

(No Model.)

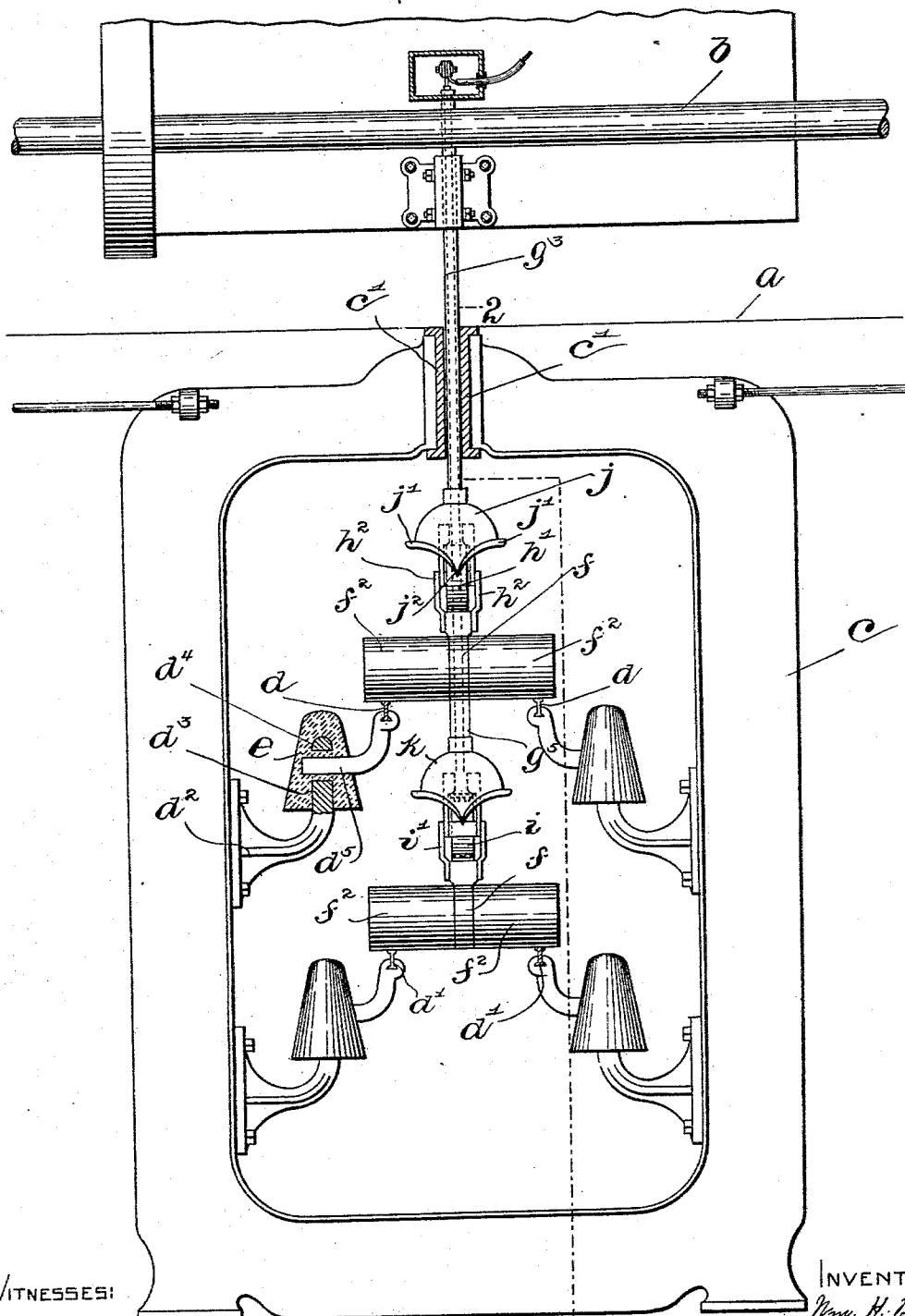
4 Sheets—Sheet 1.

W. H. BAKER.  
CONDUIT ELECTRIC RAILWAY.

No. 533,627.

Patented Feb. 5, 1895.

Fig. 1.



WITNESSES:

*A. D. Harrison*  
*C. Davis.*

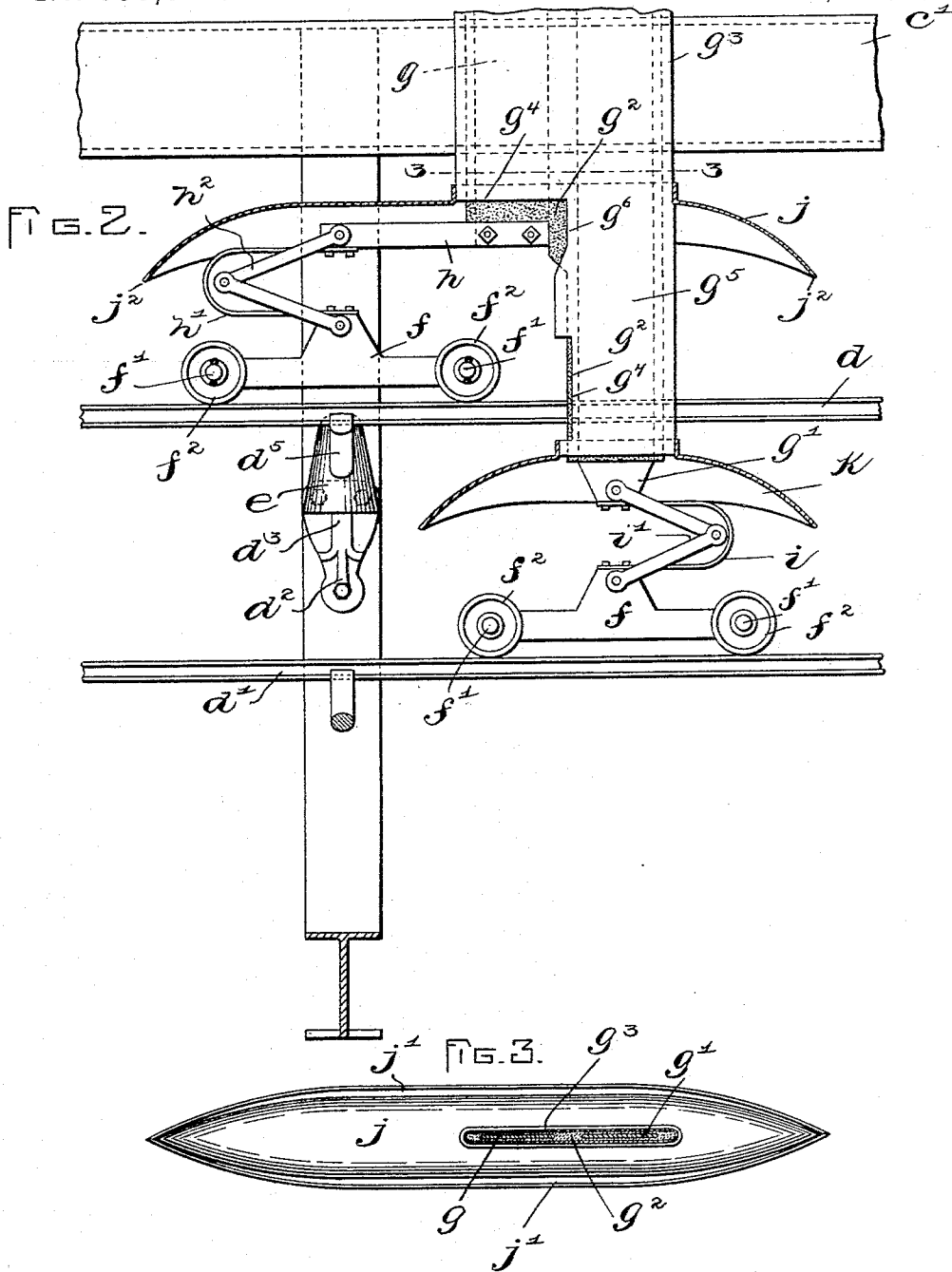
INVENTOR:

*Wm. H. Baker*  
*by Wright, Brown & Co.*  
*Attys.*

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WITNESSES:

A. D. Hanson.  
D. Davis.

INVENTOR:

Wm. H. Baker  
By Wright, Brown & Connelley  
Attys.

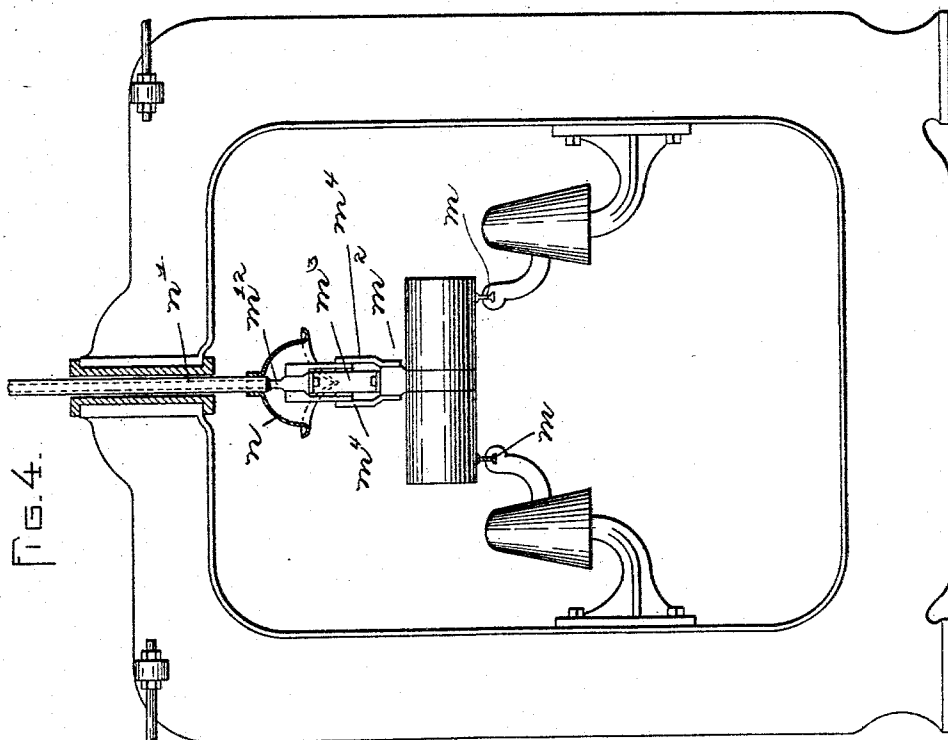
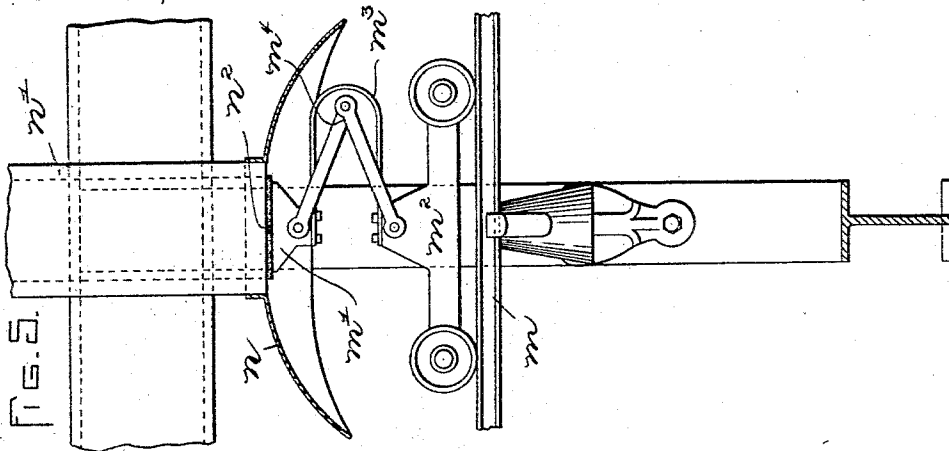
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A. D. Harrison  
P. Davis.

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Wm. H. Baker  
By Night, Brown & Connelley  
Attys.

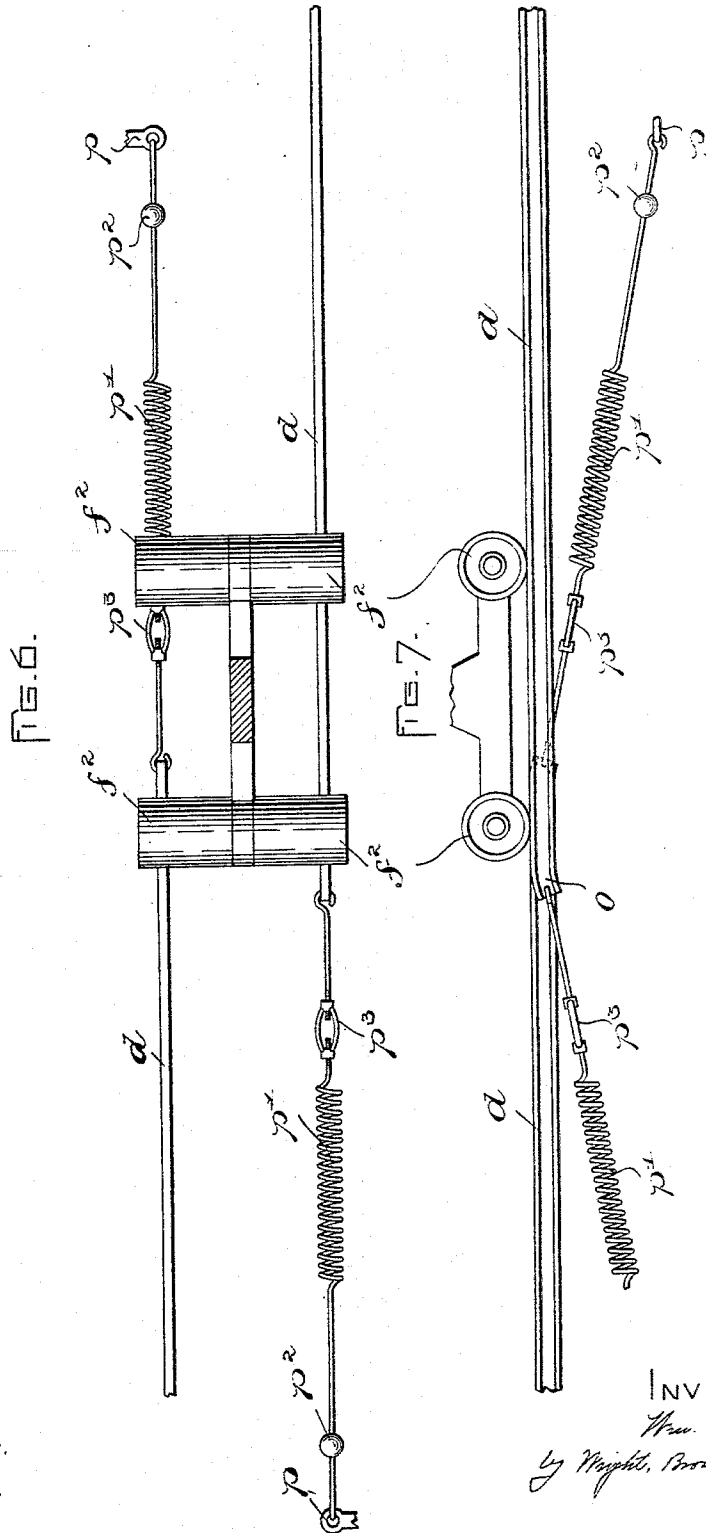
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W. H. BAKER.  
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No. 533,627.

Patented Feb. 5, 1895.



WITNESSES:

A. D. Hanson.  
O. Davis.

INVENTOR:

Wm. H. Baker  
By Wright, Brown & Bradley  
Atty's.

# UNITED STATES PATENT OFFICE.

WILLIAM H. BAKER, OF PAWTUCKET, RHODE ISLAND.

## CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 533,627, dated February 5, 1895.

Application filed May 18, 1894. Serial No. 511,682. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BAKER, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain  
5 new and useful Improvements in Conduit Electric Railways, of which the following is a specification.

The present invention relates to certain improvements in that class of electric railway  
10 systems in which the trolley devices are contained in a conduit and traverse conducting wires or rails supported therein.

The invention has in view the provision of thoroughly practical means for operating such  
15 a system, by which certain difficulties heretofore contended with are overcome.

To this end the invention consists in certain novel constructions, arrangements, and combinations of parts which are recited in  
20 the appended claims.

The accompanying drawings which form part of this specification illustrate constructions embodying the invention.

Figure 1 shows an end elevation of a trolley  
25 apparatus constructed in accordance with my invention, and a cross-section of the conduit, the arrangement shown in this figure being that employed when both the positive and negative conductors are laid in the conduit, a certain insulating rail-support appearing in section. Fig. 2 shows a side elevation  
30 of the structure shown in Fig. 1, certain water-shedding hoods appearing in longitudinal section. Fig. 3 shows a section on line 3—3 of Fig. 2. Fig. 4 shows an end elevation of  
35 the form of trolley employed when only one conductor is laid in the conduit and the return conductor is grounded, a certain hood appearing in cross-section. Fig. 5 shows a side  
40 elevation of the structure shown in Fig. 4, the hood appearing in longitudinal section. Fig. 6 shows a plan view illustrative of the manner of arranging the sections of one line  
45 of conductors. Fig. 7 shows a side view of the same.

Referring first to Figs. 1 to 3, the letter *a* designates the road-bed; *b*, the axle of a car over the same; *c*, one of the castings of the conduit, and *c'*, the slot-rails supported by said  
50 castings.

Within the conduit are supported two lines of rails, *d*, and *d'*, one being connected with

the positive and the other with the negative pole of the generator which supplies the motive current. These lines of rails are supported at different elevations for purposes of  
55 economizing space, as will hereinafter appear, and each line of rails is made up of lengths supported by brackets, *d<sup>2</sup>*, fastened to the conduit-castings. Each of said brackets has an upturned arm, *d<sup>3</sup>*, formed at its end with an eye, *d<sup>4</sup>*. A rail-supporting arm, *d<sup>5</sup>*, passes  
60 through said eye, and insulation, *e*, is molded around the arms, *d<sup>3</sup>*, and *d<sup>5</sup>*, and fills in the eye, *d<sup>4</sup>*, so as to completely insulate the arms  
65 from each other and at the same time provide a strong support for the rail.

A carriage is arranged to traverse each line of conductor-rails and each carriage has the following construction: A metal bar, *f*, supports journal-studs, *f'*, passing therethrough  
70 near each end, and each stud carries two rollers, *f<sup>2</sup>*, one on each side of the bar, *f*.

The two carriages have position in the same vertical plane as shown in Fig. 1, this being  
75 made possible by the lines of conductor-rails being arranged one above the other. The two rollers at one side of a carriage engage a length of the conductor-rails, and the next  
80 length of rail is engaged by the rollers on the other side of the carriage, the rail lengths breaking joint so as to insure continued contact. By such an arrangement all difficulty  
incident to joinder of rail-sections is overcome.

The arrangement of a line of rails is best  
85 shown in Figs. 6 and 7. The ends of each rail-section are curved downward slightly as shown at *o*, so that the roller in passing from one section to another will encounter no ob-  
90 struction. Each rail is put under tension to prevent sagging, its ends being connected with suitable supports, *p*, in the conduit, by means of spiral springs, *p'*, and suitable insulation, *p<sup>2</sup>*, and turn-buckles, *p<sup>3</sup>*, being in-  
95 serted in the connections.

The means for establishing communication between the conductor-rails and the motor on the car are of the following construction: Plates, *g*, and *g'*, which are suitably con-  
100 nected with the opposite poles of the motor, depend from the car, and are thoroughly insulated from each other and from their surroundings by a covering, *g<sup>2</sup>*, of suitable insu-

lating material. This insulation is incased in a protecting armor,  $g^3$ , of metal which takes the wear caused by contact with the sides of the slot. This armor extends below the slot and is cut back, as at  $g^4$ , below which point the plate,  $g$ , extends and also the insulation. A horizontal arm,  $h$ , is fastened to the lower end of the plate,  $g$ , and its outer end is connected by a flat curved spring,  $h'$ , with the central bar,  $f$ , of the upper carriage, said spring tending to press the rollers of said carriage upon the conductor-rail,  $d$ . Toggle-like links,  $h^2$ , connect the arm,  $h$ , with the central bar of the carriage at each side, and serve to equalize the spring's pressure and maintain the axes of the rollers horizontal.

The armor has a pendent portion,  $g^5$ , surrounding the plate  $g'$ , where it extends beyond the plate,  $g$ , and said pendent portion of the armor is cut away at  $g^6$ , to expose the insulation back of the arm,  $h$ , and prevent short circuiting between said arm and the armor, and is also cut away at  $g^7$ , in the line of the upper carriage, so that should said carriage by any possibility be thrown backward toward the armor it would encounter the exposed insulation.

The plate,  $g'$ , extends below the pendent portion of the armor and so does the insulation, and said plate is connected with the lower carriage in the same manner that the other plate,  $g$ , is connected with its carriage, viz: by a flat curved spring,  $i$ , and links,  $i'$ .

In order to prevent moisture which may drip through the conduit slot, from causing an electrical connection between parts which should be always insulated from each other, as for example, the armor and either one of the plates or connections between the same and the carriages, the following arrangement is employed: A hood,  $j$ , of elongated dome-like form is fastened to the armor at the cut-back port,  $g^4$ , thereof and its longitudinal extent is sufficient to carry its ends beyond both the upper and lower carriages. Water dripping through the slot will fall on this hood, and the design in the construction thereof is to have such water conducted to its ends from which it is discharged. In furtherance of this design, the hood is formed along each side with eaves-troughs,  $j'$ , which lead to down-turned points,  $j^2$ , at opposite ends of the hood, the hood having sufficient downward curvature toward each end to insure a flow of water in the troughs. As a further guard a hood,  $k$ , of similar construction is fastened on the lower end of the pendent portion,  $g^5$ , of the armor, and extends longitudinally beyond the ends of the lower carriage.

The construction shown in Figs. 4 and 5 is quite similar to that already described, except that in this case only a single trolley is employed and a single line of conductor-rails, the return conductor being grounded as is common in electric railway systems. In these figures the letter,  $m$ , designates the conductor-rail;  $m^2$ , the carriage which traverses said

rail;  $m'$ , the conductor-plate which is connected with the motor on the car, and depends through the conduit slot;  $m^3$ , the spring connecting its lower end with the carriage, and  $m^4$ , the equalizing links. A hood,  $n$ , of similar construction to those before described, is fastened to the armor,  $n'$ , which incases the conductor-plate and the insulation,  $n^2$ , covering the same.

Of course it will be evident that instead of the double form of trolley-device shown in Figs. 1 to 3, a single trolley device such as shown in Figs. 4 and 5 might be arranged at opposite ends of a car or at different points and respectively engage two conductor-rails, such as shown in Figs. 1 and 2.

To make clear the course of the circuit through the trolley device, it may be stated that in each case the rollers, the bar supporting the same, the equalizing links and the pendent conductor-plate are in electrical connection.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all the modes of its use, it is declared that what is claimed is—

1. In a conduit electric railway, a trolley comprising a roller-equipped carriage, a conductor-plate to pass through the conduit-slot, an expanding spring connecting said carriage and conductor-plate, equalizing links connecting said parts, and an armor for the conductor-plate.

2. In a conduit electric railway, a trolley comprising a roller-equipped carriage, a conductor-plate to pass through the conduit-slot, an expanding spring connecting said carriage and conductor-plate, equalizing links connecting said parts, an armor for the conductor-plate, and a hood attached to said armor and overhanging the ends of the carriage, said hood being constructed to conduct water to its ends and there shed the same.

3. A trolley for conduit electric railway systems having an elongated dome-like hood for catching drip falling through the conduit-slot, said hood terminating at each end in a down-turned point and having troughs along each side leading to said points.

4. In a conduit electric railway system, a trolley comprising a roller-equipped carriage for traversing lines of conductors laid at different elevations in the conduit, conductor-plates for extending through the conduit-slot and insulated from each other, one of said plates extending downward beyond the other, suitable connections between said plates and the carriages, respectively, and an armor incasing the conductor-plates and having a pendent portion, substantially as and for the purpose described.

5. In a conduit electric railway system, a trolley comprising a roller-equipped carriage for traversing lines of conductors laid at different elevations in the conduit, conductor-

plates for extending through the conduit-slot and insulated from each other, one of said plates extending downward beyond the other, suitable connections between said plates and the carriages, respectively, and an armor incasing the conductor-plates and having a pendent portion, said armor being cut away at the place of connection of the upper carriage with its conductor-plate, and in its pendent portion back of the said carriage, to expose the insulation, for the purpose described.

6. In a conduit electric railway system, a trolley comprising a roller-equipped carriage for traversing lines of conductors laid at different elevations in the conduit, conductor-plates for extending through the conduit-slot and insulated from each other, one of said plates extending downward beyond the other, suitable connections between said plates and the carriages, respectively, an armor incasing the conductor-plates and having a pendent

portion, a water-shedding hood fastened to the armor above the upper carriage, and a similar hood fastened to the pendent portion of the armor over the lower carriage.

7. In a conduit electric railway system, a bracket fastened to the side of the conduit and having an up-turned arm with an eye at the end, a conductor-supporting arm extending through said eye, and insulation around the bracket-arm and rail-supporting arm and filling in the eye of the former between the same and the arm passing through it.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 14th day of May, A. D. 1894.

WILLIAM H. BAKER.

Witnesses:

A. D. HARRISON,  
F. P. DAVIS.