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J. D. GRIFFEN.

ELECTRICAL CONDUIT RAILWAY.

No. 550,965. Patented Dec. 10, 1895.

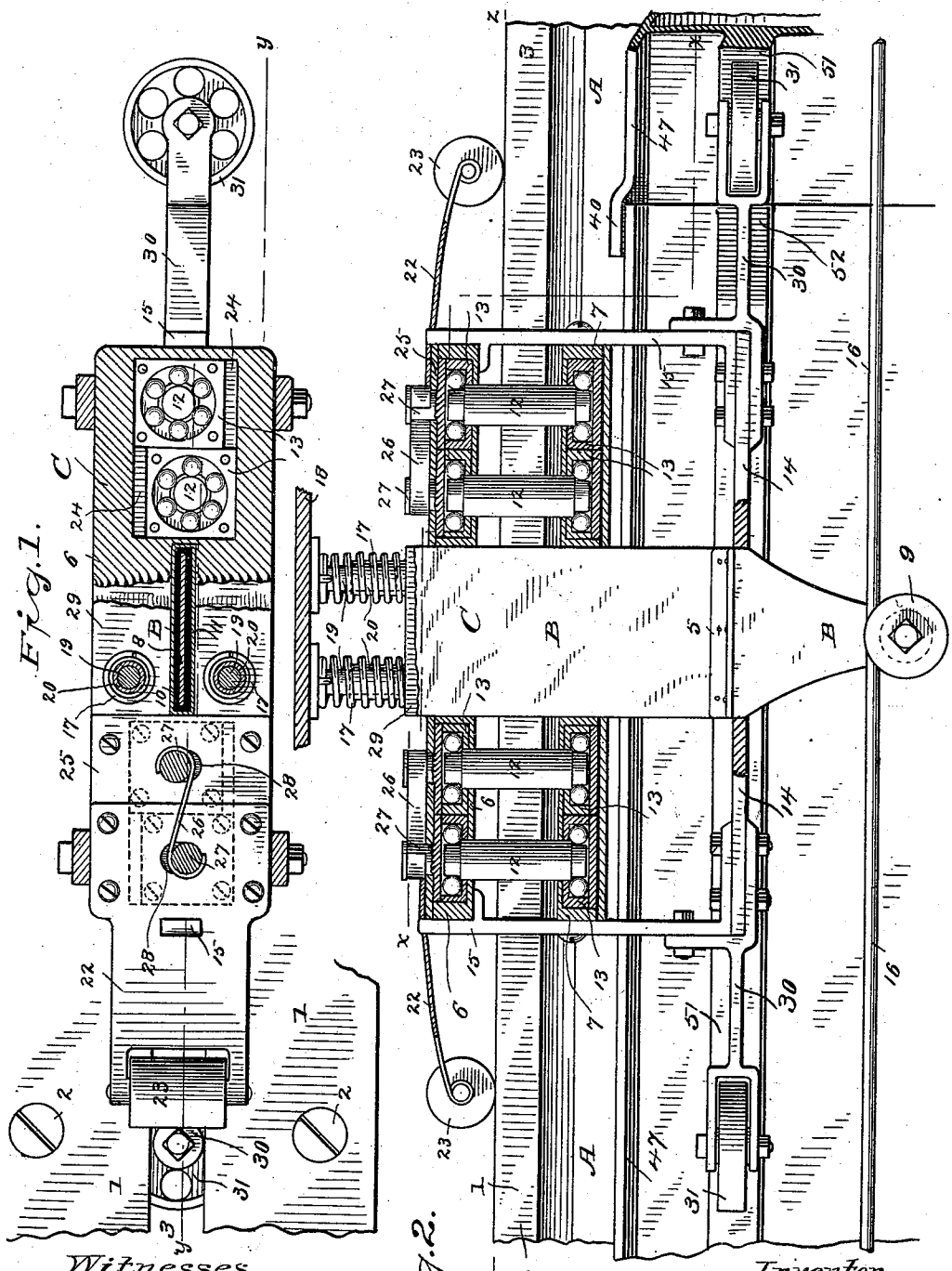

Fig. 1.

Fig. 2.

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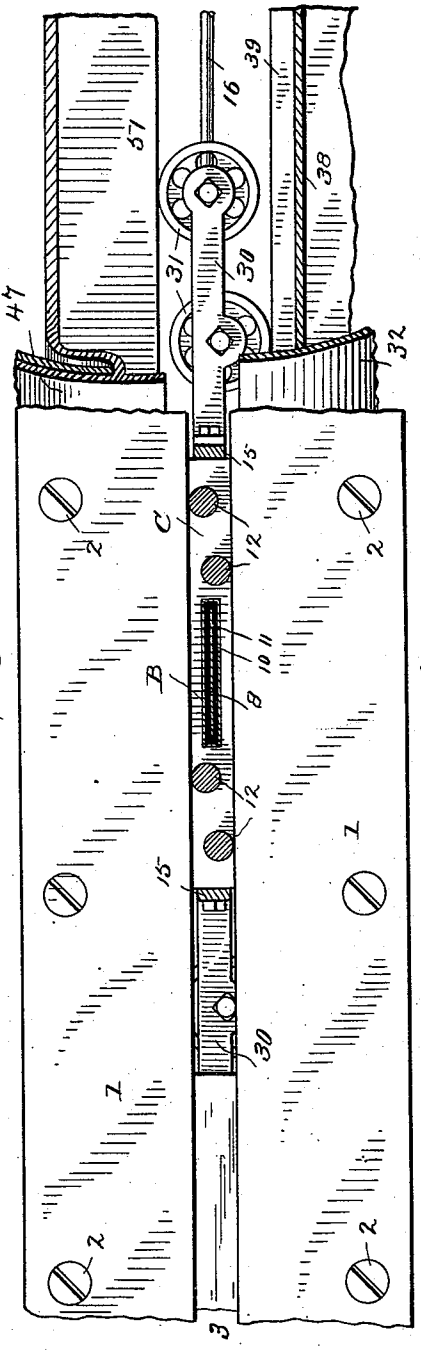

Fig. 3.

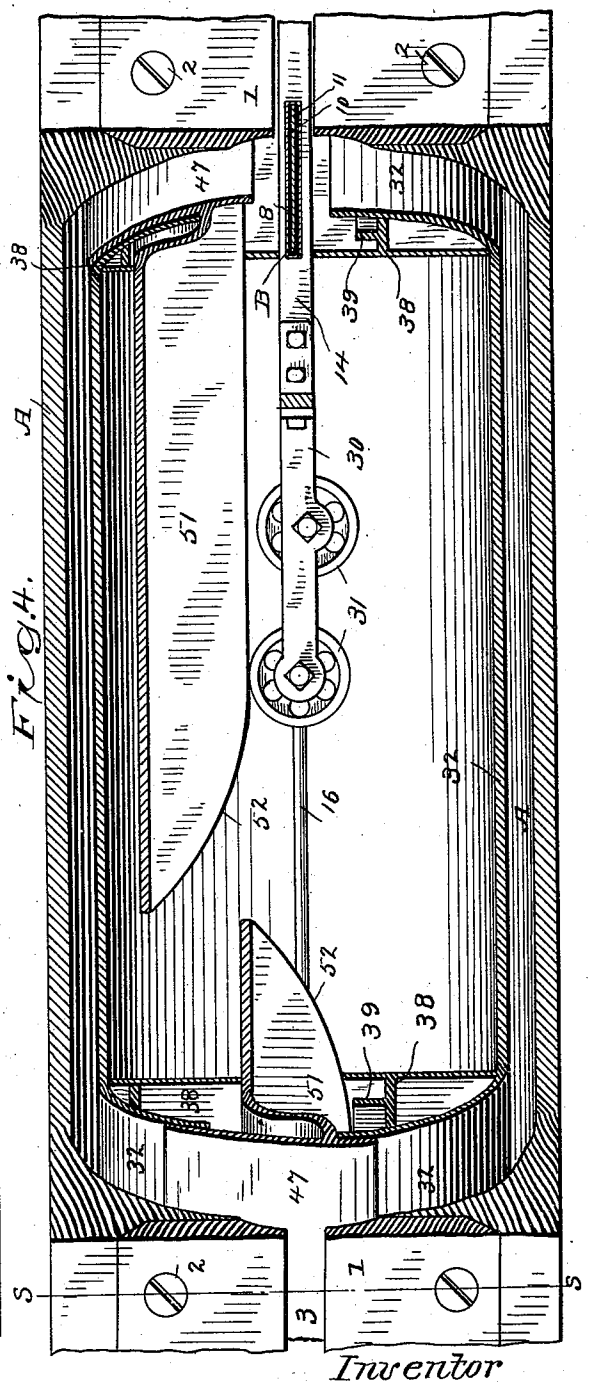

Fig. 4.

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Fig. 6.

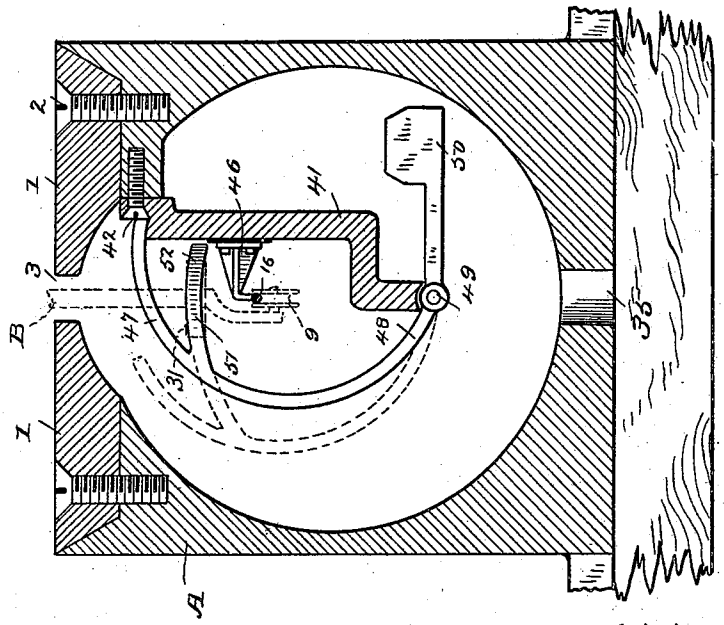

Fig. 5.

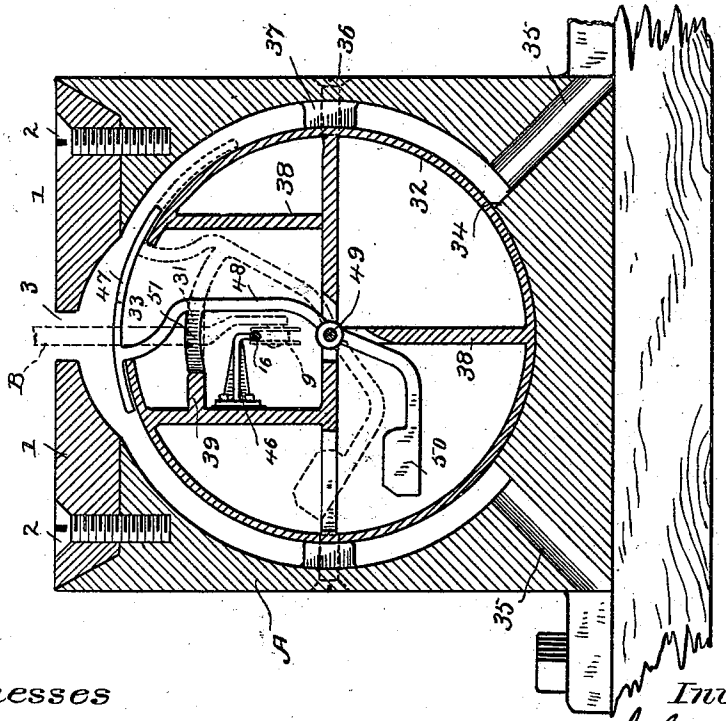

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Fig. 7.

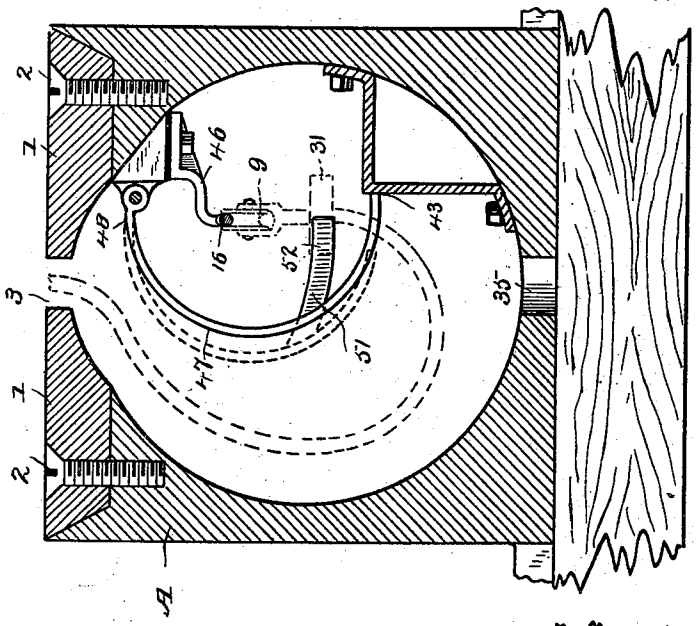
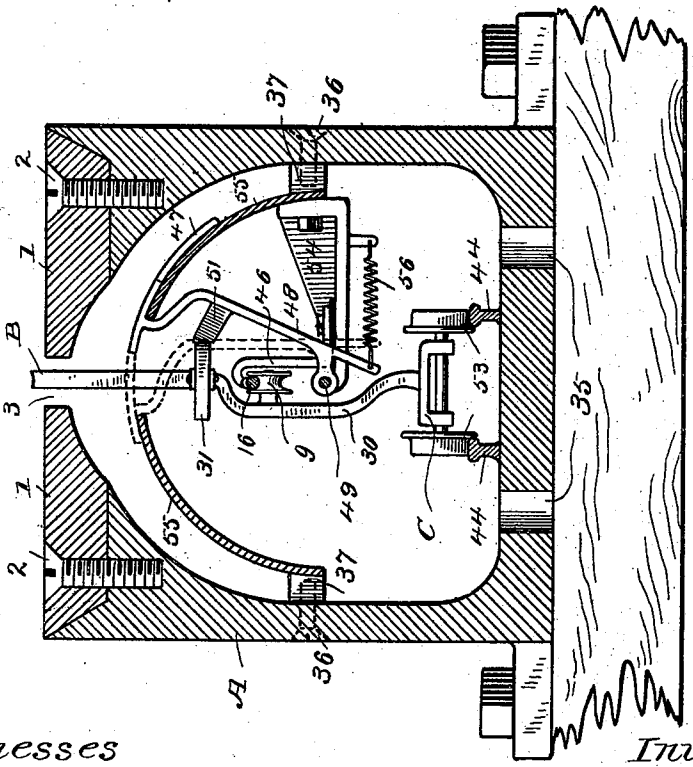


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN D. GRIFFEN, OF NEW YORK, N. Y.

ELECTRICAL CONDUIT RAILWAY.

SPECIFICATION forming part of Letters Patent No. 550,965, dated December 10, 1895.

Application filed December 5, 1892. Serial No. 454,076. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. GRIFFEN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electrical Conduit 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 has for its object to generally improve the construction and mode of operation of electrical conduit railways.

With these ends in view I have devised the simple and novel construction of which the following description, in connection with the accompanying drawings, is a specification, numbers and letters being used to designate the several parts.

Figure 1 is a plan view of the carriage, also showing the slot in the conduit, part of the carriage being shown in horizontal section on the line *x x* in Fig. 2; Fig. 2, a vertical section on the line *y y* in Fig. 1; Fig. 3, a section on the line *z z* in Fig. 2, said view corresponding with Figs. 1 and 2, with the exception that two guide-rollers are provided at each end of the carriage instead of one; Fig. 4, a view, partly in plan and partly in horizontal section, illustrating the contiguous ends of two sections of the conduit; Fig. 5, a transverse section of the conduit, the line being indicated by *s s* in Fig. 4. Figs. 6 and 7 are transverse sections of conduits, illustrating changes in the details of construction by which my invention is carried out; and Fig. 8 is a transverse section of a conduit, illustrating other changes in the details of construction and also illustrating a form of carriage which is wholly within the conduit and rests upon the bottom thereof instead of resting upon the top of the conduit, as in the other forms. Figs. 3 to 8, inclusive, are made on a reduced scale from that of Figs. 1 and 2.

A denotes the conduit, which may be made of any preferred shape and material, but is preferably made of iron cast in sections. The upper portion of the conduit is left open and is partially closed by top plates 1. (Shown as secured to the body of the conduit by screws 2.) Between these plates is a slot 3, through which the trolley-arm B passes. This trolley-arm extends downward from the motor, (not shown,) which may be carried under the car in the usual or any preferred manner. Said arm is carried by a suitable carriage, which I designate as a whole by C. The trolley-arm is shown as secured to the carriage by angle-pieces 5, riveted to the carriage and to the arm.

The carriage consists of upper, middle, and lower plates denoted, respectively, by 6, 7, and 14, and end plates 15, to which the other plates are bolted or otherwise secured.

The construction of the trolley-arm is clearly shown in Fig. 1.

The conductor is a strip of metal, preferably copper, designated by 8, to the lower end of which the trolley-wheel 9 is attached. Outside of strip 8 is a thick layer of insulating material, denoted by 10, and outside of the layer of insulating material is a protecting case or cover 11, made of metal, preferably steel. Angle-pieces 5 are of course bolted only to the case, the bolts not passing through the insulation. The trolley-arm is of course made considerably narrower than the slot, so as not to come in contact therewith, and its passage through the slot is protected by hardened steel rollers 12, alternate rollers bearing on opposite sides of the slot, as clearly shown in Fig. 3. The ends of these rollers are journaled in ball-boxes 13 in plates 6 and 7, so that while friction is reduced to the minimum the insulation of the trolley-arm is thoroughly protected. The end pieces and the bottom piece are narrower than the slot, the end pieces moving freely therein and serving as clearers to prevent the slot from being stopped up by accumulation of dirt, snow, or ice. Plates 6 and 7 are considerably wider than the slot, plate 6 wholly covering it, as shown, and being provided with recesses 24, which receive the ball-boxes, and are covered by plates 25, which retain the boxes in place. The boxes are free to move laterally in the recesses, but are held in operative position—that is, the rollers are held in contact with the sides of the slot by means of S-shaped springs 26, which engage hubs 27, which are cast integral with and extend outward from the outer plates of the upper boxes, said hubs passing through slots 28 in plates 25. It will

be seen that while these springs hold the rollers in contact with the sides of the slot they will yield sufficiently to prevent absolute rigidity of the rollers, it being necessary to provide for roughness and irregularities in the sides of the slot and also for more or less curvature of the slot. It will be seen that with this construction the insulation of the trolley-arm is under all circumstances prevented from coming in contact with the sides of the slot. This feature of protecting the insulation of the trolley-arm has heretofore been one of the greatest difficulties to be overcome in putting railways of this class upon a practical basis.

16 denotes the trolley-wire within the conduit. The trolley-arm after passing through the slot and into the conduit is ordinarily curved upward, the trolley-wheel being pivoted at the upturned end of the trolley-arm and engaging the trolley-wire from underneath. Of course the special shape of the trolley-arm is not of the essence of my invention, one form thereof being indicated by dotted lines in Fig. 7 and another form being shown in Fig. 8.

In the form shown in Figs. 1 and 2 the carriage is connected to the bottom of the car by means of strong spiral springs 17.

18 denotes the bottom of the car, 19 guide-rods extending downward therefrom, and 20 sleeves extending upward from plates 29, which are rigidly bolted to the top of the carriage and within which the rods slide. The upper ends of the springs are connected in any suitable manner to the bottom of the car, the lower ends being rigidly connected to plates 29. In addition to springs 17 heavy flat springs 22 are provided, which sustain a portion of the weight of the carriage. These springs extend outward from the carriage at front and rear, (see Fig. 1,) are slightly curved downward, as shown in Fig. 2, and carry at their ends rollers 23, which travel upon the top plates of the conduit, bearing upon opposite sides of the slot, as clearly shown. It will thus be seen that while the carriage is maintained at all times in operative position ample movement of the carriage is provided independently of the car, the trolley-wheel being at all times held up and kept in contact with the trolley-wire.

30 denotes arms which extend forward and rearward from the ends of the carriage, said arms being provided with one or more rollers 31, adapted to travel within the conduit, the purposes of which will presently be explained, one roller upon each arm being shown in Figs. 1 and 2 and two rollers upon each arm in Figs. 3 and 4.

It is of course well understood that another serious difficulty attending the introduction of this class of railways into every-day use has been in a general way the protection of the live trolley-wire in the conduit. By this I mean the retention of this wire in operative position, the keeping of all metals except the trolley-wheel out of contact with it, and the thorough protection of the trolley-wire from moisture, including, incidentally, the drainage of the conduit. These results I accomplish in the manner I will now describe.

Turning to Figs. 3, 4, and 5, one form of protection of the trolley-wire will be found clearly illustrated. Within the conduit I place a tube 32, having at its top a slot 33, through which the trolley-arm passes. This tube is of course made in sections and is held in operative position in any suitable manner. In the present instance I have shown the bottom of the tube as resting upon a raised portion 34 of the bottom of the conduit. On opposite sides of this raised portion at suitable distances I provide drainage-passages 35. The sides of the conduit are supported by screws 36, passing through bosses 37. Within the tube are cross-pieces both vertical and transverse, which in a general way I have indicated by 38. The special arrangement of these cross-pieces may be varied to suit the requirements of each special use. One of the vertical pieces is provided with an inwardly-extending flange 39, which in use is engaged by rollers 31 on the arms 30 of the carriage. The trolley-wire is carried by suitable insulated brackets 46, which are rigidly secured to any of the cross-pieces within the tube. Slot 33 in the tube is closed by means of a curved sliding cover 47. This cover as well as the tube is made in sections, each section of the cover being independently pivoted at the center of the tube. Cast integral with the sections of the cover or rigidly secured thereto are arms 48, which pass through openings in the cross-pieces, are pivoted to some rigid portions of the cross-pieces, as at 49, and are provided at their lower ends with counterweights 50. It will of course be apparent that springs may be substituted for the counterweights, as in the form illustrated in Fig. 8, and also that arms 48 may be braced and strengthened by longitudinal webs. The upper portions of the arms require to be made quite strong to support longitudinal cams 51, the ends of which consist of curved inclines 52, as clearly shown in Figs. 4 and 5. It will be seen that as the carriage moves forward each cam will be engaged by a roller 31 and moved from the position shown at the left in Fig. 4 to the position shown at the right in Fig. 4. This moves the entire section of the cover from the position shown in full lines in Fig. 5 to that shown in dotted lines in said figure. This movement of the cover opens slot 33 in the tube for the passage of the trolley-arm, which, however, cannot come in contact with any of the parts, excepting that the trolley-wheel remains in contact with the trolley-wire, as already explained. It will be seen that each section is opened slightly in advance of the passage of the carriage by roller 31 on the front arm 30 and is retained in the open position until the trolley has passed by the roller on the rear arm 30.

In the form shown in Figs. 1 and 2 but a single roller is provided on each arm 30, which engages flange 39 and also engages the cams.

In the form shown in Figs. 3 and 4 the outer rollers 31 engage the cams and the inner rollers ride upon the flange. Either form may be used, as preferred. It will be seen that it is made practically impossible for any moisture to get within the tube and affect the trolley-wire. Any moisture that passes through slot 3 drops upon the cover when it is in the closed position and passes off either side over the outer side of the tube and out at one of the drainage-passages 35. The sections of the cover remain open only while the carriage is passing, at which instant the carriage itself covers the slot. In order to prevent there being any space between the sections of the cover, I provide one end of each section with an overlapping flange 40, (see Fig. 2,) which overlaps the next section of cover, acting to prevent moisture from passing into the tube between the sections.

In the form shown in Fig. 6 the tube is entirely dispensed with. The trolley-wire is supported by insulated brackets 46, as in the other form, said brackets being bolted to a downwardly-extending continuous bracket 41, which is shown as secured to the conduit itself. In this form, although there is no tube and of course no slot to be covered, it is still just as essential to cover and inclose the trolley-wire. This is accomplished by pivoting the arms 48, which carry the cover at the lower end of continuous bracket 41, the cover itself being cast in sections, as in the other form, and being curved, so as to inclose the trolley-wire within it when in the closed position, the upper end of the cover partially overlapping the top of bracket 41 and engaging a recess 42 therein. It will be seen, therefore, that in this form the sections of cover, in connection with the continuous bracket, serve to form a pocket which incloses the trolley-wire as perfectly as if in a tube. The arms 48 are provided with counterweights the same as in Fig. 5, and the covers are provided on their inner faces with cams 51, which are engaged by the rollers 31 on the carriage in precisely the same manner as before. It will be seen that when a roller 31 engages one of the cams 51 that section of the cover will be moved from the position shown in full lines in Fig. 6 to the position shown in dotted lines, leaving ample room for the trolley-arm to pass, and that the cover will be retained in that position until after the carriage has passed, it being of course understood that the sections of cover are made to close just as quickly as possible after the passage of the carriage, so as to leave practically no opening at, all for moisture to enter the pocket formed by the cover and bracket, and that moisture entering the conduit passes out through passages 35 the same as before. When the sections of cover are in the closed position all moisture entering slot 3 will pass off over the cover, it being absolutely impossible for it to come in contact with the trolley-wire. The counterweights are made heavy enough so as to throw the cover to the closed position the instant it is released by the rear roller 31. If preferred, a spring may be substituted for the counterweight in any suitable manner—for example, in the general way illustrated in Fig. 8.

In the form shown in Fig. 7 the trolley-arm is curved outward and then recurved inward and upward, the trolley-wheel being pivoted at the upturned end of the trolley-arm and the roller 31 being pivoted on the trolley-arm below the plane of the trolley-wheel. This mode of construction contemplates a carriage resting entirely above the top plates 1, no portion of the carriage extending down into the conduit except the trolley-arm, the shape of which is indicated by dotted lines, an important difference between this and the other forms being that the roller 31 is carried by the trolley-arm itself instead of by an independent arm 30. In this form the cover is hinged at the upper side of the conduit, the continuous bracket being dispensed with. The trolley-wire, however, is just as perfectly inclosed in this form as in the form illustrated in Fig. 6. In order to accomplish this result, I provide in the lower portion of the conduit a continuous wall 43, against which the end of the cover rests, thereby forming a pocket which incloses the trolley-wire the same as in the other form. The cams 51 on the sections of the cover are engaged by roller 31 in the same manner as in the other forms, and the cover is swung outward from the position shown in full lines to the position shown in dotted lines, the trolley-arm passing between the lower edge of the cover and wall 43. In this form moisture dripping into the conduit through slot 3 comes in contact with the sections of cover and passes off through passages 35 the same as in the other forms. In the form illustrated in Fig. 8 the shape of the conduit is changed somewhat. Rails 44 are provided at the bottom of the conduit and the carriage is provided with wheels 53, which travel upon these rails. The special shape of the carriage is, of course, not of the essence of my invention. The rollers 31 are carried by arms 30, which in this form extend upward from the carriage instead of forward and backward therefrom, as in the form illustrated in Figs. 1 to 5, inclusive. The trolley-wire is supported by insulated brackets 46, which extend upward from brackets 54, which are themselves secured to the sides of the conduit. Instead of a tube within the conduit for the purpose of protecting the live trolley-wire, in this form I provide curved sections 55, which are secured to the sides of the conduit, both sections and the brackets 54 being shown as secured to bosses 37, which are themselves secured to the sides of the conduit. The cover, arms 48, and cams 51 are arranged in this form about the same as

in the form illustrated in Fig. 5. Arms 48 in this form are pivoted to brackets 54 and, instead of counterweights being used as in the other forms, the cover is thrown to the closed position by a spring 56. In the form illustrated in Fig. 7 neither counterweight nor spring is used, the cams 51 serving the purpose of counterweights and the covers being so constructed and pivoted that they will drop to the closed position as soon as released by gravity alone without counterweights or springs.

In the form shown in Fig. 8 any moisture entering the conduit through slot 3 drops upon the cover and passes off over the curved sections, dropping down to the bottom of the conduit and out through passages 35.

Having thus described my invention, I claim—

1. The combination with a conduit having the usual slot, the trolley wire and the trolley arm, of a carriage for the trolley arm, rollers in said carriage adapted to engage the sides of the slot, ball boxes in which said rollers are journaled and which are provided with hubs 27, and springs engaging said hubs and acting to hold the rollers in contact with the sides of the slot with a yielding pressure.

2. The combination with a conduit having the usual slot, the trolley wire and the trolley arm, of a carriage by which the trolley arm is carried, said carriage consisting of plates 6, 7 and 14, and vertical end plates 15 to which the other plates are attached, said end plates lying in the slot and serving as clearers when in use.

3. The combination with a conduit having the usual slot, the trolley wire and the trolley arm having a trolley wheel engaging the trolley wire from below, of a carriage for the trolley arm, rollers 12, sliding boxes in which said rollers are journaled and which are provided with hubs 27, and springs 26 engaging said hubs and acting to hold alternate rollers in engagement with the opposite sides of the slot.

4. The combination with a conduit having a slot 3, a tube 32 within the conduit having a slot 33, sections of curved sliding cover for slot 33, and arms carrying said sections which are pivoted within the tube and are provided with cams 51, of a carriage having an arm 30 extending therefrom which carries a roller adapted to engage cams 51 whereby the sections of cover are oscillated and slot 33 is uncovered as and for the purpose set forth.

5. The combination with the carriage having rollers 31, a trolley arm extending downward therefrom, and a conduit having a slot through which the trolley arm passes, of a tube within the conduit having a corresponding slot through which the trolley arm passes, arms 48 pivoted within the tube, sections of cover carried by said arms which cover the slot in the tube and are provided with cams 51 which are engaged by rollers 31 to move the sections of cover to the open position as the carriage moves forward, and suitable means for returning the sections of cover to the closed position after the carriage has passed.

6. The combination with the conduit having a slot 3, a tube 32 within the conduit having a slot 33 and cross pieces 38, of sections of cover for slot 33, arms 48 by which the sections of cover are carried and which are pivoted to the cross pieces and are provided with cams 51, suitable means for moving the sections to the open position through engagement with the cams, and counter-weights for moving the sections to the closed position after they are released.

7. The combination with the conduit having slots 3, tube 32 having slot 33, sections of cover which close said slot, cross pieces within the tube one of which is provided with a flange 39, and arms carrying the sections of cover which are pivoted to the cross pieces and are provided with cams 51, of a carriage having rollers 31 which engage flange 39 and also engage the cams to move the sections of cover to the open position while the carriage passes.

8. The combination with the conduit and tube 32 having cross pieces 38, of sections of cover having arms 48 pivoted to the cross pieces and provided with cams 51, and suitable means for moving the sections of cover to the closed position after they have been opened.

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

JOHN D. GRIFFEN.

Witnesses:
A. M. WOOSTER,
PEARL M. REYNOLDS.