

UNITED STATES PATENT OFFICE.

GRANVILLE T. WOODS, OF NEW YORK, N. Y., ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 695,988, dated March 25, 1902.

Application filed August 24, 1900. Serial No. 27,902. (No model.)

To all whom it may concern:

Be it known that I, GRANVILLE T. WOODS, a citizen of the United States, residing at New York, county and State of New York, have
5 invented certain new and useful Improvements in Electric Railways, (Case No. 1,033,) of which the following is a specification.

This invention relates to electric railways of the sectional-conductor type; and it consists in the herein-described novel means of
10 energizing successively the conductor-sections of such a railway.

The drawing illustrates in diagram the apparatus on a portion of such a railway, together with a car and accompanying apparatus.
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G represents the main generator, which supplies current to the feeder F, return being through the track-rails T and the wheels of
20 the car. As shown, the conductor-sections extend in a single line and are grouped together in sets, each set comprising a plurality of sections which are connected together in a set by resistances r, r', r^2 , and r^3 . A motor-collector W is carried by the car and connected with the controller L and the car-motor M and is adapted to engage with the conductor-sections C', &c. Gravity-switches S S' are adapted to connect the sections of each
25 set with the feeder as the car advances. For this purpose a switch-energizing contact device W' is carried by the car and adapted to engage the conductor-sections and is also connected to the secondary battery B or other
30 source of current carried by the car and with the controller L.

Conductors U U' connect the switches with the conductor-sections, and conductors D, D', D², and D³ connect the conductor-sections together in sets.
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The operation may be described as follows: Assume that the car is moving to the right, that the switch S is energized, and that the switch S' is about to be energized, as shown
45 in the drawing. Current is now flowing from the feeder F through the series-coils O and O' to the conductor-section C², through the motor-collector W, the motor M, and the controller L to ground. The resistance r' is so proportioned that a portion of the current flowing through the switch S will be shunted

through the conductors A and D' to the conductor-section C³, through the switch-energizing contact device W' to the conductor-section C⁴ of the advance set of sections, 55 thence through the conductors D² and A' and the coil O² of the switch S' to energize the magnet-coil and close the switch. After passing through the coil O² the current flows through the section C⁵ to the forward shoe of 60 the motor-collector W to complete the shunt. The switch S' being now closed, current will flow from the feeder F through the series coils O³ and O² to the conductor C⁵ and the motor-collector W, branching at A', as at A 65 in the previous set of sections, and when the device W' engages the section C⁶ flowing through the conductor D³ to said device to energize the next succeeding switch-magnet. It will be observed that collectors, conductor- 70 sections, and resistances are so arranged that the car will operate when moving in either direction. After the rear shoe of the motor-collector W has left the section C² and while its forward shoe is collecting current from 75 the section C⁵ the said rear shoe engages the section C³ and receives current through the branch conductors A and D'. As soon as the circuit of the coil O' is broken, when the rear shoe of the collector W leaves the section C² 80 the coil O will discharge around the loop C², r, C', D , and A, the resistance r being small enough to permit the passage of a discharge.

When it is desired to start the car from a dead conductor-section, the handle of the controller L is turned to a position where it will 85 engage the contacts H and K. A circuit will thereupon be completed from the battery through the contact device W' to energize the switch-magnet, returning through the collector W and the conductor N to the battery. 90 While the handle of the controller connects the contacts H and K after a switch has been closed the battery will be charged by current flowing through the branch N. 95

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric railway, the combination with the feeder, of conductor-sections, electromagnetic switches for connecting the latter with the former, a motor-collector and a 100

switch-energizing contact device carried by the car, and resistances connecting adjacent conductor-sections engaged by said collector and contact device, said resistances serving to shunt a portion of the current flowing to the collector, through the switch-energizing contact device and the magnet of the switch of an advance section.

2. In an electric railway, the combination with the feeder, of a single line of conductor-sections, electromagnetic switches for connecting the latter with the former, a plurality of successive conductor-sections constituting a set, resistances connecting together the members of each set, a motor-collector and a switch-energizing contact device carried by the car, said resistances serving to shunt the portion of the current flowing to the motor-collector through the switch-energizing device and the magnet of the switch of an advance section.

3. In an electric railway, the combination with the feeder, of conductor-sections, electromagnetic switches for connecting the latter with the former, three successive conductor-sections constituting a set, resistances connecting together the sections of each set, a connection between the switch of a set and the sections thereof, a connection between the magnet-coil of the switch of a set and the sections thereof, and a motor-collector and a switch-energizing contact device carried by

the car, which bridge adjacent sets of sections.

4. In an electric railway, the combination with the feeder, of conductor-sections, electromagnetic switches for connecting the latter with the former, and closed circuits for the secondary discharge of the magnet-coils.

5. In an electric railway, the combination with the feeder, of conductor-sections, electromagnetic switches for connecting the latter with the former, several conductor-sections constituting a set, resistances connecting together the sections of each set, a connection between the switch of a set and the sections thereof, a connection between the magnet-coil of the switch of a set and the sections thereof, and a motor-collector and a switch-energizing contact device which bridge adjacent sets of sections, said resistances being sufficiently large to shunt a part of the main current through the switch-energizing device, and sufficiently small to receive the secondary discharge of the magnets around the closed circuits formed by the sections of a set and the connections described.

In witness whereof I have hereunto set my hand this 22d day of August, 1900.

GRANVILLE T. WOODS.

Witnesses:

CHARLES T. HUGHES,
C. S. REID.