(No Model.)

3 Sheets—Sheet 1.

J. F. SCHERPE, Dec'd.

L. SCHERPE, Administratrix.

ELECTRIC RAILWAY.

No. 600,381. Patented Mar. 8, 1898.

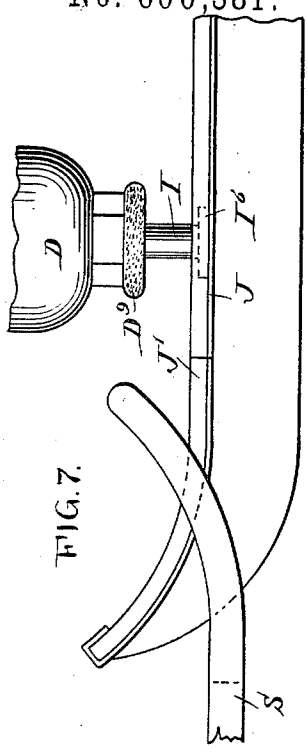

FIG. 7.

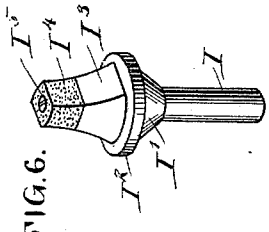

FIG. 6.

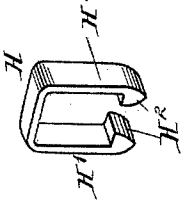

FIG. 5

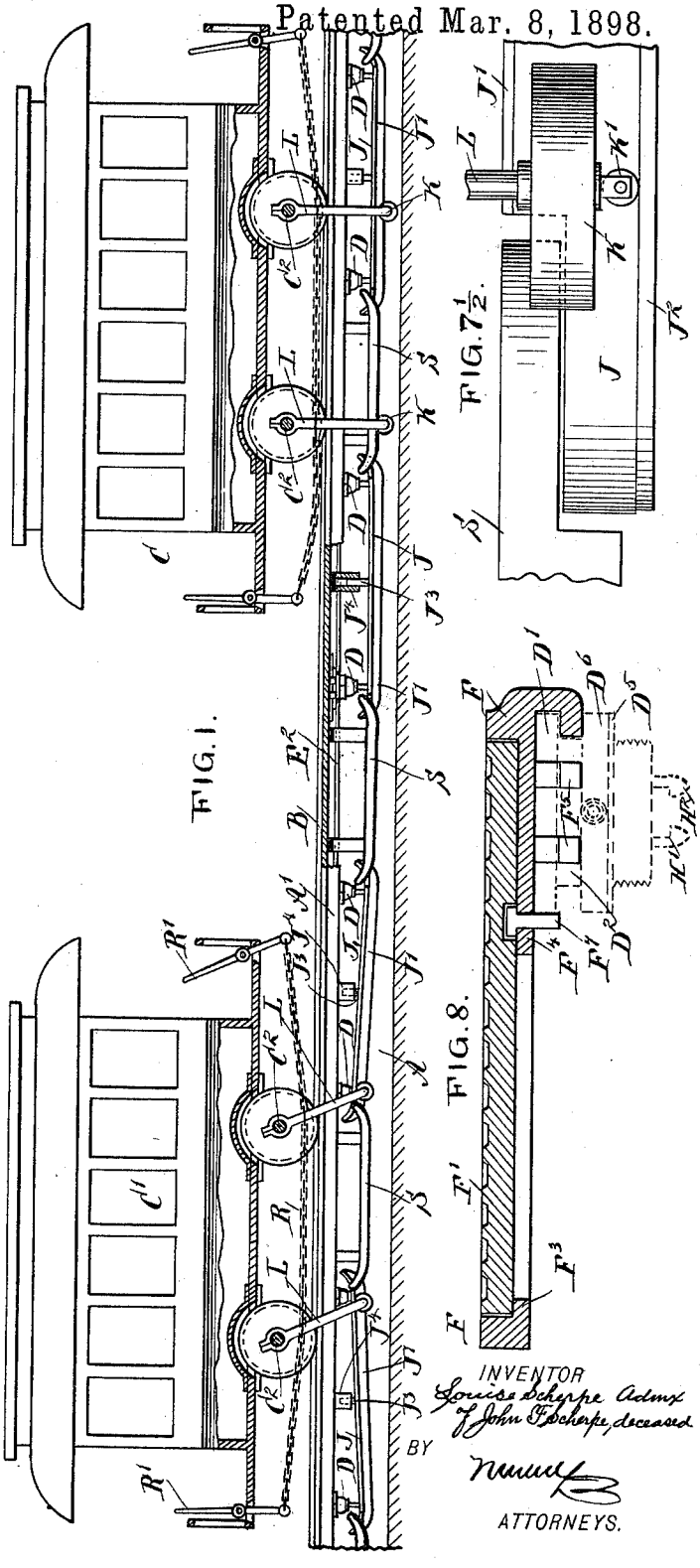

FIG. 1.

FIG. 7½.

FIG. 8.

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(No Model.) 3 Sheets—Sheet 2.

J. F. SCHERPE, Dec'd.

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ELECTRIC RAILWAY.

No. 600,381. Patented Mar. 8, 1898.

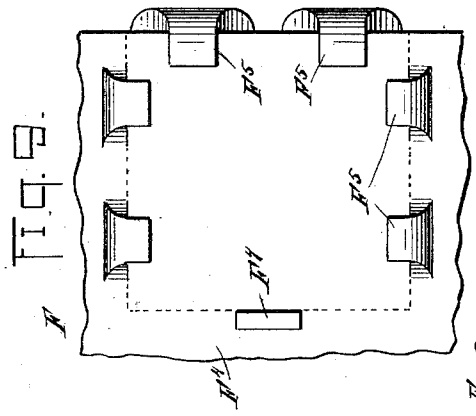

Fig. 8.

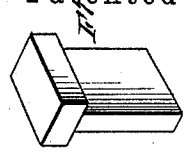

Fig. 10.

Fig. 4.

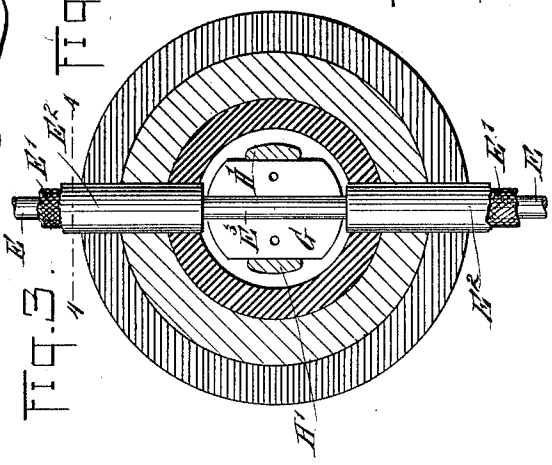

Fig. 3.

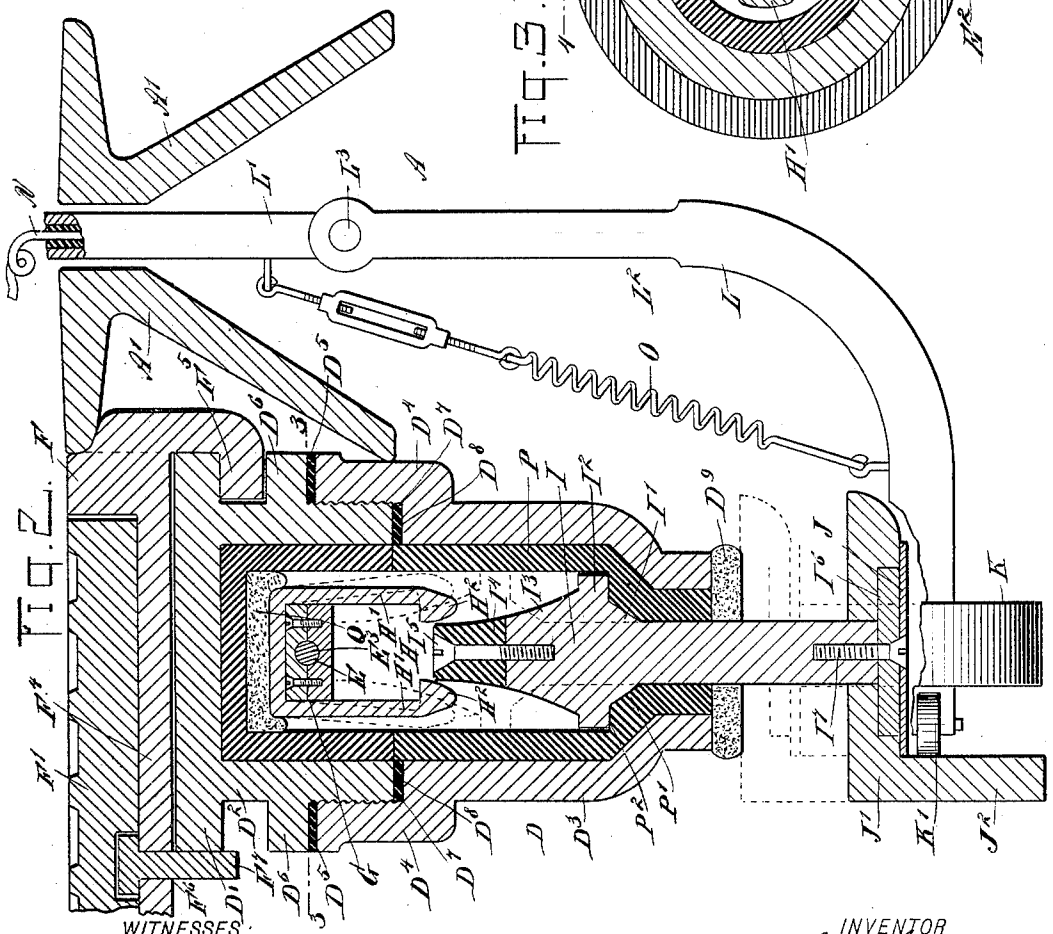

Fig. 2.

WITNESSES:

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INVENTOR

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(No Model.) 3 Sheets—Sheet 3.

J. F. SCHERPE, Dec'd.

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ELECTRIC RAILWAY.

No. 600,381. Patented Mar. 8, 1898.

Fig. 11.

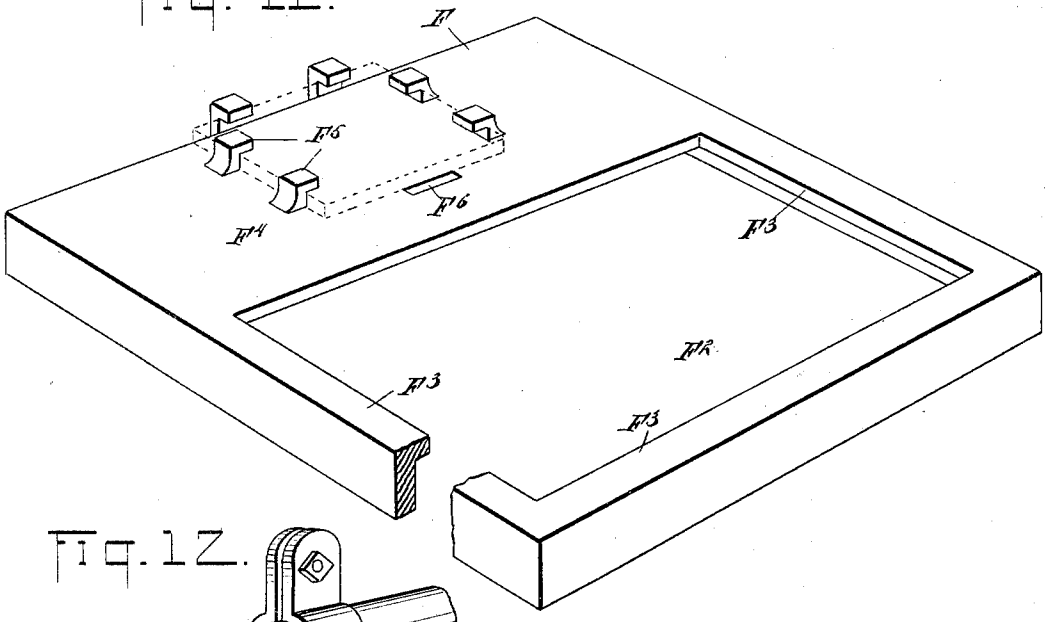


Fig. 12.

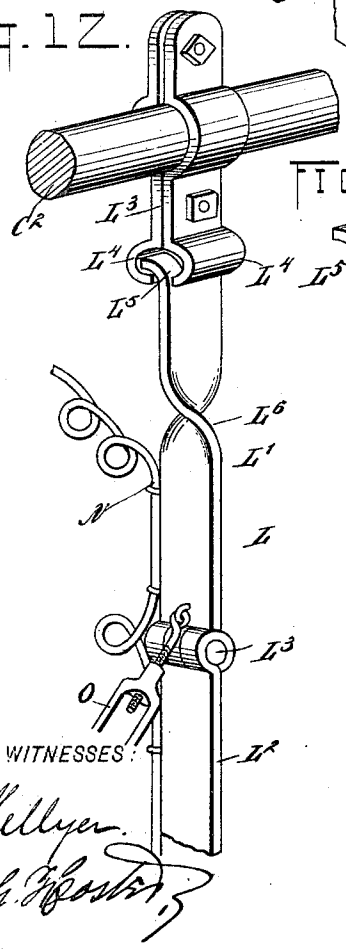


Fig. 13.

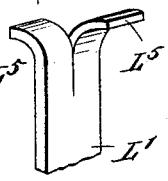
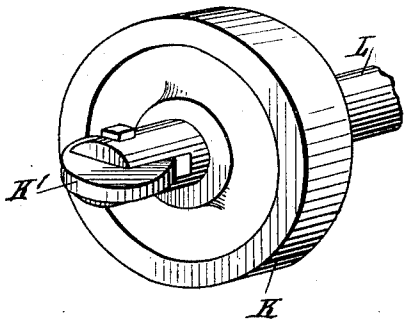


Fig. 14.



WITNESSES:

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Henry F. Bostwick

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John F. Scherpe deceased.

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ATTORNEYS.

UNITED STATES PATENT OFFICE.

LOUISE SCHERPE, OF ST. LOUIS, MISSOURI, ADMINISTRATRIX OF JOHN F. SCHERPE, DECEASED.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 600,381, dated March 8, 1898.

Application filed August 12, 1897. Serial No. 647,994. (No model.)

To all whom it may concern:

Be it known that I, LOUISE SCHERPE, of St. Louis, Missouri, administratrix of the estate of JOHN F. SCHERPE, late of St. Louis, Missouri, deceased, who did in his lifetime invent new and useful Improvements in Electric Railways, do hereby declare the following to be a full, clear, and exact specification of the same.

The object of the invention is to provide certain new and useful improvements in electric railways of the underground trolley type, whereby the main or supply conductor is completely closed, sealed, and protected against all deleterious exterior influences to insure a constant supply and safe transmission of the electricity to the car-motors without charging the track and slot rails with electricity.

The invention consists principally of sealed switch-boxes placed suitable distances apart and supporting an insulated main supply-conductor extending through the said boxes, a contact fixed on the said conductor within each box, a plunger fitted to slide in each box and adapted to make contact with the said fixed contact, contact-bars connecting the said plungers in pairs to leave an electrically free and unobstructed space between the bars, and a current-conveying trolley adapted to engage the said bars to lift the plungers, so as to make contact with the main conductor and permit the electricity to pass from the latter to the car-motor.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of the improvement, showing the conduit and railway-track with two cars in position therein. Fig. 2 is an enlarged transverse section of the same on the line 2 2 of Fig. 1. Fig. 3 is a sectional plan view of the switch-box on the line 3 3 of Fig. 2. Fig. 4 is a cross-section of the main conductor on the line 4 4 of Fig. 3. Fig. 5 is a perspective view of the flexible contact in the switch-box. Fig. 6 is a perspective view of one of the plungers. Fig. 7 is a side elevation of part of the switch-box, the plunger, and the contact-bar. Fig. 7½ is an inverted plan view of the same with the trolley-wheel in position. Fig. 8 is an enlarged cross-section of the manhole frame and cover. Fig. 9 is an inverted plan view of part of the manhole-frame. Fig. 10 is a perspective view of the pin or bolt for locking the switch-box to the manhole-frame. Fig. 11 is an inverted perspective view of the manhole-frame with part broken out. Fig. 12 is a perspective view of the trolley-arm on the car. Fig. 13 is a perspective view of the upper end of the trolley-arm, and Fig. 14 is a similar view of the lower end of the trolley-arm and the wheels carried thereby.

The conduit A, of any approved construction, is provided with the usual slot-irons A′, arranged to form a slot between them, and on opposite sides of the said irons are arranged the track-rails B, on which travel the cars C C′ or other vehicles. In the conduit A and at suitable distances apart are placed switch-boxes D, through which extends the main or supply conductor E, connected with a suitable source of electricity and insulated by a suitable material E′, inclosed, preferably, within a pipe E^2, of lead or like material, the insulating material and lead pipe leaving but a short portion E^3 of the conductor bare or exposed within each switch-box, as plainly indicated in Figs. 2 and 3.

Each switch-box is removably secured to the under side of the frame of a manhole of special construction, as hereinafter more fully described, to permit of giving ready access to a switch-box for removing the same in case of derangement or other cause. The bare portion E^3 of the main conductor E is engaged by a clamp G, made in two parts, secured together by screws and straddled by a contact H, preferably made U-shaped, the side arms H′ being flexible and formed at their lower ends with heads H^2, depending freely within the switch-box, as plainly indicated in Fig. 2.

A plunger I is movable in the lower end of each switch-box D and is normally out of engagement with the contact H, but when moved upward makes contact therewith, so as to allow the electricity from the conductor

E to pass to the said plunger. The outer lower end of the plunger is connected with a contact-plate J, attached to a bar J', extending longitudinally in the conduit, the said plate J being adapted to be engaged by the trolley-wheel K, journaled on the lower end of the trolley-arm L, carrying the conducting-wire N, leading from the trolley-wheel K to the motor of the car, the said trolley-arm being preferably supported from the axle C^2 of the car C or C', as plainly indicated in Figs. 1 and 12.

The trolley-arm L is preferably made in two parts L' and L^2, pivotally connected with each other by a longitudinal pivot L^3, to allow the part L^2 to swing up and down in a transverse direction, the parts being connected with each other by a spring O, so as to cause the arm L to yield and move the contact-plate J, with the plunger I, upward to make connection with the main conductor E to allow the electricity to pass from the latter to the car-motor.

The detailed construction of the various parts enumerated is as follows:

The manhole-frame F, which carries the cover F', is preferably rectangular in shape, as indicated in Fig. 11, and fits closely against one of the slot-irons A', as indicated in Fig. 2. The cover F' closes the frame-opening F^2 and normally rests on flanges F^3, formed on the bottom of the said frame, and the top of the cover is preferably roughened to prevent the slipping of the horse's feet. The solid part F^4 of the bottom of the frame next to the slot-iron A' is provided with a series of depending lugs F^5, the free ends of all of which extend toward each other in a horizontal plane, so as to form a support or socket for the reception of the marginal flange D' at the upper end of the switch-box D, so that the latter may be readily and quickly detached by a lateral movement whenever required and removed from the conduit by way of the opening F^2 in the manhole-frame at the time the cover F' is removed.

In the solid part F^4 is formed an opening F^6, adapted to receive a bolt or a pin F^7, engaging with its lower end one edge of the flange D' of the switch-box, so as to lock the latter securely in position in its support or socket against lateral movement. The head of the bolt or pin F^7 rests on the top of the part F^4 and fits into a recess in the under side of the cover F', (see Fig. 2,) so that the cover has to be removed before the bolt or pin can be withdrawn. Each switch-box D is preferably made in two parts D^2 and D^3, of which the upper part D^2 is formed with the flange D', previously mentioned, and the lower part is provided with a vertical flange D^4, formed with an interior screw-thread screwing on an exterior thread on the lower end of the part D^2. A gasket or packing-ring D^5 is placed between the upper end of the flange D^4 and the bottom of the flange D^6, formed on the upper part D^2, and a second gasket D^7 is interposed between the lower edge of the part D^2 and a shoulder D^8, formed on the lower part D^3. The two gaskets or packing-rings D^5 and D^7 are thus arranged in different horizontal planes, and a double joint is formed between the two parts or sections of the switch-box, so as to insure absolute tightness to prevent the entrance of water or moisture even should the box be submerged. Each of the switch-boxes D is preferably provided with a lining or shell P of an insulating material, which is sealed and covers the entire inner surface of the box. This lining is for convenience also made in two sections, the point of separation being located, preferably, at a line of demarcation between the lower end of the upper section or part D^2 and the shoulder D^8, as plainly indicated in Fig. 2.

At the upper end of the lining P is arranged a cushion Q, of rubber or analogous substance, and engaged by the middle part of the U-shaped contact H, so as to allow the latter to yield in an upward direction when engaged by the plunger I, as before mentioned.

Each of the contact-plungers I is formed with a valve I', normally seated on a suitable valve-seat P', formed in the lining P, at the lower end thereof, and directly above the said valve I' is arranged or formed a flange or shoulder I^2, normally in contact with a shoulder P^2 on the said lining. Above the flange I^2 is formed the bared contact-head I^3, preferably made conical in form, with opposite curved faces, as plainly shown in Fig. 6, the curve of the faces corresponding with the shape of the heads H^2 on the flexible contact-arms H', straddling the contact-clamp G in electrical contact with the main conductor E at the part E^3. On the upper end of the contact-head I^3 is arranged a block I^4, of an insulating material, and secured in place by a screw or bolt I^5, passed through the said block and threaded into the upper end of the head I^3, with the head of the screw flush with the upper end of the said block. (See Fig. 2.) A cushion D^9, of rubber or analogous material, is seated upon the lower end of the switch-box D and the lining P, so as to form a yielding resistance for the contact-bar J' when the latter is moved upward by the action of the trolley-wheel K. The switch-boxes D are connected in pairs with each other by the bars J' engaging the plungers I of the said pair of boxes, and the distance between adjacent pairs of switch-boxes is preferably slightly less than the length of the contact-bars or any one of them. Each of the contact-bars J' may be formed of wood, metal, or other suitable material and is preferably L-shaped in cross-section, having a vertical strengthening-rib J^2, with the ends turned up or curved to form inclined surfaces to be engaged by the trolley-wheels K or other collectors carried by the car moving in either direction. The contact-bars may be formed so as to produce a narrow running edge for the trolley, exposing to contact with the trolley a suitable con-

ductor, which is connected to the plungers I to project from the switch-boxes. In case this latter form of conductor is used the trolley-wheel or collector K must be grooved instead of having a flat surface, as shown in the drawings. The contact-bar J′ is provided at or near its ends with perforations, and these perforations are engaged by the lower ends of the pairs of plungers I, each of the plungers being formed at its lower end with a head I^6, fitting into a recess in the under side of the bar and secured to the plunger by a screw I^7, which also serves to fasten the contact-plate J to the under side of the horizontal arm of the bar J′. The plate J extends throughout the length of the bar J′ and is readily engaged by the trolley-wheel K as the car moves along the track.

As illustrated in Fig. 1, two trolley-arms L are fixed upon each motor of the car C or C′ or are removably carried thereby a slightly less distance apart than the length of the contact-bars J′, but at a slightly greater distance apart than the distance between the adjacent ends of successive contact-bars carried by adjacent pairs of contact-plungers I, so that when the cars move either forward or backward one of the trolley-wheels or collectors K will always be in contact with one of the contact-plates J, connected with the plungers and supported thereby.

The upper portion of the part L′ of the trolley-arm L is loosely connected with a socket L^4, formed on a clamp L^3, preferably made in two parts, secured to the axle C^2, the two parts being fastened together by suitable bolts, as plainly indicated in Fig. 12. The socket L^4 extends in a direction transverse to the car-axle C^2, and the ends are open, and the upper end of the trolley-arm part L′ is split longitudinally and bent in opposite directions, so as to form the head L^5, loosely engaging the socket L^4. The part L′ is preferably torsionally bent a quarter-turn, as at L^6, so that the lower portion of the part L′ occupies a position at right angles to the headed portion thereof. The lower portion of the said arm part L′ engages the conduit, while the headed end engages the said socket, as stated, so that when the car accidentally jumps the track the said socket will be carried laterally with the car and be disengaged from the said head, and no special harm will come to the section or part L′ of the trolley or the devices in the conduit.

The conductors N may be secured upon the exterior of the trolley-arms L in any suitable manner, as shown in Fig. 12, or they may be properly mounted in a passage formed in the trolley-arms, as indicated in Fig. 2. The lower part L^2 of the trolley-arm is bent at right angles, and a small guide wheel or roller K′ is journaled horizontally in a bifurcation formed in the said part, as plainly indicated in Fig. 14, so as to engage the vertical rib J^2 of the contact-bars. The wheel K′ may also be placed in such a manner as to roll along the wall of the conduit and guide the trolley-wheel K in contact with the contact-plates J. The wheels K and K′ are urged into contact with the parts which they engage by the spring O, as previously mentioned.

The operation is as follows: When a current is supplied to the main insulated conductor E, then the contact or trolley wheel K in engaging one of the contact-plates J, held on the contact-bars, elevates the latter, as shown by dotted lines in Fig. 1, so as to force the contact-plunger I and the parts carried thereby upward to the position shown in dotted lines in Fig. 2. When the plunger I is thus forced upward, the oppositely-curved faces of the head I^3 engage the curved heads H^2 of the flexible contact-arms H′, and on a farther upward movement of the plunger the head of the screw I^5 makes contact with the under surface of the bottom of the clamp G, always in the switch-box, and so on, as each box is reached consecutively. As soon as the contact is made the electricity passes from the conductor E, clamp G, fixed contact-arms H′, plunger I, plate J, trolley K, and conductor N to the motor of the car, so as to actuate the said motor to propel the car forward over the tracks B. As soon as the trolley-wheel K runs off one of the contact-plates the latter drops very quickly to the normal position. (Shown in full lines in Fig. 2.) When the several parts are in their normal position, then the valve I′ forms a tight joint with its seat P′, and each switch-box is therefore practically sealed against the entrance of dampness or moisture, so as to secure perfect insulation. When the plungers I reach the limit of their upward movement, the cushion Q receives any impact that might otherwise injure the main conductor E at that point, and the cushion D^9 is contacted by the contact-bar J′, so as to prevent injury to the lower end of the switch-box.

By reason of the above-described construction and relative location of parts it will be impossible for both of the collectors carried by any motor-car on the line to become disengaged from a contact-plate at the same time, and current will of course be continuously supplied to the motors carried by the cars whether moving forward or backward.

In some cases the contact-bar may be carried by the car instead of being located as herein shown, and the operation will be practically the same in both cases, the contact-bar carried by the car being inverted, so that its curved ends will project downward and engage the lower ends of the series of contact-plungers as the car moves along.

The switch-boxes may be placed in horizontal or inclined positions, and I do not wish to be limited to the exact positions in which they are herein shown.

The means for attaching the trolley to the cars may be changed, so as to permit detachment of the trolley at any time from the con-

tact-bars in the conduit, which can readily be done by means of a common lever conveniently located for the motorman.

The trolley fixture may be suspended from a part of the frame of the motor where it is attached to the axle, and the two trolley-arms L, which project into the slot, are connected with each other by a rod or chain R, extended to the car-platforms to connected with levers or cranks R′, so as to enable the motorman to swing the trolleys forward or backward or permit them to hang vertically when the cars are at rest. When hanging vertically, as shown at the right in Fig. 1, the trolleys are out of contact with the contact-bar J′.

The trolley-wheels may be made in the form now commonly used for overhead trolleys, and contact-bars may be made of a narrow strip of bar-iron and have a slotted copper wire fastened to the under side and connected with the plungers.

The contact-bars should be arranged to prevent the bending of the plungers or the destruction of the insulation surrounding the plungers by the forward blow given by the trolleys of a moving car. This could be obviated to a very great extent by providing a bridge-bar S (see Fig. 1) to guide the trolleys when passing from one contact-bar to another and by having the bridge-bar hang lower in the conduit than the contact-bars and overlapping the contact-bars in the form of a fork with the points slightly curved upward. (See Figs. 1, 7, and 9.)

The switch-boxes could easily be made of hard rubber if it were not for the forward strain placed upon them by the rapidly-moving trolleys, and if this forward strain could be taken care of there would be little difficulty in making suitably hard rubber switch-boxes, which would thereby simplify the problems in insulation attendant on iron switch-boxes. One way that might prevent this injury and make rubber boxes valuable would be to have a vertical projection J^3 (see Fig. 1) about midway of the length of each contact-bar, which would project into a socket J^4, hanging from the top of the conduit, but insulated from it. This would take any strain caused by the contact-bar being thrust forward and make a rubber box entirely feasible.

The bridge-bar between the contact-bars for rigidity and durability should be of iron. The supports of this bar, however, should be very good insulators, so that said bar will be perfectly insulated from the conduit.

Having thus fully described the invention, I claim as new and desire to secure by Letters Patent—

1. An electric railway, comprising sealed switch-boxes placed suitable distances apart, an insulated main supply-conductor extending through the said boxes and supported thereby, the said conductor having a bare portion within the said box, a contact fixed to the said bare portion of the conductor within the said box, a plunger fitted to slide in each box and adapted to engage the said contact, spaced and independent contact-bars connecting the said plungers in pairs to leave an electrically free and undisturbed space between the said bars, and a current-conveying trolley adapted to engage the said bars, substantially as shown and described.

2. An electric railway having a series of normally-sealed switch-boxes spaced a distance apart, contact-bars each connecting a number of said switch-boxes so as to leave an electrically free and unobstructed space between said bars a main supply-conductor connected to and supported by said switch-boxes and sealed and protected throughout its length, a fixed contact in said boxes normally connected to the exposed parts of said main conductor therein, a movable contact in said boxes, a reciprocatory plunger connected to said movable contact and projecting upon the exterior of the boxes, and a number of mechanically-separated current-conveying trolleys or collectors placed a greater distance apart upon the motor-car than the distance between said contact-bars and arranged to engage the latter, whereby electrical connection is made between said main supply-conductor and the car-motor.

3. An electric railway having a series of sealed switch-boxes spaced a distance apart and connected in pairs, a main supply-conductor connected to said switch-boxes and sealed and protected against moisture or other deleterious influences but bared upon the interior of said boxes, suitable contacts within said boxes, contact-bars connecting the boxes forming a pair with each other to leave an electrically clear space between the ends of adjacent bars, and a number of mechanically-separated current-conveying trolleys placed on a car a greater distance apart than the space between the ends of said contact-bars.

4. An electric railway having a series of sealed switch-boxes, a sealed main conductor, a flexible contact in said switch-boxes connected to said main conductor, a reciprocatory contact-plunger applied one to each box having a contact-face normally separated from said contact within said boxes and having a body which projects upon the outside of the latter, contact-bars connecting with pairs of said plungers to form an electrically clear space between the ends of said bars, and a number of mechanically-separated current-collectors placed a greater distance apart on the car than the space between said ends of said contact-bars.

5. In an electric railway, a series of manhole frames spaced a distance apart and provided with lugs on their under surfaces, a series of switch-boxes having flanges detachably engaging said lugs and removable by lateral movement, a movable lock for preventing such movement, a removable cover for said frames, a main supply-conductor insulated and protected at every point throughout its length, contacts located within said

boxes, and movable connections for placing said contacts in electrical connection with said main conductor, substantially as herein specified.

6. In an electric railway, a trolley, or collector-arm, made with two normally vertically alined parts or sections hinged or pivotally connected, a contact-wheel on one section, a guide-wheel on the same section but separate from said contact-wheel, and a spring connecting said sections to simultaneously urge both of said wheels against the surface with which they contact.

7. In an electric railway, a conduit-trolley or collector-arm having an enlargement, another arm hinged to the first-mentioned arm and extending into the conduit, a spring connected to both arms, a socket extending transversely of the conduit and connected to some portion of a car-truck or motor-frame and provided with a slot or opening, said enlargement loosely engaging said socket, and proper connections whereby upon accidental derailment of the car the said enlargement will be dislodged from said socket and injury of said trolley-arm and devices in the conduit will be prevented.

8. An electric railway having a series of sealed switch-boxes spaced a distance apart, contact-bars each connecting a number of said switch-boxes with a space between said bars, bridge-bars made of suitable material separate from and arranged in the space between the ends of said contact-bars but independent thereof for supporting the trolleys when passing from one contact-bar to another, whereby a practically continuous guide for said trolleys is provided, said bridge-bars being insulated from the conduit, a main supply-conductor connected to said switch-boxes, and a trolley or current-collector carried by a car and adapted to pass over and engage said contact-bars and said bridge-bars, substantially as herein described.

LOUISE SCHERPE,
Administratrix of the estate of John F. Scherpe, deceased.

Witnesses:
JULIUS LINGENFELDER,
ADOLPH MUNTER.