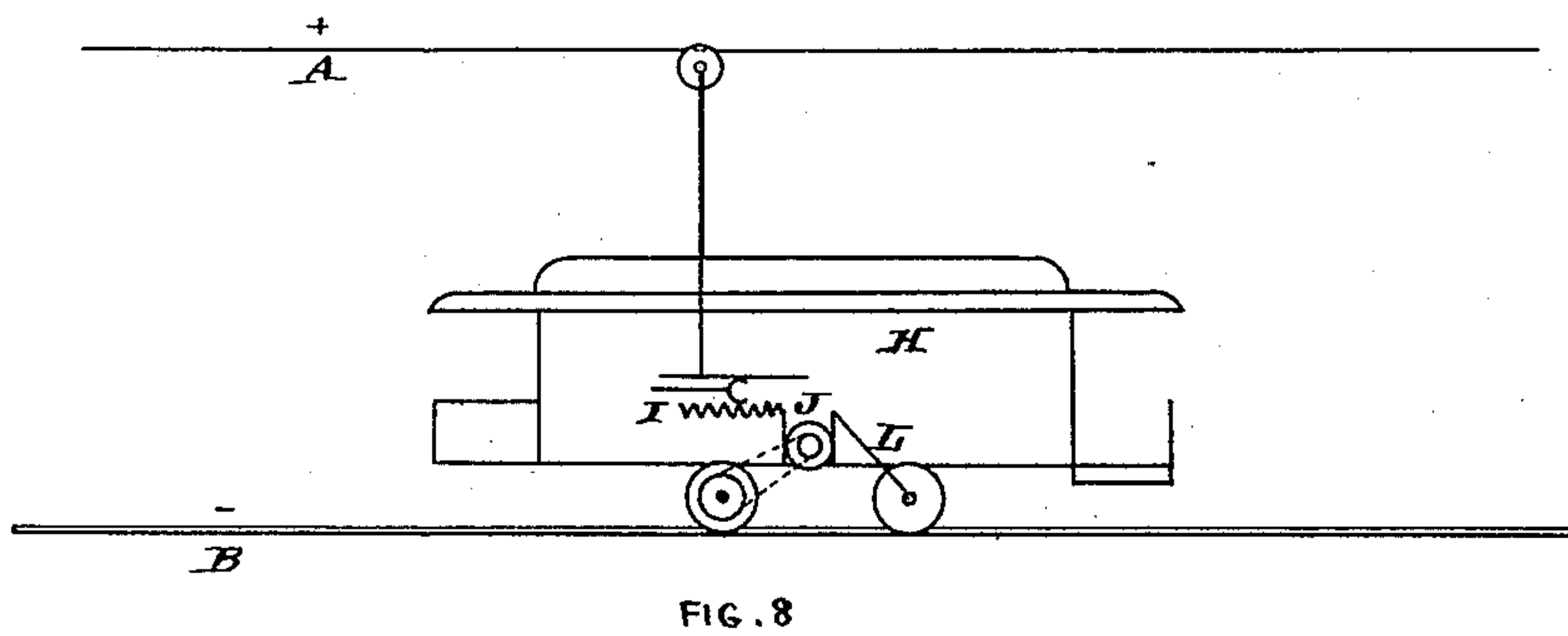
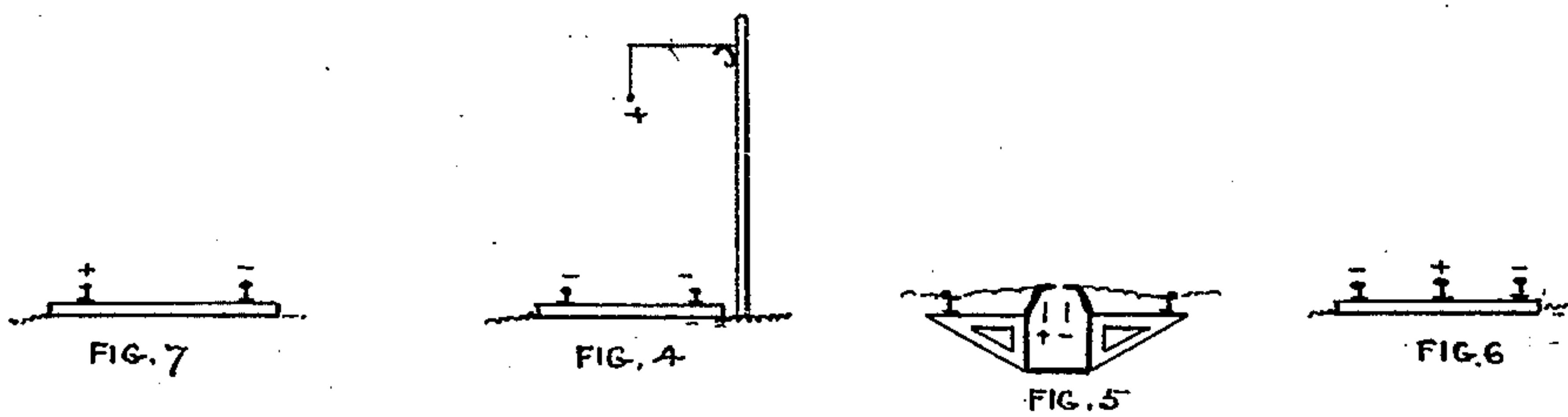
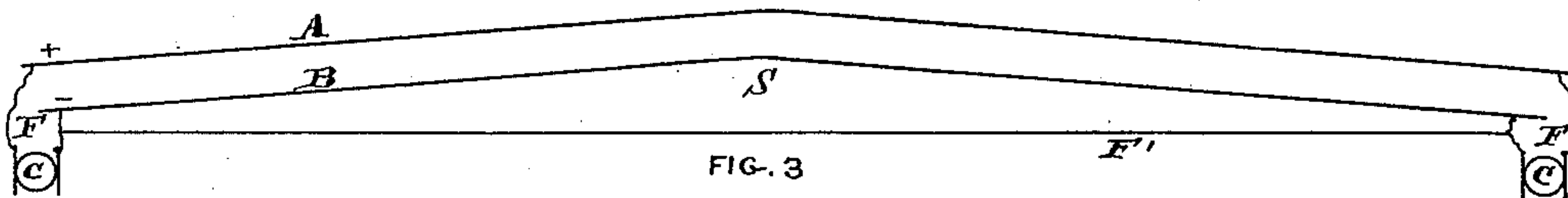
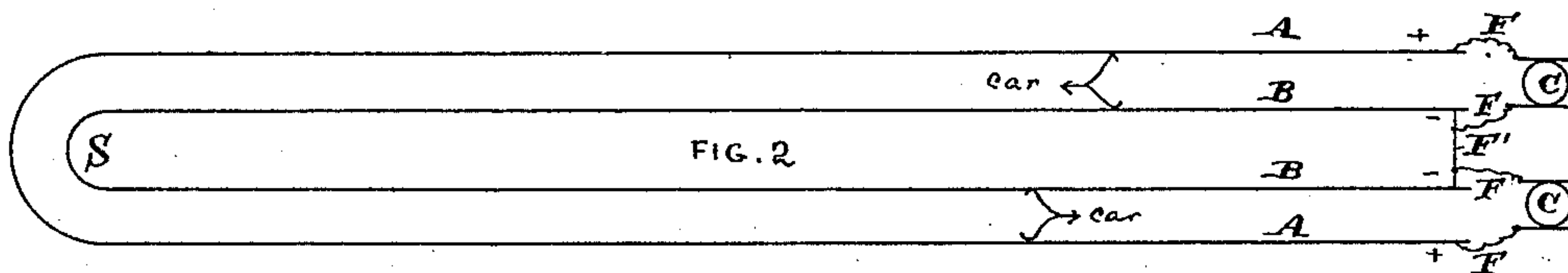
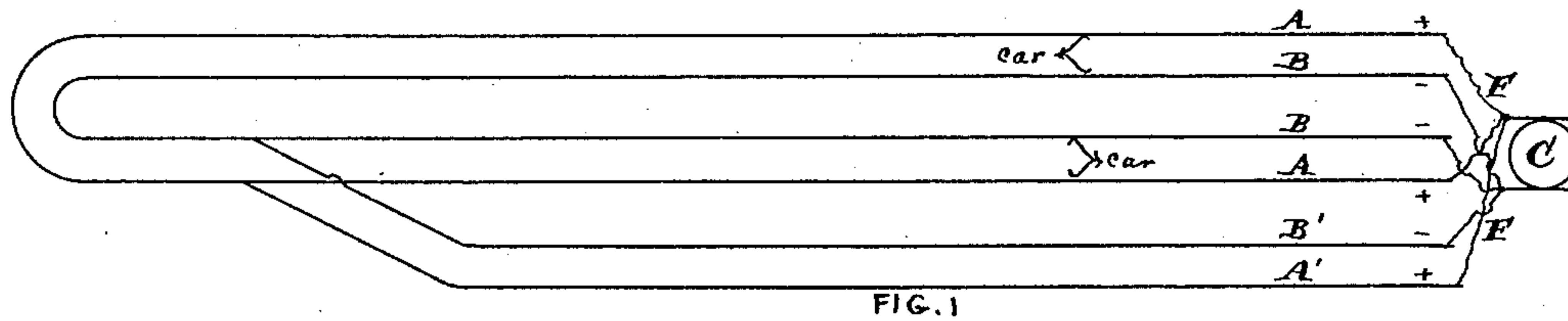


(No Model.)

R. M. HUNTER.
ELECTRIC RAILWAY.

No. 446,834.

Patented Feb. 17, 1891.



Attest
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UNITED STATES PATENT OFFICE.

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OF BOSTON, MASSACHUSETTS.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 446,834, dated February 17, 1891.

Original application filed June 4, 1889, Serial No. 313,095. Divided and this application filed November 24, 1890. Serial No. 372,524. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Electric Railways, of which the following is a specification.

My invention has reference to electric railways; and it consists of certain improvements, which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

This application (Case 184) is a division of my application, No. 313,095, of June 4, 1889.

My invention comprehends a system of electric distribution as applied to electric railways in which there are employed extensive line or working conductors, presenting objectionable resistances, possibility of leakages, &c. In electric railways where there are a large number of cars in circuit the resistance of the line-working conductor becomes an item of importance and presents serious obstacles to the proper distribution of the current with the employment of small conductors. To overcome this difficulty, I connect the generator or generators of electricity with different parts of the same circuit by suitable feeding-wires. By this means I am enabled to locate a central station at a convenient place and supply current by such feed-wires to different distant parts of the same line-working conductor, and thus overcome the detrimental effect due to connecting the generator or generators at one place only on the circuit.

I do not confine myself to any system or arrangement of circuits, as they may be greatly modified without departing from my invention.

In the drawings, Figure 1 is a diagram showing an extensive railway system embodying my invention. Fig. 2 is a similar view of a portion of same with two generators in place of one. Fig. 3 is the railway shown in Fig. 2 stretched out, showing the generators separated to a greater distance. Figs. 4, 5, 6, and 7 are cross-sections of different types of railways to which my invention is applicable,

and Fig. 8 is a side elevation of an electric car adapted to my improved railway.

A and B are the two lines of working-conductors, and may include or not, as desired, the rails.

In Fig. 4 we have the rails as the return-conductor and the positive or outgoing conductor suspended. In Fig. 5 we have both conductors in a slotted conduit. In Fig. 7 we have both rails acting as conductors. In Fig. 6 we have a third rail as the outgoing conductor and the traffic-rails as the return.

In Fig. 2 we have a long return-railway in which the conductors A B are looped, and in which separate generators C C supply current to each end of the railway, and the feeding-conductors for the negative current are united to more readily balance the circuit. The positive feed-wires E, leading from the positive poles of the generators, connect with the positive line-working conductor A at widely-separated points, (the entire length of the line.) The negative conductors B may be the rails and earth. In place of the railway being curved at one end, it may be substantially straight, as indicated in Fig. 3, in which the two branches of the railway are stretched out and the connection between the two negative poles of the two generators is extended, as at F'.

The construction shown in Fig. 3 is in no respect different electrically considered than that shown in Fig. 2. This Fig. 3 is designed to illustrate the nature of the construction of Fig. 2 under some condition of practice.

In Fig. 1 we have the looped railway of Fig. 2 combined with a branch track having conductors A' B', and in place of the two generators we have one generator connected by feeding-conductors F with the terminals of the railway-conductors. The positive pole of the generator is coupled with all of the positive terminals of the railway-conductors, and likewise the negative pole of the generator is coupled with the negative terminals of the railway-conductors. We have here feeding-conductors leading from a source of electric

supply and connecting with the line-working conductor at different places widely separated electrically considered. As in the other case, the conductors B B' may be the rails and earth. The positive conductors of the various portions of the same railways or of the different railways, whether they be elevated, placed in a conduit, or arranged upon the surface of the ground, are arranged so that the current-collector of the car may travel in contact with the conductors of positive polarity of the respective railways, and the same is true of the negative conductors.

In Fig. 8 is shown an electric car H, having an electric motor J to propel it. K is an upwardly-extending under-running current-collector for collecting the current from the conductor A and supplying it to the motor-circuit L on the car, the current being regulated by a resistance changer or regulator I. Any form of collector may be used to suit either of the systems shown in Figs. 4 to 7.

When a large number of cars are on circuit, the operation of the resistance-changers I on the various cars constantly varies the current flowing through the motors, and this varies the demand for current. When large numbers of cars congregate at one portion of the railway, it takes considerable current, and if it were not for the local feeders such congregation of cars might find too little current to be properly operative. There are varieties of contingencies which must be met in practical operation of an electric railway employing line-conductors, and those specified in this application are perhaps among the most important.

I do not confine myself to any particular arrangement of circuits, as they may be modified in various ways without departing from the principles of my invention, and likewise the car may have its current-collector varied to suit the particular system of railway employed.

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

1. In an electric railway, the combination of two sets of working-conductors for two railway-tracks in which the said conductors of similar polarity connect and are adapted to receive a current-collecting device of a car traveling on either railway, whereby the said current-collecting device may run from the conductors of one railway to the conductors of the other railway, an electric generator, electric connections connecting the positive pole of the generator with the positive conductors of the two railways at a distance from their connection and the negative pole with the negative conductors, and an electrically-propelled vehicle having a current-collecting device adapted to travel in connection with the conductors of either track.

2. In an electric railway, the combination of two railway-tracks connecting with each other, so that an electrically-propelled vehicle may run from one track to the other, and

each of which railways is supplied with a suspended conductor extending along the railway and connecting, so that a current-collecting device upon the traveling vehicle may pass from one suspended conductor to the other, an electric generator having its positive pole connected by separate conductors with the two line-conductors of the two connecting railways, and a traveling car adapted to run over one railway to the other, provided with an upwardly-extending contact device for making a traveling connection with the suspended conductor for supplying current to a motor on the car.

3. In an electric railway, the combination of two sections of track connected at a distant point by means of a curved section, whereby a car may travel along one track around the curve and back upon the other track, a line-conductor insulated from the track extending along the two sections of railway and curved portion thereof in a continuous manner, an electric generator, and an electrical connection between the positive pole of the generator and the conductor arranged along the railways at two distant points from the curved portion and from each other.

4. In an electric railway, the combination of two main pairs of working-conductors and two generators to supply electricity thereto, having their poles of one polarity coupled together and to the two main-line conductors of like polarity, and the remaining similar poles of the two generators connected, respectively, with the two other line-conductors.

5. In an electric railway, the combination of two main pairs of working-conductors having their distant ends of similar polarity connected together to form a loop, and two generators to supply electricity thereto, having their poles of one polarity coupled together and to the two main-line conductors of like polarity at their other end, and the remaining similar poles of the two generators connected, respectively, with the two other line-conductors.

6. In an electric railway, the combination of a line-conductor extending along said railway, electrically-propelled cars receiving current from said line-conductor, two or more independent generators of electricity, and independent connecting feeding-conductors between said generators and different distantly-located parts of the line-conductor.

7. In a railway, a continuous line-conductor extending along said railway, in combination with an electrically-propelled car receiving current from said line-conductor, two or more generators of electricity located at a central station, and independent feeding-conductors extending from similar poles of said generators to distant portions of the same continuous line-conductor.

8. In an electric railway using the rails as a return-circuit, the combination of the rails,

a suspended line-conductor extending along the railway, but insulated from the rails, traveling electrically-propelled cars making electrical connection with the rails and having an upwardly-extending current-collector making connection with the suspended line-conductor, two or more generators of electricity, and feeding-circuits connecting one of the poles of the generators with the rails and the other poles with distant portions of the line-conductor.

9. In an electric railway using the rails as a return-circuit, the combination of the rails, a suspended line-conductor extending parallel with the rails, but insulated therefrom, traveling electrically-propelled cars making electrical connection with the rails and line-conductor, two or more generators of electricity located at a central station, and feeding-circuits connecting one of the poles of the

generators with the rails and the other poles with distant portions of the line-conductors.

10. The combination of an electric working-conductor extending along a railway from which current is delivered to the car through a collecting device, a series of independently electrically-propelled vehicles directly receiving current therefrom, current-controlling devices on said vehicles to vary the current received from the line-conductor, two or more generators of electricity, and separate feeding-conductors extending from similar poles of the generators and connecting with distant portions of the electric working-conductors.

In testimony of which invention I have hereunto set my hand.

R. M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,
S. T. YERKES.