

G. WESTINGHOUSE, Jr.

SECTIONAL CONTACT CONDUCTOR FOR ELECTRIC RAILWAYS.

No. 497,436.

Patented May 16, 1893.

Fig. 1.

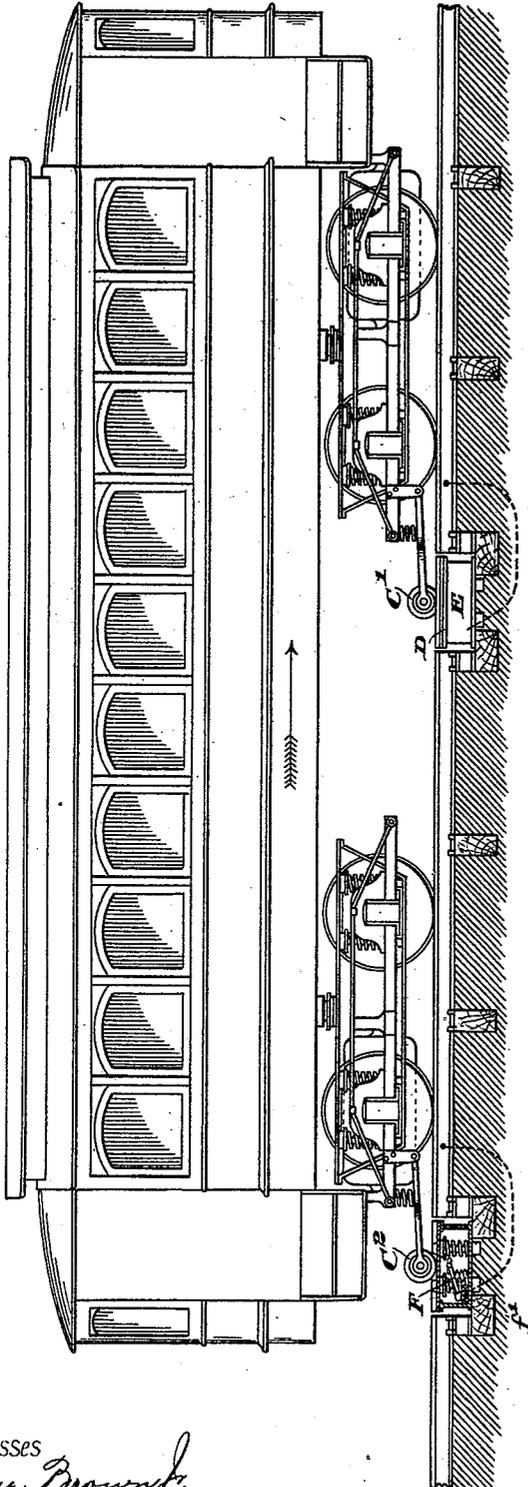
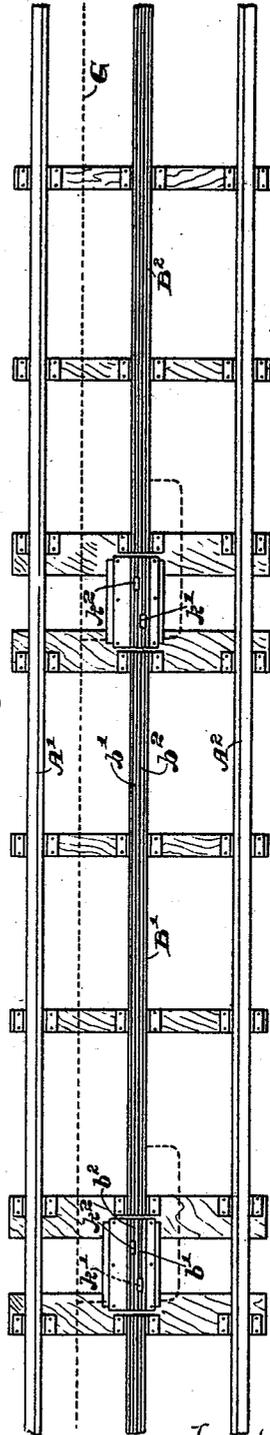


Fig. 2.



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*Charles A. Terry*

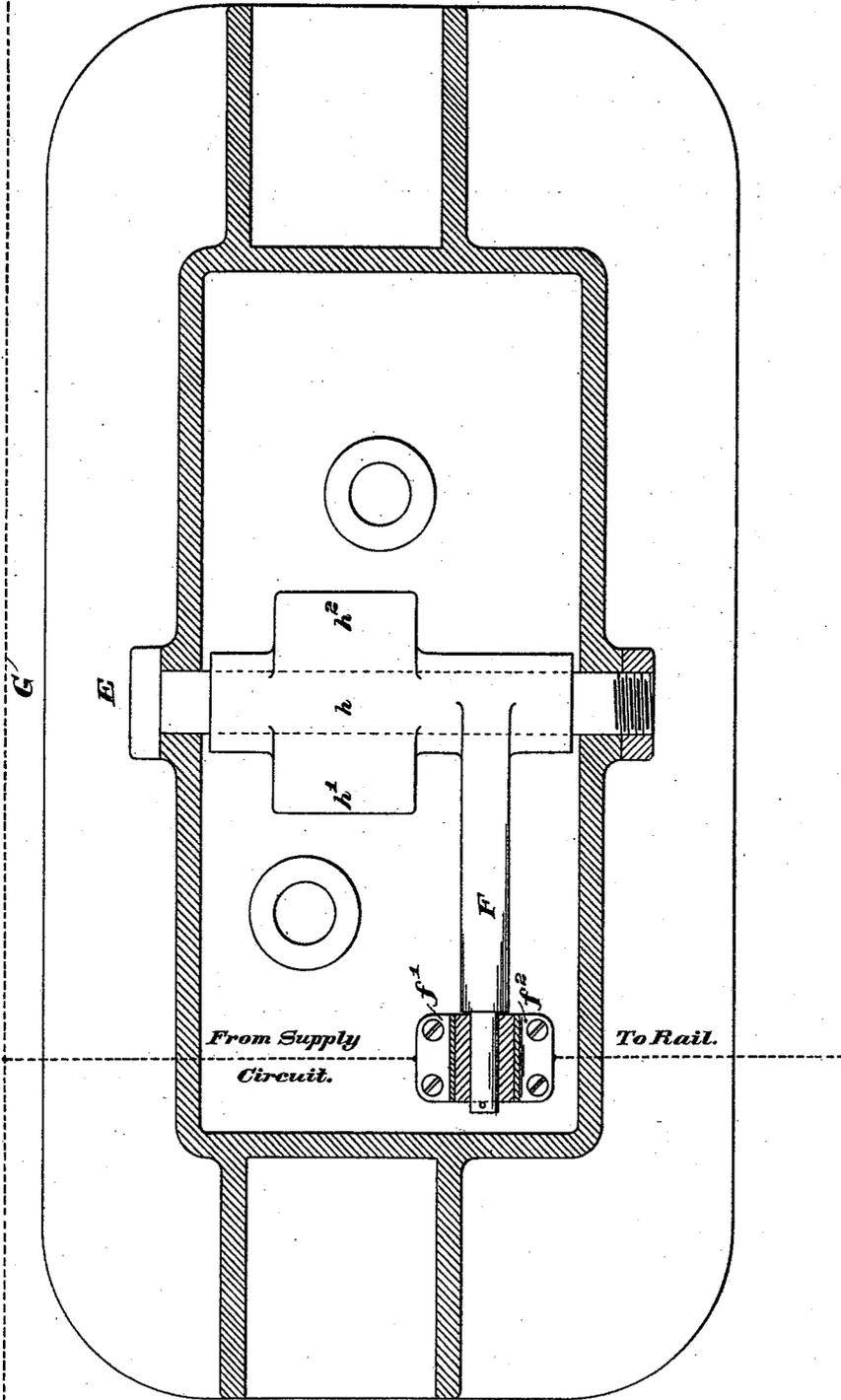
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Fig. 3.



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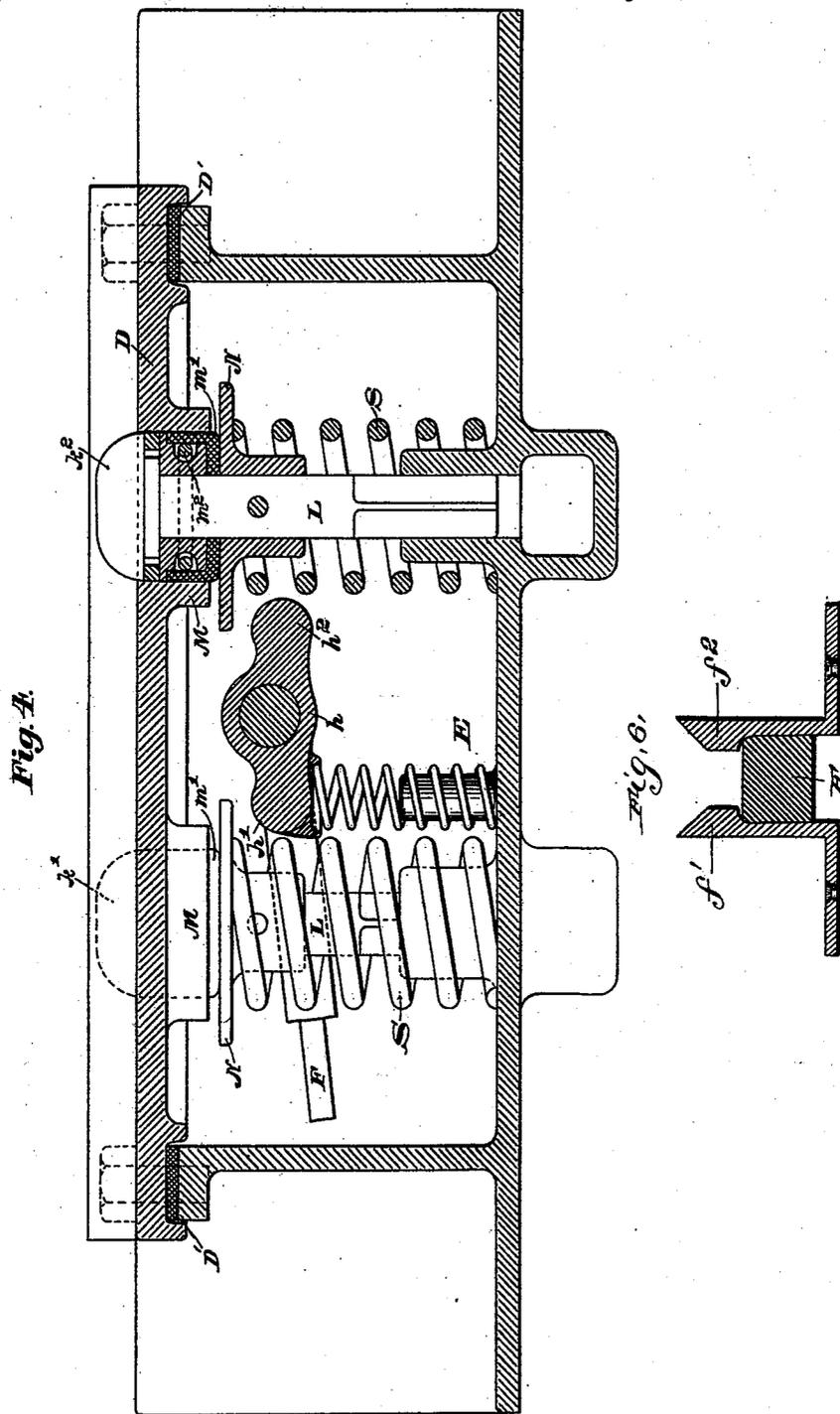
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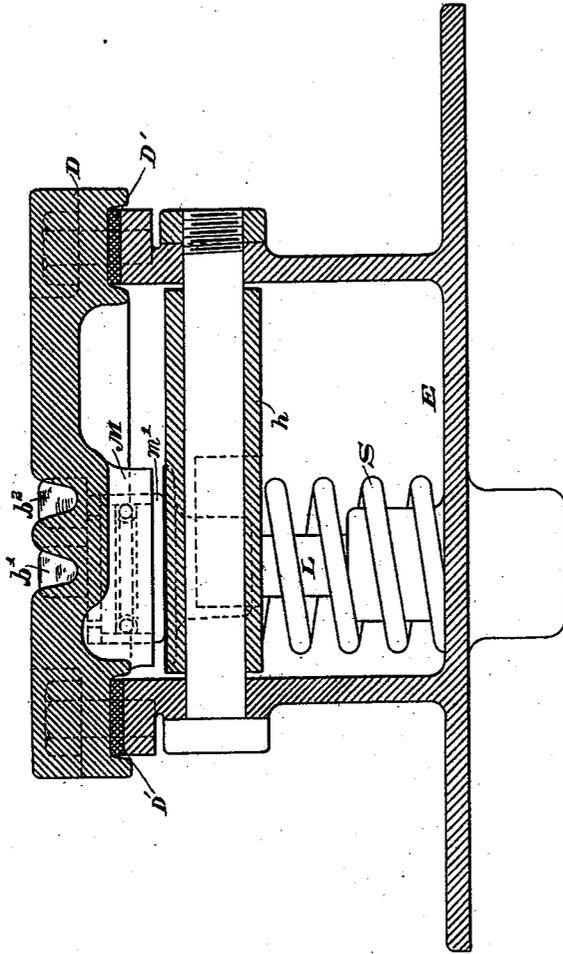
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Fig. 5.



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# UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

## SECTIONAL CONTACT-CONDUCTOR FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 497,436, dated May 16, 1893.

Application filed April 11, 1892. Serial No. 428,752. (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 Systems of Circuits and Apparatus for Electric Railways, (Case No. 488,) of which the following is a specification.

The invention relates to an organization of circuits and circuit closers for supplying electrically actuated cars with currents by means of conductors laid along the bed of the track.

It has been proposed heretofore to lay main supply conductors along the bed of the railway track, and to provide various forms of circuit closers for completing electrical connections from the main supply conductors with different sectional contact conductors through which electrical connections are continued to the motors upon the car. It has been found difficult to provide suitable means for thus connecting and disconnecting the sectional conductors with the main supply conductor and the present invention relates particularly to the construction of circuit-controllers, and the contact rails or sectional conductors.

The general plan of the invention is to place in some suitable position along the road-bed, a contact conductor consisting of sections of contact rails, the separate sections being insulated from each other. These contact rails are formed with grooves in which run contact devices, such, for instance, as a wheel with a suitable rib or flange for entering the groove. At suitable intervals there are placed circuit-controlling boxes in which are placed contacts connected with the main supply conductor and insulated contacts connected with the corresponding section of the contact rail. For the purpose of operating the circuit-controller, a plunger or rod extends upward through the top of the box into the grooves of the rails, and as the wheel carried by the car passes along the groove and flange strikes such a plunger, the latter is forced downward, bringing the respective contacts into connection with each other, and thus completing the circuit with the corresponding contact rail. In order to again open the circuit after the car has passed to a succeeding section of the con-

tact rails, a second circuit controlling wheel, carried by the car and running in a second groove similar to the first, strikes against and presses downward a second plunger, which serves to return the circuit closing device to its former position. In this manner the car may travel from section to section and connect and disconnect the successive contact rails with the main supply conductor, always keeping the section which is beneath the car in electrical connection with the main supply conductor.

There are numerous details in the construction and organization of the various parts of the apparatus, which will be described in connection with the accompanying drawings.

In the drawings, Figure 1 is a side elevation of a car upon a railway track equipped with circuit closing boxes. Fig. 2 is a plan of the track. Fig. 3 is a plan, partly in section, of one of the boxes. Fig. 4 is a side elevation thereof, partly in section. Fig. 5 is an end section, and Fig. 6 is a detail view of a preferred form of locking contact.

Referring to the figures,  $A'$ ,  $A^2$ , represent the traction rails of an electric railway. At a suitable position, as, for instance, midway between the traction rails there is laid a contact conductor composed of insulated rails  $B'$ ,  $B^2$ , &c., through which electrical connection is to be made with the motors carried by the car. The rails  $B'$ ,  $B^2$ , are formed with two longitudinal grooves,  $b'$ ,  $b^2$ , of suitable width and depth. Circuit controlling wheels  $C'$ ,  $C^2$ , run in the respective grooves. These wheels may be carried at or near the respective ends of the car, as indicated in the diagram Fig. 1, and they may be forced downward into the grooves by means of springs serving to afford considerable pressure for operating the circuit controllers. The circuit controlling wheels are also contact wheels for continuing the electrical connections from the sections of the rail to the terminals of the electric motor, the return connections being through the traction wheels and the rails  $B'$ ,  $B^2$ , if desired, or through another special conductor. At suitable points, for instance, midway in the length of each section of the traction rails, there is placed a circuit-controlling box  $E$ . These boxes may advantageously be made

water-tight, so as to prevent injury to the apparatus by moisture. In the drawings there is shown a box of rectangular form, preferably of cast iron. The cover D of the box is carefully fitted to the box itself, and a suitable packing shown at D' may be employed if desired, for preventing moisture from entering. The grooves  $b'$ ,  $b^2$ , of the rails are continued across the box cover. Within the box there are placed electrical contacts  $f'$ ,  $f^2$ , which are respectively in electrical connection with the main supply conductor G, which may be laid in a pipe or tube extending along the line of the railway track, and with an adjacent section B' or B<sup>2</sup> of the contact-conductor. A contact-arm F, Fig. 3, is employed for completing the connections from the contacts  $f'$  to the corresponding section of the contact rail B', for instance, and it is operated in the following manner: A rock-shaft  $h$ , is suitably supported in the box, as, for instance, by a bolt passing through the sides of the box. Two arms,  $h'$ ,  $h^2$ , project from this rock-shaft in opposite directions. When one of them,  $h'$ , is forced downward, it throws the contact arm F between the contacts  $f'$  and  $f^2$ , which may be constructed to lock the arm in place until forcibly removed, and thus completes the circuit to the contact rail. Any form of locking contact used in switches might be used, but I have shown in Fig. 6 a preferred form of spring contacts  $f'$  and  $f^2$ , provided with beveled ends and lugs which catch over the top of the part F, as shown. The locking feature is, of course, optional. When the arm  $h^2$ , of the rock-shaft is forced downward, the shaft is turned in the opposite direction, and thus the contacts are separated. For the purpose of thus operating the rock-shaft, two plungers  $k'$ ,  $k^2$ , are employed. These are both constructed in the same general manner, but their upper ends terminate in the respective grooves of the box cover. Each consists of a shaft, L, which may with advantage be rounded at its upper end where it extends into and partially through the rail. This shaft is provided with suitable packing, as indicated at  $m'$ ,  $m^2$ , and extends through a web or flange M, formed in the cover of the box. A spring, S, normally forces the plunger upward, but when it is forced downward by the pressure of the circuit controlling wheel, it carries with it a flanged ring or plate N, the edge of which projects above the corresponding arm  $h'$  or  $h^2$  of the rock-shaft. In this manner the rock-shaft is turned, and the circuit closed and opened. A contact wheel C' passing along the groove  $b'$  will force down the plunger  $k'$  and close the circuit. The plunger will immediately return to its normal position, but the rock-shaft will remain in the position into which it has been thrust, being retained by the friction of the contacts, and thus the circuit will remain closed. As the car passes to another section, however, the rear contact roller or wheel, passing along the groove  $b^2$ , will strike the plunger  $k^2$  and turn

the rock-shaft in the opposite direction, thus withdrawing the lever F from the circuit-closing contacts and opening the circuit, so that the car will leave the successive rail sections disconnected from the main conductor. A spring  $s$  may serve to hold the lever F up until it is again forced down by another car.

The distances between the successive circuit controlling boxes and the circuit controlling wheels upon the car, may be so arranged that the connections with the succeeding track rail will be completed immediately before the interruption of the circuit connections of that just traversed, so that at all times there will be an electric circuit completed through the motors.

I claim as my invention—

1. In an electric railway the combination of a series of contact rails each constructed with two longitudinal grooves, a circuit-controlling box for each section, a rock-shaft within the box, a circuit-closing arm operated by the rock-shaft and two plungers terminating in the respective grooves for operating the rock-shaft.

2. In an electric railway system, a circuit controlling device consisting of electrical contacts respectively connected with the main conductor and the contact rail, a plunger projecting through said rail and a controlling device moving with the car for operating the plunger.

3. In an electric railway system, the combination of a sectional contact conductor, circuit-controlling devices for completing electrical connections with the respective sections, consisting of a circuit-closing arm and a plunger projecting through said contact conductor for operating the arm.

4. In an electric railway system, the combination of a movable circuit-closing arm, a vertically moving plunger for operating the arm and a contact rail through which the plunger extends, substantially as described.

5. In an electric railway system, the combination of a sectional conductor constructed with two parallel grooves, a circuit-closing device, two plungers for respectively opening and closing the circuit-closing device, and terminating respectively in the two grooves.

6. In an electric railway system, sectional contact conductors composed of grooved rails, circuit-closing boxes constituting intervening sections of the rail, and a circuit-closing device within the box consisting of a lever, contact-plates therefor, a rock-shaft carrying the same, vertically movable plungers for turning the rock shaft in opposite directions.

7. A circuit-closing device for electric railway systems consisting of a contact lever and its contact plates, a rock-shaft carrying the same, and two independently movable plungers for engaging the rock-shaft, substantially as described.

8. In an electric railway system, a sectional supply conductor for delivering currents to the car, said supply conductor being formed

with two longitudinal grooves, arms or plungers extending into the respective grooves, and serving to respectively open and close circuit connections from the sectional conductors with a main supply conductor when forced downward.

9. The combination with an electrically actuated vehicle of a supply conductor therefor, constructed in sections, a main supply conductor with which the sections are adapted to be connected, a collecting device for delivering currents from the sectional conductors to the car, and two series of vertically

moving plungers operated by the movement of the car to respectively close and open the circuit connections from the supply conductor to the successive sections of the sectional conductor.

In testimony whereof I have hereunto subscribed my name this 8th day of April, A. D. 1892.

GEO. WESTINGHOUSE, JR.

Witnesses:

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