(No Model.)

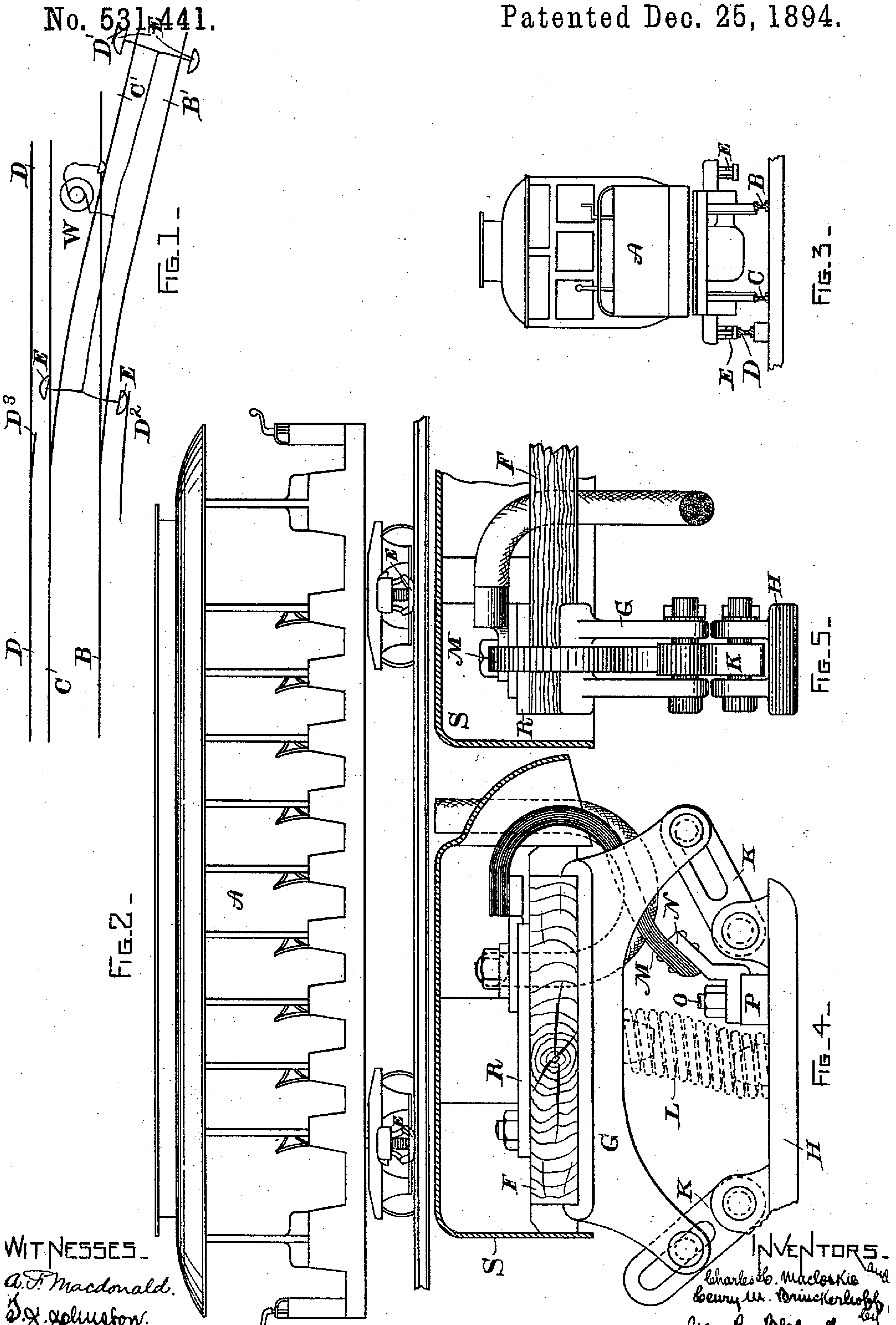
3 Sheets—Sheet 1.

C. H. MACLOSKIE & H. M. BRINCKERHOFF.

ELECTRIC RAILWAY.

No. 531,441.

Patented Dec. 25, 1894.



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(No Model.) 3 Sheets—Sheet 2.

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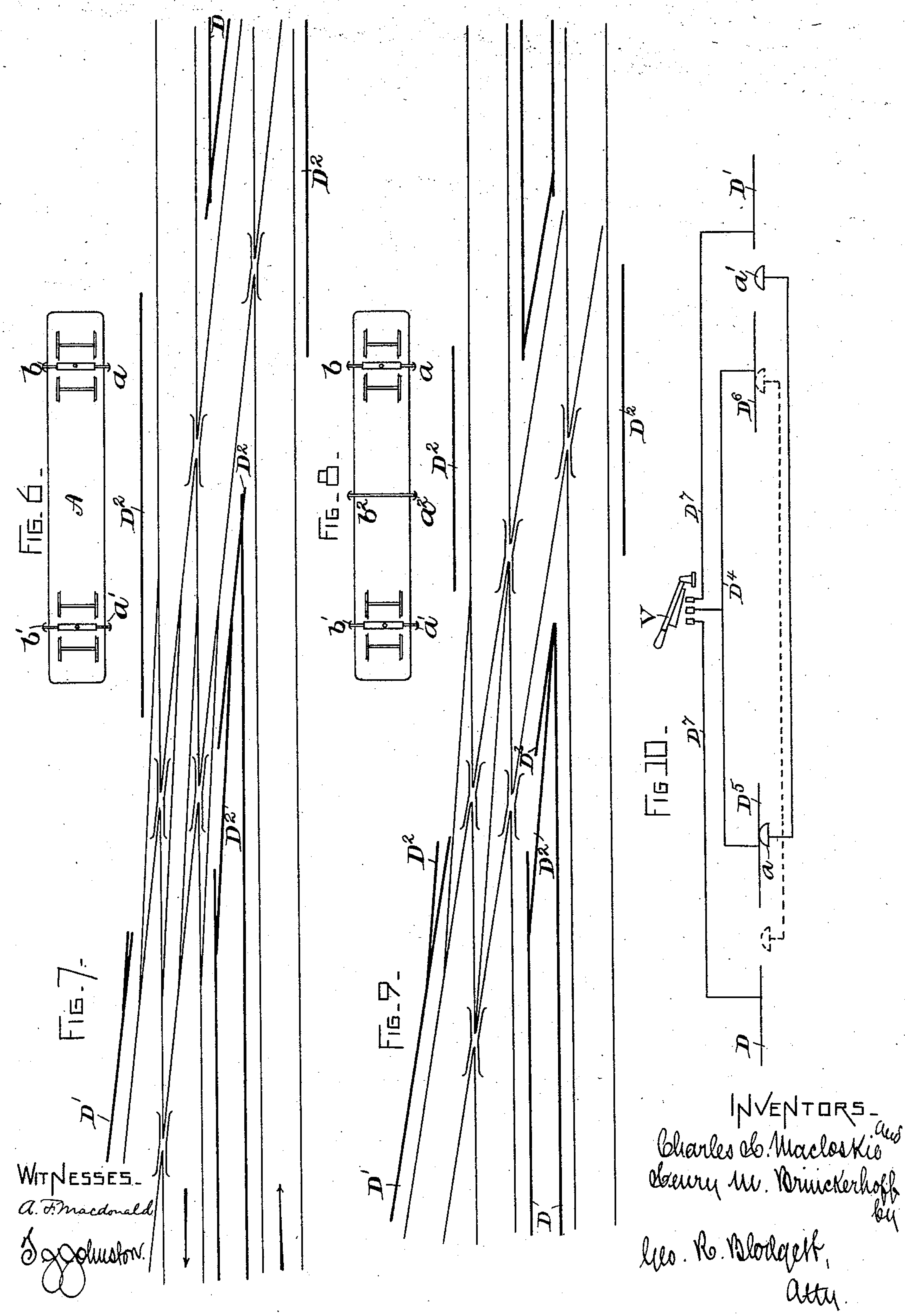

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FIG. 11

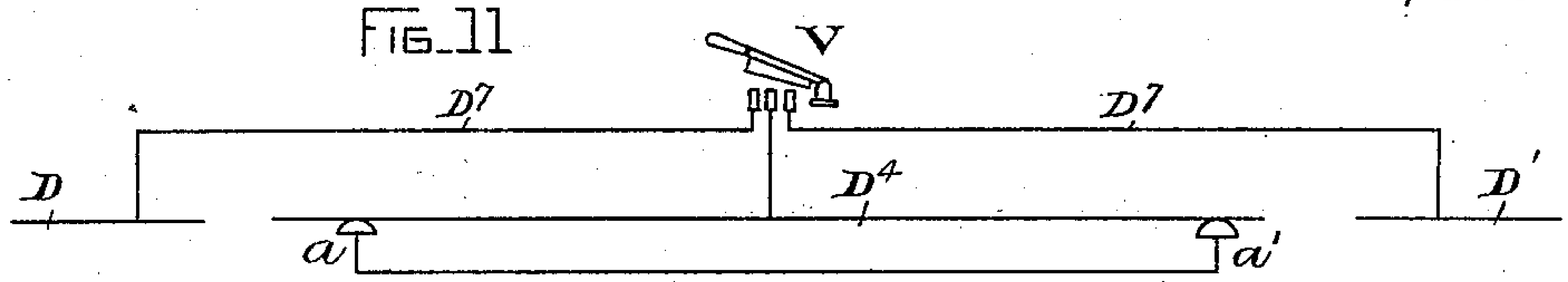


FIG. 12.

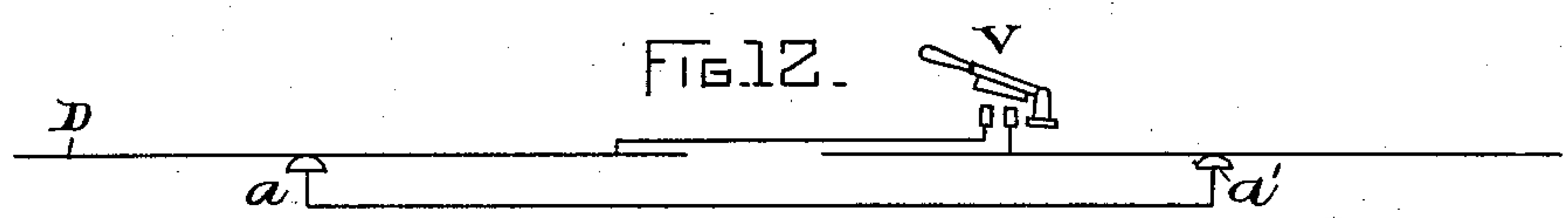
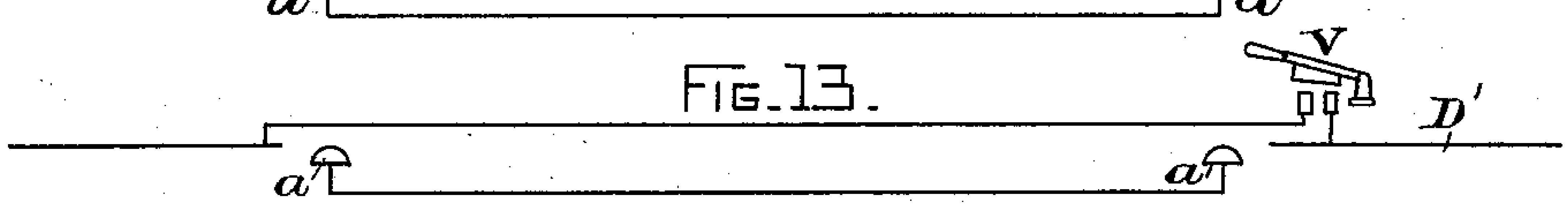


FIG. 13.



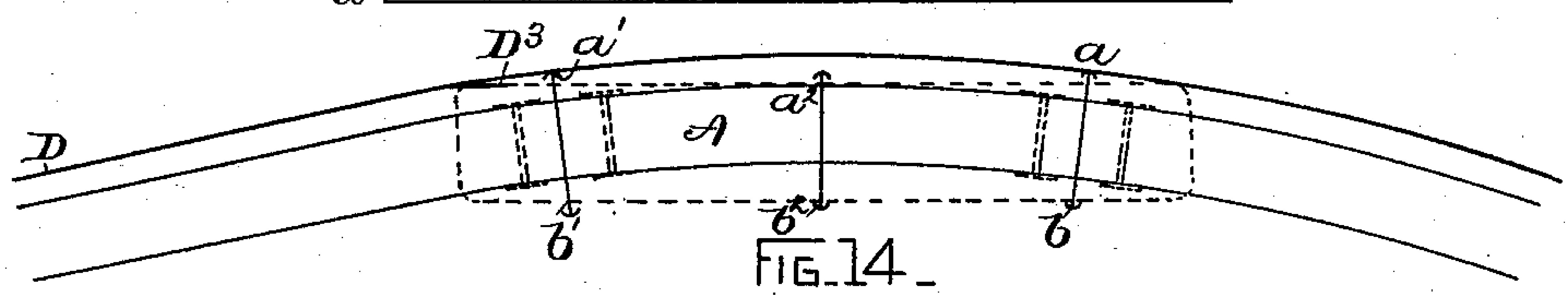


FIG. 14.

FIG. 15.

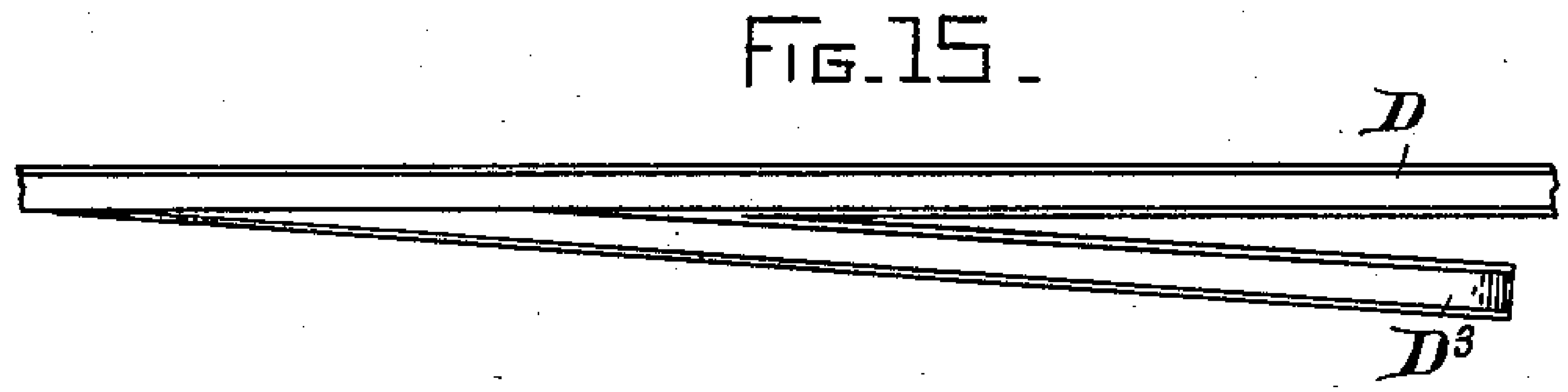
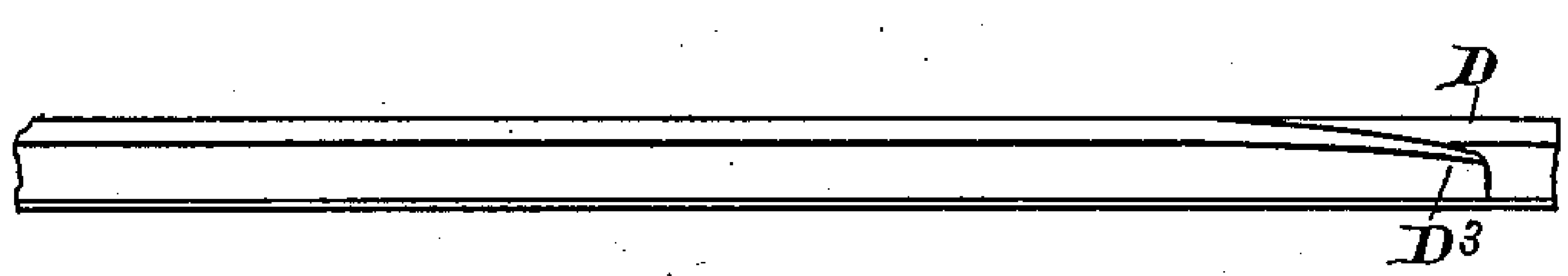


FIG. 16.



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UNITED STATES PATENT OFFICE.

CHARLES H. MACLOSKIE, OF SCHENECTADY, AND HENRY M. BRINCKERHOFF, OF MATTEAWAN, ASSIGNORS TO THE GENERAL ELECTRIC COMPANY, OF SCHENECTADY, NEW YORK.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 531,441, dated December 25, 1894.

Application filed May 17, 1894. Serial No. 511,527. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. MACLOSKIE, residing at Schenectady, county of Schenectady, and HENRY M. BRINCKERHOFF, residing at Matteawan, county of Dutchess, and State of New York, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

In the accompanying drawings, Figure 1 is a diagram showing the principle of our invention. Fig. 2 is a side elevation of a railway car, with contact devices in position. Fig. 3 is an end elevation of the same. Figs. 4 and 5 are details of the contact devices. Figs. 6 and 8 are plan views of the trucks and contact devices, the car body being removed. Figs. 7 and 9 to 14 are diagrams illustrating railway tracks embodying our invention. Figs. 15 and 16 show the rail inclines in detail.

Our invention relates to an electric railway in which the current is supplied to electrically propelled vehicles on a railway by a line conductor parallel with the track. It has heretofore been customary to place the conducting rail either above the track, as in the ordinary overhead system; or beneath the track, as in the conduit system; or lastly, on substantially the same level as the track rails, which is the system generally designated as "the third rail system."

Our invention relates to the last named system, and to that form of such system in which the third rail is placed outside of the track rails so that in a double track road the two conducting rails would be between the two tracks.

Our invention consists in certain details of the contact device by means of which vehicles upon the railway are maintained in constant electrical connection with the conducting rail, and it also consists in a special arrangement of the conducting rails by means of which the connection may be readily maintained at switches and crossings.

It moreover consists in a special device for cutting out a section of the conductor from the circuit.

Referring to the drawings, Figs. 2 and 3, A represents a railway car adapted to travel on track rails B and C. D is a conducting rail of any desired form placed outside of the track rails and slightly elevated above them.

The car A is provided with four contact devices E, each of the two swiveling trucks of the car having a contact device on each side. The details of these contact devices are illustrated in Figs. 4 and 5. In these figures F represents an insulated support, such as a plank, extending out from any available part of the truck. On the under side of this plank, at the outer end, is placed a casting G having two depending arms from which the contact-shoe H is supported by means of pivoted and slotted links K. The contact-shoe H is adapted to slide along the upper surface of the conducting rail D, and by means of the links K it is dragged along loosely in either direction, readily conforming itself to any inequalities in the rail or in the elevation of the supporting plank F. The contact-shoe has thus a limited vertical play ranging to a point below the surface of the conducting rail, but not reaching the surface of the track rail. It also automatically adjusts itself to trail in the direction of movement of the car. If necessary a spring L may be used to force the contact-shoe down against the rail, but this has not proved essential in most cases, and we have therefore indicated it by dotted lines. Contact-shoe H is maintained in electrical connection with the vehicle and motor thereon by means of a flexible conductor M, made up of a number of flat leaves of copper, which at one end is bolted to the shoe H by means of a casting N riveted to M and provided with a bolt hole through which passes the bolt O seated in a projection P from shoe H, and carrying a retaining nut. The opposite end of conductor M is in a similar manner attached to the conducting plate R on the upper surface of plank F, and thence the current is led by any suitable conductor to the propelling motor of the car. The whole contact device is preferably sheltered by a hood S.

In Fig. 1 we have indicated diagrammatically the feature of our invention by which the contact is maintained at crossings and switches. In this figure C and B are main track rails and D is the conducting rail. A branch from each of these three rails is shown, the corresponding branch rails being marked C′ B′ D′, and a car with its four contact devices is indicated in the act of passing from main to branch track or vice versa. It will be apparent that as the conducting rail D is elevated above the track rail it is impossible to continue it to the branch track so as to make an uninterrupted continuity of contact surface between D and D′. It is equally impracticable to put a section of conducting rail between the track rails C and B and parallel to the branch rail C′, as it would interfere with the motor and other parts beneath the car, and even apart from such interference there would necessarily be wide breaks in the conducting rail through which the car wheels would pass when traveling along the main line. We have therefore broken the rail D′ at a point some distance before it reaches the track rail B, and at the point where the contact device in passing from D′ to D would come into position on conducting rail D we have placed an inclined angular piece D^3 which will receive the contact device and lead it into position upon the upper surface of the rail; but as the break between D^3 and D′ is so great that the connection would be interrupted, being longer than the distance between the two contact-shoes on the same side of the car, we have placed an additional or supplementary short section of conducting rail D^2 on the outside of the track opposite the incline D^3. Of course it will be understood that D D′ D^2 are all in electrical connection with one another and that the car is provided with four contact devices all connected together and with one terminal of the propelling motor W. By this means a car can readily pass along the main line, or it can pass either from the main line to the branch or from the branch to the main line without any interruption of the electrical connection between the propelling motor and the source of current, as one at least of the four contact devices will always bear on the conducting rail.

In Figs. 15 and 16 we have shown the angular incline piece D^3 bolted to the rail D. In this connection it will be remembered that the contact-shoe H can only fall away from the supporting casting G a distance determined by the slots in the links K. This distance is such that the shoe H upon leaving the end of the section of conductor D will drop slightly below the level of the rail and will then be lifted by engagement with the incline D^3, and thereby raised and guided upon the upper surface of rail D.

In Fig. 6 we have shown in diagram the four contact devices *a*, *b*, *a′*, *b′*, one upon each side of the respective trucks, and in Fig. 7 we have shown an application of the principle disclosed in Fig. 1, to a more complicated switch, in which there are two tracks crossed by a third track and provision for passing from the third track to either of the first two, to or from one of the first two to the other. In this figure the track rails are represented by light lines and the conducting rails by heavy lines. The two conducting rails corresponding to the two main tracks are marked D and that of the third or crossing track is marked D′, and it will be observed that it becomes necessary to add four short supplementary rail sections D^2 upon which the outside contacts will bear at times when the regular contact-shoes are out of contact with the conducting rail. Thus if a car be passing along the main line in the direction of the lower arrow, then the connection will normally be maintained by the two contacts *b*, *b′*, but upon reaching the switch these will pass off the end of rail D, and just before the car reaches the frog, one of the opposite contact devices, for instance *a*, will come into contact with the lower sectional rail D^2 and maintain the connection until the car has passed the switch; and in like manner it will be found that the car may pass in any direction over the switch, and at all times one of its four contact devices will be in connection either with one of the main conducting rails D or the supplementary section rail D^2. An additional contact device may be used if desired. In Fig. 8 we have shown this contact device a^2, b^2, on the car instead of on the truck, and in Fig. 9 a switch placed at such an angle as to necessitate the employment of each of the six contact devices at one time or another as the car passes in different directions over the switch.

Assuming that the car represented diagrammatically in Fig. 8 is crossing upon the track D′ from left to right, it will be seen that all of the contacts marked with the reference letters *b* or *b′*, b^2, are running upon the conducting rail D′. The contact *b* first leaves the conducting rail, but before the contact b^2 leaves it, the contact *a* has touched the conducting rail on the right connecting with the middle section D^2. Similarly, before the contact *b′* has left the rail D′ the contact a^2 has made connection with the same conducting section. At this time the contacts *a*, *b* are not touching any portion of the conducting rail. When the contact *b′* has left the rail D′ the contact a^2 is still supplying current and *a′* touches the same section of conducting rail before the contact a^2 leaves it; and *a′* maintains its connection with the source of current until the contact *b* upon the other side of the car has made connection with the conducting rail joining the two conducting rails at the right of the figure.

In the event of six contact devices being employed on a car having two swiveling trucks the immediate pair of devices must be suspended from the body of the car, as mentioned above, in which event, as illustrated in Fig. 14, the intermediate contact device will not follow the conducting rail at curves, and it therefore becomes necessary to place an incline D^3 at the beginning of the straight portion of the track in order that the intermediate contact device which has left the rail, may be again lifted into position on the upper surface. It is also to be remembered that although the contact shoe H is permitted to drop a short distance below the upper surface of the third rail D, it does not drop far enough to come into contact with the track rails C and B, but is always suspended in mid air while passing over the latter rails.

We have also found it highly desirable that in car-sheds, and in other places, a suitable cut-out be used for disconnecting a section of conductor rail from the main line. To effect this it is not sufficient to make a simple break in the conducting rail with a circuit around the break containing a switch which shall make or break at will the connection between succeeding sections of conductor, for the reason that a car equipped like the one shown with contact devices on both trucks would in passing over the break, bridge it momentarily and put the cut-out section in the circuit. On the other hand it is not feasible to make a break so long as to be longer than the distance between two succeeding contact devices on the car, because this would make a dead point where a car could become stalled without any current. Figs. 12 and 13 illustrate this point. In these figures D represents the main conductor and D′ a part of the conductor which it is desired to disconnect from the circuit. In Fig. 12 we have shown a short break between D and D′ sufficient to insulate the latter from the former whenever the switch V is open; but assuming that the switch V is open and section D′ cut out, the break would be bridged by two contact devices a and a' attached to any car that might be passing by momentum along the track. For instance, in a train-shed it is desirable that cars be run upon cut-out sections D′ for inspection and repairs. Cars can thus be run in by momentum but would usually require their own motive power to go out again, and for this reason the switch V is essential so that workmen can operate with safety on the cut-out section; while whenever it is desired, the switch V can be closed and the car will receive current by which it can be propelled out of the shed. It will be impossible however without further precautions to run in any additional cars, because as each one passes over the break it will momentarily put section D′ in circuit although switch V is open, thereby causing danger of accident to workmen and of short circuits through tools left on the track. Fig. 13 shows in an obvious way that it would be equally impracticable to make the break longer than the distance between contact devices a and a' as this would make a long dead point between D and D′ at which cars would become stalled. We have overcome the difficulty thus pointed out by the arrangement shown in Fig. 11, in which the two sections D and D′ have an intermediate section D^4 which is separated by a break from each of the adjacent sections, and is in line with D and D′; the latter being provided with leads D^7 which are connected together and with the section D^4 by the switch V. By means of this construction it will be seen that the section D′ and its lead D^7 are cut out from the main conductor D. The switch V is adapted to connect all three sections together or to leave them all insulated. If the switch is closed the car can readily pass from D to D′, as either one of the contact devices a and a' can receive current from section D^4 while the opposite one is passing over the break. If switch V is open it will be impossible to establish momentary connection between D and D′ as the contact devices a and a' are not far enough apart to bridge the distance between the said sections. A modification of this is shown in Fig. 10, which differs from the arrangement of Fig. 11, in that the intermediate section D^4 is provided with two shorter sections D^5 and D^6. This gives a longer insulation distance in the rail.

It is obvious that other forms of contact devices can be employed and that our invention may assume different forms while the underlying principle thereof is still present.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electric railway, the combination with a main track, of a main conducting rail outside of the track, a branch track and a branch conductor outside of the branch track, the main and branch conductors being separated by a mechanical break, and a supplementary sectional conductor located near the switch on the side of the track opposite to that upon which the main conductor is located, the arrangement and location of the parts being such that a contact device makes contact with the conductors to preserve the continuity of the circuit.

2. The combination with a railway track and a vehicle thereon, of a conducting rail placed outside of the track, a branch track having a similar conducting rail but separated from the main conducting rail by a mechanical break, and a supplementary sectional conductor for bridging the break placed on the opposite side of the track, and contact devices on the vehicle for making connection with the main and branch conductors and with said supplementary conductor.

3. In an electric railway, the combination with a main track, and a vehicle traveling thereon, of a conducting rail having a short break therein, contact devices on each end of the vehicle adapted to bear on the conducting rail and bridge the short breaks therein, a supplementary section of rail for bridging breaks longer than the distance between the said contact devices and a supplementary contact device adapted to bear on the supplementary section of rail.

4. The combination with a railway track and a vehicle thereon, of a conducting rail, a branch track having a similar conducting

rail separated by a mechanical break from the conducting rail of the main track, contact devices at each end of the vehicle for bearing on the conducting rails, a supplementary contact device on the opposite side of the vehicle, and a supplementary section of conductor upon which the contact device bears bridging the break between main and branch conducting rails.

5. In an electric railway, the combination with a railway track and a vehicle provided with swiveling trucks traveling thereon, of a conducting rail outside of the track rails and slightly elevated above them, contact devices placed upon each truck and upon opposite sides of the truck, and a supplementary contact rail located on the opposite side of the track from the conducting rail bridging a break in the conducting rail.

6. In an electric railway provided with a conducting rail adjacent to the track rails, a curved portion, a portion tangent to the curve, and a short branching inclined piece attached to the conducting rail at the junction of the curve and the tangent, adapted to guide the contact shoe upon the conducting rail, as herein set out.

7. In a contact device, a supporting piece, a contact shoe, intermediate link connections, pivoted at their lower ends to the shoe and having a pivoted and sliding connection with the support whereby the shoe has vertical play and can automatically reverse its position to trail in either direction, and a spring forming a supplementary and flexible electrical connection between the contact shoe and its support.

8. The combination with a swiveling truck having a lateral extension, of a contact shoe suspended therefrom by a linked connection and a conducting rail outside of the track rails and slightly elevated above them.

9. In an electric railway, a continuous conducting rail provided at its side with a short branching inclined piece at an angle thereto, in combination with a main track parallel with the conducting rail, a branch track, and a branch conductor parallel therewith, the branch conductor being separated from the main conductor by a mechanical break.

10. In an electric railway, the combination with a swiveling truck having an insulating extension, of a contact shoe thereon vertically suspended by means of linked connections permitting the contact shoe to automatically adjust itself in the reverse movement of the car to trail in either direction.

11. An electric railway car having swiveling trucks, contact devices arranged to trail in either direction of the motion of the car and independent of the wheels, located on opposite sides of the truck.

12. In an electric railway, a car having swiveling trucks and contact devices placed on opposite sides of the trucks, in combination with a main track, a branch track, a branch conductor separated by a mechanical brake from the main conductor and a supplementary sectional conductor on the opposite side of the main track from the main conductor and adjacent to the switch.

13. In an electric railway, the combination with a main conducting rail, of an insulated section of conducting rail disconnected from the circuit and in line with the main conducting rail, an intermediate section of conducting rail insulated from the main and sectional conducting rails, branch conductors leading from the main and sectional conductors and a switch connecting the branch main and sectional conductors together.

14. In an electric railway, the combination with a main conducting rail, of a cut out section of conducting rail, an intermediate section of conducting rail in line with and insulated from the main conducting rail and the cut out section and a switch connecting the cut out section with the main conducting rail and intermediate section of conducting rail.

15. In an electric railway, the main conducting rail D in combination with cut out section of conducting rail D′, the intermediate section of conducting rail D^4, insulated from the conducting rail D and from the sectional conductor D′, and having the sectional conductors D^5, D^6 in line with D and D′ and the switch V connecting the leads D^7 of D and D′ and the intermediate section D^4.

In witness whereof we have hereunto set our hands this 9th day of May, 1894.

CHARLES H. MACLOSKIE.
HENRY M. BRINCKERHOFF.

Witnesses as to the signature of Charles H. Macloskie:

B. B. HULL,
A. F. MACDONALD.

Witnesses as to the signature of Henry M. Brinckerhoff:

DAVID GRAHAM,
THEODORE BRINCKERHOFF.