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THE

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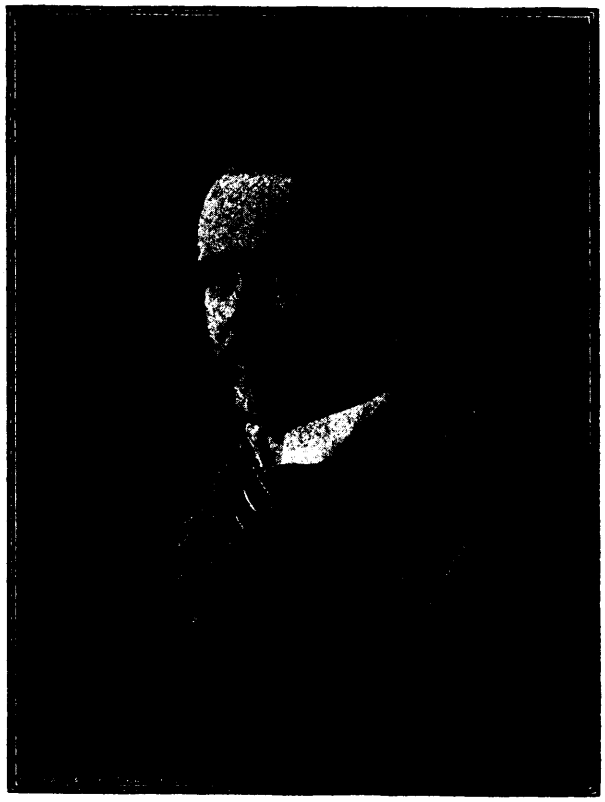
The Electrical Equipment of an Ordinary Street Car.

By A. B. Lambe, Toronto.

Electric railways, as we are all aware, are fast becoming more numerous throughout the world. Perhaps England is making the greatest strides to-day, though still far behind this continent in the number and value of the roads in operation; this progress being such that from the double reduction rheostatically controlled 5 to 6 ton car which was the very latest and best product of but a few years back, we have come to now consider a 125 ton train, the units weighing 25 to 35 tons each, with some one of the various forms of master control now on the market, or a single locomotive, such as those of the Baltimore and Ohio Railroad—not an uncommon sight. Equally to be admired are the many forms of smaller equipments which are used to-day in large numbers, such as the various industrial railways in service the country over, for mining, telpherage, factory transportation, private shunting, in fact there to-day remains practically no form of travelling or conveying mechanism or apparatus which does not find its most advanced exponents using electricity to a very great extent, in some cases almost exclusively. By this we do not mean to say that electrical machinery is going to supersede all other forms of power transforming apparatus, or that it is the panacea for every difficulty, for we are all ready to acknowledge that compressed air, rope, belt and chain driving, and the steam engine have each their field which cannot be commercially invaded by the electric motor, but, on the other hand, electrical machinery has made fields for itself, and in doing so has been a factor in the world's increase of wealth to an extent which a few years ago was not dreamed of. Chief among these is the work of traction in its many and varied forms, and presumably it is to heavy electric railroading that we must look for the greatest field of the large output of the future, which we all trust will be a feature of the years to come.

A text such as this would occupy us for a long time, if discussed only in its generalities, and therefore we must confine ourselves to the subject matter proper, and as all that is to be laid before you will be of a strictly elementary character, it has been decided to illustrate it with samples of the various apparatus which go to make up the motive and controlling power of the ordinary car with which we are all so familiar, even if only through the fare-box; presumably the logical way of handling the matter will be to divide the equipment into its main features, and discuss them one by one, the trolley, controller, rheostats, motors, etc.

The first roads put into service used two trolley wires and two trolleys on the car, or, as it is now called, were of the double trolley type; we can all picture the difficulties encountered in such a form of construction as this where there were turnouts, crossovers and crossings to insulate; it has to-day been almost universally abandoned, the rail being



H. V. HARRIS,
General Manager, Midland Railway, Nova Scotia.

used as a conductor instead of one of the wires, though occasional survivors are found. The trolley wire was round, and though soft at first was soon made somewhat harder than that used for ordinary purposes, being suspended in nearly all cases by mechanical clips, which had the great disadvantage of being in the way of the trolley wheel; the result was a heavy blow every time the wheel went under the clip. Efforts to overcome this difficulty led to the various designs of the soldered ear, the wrought sheet hanger, the Walker clip, and the figure 8 wire, an ever-improving chain leading finally to the evolution of the grooved wire, which is to-day considered the best trolley wire equipment to be found in the market. In passing we should note that a wire of any given size has the same resistance, weight, etc., length for length, irrespective of whether it is round, figure 8, or grooved.

The soldered ear in connection with a round wire is also used extensively, but its grip is not as good as that of the mechanical clips which are used with the grooved type, and it is much more expensive to put on or take off.

The almost universal trolley wheel of this country for city work at moderate speeds, four to five inches in diameter, has reached a point where it might be considered standard. It is usually made of brass, though occasionally iron with a brass centre, to avoid undue wearing of the wire. It has a separate piece bushing, which can be renewed cheaply, a steel spindle automatically lubricated by oil or graphite, and is carried by a malleable iron harp, designed to as much as possible prevent catching in the overhead work. There are of course numerous styles and sizes of what might be termed freak wheels running up to as much as 10 inches in diameter, for high speed duty 6 inches is a common size. There is also the sleet cutter, used in localities troubled with storms in cold weather to clear the trolley wire of the accumulated ice and snow.

Under the heading of trolleys, we should mention—we have not time to go into them in detail—such other current collecting devices as the third rail, the conduit systems, and, as a curiosity, the roller trolley. This latter is used quite extensively to-day on the continent, though it has never made any great progress in this country; it was exploited to a certain extent by the old Walker Company. The pressure of the wheel against the trolley wire is somewhere about 20 to 40 pounds, which, after the addition of the pressure or strain necessary to balance the weight of the wheel harp and pole, means a tremendous strain on the trolley stand and the superstructure of the car; few realize how large it is. When horse cars were first changed over to electric propulsion, this great roof strain was not recognized, and the cars soon presented badly distorted roofs; modern practice provides a long and heavy wooden trolley stand on which is mounted the metal base, thus distributing the stresses uniformly over the roof. The trolley poles to-day are all steel, usually seamless and graduated in thickness and diameter from top to bottom, sometimes reinforced near the stand; the first equipment was wood, with a wire run down the side to