

(No Model.)

R. M. HUNTER.  
ELECTRIC RAILWAY.

No. 456,514.

Patented July 21, 1891.

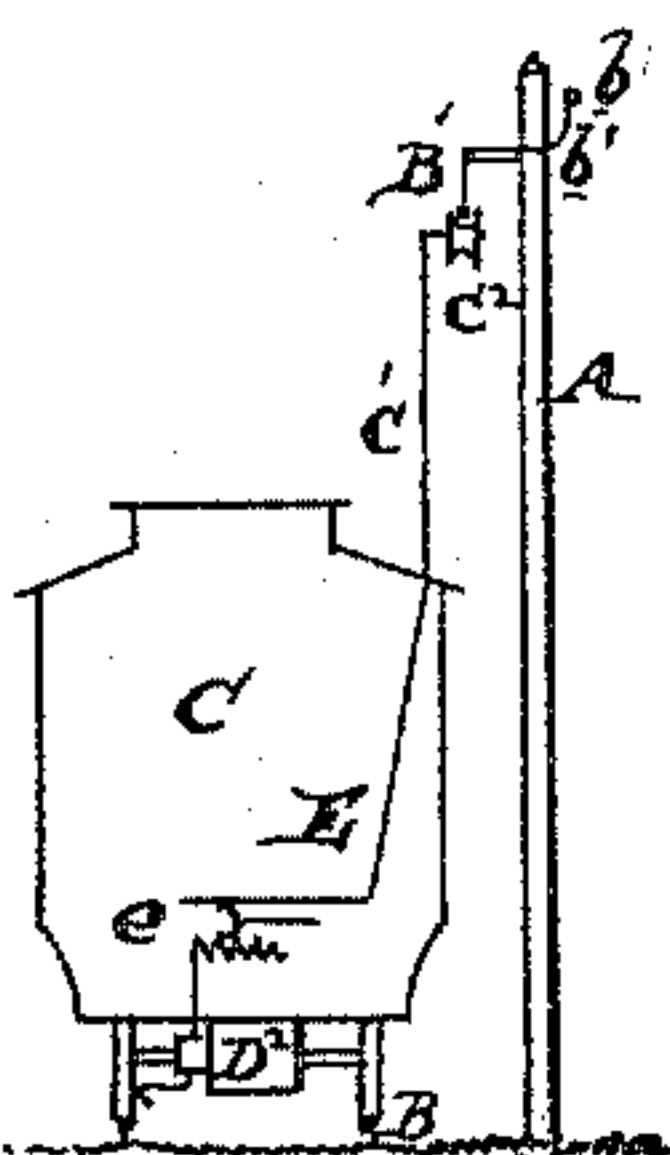
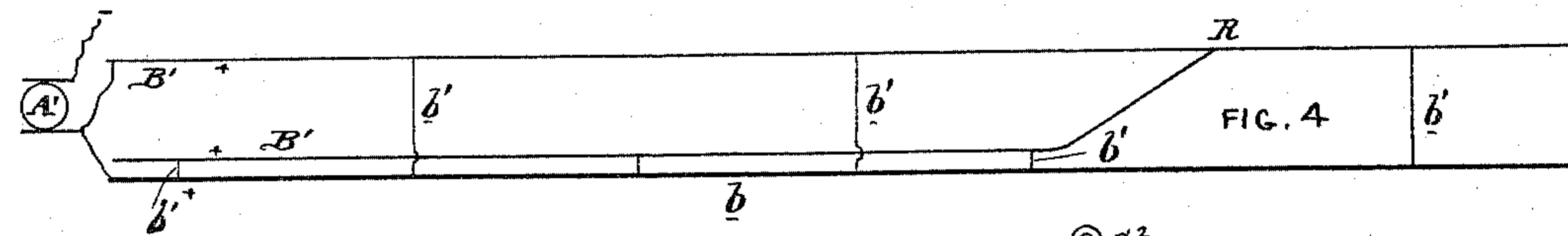
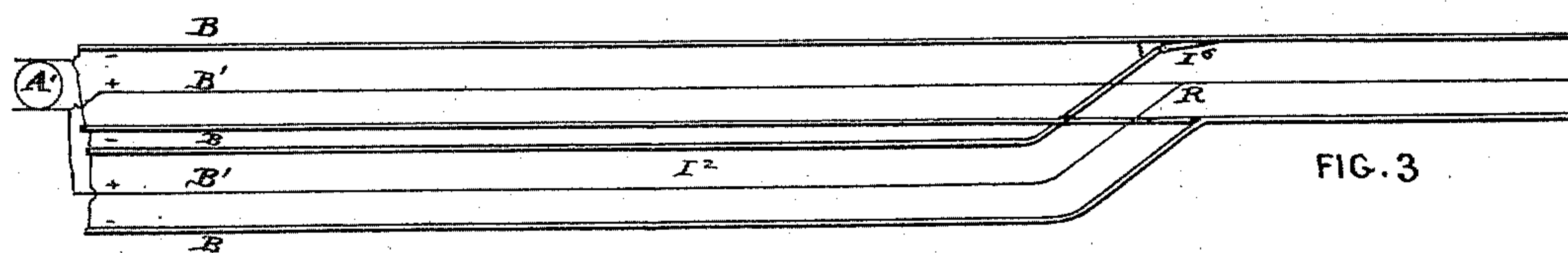
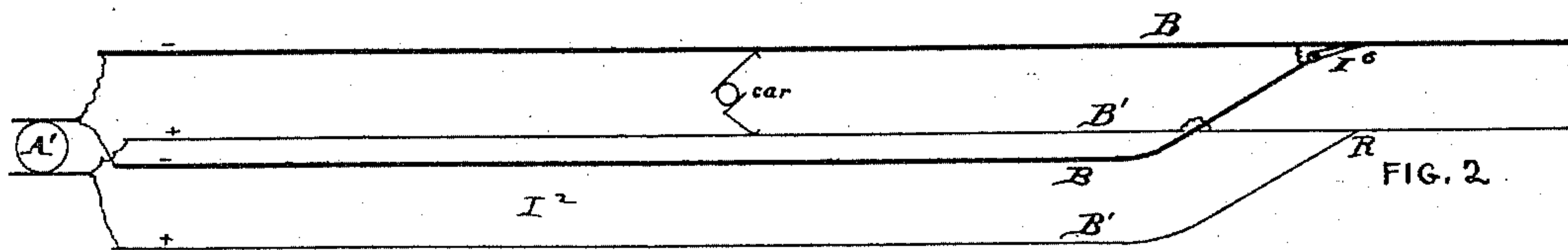
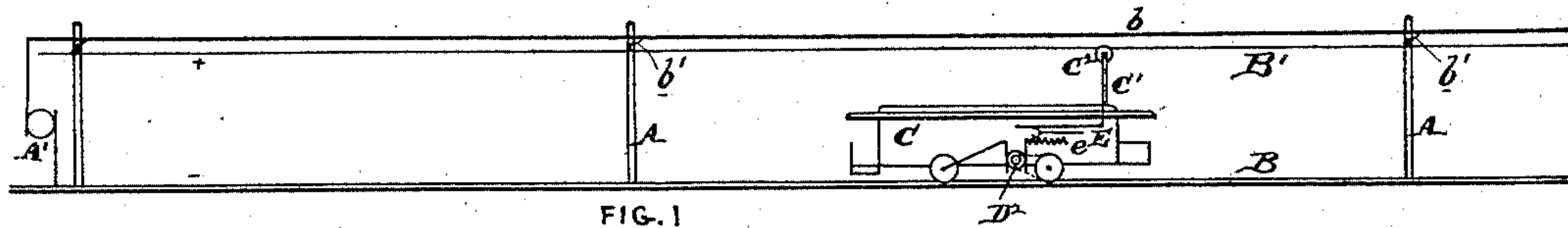


FIG. 5

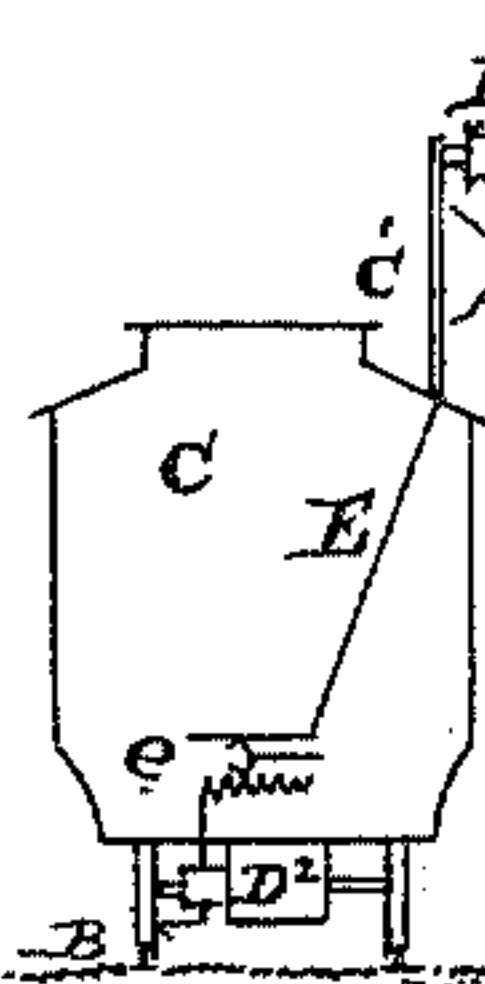


FIG. 6

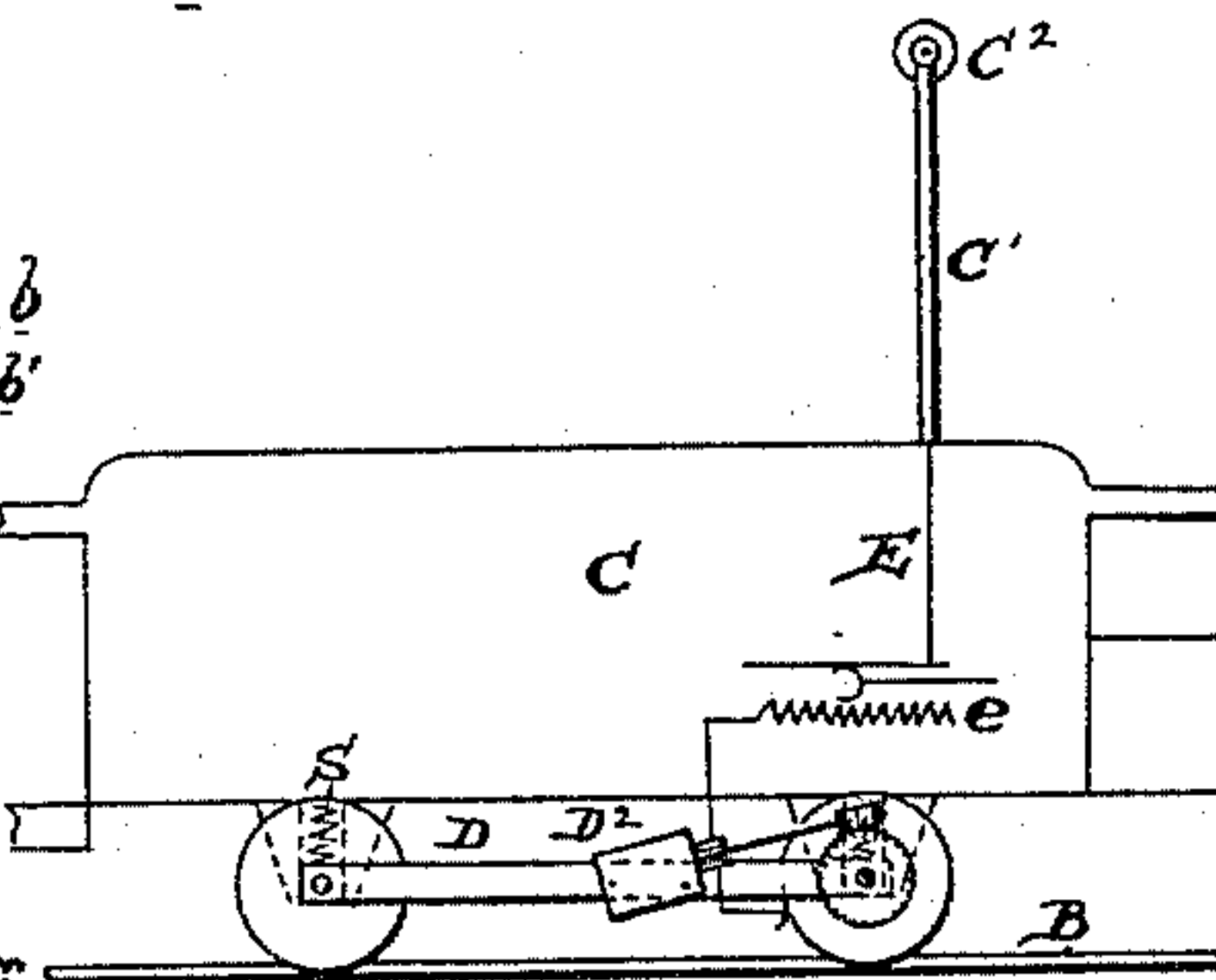


FIG. 9

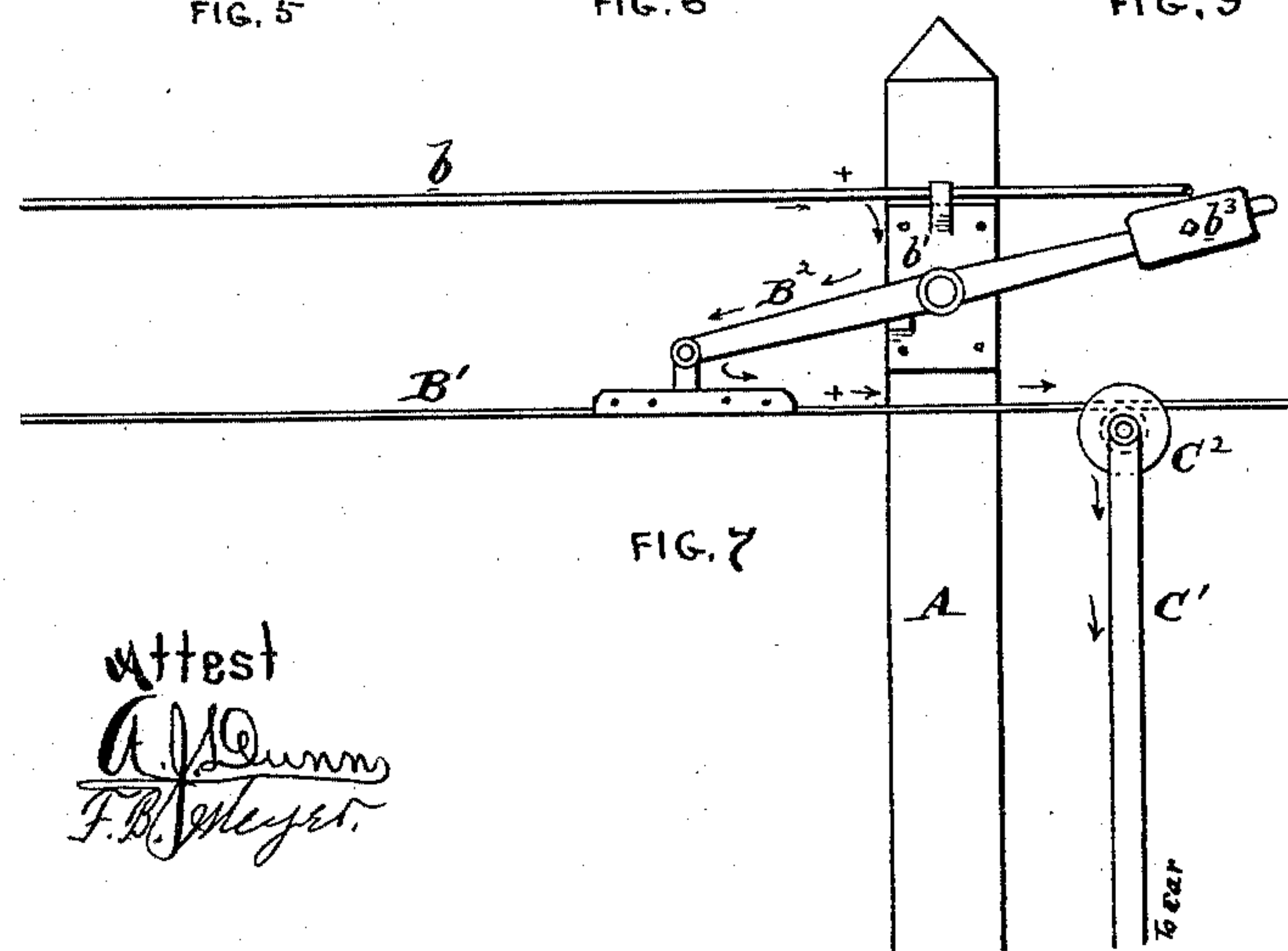


FIG. 7

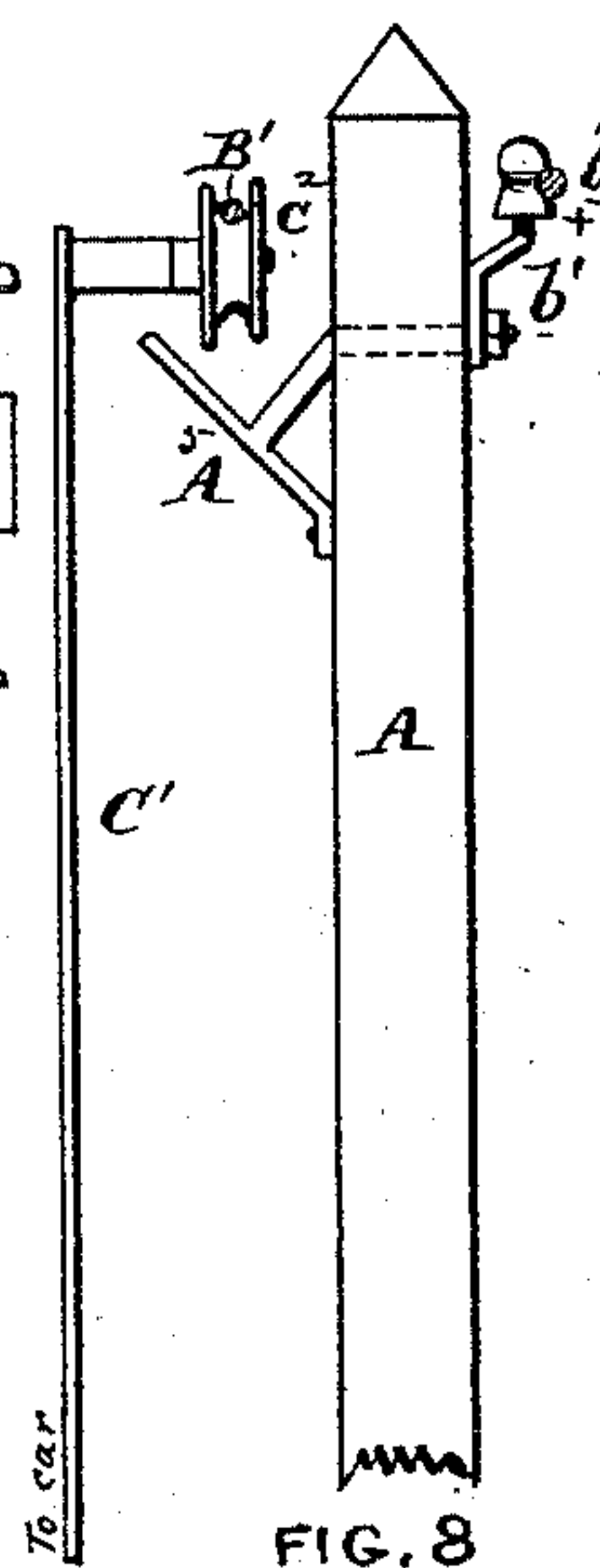


FIG. 8

Attest  
A. J. Quinn  
F. B. Meyer.

Inventor  
R. M. Hunter



# UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
THE ELECTRIC CAR COMPANY OF AMERICA, OF SAME PLACE.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 456,514, dated July 21, 1891.

Original application filed September 23, 1886, Serial No. 214,309. Divided and this application filed September 27, 1890. Serial No. 366,368. (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 176) is a division of my application, Serial No. 214,309, filed September 23, 1886.

My improvement forming the subject-matter of this application has particular reference to electric railways wherein is employed a suspended electric conductor extending along the railway, and a surface-conductor arranged along the bed of the railway and parallel with respect to the suspended conductor. A stationary source of electric power supplies current to the suspended working conductor either directly or through a supply-conductor connected at intervals with the suspended or working conductor. The electrically-propelled vehicle is provided with a motor, preferably supported on the axles independently of the car-body and mechanically connected to rotate one of the axles, and the said vehicle is provided with an upwardly-extending collector-arm provided with an underrunning contact-wheel making a traveling connection with the under side of the suspended working conductor. The main-line railway is combined with a branch railway, and each of said railways is provided with a suspended and a surface conductor preferably receiving electricity from the same source. The suspended conductors at the point of juncture are rigidly and preferably electrically connected in parallel. The conductors of the main line and branch on the surface are connected by a movable switch-point. The conductors on the surface may be the rails, while the suspended conductors are formed of wires, rods, or cables and suspended from posts or poles in any suitable manner, so as to be out of reach of persons walking on the railway.

In practice the conductors would be suspended at considerable distance above the roof of the car and a connection made with them by an upwardly-extending current-collecting arm carried above the roof of the car and supported upon the axles by the springs of the car-body independently of the motor.

Referring to the drawings, Figure 1 is a side elevation of an electric railway embodying my invention. Fig. 2 is a diagrammatic plan view showing the relative arrangement and connections of the two lines of conductors of the main line and branch track. Fig. 3 is a view similar to Fig. 2, but illustrating the surface conductors as the rails. Fig. 4 is a diagram corresponding to the suspended conductors of Fig. 2 and showing their connection with the supply-conductor. Figs. 5 and 6 are cross-sections of electric railways, showing two methods of supporting the suspended conductors. Fig. 7 is a front elevation of the upper part of the supporting post or pole and the means of sustaining the supply and working conductors, and shows the connection of the contact device with the working conductor. Fig. 8 is an enlarged view of the upper portion of Fig. 6, and Fig. 9 is a sectional side elevation of an electric car adapted to my improved railway.

A represents a series of posts arranged along the railway and located to one side thereof. Upon or from these posts are suspended the working conductors B B' of the main line and the branch railway I'. The suspended conductors B' of the main line and branch are connected in multiple by a rigid connection at their point of juncture without the use of a movable switch-point and receive current from one terminal of the generator A'. The other pole of the generator is connected with the return-conductors B, arranged upon the surface and corresponding to the main line and branch. These conductors B B are also coupled in multiple or parallel, but at their point of juncture are provided with a movable switch-point I'. The conductors B B are made in the form of the rails, as shown in Fig. 3. When the current is not supplied to the suspended conductors B' directly, it may be delivered through a



supply-conductor  $b$ , preferably suspended along the railway upon the poles or posts and connected at intervals with the suspended working conductors  $B'$  by means of branch conductors  $b$ , as shown in Figs. 1 and 4. The suspended working conductor  $B'$  may be connected to the posts or poles  $A$  by means of levers  $B^2$ , counterbalanced by weights  $b^3$ , the connection with the working conductor being from above, so as to expose an unobstructed under surface for contact with the current-collector carried upon the vehicle. This construction is shown in Fig. 7. The lever  $B^2$  is pivoted to a conducting-plate  $b'$ , upon which is sustained the supply-conductor  $b$ . The conducting-plate  $b'$  acts as the branch conductor.

Another method of supporting the suspended working conductor is shown in Fig. 8, in which the post or pole  $A$  is provided with a V-shaped bracket  $A^5$ , connected by a conductor-support  $b'$  with the supply-conductor  $b$ . The suspended working conductor normally rests in the brackets; but when the car passes along it is slightly lifted by the collector-wheel  $C^2$  moving against its under surface, which is unobstructed or exposed so far as the action of the current-collecting device is concerned.

$C$  is an electrically-propelled car, and has its body supported upon springs  $S$ .

$D$  is a motor-frame carried upon the axles independently of the car-body, and secured to this motor-frame is an electric motor  $D^2$ , which is mechanically connected to rotate the axle of the car. Extending upwardly from the roof of the car-body is a collector-arm  $C'$ , provided at its upper part with a grooved contact  $C^2$ , preferably formed in the shape of a wheel, and by the action of the springs  $S$  it is spring-supported on the axles.

$E$  is a motor-circuit connecting the collector with the motor through a regulator  $e$ , which latter is employed to control the speed and power of the motor. The current after leaving the motor is delivered to the wheels and by them to the return-conductor  $B$ .

In the methods of supporting the suspended conductors there is a natural compensation between the said conductor and collector, so that a constant underrunning contact is maintained irrespective of the variation in the alignment of the conductor with respect to the railway. By moving the switch-point  $I^6$  the car may run from the main track onto the branch track, maintaining an electrical connection at all times with the return-conductors, and as the suspended conductors are arranged above the railway-tracks the underrunning contact  $C^2$  may travel from one conductor to the other without the employment of the switch-points, as it is positively guided by the movement of the car in traveling over the return-conductors.

Fig. 2 of this application corresponds to part of the railway-conductors of one of the figures of my original application, which

shows, in addition to them, a return set of conductors looping from the right-hand end of the upper pair of conductors, or the conductors of Fig. 2 may be said to correspond to one-half of another figure of said original application, in which a main line and a turn-out are shown.

Fig. 3 of this application corresponds to the same figures of the original application as Fig. 2, but with the rails used as the return-conductor and a separate suspended conductor employed, as clearly set out in the said original application.

Fig. 4 of this application illustrates the suspended conductors of Fig. 3, combined with a supply-conductor, which supply-conductor is clearly shown in connection with a large number of the figures of the original application.

I do not limit myself to any particular means for supporting the suspended conductors, nor to the details of construction of the current-collecting device, as they may be modified in various ways without departing from the principles of my invention.

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

1. The combination, in an electric railway, of a main line and branch, each of which is provided with a positive and a negative conductor, and in which the positive conductors of the main line and branch are directly connected and electrically united without the employment of a switch, and in which the negative conductors are electrically connected and provided with a switch at their point of juncture.

2. In an electric railway, the combination of a positive and a negative conductor of the main line and branch, in which the corresponding conductors of one polarity of the main line and branch are fixedly connected together and in which the conductors of the other polarity of the main line and branch are provided with a movable switch connection.

3. In an electric railway having a main line and branch, a positive conductor for the main line and a positive conductor for the branch line, having their juncture fixedly connected, in combination with a negative conductor for the main line and a negative conductor for the branch line, and a movable switch at the point of juncture of negative conductor of the main line and branch line.

4. In an electric railway having a main line and branch, a positive conductor for the main line and a positive conductor for the branch line, having their juncture fixedly connected, in combination with a negative conductor for the main line and a negative conductor for the branch line, and a movable switch at the point of juncture of the main line and branch line hinged to the negative conductor leading from the branch line.

5. In an electric railway having a main line and branch, a positive suspended conductor for the main line and a positive suspended



conductor for the branch line, having their juncture fixedly connected, in combination with a negative surface conductor for the main line and a negative surface conductor for the branch line, and a movable switch at the point of juncture of the surface conductor of the main line and branch line.

6. In an electric railway having a main line and branch, a positive suspended conductor for the main line and a positive suspended conductor for the branch line, having their juncture fixedly connected, in combination with a negative surface conductor for the main line and a negative surface conductor for the branch line, a movable switch at the point of juncture of the main-line and branch-line negative conductors, an electrically-propelled vehicle having a current-collecting device making an underrunning contact with the suspended conductor, and a contact moving in connection with the negative surface conductor.

7. In an electric railway having a main line and branch, the combination of a suspended working conductor for the main line and a suspended working conductor for the branch, having their juncture made without the use of a movable switch, an electrically-propelled car, and a current-collecting device extending above the roof of the car and making an underrunning contact with either of the suspended conductors.

8. In an electric railway having a main line and branch, the combination of a suspended working conductor for the main line and a suspended working conductor for the branch, having their juncture made without the use of a movable switch, a supply conductor or conductors extending along the railway and connected with the working conductors at intervals, a source of electric energy connecting with the supply-conductor, an electrically-propelled car, and a current-collecting device extending above the roof of the car and making an underrunning contact with either of the suspended conductors.

9. In an electric railway having a main line and branch, the combination of a suspended working conductor for both the main line and branch and having their juncture positively made without the employment of a movable switch-point, a supply conductor or conductors extending along the railway and electrically connected with the working conductors at intervals in their length, a source of electrical energy connecting with the supply-conductors, a surface conductor for the main line and branch, and a movable switch-point at the juncture of the surface conductors.

10. In an electric railway having a main line and branch, the combination of a suspended working conductor for both the main line and branch and having their juncture positively made without the employment of a movable switch-point, a supply conductor or conductors extending along the railway and electrically connected with the working con-

ductors at intervals in their length, a source of electrical energy connecting with the supply-conductors, a surface conductor for the main line and branch, and a movable switch-point at the juncture of the surface conductors, and an electrically-propelled car having a contact for the suspended conductors above its body and a contact for the surface conductors below its body.

11. In an electric railway having a main line and branch, the combination of suspended positive conductors for the main line and branch, connected in parallel and having their juncture positively connected without the use of a movable switch-point, surface negative conductors for the main line and branch, constituting the rails and having their juncture connected by means of a movable switch-point for guiding the car while maintaining an electrical connection, and a source of electrical energy for supplying current to said conductors of the railway.

12. In an electric railway having a main line and branch, the combination of suspended positive conductors for the main line and branch, connected in parallel and having their juncture connected without the use of a movable switch-point, surface negative conductors for the main line and branch, constituting the rails and having their juncture connected by means of a movable switch-point for guiding the car-wheels while maintaining an electrical connection with the car, a source of electrical energy for supplying current to said conductors of the railway, an electrically-propelled car having an upwardly-extending and underrunning contact for making connection with the positive conductors, an electric motor to propel the car, and a motor-circuit between the collector and the wheels and including the electric motor.

13. In an electric railway having a main line and branch, the combination of suspended positive conductors for the main line and branch, connected in parallel and having their juncture connected without the use of a movable switch-point, surface negative conductors for the main line and branch, constituting the rails and having their juncture connected by means of a movable switch-point for guiding the car while maintaining an electrical connection, a source of electrical energy for supplying current to said conductors of the railway, an electrically-propelled car having an upwardly-extending and underrunning contact for making connection with the positive conductors, an electric motor to propel the car, a motor-circuit between the collector and the wheels and including the electric motor, and a current-regulator in the motor-circuit carried by the car.

14. In an electric railway having a main line and branch, the combination of suspended positive conductors for the main line and branch, connected in parallel and having their juncture connected without the use of a movable switch-point, surface negative conduct-



ors for the main line and branch, constituting the rails and having their juncture connected by means of a movable switch-point for guiding the car-wheel while maintaining an electrical connection, a source of electrical energy for supplying current to said conductors of the railway, an electrically-propelled car running upon the negative conductors and provided with an electric motor to propel it, and an upwardly-extending current-collecting device making an underrunning contact with the suspended positive conductors and sustained on the axles by means of a spring-support.

15 15. In an electric railway, the combination of a main line and branch, each of which has

a positive conductor suspended at a distance above the rails and in which the said conductors are rigidly connected at the point of juncture of the tracks, a source of electrical energy for supplying the current of similar polarity to each of the suspended conductors, and poles arranged along the railway, from which the suspended conductors are supported.

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

R. M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,  
A. J. DUNN.