LETTER TO THE EDITOR.

Proposal to Dam Niagara Rapids.

Sir,—The writer is in receipt of your communication enclosing a clipping of your editorial of July 6th, and wishes to thank you for the courtesy extended in your invitation to comment upon the question of the proposed dam across the Niagara River at Queenston.

It is difficult to consider this matter in a serious vein, because the problems involved are so stupendous that the probable consequences following the construction of such a structure as you describe are impossible to conjecture except through the medium of a very lively imagination. There are a few obvious facts, however, which may be of assistance in directing flights of fancy toward a more or less rational conclusion.

In this connection, it might be instructive to point out the manner in which ice is periodically discharged through the gorge during a part of the ordinary winter season. The surface velocity of the water in the upper gorge is so slow that the ice, as it rises after its submergence in the vortex of the cataract, finds itself crowded by ice already lying nearer the surface, and the result is a so-called ice bridge, or jam of ice, arching itself between the abutting banks of the gorge. It is quite clear that the chief contributing cause of this condition is the sluggishness of the surface velocity. Under favorable weather conditions the bridge remains a more or less stable structure; but, in mild winters, when a high wind is able to break up the ice on the surface of Lake Erie and start it down the river, a new set of phenomena is observable. The jam then begins to thicken by the application of new layers of ice underneath, and at the same time extends its surface, in some cases even to the narrowing neck just above the cantilever bridge. This thickening process continues, heaving the surface by flotation, higher and higher, and incidentally gradually stopping off the discharge of the river underneath the jam. The restriction of the flow causes the water to back up until sufficient pressure is developed against the ice-pack to move it *as a glacier* and shove its nose into the swift water at the head of the rapids, where the mass is continually churned into small bits and usually gets away as fast as it is being fed by the glacier. The water has been known to rise in the upper gorge, some forty feet, due to this cause, and the writer has observed the ice surface opposite the Hydraulic Power Co.'s plant, to be just about even with the eaves of the building, although the discharge from the tail-races kept the floe free from the building.

The construction of a dam rising ninety feet above the water level at Queenston would render sluggish the surface velocity for a good part of the five miles from the cantilever bridge to Queenston, so that the relief point for the nose of the glacier would be *gone*, unless the dam crest, five miles further down stream, might be imagined to serve the purpose.

The question is, how high would the water need to rise to develop sufficient pressure to move this new glacier, including in its course, a sharp right-angle bend at the Whirlpool site? Of course, the answer must be only problematical, but how can it be conclusively shown that this artificial condition would not result in a filling of the upper gorge with ice—even to the top? This presumption is naturally partly contingent upon whether the dam remained in place, or took the easier course down stream.

The writer would not like to have it understood that he regards any obstacle in connection with this dam project as absolutely insurmountable, for he believes that with unlimited capital and engineering talent of the highest order, almost anything rationally conceivable may be accomplished, if there is a strong enough public sentiment demanding it. But it is safe to say that a number of the problems to be encountered in the construction of a power plant as described, would need to be solved by the trial and error method, somewhat as is frequently done in laboratories, and such experiments as outlined in your editorial, which would have to be conducted on a full grand scale to be at all instructive, would not tend to promote faith in any estimate of cost.

R. D. JOHNSON, Consulting Engineer.
(Formerly Chief Hydraulic Engineer of the Ontario Power Co., Ltd.)

New York City, July 18th, 1916.

AN EXPENSIVE PAVING "ECONOMY."

Andrew F. Macallum, works commissioner of Ottawa, Ont., who was until very recently city engineer of Hamilton, Ont., made some interesting remarks while presiding at the last annual meeting of the American Society of Municipal Improvements, which show that some "economies" in engineering work are expensive in the long run.

"About four years ago," said Mr. Macallum, "some bright mind suggested the idea of doing without a binder in asphalt paving, and in a moment of weakness I accepted the suggestion, and unfortunately tried it on two streets. Both of these streets developed the handsomest waves that I have ever seen on any streets in the country. The streets ran east and west, and peculiarly enough the waves were formed on the south side of the street almost to the centre line in the second year, and about the fourth year on the other side of the street; that is, they formed continuously across. The idea at the time, I think, was to roughen the base and do away with the binder, and save about thirty-five cents, but as a matter of fact it was a great failure."

The official report of the meeting also contains other interesting comments on Hamilton paving work, as follows:—

"Recently we found in some streets where there is heavy motor truck traffic, that the compression which is given to sheet asphalt with the ordinary asphalt roller is not sufficient. The great compression you get from the wheels of these motor trucks is much greater than the compression you get with your asphalt roller, and I have found it necessary in streets of heavy traffic to put on a road roller also.

"On one street in Hamilton, called John Street, we had a six or seven per cent. grade, and we used a pavement called asphalt concrete. That is what we called it at the city hall, but the people who use the pavement call it other things. It is different from the ordinary asphalt, and being on a seven per cent. grade, our own teamsters in hauling stone down there developed the faculty of going down with the rear wheels going along in the gutter at right angles and scraping the curb, but those living outside the city did not realize the possibilities of such a pavement, and they generally came down with the wagon first and the horses after. I found that this pavement, which is supposed to have a rougher face than the sheet asphalt, developed a surface that was much smoother than an asphalt pavement; in fact, it was polished. I just want to point out the fact that on a grade of that nature, almost any kind of bituminous pavement will get to such a state that it is just as smooth as an asphalt."