the Atlantic seaboard, the United States Deep Waterways Commission of 1896 pointed out that it was the shortest route between terminals, and unquestionably was adapted to navigation of considerable capacity. Its consideration, they thought, was not justified at that time.

A detailed report as to the estimated cost of a twenty-one foot waterway from Georgian Bay to Montreal is to be presented to Parliament next session. It will be strictly an engineering report. Almost the whole length of the waterway—460 miles—has been mapped out, showing the necessary excavation work, the cost, location, and character of the structural work. The enterprise does not present very intricate engineering problems. The chief difficulty is the question of maintaining a supply of water across the height of land between Lake Nipissing and Trout Lake. This can be done, the engineers have determined, by conserving the flood waters of the lake and the tributary waters of the Ottawa River to maintain a continuous and adequate supply of water during the whole season of navigation without having to excavate from Trout Lake to the level of Lake Nipissing, which would have meant the expenditure of an enormous sum.

The proposed waterway would be continuous from Georgian Bay to Montreal, via the French River, Lake Nipissing and the Ottawa River. The Ottawa drains a total area of fifty-five thousand square miles. The survey has proved that it will be possible, at moderate cost, to reduce the flood level of the river and increase the low water level by a system of dams and control of tributary waters. The fluctuations between high and low water-marks vary from eleven and a half feet to twenty-five feet at various points.

The United States Government benefited the commerce of the Mississippi valley recently by an undertaking in connection with the Mississippi River similar to that proposed by the Georgian Bay Canal survey. The value of the water powers of the Ottawa River will be increased. If the proposed canal were completed, some five hundred thousand horse-power would be available along its course—almost equal to that of Niagara. By controlling the high and low water levels of the Ottawa River the low water level in Montreal harbor will be raised.

An increase of a foot in the depth of the Ottawa makes a difference of three inches in the depth of water in Montreal harbor. The cost of the undertaking would exceed probably one hundred million dollars. From the report to be presented to Parliament next session it will be seen that, from an engineering standpoint, the Georgian Bay Canal is undoubtedly a feasible scheme. The engineers will be found to have dealt with their report in a businesslike fashion, and to have demonstrated beyond question, from their point of view, that the waterway presents very few difficulties.

But the canal must be proved of value from a commercial standpoint. Montreal would be nearer Fort William and Duluth than Buffalo is, and from Chicago to Montreal the distance would be the same as the present distance from Chicago to Buffalo. From Fort William to Montreal, via the St. Lawrence, is 1,296 miles; via the Georgian Bay Canal it would be 882 miles, a saving of 414 miles. From Fort William to Liverpool, as against the Buffalo route, the saving would be 1,198 miles.

The saving in distance from Chicago to Liverpool would be 1,254 miles, and from Duluth to Liverpool, 1,213 miles. For such places as Kansas City, Omaha, Sioux City, and St. Paul—the centres of agricultural production in the Middle West—the projected Canadian waterway would mean very considerable savings in distance to Liverpool.

Six hundred thousand dollars have been spent by the Government in securing accurate data regarding this enterprise. This is certainly not an unnecessary expenditure of money, even in the event of it being found that one hundred million dollars is too big a price to pay for a Canadian waterway to the Atlantic. The engineering and commercial report at least should decide finally a question which has agitated transportation and commercial circles for more than half a century.

TRANSPORTATION AND THE MONO-RAIL.

In railroad spheres, the saving of fuel expenditure, increase of speed, and total absence of lateral oscillation are important items. These are a few of the advantages which Mr. Louis Brennan, C.B., inventor of the Brennan torpedo, claims for his mono-rail railroad. London advices state that the leaders of the English scientific world have acclaimed Mr. Brennan as worthy to rank high upon the roll of honor, which bears the names of Newton, and Watt, and Stephenson. If this be so, the new invention should cause, before very long, a revolution in steam transportation methods.

The invention has reached only the model stage. But there is many a slip between the real and the model. The gyroscope is used to overcome gravitation. One of the chief features, says the inventor, is that each vehicle is capable of maintaining its balance upon an ordinary rail, laid upon ties on the ground, whether it is standing still or moving in either direction, at any rate of speed, notwithstanding that the centre of gravity is several feet above the rail, and that wind pressure, shifting of load, centrifugal action or any combination of these forces may tend to upset it.

Automatic stability mechanism of extreme simplicity carried by the vehicle itself endows it with this power. The mechanism consists essentially of two fly-wheels rotated directly by electric motors in opposite directions at a very high velocity, and mounted so that their gyrostatic action and stored-up energy can be utilized. These fly-wheels are mounted on high-class bearings, and are placed in exhausted cases, so that both air and journal friction is reduced to a minimum, and consequently the power required to keep them in rapid motion is very small.

The stored-up energy in the fly-wheels, when revolving at full speed, is so great and the friction so small that if the driving current is cut off altogether they will run at sufficient velocity to impart stability to the vehicle for several hours, while it will take from two to three days before they come to rest. The stability mechanism occupies but little space, and is conveniently placed in the cab at one end of the vehicle. Its weight is also small, about five per cent. of the total load being considered an ample allowance for the first vehicle.

The road wheels are placed in a single row beneath the centre of the vehicles, instead of in two rows near the sides, as usual, and are carried on bogies or compound bogies, which are not only pivoted to provide for horizontal curves on the track, but for vertical ones also. By this means the vehicles can run upon curves of even less radius than the length of the vehicle itself, or on crooked rails or rails laid over uneven ground without danger of derailment.

The motive power may be either steam, petrol, oil, gas or electricity, as considered most suitable for local conditions. In the first instance, it has been decided to use a petrol electric generating set, carried by the vehicle itself, for the supply of current to the road wheel motors and to the stability mechanism. Such a vehicle will have the great advantage of being always ready for immediate use, the gyro wheels being kept constantly running by current from a small accumulator while the engine is at rest. In order that the vehicle may be able to ascend steep inclines the wheels are all power driven, and change gears are provided for use in hilly country. It is also possible to run free wheel down hill at great velocity, so that a good average rate of speed can be attained.

Mr. Brennan claims that great economy will result from making the vehicles wider in proportion to their