(No Model.)

L. H. PARKER.

SURFACE CONTACT ELECTRIC RAILWAY.

No. 589,785. Patented Sept. 7, 1897.

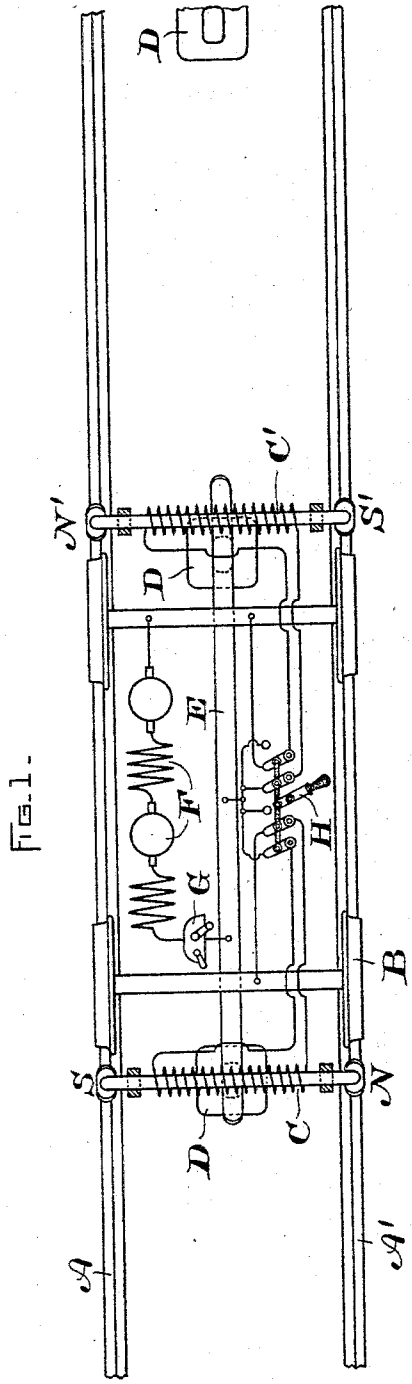


FIG. 1.

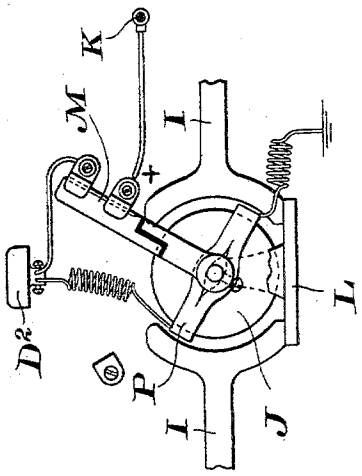


FIG. 3.

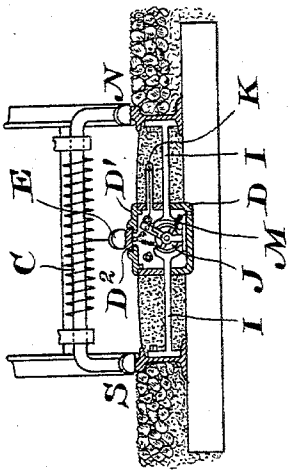


FIG. 2.

WITNESSES.

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SURFACE-CONTACT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 589,785, dated September 7, 1897.

Application filed November 18, 1896. Serial No. 612,584. (No model.)

To all whom it may concern:

Be it known that I, LEE H. PARKER, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Surface-Contact Electric Railways, (Case No. 454,) of which the following is a specification.

The present invention relates to surface-contact electric railways in which the circuit to the contacts is normally interrupted, but is completed as the vehicle advances by means controlled by the moving vehicle.

The invention relates particularly to that class of electric railways in which the closing and opening of the surface contacts is accomplished by means of an electromagnetic device carried by the moving vehicle. In systems of this kind the greatest difficulty has been to maintain a constant air-gap between the magnet carried by the vehicle and the switch-operating devices. In theory it is accomplished by placing the switches and their operating mechanism below the surface of the road-bed and supporting the magnet from the car-axle, which maintains it at a certain distance from the surface of the road. In practice this fails to attain the object sought, for the switch-boxes move slightly with respect to the rails caused by changes in the road-bed. However slight these changes may be they affect the working of the apparatus, as a very slight increase in the air-gap of the magnetic circuit will cause the failure of the switch to work. In systems of this kind it has been proposed to make the operating-magnet of sufficient strength to operate the switches without regard to changes in the air-gap. This is expensive, for it involves the use of a magnet many times the strength required for normal operation to insure the working of the few switching devices having an increased air-gap.

One object of the present invention is to provide a switch mechanism operated by magnetic means controlled by the moving vehicle, the means being so arranged that a constant air-gap is maintained in the magnetic circuit irrespective of any changes which may occur in the road-bed and tracks.

A further object of the invention is to provide a magnetically-controlled switching device for closing and opening the circuit between the source of supply and the contacts located at the surface of the road-bed, and one which is positively actuated as the moving vehicle advances.

In carrying out the invention two magnets are mounted on the moving vehicle and are provided with shoes making contact with the track-rails. These magnets are energized by means of coils included in the motor-circuit. Situated at suitable intervals along the line of way are pole-pieces, bolted at their outer ends to the rails and formed at their inner ends with enlarged faces, between which is mounted an armature for actuating the switch mechanism.

Mounted in suitable bearings is an armature adapted to oscillate between the pole-pieces which are secured to the rails. To this armature is secured a suitable switch-arm for completing the circuit between the source of supply and the surface contact.

As the vehicle advances the magnet at the front causes a magnetic flux to pass through the pole-pieces and armature. At the same time a current passes through the armature-coil to ground and the armature is moved to the left or right, depending upon the direction of the flux. At the rear end of the vehicle is a second magnet, wound oppositely to the first, for reversing the magnetism and opening the switch.

In the accompanying drawings, attached to and made a part of this specification, Figure 1 is a diagrammatic illustration of the invention. Fig. 2 is a sectional view of a switch-box, and Fig. 3 is an enlarged view of the switch-armature.

At A A′ are indicated the traffic-rails upon which the vehicle B is arranged to travel. Mounted on the front and rear of the vehicle are electromagnets C and C′. These are energized oppositely, as indicated at N S N′ S′, the object of which will be hereinafter explained.

Located at suitable intervals along the line of way are switch-boxes D, made of cast-iron and provided with removable covers D′. In the center of these covers but insulated therefrom are contacts D^2, adapted to be connected

to the source of supply. The boxes D are of sufficient size to inclose the switch-operating mechanism, thereby protecting it from moisture and injury.

The contact-shoe E is carried by the moving vehicle and is preferably supported from the axles of the car. It is long enough to span at least two contacts and is usually provided with springs to compensate for irregularities; but as the support forms no part of the invention it is not illustrated.

Motors F are provided for propelling the vehicle. These are controlled by means of the controller G.

When it is desired to reverse the polarity of the magnets C and C', the switch H is thrown. This changes the direction of current through both of the magnets simultaneously.

In Fig. 2 is shown a section through one of the switch-boxes. The pole-pieces I are bolted to the traffic-rails and extend into the switch-box D, where they are provided with enlarged faces, between which the armature J revolves. The armature J is mounted in suitable bearings and as it oscillates it opens and closes the switch M.

Protected by means of a suitable covering is the feeder K. Extending therefrom is a wire secured to the positive terminal of the switch.

Fig. 3 shows an enlarged detail view of the switch-operating mechanism. The armature J is provided with a coil or coils P, having one end connected with the contact D^2, the other to the box D, which is grounded. The switch M is shown in its closed position and current is supposed to be passing from the contact D^2 through the armature-coils to ground, and at the same time a magnetic flux is passing through the pole-pieces I from the shoes forming a part of the magnet C.

The air-gap between the armature J and the pole-pieces I always remains the same, the latter being secured together at the bottom by the non-magnetic plate L, which holds them in alinement and prevents their separating. The magnets C and C' are provided with shoes which make contact with the tracks, and are so supported that they follow all the irregularities of the track. This may be accomplished by the use of vertical guides, which allow the weight of the magnet to press the shoes upon the tracks.

The operation of the invention is as follows: When the contact-shoe E reaches a contact D^2, a shunt-circuit is formed through the coils on the armature J to ground. At the same time a magnetic flux passes from the magnet C through the shoes and traffic-rails to the armature J, and the direction is such that it causes a right-handed rotation of the armature, which closes the circuit between the feeder K and the contact D^2. This action is repeated at each switch as the vehicle progresses. To open the switches, the magnet C' is energized oppositely to the magnet C, which causes the armature J of the rear switch to revolve left-handedly and open the circuit, and this while the vehicle is over the contacts, preventing accidents to persons crossing the tracks near the vehicle. In going in the opposite direction the switch H is thrown to the left. This simultaneously reverses the polarity of the magnets C and C', and the operation is as before. The magnets C and C' are in a shunt-circuit from the contact-shoe E to the ground, and under normal operation are permanently included in circuit.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a surface-contact electric railway, the combination of a vehicle, stationary contacts, switch mechanism for including the contacts in circuit with the source of supply, coils permanently connected between each contact and the ground, a contact-shoe mounted on the vehicle and supplying current to the coil as it advances, a magnet mounted at the front of the vehicle coöperating with the coils to close the switches, and a second magnet mounted on the rear of the vehicle coöperating with the coils to open the switches.

2. In a surface-contact electric railway, the combination of a moving vehicle, contacts located along the line of travel, switches for closing the circuit between the source of supply and the contacts, armatures for operating the switches, a coil mounted on each armature forming a permanent connection between the contact and the ground, fixed pole-pieces for the armature, and a magnet carried by the vehicle supplying a magnetic flux to the pole-pieces.

3. In a surface-contact electric railway, the combination of a vehicle, a magnet mounted thereon and making sliding contact with the rails, a coil for energizing the magnet, pole-pieces secured to the tracks at intervals, armatures mounted for movement between the pole-pieces, switch mechanism operated thereby, and a coil on each armature permanently connected between each surface contact and ground.

4. In a surface-contact electric railway, the combination of a vehicle, magnets of opposite polarity located in advance and rear of the vehicle, shoes for each magnet making sliding contact with the rails, energizing-coils for the magnets, a source of supply, and a switch for simultaneously reversing the polarity of the magnets when it is desired to reverse the direction of movement of the vehicle.

In witness whereof I have hereunto set my hand this 12th day of November, 1896.

LEE H. PARKER.

Witnesses:
B. B. HULL,
E. W. CADY.