(No Model.) 2 Sheets—Sheet 1.

H. A. F. PETERSEN.

ELECTRIC APPLIANCE FOR RAILWAYS.

No. 550,132. Patented Nov. 19, 1895.

Fig. 1.

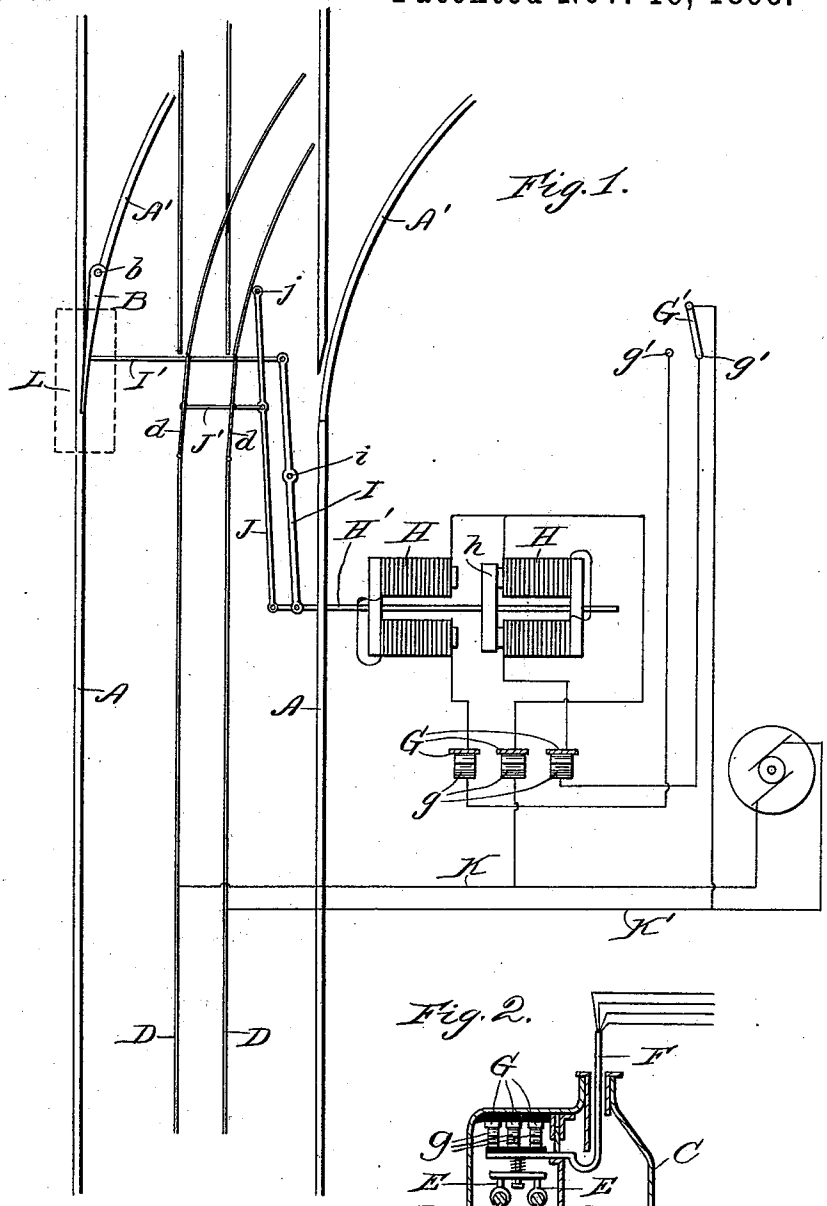

Fig. 2.

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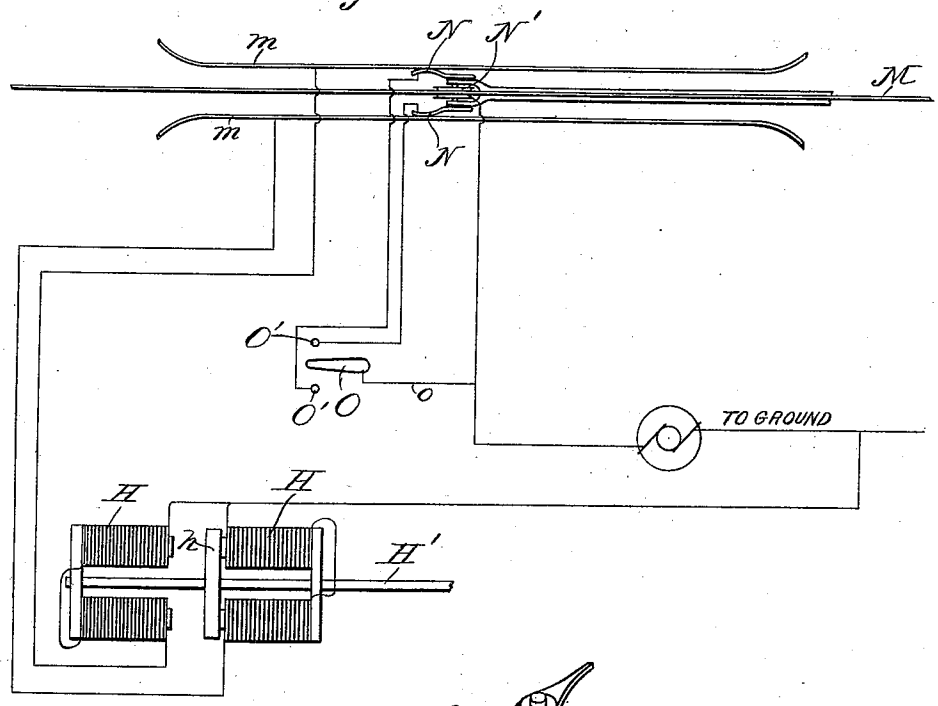
Fig. 3.



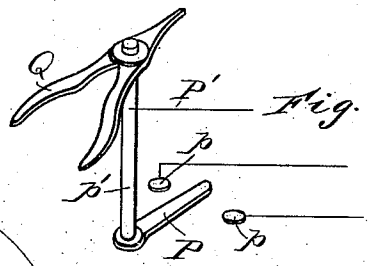
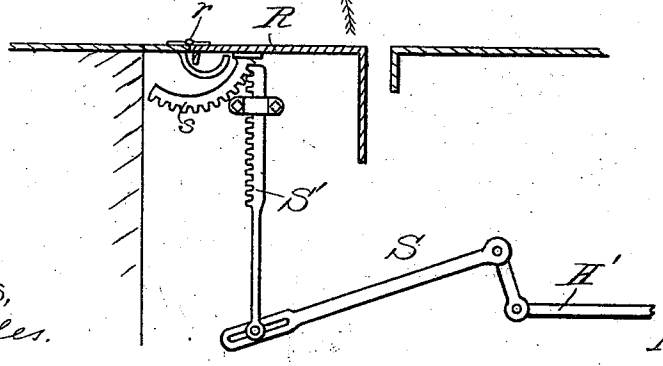


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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ELECTRIC APPLIANCE FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 550,132, dated November 19, 1895.

Application filed March 19, 1894. Serial No. 504,249. (No model.)

To all whom it may concern:

Be it known that I, HERLUF A. F. PETERSEN, a citizen of the United States, residing at Milwaukee, county of Milwaukee, State of Wisconsin, have invented a certain new and useful Improvement in Electrical Appliances for Railways; and I 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in electrically-actuated apparatus for adjusting the movable switch rails or tongues of electric railways or for moving or adjusting any other movable devices in or adjacent to the line of an electric railway; and my said invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a diagrammatic view illustrating one form of my apparatus arranged in connection with underground electric conductors and adapted to simultaneously adjust the switch-tongue and the movable sections of the conductors within the underground conduit. Fig. 2 is a transverse vertical sectional view of a conduit equipped with my improved apparatus, and shows a contact-carrier arm supported from a car in operative connection with the apparatus within the conduit. Fig. 3 is a diagrammatic view of a somewhat different form of my apparatus, showing the same as adapted for use in connection with overhead wires. Fig. 4 is a detail perspective view of switch mechanism for controlling the electromagnets and designed for location within a conduit and adapted for operation by a suitable actuating device carried by a car. Fig. 5 illustrates a modification of my improved apparatus adapted to operate a movable manhole-cover.

Referring by letter to said drawings, A A designate the main-track rails of an electric railway, and A′ A′ the rails of a side or branch track leading therefrom.

B designates the movable switch-tongue, pivoted in the usual manner at *b* and adapted to be adjusted in a familiar manner, so as to direct the wheels of a car upon the track to the rails of the branch or side track, or to permit the car to continue upon the main track, according to the direction of adjustment of the switch-tongue.

C, in Fig. 2, designates an underground conduit.

D D designate the conductors located in the conduit and adapted for engagement by contact devices carried upon an arm supported beneath an electric car.

Any preferred form of contact devices may be employed to form electrical contacts with the conductors D D—such, for instance, as the contact-shoes E E, carried at the end of the contact-supporting arm F, suspended from the front of the car.

I provide suitable means upon the car controlled by an electric switch and electrically connected with the contact-shoes and adapted to form electrical contacts with suitable conducting strips or wires within the conduit C, whereby electromagnets may be energized, so as to move an armature in either direction desired, and said armature is operatively connected in any suitable manner with lever mechanism for adjusting the movable switch-tongue or movable sections of the conductors within the conduit, or both.

In the particular form of construction illustrated in Figs. 1 and 2, G G designate contact-strips supported upon the under side of the upper wall of the conduit, but insulated therefrom and adapted for electrical contact with contact-springs *g g*, carried by the arm F, but also insulated from said arm. A pair of electromagnets H H are arranged at any convenient point adjacent to the conduit, as within a manhole-casing, and a movable armature *h* is adapted to be attracted alternately by said electromagnets, being placed within the electrical field of both of the latter, so as to be attracted by either one of said magnets which happens to be energized. A longitudinally-movable rod H′ is operatively engaged with the armature *h*, and at its other end has operative engagement with a suitable lever I, pivotally supported at *i* and having operative connection at its other end with a connecting-rod or pitman I′, engaged with the movable switch-rail or tongue B, and it fol-

lows from this construction that in case either electromagnet H is energized the movement of the armature *h* due to the attraction of the electromagnet which is energized, will, through the medium of the rod H′ and the lever mechanism, serve to adjust the movable switch-tongue, thereby adjusting the switch so as to direct the wheels of a car onto the side or branch track or to permit the car to continue on the main track, according to the direction of movement of the armature.

As shown in Fig. 1 of the drawings, where my improved apparatus is employed in connection with underground conduits, it becomes necessary to adjust movable sections of the electric conductors within the conduit simultaneously with the adjustment of the switch-tongue, but in an opposite direction, and to this end I may employ a suitable lever J, operatively connected with the rod or bar H′ and pivotally supported at its other end, as at *j*, and having operative connection by means of a connecting-rod or pitman J′ with movable sections *d d* of the electric conductors D D. By reference to said Fig. 1 of the drawings, it will be seen that the lever I is of the first class, the fulcrum being located between the power and the load, while the lever J is of the second class, the load being applied between the fulcrum and the power, and it therefore follows that by the adjustment of the connected ends of said levers in one direction by means of the movable armature *h* and the rod H′ the connections I′ and J′ will be adjusted in opposite directions, and the movable switch-tongue B and the movable sections of the conducting-rails D D will be simultaneously adjusted in opposite directions, so that when the switch-tongue is moved into the position shown in the drawings, so as to direct the car to the branch or side track, the movable sections *d d* of the conductors will be adjusted into register with the conductors extending through the conduit of the side or branch track. Similarly the adjustment of the lever mechanism so as to move the switch-tongue into position to permit the car to continue upon the main track will simultaneously adjust the movable sections *d d* of the conducting-rails into register with the conductors extending through the conduit of the main track. As shown in diagram in said Fig. 1, I establish electrical connections between one pole of each electromagnet and the center one of the contact-strips G G, the other poles of said magnets being independently connected with the outer ones of the contact-strips G G, and the three springs *g g* being arranged to independently make electric contact with said strips G G. At any convenient point upon the car I provide suitable contact-posts *g′ g′*, which are independently in electrical connection with the outer ones of the springs *g g*, the center one of said springs being electrically connected with the conducting-wire K, which leads from one of the contact-shoes E to the motor through the arm F, and adjacent to the contact-posts *g′ g′* I arrange a switch-lever G′, adapted for engagement with either one of said contact-posts and electrically connected with the other wire K′, leading from the other one of the conductors D D to the motor. It follows from this construction that when the car has advanced to a position which will bring the contact-carrier arm beneath the contact-strips G G electrical connection will be established by means of the center one of the springs *g* between the center contact-strip G and the wire K and that by adjusting the switch G′ the motorman upon the platform of the car may cause current to traverse either one of the electromagnets H H, according to the adjustment of said switch.

As shown in the diagram, the switch-lever is shown in contact with the right-hand contact-post *g′*, in which condition current traverses the right-hand magnet H through the medium of the connecting-wires and the right-hand contact-spring *g* and the strip G. This energizes said electromagnet and draws the armature *h* to the right, thereby serving to adjust the movable switch-tongue B into the position indicated in the drawings, so as to guide the wheels of a car onto the side track, and at the same time adjusts the movable sections *d d* of the conductors into register with the conductors in the conduit of the branch or side track. By an opposite adjustment of the lever G′ it will be seen that the other magnet will be energized and a reverse movement of the parts effected.

As shown in Fig. 1 by the dotted lines, I prefer to provide beneath the movable switch-tongue a pit or chamber L, into which any dirt which may find its way between the switch-tongue and the track-rail may discharge, so as to prevent any liability of the switch-tongue sticking or binding on account of accumulated dirt.

In Fig. 3 I have illustrated in diagram a modification of my apparatus as applied to overhead trolley-wires. In this form of my device I employ the magnets H H, as before, located at any convenient point adjacent to the track and provided with the movable armature *h*, as before, and with the connecting rod or bar H′, which is engaged with a movable part to be adjusted. At a desired point along the line of the trolley-wire M, I provide a pair of contact wires or strips *m m*, arranged at opposite sides of said trolley-wire, and in such a position relative thereto as to be readily engaged by contact-springs N N, carried by the trolley-arm adjacent to opposite sides of the trolley-wheel N′, as shown. The electromagnets H H are independently connected with the respective contact strips or wires *m m* in the manner indicated in the drawings, and the other poles of said magnets are electrically connected with the return or ground wire upon the other side of the motor from the trolley connection.

At any convenient point upon the platform

of the car is provided a switch-lever O, connected electrically by the wire *o* with the wire which connects the trolley-wheel with one pole of the motor, and said switch-lever is adapted for electrical contact with either one of a pair of contact-posts O′ O′, which are independently connected with the contact-springs N N, carried at the upper end of the trolley-arm. These contact-springs N N are of course insulated from the trolley-arm, and the trolley-wheel and the contact-strips *m m* are likewise supported in any desired manner in insulating-supports, so as to keep them out of contact with the trolley-wire M. It follows from this construction that when the car has moved into a position beneath the trolley-wire M to bring the contact-springs N N into engagement with the contact strips or wires *m m*, as indicated in Fig. 3 of the drawings, the man upon the car-platform may by adjusting the switch-lever O cause either one of the electromagnets H H to be energized, as in the construction first described, so as to produce a movement of the armature *h*, the rod or bar H′, and the connected mechanism in a desired direction. Supposing lever O to be moved into a position to bring it into contact with the upper one of the contact-posts O′, current will obviously travel from the trolley connection through the wire *o*, contact-lever O, contact-post O′, and the connecting-wire to the lower contact-spring N. Thence along the contact strip or wire *m* and through the connecting-wire to the right-hand electromagnet H, and thence to the ground connection upon the other side of the motor. Similarly an adjustment of the switch-lever O in an opposite direction will effect an opposite adjustment of the parts. By this construction the electromagnets H H are connected in shunt with the motor, as is also the case with the form of connections shown in Fig. 1 and before described.

If desired, instead of the electric switch mechanism located upon the car, as before described, I may employ an electric switch P, adapted for electrical engagement with either one of a pair of contacts *p p*, leading to the electromagnets in the manner before described, and said switch being electrically connected by a wire P′ with one of the underground conductors or with the overhead trolley-wire, as the case may be. Upon the upper end of the post *p′* of the switch P is provided a suitable **V**-shaped cam-lever Q, adapted for engagement by any suitable device carried by a car, so as to adjust the switch into contact with either one of the contact-posts *p p* that may be desired, and thereby to cause either one of the electromagnets to be energized and a desired movement of the parts connected with the armature to be effected.

It will be understood that the lever Q is to be located above the surface of the ground in such a manner as to be readily engaged by any convenient form of device depending from a car, which by the forward movement of the car will serve to oscillate said lever Q, together with the post *p*, in an obvious manner. Such forms of actuating devices being common and well known, it is not deemed necessary to illustrate the same in this application, as any preferred one of a large number of such devices might be employed.

As shown in Fig. 5, other movable parts may be operatively connected with the electromagnets and adapted to be adjusted thereby—such, for instance, as the movable manhole-cover R, which is hinged at *r* and adapted to swing back in the direction indicated by the arrow. In the particular form of construction illustrated I have shown the connecting rod or bar H′ as operatively engaged with one arm of a bell-crank lever S, to the other arm of which is operatively secured one end of a rack-bar S′, meshing with a segmental gear *s*, which is secured to the hinged cover R, and it follows from this construction that by an adjustment of the switch mechanism which controls the electromagnets a movement of the bell-crank lever S, rack-bar S′, and the segmental gear *s* may be effected in either direction, so as to either raise or lower the manhole-cover R.

I would have it understood that I do not desire to limit myself to the exact form or forms of devices illustrated in the drawings and herein described, as various modifications might be made in details of construction without departure from my original invention, and that I would regard any form of devices which comprises a pair of electromagnets adapted for electrical connection with the circuit wires or conductors and arranged to move an armature in either direction, switch mechanism for throwing either electromagnet into or out of circuit, lever mechanism connected with the armature and with a movable part to be adjusted and a controlling device upon the car for governing the electromagnets, as coming within the scope of my said invention.

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

1. The combination in an electric railway with an underground conduit and its contained conductors, of suitable contact strips or wires, located within said conduit, and extending parallel with the conductors but insulated therefrom, a pair of electro-magnets, provided with a movable armature operatively connected by lever mechanism with the movable tongue of a switch in the track, and with movable sections of the conductors within the conduit, contact devices carried by the car and adapted for independent electrical contact with said strips or wires and a suitable switch upon the car adapted to be adjusted so as to throw a desired one of said electro-magnets into circuit, substantially as and for the purpose described.

2. The combination in an electric railway, of an underground conduit and its contained

conductors, a movable switch tongue in the railway track communicating with a side track, a branch conduit leading from the main conduit beneath the line of the side track, branch conductors therein, movable sections of the conductors adapted to be brought into register with the main or the branch conductors, and suitable electrically actuated mechanism for simultaneously producing opposite adjustments of the switch tongue and the movable sections of said conductors, contact strips or wires located within the conduit and having electrical connection with said adjusting mechanism, contact devices carried by a car, and adapted for engagement with said contact strips or wires, and a switch upon said car for controlling said contact devices, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

HERLUF A. F. PETERSEN.

Witnesses:

JOHN E. WILES,

M. M. WILES.