

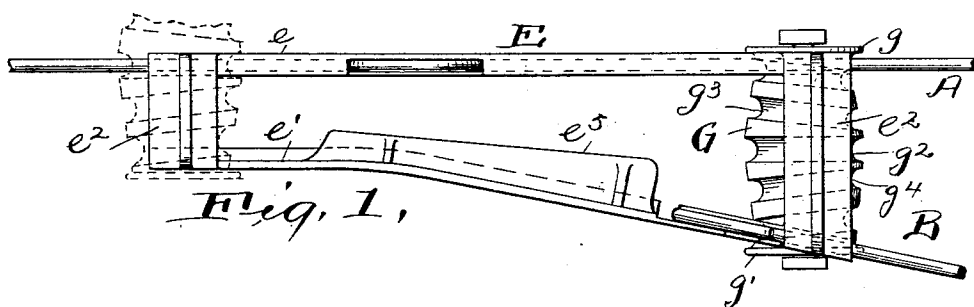
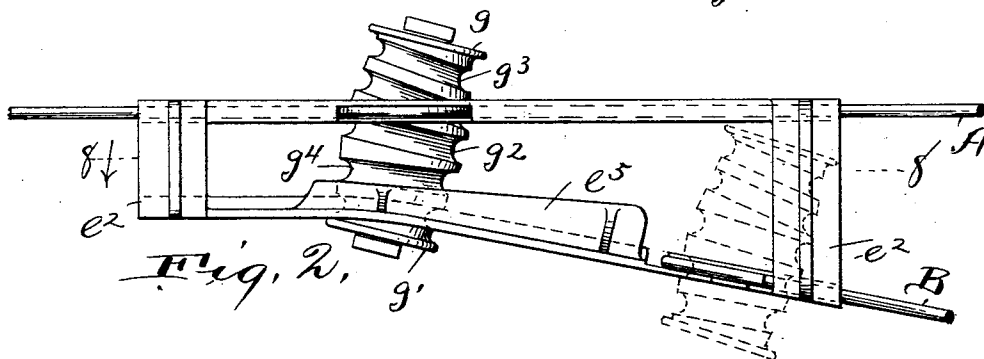
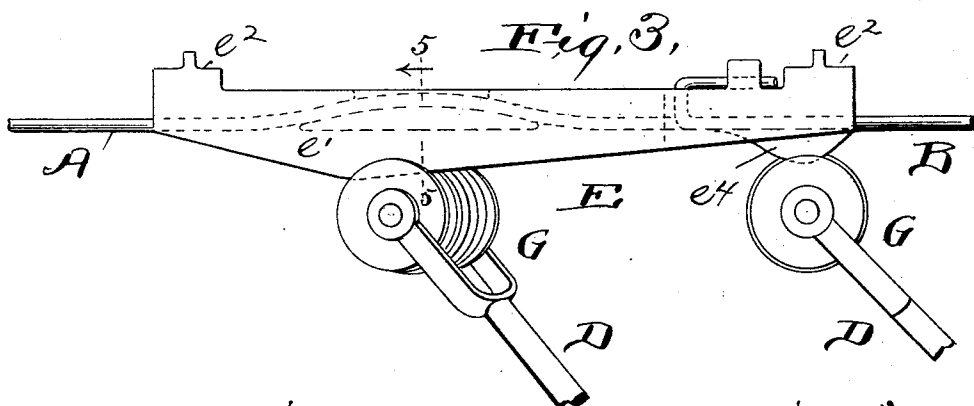
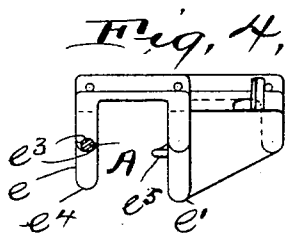
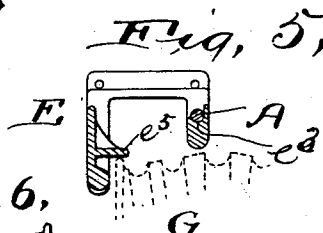
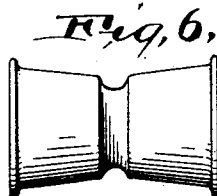
(No Model.)

2 Sheets—Sheet 1.

R. L. CALDWELL.
ELECTRIC RAILWAY.

No. 587,792.

Patented Aug. 10, 1897.



Witnesses:
E. B. Gilchrist
H. M. Hutchinson

Inventor:
Robert L. Caldwell
By Thurston & Bates
his attys.

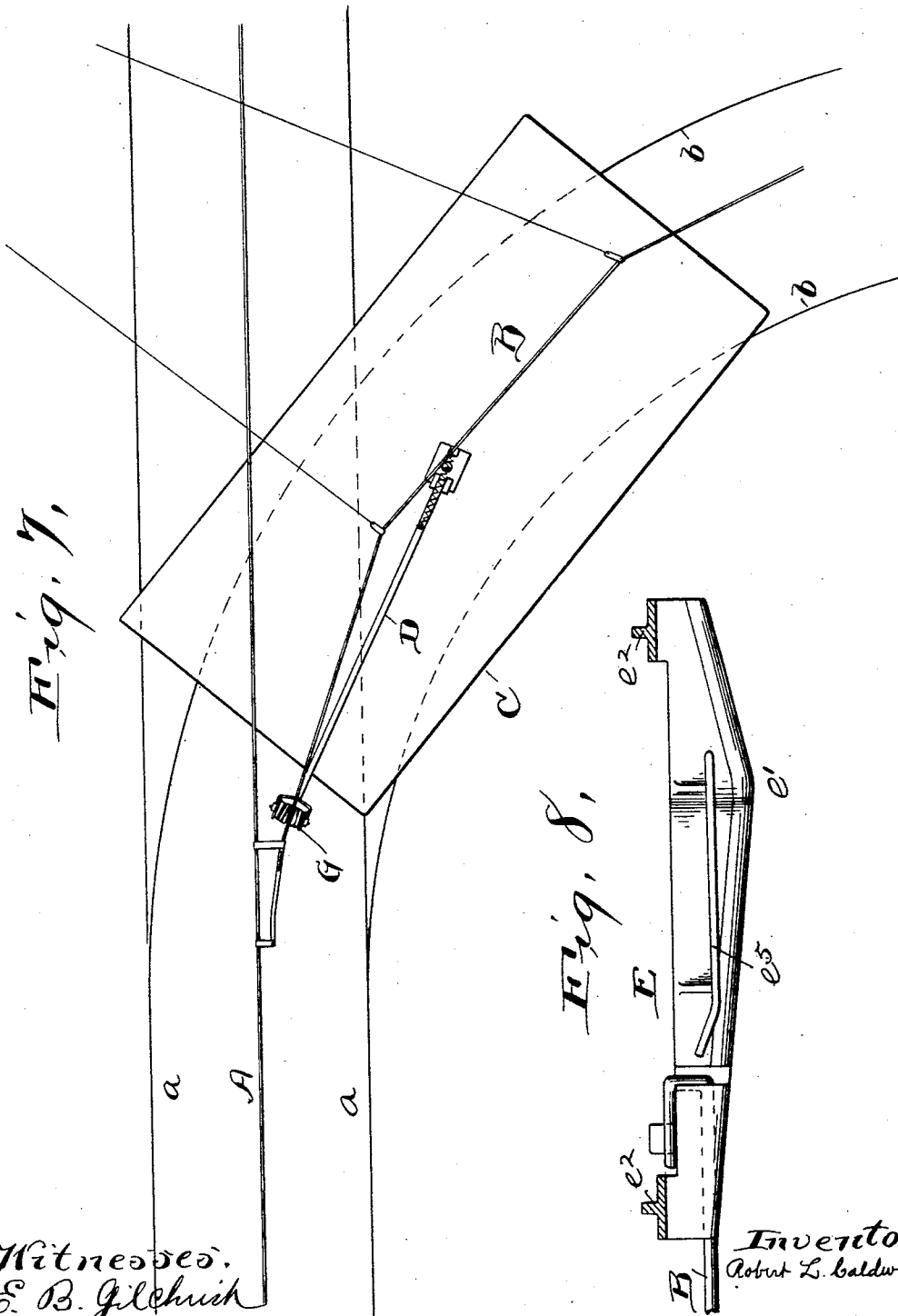
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

ROBERT L. CALDWELL, OF CLEVELAND, OHIO, ASSIGNOR TO THE WALKER COMPANY, OF SAME PLACE.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 587,792, dated August 10, 1897.

Application filed January 21, 1897. Serial No. 620,159. (No model.)

To all whom it may concern:

Be it known that I, ROBERT L. CALDWELL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electric Railways; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates particularly to the construction of overhead conductors at the points therein where a branch wire joins a main wire and to the trolley capable of being used therewith.

The object of the invention is to insure the passage of the trolley-roller onto the corresponding conductor when the car passes from the main track onto the branch track, or vice versa, or continues on the main track. This result is effected by so constructing the conductors that the trolley-roller is automatically moved out of contact with the wrong conductor and permitted to follow the draft of the car which carries it into proper relation with the right conductor. By "right" conductor I mean that one which corresponds with the track upon which the car is running. By "wrong" conductor I mean the other one.

The invention consists in the combination of the main conductor and branch conductor, both held in substantially the same approximately horizontal plane, except that the branch conductor is curved below said plane for a short distance, beginning at a point which is removed from the main conductor less than half the length of the trolley-roller and ending at a near point which is about twice as far from said main conductor.

It also consists in the combination of the conductors, constructed as described, with a trolley having end annular flanges and a central circumferential groove.

It also consists in the conductors constructed as described when the main conductor is also curved downward for a short distance at the proper point relative to the branch conductor.

Certain features of the invention also reside in the particular construction of the con-

necting member, which connects the branch to the main wire, all of which will be hereinafter described, and definitely pointed out in the claims.

In the drawings, Figure 1 is a plan view of the two conductors, the connecting member, and the trolley-roller. Fig. 2 is a similar view of the same parts when said trolley-roller is in a different position relative to said conductors. Fig. 3 is a side elevation of the same parts. Fig. 4 is an end view from the left end of Fig. 3. Fig. 5 is a sectional view to the left on line 55 of Fig. 3. Fig. 6 is a plan view of another form of trolley-roller which may be used when the conductors are constructed as shown. Fig. 7 is a plan view of the conductors, tracks, a car, and its trolley. Fig. 8 is a vertical sectional view on line 88 of Fig. 2, looking toward the branch leg of the connecting member.

Referring to the parts by letters, A represents the main conductor-wire, and *a a* the corresponding tracks.

B represents the branch conductor, and *b b* the branch tracks. These two conductor-wires are arranged in substantially the same approximately horizontal plane and are held therein in the usual or any appropriate manner.

C represents a motor-car.

D represents a trailing trolley-arm mounted upon the car in the usual manner.

G represents the trolley-roller, which is mounted in a horizontal position in the upper end of the trolley-arm.

E represents a connecting member, by means of which the two conductor-wires are connected together. This member has two legs *e* and *e'*, of which the former is the main leg and the latter the branch leg. These legs are connected rigidly by the yoke-pieces *e²*, and the branch leg diverges from the main leg at the desired angle. The main leg is connected to the main wire in such manner that it becomes a part of the main conductor, and its lower edge, with which the trolley-roller contacts, is, except at one place, in the same horizontal plane with the two wires A and B. In the specific construction shown the wire lies in a groove *e³*, which at the ends of the leg are in its lower edge, but between its ends

it is deflected upward, being formed upon the inner face of said leg. The branch wire lies in a groove which is formed in the lower edge of the rear end of the leg and then passes up
 5 on its inner face, the wire passing onto the top of the yoke e^2 , where it is secured. The lower edge of this leg is therefore a continuation of and a part of the branch conductor. The lower edge of this branch leg at its ends
 10 is in the same horizontal plane with the conductor-wires, but it inclines downward from both of said ends below said plane, as shown.

The trolley-roller G, which is adapted to be used with the described connection, is provided with annular flanges g g' at its ends
 15 and with a circumferential groove or channel g^2 midway between its ends. Intermediate of the groove and flanges the roller will be constructed in such manner that the contact
 20 of the roller and conductor as the former is rolled in contact with the latter will cause said roller to travel endwise and transversely of the conductor until the conductor enters the said groove. The means shown in Figs.
 25 1 to 5 for this purpose are the oppositely-inclined spiral grooves g^3 g^4 , which unite with the groove g^2 .

I am aware that it is not new to form a trolley-roller with a central groove and two
 30 oppositely-inclined spiral grooves uniting with it, and I do not therefore make any independent claim to such roller. Moreover, the roller is not necessarily provided with spiral grooves. A roller having the middle
 35 groove or channel g^2 and the flanges g g' and which gradually increases in diameter from the groove to the flanges, as shown in Fig. 6, may be used.

One essential characteristic of the construction of the conductors is that the distance between the branch and main conductors at the point where they are nearest shall not be greater than the distance between the groove
 40 g^2 and one of the flanges g g' and that the distance between the two conductors at the point where the branch conductor rises into the plane of the main conductor shall not be greater than the distance between the said two trolley-flanges.

The parts described act substantially as follows, under the different conditions which may arise in practice, viz:

First. When the car, coming from the left of Fig. 1, continues upon the main track, the
 55 conductor A is in the channel g^2 when the trolley reaches the connecting member; but the right end of the roller passes under and into contact with the branch conductor, by which as the trolley moves forward the roller
 60 is pressed down out of contact with the main conductor. The diverging branch conductor by engaging with the flange g on the roller also draws the roller to the right, the roller being free to so move because it does not at
 65 the moment contact with the main conductor. When, owing to the shape of the lower edge of the leg e' , the trolley is permitted to move

upward again, the left end of the roller just inside of the flange g' contacts with the main conductor at a point just in front of the
 70 downwardly-curved wing e^2 on the lower edge of the leg e . As the roller contacts with this wing it is again pressed down, being thereby withdrawn from contact with the branch conductor, under which it passes. Thereafter
 75 the roller remains, as it should, in contact with the main conductor A, and in the form of the trolley-rollers shown in Figs. 1 to 3 the engagement of the spiral groove with the conductor, assisted by the draft of the car, 80 causes the roller to move to the left until the conductor is in the central channel g^2 . The inclined surface of the roller shown in Fig. 6 will produce the same result. The trolley-roller would in nearly all cases be drawn be- 85 neath the branch conductor, assisted by the natural draft of the car, if the main conductor were not depressed, as described, by means of the wing e^4 or its equivalent; but this depression of the main conductor below 90 the plane of the branch conductor at the described point makes it certain that the trolley-roller will be disengaged from the branch conductor and will remain in contact with the main conductor. 95

Second. When the car, coming from the left of Fig. 1, passes onto the branch tracks, as before, the right end of the roller passes under and into contact with the branch conductor, by which it is pushed down out of contact with the main conductor. The draft of the car tends to and does change the angle of the trolley-roller to the main conductor and draws said roller beneath the main conductor. The engagement of the flange b with
 105 the branch conductor will prevent any failure of the parts to act as described. As a matter of fact, as soon as the trolley-roller is moved out of contact with the main conductor it begins to move to the right upon the
 110 branch conductor, which movement is due in part to the natural draft of the car and in part to the engagement of a spiral groove with the conductor in one construction or to the action of the inclined surface of the roller
 115 upon the conductor in the other construction.

Third. When the car passes from the branch track to the main track, moving toward the left of Fig. 1, the depressed part of the branch conductor depresses the trolley-roller, where-
 120 by it passes under the main conductor and then permits it to rise in contact with said conductor.

Fourth. When the car comes from the right of Fig. 1 on the main track. In this case the
 125 left end of the trolley-roller and its fork would, if means were not provided to prevent it, strike the inner face of the leg e' , whereby it or the trolley might be bent or broken. This action is prevented by forming upon the in- 130 ner face of said leg a rib e^5 , under which the flange g' of the trolley-roller will pass. This rib e^5 curves downward a little from the end, where the said roller is depressed out of con-

tact with the main conductor. The trolley may then (because the groove g^2 does not then engage the conductor) be easily moved over to the right by its engagement with the inner face of leg e' without danger of breaking or bending the trolley or the conductor.

The representation of the trolley-roller in full lines in the several figures indicates its positions relative to the conductors under the different conditions named.

Having described my invention, I claim—

1. The combination of the main overhead conductor and a branch conductor in substantially the same approximately horizontal plane, except that said branch conductor is curved downward below said plane near to their point of convergence, with a trailing trolley-arm, a contact device carried thereby, said contact device having end flanges and a groove between said flanges, and having its surface between said flanges and groove constructed substantially as described whereby, as it is drawn along in contact with a conductor, it will be caused to move endwise until its groove engages with said conductor, substantially as and for the purpose specified.

2. The combination of the main overhead conductor and a branch conductor, both being in substantially the same approximately horizontal plane except that the branch conductor is depressed below said plane from a point which is removed from the main conductor less than half the length of the trolley contact device, to a point which is removed from the main conductor a distance approximately equal to the distance between the end flanges on said contact device, with a trolley contact device having end flanges and a channel between said flanges, substantially as and for the purpose specified.

3. The combination of a main overhead conductor, and a branch conductor, both arranged in substantially the same approximately horizontal plane except in these particulars, viz., first, that the branch conductor is curved below said plane from a point which is distant from the main conductor less than half the length of the trolley contact device, to a point which is distant from the main conductor a distance nearly equal to the distance between the end flanges of said contact device; and, second, that the main conductor is also curved below said plane from a point which is distant from the branch conductor less than the distance between the end flanges of the trolley device, to a point which is distant from the branch conductor more than the distance between said end flanges, with a trailing trolley-arm, and a contact device in

its upper end having end flanges, and a channel between said flanges, substantially as and for the purpose specified.

4. The combination of the main conductor-wire and a branch conductor-wire in substantially the same approximately horizontal plane, with a connecting member having a main leg which is secured to the main wire with its lower edge in substantially the plane of the conductor-wires, and a diverging branch leg which is secured to the branch conductor and has its lower edge inclined from both ends down below said plane, said legs being connected rigidly, substantially as and for the purpose specified.

5. In an electric railway, a connecting member for a main and a branch conductor-wire consisting of a straight leg adapted to be connected to the main wire with its lower edge in the plane of the lower surface of the main wire, a diverging branch leg adapted to be connected with the branch wire, and having its lower edge inclined downward from both ends below the plane of the lower edge of the main leg, and rigid connections between said legs, substantially as and for the purpose specified.

6. In an electric railway, a connecting member for a main and a branch connecting-wire consisting of a straight leg adapted to be connected to the main wire with its lower edge in the plane of the lower surface of the main wire, a diverging branch leg adapted to be connected with the branch wire, and having its lower edge inclined downward from both ends below the plane of the lower edge of the main leg, and a depending wing on the lower edge of the main leg near the open end of said connecting member, substantially as and for the purpose specified.

7. In an electric railway, a connecting member for a main and a branch conductor-wire consisting of a straight leg adapted to be connected to the main wire with its lower edge in the plane of the lower surface of the main wire, a diverging branch leg adapted to be connected with the branch wire, and having its lower edge inclined downward from both ends below the plane of the lower edge of the main leg, and a flange projecting inward from the inner face of the branch leg, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT L. CALDWELL.

Witnesses:

E. L. THURSTON,
ALBERT H. BATES.