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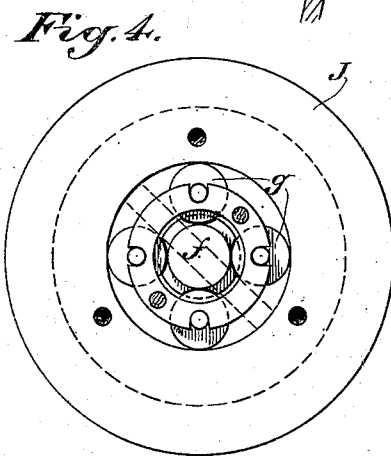
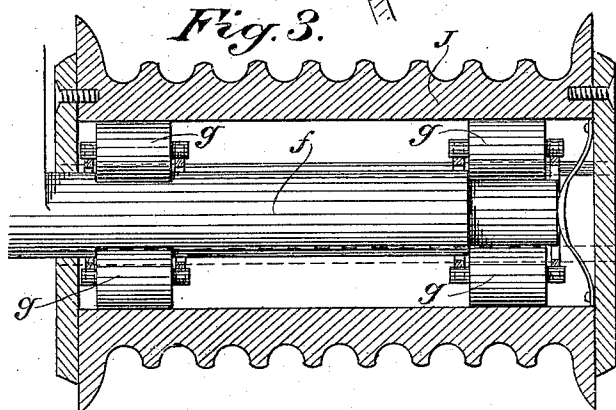
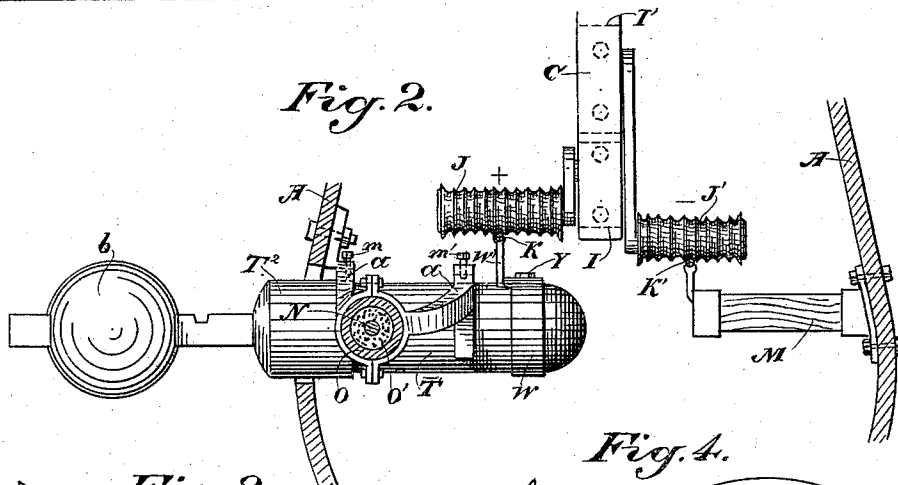
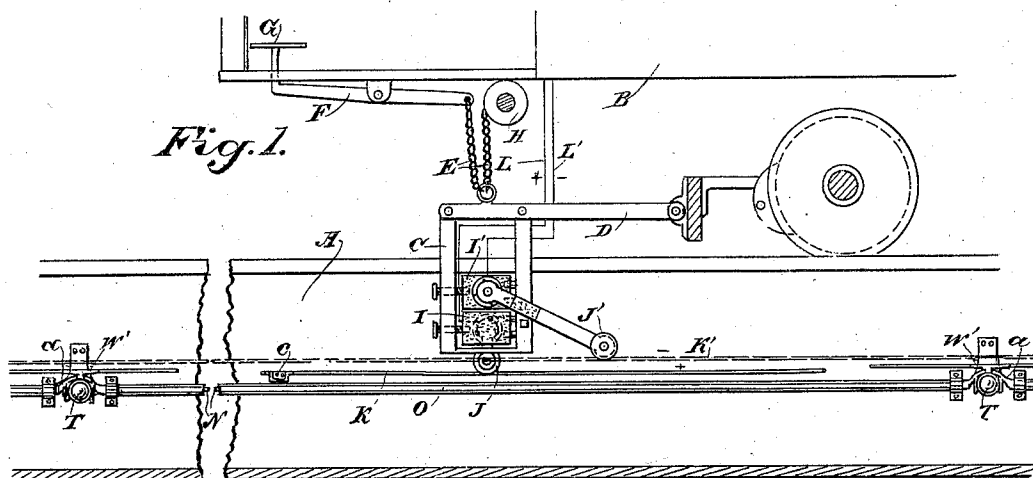
3 Sheets—Sheet 1.

A. ROSENHOLZ.

SECTIONAL CONDUCTOR SYSTEM FOR ELECTRIC RAILWAYS.

No. 535,297.

Patented Mar. 5, 1895.



Witnesses,
W. H. Brown
J. F. Aschbeck

Inventor,
Alfred Rosenholz.
By Dewey & Co. atty

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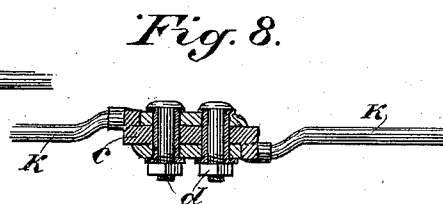
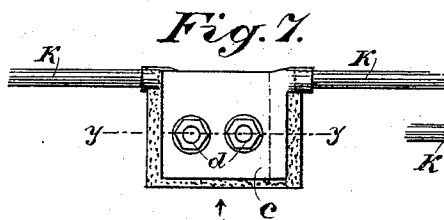
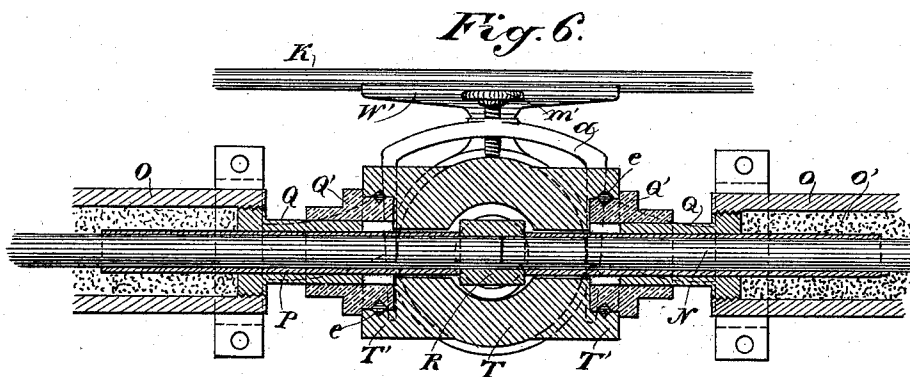
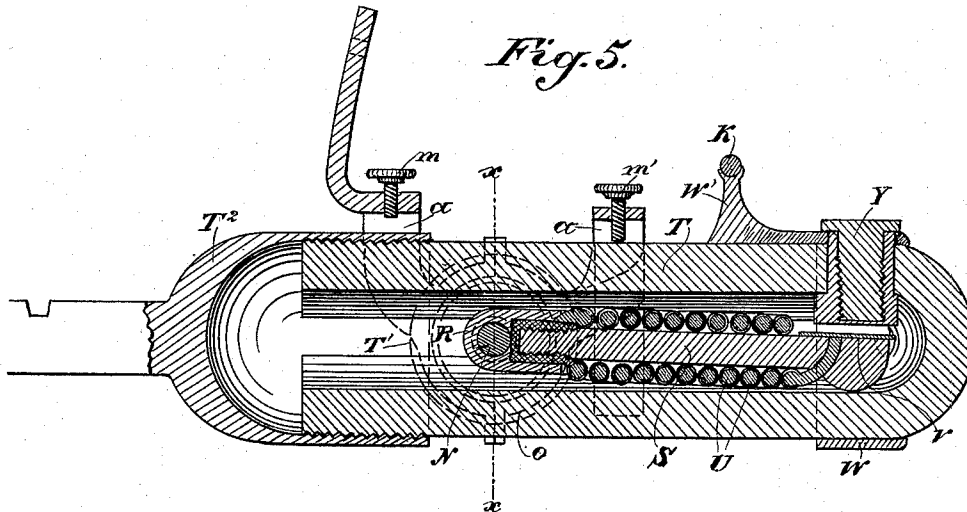
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J. H. H. H.
J. F. Aschbeck

Inventor,
Alfred Rosenholz.
By Dewey & Co. atty.

(No Model.)

3 Sheets—Sheet 3.

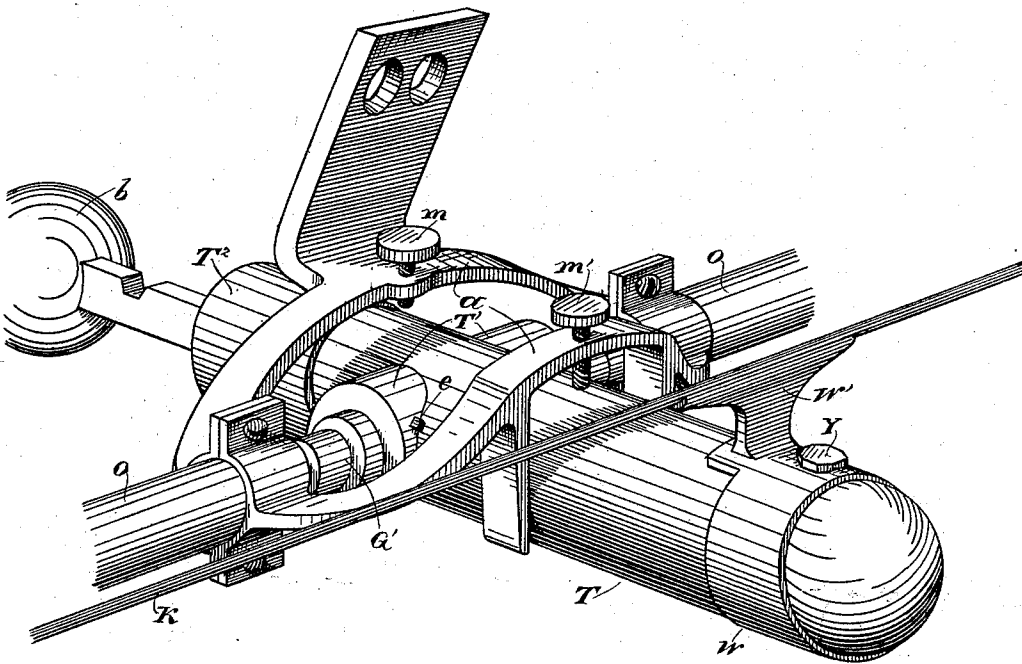
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Fig. 9.



Witnesses,
 B. Source
 H. F. Aschbeck

Inventor,
Alfred Rosenholz.
By Dewey & Co. atty

UNITED STATES PATENT OFFICE.

ALFRED ROSENHOLZ, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO SAMUEL J. CLARKE AND HARVEY S. BROWN, OF SAME PLACE.

SECTIONAL-CONDUCTOR SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 535,297, dated March 5, 1895.

Application filed October 11, 1894. Serial No. 525,628. (No model.)

To all whom it may concern:

Be it known that I, ALFRED ROSENHOLZ, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Distributing-Switches for Conduit Electric Railways; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in electric railways in which the conducting wires are adapted to pass underneath the ground, and it consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a part of the front end of the car, and a sectional view of the underground tube, showing my device in its connection with the car. Fig. 2 is an enlarged transverse section of a part of the underground tube, showing the attachment of the trolleys for positive and negative currents, and the switch by which the positive current is allowed to pass to the car or is cut off therefrom. Fig. 3 is an enlarged sectional view of one of the trolleys. Fig. 4 is an end view of the same. Fig. 5 is a longitudinal sectional view of the switch. Fig. 6 is a sectional view taken through $x-x$ of Fig. 5. Figs. 7 and 8 are views showing the connection of the trolley wires and their insulation from each other. Fig. 9 is a perspective view of the switch and its connections.

This invention is adapted to be used in conjunction with a tube or tunnel which has been built for the cable railway, when it is desired to transform the cable road into an electric road, or it may be employed on entirely new work, in which case the tube or tunnel may be built as may be desired.

A is the tube or tunnel.

B represents a car adapted to travel upon the track, and having a yoke or frame-work C connected with it by a lever arm D fulcrumed to some part of the car or truck frame, as shown, so that the yoke C extends down through the slot into the tube or tunnel. This yoke C is suspended by links or chains E, one of which is connected with the lever F fulcrumed beneath the car platform and having

a treadle G, by which the motor-man can instantly raise the yoke C so as to break any contact with the conducting wires, to be hereinafter described, by lifting the yoke C and the devices carried by it. The other chain E passes over a pulley H, and leads thence to the opposite end of the car, so that the device can be operated from either end.

The yoke C has fixed within it, by suitable holding pins or screws, the insulated blocks I and I', in one of which the corrugated roller or trolley J is supported, and in the other the roller J'.

The roller J forms connection with the wire K, through which a positive current is transmitted under proper conditions, and by means of connecting wires shown at L (Fig. 1) the current passes to the motor upon the car. Returning thence upon the wire L' it passes out through the roller J', thence to the negative wire K' which is supported upon insulated brackets M fixed to the side of the tube A.

The main conducting wire N is inclosed within a tube O, and surrounded by a body of non-conducting cement or material which prevents any loss of current during its transmission, and enables me to use a current of high voltage.

At intervals the switching mechanisms are interposed in the length of this wire, so as to conduct the current from it to the supplemental or trolley wire K which extends along parallel with it and at a short distance from it.

The main conducting wire N, the outer tube O and the non-conducting cement O' in which the wire is embedded are well shown in Fig. 6. The adjacent ends of the tubes O within which the main conducting wire N is inclosed are separated from each other at each point where a distribution switch is to be introduced, a distance sufficient to receive the switch. At this point the wire N is surrounded by a tape or other suitable insulating coating or jacket P which extends into the cement within the pipes O, and thus continues the insulation of the conductor to a point between the ends of the pipes where the switch is to be placed.

This switch consists of an outer casing T, closed at one end, open at the other, and having the sides formed with slots or channels

which will allow it to be fitted over the conducting wire N, so that when it is in position it projects at right angles from the conductor as shown in perspective, Fig. 9. This casing is made of glass or other suitable insulating material and has necks T' projecting from its sides to serve as journals about which the casing has a small tilting motion. This casing is journaled or supported as follows: Q are sleeves surrounding the insulating coating or covering P, and these sleeves are screw-threaded so as to be screwed into the ends of the pipes O. The projecting necks T' of the casing T have annular recesses formed in the ends, into which are fitted the rubber or other insulating collars Q', and these collars surround and bear upon the sleeves Q so as to form a support for the switch, and to allow it a certain amount of movement for the purpose of making and breaking contact as will be hereinafter described. The interior of these recesses and the outside of the collars Q' are channeled so as to receive flexible strips *e* which are introduced into the channels through openings in the sides, and serve as a packing to make tight joints between the casing and collars, and also to retain the parts locked together. Around the closed end of the casing is a metal collar or ring having a standard W' projecting upwardly from it, and adapted to support the supplemental trolley wire K. A brass or other metal sleeve W, closed by a thin plate at the bottom, is inserted into an opening made in the end of the casing, and passing up through the ring to which the standard W' is fixed. This sleeve is introduced from the interior of the casing, and an iron screw plug Y is screwed into the sleeve W, thus locking it in place. Around the conducting wire N, within the casing T, is secured a band or strap R, and to this strap is fixed an iron core S which extends within the hollow casing T to a point just beneath the sleeve W which is fixed as before described in the closed end of the casing. This core is surrounded by a coil of insulated wire U, one end of which is connected with the conductor N, and the other is secured to a copper plate V which lies directly beneath the lower end of the sleeve W, so that when the casing T is depressed, the sleeve W will form contact with this copper plate, and will thus make a connection between the main conductor N, through the coil and the sleeve W, with the trolley wire K, and when the casing is tilted so as to separate these parts, the current will be cut off.

It will be seen that by reason of the band R which is secured to the conductor N, the core will always remain stationary, while the outer casing T journaled upon the sleeves Q, as previously described, can be tilted with relation to the core so as to make or break the contact.

The open end of the casing T has a cap T² screwed upon it, and an extension arm from the end of this cap is adapted to carry a

weight *b* which is sufficient to depress that end of the casing and correspondingly raise the opposite end to break the contact between the plate V and the sleeve W whenever that end is released from pressure.

a' is a yoke having one end fixed to the side of the tube or tunnel A, and this yoke incloses and supports the ends of the pipes O and the journals in which the switch is supported, and an extension of it beyond the journals receives the adjusting screw *m'*. The screw *m* serves to regulate the movement of the opposite end of the switch, and the two limit its movement as may be desired.

The operation will then be as follows: When the trolley J comes along, it presses upon the wire K, and forcing the end of the casing T down, forms a contact between the block Y and plate V, and thus allows a current of electricity to pass from the wire N through the wire U, the plate V, block Y to the trolley wire K and thence through the trolley J to the car, whence it again returns through the trolley J' to the returning wire K' by which the connection is made with the source of electric energy. As soon as the contact is completed and the current begins to flow through the coil, the core will become magnetic, and will be attracted to the block or plug Y which forms an armature for the magnet, so that the contact will be maintained perfect, and there will be no sparking by reason of any jarring or temporary separation of the contact surfaces. It will thus be seen that the current passes from the main conductor N into a short length of the trolley wire K through which the current is to be transmitted to the car. These wires K are made of any desired length and are connected together as shown in Figs. 7 and 8, by means of an intervening non-conducting plate *c*, to the opposite sides of which the adjacent ends of two meeting sections of the wire K are secured by insulated bolts, as shown plainly at *d*, Figs. 7 and 8. As fast as the trolley passes from one section to another, the switches will be tilted by the counterweight, and the casing T raised so as to break the connection between the parts V and W, and thus cut off the current at that point.

It will be seen that the core S with the surrounding wire U, being connected directly with the conductor N, remains approximately stationary, while the casing T carrying the parts W and Y and the wire K, tilts very slightly about its journal or pivotal points of support upon the sleeves Q.

The trolleys J may be mounted in any suitable manner upon shafts *f*, preferably by the use of intermediate roller or equivalent anti-frictional bearings as shown at *g*.

The rollers J and J' are of considerable length, and are provided with a great number of grooves around their surfaces so that the wires K or K' will be certain to engage the trolley rollers when the latter are passing.

By this device I am able to prevent a large

portion of the loss of current, especially at a high tension, by confining it to a conductor which is thoroughly insulated and protected, and only transmitting a current from said conductor at the point where the car may be passing at the instant when the current is wanted and cutting it off immediately after the car has passed. It enables me to employ an increased voltage, and use less copper.

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

1. In a conduit electric railway, a main conductor supported within the conduit, a supplemental wire extending parallel therewith and intermediate mechanism comprising insulated casings swiveled to turn about the main conductor and projecting at right angles therefrom, and suitable contacts whereby a current may be taken from the main wire and transmitted to the trolley wire during the passage of the car, a trolley connected with the car by a vertically movable yoke adapted to pass down into the conduit through a slot therein and a mechanism whereby the yoke may be raised or depressed with relation to the conducting wires.

2. In a conduit electric railway, the main insulated conducting wire, a supplemental trolley wire extending parallel therewith and formed in independent sections, a mechanism comprising insulated casings swiveled to turn about the main conductor and projecting at right angles therefrom, and suitable contacts, said casings being interposed between the main conductor and the trolley wire whereby a current of electricity is diverted from the main to the supplemental trolley wire whenever a car is passing, a yoke suspended from the car and capable of elevation or depression in the slot of the conduit, and trolleys supported from said yoke, being connected with the trolley wire when the yoke is depressed and raised out of contact therewith when the yoke is raised.

3. In a conduit electric railway, a main conducting wire and a supplemental trolley wire parallel therewith, a casing arranged at right angles to the main conductor, and adapted to swivel about the same, and within which the main wire is embedded and insulated, switches at intervals connecting with said main conducting wire, carrying upon their inner ends the supplemental trolley wires, trolleys carried by yokes or frames depending from the car into the tube or tunnel and adapted to form contact with the trolley wires to depress the switch and make connection between the trolley wires and the main conducting wire.

4. The switches consisting of tubular casings of insulating material projecting at right angles from the main conductor and journaled to turn about it as a center, soft iron cores fixed to the conductor extending into the insulated casings and surrounded by coils of insulated wire which connect the main con-

ductor with insulated contact plates at the outer ends of the cores, corresponding contact plates fixed in the casing and connected with trolley wires which are supported upon said casings so that when a trolley forms contact with the wire and depresses it, the ends of the casing will also be depressed to form contact between the interior plates.

5. The switches consisting of exterior insulated casings swiveled to turn about the main conductor and projecting at right angles therefrom, cores fixed to the conductor and projecting into the tubular insulated casings, insulated wires surrounding said cores having one end connected with the main conductor and the other with insulated contact plates at the ends of the cores, corresponding contact plates fixed within the casing and connected with the trolley wire which is supported upon the movable ends of the casings whereby the latter are depressed to form contact between the interior plates when a trolley upon the car comes in contact with the trolley wire, and a weight fixed to an extension upon the opposite end of the casing whereby the casing is tilted so as to break the contact as soon as the trolley has passed.

6. A main conductor inclosed in tubes surrounded by non-conducting cement, yokes fixed to the interior of the conduit or tunnel and adapted to support the adjacent ends of the conductor tubes at points where the switches are introduced between them, switches consisting of non-conducting casings fitting over the main conductor between the ends of the pipes in which it is carried, a non-conducting tape or film inclosing the conductor where it emerges from the tubes, sleeves surrounding the conductor and screwing into the ends of the tubes, insulating collars journaled to turn upon said sleeves and fitting into the sides of a tubular insulated casing which projects at right angles from the conductor, said casing supporting a trolley wire at its inner closed end with connection between said trolley wire and a contact plate in the interior of the casing, a soft iron core fixed to the main conductor and extending within the casing to a point adjacent to the contact plate thereof, an insulated wire having one end connected with the main conductor coiling around the core with the opposite end connected with an insulated contact plate at the end of the core whereby contact is formed between the two plates when the trolley wire is depressed by a passing trolley, and contact between the plates is broken by a counterbalance weight at the opposite end of the casing which raises the opposite end after the trolley has passed.

7. A switch mechanism adapted to distribute an electric current from the main conductor to supplemental trolley wires, and thence to the car through trolleys carried thereby, said switch consisting of a core with surrounding insulated wire fixed to the main conductor and projecting at right angles therefrom,

having an insulated contact plate at its outer end with which the end of the wire coil is connected, an insulated tubular casing surrounding said core and journaled to turn about the main conductor by means of sleeves and insulated collars, a trolley wire supported upon the inner movable end of the casing and connected with a contact plate interior thereto and corresponding in position with the contact plate of the interior core, a counterbalance weight at the opposite end of the casing whereby the latter is normally tilted so that the contact plates are separated from each other when a trolley is not in contact with a trolley wire and adjusting screws *m m'* whereby the movement of the switch is regulated.

8. The switch consisting of the interior fixed core projecting at right angles from the main conductor having a surrounding insulated coil one end of which connects with the conductor, and the other with an insulated contact plate at the end of the core, an exterior counterbalanced, insulated casing journaled to tilt about the main conductor having a contact plate adapted to form contact with the stationary contact plate of the core when the casing is depressed at this point, and to break the contact when the casing is raised, a trolley wire supported upon this movable end of the casing, a grooved trolley carried by a yoke upon the car adapted to form contact with the trolley wire and depress it and the casing so as to form contact between the plates while the car is passing, said contact being broken by the action of the counterbalance after the car has passed.

9. A main conductor inclosed and insulated in tubes made in lengths, an inclosing conducting band soldered thereto, an iron core connected with and insulated from the band, an insulated coil surrounding the core having one end connected with the conductor and the other with a contact plate, an inclosing non-conducting casing with slotted sides and hollow necks projecting from the sides, insulating collars fitting the recesses in the necks, channels made in the collars and the necks, flexible locking strips fitting the channels, a closing cap at the opposite end of the casing, and a filling of non-conducting cement between the cap and the main conductor.

10. A distributing switch for electric conduits, consisting of a stationary core or conductor fixed and projecting at right angles

with the main conductor, a sealed insulating casing fulcrumed and turnable about the main conductor, and inclosing the core, a trolley wire supported from the movable end of the casing, and connected with a contact plate adjacent to the free end of the core and movable with the casing, said casing being movable about its fulcrum points to connect the contact plates within the casing, when the trolley wire is depressed by a passing trolley contacting therewith.

11. A distributing switch for electric conduits, consisting of a stationary core insulated from and projecting at right angles with the main conductor, a sealed insulating casing inclosing the core and movable with relation thereto about the main conductor, a trolley wire supported upon the movable end of the casing in the path of passing trolleys and depressible thereby, a contact plate and armature fixed to the casing adjacent to the core, and connected with the trolley wire, and an insulated coil surrounding the stationary core, having one end connected with the main conductor and the other with a contact plate at the free end of the core, whereby a current is transmitted when the contact plates are brought together, and the core is rendered magnetic.

12. An electric conduit and distributing switch, consisting of a hermetically inclosed and insulated main conductor having contact points exposed at intervals, sealed insulating casings with insulating journals turnable about the main conductor and inclosing the exposed portions thereof, said casings supporting independent sectional trolley wires upon the movable ends, and interior contact plates and armatures connected with the trolley wires, stationary cores fixed to and insulated from the main conductors, projecting within the insulating casings and having contact plates adjacent to those carried by the casings, and insulated conducting wires coiled about the core, connected with the main conductor at one end and with the contact end of the core at the opposite end.

In witness whereof I have hereunto set my hand.

ALFRED ROSENHOLZ.

Witnesses:

GEO. T. KNOX,
M. TRANOR.