(No Model.) 2 Sheets—Sheet 1.

D. O'FLAHERTY.

CONDUIT ELECTRIC RAILWAY.

No. 535,398. Patented Mar. 12, 1895.

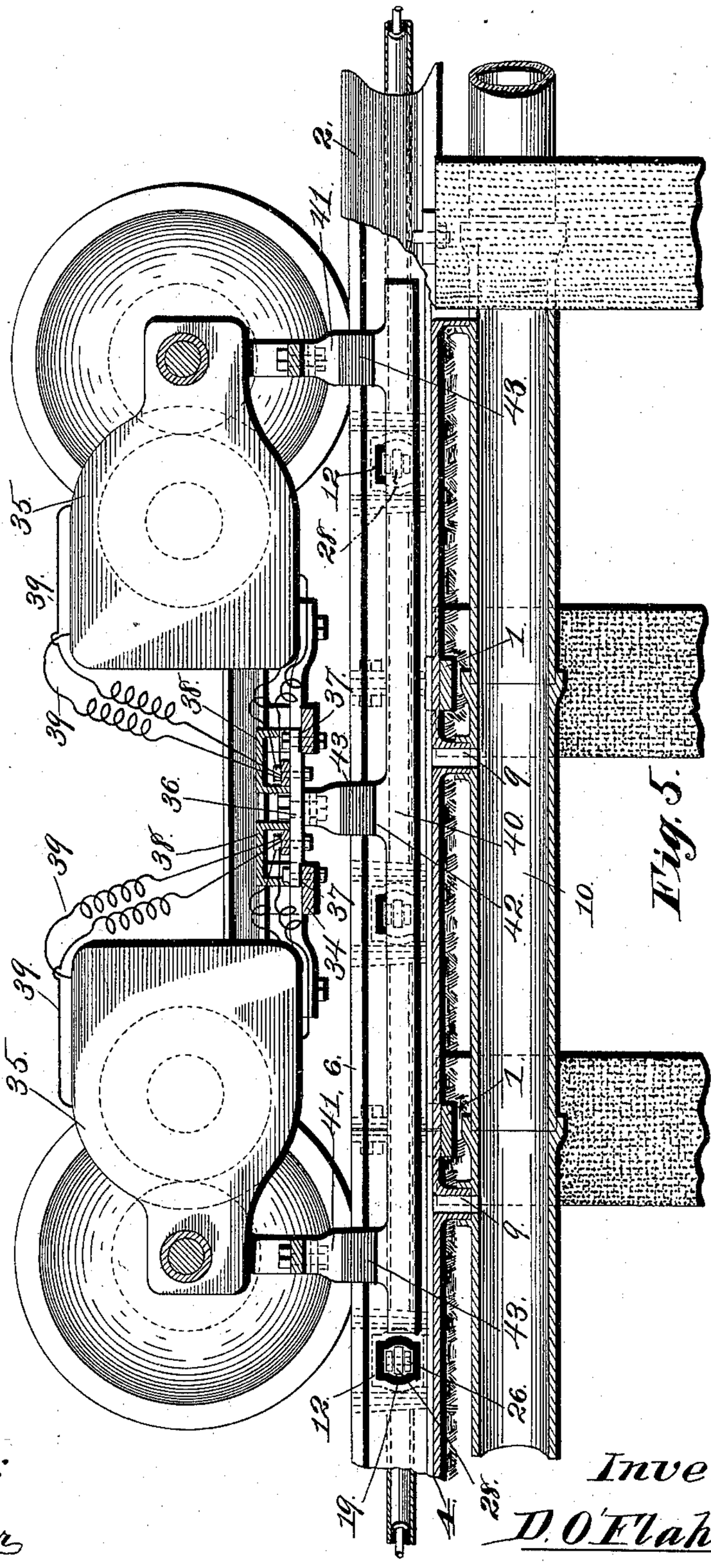

Fig. 1.

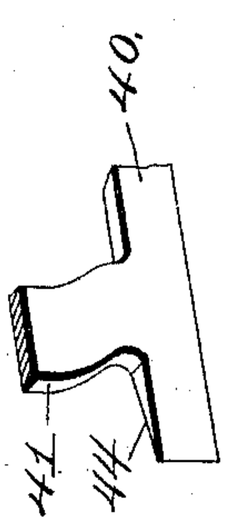

Fig. 5.

Witnesses:

F. G. Fischer

G. J. Thorpe.

Inventor:

D. O'Flaherty,

By Hyde & Higdon

Attys.

(No Model.) 2 Sheets—Sheet 2.

D. O'FLAHERTY.

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Fig. 2.

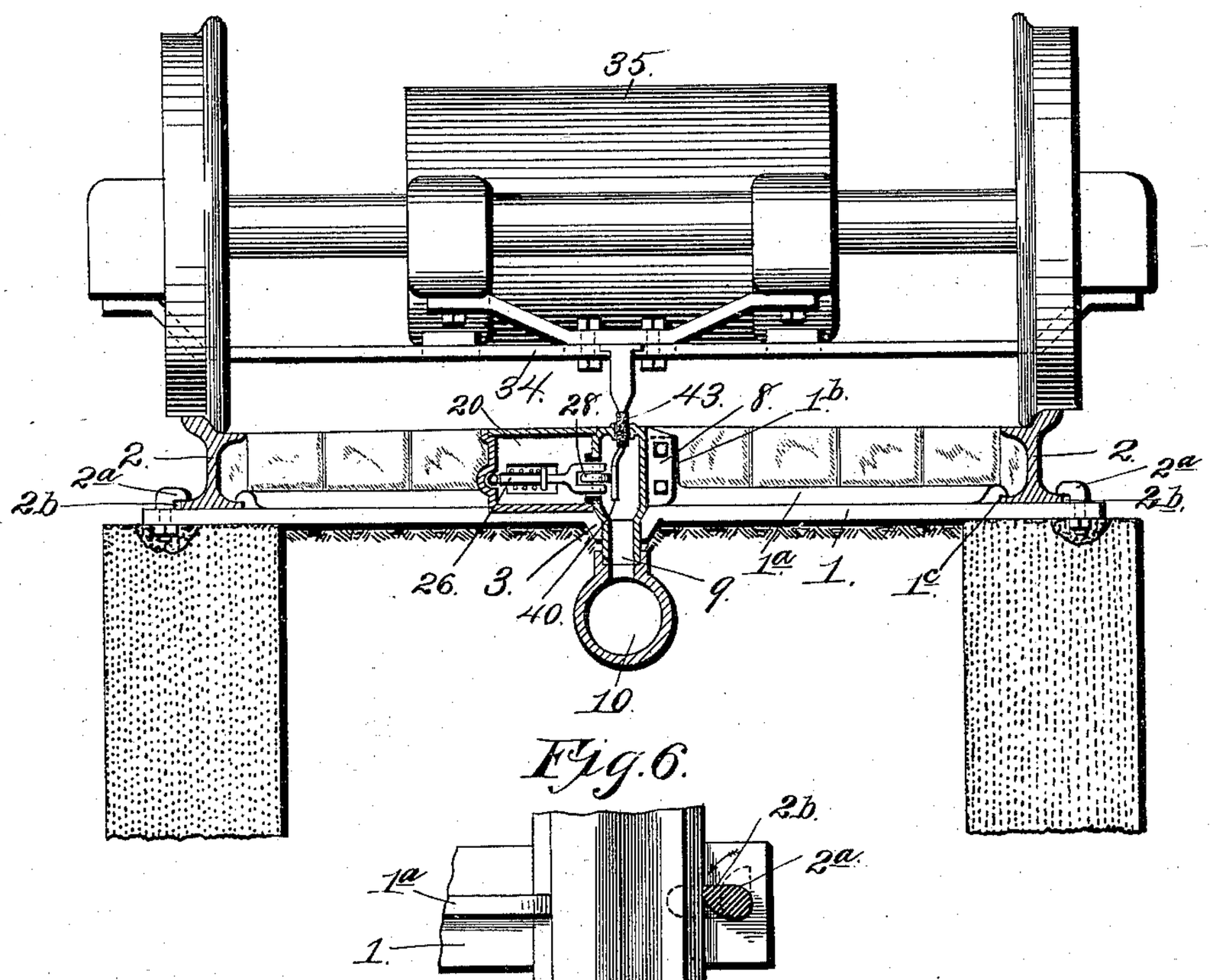


Fig. 6.

Fig. 4.

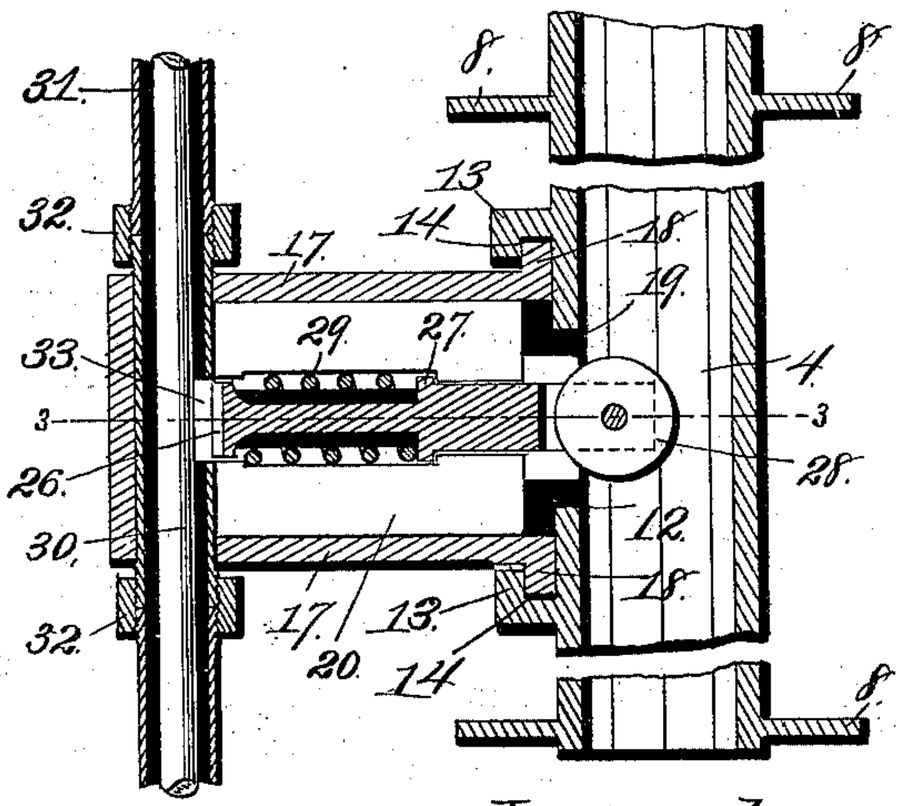
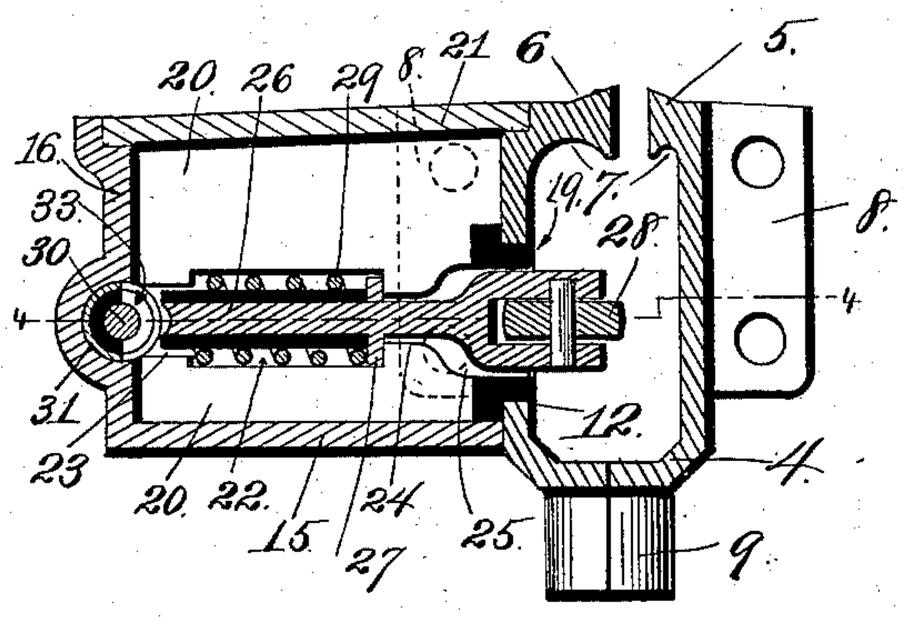


Fig. 3.



Witnesses:

F. G. Fischer

C. L. Goepel.

Inventor

D. O'Flaherty,

By Higdon & Higdon

Attys.

UNITED STATES PATENT OFFICE.

DANIEL O'FLAHERTY, OF KANSAS CITY, MISSOURI, ASSIGNOR TO ELLA A. O'FLAHERTY, OF SAME PLACE.

CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 535,398, dated March 12, 1895.

Application filed March 31, 1894. Serial No. 505,970. (No model.)

To all whom it may concern:

Be it known that I, DANIEL O'FLAHERTY, of Kansas City, Jackson county, Missouri, have invented certain new and useful Improvements in Electric-Railway Conduits and Appliances, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to electric railways, and more particularly to the underground cable system, and has for its object to provide a generally improved construction, whereby the leakage of the electricity is prevented; thus obviating a very objectionable feature of the underground cable systems now in use; whereby connection with the cable is made successively by connections which are interposed between the cable and the contact-shoe depending from the car; whereby said interposed mechanism is moved out of contact with the cable, when the pressure of the shoe is removed from said intermediate mechanism; and whereby all water, snow, &c., is drained or conveyed from the conduit; furthermore, to provide a construction which is simpler, more durable, and less expensive, so as to be adapted in a higher degree for street railways than any underground system now in use.

In order that the invention may be fully understood, reference is to be had to the accompanying drawings, in which—

Figure 1. is a vertical longitudinal sectional view of an underground electric conduit and appliances, constructed in accordance with my invention. Fig. 2. is a vertical cross-sectional view of the same. Fig. 3. is a vertical transverse sectional view of the conduit on an enlarged scale, and taken on the line 3—3 of Fig. 4. Fig. 4. is a vertical sectional view taken on the line 4—4 of Fig. 3. Fig. 5. is a detail perspective view of a portion of the contact-shoe, to show the bevel or wedge formation of its end. Fig 6. is a plan view of a portion of a tie, and showing a rail secured thereon in operative position, by a clamping-bolt of peculiar construction; said bolt being shown in section.

Referring to the drawings, where similar numerals refer to corresponding parts in all the figures, 1 designates the metallic cross-ties, which rest at their opposite ends upon concrete foundations, as shown, and are bent downwardly at 3, at their middle, so as to form a recess or depression in their upper sides, for a purpose hereinafter explained. Each cross-tie is provided with two central and longitudinally extending ribs 1^a, which terminate at their inner ends in vertical flanges 1^b, at opposite sides of the depression alluded to, and are formed with recesses 1^c, in their outer ends.

The track-rails 2—2, are mounted upon the outer ends of the cross-ties, and have their inner base-flanges engaging the recesses 1^c, and their outer flanges engaged by the heads of clamping-bolts 2^a, which extend vertically through the cross-ties and are engaged by retaining-nuts at their lower ends. Each bolt is provided with a segmental lug 2^b, the periphery of which is eccentric to the axis of the bolt, so that by forcing the bolt to turn in the direction indicated by the arrow, Fig. 6, the lug engages the adjacent or outer flange of and forces the rail inward until it engages the recesses 1^c, and, as will be readily understood, by tightening the clamping-nuts, it will be impossible for said rails to be accidentally displaced.

A conduit, comprising cast-iron shells 4, laid end to end, rests in the depression above alluded to, formed in the upper side of the cross-ties, and these shells are formed at their upper ends with the inwardly projecting flanges 5 and 6, to form the conduit-slot. The flange 6 is of greater width than the flange 5, so that the slot will be to one side of the vertical center of the shells, and the under sides of these flanges are preferably concaved, as shown at 7, to insure that any water entering the slot will drop vertically to the bottom of the conduit without running down the walls thereof, and possibly injuring the insulation hereinafter described. The shells 4, at their ends, and at other points, are provided with the laterally projecting flanges 8, provided with apertures through which bolts extend to secure them rigidly to the adjacent flanges 8 of the next succeeding shell, and also to the interposed vertical portions 1^b, of the cross-ties; these shells being so arranged that their adjacent ends shall rest upon the cross-ties. De-

pending from said shells, and at suitable distances apart, are tubular portions, to form the passages or ways 9, which communicate at their upper and lower ends, respectively, with the conduit and the drain-pipe 10, located beneath and parallel with said conduit; the pipes composing the drain being coupled at their adjacent ends, in the ordinary manner. The drain 10, at its intersection with the sewers (not shown), is trapped in the ordinary manner, to prevent the escape of vapor. The vertical side of each shell from which the flange 6 projects is provided with an opening 12, and projecting from the outer side of said shell and at opposite sides of the opening 12, are vertical flanges 13, which are turned inwardly, so as to form the vertically and oppositely disposed grooves 14. A box or casing comprises the bottom 15, the outer end-wall 16, and the vertical side-walls 17, and the inner ends of said side-walls are provided with the vertical and outwardly projecting flanges 18, which engage the vertical grooves 14 of the shell. An annulus or ring 19, of insulating material, is mounted in the opening 12, for a purpose hereinafter explained. The box or casing has, fitting snugly therein, the porcelain or other suitable insulating blocks of hard material 20, and these blocks are secured therein by the top-plate 21 of the box or casing; said top-plate also preventing, while in place, the vertical disconnection of the flange 18 from the grooves 14, so that the removal of said boxes from position is prevented. The insulation blocks 20 are provided with the elongated opening 22, which extends transversely of the conduit, and a diametrically smaller opening 23 extends from the rear or outer end of the opening 22, through the rear or outer end of the said insulation blocks. An opening 24, also diametrically smaller, communicates axially with the front end of the opening 22, and with the rear end of a diametrically enlarged opening 25, which corresponds diametrically with the interior of the annulus or ring 19, and registers therewith. Extending longitudinally through the aligned openings above referred to, is a contact-rod 26, which is provided, a suitable distance from its rear end, with an annular enlargement or collar 27. The front end of the rod, which is bifurcated, has mounted therein, to operate in a horizontal plane, the antifriction and contact roller 28, the inner periphery of which is vertically beneath the margin of the slot formed by the flange 6, so that water or snow, entering said slot, will not descend upon the said contact roller and clog or impede its operation by freezing thereon, but is allowed free passage to the bottom of the conduit, and through the passage-ways 9 to the drain. A spring 29, spirally encircling and preferably insulated from the rear portion of this rod 26, bears at its rear or outer end against an annular shoulder formed at the junction of the openings 22 and 33, and at its forward end, against the rear or adjacent side of the flange or collar 27, so that its pressure tends to hold said collar in its advanced position and against the shoulder formed at the junction of the openings 22 and 24.

In an auxiliary conduit, parallel with the conduit 4, and occupying the horizontal plane corresponding with the axis of the rod 26, is an insulated cable 30, which extends continuously from one end of the line to the other, and also through the interposed boxes or casings previously described. The auxiliary conduit comprises a series of metallic pipes 31, which are connected together at their adjacent ends by unions 32, so that said conduit shall be absolutely air and water-tight. That portion of each pipe section 31 and the adjacent insulation at the inner side of the cable 30 opposite the rear or outer end of the corresponding contact-rod 26, is cut away, as shown at 33, so as to expose the cable, and by thus cutting away the conduit and insulation at this point, the rod 26 is allowed to contact directly with the cable when moved outwardly or rearwardly, as hereinafter referred to, and the rear or outer end of said rod is preferably concaved, so as to have a more extended bearing surface or contact upon the cable.

Referring now to the appliances carried by the car, 34 designates a steel framework of any suitable or preferred construction, which supports the motors 35, through the medium of a steel bar 36 in the center of the car and its connections, and this bar is insulated at 37 at the points where it rests upon said framework, and mounted upon this bar are the metallic boxes 38, which are operatively connected to the motors by the electric conductors 39, in the ordinary manner. Extending longitudinally in the conduit, is the contact-shoe 40, which is of length sufficient to be always in contact with two of the contact-rollers 28, and at times to be in contact with a third contact-roller, and projecting upwardly from a point near each end of said contact-shoe, is a vertical arm 41, which is fastened at its upper end to and insulated from the motor. A center arm 42 projects vertically upward, and is attached in any suitable manner at its upper end to the plate 36, and these arms 41 and 42 are inclosed by a casing of hard leather or any other suitable insulating material 43, at the points where they extend through the contact-slot, so that contact between said arms and said slot will be prevented. The opposite ends of the shoe, at the side adjacent to the contact-rollers, is beveled at 44 to form a wedge, which exerts a gradually increasing pressure against each contact-roller, so that a violent blow to said contact-roller, which would be injurious, is prevented.

From the above description, it will be obvious that when the contact-shoe is in engagement with two or more of the contact-rollers 28, the spring actuating the rods carrying said rollers will be repressed or contracted by the overcoming force applied by the contact-shoe,

and the rear or outer ends of said rods will be in contact with the exposed portion of the cable 30, so that a complete circuit is made, and is maintained at all times, because said contact-shoe is at all times in contact with two or more of said rollers.

While I have shown the contact-shoe of length sufficient to operate three contact-rods 26, it will be apparent, without departing from the spirit of my invention, that the contact-shoe need be of length only sufficient to operate two of said rods simultaneously, so that it shall always be in engagement with one repressed rod through which the circuit is completed.

From the above description, it will be seen that I have produced an underground cable system for electric railways, which allows of perfect drainage; absolutely prevents the leakage of electricity from the cable; which is positive and reliable in operation, and which is simple, durable and inexpensive of construction; furthermore, a construction whereby the current is completed only at the point of contact with the contact-shoe depending from the car.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric railway system, the combination with a slotted conduit having openings at intervals in one of its side-walls and insulation rings fitting therein, an auxiliary conduit also having openings at intervals, which occur opposite the openings of the slotted conduit, casings inclosing said auxiliary conduit at corresponding intervals and thereby surrounding the openings in said conduit, an electric cable extending continuously through and insulated from said conduit, and insulation blocks within said casings, of contact-rods within said casings and protruding into the slotted conduit and surrounded by insulation blocks, springs engaging said contact-rods and holding them normally away from the cable, a car, a motor carried thereby, and a contact-shoe 40, electrically connected to the said motor and carried by said car and depending into said slotted conduit, and formed at one side with the beveled ends 44, substantially as and for the purpose set forth.

2. In an electric railway system, the combination with a slotted conduit, having openings in one side, and insulation rings fitting in said openings, of casings or boxes having their open ends fitting externally against one side of the slotted conduit and surrounding the openings therein, and having oppositely disposed openings in their sides, an auxiliary conduit impervious to air and water comprising pipes connected by unions and extending through the openings of the casings or boxes, and having apertures in its inner side within said casings or boxes, and opposite the openings of the slotted conduit, a cable located in and insulated from the auxiliary conduit and exposed at points within said casings and opposite the openings of the slotted conduit, insulation blocks fitting within said casings or boxes and provided with a longitudinal passage, a spring-actuated contact-rod fitting therein and projecting into the slotted conduit, and an antifriction roller carried thereby, substantially as set forth.

3. In an electric cable railway system, the combination with a conduit having a slot extending parallel with and at one side of the longitudinal center of the conduit, and having openings in the side wall farthest from the slot, insulation rings fitting in said openings, external flanges projecting vertically from the conduit at opposite sides of said openings and forming guide-grooves, casings or boxes having flanges detachably engaging said guide-grooves, and insulation blocks fitting within said casings or boxes and having registering passages 22, 23, 24, and 25, and a shoulder at each end of the passage 22, of an auxiliary conduit extending through said casings, and composed of pipes 31, joined by unions 32, and having openings 33, opposite the registering passages of the insulation blocks, an electric cable within and insulated from the auxiliary conduit and exposed for contact at points within said casings and opposite the said registering passages, a contact-rod occupying said passages, and having a shoulder, and a spring encircling said contact-rod and bearing at its opposite ends against a shoulder of the insulation blocks and the shoulder of said rod, substantially as set forth.

4. In an electric railway system, the combination with cross-ties having depressions in their upper sides, and flanges projecting from said cross-ties, of a slotted conduit located in said depressions and having flanges bolted to the flanges of the cross-ties, a drain-conduit 10, below the slotted conduit, passages connecting said conduits, an auxiliary conduit, an insulated cable therein, and spring-actuated contact-rods projecting into the slotted conduit and adapted to contact with said cable, substantially as set forth.

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

DANIEL O'FLAHERTY.

Witnesses:
M. R. REMLEY,
G. Y. THORPE.