the capture of the pole; the one by paying the piper, while at any rate the piper or discoverer will be a Canadian, and thus give Canada its share of the honor of discovery."

TRACTION SYSTEM FOR INTER-URBAN RAILWAYS.

The Westinghouse Electric and Mfg. Co., of Pittsburg, has recently contracted for the equipment of a line from Washington to Baltimore, about forty miles in length, with a branch to Annapolis, fifteen miles in length, with alternating current apparatus.

This contract marks a step in advance that has long been awaited by engineers. In the ordinary method direct current is fed to the trolley line for the car-motors. For city lines the current is often generated as direct current, but for long distance inter-urban roads this would involve a cost of copper conductors entirely prohibitive. To meet this objection a system has been used thus far in this country involving the generation of alternation currents at high pressures of from 10,000 to 30,000 volts and the transmission of the same to substations where by means of transformers and rotary converters the current is supplied to the trolley wire as direct current at the usual railway voltage from 500 to 650 volts. The substation has always been an undesirable feature, on account of cost. The plans that have been proposed to do away with this feature are numerous, but hitherto none have appealed to practical street railway engineers. In Europe the polyphase induction motor has been used to some extent, but it implies the use of two or three overhead wires, and the characteristics of the induction motor in regard to starting and average efficiency in railway service are said to be not of the best. Other systems which have been proposed involve the use of single-phase motors upon the cars driving generators which in turn supply power to the motors on the axles. However, this involves the placing of a substation upon the car itself. Details regarding the new system of the Westinghouse Co. are not at hand, but it is known that by its use the limitations of the induction motor and the disadvantages of the multiplicity of overhead conductors as well as the great cost of the system just described will be avoided. For the road referred to single-phase, alternating current will be generated in a main power house by three 1500 K. W., single-phase, Westinghouse generators, delivering current at 15,000 volts. Current will be distributed from the power house at 15,000 volts to transformer stations at suitable intervals along the line. These transformer stations will contain only stationary transformers with the necessary switches and fuses, but no moving machinery, and therefore will not require the presence of an attendant. From these stations current will be fed to the single trolley wire at 1,000 volts. The pressure of 1,000 volts which has been adopted for the trolley wire is not a necessary part of the system, as a much higher voltage could have been used if it had been deemed advisable by the engineers of the road.

The cars are to be equipped with four motors, each of 100 h.p. The motor, which is the novel part of the equipment and the key to the entire system, is a variable speed motor, having characteristics adapted to railway service and in all respects equal to the present direct-current railway motor. A speed of 40 to 45 miles an hour will be attained, which can be increased to 60 miles if necessary.

It is to be remarked that this latest development in electric railroading follows in the path already traced by electric lighting. The first electric lighting systems employed direct current at low voltage, but as the area to be supplied increased, this involved a cost of copper cables. To meet the difficulty alternating current distribution at high voltage was adopted, wih rotary converter sub-stations to enable the current to be distributed on the existing mains as direct current. However, most electric power plants now being installed distribute low voltage alternating current directly to the lamps and motors, thus avoiding the expensive rotary-converter substations.

—Surveyors are in great demand in Western Canada at present. Besides all the regular survey work now going on there are railway lines to be plotted, timber limits to be surveyed and a great deal of private work to be done.

A NEW MATCH.

Another kind of match, intended to supplant phosphorus matches, has lately been introduced in the Swedish market. The inventors of the new match are Messrs. Landin and Jernander, of Stockholm, who have patented their invention in several countries. This match looks like the well-known potash and paraffin matches, which, however, by reason of the fact that they contain poisonous phosphorus, come under the same prohibition as the old and worthy lucifer match. But the new match which has been named "Repstickan" (the scratch match), possesses a property which the potash match lacks—viz., it is damp proof and can therefore be lighted against a damp or wet surface, provided this is hard. The inventors claim that Repstickan is the least poisonous match in existence, the safety match not excepted.

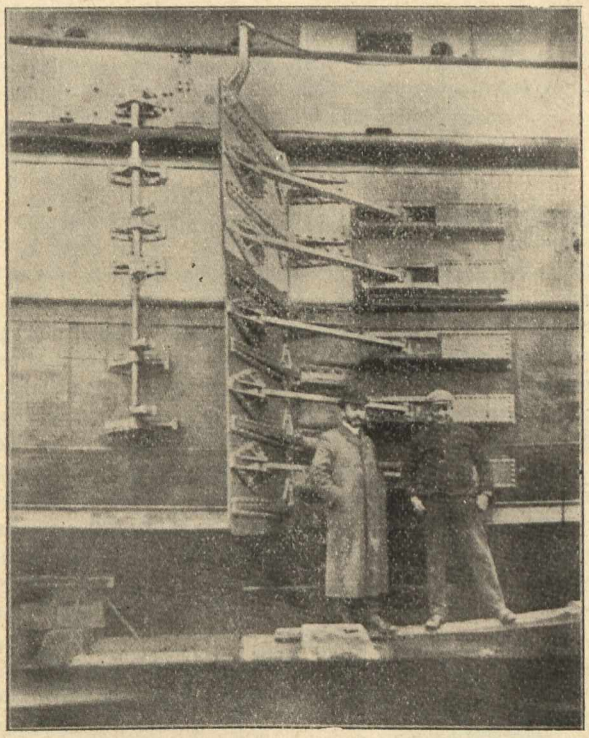
LACOSTE'S STEAMSHIP BRAKE.

In the December number of the Canadian Engineer, there appeared a notice of a steamship brake, invented by L. J. Lacoste, of Montreal. We give herewith an illustration of the brake, together with the official report of James Howden, superintendent of dredging for Canada, on its operation as applied on the Government steamer Eureka. The report is as follows:

DEPARTMENT OF PUBLIC WORKS,
Montreal, 1st December, 1902.

To the Right Honorable Sir Wilfrid Laurier, G.C.M.G., Prime Minister of Canada, Ottawa, Ont.:—

SIR,—I have the honor to send you my report on the test made with Mr. Lacoste's ship-brake, which was adopted on the Government steamer, Eureka. A private test was made on the 25th of November last in the Lachine Canal,



and the following day the steamer was taken to the harbor of Montreal, where the tests were continued for upwards of a week, the most severe being in St. Mary's current. After the Eureka had attained the speed of 11 miles an hour, by the log, the fins were opened on both sides, steam shut off, and the vessel was brought to a full stop in less than her own length. Subsequently, the fins were again opened, the engines were reversed, and the vessel was stopped in about half her length, or within a distance of fifty feet. Tests were also made of the turning of the vessel in a limited space at full speed with one fin opened, and they were very satisfactory, the Eureka turning within her own length. In order to test the strength of the fins, one was opened when the steamer was going up the current with her engines at full