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SWITCH OPERATING MECHANISM FOR ELECTRIC RAILWAYS

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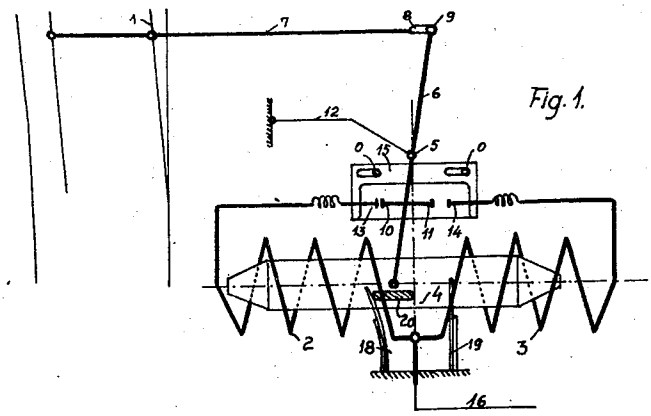

Fig. 1.

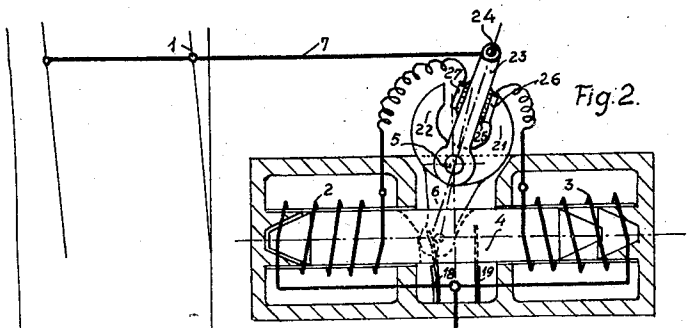

Fig. 2.

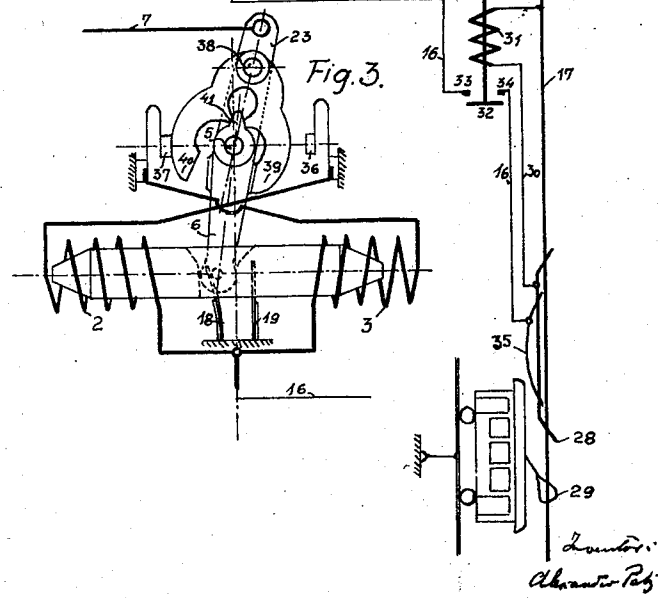

Fig. 3.

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SWITCH-OPERATING MECHANISM FOR ELECTRIC RAILWAYS

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This invention relates to a switch-operating mechanism for electric railways, by means of which the switch may be operated at will by the driver of the tramway-car or by the engine-driver.

The invention relates mainly to such switch-operating mechanisms, in which the pointed rail is operated by a lever or other transmission-means, in a manner known per se, from an electromagnet (solenoid), and it consists essentially in providing, in the elements connecting the iron-core of the electromagnet with the pointed rail, at any convenient point an idle movement necessary for reversing the exciter-circuit and functioning at the reversing of the direction of movement of the adjusting armature, said adjusting armature being loaded in its extreme position by a spring, weight or other force, having the tendency to push said armature back from its extreme position.

An embodiment of the invention is illustrated, by way of example, in the accompanying drawing, in which:

Fig. 1 shows diagrammatically a switch-operating mechanism of the preferred form of construction.

Figs. 2 and 3 show each a modified form of construction.

A double electromagnet 2, 3, having a common iron-core 4, serves for adjusting the pointed rails 1.

In the form of construction shown in Fig. 1 the armature 4 is connected to a lever 6 oscillatable around a pivot-pin 5 so that said armature 4, as soon as it is attracted by the electromagnet 2 or 3, makes said lever 6 oscillate in the one or other direction. The end of the lever 6 is connected by a pull rod 7 to the pointed rails 1.

Between the lever 6 and the pull-rod 7 an idle movement is inserted according to the invention, which is produced in this form of constructon by a bolt 9 of lever 6 engaging with a longitudinal slot of rod 7. On the lever 6 contacts 10 and 11 are mounted, which are earth-connected by a lead 12. Contacts 13 and 14 are arranged at a distance from the contacts 10 and 11 which is not greater than the idle movement of bolt 9 in slot 8, said contacts 13 and 14 being adapted to be moved along with the contacts 10 and 11, when these contacts bear against the contacts 13, 14 at the oscillating movement of the lever 6. With this object in view the contacts 13, 14 are mounted insulated in a bow-shaped carrier 15, adapted to slide with longitudinal slots on bolts *o*, *o*.

The one end of the winding of the electromagnet 2 is connected to the contact 13 and the one end of the winding of the electromagnet 3 is connected to the contact 14, the other ends of the two electromagnets being connected, in a manner known per se, by a lead 16 to the railway-feeder. Of two springs 18 and 19 the one spring 18 is put under tension from the armature 4 by an abutment 20 only, when the electromagnet 2 in excited state has attracted the armature and brought thereby the pointed rail 1 into the position shown in Fig. 1 by means of the connecting rods 6 and 7. In this position the contacts 10 and 13 touch each other so that the current from the railway-feeder, flowing through the lead 16, the electromagnet 2, the contacts 10, 13 and the lead 12, is connected to earth.

When the circuit is interrupted in the lead 16, this being effected in a manner known per se which will be hereinafter described, the electromagnet 2 releases the armature which is then pushed back by the action of spring 18 as long as the bolt 9 of the lever 6 is moving idly in the longitudinal slot 8 of the pull-rod 7. As soon as bolt 9 strikes against the corresponding end of slot 8, the friction and the action of the spring which controls the pointed rails are sufficient to prevent further movement of the armature by the spring 18.

As soon as the armature has started its idle movement, the contact at 10, 13 is interrupted and at the end of the idle movement the contact 11 will bear against the contact 14. When the lead 16 is switched again on the railway-feeder, the current from lead 16 earth-connects the electromagnet 3 and the contacts 14, 11 through the lead 12. The electromagnet 3, which is excited in this manner, attracts the armature 4 so that, through the intermediary of lever 6 and rod 7, the pointed rails 4 are brought into the other extreme position. The armature 4 at the same time puts, by the abutment 20, the spring 19 under tension which, as soon as the excitation of the electro-magnet 3 ceases, pushes the armature 4 back a distance admitted by the idle movement 8, 9, whereupon the contact at 10, 13 is closed. At a new-circuit-closing the electromagnet 2 will be excited so that it brings the pointed rails into the position shown in Fig. 1. The electromagnet must be switched on the railway-feeder each time, when the switch has to be adjusted or when the same does not point in the direction of travel. This is done in a manner known per se, which will be hereinafter described by way of example.

In the form of construction shown in Fig. 2 the free arm of the lever 6, which is oscillated around the pivot-bolt 5 by the action of the armature 4, forms a fork 21, 22 and the pull-rod 7 has an arm 23, pivotally mounted on the pivot-pin 5 and connected to the corresponding end of the pull-rod 7 by means of a hinge 24. On the arm 23 an abutment 25 is arranged between the arms 21, 22 of the fork and at either side of the abutment a contact 26, 27 is arranged insulated the one from the other and from the arm 23. The electromagnet 2 is inserted between the lead 16 and the contact 27, the electromagnet 3 being inserted between the lead 16 and the contact 26. The fork 21, 22 is earth-connected.

In the position shown in Fig. 2 the arm 21 of the fork is in contact with the contact 26 and pressing against the abutment 25. When in this position the circuit through lead 16 is closed, the current is earthed through lead 16, electromagnet 3, contact 26 and fork-arm 21 so that the electromagnet 3 atttracts the armature 4 which makes the lever 6 oscillate. The arm 23 is oscillated from the work-arm 21 by means of the abutment 25, whereby the pointed rail 1 is brought into the other extreme position. The armature 4 has put the spring 19 under tension which, when the circuit is interrupted, pushes back the armature 4 and the lever 6 until the fork-arm 22 bears against the contact 27. When the circuit is closed again, the current is earthed through lead 16, electromagnet 2, contact 27 and fork-arm 22 so that the electromagnet 2 attracts the armature 4 and the pointed rails are brought into the position shown in Fig. 1. The spring 18 is at the same time put under tension so that at the next following circuit-interrupting it pushes the armature 4, which oscillates the lever 6, according to the idle movement between the fork-arms 21, 22 until arm 21 bears again against the contact 26.

The switching of lead 16 on the railway-feeder 17 is effected in the following manner:

When the driver of the tramway-car wants to adjust the switch, he makes the car run, the starter switched in, under a bar 28 fixed insulated on the feeder 17 so that the current-collector 29 is lifted off the feeder 17. The bar 28 is connected to the feeder 17 by a lead 30 in which an electromagnet 31′ is inserted. As soon as the current-collector 29 arrives under bar 28 the current from the feeder 17 is earth-connected through the electromagnet 31, lead 30, bar 28, current-collector 29 and the motor on the car. The electromagnet 31 which is thus exicited closes by its armature 32 the contact between two contacts 33 and 34 so that the lead 16 is connected to the lead 35. As soon as the current-collector arrives under the lead 35 it connects this lead with the bar 28, so that from the feeder 17 the current flows through lead 30, bar 28, current-collector 29, lead 35, 36 to the electromagnets 2, 3 and is earthed in the manner described.

When the switch is in the correct position the car-driver runs under the bar 28 with starter switched out so that in this case the mechanism remains at rest as no current is supplied to the electromagnet 31, the circuit through lead 16 being interrupted at the contacts 31 and 34.

Fig. 3 shows a form of construction in which the contacts 36, 37, connected to the electromagnets 2, 3 are not movable but remain stationary at the same point. In this form of construction the pointed rail 1 is also hingedly connected by rod 7 with the arm 23, pivotally mounted on the pivot-bolt 5, the armature 4 oscillating the lever 6 around the bolt 5. On the arm 23 a bow 39, 40 is pivotally mounted on a pivot-pin 38, and the lever 6 has a nose 41 projecting into a gap in the bow so that, when the armature 4 makes the lever 6 oscillate, the nose 41 oscillates the bow in the one or other direction around the bolt 38 so that, according to the direction of the oscillating movement, either the arm 40 of the bow comes to bear against the contact 37 or the arm 39 of the bow comes to bear against the contact 36. The outer surfaces of the bow-arms, designed to bear against the contacts, are curved concentrically to the pivot-bolt 5. At the moment, when the one arm of the bow comes to bear against the corresponding bow, the other arm of the bow strikes against the lever 6.

The electromagnet 2 is inserted between the lead 16 and the contact 36 and the electro-

magnet 3 between the lead 16 and contact 37.

When the lead 16 is being switched on the feeder 17 the elements being in the position shown in Fig. 3, the electromagnet 3 excited by the current earthed through lead 16, coil of the electromagnet 3, contact 37 and bow-arm 40, attracts the armature 4 which, through the intermediary of lever 6 bow-arm 39, arm 23 and pull-rod 7, reverses the switch and puts at the same time the spring 19 under tension. At the next following circuit-interruption the spring 19 pushes back the armature 4 so that the lever 6 is oscillated. As at this oscillating movement of lever 6 the arm 23 remains in its position notwithstanding the action of the spring 19 in opposite direction, the nose 41 of lever 6 will make the bow oscillate until the end of the bow-arm 40 strikes against the lever 6, the outer side of the bow-arm 39 being pressed at the same time against the contact 36. At the next following circuit-closing the electromagnet 10 will be excited and the switch turned into the former position.

These springs 18 and 19 serve merely for changing the contact and are therefore much weaker than the ordinary known spring used for effecting the shifting of the pointed rails from one position to the other. This known spring is omitted from the drawing for the sake of clearness as it has no bearing on the invention.

At the reversing of the switch the outer surface of the bow-arm slides on the corresponding contact and for this reason the contacts 36, 37 are elastic in order to ensure reliable contact and to avoid breakage.

Several other modifications are possible without departing from the scope of the invention. For the springs 18, 19 counterweights or the like may, for instance, be substituted.

I claim:

1. A switch-operating mechanism for electric railways in which the pointed rails are adjusted by means of a transmission lever and by an electromagnet of an exciter circuit when the driver of the car is running under a certain point of the railway feeder with the motor-starter switched in, comprising in combination with the pointed rails with the electromagnet and with the transmission lever, an adjusting armature on said electromagnet, an idle run inserted between said armature and said pointed rails for reversing the exciter circuit, a pivot axle, a pivotally mounted lever adapted to be operated by said electromagnet, a two-armed bow oscillatably mounted on said oscillatable lever the arms of said bow gripping with clearance over said lever and coupled with said lever toothlike for alternately earthing the ends of the electromagnet winding at the oscillation of said lever and an arm pivotally mounted on the said pivot axle and operated by said bow to operate the switch.

2. A switch-operating mechanism as specified in claim 1, comprising in combination with the armature of the electromagnet, two blade springs which at the reversing of the switch by said armature of the electromagnet are put under tension and are adapted to move back said armature when the excitation ceases, in a manner corresponding to the idle run to produce an alteration of contact for the next following switch position.

In testimony whereof I affix my signature.

ALEXANDER PATZ.