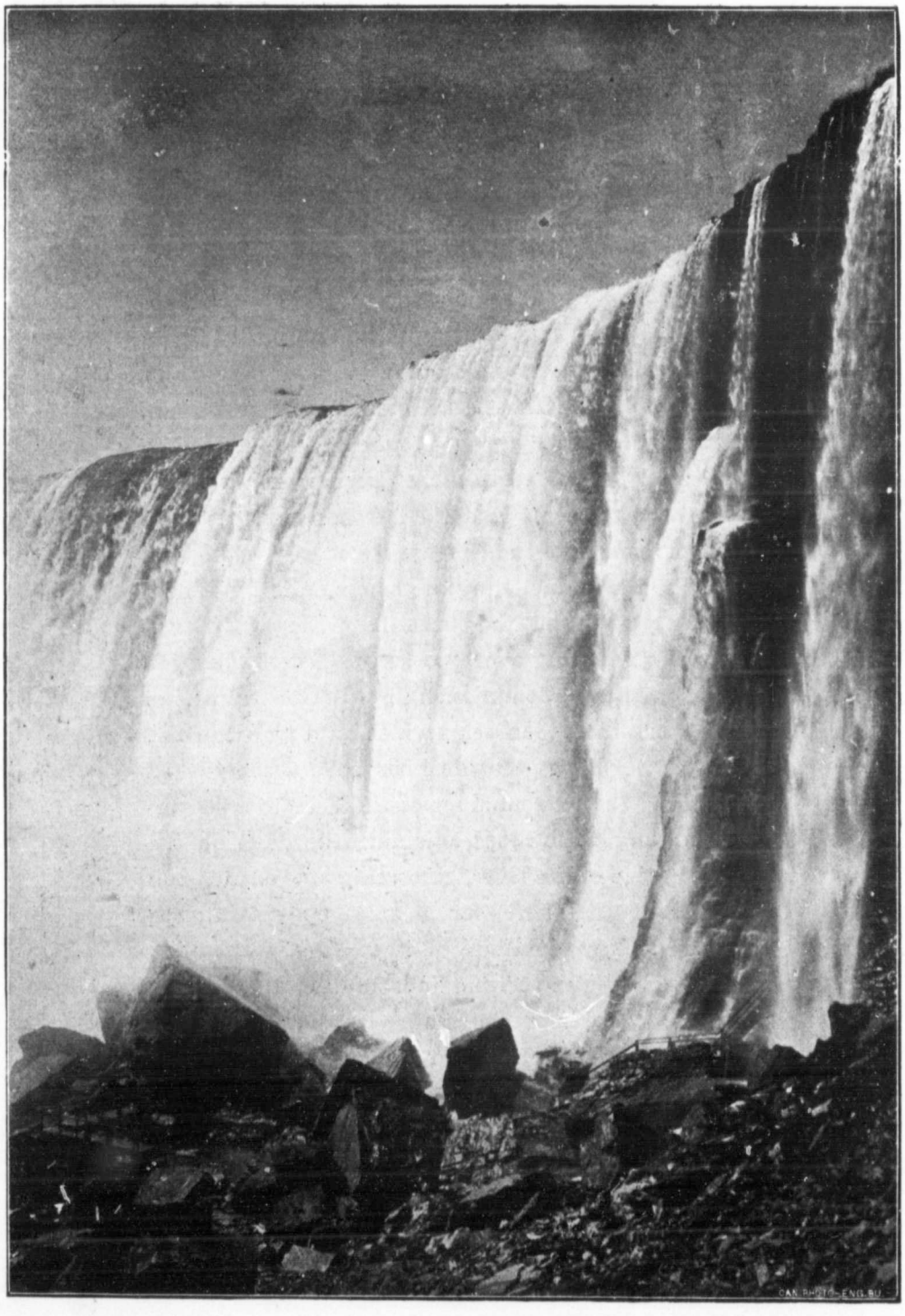
The old bridge was supported by four cables, each of 3640 No. 10 wires laid parallel and of an average strength of 1648 lbs. These wires when removed were found as efficient in every particular as when first placed in position over forty years previously. The present bridge was built and the old bridge removed without interrupting traffic. The total span over the gorge is 825 feet, and the height from rail to water 258 feet. The live load per running foot which can be safely supported is 10,000 lbs. The illustration of this bridge on the opposite page is made from a photograph taken at the time of the test during construction, the upper deck of the bridge being loaded to 7,000 lbs. per lineal foot.

Just above the new steel arch bridge is situated the Cantilever Bridge, owned by the Michigan Central Railway. This bridge is one of the first of its kind constructed and was completed in 1883. The total length is 910 feet and the distance between rail and water 245 feet. A mile further upstream, near the Falls, is the carriage Suspension Bridge, with a span of 1268 feet, built in 1869 of wood and rebuilt in 1889 of steel.

American Falls, from Queen Victoria Niagara Falls Park.

AMERICAN FALLS, FROM QUEEN VICTORIA NIAGARA FALLS PARK.

QUEEN VICTORIA NIAGARA FALLS PARK is a national park belonging to the Province of Ontario. Preliminary work in connection with its establishment was undertaken in pursuance of an Act passed by the Legislature 30th March, 1885, and the park was formally opened to the public on the 24th May, 1888. It comprises the lands adjoining the Falls, some 154 acres, and the foreshore along nearly the whole course of the Niagara River from Lake Erie to Lake Ontario, including the commanding "Queenston Heights," and the beautiful "Niagara Glen," the total area being over 700 acres. The property is administered by a Commission for the Government of Ontario, and in the ten years which have elapsed since work was begun, a great deal has been accomplished in restoring the surroundings of the Falls to a becoming condition. The lands adjoining the Falls on the American side of the river, embracing the Islands and a portion of the shore for a mile up stream, are similarly held by the State of New York. The idea of maintaining the surroundings of this magnificent natural wonder in a state of nature at the public expense originated with Lord Dufferin, while Governor-General of Canada.



Under Table Rock.

THE PARKS of both sides of the river abound with beautiful drives and walks, and all buildings not required for the use of the sight-seer or park administration have been removed. The only satisfactory general views of either the American, or the Canadian or Horseshoe Falls, is obtained from the Canadian Park. The American Fall is 1,060 feet wide. This Fall is separated from the Canadian or Horseshoe Fall by Goat Island. The main body of water passes over the Canadian Fall and the boundary line between Canada and the United States is situated near the Terrapin Point, the south-western extremity of Goat Island, leaving almost the whole of this Fall in Canadian territory. The Horse-shoe Fall is 160 feet high, and the American Fall considerably less, as its base is obstructed by masses of fallen rock.

The total average quantity of water passing over the Falls is about 15 millions of cubic feet per minute —of this total about one-tenth is supposed to pass over the American Fall and nine-tenths over the Canadian Fall.

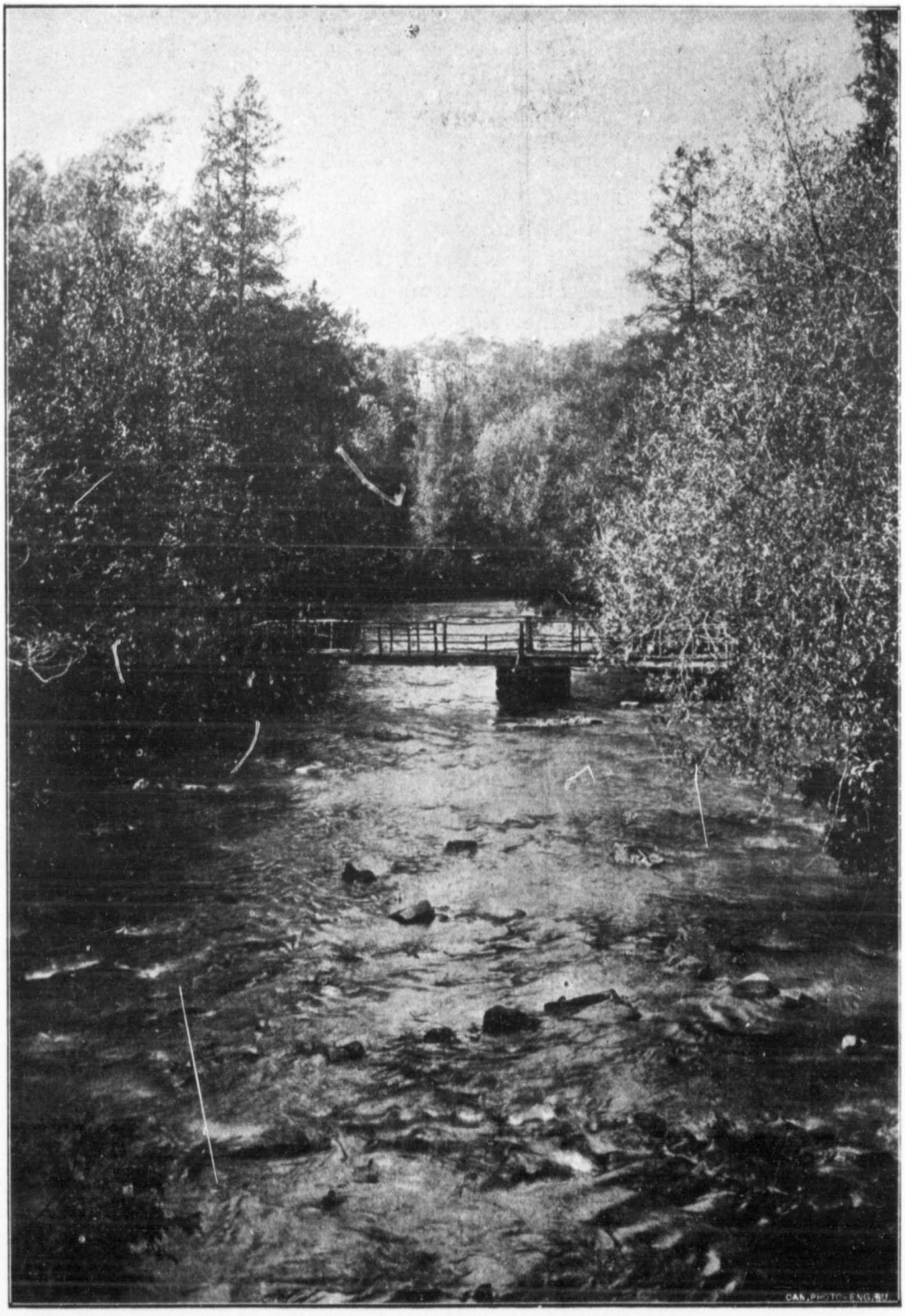
The crest line formerly took the form of a perfect horseshoe, but the wearing away of the cliff in the centre where the water is deepest has altered some-what the general appearance of late years. The length of crest line is 3010 feet. The mean recession of the American Fall between the years 1842 and 1890 has been ascertained to be 7⅔ inches annually ; that of the Horseshoe Fall over 2 feet 2 inches ; the maximum recession of the Horseshoe Fall during that period has been 5 feet per year.

THE UPPER RAPIDS, FROM TEMPEST POINT.

THE UPPER RAPIDS, FROM TEMPEST POINT.

A SMALL steamer called the "Maid of the Mist" affords a splendid view of the Falls from below and the best idea of the height and grandeur of the cataracts is had from her decks. Access to the wharves on either side of the river is afforded by inclined railways, that on the Canadian side being operated by electricity in connection with the Electric Railway. Another excellent view is obtained below the brink of the Canadian Falls. An hydraulic lift conveys tourists from the top of the cliff down and up, and after passing through a tunnel of some length one finds himself immediately behind the great sheet of roaring water half-way down in its descent to the seething chaldron of foam below.

A short distance above the Falls is the power station of the Niagara Falls Park and River Railway, where the only electrical power is so far developed on the Canadian side of the river. The water is taken from the rapids just above the Falls by a flume 200 feet long to the gates; the height of the penstocks is 62 feet and water is carried away by a tunnel 600 feet long and discharged underneath the falls into the gorge below. The water connections are sufficient to permit the capacity being increased to 3,000 electrical horse power. Within a short time it is expected that power will be developed in large units for commercial purposes, similar to the development on the American side of the river. The superior natural advantages afforded on the Canadian side will lessen the cost and allow the producers to supply power at a proportionately lower rate.



THE DUFFERIN ISLANDS.

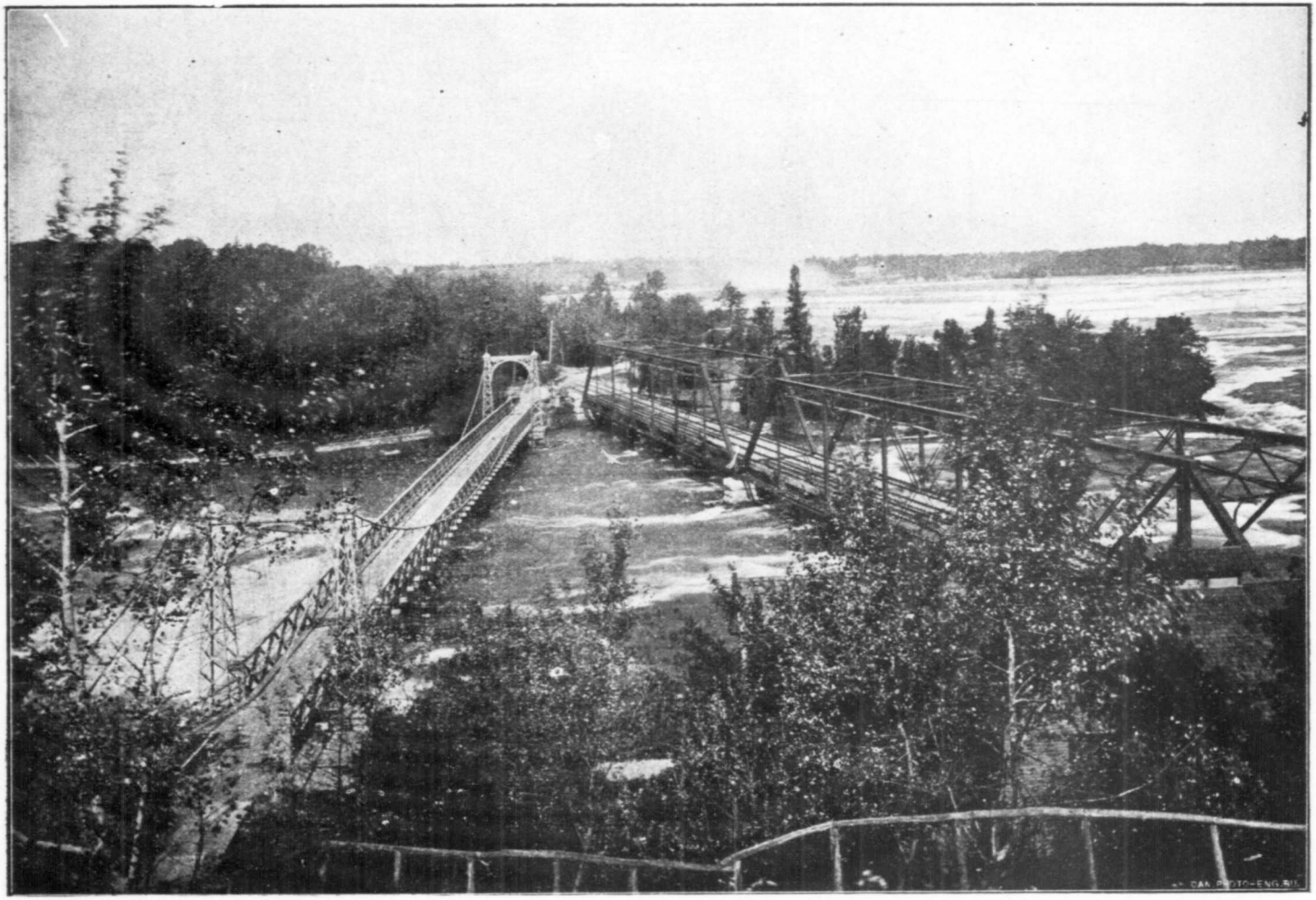
THE NIAGARA FALLS HYDRAULIC POWER AND MANUFACTURING COMPANY'S WORKS are situated near the American end of the Suspension Bridge. Water for power purposes is conveyed from the river a mile above the Falls, by an open canal, to a basin near the cliff north of the Falls. From this basin the water is taken through penstocks to wheels in a power house located at the foot of the high bank at the level of the water in the lower river; 210 feet head is obtained.

Wheels running on an horizontal axis are used, and electric generators are coupled direct to each end of the axis. About 6,000 horse power is in use from this power house, and an extension to provide 10,000 horse power more is now nearly completed.

The company owns about a mile of front on the lower river, and its plans contemplate an ultimate capacity of about 100,000 horse power.

Flour and paper mills are now using about 5,000 horse power direct from shaft connections.

The officers of this company are: Jacob L. Schoellkopf, President; Arthur Schoellkopf, Secretary; and W. C. Johnson, Chief Engineer, by whom the Association will be received when visiting the works.

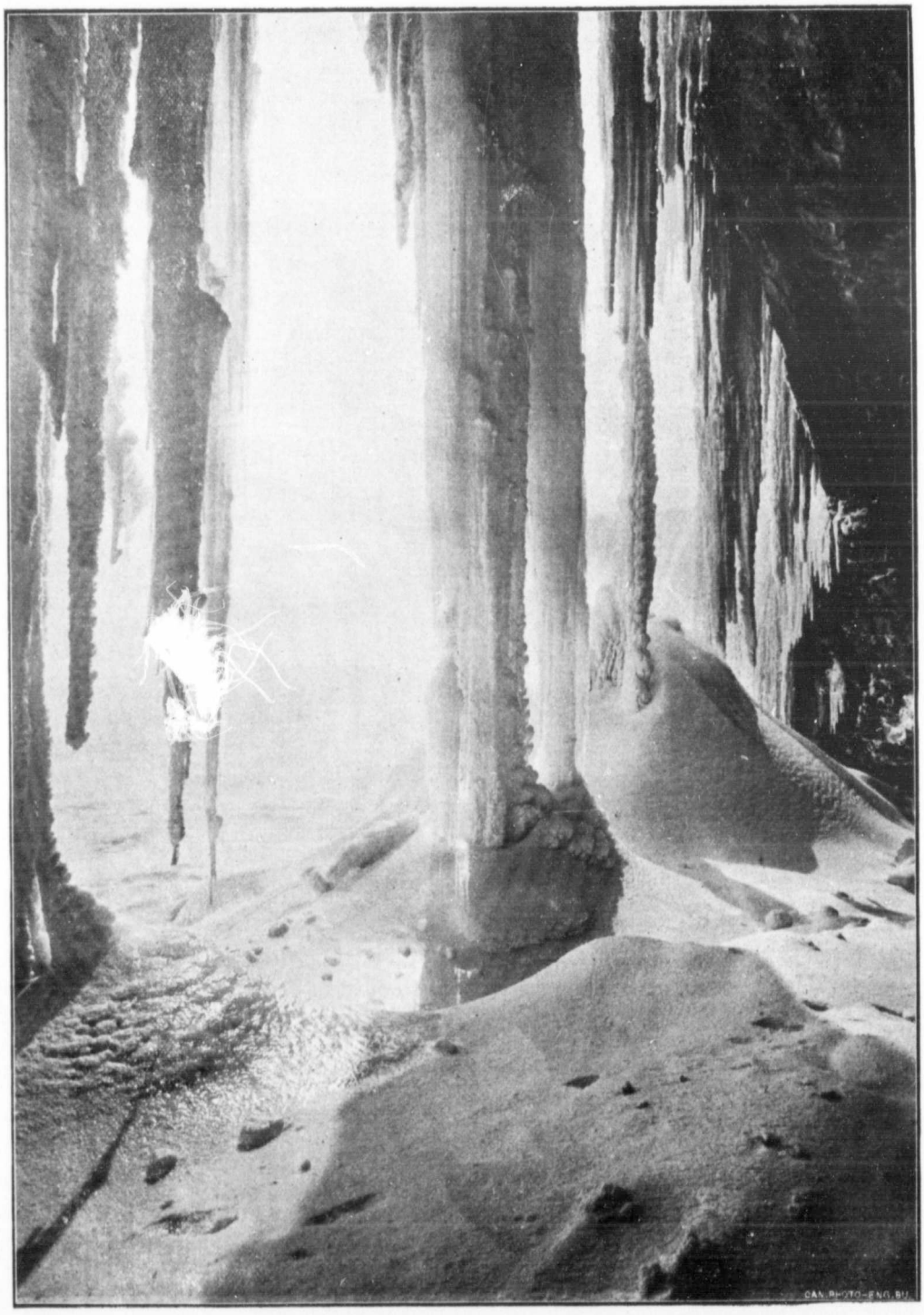


THE DUFFERIN ISLANDS, FROM PROSPECT DRIVE.

THE DUFFERIN ISLANDS, FROM PROSPECT DRIVE.

THE NIAGARA FALLS POWER COMPANY'S PLANT is one of the most complete and extensive electrical plants in the world. Here water is taken from the river by a short canal led in penstocks to the water wheels where it is used under a head of 140 feet, the spent water being discharged into a tunnel 1½ miles long, which empties into the river immediately under the Suspension Bridge, already crossed. 15,000 electrical horse power is now being developed and extensions to the plant are in progress which will give a total of 40,000 of electrical H.P. by the beginning of the year. Power is being successfully transmitted to the city of Buffalo, a distance by the route traversed by the electric conductors, of 26 miles, and the Electric Railway of that city at present uses 1,000 H. P. to propel its cars. The quantity of power to be delivered in the City of Buffalo is to be increased to 10,000 H.P. by the beginning of next year.

The Association and guests will be received at the Power House of the Niagara Falls Power Company by Dr. Coleman Sellers, President and Chief Engineer; Wm. B. Rankine, Secretary and Treasurer of the Cataract Construction Company; W. A. Breckenridge, Resident Engineer; and L. B. Stillwell, Electrical Director.



ICE FORMATIONS UNDER TABLE ROCK.

The following list of users of power supplied by this company is taken from the Electrical Engineer of January 6th, 1897:

HYDRAULIC POWER.

	H. P.
Niagara Falls Paper Co.,	7,200

ELECTRICAL POWER.

Pittsburg Reduction Co. (aluminum)	3,050
The Carborundum Co. (carborundum)	1,000
Acetylene L. H. & P. Co. (calcium carbide)	1,075
B. & N. F. Elec. Light & Power Co. (local lighting)	500
Walter Ferguson (chlorate of potash)	500
Niagara Electro-Chemical Co. (peroxide of sodium)	400
B. & N. F. Electric Railway (local railway)	250
N. F. & S. B. Railway Co. (local railway)	250
(All from October 1, 1896.)	
Buffalo Street Ry. Co. (22 miles transmission)	1,000
(From November 15, 1896.)	
Acetylene Light, Heat & Power Co.	
(From February 1, 1897)	1,000
(From March 1, 1897)	1,000
(From delivery, say Nov. 1, 1897.)	2,000
Mathieson Alkali Works (soda ash)	
(From June 1, 1897.)	2,000
Buffalo Street Railway Co.	1,000
Buffalo General Electric Co. (lighting)	3,000
(From November 15, 1897)	
Totals	25,225

SUMMARY.

Total hydraulic power sold—Niagara	7,200
Total electric power sold—Niagara	13,025
Total electric power sold—Buffalo	5,000
	25,225

ADDITIONAL.

Albright & Wilson, Ltd. (electro-chemicals)	400
1896—Grand total	25,625

The plant of the Niagara Power Company is situated about a mile above the Falls and is reached by electric street cars.

WATER WORKS PUMP HOUSE AND HORSESHOE FALL.

WATER WORKS PUMP HOUSE AND HORSESHOE FALL.

THE TOWN OF NIAGARA FALLS, CANADA, extends from the Whirlpool to the Horseshoe Fall, and is an example of one of the most thrifty and enterprising towns in the Province.

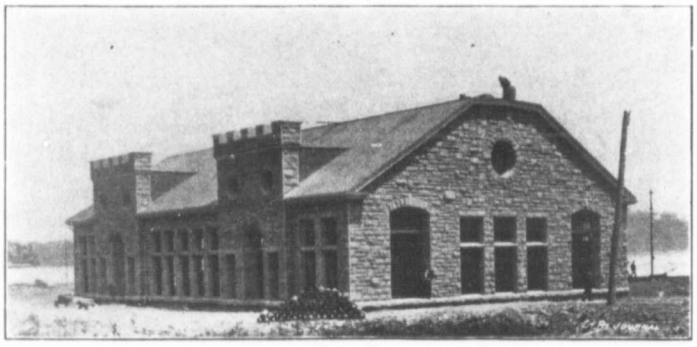
It owes much to its railway interests, as it is the terminal Canadian point on the Niagara frontier for three great railway systems—the Grand Trunk, the Canadian Pacific and the Michigan Central Companies. It is one of the chief Canadian ports of entry for goods coming in from the United States, and the traffic on these railroads is enormous.

Of late years the town has had a rapid growth, due to the encouragement given to manufactories and commercial enterprises. The development of manufacturing interests by means of water power has been the object which has attracted the eyes of the manufacturing world to this locality, and the facilities afforded by the Canadian side are quickly recognized. Work in actual construction of additional power plants has given a fresh impetus to the already bright prospects of the town.

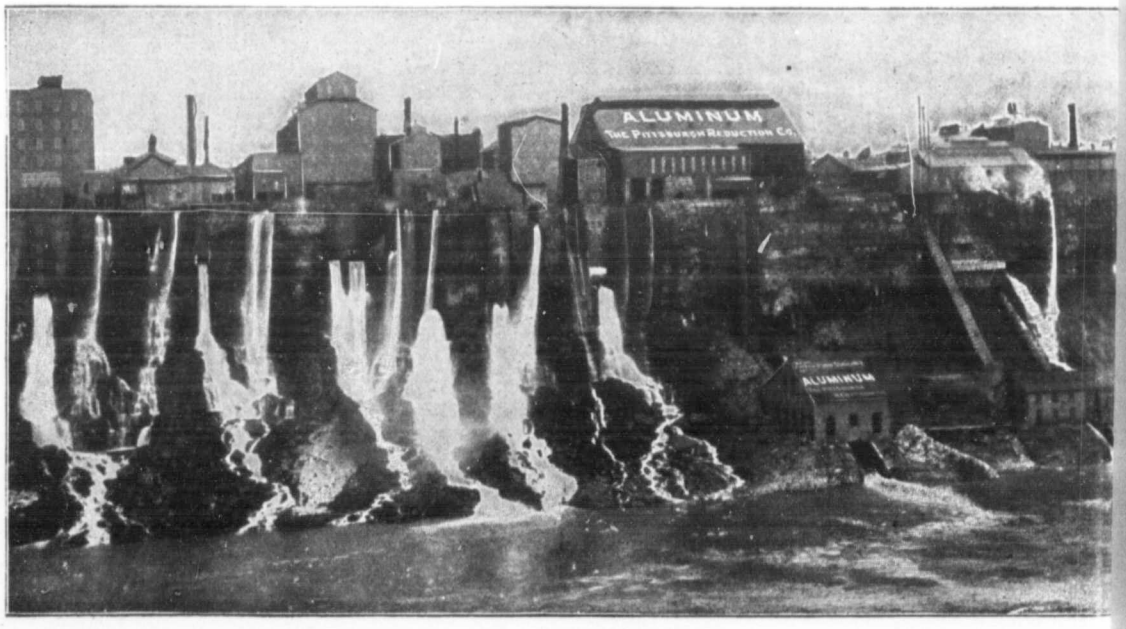
With the 150,000 horse power to be eventually developed by the Canadian Niagara Falls Power Co., for which franchise the company pays the Ontario Government $25,000 per year; the Canadian Power Co., with a charter to take water from the Welland River, which will enable the company to develop unlimited power; and with a fall of 48 to 50 feet in the river between the bridge and the Whirlpool, which can be cheaply developed, it would seem that at a very early date the town will become one of the largest manufacturing cities in the country.

Municipally, the town is favored with valuable public improvements. Waterworks and a most extensive system of sewers, now almost completed, are of especial sanitary value, while the paving of the streets is about to be commenced. The supply of water is pumped from the verge of the Horseshoe Fall, the pump house being shown in the illustration.

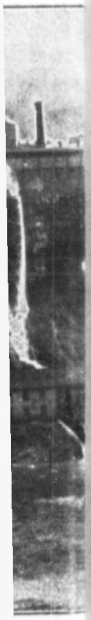
As this locality is in the centre of the great Niagara fruit growing district, the fruit market at this time of the year is particularly busy. Large shipments of fruit are made daily. The population of the town proper is in the neighborhood of 5000, while that of the adjoining village is about 1500.



NIAGARA FALLS PARK AND RIVER RAILWAY POWER HOUSE.



INDUSTRIAL NIAGARA—THE AMERICAN SIDE.



LUNDY'S LANE BATTLE GROUND, FOUGHT JULY 25, 1814. The following brief sketch of the fierce and decisive battle of Lundy's Lane is condensed from the statement of Sir R. H. Bonnycastle, R. E.:

The place of the battle is about one mile from the Falls of Niagara, on rising ground, the highest point between Lakes Erie and Ontario.

The battle commenced by the Americans emerging from the skirts of the wood to the southeast of the church schoolhouse.

Gen. Scott's division commenced firing almost simultaneously with the British at 5:30 P. M. The blaze of cannon and musketry, instead of being as usual covered in American warfare by the forest, was here displayed in fair field and in open day for an hour, until Gen. Scott was strengthened by Gen. Brown, who then took command in person, and about 9 o'clock a second reinforcement to the British, under Col. Scott, arrived on the field.

Both armies continued the conflict with unabated vigor long after darkness had set in, nor did it cease until an hour after midnight. During the darkness many serious mistakes on both sides occurred. The British artillery was captured by Col. Miller at the point of the bayonet, but soon recaptured by its proper guardians.

The number of troops engaged is stated as 1,600 British and five guns until 9 o'clock at night, when two more guns and 1,200 men joined in such utter darkness that friend and foe were mingled, fatally in some instances.

The Americans had 5,000 of their best troops throughout the action, and nine guns.

The 1,200 men (British) and two guns, had been nine hours on the march before they had joined in the dark. This was, in fact, the most steady, hard fought action of the whole campaign in Upper Canada, as was proved by the excessive slaughter, by Gen. Riall having been wounded and taken prisoner, Gen. Drummond having been seriously wounded, and by the two American generals, Brown and Scott, having been so disabled that their command devolved upon Gen. Ripley.

The British loss was 870 killed and wounded; the American loss was 930, and 300 taken prisoners.

Accommodations.

The following desirable Hotels are conveniently located for members of the Association wishing to remain over Sunday :

American Side—

The Cataract, Main Street.

The International, Main Street.

The Kaltenbach, Riverway.

Imperial, Falls Street.

Prospect House, Second Street.

Canadian Side—

The Clifton, River Road.

The LaFayette, River Road.

Rosli, Bridge Street.

Windsor, Bridge Street.

Prospect, Drummondville.

Members of the Association will be able to obtain reduced rates for the trip on the "Maid of the Mist," under the Falls at Table Rock, and to the Elevator at Whirlpool Rapids, Canadian side.

Local Committee.

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Alexander Logan, P.M.

Charles C. Cole, Mayor.

James A. Lowell, Esq.

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