previous to the building of this canal, with the beach between the channel and the lake almost parallel to the old channel of the river.

The lake bottom at Grand Bend being harder than it is farther south, the dunes were less there than they were farther to the south—where the soft nature of the lake bottom favored their formation. Hence the waters penned back flowed out at Grand Bend, and scoured out a channel from that point to Lake Smith, through the soft material along that part of the river. But at Grand Bend a hard bank of clay with boulders was encountered, which turned the stream west or south of west. Here the beach began to form which crowded the old river up against the base of the dunes—and extended itself, carrying the river with it to and below Port Franks.

One of our learned Chief Justices has remarked that the man who diverted a large river assumed an immense amount of responsibility. As the writer in 1885 stood on the bank of the canal 100 feet above the water, with the washed-out channel one-eighth of a mile wide in front of him, he thought he could appreciate the force of the Judge's remark.

GAS ENGINES ON LIGHT RAILWAYS.

Editor CANADIAN ENGINEER.

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Sik,-In Europe, as a means of working passenger and light freight traffic on railways, cars with gas and petroleum motors as the propelling power are now coming into use. There are being introduced by the Traction Syndicate of 22 Chancery Lane, London, selfcontained cars fitted with gas engines, and carrying the gas supply compressed in steel tubes. Such cars are now running on the Thornton Heath and Croydon tramway. They certainly have much to recommend them. The cars are not very different from ordinary horse cars, and run quietly and easily, emitting neither smoke nor steam, and are quite under control. No machinery whatever is visible, the engine and gearing being entirely enclosed, the motor lying under one seat and the balance of the machinery under the floor of the cars. The driver stands on the front platform, with the brake handle and working lever beside him. The motors have two cylinders placed face to face at opposite sides of the crank shaft at one end of the engine. The shaft is a balance wheel; at the other end a pinion which gears into the wheel on the first motion shaft. On this shaft are two pinions of different diameters giving speed of four or eight miles per hour to the car, higher speeds not being allowed on the English highways. The engine cannot be stopped en route, but must run constantly; it is, however, subject to a regulating device that acts when the work is light, as the governor cuts off the gas supply from one cylinder altogether, the other doing all the work. By weight regulators on the governor, the speed of the cars can be reduced 50 per cent. The gas is carried in three receivers under a pressure of 120 pounds to the square inch. It is compressed by a gas engine and pump; the gas is carried to the cars by a flexible hose, the time required to charge each car being no longer than that required for changing horses. The consumption of gas is 25 cubic feet per mile, run with passengers on. The cars carry 28 passengers; with these they will mount an incline of 1 in 16; in going down they can be stopped by the brakes in their own length, it is claimed. They go round curves of 35 feet radius. The new motors are said to have an advantage over tramway steam locomotives, which in some districts have done good service. It has no steam boiler requiring renewal and repairs.

The first section of the gas-motor tramway was inaugurated at Dessau in Germany in 1894, and the second in December of the same year. The track is the same gauge as on ordinary railways; the maximum gradients are two-thirds of one inch to the foot; the sharpest curves 40 feet radius; the weight of each car is six tons, with 28 persons on board. The motors are of the Otto type, and are from the Dentz works at Cologne. The motor, as placed on the car, is horizontal and has two cylinders; it is seven horse power. These cars easily ascend gradients hauling a trailer full of passengers; also, since the opening of the railway the company has purchased freight cars and trailers. Upon reaching Dessau after a travel of eight days on the railway, they were placed on the rails at the station and run to the tramway depot at the other end of the city, by the test gas stored in them when they were built. The gas is compressed for the whole of the cars by an eight-horse power Otto motor and pump. If the pumps were run fourteen hours per day, they would be sufficient to supply 40 cars. There are now 14 motor cars on the line four of them being 10 horse power. Those interested in a remarkably simple and cheap method of traction power on light railways should study this system, as it is capable of ireing utilized to a much greater extent. CANADA FIRST.

RAPID TRANSIT.

The problems upon which rapid transit depends are not wholly those connected with the motors. There are other difficulties, and they operate, at present, to prevent us utilizing to the fullest extent the speed of which



our locomotives are capable. The chief of these is the danger of a train running at a high speed jumping the track. Improvements in locomotives, which would enable the present speed to be doubled, could easily be made; but it would be impossible to run them on the present tracks. A number of men are looking for the solution of this difficulty, at present, and a Canadian inventor believes he has found it. V. A. Emond, of Quebec, has lately patented in Canada and the United States a system by means of which each car carries its own track and runs on a series of rollers contained in a grooved rail.

The advantages which are claimed for this contrivance are as follows: Trains can be run at a speed of several hundred miles per hour without danger of derailment. All risk from obstructions on the track is obviated. As the rail is entirely covered and provided with holes at the base for the escape of water, etc., it offers advantages, hitherto unattained, in contending against frost, snow, rain, dust, etc. The trucks having no wheels, shafts, nor bearings, liable to break at any