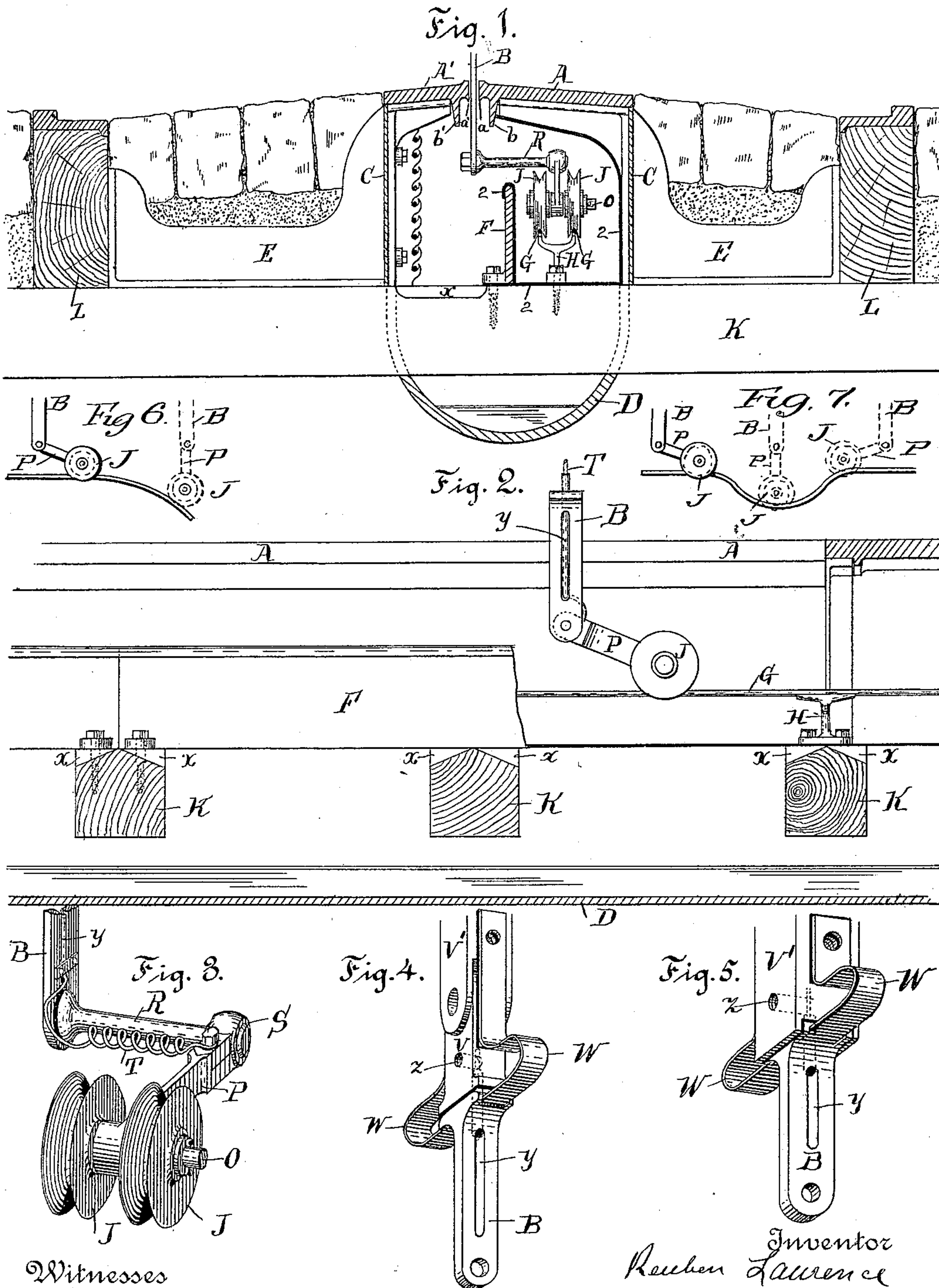


R. LAWRENCE.
CONDUIT SYSTEM FOR ELECTRIC RAILWAYS.

No. 481,959.

Patented Sept. 6, 1892.



Witnesses
H. Edredge.
H. Chivers

Inventor
Reuben Lawrence

By his Attorney *W. H. Ford.*

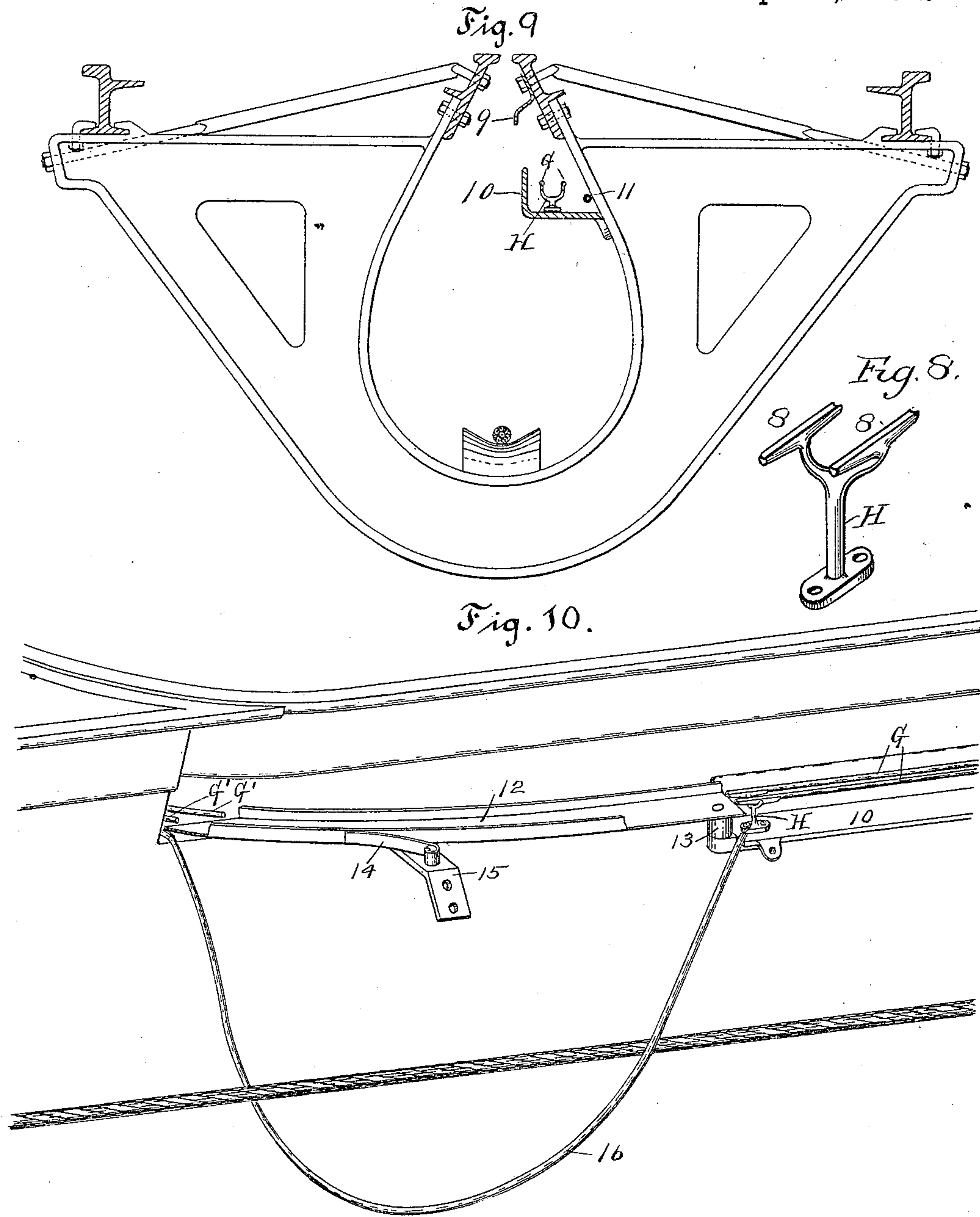
(No Model.)

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UNITED STATES PATENT OFFICE.

REUBEN LAWRENCE, OF ST. JOSEPH, MISSOURI.

CONDUIT SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 481,959, dated September 6, 1892.

Application filed January 27, 1890. Serial No. 338,204. (No model.)

To all whom it may concern:

Be it known that I, REUBEN LAWRENCE, a citizen of the United States, residing at St. Joseph, in the county of Buchanan and State of Missouri, have invented new and useful Improvements in a Conduit System for Electric Railways, of which the following, in connection with the accompanying drawings, is a specification.

The present invention relates particularly to the construction of underground conduits for electric railways and the necessary requirements for making electric connection with the cars running above, said conduit being also adapted for containing wires for other purposes than that intended for car propulsion.

In the accompanying drawings, Figure 1 is a transverse section of a railway with conduit constructed in accordance with my invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a detail of the trolley and its connection to the hanger from the car. Figs. 4 and 5 are details of two forms of hangers, showing arrangement for detaching in case of derailment of the car. Fig. 6 is a detail of the "run out" or "run on," as the case may be, at the end of the line, showing the method of causing the trolley to automatically assume a trailing position. Fig. 7 is a detail having the same object in view for various places on the line where it may be necessary to reverse the direction of the car, notably near switches and turnouts. Fig. 8 is a detail of support for the wire conductors. Fig. 9 is a cross-section of a cable road, showing the adaptation of this system to such without interfering with the use of the cable, while Fig. 10 is a detail showing the method of making a branch electric railway connect with a cable road.

As preferably constructed the conduit is formed of two series of cover-plates A A', Fig. 1, having a space allowed between them for the passage of the trolley-hanger B, side plates C C, bottom drain D, the top and sides being supported by the brackets E E, the drain being laid directly in the earth. In addition the conduit has a separating partition F for the purpose given further on. Within the conduit are placed the two round wires G G for conducting the electric current, together with the necessary supports, crossings,

switches, &c. The wires G G are supported on straight lines by the standards H, on curves by the continuous bars M M, and at crossings by supports N N or insulators N' N'. The current is taken from the conducting-wires G G by the rolling sheave-brushes J J, these sheave-brushes making contact on the top of the wires and held to that contact by gravity or with the assistance of a spring, preferably by gravity, as shown. The brackets E, supporting the top and sides of the conduit, are in turn fixed by bolting or spiking upon the ties K, which may be the ordinary ties used in tramway construction, as shown, or may be part and parcel of the brackets. These brackets are extended, as shown, to support the longitudinal sills L L.

The plates A A' are so constructed as to be movable, in order to gain access to the conduit, and have formed on the lower side of their inner edges a lip *aa'*, as well as a flange *bb'*, set back a short distance from same edge, the intention of said lips and flanges being for the purpose of forming dripping-points to the end that water entering the slot between them will fall at once to the drain D below them. The tie K is chamfered at *x* also, to allow the water to flow off of it freely. As a further defense against water splashing upon the conducting-wires G G, the partition-plate F is introduced.

To prevent the leakage of the electricity by induction from the non-insulated conductors G G and the trolley, the space allotted for this purpose is lined with a non-conducting material 2 2. This non-conductor forms also a water or moisture safeguard against dripping from above or oozing from side.

The trolley-sheaves J J are carried by a spindle O, Fig. 3, upon the arm P. This arm is attached to the stud R by a ball-and-socket joint. The stud R is insulated from the hanger B, and the circuit is made by an insulated wire T, attached to the trolley-arm P and passing into a slot *y* in the detachable hanger B, and passing up through the head of said hanger is held lightly in the pendant V, Fig. 4, or standard V' in Fig. 5, by a set-screw in the hole Z shown in those two figures. At the point where held by said set-screw the insulation is removed from the wire, as shown at T, Fig. 2, the intention being to provide a

reliable electric connection between the trolley and the car that will be at once safe both from leakage at the place of passage through the slot between the upper plates and from
5 obstructions lying in the way upon the surface of the road.

The method of detaching the arm B from the standard V' (shown in Fig. 4) is by the side movement of the car causing the pend-
10 ant V to swing over, thereby opening the springs W W, and hence releasing the arm, which has its resistance in the slot between the plates A A'. The same effect is produced by the device shown in Fig. 5, where the
15 hanger B is wrenched from between the springs W W, being held by the stud R beneath the plates A A, also withdrawing the wire T from the standard V'.

The run out or run on is effected, as shown
20 in Fig. 6, by lowering the end of the wire sufficiently to allow the trolley-arm P to assume a vertical position, as shown at the right of the figure. Then if the car is moved toward the left the trolley is drawn against
25 the incline, and thereby automatically assumes a trailing position.

Fig. 7 sufficiently explains itself, being for the purpose of reversing the trailing action of the trolley where such action is needed.

30 Fig. 8 is a form of support for the wire-conductors, and to which they are fastened, preferably by soldering, in the grooves 8 8.

Fig. 9 shows an application of my invention to a cable-conduit, in which I introduce
35 the grip-guard 9 and combined shelf and splash-guard 10.

Fig. 10 shows a cross-over for an electric line connecting with a cable line, the near side of the cable-conduit being removed to
40 show the device. In this figure the wires G G are stopped off and electric connection continued through the insulated wire or wires, which is or are carried below the cable.

To carry the trolley from end of wires G G
45 to ends G' G', there is a plate 12, provided with side-guards and pivoted at 13, held in place by the spring 14, fulcrumed upon the bracket 15, said bracket being also a support for the plate and upon which it slides in giving
50 passage to the cable-grip.

The operation is as follows: The trolley will pass over the plate while the cable-grip hanger—supposing that the cable moves from right to left—strikes the farther side of the
55 plate and forces it aside against the spring 14. After the passage of the cable-grip the spring 14 forces the plate back to its normal position. If the movement of the grip should be from left to right, instead of as shown,
60 the pivot 13 is placed at the opposite end of the cross-over plate and the position of spring 14 and bracket 15 reversed.

I claim—

1. In an electric-railway conduit, the com-
65 bination of removable cover-plates A A', hav-

ing a slot-opening between them, side plates C C, brackets E E, and drain D, substantially as set forth.

2. In an electric-railway conduit, the combination of the removable cover-plates hav- 70 ing a slot-opening between them, side plates C C, brackets fixed upon the ties of the railway, supporting and forming the framework of the said conduit, and the longitudinal rail-carrying sills also supported by said brack- 75 ets, substantially as set forth.

3. In an electric-railway conduit, the combination of the removable cover-plates having a slot-opening between them, side plates C C, brackets fixed upon the ties of the rail- 80 way, supporting and forming the framework of the said conduit, the longitudinal rail-carrying sills also supported by said brackets, and the drain D, substantially as set forth.

4. In an electric-railway conduit, the side 85 plates C C, the brackets E E, fixed upon the ties of the railway, supporting and forming the frame of said conduit and sustaining the rails of the road, substantially as set forth.

5. In an electric-railway conduit, the com- 90 bination of dripping-points *a a'* with the strengthening-flanges *b b'* of the plates A A', substantially as set forth.

6. In an electric-railway conduit, the combination of the drip-points *a a'*, flanges *b b'*, 95 and the splash-guard partition F, substantially as set forth.

7. In a conduit, cover-plates having dripping-points on each side of the slot-opening, and a partition within the conduit to one 100 side of the slot-opening, conducting-wires located therein, substantially as described.

8. In an electric-railway conduit, the combination of removable cover-plates A A', having a slot-opening between them, side plates 105 C C, brackets E E, drain D, a double electric conductor composed of round wire, and elevated supports therefor, substantially as set forth.

9. In an electric-railway conduit, the com- 110 bination of removable cover-plates A A', having a slot-opening between them, side plates C C, brackets E E, a double electric conductor composed of round wire, elevated supports 115 therefor, a trolley having two sheave-formed brushes making contact upon the upper sides of said conductors, and a pendulous support for carrying said brushes, substantially as set forth.

10. In combination with a hanger B, an ex- 120 tension R, secured thereto, a trolley J, a swinging arm P, carrying the trolley and supported from the extension R, and an electrical connection between the hanger B and the arm P, substantially as described. 125

11. In a conduit, the contact-wires located therein, a break in said wires, a bridging- 130 wire 16 between the ends of said wires, a supporting-plate 12 for the trolley, pivoted at one end, a centrally-arranged supporting-bracket,

and a spring secured to said bracket and bearing against the pivoted plate 12, substantially as described.

12. In combination with a standard, as V',
5 a hanger B, a trolley supported therefrom, a detachable connection between the standard and hanger, and flexible connecting means, as W, between the said standard and hanger, substantially as described.

10 13. In an electric-railway conduit, the combination of removable cover-plates having a slot-opening between them and a space partitioned off and to one side of the slot, a double electric conductor, elevated supports therefor,
15 and a trolley supported by a ball-and-socket connection, having contact upon the top of said conductors and having free movement in any direction, substantially as set forth.

20 14. In an electric-railway conduit, the combination of removable cover-plates having a

slot-opening between them, dripping-points on opposite sides of said slot, and a space partitioned off and to one side of the slot, a double electric conductor, elevated supports therefor, and a trolley supported by a ball-and-socket 25 connection, having contact upon the top of said conductors and having free movement in any direction, substantially as set forth.

15. In an electric-railway conduit, the combination of removable cover-plates having a 30 slot-opening between them, a space partitioned off and to one side of said slot, a double electric conductor therein, a trolley having contact upon the top of said conductor, and an automatically resilient support for the 35 trolley, substantially as set forth.

REUBEN LAWRENCE.

Witnesses:

H. ELDREDGE,

H. C. CHIVERS.