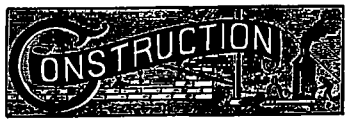
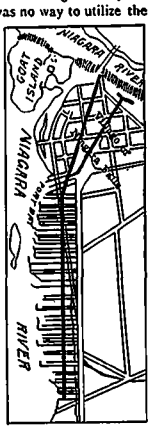



*Architects, Engineers, Builders, Contractors and others are invited to contribute to this department of their experience regarding methods of construction. Also particulars—such as location, character, cost, name of owner, etc.—of any works of construction in progress.*

## NIAGARA RIVER POWER.

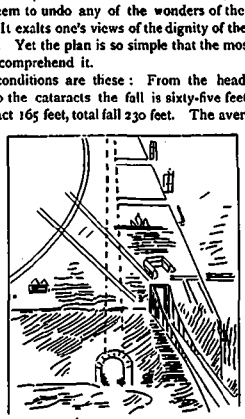
ALL lovers of the sublime and beautiful in nature have rejoiced that the State of New York at last took control of Niagara Falls, laid out a reservation including and preserving the adjacent beauty, and to some extent regulating the cost of a visit to the great waterfall. At the same time, all who have seriously thought of the immense water-power there literally "running to waste" have had their utilitarian instincts grieved by the confident statement that there was no way to utilize the force without marring the beauty. How to make Niagara useful without making it less beautiful has been the question; and it is now confidently announced that the problem is solved.




Niagara, say the engineers can be made to yield 119,000 horse power and not a foot of the reservation be encroached upon any building erected near the falls. Mr. Thomas Evershed, Division Engineer of the New York State Canals, has presented the perfect plan and estimates; Mr. Elnathan Sweet, New York State Engineer and Surveyor, has cordially approved them, and a company has been formed to carry them into execution. This company proposes to furnish 500 horse power each to 238 mills, which shall be located from one mile to two and a half miles up the river from the falls in no way interfering with the view, yet easily accessible by the river and railroad, and all this they propose to accomplish by one great tunnel underneath the town and side tunnels from the river, each with its wheel pit for turbine water-wheels—the whole series drawing through the main tunnel to the level of the river below the falls. Thus they will secure, at a cost of $3,000,000 or less, a power exceeding the combined water power of Holyoke, Lowell, Minneapolis, Cohoes, Lewiston, and Lawrenc and unlike theirs, subject to no vicissitudes of drouth or danger of overflow or destruction of dams, but from sources exhaustless as the great lakes and in tunnels as enduring as the solid rock.

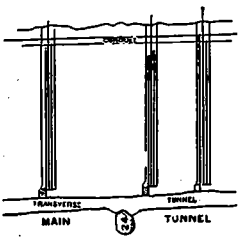
The conception is sublime. The complete work would seem to undo any of the wonders of the ancient world. It exalts one's views of the dignity of the human intellect. Yet the plan is so simple that the most ignorant can comprehend it.

The conditions are these: From the head of the rapids to the cataracts the fall is sixty-five feet, height of cataract 165 feet, total fall 230 feet. The average flow



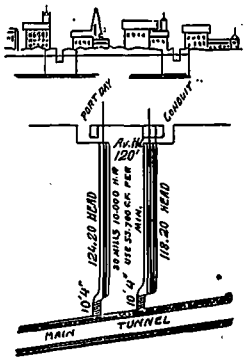
of the river is 275,000 cubic feet per second; total water power, therefore, 7,000,000 horse power, from which the company proposes to take only 190,000 horse power. At the foot of the falls the river turns almost square to the right; thus a straight line from the rapids to the edge of the water just below them is the hypothenuse of a right-angled triangle. The tunnel, therefore, is to begin at a point just above high water level, but 200 feet below the top of the bluff, below the falls; thence it is to run at an up-grade of one foot in 100 through the solid rock to a point a mile above the falls; thence it is to continue one and a half miles parallel with the river, 400 feet distant from it and 100 feet below it, and to be connected with it by lateral tunnels. Of these each is to have its wheel-pit for turbine water-wheel, and the slope of the lateral tunnel or conduit such as to secure a rapid discharge of the water. The main tunnel is to be twenty-four feet in diameter, amply sufficient to discharge all water the side tunnels may pour into it; and these with heads ranging from twenty-four to eighty feet, for turbine wheels of the latest pattern, will amply secure the promised 119,000 horse power, or, 500 horse power each for the 238 factories, for which sites can be provided in the space secured.

It is proposed to lay out the mill sites of sizes from 75x200 to 200x400 feet; to leave ample space between




for railroad tracks to the main line and for streets; to build wharves and secure landings for lake and canal vessels, and secure ample rail connections with the railroads centering at the falls. And finally the company propose a charge of but $10 per year for each horse power of water supplied—less than a third of the average cost at other places—yet when all the sites are utilized the income will be 40 per cent. on the total cost. These are the immediate returns looked for; but beyond lie vast possibilities of storing and transporting the power by electricity to neighboring cities.

Considering the fact that the available water power of the country is diminishing as the forests are cleared, and that in many manufacturing centers summer drouth and winter floods are serious menaces, one can but wonder that the exhaustless power of Niagara has not already been utilized. Manufacturers would hardly ask us to credit them with sentimental reasons for withholding their hands. No doubt the principle obstacle has been the enormous initial cost of making the improvements, as it presented itself to most who examined the subject. No one company could profitably utilize such a power; and it was not easy to form a sufficient combination of companies. The fact that Niagara is on the Canada frontier had something to do with it no doubt; and still more, that it was on the western frontier when the factories of New England and Eastern New York were established. Some small raceways were made several years ago, involving not 1,000 horse power in all; but they all come within the fixed bounds of the park reserved by the state, and are, of course, discontinued. In




1855 the hydraulic canal was begun, outside the limits of the reservation—that is, across the peninsula on which the village of Niagara Falls is built, and after a long disuse it was reopened in 1878, and now supplies power to a few manufacturers. Since July 4, 1879, a Brush dynamo, supplied with power by the rapids, has been run in Prospect Park for the illumination of the falls and grounds, and other small uses have been made of the power. But all appear trifling compared with the plan proposed by the new company.

Another scheme for the utilization of Niagara's power has been set on foot by certain gentlemen of Lockport, N. Y. Their purpose is to supply water for the city of Tonawanda and vicinity, for manufacturing and other purposes, by taking it from the Niagara river at Tonawanda, or some point between Tonawanda and Niagara Falls, and discharging the current into Lake Ontario near the village of Olcott, The watchwords of this organization are, taking. They are: Lake Erie, the mill-pond. Niagara river, the head-race. Lake Ontario the tail-race. No floods. No drouths. No broken dams. No idle mills.

The land at Tonawanda is but little higher than the river. From there northward is a gradual rise for about ten miles to a ridge running in an east and west direction, Lockport being situated on the ridge, whose crest there is lower than farther west, and is cut by two ravines or depressions. The work will be all cutting, and little or no embankment will be required. From Lockport to the mouth of Eighteen Mile Creek the country falls and the distance is comparatively trifling.

The Niagara river has a fall of 333 feet. It is proposed to run a canal from a point opposite Grand Island, near Tonawanda, where the current is not rapid, to Lockport, discharging the water which shall pass through it into Eighteen Mile Creek, which empties into Lake Ontario and will form a conduit for about one-third of the distance. The utilization of the power is first practicable at Lockport. Between Lockport and the lake twenty dams are practicable, at each of which the full power of the water of the canal with a considerable head can be effective. Of course the size of the canal and the fall obtained will determine the amount of power that can be made available. It is claimed that 363,636 horse power can be obtained at Lockport, where a 220 feet fall can be had if the canal be twenty feet deep and 200 feet wide.—*Chicago Tribune.*

## MONTREAL TECHNICAL SCHOOLS.

BY D. J. CAMERON.

TO all who feel interested in the material progress and national advancement of our own country it is satisfactory to know that the Council of Arts and Manufactures of the Province of Quebec, is making steady forward steps in the direction of art industrial education. The establishment of free evening drawing classes in the Province of Quebec for instruction of a practical nature has already attained marked beneficial results, and a visit to the schools whilst in session, promptly dispels the notion which many people entertain, that drawing is a merely ornamental study, for there is no mechanical industry requiring construction which does not to some extent employ the principle of drawing, and in these evening classes which are conducted by competent practical teachers, the pupils are not only instructed in the principles and methods of construction, but are required to develop their conclusions in a practical manner with their own hands. The stair builder, after having made his plans, proceeds to lay off his material, and develops his reasoning faculties by erecting from his own plans the actual stairs.

### THE SCHOOLS.

There are eleven distinct classes in the Montreal evening school, each class meeting twice a week from 7.30 to 9.30 p.m. By kind permission of Mr. S. C. Stevenson, the Secretary of the Council of Arts, the writer was permitted to inspect each class at work.

The first class visited was the

### FREEHAND DRAWING (ELEMENTARY)

conducted by Mr. Frank S. Cleverly, assisted by Mr. E. Bregent. This class has an average attendance of 98 pupils, two-thirds having daily employment as engineers, architects' pupils, carpenters, engine fitters, mechanical draughtsmen, etc., and the remainder are attending day school. The method of construction pursued in this class is similar to that recommended by the South Kensington School of Art. Junior pupils having no idea of drawing, are first given two points on their drawing paper, between which points they are taught to make a straight line. When this task—to the beginner a difficult one—is mastered, they are taught to draw a gate, a box, or some other simple subject. From straight to curved lines is the next step, and the pupil is given some outline object, such as tea cup and saucer, to work upon, and by graduated studies he is trained to a proper knowledge of form and proportion, and in this manner is prepared for the higher classes. The pupils being in all stages of advancement, a hard task is imposed upon the two teachers to give proper attention to each of the ninety-eight. This class should be divided, and one formed for boys attending school, and the other for young men in mechanical pursuits or offices during the day.

### FREEHAND DRAWING (ADVANCED.)

This class is conducted by Mr. A. Boisseau, A. R. C. A. It is intended for pupils more advanced than those attending the former class, being more comprehensive. It includes applied designs and drawing from the human figure or ornament. The majority of the pupils are engaged in industrial pursuits.

### MECHANICAL DRAWING.

The teachers in this department are Mr. J. S. Gardham and Mr. S. C. Wilkinson. The instruction is of a very practical nature and is designed chiefly for mechanics. The ages of the members range from 14 to 35, and the occupations represented are: mechanics, 44; pattern makers, 8; moulders, 3; brass finishers, 2; plumbers, 2; tinsmiths, 2; engineers, 1; clerks, 1; students, 3. The fact of these pupils working for the most part, ten hours during the day and coming from all parts of the city to devote two hours to study, shows an ardent desire for advancement. Having provided themselves with necessary tools and materials, the pupils are first instructed in their proper use, and then proceed to do