(No Model.)

P. WRIGHT.

SWITCH BOX FOR ELECTRIC MOTORS.

No. 472,283. Patented Apr. 5, 1892.

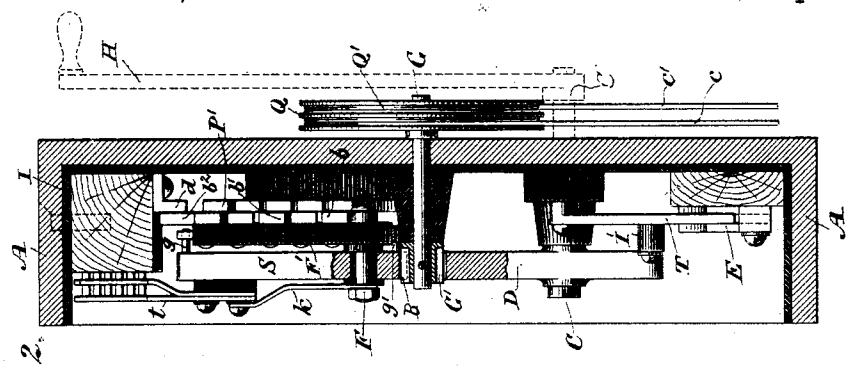

Fig. 2.

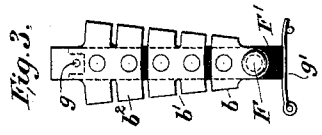

Fig. 3.

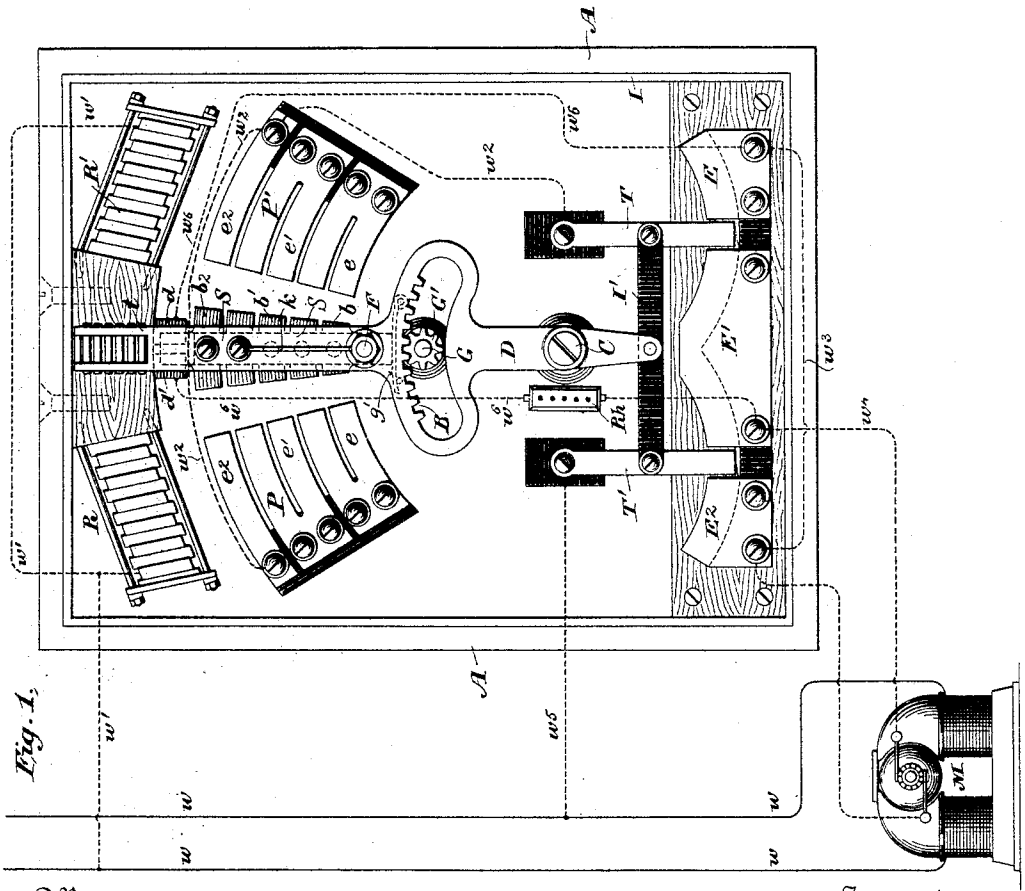

Fig. 1.

Witnesses

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UNITED STATES PATENT OFFICE.

PARVIN WRIGHT, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO JOSEPH W. KINSEY, OF SAME PLACE.

SWITCH-BOX FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 472,283, dated April 5, 1892.

Application filed January 31, 1891. Serial No. 379,829. (No model.)

To all whom it may concern:

Be it known that I, PARVIN WRIGHT, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Switch-Boxes for Electric Elevators; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention is directed particularly to improvements in apparatus for controlling electric motors used in connection with electric railways, electric elevators, or analogous moving vehicles, and although it is designed for use with these special types of vehicles it is equally applicable in the controlling of electrical motors generally; and its objects are, first, to readily reverse the direction of the supplying current through the armature of the motor without undue sparking; second, to regulate the speed of the motor without unduly heating or overloading it; third, to provide an automatic brake for the armature which shall depend for its operation upon the residual current left in the armature when short-circuited; fourth, the accomplishment of the several features hereinafter pointed out, all of which objects are attained by the use of the apparatus hereinafter described, and particularly pointed out in the claims which follow this specification.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 is partly a diagrammatical and partly a plan view showing the circuit and circuit connections and interior operating mechanism of the entire apparatus. Fig. 2 is a longitudinal sectional view taken through the body of the apparatus, as shown in Fig. 1. Fig. 3 is a detail view of a portion of the switch apparatus.

A is an inclosing box, preferably of metal, lined with an insulating-coating I, to which is secured all of the switch-operating mechanism. This box is secured to one of the inner walls of an ordinary passenger-elevator, and is connected through the usual forms of cables and conductors w' w^4 w^5 with the mains w w and connected to the motor M, said mains running to a distant dynamo. (Not shown.)

G represents a rotary shaft journaled in the box A and carrying at its inner end a gear-wheel G′, adapted to mesh with the teeth of a rack B in the upper portion of a lever DS, pivotally secured to the box by a journal-bearing and screw C, the lower end of said lever being pivotally attached to an insulating-bar I′, which joins a pair of pole-changing contact-levers T and T′, pivoted to insulating-blocks secured to the bottom of the box A, the free ends of said contact-levers being adapted to contact with conducting-plates E, E′, and E^2, insulated from each other and from the body of the box.

F′ is a switch-lever made of insulating material and carrying a series of contact-plates b b' b^2 on its under surface. This switch-lever F′ is secured to a conducting journal-bearing F, insulated from the upper portion S of the lever DS, and is held, when in its central position, in vertical alignment with the lower portion D of the lever DS by a flat spring g', secured to the upper portion of the rack B and bearing normally against the lower squared end of the lever F′.

The pivoted journal-bearing F is connected at its outer end with a conducting-bar k, which in turn is connected to a conducting-extension t, insulated from the upper portion S of the lever DS. This conducting-extension is divided into two portions at its upper end and carries a series of conducting-contacts adapted to be carried to the right or left and make electrical contact at will with either of a pair of variable-resistance coils R or R′, both of which are connected at their outer ends to a branch conductor w', running to one of the mains w.

P and P′ represent the switch-plates, divided into sections e e' e^2 in order to give greater breaking-surface, the upper pair of these switch-plates e^2 being connected to the right-hand contact-lever T by a conductor w^2.

g is a pin (see Figs. 2 and 3) secured to the upper end of the part S and adapted to have slight lateral play in either direction against

projections or lugs in the upper portion of the contact-plate b^2 when the part S is carried either to the right or left.

d d' are contact-plates, upon which the upper portion of the contact-plate b^2 rests when the lever DS is in a vertical position, as shown in Fig. 1, said contact-plates being connected by conductors w^6 to the switch-plates E and E', and including an adjustable rheostat or resistance Rh, the plates E and E' being in turn connected through conductors w^3 and w^4 with the armature of the motor M, as shown. The function of this part of the apparatus is to cause the stored-up current in the armature to act through the short circuit just described for a brief space of time as a brake. In other words, the counter electro-motive force of the armature when in this position will tend to act upon the motor in the nature of a cushion, and will therefore tend to speedily stop the elevator or vehicle in its forward motion, and will also prevent the elevator from descending by reason of the fact that the weight of the elevator upon the cables will transmit power to the armature, thereby tending to rotate it through a saturated field, which rotation would create a current through the armature, thereby reacting and preventing any descent of the car.

The shaft G, if the apparatus is used in a passenger-elevator or on board of a car, is rotated by a switch-handle H, controlled directly by an attendant. When used on a freight-elevator, the shaft G is rotated directly by pulleys Q Q' and cords c c', running to a point where the attendant is located.

The operation of the apparatus is as follows: The apparatus as illustrated is stationary, and the field-magnets of the motor M are being supplied with current from the mains w w from a dynamo. (Not shown.) These field-magnet mains may of course be provided with a switch accessible to the attendant for controlling the circuit, if desired. Suppose, now, it is desired to move the elevator-car, say in an upward direction. The attendant, operating either through the handle H or cords c c', causes the upper part of the lever DS to move to the left, carrying with it the sliding contacts borne by the conducting-arms t. As soon as these contacts touch the variable resistance R a minimum flow of current passes by the main w through the branch w', through the entire variable resistance R, the contacts borne by the extension t, the conducting part k, the conducting-journal F, the first movable contact-plate b, the first fixed contact-plate e on the left, thence through the second movable contact-plate b', thence through the second fixed contact-plate e' on the left, thence through the third movable contact-plate b^2, thence through the third fixed contact-plate e^2 on the left, thence by the wire w^2 to the pivoted portion of the right-hand lever T. The free ends of said lever T and its counterpart T' having been swung to the right under the influence of the lever DS, and hence into contact with the plates E and E', the current passes through the plate E by the conductor w^3 to the armature of the motor, thence by the conductor w^4 to the plate E', through T' and the conductor w^5 to the other main w. This sets the armature slowly in motion and starts the elevator on its upward journey. The attendant continues to swing the upper portion of the lever S to the left, thereby cutting out additional parts of the resistance R until the armature, and hence the elevator, assumes a maximum speed and it proceeds on its upward journey. If he wishes to check its speed, he simply forces the lever DS in a reverse direction and additional resistance R is cut into circuit. Should he wish to stop the elevator, the lever S is placed in the vertical position shown in Fig. 1. It will be noticed that when the contact-plates b b' b^2 are drawn away from the corresponding fixed contact-plate e the frictional bearing between the two sets of plates causes the upper portion of the switch-lever F' to be tilted to the left until the pin g finally forces a separation of these plates. When this occurs, the upper end of lever F' is inclined slightly to the left, so that the spring g' is bearing with considerable force upon the lower left-hand corner of said lever and through its elasticity suddenly causes the movable plates b to b^2 to be snapped away from the plates e to e^2, thereby avoiding unnecessary sparking. Under exactly the same condition the elevator-car is caused to descend on throwing the upper portion S of lever DS to the right, so that the contacts carried by the extension t are thrown into contact with the variable resistance R' and the movable contacts b to b^2 placed in electrical contact with the fixed contacts e to e^2 on the right, the pivoted parts T and T' in this instance being in contact with the plates e to e^2 of P', so that the current passes in a reverse direction through the armature.

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

1. An electric motor having its field-magnets located directly in circuit with a source of electrical energy and its armature in a derived circuit thereto, in combination with a pole-changing switch for reversing the direction of the current through the armature, and a second normally-open independent circuit operatively connected to the armature with circuit connections, whereby the first-named circuit may be broken and the second closed, and vice versa, substantially as described.

2. An electric motor provided with a polar switch adapted to reverse the direction of the energizing-circuit through its armature, in combination with a rheostat for varying the current-supply, a normally-open independent circuit connected also to the armature, and circuit connections whereby the current-flow to the armature may be either interrupted or reversed at will and the armature connected

to or disconnected from the second or independent circuit, substantially as described.

3. An electric motor having its armature connected in derived circuit with its field-magnets, a second independent normally-open circuit for the armature, a pole-changing switch having its pole-changing parts operatively connected with the armature and a source of electrical energy, and means for varying the current-supply to the armature, with movable circuit connections for the direct and independent circuits carried by the movable part of the switch, the second or independent circuit being closed when the armature is disconnected from the current-mains, and vice versa, substantially as described.

4. An electric motor having its field-magnets and armature located in derived circuits, the field-magnet circuit being permanently closed through a source of electrical energy and the armature provided with a pole-switch and an independent normally-open circuit, in combination with an adjustable rheostat and additional circuit connections carried by the switch, whereby the current may be passed through the armature in alternate directions or interrupted at pleasure and the independent circuit connected thereto, substantially as described.

5. An electric motor having its field-magnets and armature inclined in independent or derived circuits, a polar switch connected through the armature-circuit with the current-mains, and an independent armature-circuit including an adjustable resistance and independent circuit making and breaking contacts carried by the switch, the circuit connections being always closed through either one or the other of the armature-circuits, substantially as described.

6. A switch for electric motors or analogous high-tension-current devices, consisting of sets of fixed contact-plates arranged side by side and corresponding sets of movable contact-plates arranged side by side and bridging the first-named plates, in combination with a spring-actuated arm carrying said movable plates, substantially as described.

7. An electric motor having its field-magnets and armature in independent or derived circuits, in combination with a switch and a second or independent armature-circuit including a variable resistance, said switch having connections for changing the current through the two armature-circuits at will, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

PARVIN WRIGHT.

Witnesses:
KEPPEL BRIERLY,
O. B. BARROWS.