

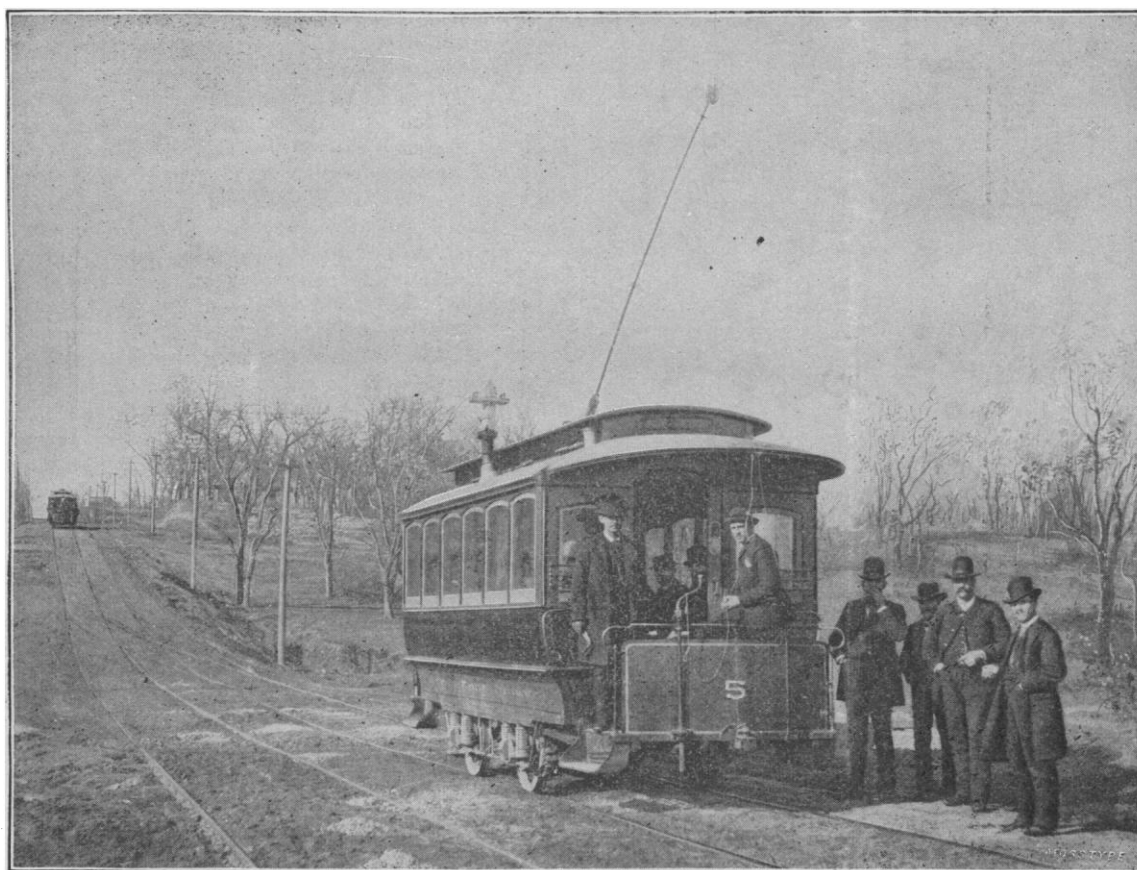
substitute for the chamois-leather now used for these and for analogous purposes. Being, moreover, of a woven texture, and absorbent, it is more healthy for use in garments than chamois-leather, and does not require to be perforated. Unlike leather, also, which gets stiff after washing, this improved material so produced is capable of being repeatedly washed without stiffening, and is found to retain its softness perpetually."

THE ELECTRIC RAILWAY IN ST. JOSEPH, MO.

ONE of the successful electric street-railways in the country is that in operation upon the Wyatt Park Company's line at St. Joseph, Mo., a view of which we give in this issue. This line at St. Joseph was the first one in the country to practically demonstrate the successful operation of an electric railway in a snow-storm. In the early

A NEW FORM OF SELF INDUCTION AND REGULATING COIL.

IN the operation of electric lighting and other apparatus in which an alternating current is employed, it is frequently desirable to vary the current or electro-motive force through considerable range. With direct or continuous currents, a variable rheostat is usually employed for such purpose, and, where saving of energy is not an object, might be used also with alternating currents. But with such currents it is possible, by employing self-induction or inductive resistance in place of pure resistance, to secure such variations without much loss of energy, because the action of self-induction is really only a storing-up and giving-back of energy consequent on a displacement of phase of induced alternating impulses from the phase of impressed or supplied impulses. This is what is



SPRAGUE ELECTRIC RAILWAY AT ST. JOSEPH, MO.

part of this winter a blizzard from the Western prairies struck St. Joseph with all its force, and covered the streets in that city to the depth of from six inches to one foot, in many places drifting badly. The telephone, telegraph, and electric-light wires were borne down by the snow in all parts of the city. In spite of this general blockade, the electric railway ran uninterruptedly, and the cars ploughed their way through the heavy drifts on the line without trouble or stoppage, and without any aid from snow-ploughs.

The grades on the Wyatt Park Railway are in some points on the road as high as nine per cent; and the cars reach a speed of fifteen to eighteen miles an hour in the outside and suburban districts, reducing to a lower rate of speed when operating within the city.

St. Joseph, Mo., already has two street-railways operating by electricity on the Sprague system, and a great many manufacturing industries are kept in operation by the same power by means of stationary electric motors operated from the regular railway circuit. It is said that the two other street-railways in St. Joseph will soon be in operation upon the electric system, so that the horse shall be supplanted entirely for car service in that city.

meant by "lagging of phase," and it is an effect of self-induction or inductive resistance. Any wire capable of producing magnetism is a self-inductive resistance to such currents. A coil wound on an iron-wire core or bundle is a good example; and, if the wire bundle be a ring core or closed magnetic circuit, its effects per unit of length of wire will be enormously intensified.

Hitherto the usual plan of constructing a variable inductive resistance has been to provide a hollow coil with a movable iron-wire core in its axis, so that the centres of coil and core could be made coincident for maximum effect. This arrangement for a given effectiveness is cumbrous and unnecessarily large, inasmuch as it employs only an open magnetic circuit, and not a closed one; and, even though the core be entirely removed from the coil, the self-induction is not neutralized, because of the numerous turns of wire in the coil itself. Besides, the true resistance of the wire as such is considerable.

With a view of obviating these defects, and securing the other advantages of compactness and ease of manipulation, the apparatus to be described was devised.