

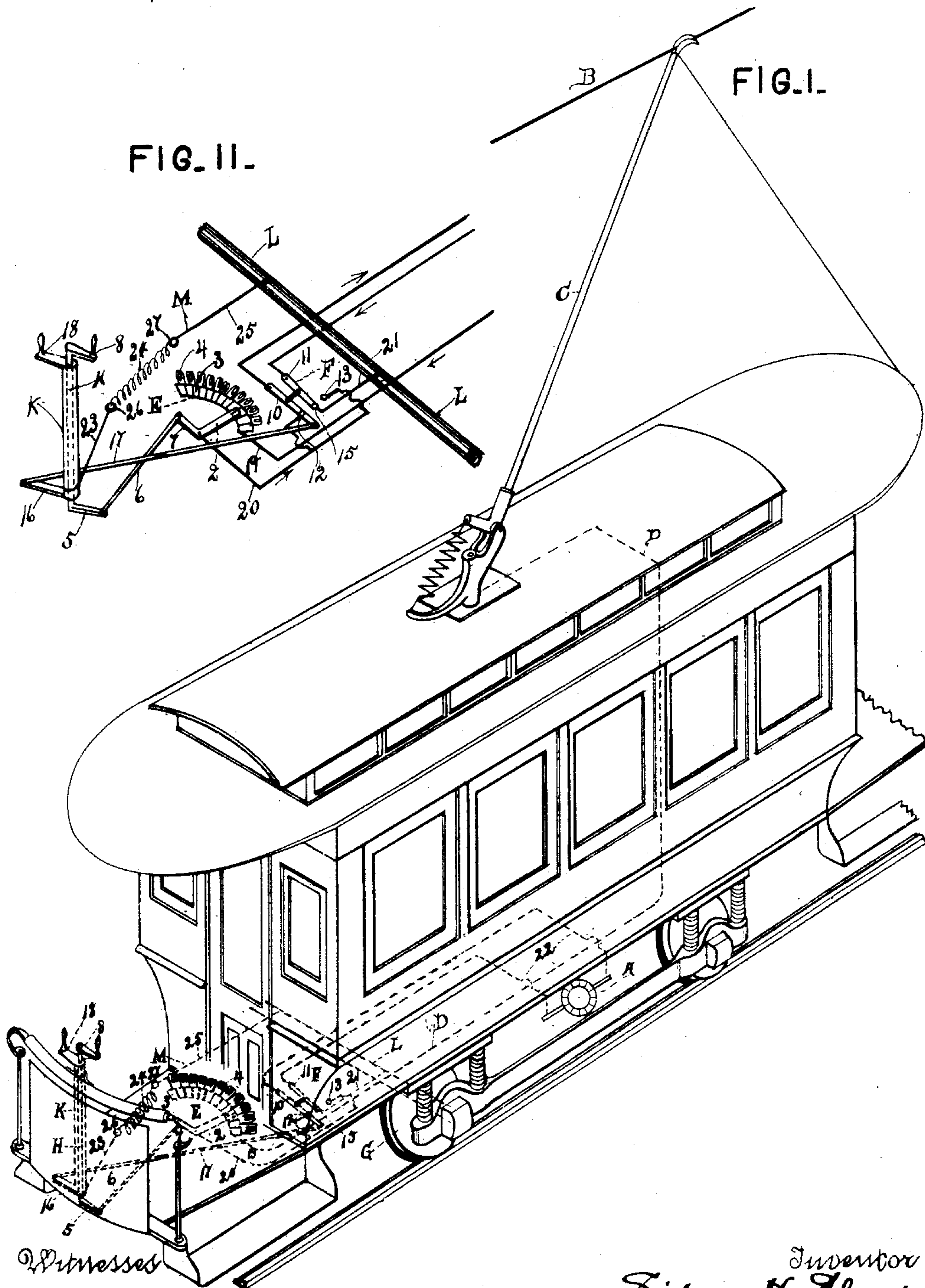
(No Model.)

S. H. SHORT.

REGULATOR FOR ELECTRICALLY PROPELLED VEHICLES.

No. 445,654.

Patented Feb. 3, 1891.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## REGULATOR FOR ELECTRICALLY-PROPELLED VEHICLES.

SPECIFICATION forming part of Letters Patent No. 445,654, dated February 3, 1891.

Application filed October 17, 1890. Serial No. 368,499. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY H. SHORT, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Regulators for Electrically-Propelled Vehicles; and I do hereby 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 appertains to make and use the same.

This invention relates to an attachment to the electric regulators used on electrically-propelled vehicles (or cars of electric railways) to reverse the direction of the current in appropriate parts of the motor or to control the intensity of the current supplied to said motor, or to accomplish both objects. It has more particular reference to the regulators of such vehicles on lines of railway in which the electricity is supplied to the motor-cars from an electrically-charged line through trolleys or travelers. The improvements constituting said invention are, however, each included for all the uses to which it may be adapted.

These regulators comprise usually switching means, which are of course included in the motor-circuit, and devices which operate these switching means, and which it is found convenient to make at least in part of metal, the knobs to be grasped by the operator being made of non-conducting material, such as wood. These operating devices after use are apt (particularly in wet weather) to get what the motor-men term "lousy;" or, in other words, there is apt to be a leakage to the operating devices notwithstanding the insulation between them and the switching means proper, and this leakage electricity passes into the operator or motor-man, producing shocks of greater or less intensity.

In accordance with the present invention the metallic or conducting portions of the operating device or devices are protected by a branch to ground, (or it may be connected with the return-wire of a double-wire system,) so that any leakage which may take place will flow away by the conductor to ground without annoying the motor-man. Preferably this ground conductor is made of high resistance, so as not to afford too ready a path to

ground by way of the insulation of the regulator. It is further preferred to provide an automatic cut-out or fuse in said conductor, so that if the leakage become excessive the large current will operate the cut-out or melt the fuse and open said conductor.

What is considered the best mode of proceeding is to employ a fine fusible wire as or as a part of the said conductor to ground, such a wire having a high resistance and being adapted to fuse, and thus open the circuit should the leakage become excessive.

While the invention extends generally to an electric regulator (whether a circuit-changer or intensity-governor, or both, or it may be a circuit maker and breaker or an ordinary switch or the like) provided with a ground conductor such as aforesaid, it specially covers a regulator comprising rotary metallic shafts as or as a part of the operating devices; also, a regulator having two movable parts connected mechanically, one with a reversing-switch and the other with an adjustable rheostat, (or other means for regulating current strength,) and connected electrically each with the other conductor. In order to establish an electrical connection with each it suffices to make the connection with one of said parts when they are otherwise electrically in contact with each other, so that one ground-wire serves to protect both the reversing and the speed mechanism.

In the accompanying drawings, which form a part of this specification, Figure I is a perspective view (partly diagrammatical) of an electric-motor car provided with the present invention; and Fig. II is a perspective of the regulating apparatus detached from the car.

As shown, the motor, whose commutator is indicated at A, receives electricity from the overhead wire B through the trolley C and car-circuit D, which latter includes the adjustable rheostat E, the reversing-switch F, the said commutator A and armature of the motor, the reversing-switch F, and the wheel-base G, and is thus connected with the ground or return conductor. The rheostat E comprises a switching-arm 2, a series of contact-plates 3, and a series of resistances 4. The arm 2 is operated by the metal shaft H, through the arm 5 on its lower end, and the



rod 6, jointed to the arm 5 at one end and to an operating-arm 7 of the switching-arm 2 at the other. A crank-handle 8, which may have a knob of non-conducting material, serves to turn the shaft H, which is suitably insulated from the switching-arm 2 in any known or suitable way. The reversing-switch F is of the ordinary description. It has two switching-arms 10 and 11 insulated electrically from each other, but mechanically connected, and three changeable contacts—namely, two outer contact-points 12 and 13 and an intermediate contact-point 15.

The switching-arms 10 and 11 are moved by a metal shaft K, which is made hollow and surrounds the shaft H, the movement being communicated from an arm 16, fixed to the lower end of the hollow shaft K, through the jointed rod 17. The shaft K is insulated from the switching-arms in any known or suitable way. It is provided with a crank-handle 18, which may have an insulating-knob to turn it. The wire 19 of the car-circuit D leads to the end plate of the series of contact-plates 3, over which the arm 2 travels to connect in or cut out the resistances 4. From the switching-arm 2 the wire 20 extends to the points 12 and 13, (which are electrically connected,) while the ground wire 21 is connected with the middle point 15, the grounding being indicated by the termination of the said wire at the car-axle L. The armature of the motor is included in the loop 22, whose opposite ends are connected with the switching-arms 10 and 11, respectively.

In order to accomplish the purposes of the present invention, a ground connection M is provided for the shafts H K or operating means for the regulator, which last comprises the means E for regulating the current strength and means F for regulating the direction of the current in the motor-armature. As shown, the connection M consists of a stout wire or conductor 23, a fine fusible wire 24, and a stout wire 25. The wire 23 is connected at one end electrically with the metal hub of the arm 16 and preferably is also fastened mechanically to said hub, and at the other end it is fastened to a binding-post 26, or some other substitute therefor, such as a screw-head. The other stout wire 25 leads from a similar post 27 to the ground or return conductor through the car-axle L, as represented. The fine fusible wire 24 extends between the posts 26 and 27 and completes the electrical connection between the shafts H K and the ground. The object in using the two posts is for facility of renewing the fusible wire 24; but it is of course not necessary to employ them. Various other dispositions as well of the ground connection M, as of the electrical apparatus in connection with which it is used may be made.

Should the electricity leak over to the shafts H K or operating devices for the electric regulator or regulators E F, it will not annoy the operator or motor man, but will pass off by way of the ground connection M. Should an excessive leakage occur, the wire 24 fuses and opens the ground connection.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electric regulator having an operating device or devices insulated from the switching means and provided with a ground connection for said operating device or devices, substantially as described.

2. In combination with the motor of an electrically-propelled vehicle and an electric regulator therefor, a branch to ground for the operating device or devices of said regulator, substantially as described.

3. In combination with an electrical machine or motor and an electrical regulator therefor, a branch of high resistance to ground for the operating device or devices of said regulator, substantially as described.

4. In combination with an electric machine or motor and an electrical regulator therefor, a branch containing a cut-out or fuse and extending to ground for the operating device or devices of said regulator, substantially as described.

5. In combination with an electrical machine or motor and an electrical regulator therefor, a branch of high resistance containing a cut-out or fuse and extending to ground for the operating device or devices of said regulator, substantially as described.

6. An electrical regulator provided with a ground connection for the operating device or devices in the form of a fine fusible wire, substantially as described.

7. An electrical regulator comprising one or more metallic shafts for operating the same, and a branch to ground for protecting the said shafts against leakage, substantially as described.

8. An electrical regulator comprising a reversing-switch and an adjustable rheostat or intensity-regulating means, together with two movable operating devices mechanically connected one with the reversing-switch and the other with the rheostat, and having said devices each insulated from the current to be regulated and each in electrical connection with the ground, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SIDNEY H. SHORT.

Witnesses:

A. B. CALHOUN,  
W. A. PALLANT.