(No Model.)

G. WESTINGHOUSE, Jr.

ELECTRIC RAILWAY SYSTEM.

No. 560,452. Patented May 19, 1896.

Fig. 1.

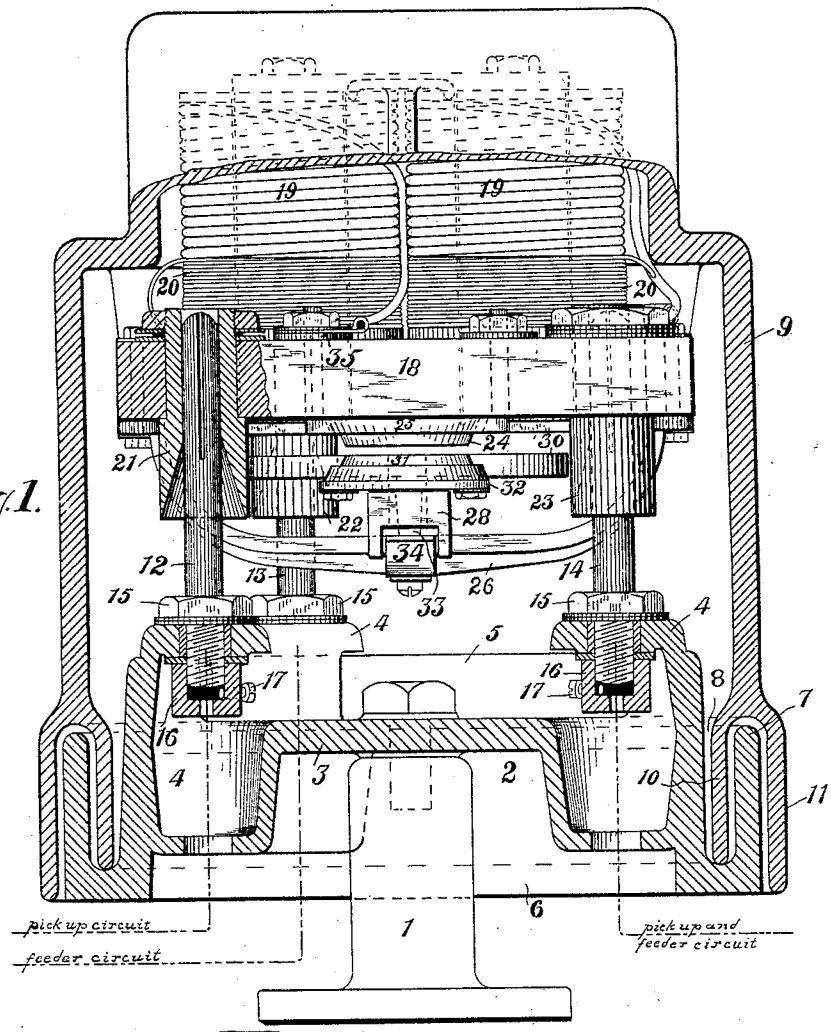
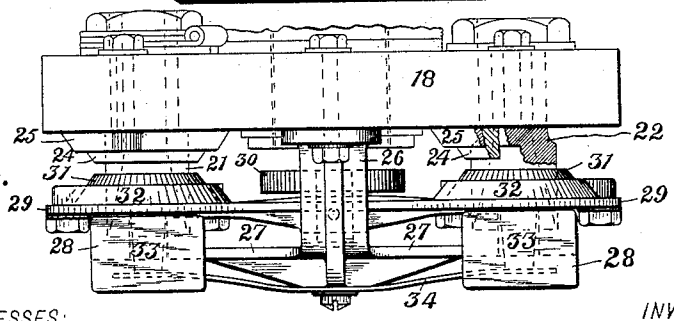


Fig. 2.



WITNESSES:

Ethan D. Dodds

Hubert C. Tener

INVENTOR

George Westinghouse Jr.

BY

Terry, MacKaye & Carr

ATTORNEYS.

UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE ELECTRO-MAGNETIC TRACTION COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 560,452, dated May 19, 1896.

Application filed July 27, 1895. Serial No. 557,378. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., a citizen of the United States, residing in Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric-Railway Systems, (Case No. 654,) of which the following is a specification.

My invention relates to automatic switches for use in connection with electric railways, and has particular reference to devices of this character which are employed in connection with railway systems in which exposed contacts are located at intervals along the track and are so connected and arranged as to be energized only when the current-collecting devices carried by the car are in contact therewith.

One of the objects of my invention is to provide a switch and a box or casing therefor so constructed and arranged that the necessary electrical connections with the pick-up and feeding conductors will be made by merely placing the switch-box cover or bell and the attached switch in position, thus doing away with all fastening means between the cover and the base and all binding-posts or other fastening devices requiring manipulation in order to remove the switch or the cover.

A further object of the invention is to provide means whereby the action of the magnet upon the armature may be supplemented at the beginning of the movement of the latter, when the pull of the magnet thereon is weakest, and also means whereby any binding action due to unequal movement of the two movable contacts may be obviated.

With these ends in view I have devised the improvements shown in the drawings and hereinafter described and claimed, which are designed for use in connection with the electric-railway system shown and described in the patents of Malone Wheless, No. 524,773, of August 21, 1894, and No. 534,238, of February 12, 1895, and which constitute improvements upon the structure covered by the said patents.

Referring to the drawings, Figure 1 is a view, partially in section and partially in side elevation, of a switch and its inclosing casing embodying my improvements; and Fig. 2 is a side elevation of a portion of the switch at right angles to the position shown in Fig. 1.

Referring now in detail to the several features shown in the drawings, 1 is a supporting-block which may be bolted or otherwise fastened to a suitable foundation, and 2 is the bottom of the switch-box, supported upon and bolted to the said supporting-block 1. This bottom 2 consists of an elevated horizontal portion 3, provided with three hollow bosses 4, projecting some distance above and below the same and also provided with an upwardly-projecting flange 5, these several parts constituting a pan or receptacle which is in practice filled with some insulating and moisture-excluding solid or semisolid—such, for example, as paraffin-wax. A flange 6 projects downwardly from the part 3, and joined to it at its bottom is an external flange or rim 7, the two forming a trough or channel 8, which when the apparatus is in use is filled with oil or some other suitable insulating and moisture-excluding liquid.

9 is the bell or cover, provided at its lower edge with two rims or flanges 10 and 11, the former of which extends into the channel or trough 8 and rests upon the bottom of the same, and the latter of which extends outside the rim or flange 7, preferably to the bottom thereof.

The features thus far described, while preferably employed in connection with my invention, form no part thereof.

12, 13, and 14 are pins constructed of good conducting material, the upper ends of which are preferably split, as shown, and the lower ends of which are screw-threaded and extend through the openings in the upper ends of the bosses 4. These pins are suitably insulated from the bosses by means of insulating sleeves and washers, as shown, and are firmly secured in position by means of nuts 15 above and caps 16 below the portions of the bosses 4 through which they project. The lower ends of the pins and the lower ends of the caps 16 are perforated for the insertion of the conductors and the caps are provided with suitable binding-screws 17.

18 is a slab or plate of insulating material rigidly fastened to the upper portion of the bell. To the upper side of this slab are bolted the spools of the electromagnet, each of which has a coil 19 for the main current and a coil 20 for the pick-up current.

21, 22, and 23 are metal sockets fitting corresponding perforations in the slab 18 and fastened therein by means of binding-nuts and washers, as shown. These binding-nuts and washers are also employed to make good electrical connection between the sockets and the feeder and pick-up conductors, as will be hereinafter more fully described. Each of these contact-sockets 21, 22, and 23 is provided through the major portion of its length with a cylindrical opening of the right size to closely fit the corresponding split pin, which engages therewith. The lower end of this opening in each of the sockets is flared into frusto-conical form in order to insure the ready engagement of the respective pins therewith when the bell or cover is placed in position.

24 are carbon contact-plates clamped to the slab 18 by means of bolts and clamping-rings 25.

26 is a metal yoke also bolted to the slab 18 and provided with lateral arms 27, each of which has a block 28 at its outer end provided with a cylindrical opening extending vertically through the same. The yoke 26 and its connected parts above described preferably constitute a single casting, though the parts may be separately formed and subsequently fastened together, if desired.

29 is a supporting-bar, upon which is mounted the armature 30, and which at its outer ends supports carbon contact-plates 31, these plates being clamped to the supporting-bar 29 by means of clamping-rings 32 similar to the rings 25 above described. Depending from the plate or bar 29 are tapered pins or lugs 33, which rest in and are guided by the perforations in the blocks 28. These tapered pins or lugs rest upon the ends of a leaf-spring 34, which is bolted at or near the middle to the lower side of the yoke 26. It will thus be seen that this spring 34 constitutes in effect two springs, one for each end of the supporting-bar 29, each serving as a cushion for the corresponding end of said bar and the parts carried by it when they drop under the action of gravity upon the interruption of the current through the electromagnet. The spring also assists, by its upward pressure, in raising the bar and the contact-plates and armature during that portion of the movement when the pull of the magnet is weakest. When the supporting-bar 29 is raised by the magnet, it sometimes happens that it becomes slightly tilted from the horizontal, and this movement would tend to have a binding action and thus prevent its free movement except for the shape of the lugs or pins 33. While this tapered form of the lugs does not prevent the tilting or rocking movement it insures freedom of the bar and its attachments toward and away from the magnet and stationary contacts.

When the bell or cover 9 is in position, as shown in Fig. 1 of the drawings, and the collecting-bars are in engagement with the contact-pins projecting above the surface of the roadway, the current from the auxiliary source employed for picking up the armature will pass into the connecting-pin 12, thence through the socket 21, the coils 20, the socket 23, and pin 14, and out, thus producing a sufficient magnetic field to attract the armature and bring the movable carbon contact-plates 31 into engagement with the stationary plates 24. The insulated feeding-conductor is at all times connected with the pin 13, as indicated in the drawings, and the corresponding socket 22 is electrically connected with one of the clamping-rings 25, as shown at the right in Fig. 2. The other contact-plate 24, through its clamping-ring 25 and the nut and washers shown at 35 in Fig. 1, is connected to one terminal of the coils 19, the other terminal of these coils being joined to the corresponding terminal of the coils 20 and connected by a nut and washers to the socket 23, with which the pin 14 engages. It will thus be seen that when the armature is attracted by means of the current sent through the coils 20 and the carbon contacts brought into engagement the main or supply circuit will be completed from pin 13 through socket 22, the carbon plates 24 and 31, (shown at the right in Fig. 2,) the supporting-bar 29, the two carbon plates at the other side, the coils 19, socket 23, and pin 14, and thence to the return-conductor.

While I have illustrated and described certain specific details of construction, I desire it to be understood that these details may be varied as regards both the structure and the arrangement of many of the parts without departing from the spirit and scope of the invention.

I claim as my invention—

1. In a circuit-closing switch for electric railways, an armature and contact-plates and a loosely-mounted support therefor provided with downwardly-projecting pins or lugs, and a spring on which said pins or lugs rest.

2. In a circuit-closer, the combination with a loosely-mounted, vertically-movable bar or plate provided with contacts and actuated in one direction by a magnet and in the opposite direction by gravity, of a spring for supporting each end of the bar or plate when the magnet is inactive and supplementing the action of the magnet when its pull is weakest.

3. In a circuit-closer, the combination of a stationary electromagnet and contacts, and a movable bar provided with an armature and contacts and having tapered lugs loosely fitting cylindrical guiding-sockets, with a spring upon which said tapered lugs rest.

4. In a switch-box, a stationary base provided with upwardly-projecting pins insulated from said base, in combination with a

bell or cover carrying an electromagnet, its movable armature and stationary and movable circuit-closing contacts and provided with circuit-terminal sockets engaging with said pins.

5. In a switch-box, a stationary base provided with contact-terminal pins insulated therefrom, said pins being split at their upper ends and provided with binding-posts at their lower ends, in combination with a removable cover or bell having an insulating slab or plate carrying a circuit-closing magnet and contacts and being provided with metal sockets having flaring lower ends and making close electrical connection with the split ends of the pins when the bell is in position.

6. A switch-box having a stationary bottom provided with circuit-terminals and a protecting bell or cover carrying the switch and provided with terminals making frictional contact with the first-named terminals, the engagement of said contact-terminals and the weight of the cover being the sole means of attachment between the latter and the bottom.

7. The combination with an air-tight switch-box having a removable cover, of two sets of frictionally-engaging contacts supported respectively by the stationary bottom and the removable cover, and means for connecting outside conductors with said contacts through the bottom of the box, whereby the cover may be removed without disturbing said connections.

In testimony whereof I have hereunto subscribed my name this 25th day of July, A. D. 1895.

GEO. WESTINGHOUSE, JR.

Witnesses:
H. A. CROOKS,
W. G. CARR.