

fits to mining & other enterprises in British Columbia. These benefits are self-evident.

In every lead mine there are masses of ore that will not pay at the present rate for treatment; in every camp there are propositions & mines just too lean to tempt operators or investors. Every dollar taken off the charge for treatment means thousands of tons more of ore available, & proportionately swells the pay rolls of every camp. Every dollar of reduction in smelter charges widens the pay streak of every mine, & brings new mines within the paying class.

It would be a great misfortune to British Columbia & to the Dominion at large if this opportunity should be lost, through the failure to secure adequate means of transportation. There are rival projects south of the boundary. Immense coal areas in the States of Washington & Montana are in process of development, & if the parties interested in these properties once secure possession & control of the market in these States for coal & coke I fear the coal & coke in British Columbia will stand a very poor chance of ever taking it from them.

The promoters of this railway ask no cash bonus or land grant of any kind; they simply desire the opportunity of expending their own money to construct a railway which will be of great public benefit.

We now have a prospect of building up a city as large as Butte in the Crow's Nest coal district; & I cannot think it possible that either the Parliament of Canada or the Legislature of British Columbia will place any barrier in the way of the industrial development of our country, or will adopt a course which may delay that development half a century. I, therefore, look forward with confidence to a charter being granted; & this being done, the development which I have outlined will be at once proceeded with; but unless the charter is granted the development outlined cannot be undertaken.

The President moved the adoption of the report, which was seconded by R. Jaffray, first Vice-President of the Co.

Elias Rogers, Managing Director, gave an interesting address, detailing the past year's operations of the Co. The usual formal resolutions were adopted, & all the members of the board were re-elected for the ensuing year.

Wireless Duplex Telegraphy.

From an ill-understood curiosity wireless telegraphy seems at last to have become an important & valuable branch of electrical science. Much of the credit for this evolution is due to Prof. Slaby, of Charlottenburg, & to his indefatigable collaborator, Count Arco, both of whom have systematically investigated the phenomena of the Hertzian waves, & formulated laws by which these phenomena can be explained. As a result of their labors the uncertainty & whimsicality of wireless telegraphy have disappeared. Much that was formerly considered indispensable in the ethereal transmission of electrical waves has been proven unnecessary, & even disadvantageous.

The balloon at the upper end of the transmitting wire, supposed to serve the purpose of increasing the capacity; the peculiar plates at the receiving station, formed like butterfly-wings, & likewise designed to increase the capacity; the careful insulation of the receiving wire from the earth; & other details of the old system have been rudely thrown aside. Nothing more is heard of the law that the distance to which messages can be transmitted is proportional to the square of the length of the transmitting & receiving wires. That there is a definite relation between distance & length of wire or height of mast may well be assumed; but that relation, whatever it may be, plays no very important part in

Slaby's system, since the tension to which the coherer is subjected is augmented by means different from those hitherto known.

The waves sent forth by a transmitter loop are augmented by a condenser. An induction coil is connected with the upper end of the loop, & is so wound that it permits the passage of low frequency currents, but checks the high frequency currents generated by the discharge of the condenser. At the moment of discharge the loop acts as a single vertical wire. By varying the nature of the induction-coil & the condenser, waves of any length can be sent forth. At a lecture delivered before the German Emperor, waves varying in length from 140 to 600 metres were utilized.

In direct opposition to Marconi, Slaby grounds his receiving wire. An ordinary lightning rod is used instead of a mast. If the length of the receiving wire be exactly one-fourth the wave length, a node is formed at the connecting point with the earth, & the maximum amplitude of the alternating tension appears at the upper end. Evidently the coherer should be attached to the point of greatest amplitude; but such an arrangement is impossible in practice. The difficulty is very simply & ingeniously overcome by connecting with the receiving wire at the earth-node a horizontal auxiliary wire of equal length. At the free end of this horizontal wire the wave-amplitude is equal to that of the upper end of the main wire. To the free end of this auxiliary wire the coherer is attached. The auxiliary wire need not be extended in a straight line; it can be wound to form a coil.

If the main receiving wire, which is usually a lightning rod, & which cannot, therefore, be readily lengthened & shortened, be subjected to the action of electrical waves of greater length than the wire can receive, it is necessary merely to lengthen the auxiliary wire in order to receive the message. In this manner a nodal point can be formed in the auxiliary wire, so that the receiving wire may be subjected to electrical impulses by which it would not otherwise be influenced. The auxiliary wire in Slaby's system is of the utmost importance; for by its use the receiving apparatus will be affected only by certain waves. Thus he has succeeded in overcoming one of the most glaring deficiencies in wireless telegraphy—the impossibility of secretly transmitting a message to one station alone.

In order to increase the effect of the waves a peculiarly wound induction coil is placed in the circuit between the coherer & the auxiliary wire. The coil Slaby terms a "multiplier." By means of this instrument a trustworthiness & certainty of operation have been attained which are as gratifying as they have been conspicuously lacking in previous methods of ethereal telegraphy.

Not the least interesting feature of Slaby's invention is the possibility of receiving two messages simultaneously at a single station—an end which has been attained largely by means of the auxiliary wire of variable length already mentioned.

Conversion from Steam to Electricity.

W. Langdon, Superintendent of the Electrical Department of the Midland Ry. of England, recently read a paper before the Institute of Electrical Engineers, upon the practicability of converting the trunk railways from steam to electric traction, & the numerous benefits that would accrue from such a change. He contended that the utilization of electric traction for this purpose was perfectly feasible, & he was of opinion that the railways could be worked much more economically by this means. He had obtained returns of the trains running over the main road of the Midland Ry. between London & Bedford, a distance of 50 miles, in order to ascertain the amount of current required to deal with it, &

the cost of installing & maintaining the necessary generating plant. From his deductions, he discovered that the capital outlay for the installation of the plant would amount to \$2,350,000, & the annual expenditure would aggregate about \$194,800. In comparison with the cost of working the same distance by steam traction, an economy of nearly 2c. a train mile would be effected by the employment of electricity. At present, owing to the high price of coal, the saving would be much greater. If all the railroads of the United Kingdom were to adopt electricity for the propulsion of their trains in place of steam, no less than 3,000,000 tons a year would be saved.

Niagara Frontier Summer Rates.

The annual meeting of the Niagara Frontier Summer Rate Committee was held at the Windsor Hotel, Montreal, Jan. 30, for the purpose of making tourist rates from Detroit, Port Huron, Niagara Falls, N.Y., Montreal, & Quebec, the same to be on sale from June 1 to Sep. 30, valid until Nov. 1, with certain exceptions.

The following lines were represented:—Algonia Central Ry. & S.S. Line; Anchor Line; Bangor & Aroostock Rd.; Boston & Maine Rd.; Canada Atlantic Ry.; Canadian Pacific Ry.; Central Vermont Rd.; Champlain Trans. Co.; Cleveland, Cincinnati, Chicago, & St. Louis Ry.; Cleveland & Buffalo Transit Co.; Delaware & Hudson Rd.; Delaware, Lackawanna, & West. Rd.; Dominion Atlantic Ry.; Grand Trunk Ry.; Great Northern Ry. of Canada; Intercolonial Ry.; International S.S. Co.; Lake George S.B. Co.; Lake Ontario & Bay of Quinte S.S. Co.; Lake Ontario Nav. Co.; Lake Shore & Michigan Southern Ry.; Lehigh Valley Rd.; Maine Central Rd.; Maine S.S. Co.; Manitou S.S. Co.; Michigan Central Rd.; Montpelier & Wells River Rd.; Mint. & Roch. Trans. Co.; Muskoka Navigation Co.; New England Passenger Association; New York & Ottawa Ry.; New York Central & Hudson River Rd.; New York, Chicago & St. Louis Rd.; New York, New Haven, & Hartford Rd.; New York, Philadelphia, & Norfolk Rd.; Niagara Gorge Rd.; Niagara Navigation Co.; Northern S.S. Co.; North Michigan Trans. Co.; Ottawa River Navigation Co.; Pennsylvania Rd.; Portland, Mt. Desert, & Machias S.B. Co.; Portland S.S. Co.; Quebec Ry.; Quebec Central Ry.; Quebec & Lake St. John Ry.; Richelieu & Ontario Navigation Co.; Rideau Lakes Navigation Co.; Rutland Rd.; St. Lawrence River S.B. Co.; Thousand Island S.B. Co.; Toronto, Hamilton, & Buffalo Ry.; Trunk Line Association; West Shore Rd.

T. Henry, Traffic Manager of the Richelieu & Ontario Navigation Co., was elected Chairman, & G. C. Wells, Chief Clerk Passenger Traffic Department C.P.R., was re-elected permanent Secretary.

The rate sheets, as checked by the rate clerks, were reported by the Secretary, & certain difficulties which had been encountered were stated & dealt with.

New York was selected for the next annual meeting, the date being left to the Chairman, it being understood that it should be as soon as possible after the meeting of the New England lines.

The Secretary was instructed to compile & issue a division book, showing divisions of all rates quoted in the Niagara Frontier excursion rate sheet. The expense of compiling the division book & rate sheet, together with \$100 additional for Secretary's services, to be assessed on the basis of mileage of each line over which rates are quoted in the sheet.

The U.S. representatives at the meeting tendered their sympathy to their Canadian confreres in the loss which they have sustained through the death of the Queen.