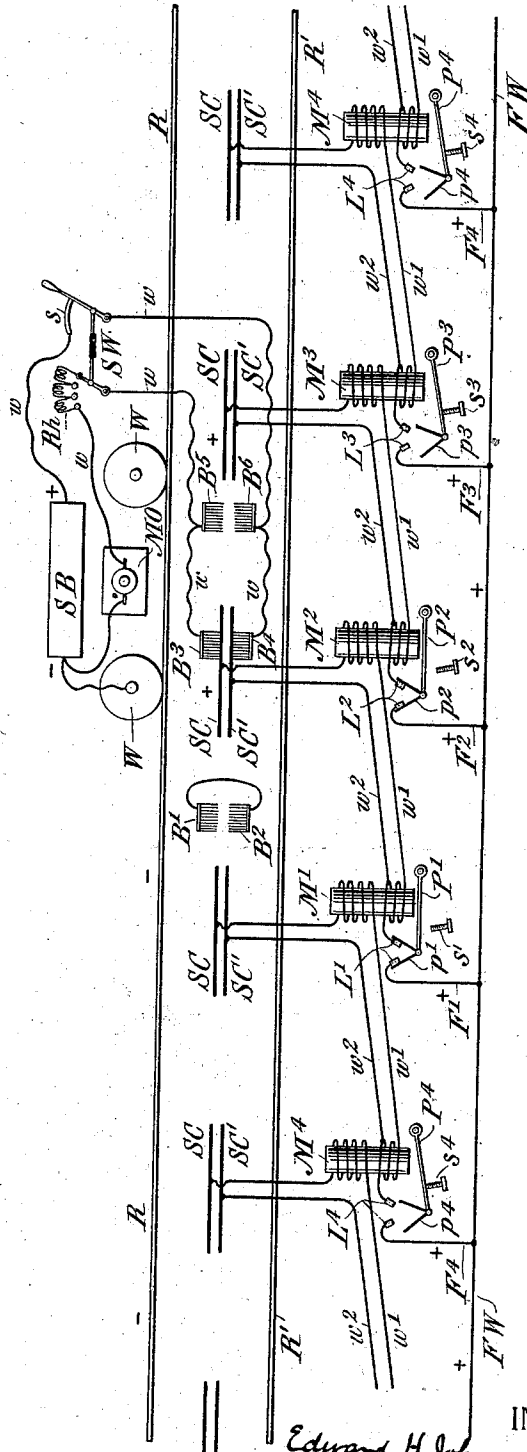


(No Model.)

E. H. JOHNSON & R. LUNDELL.
ELECTRIC RAILWAY.

No. 560,721.

Patented May 26, 1896.



WITNESSES:

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UNITED STATES PATENT OFFICE.

EDWARD H. JOHNSON, OF NEW YORK, AND ROBERT LUNDELL, OF BROOKLYN, NEW YORK, ASSIGNORS TO THE JOHNSON-LUNDELL ELECTRIC COMPANY, OF NEW YORK, N. Y.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 560,721, dated May 26, 1896.

Application filed October 15, 1895. Serial No. 565,750. (No model.)

To all whom it may concern:

Be it known that we, EDWARD H. JOHNSON, residing at New York, county of New York, and ROBERT LUNDELL, residing at Brooklyn, county of Kings, State of New York, citizens of the United States, have made a new and useful Invention in Electric Railways, of which the following is a specification.

Our invention is directed particularly to improvements in that type of electric railways in which sectional trolley-conductors are automatically connected to and disconnected from one or more current feeders or mains as a car or vehicle advances over them; and its object is to devise a method of and means for preventing any current leakage between the current-main through the sectional trolley-conductors and their controlling mechanism from causing said sectional trolley-conductors to remain connected to the current feeder or main after a car or vehicle has passed over it, thereby avoiding any possibility of receiving dangerous shocks from sectional trolley-conductors of the character referred to.

To this end our invention consists in the methods of and means for effecting the result specified, and particularly pointed out in the claims at the end of this specification.

Our invention will be fully understood by referring to the accompanying drawing, which represents, diagrammatically, a pair of tramway-rails, a traveling car or vehicle located thereon, and sectional trolley-conductors, together with electromagnetic switching mechanism for automatically connecting said sectional trolley-conductors to the current feeder or main as the car passes over them, and also our preferred form of means for effecting the disconnection of any of such sectional trolley-conductors should it by any chance remain electrically connected to the current feeder or main after the car has passed entirely over it.

Referring now to the drawing in detail, R and R' represent a pair of tramway-rails which are connected in the usual way to earth or by rail-bonds and to the negative pole of the generator. (Not shown.)

WW represent the truck-wheels of a car

or vehicle traveling thereon; MO, an electric motor for propelling said car or vehicle; SB, a storage battery for operating the switching-magnets or propelling the car at pleasure; SW, a switch, and Rh a rheostat for controlling the current through the motor and the storage battery by the conductors *ww* and contact-brushes B³ B⁴ B⁵ B⁶.

FW is a current feeder or main preferably insulated and buried near the tramway.

F', F², F³, and F⁴ are insulated sectional feeders running from the current feeder or main to switching contact-points L', L², L³, and L⁴.

M', M², M³, and M⁴ are switching-electromagnets adapted to operate switching armature-levers P' P² P³ P⁴, said armature-levers being provided with switching contact-points *p'*, *p*², *p*³, and *p*⁴, adapted to close the circuit between the insulated sectional feeders F', F², F³, and F⁴ and the switching-electromagnets M', M², M³, and M⁴, which switching-electromagnets are connected and interconnected in the manner shown, through conductors *w'* *w*², to sectional trolley-conductors SC SC', &c. *s'*, *s*², *s*³, and *s*⁴ are back-stops for the armature-levers P', P², P³, and P⁴.

It will be understood that the electromagnets M', M², M³, and M⁴ are arranged in groups of four in water-tight switch-boxes or in any other preferred manner, the arrangement of the grouping being such, owing to the double windings of the coils, as shown, that the successive sets of sectional trolley-conductors SC SC' SC SC' are held completely under the control of the storage battery and the current feeder or main FW through the agency of two pairs of sliding contact-brushes B³ B⁴ B⁵ B⁶, adapted to contact successively with the sectional trolley-conductors SC SC'. This peculiar arrangement of electromagnetic switching devices, together with the arrangement of sectional trolley-conductors, in combination with a storage battery and propelling-motor carried by the car or vehicle, constitute the subject-matter of a prior United States Patent, No. 551,334, granted to Robert Lundell on the 10th day of December, 1895, and no claim is therefore made in the present application to any feature which might be

properly claimed in the aforesaid application, the present application being directed, as already indicated, to a method of and means for preventing any sectional conductor SC or SC' from remaining electrically connected with its corresponding sectional feeder F', F², F³, or F⁴ through the agency of leaking currents from the current feeder or main or other source of current supply, this arrangement of electromagnetic switching devices being here shown and described for the purpose of best illustrating the application of our improvement, which will now be described.

B' and B² are conducting-brushes substantially like B³, B⁴, B⁵, and B⁶, said brushes being connected together electrically by a conductor and carried in any preferred manner at the rear end of the car, the arrangement being such that they will come into contact with the successive pairs of sectional trolley-conductors SC SC' as their rear ends emerge from beneath the car.

The operation of our invention is as follows: Suppose the car or vehicle to be traveling from left to right. Under this condition of affairs the electromagnets M' and M² are energized by a current passing from the feeder or main FW, as follows: by sectional feeder F', switching contact-points L' p' to the lower coil of electromagnet M', where it divides, one part going by conductor w² to the sectional trolley-conductor SC', brush B⁴, conductor w, switch-lever s, conductor w, storage battery SB, wheel W of the car or vehicle to the tramway-rail R and back to the generator, the other branch passing by way of the lower coil of the electromagnet M', conductor w', upper coil of electromagnet M², sectional trolley-conductor SC, brush B³, conductor w, switch SW, rheostat R/h, conductor w, motor MO, wheel W of the car or vehicle to the tramway-rail R and back to the generator. This current therefore energizes the electromagnets M' M² and continues to hold the armature-levers P' P² in their upward position, as shown.

It might occur, owing to the presence of water or some other conducting agency upon the track, that sufficient leakage would result between the sectional conductors SC or SC' and the tram-rails R or R', or both, to energize that one of the electromagnets M', M², M³, or M⁴ with which it is connected after the car or vehicle has passed over it. In order to avoid this, therefore, we provide a pair of short-circuiting brushes B' B², so arranged that as the sectional conductors SC and SC' emerge from under the rear end of the car said conductors are immediately automatically connected together, so as to short-circuit the energizing-coils of the switching-magnets, which are connected to them, thereby deenergizing said magnets and allowing the armature-levers to fall back upon their back-stops P' P² P³, &c.

To illustrate our meaning, suppose, for in-

stance, that the sectional trolley-conductors SC SC' offer, owing to the presence of water of some other conducting agent, a sufficiently-low resistance to permit the passage of sufficient current to hold the armature-levers P' and P² in their upper positions after the brushes B³ and B⁴ pass off of said conductors. As soon as the brushes B' B² are brought into contact with said sectional trolley-conductors SC SC' a path of low resistance is afforded for the current through said brushes and by way of the leak, owing to the presence of water or other conducting agent, said path being as follows: from the current-main FW by way of the sectional feeder F', contact-points L' p' directly to the conductor w², sectional conductor SC' through the brushes B² and B', thus short-circuiting the lower coil or coils of the electromagnet M', which coil or coils, it will be remembered, cause the armature-lever P' to be held up. This short-circuiting effect therefore allows the armature P' to immediately drop back upon its back-stop s'. It will be apparent, therefore, that as the car advances these short-circuiting brushes b' and b² will offer to the current a path of lower resistance between the sectional conductors SC SC' than is offered by the leaking agency, and they will therefore demagnetize any such magnets as are kept magnetized by leaking currents from the feeder or main.

We are aware that it is not broadly new with us to demagnetize the switching-electromagnets in a system of the type named as a car or vehicle passes over a sectional conductor or contact which conveys the working current to the propelling-motor.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

1. The described method of disconnecting a sectional trolley-conductor from circuit with a current main or lead, when the circuit connections between said conductor and main are due to leaking currents; which consists in conveying the leaking currents around the switching mechanism and thereby causing said switching mechanism to assume its normal or open position.

2. The described method of disconnecting a sectional trolley-conductor from circuit with a current main or lead, when the continuity of the circuit between said trolley-conductor and current main or lead is due to current leakage through the switching-magnet after the trolley which carries the working current has passed off of said sectional conductor; which method consists in conveying the leaking current around the switching-magnet and thereby demagnetizing it.

3. In an electric-railway system a current feeder or main, sectional trolley-conductors, electromagnetic switching devices for connecting said sectional conductors to the current-main, contact-brushes carried by a moving vehicle, short-circuiting devices carried by the vehicle and adapted to make contact

500,
with the sectional conductors after the con-
tact-brushes which supply the working cur-
rent have passed off of said conductors,
whereby any leaking current left closed
5 through the switching devices after the work-
ing current may be short-circuited and the
switching devices restored to their normal
condition, substantially as described.
10 4. In an electric-railway system a current
feeder or main, sectional trolley-conductors
normally disconnected therefrom; switches
for connecting said sectional conductors to
the main in sequence, electromagnets for con-

trolling said
means for short-cir-
cuiting the work-
ing current which may flow in the
magnet after it is out of the
current which actuates it as the
over it.
In testimony whereof we have hereunto
subscribed our names this 7th day of Octo-
ber, 1895.

EDWARD H. JOHNSON.
ROBERT LUNDELL.

Witnesses:
C. J. KINTNER,
M. M. ROBINSON.