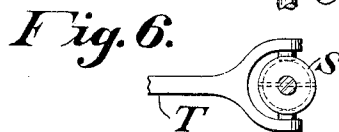
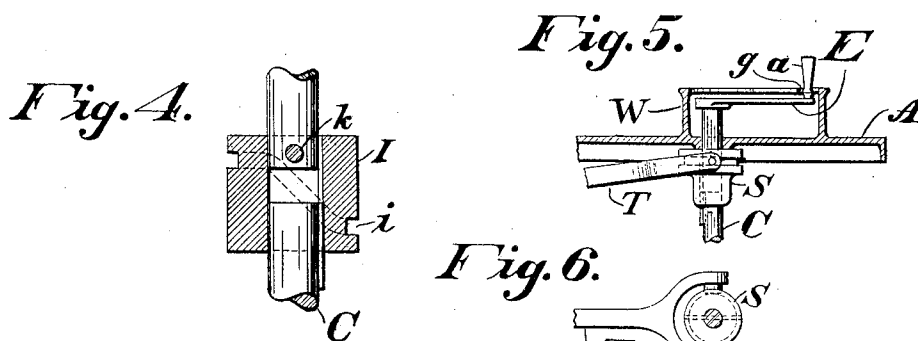
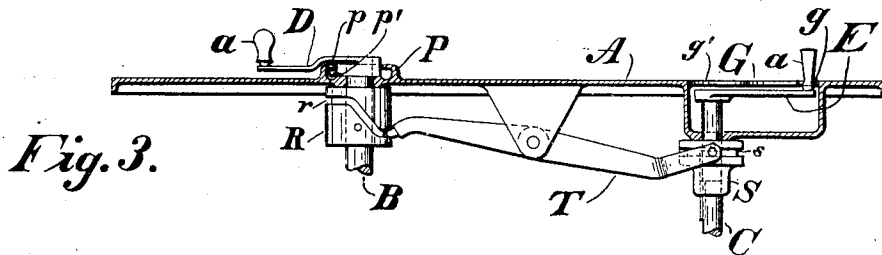
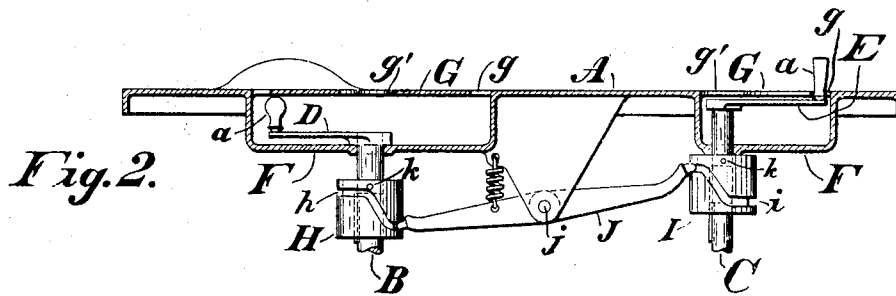
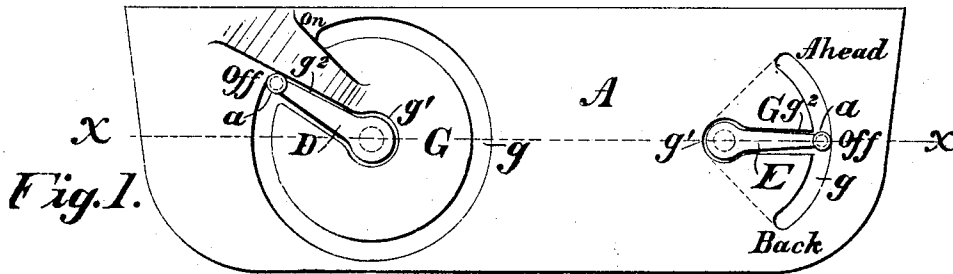


G. H. PARMELEE.
CONTROLLER FOR ELECTRIC MOTORS.

(Application filed July 25, 1900.)

(No Model.)



WITNESSES:

G. M. Powell,
Blanche M. Smith.

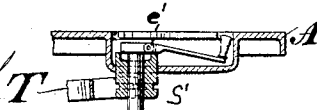


Fig. 7.

INVENTOR

G. H. Parmelee.

UNITED STATES PATENT OFFICE.

GEORGE H. PARMELEE, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR TO
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CONTROLLER FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 665,127, dated January 1, 1901.

Application filed July 25, 1900. Serial No. 24,782. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. PARMELEE, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Improvement in Controllers for Electric Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to controllers for electric motors, and is designed to provide means of simple and efficient character for preventing improper operation of the controller by ignorant or careless motormen.

The controllers now generally in use on street-railways comprise a regulating-drum, by means of which the motor-circuits may be changed in various ways to control the speed and power of the motors, and in the same case or inclosure therewith a reversing-switch, by means of which the direction of movement of the car is controlled, said switches being operated by means of independent handles or levers detachably connected to the projecting ends of the switch-shafts. I attain the object of my invention by providing means whereby the handle or lever of one or both the said switches is not accessible to the motorman unless the other switch has first been moved to a certain predetermined position.

My invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 is a plan view of a controller embodying my invention; Fig. 2, a side elevation of the upper portion of the same with the case or cover partially removed; Fig. 3, a similar view showing a modification; Fig. 4, a detail view showing the connection between one of the handles and the switch-shaft; Fig. 5, a detail view showing a modified arrangement of guard for the said handle. Fig. 6 is a plan view of the pivoted lever shown in Fig. 3. Fig. 7 is a fragmentary view showing another modification.

In the drawings the letter A designates the top portion or cover of a controller-case.

B is the shaft of the main or regulating drum, and C the shaft of the reversing-switch drum.

D is the operating-handle for the shaft B,

and E is the handle for the shaft C. Each of these handles is provided at its free end with an upwardly-projecting handhold *a*.

The top portion A of the casing is formed with a depressed circular pocket F around the projecting end portion of each of the said shafts, the diameter of such pocket being slightly greater than twice the length of the shaft-handle, whereby the handle can turn freely therein throughout the range of its movement, and the depth of each pocket is somewhat greater than the height of the upwardly-projecting handhold. Each of said pockets is partially covered by a guard portion or plate G, which is so arranged as to leave between its peripheral edge and the wall of the pocket a narrow opening *g* of sufficient width to just permit the handhold *a* of the handle to pass therethrough and of a length equal to the arc of movement of the switch. These guard portions are each formed with a central opening *g'* and a communicating open slot *g''* for the purpose of permitting the handles to be engaged with and disengaged from the respective switch-shafts, and these slots are so positioned that such engagement and disengagement can only occur when the switches are at their respective off positions.

On the shaft B is block H, arranged to rotate with the said shaft, but to move freely up and down thereon and formed with a peripheral cam-groove *h*. I is a similar block similarly mounted on the shaft C and having a peripheral cam-groove *i*.

J is a lever fulcrumed at *j* intermediate the two shafts, with the ends of its respective arms engaging the respective cam-grooves *h* and *i*.

In order to provide a proper bearing for the upper ends of the two shafts in the top portion A, I make the upper projecting end of each shaft in a separate piece, to which the cam-block is rigidly secured by a pin *k*, said block moving on a spline or squared portion of the main section of the shaft (see Fig. 4) and forming at all times a connection between the two sections.

The operation is as follows: When both switches are at off position, the relative construction and arrangement of the two cams

are such that the cam-block H is in its lowest position and the block I is in its most elevated position. The handle of the reverse-switch is first placed in position on its shaft and turned to the desired operative position. This movement of said switch through the cam-groove *i* operates the lever J to depress that arm which engages the said groove *i* (without moving the block I) and elevate that arm which engages the cam-groove *h*, together with the block H. The handle can now be applied to the shaft B and the regulating-switch operated in the usual manner. As soon, however, as this switch is operated the arm of the lever J will ride onto the high part of the cam-groove *h*, thereby depressing the opposite arm of said lever. This movement pulls the block I to its low position and also depresses the handle into the pocket F to such a position that the motorman cannot effectively grasp the handhold. He is therefore unable to operate the reversing-switch until the regulating-switch has been returned to off position, when the reverse-handle will be again elevated by the action of the cam-groove *h* on the lever. The handle D remains in elevated position at all times except when the reverse-switch is turned to off position, when the cam-groove *i* will act on the lever J to depress the said handle to an inaccessible position. The motorman is therefore unable to operate the regulating-switch unless the reverse-switch has first been moved to a running position and is also unable to operate the reversing-switch unless the regulating-switch is at off position. When the motorman leaves the car or goes from one end of the car to the other, he first moves the regulating-switch to off position and removes its handle. He then turns the reverse-switch to off position and removes its handle. Inasmuch, as above stated, neither handle can be removed unless its corresponding switch is at off position, it is impossible for the motorman to leave his controller unless both switches are at off position, it being understood, of course, that but one set of handles is employed for the controllers at both ends of the car on roads having cars equipped with controllers at each end and that according to the usual practice a motorman is required in all cases to remove the handles before leaving his car.

Although the devices above described operate to control the operative position of both handles, it is entirely feasible in many controllers to dispense with means for controlling the operative position of the regulating-switch handle, provided some means be still retained to prevent the said handle being removed except at its off position. This is possible, because in such controllers the circuit to the motors is not closed until both switches have been moved to running positions, and movement of the regulating-switch with the reversing-switch at off position can result in no injury to the motors or the apparatus, and

the reversing-switch cannot be moved from off position until the regulating-switch has been returned to off position. In Fig. 3, therefore, I have shown my invention adapted to control only the operative position of the reverse-switch handle. In this arrangement I dispense with the pocket around the regulating-switch shaft B and provide simply a guard-flange P, having a slot *p*, which coincides with a lug *p'* on the sleeve of the handle only when said handle is at off position. This is a common and well-known expedient for the purpose. Instead of a movable block H, I rigidly secure on the shaft B a block R, having a similar cam-groove *r*. On the shaft *c* instead of the block L, I place a movable block S, having a straight groove *s*. T is a lever which is similar to the lever J, except that it may be bifurcated to engage the groove of the block S. Otherwise the arrangement with respect to the reversing-switch is the same as in the construction first described. The operation will be readily seen. The cam-groove *r* actuates the lever T to raise the block S whenever the regulating-switch is turned to off position and to hold said block depressed in all other positions. Therefore the motorman cannot reach the handle of the reverse-switch to operate it unless the regulating-switch has first been moved to off position.

Instead of depressing the top portion A to form the guard-pockets F, said pockets or either of them may be formed in the manner shown in Fig. 5—that is to say, by forming on or securing to the cover-plate a raised guard W.

Fig. 7 illustrates a further modification, in which the handle of the reverse-switch is pivoted at *e'* to the hub or shaft engaging portion of the handle. The position of said handle at all times except when the regulating-switch is at off position is that shown, where it is inaccessible for operation. When, however, the regulating-switch is moved to off position, the lever T elevates the sleeve S', which engages said handle and raises its handhold above the guard. The lever T may be actuated by the means shown in Fig. 3.

While I have shown the reversing-switch as having only two positions besides the off position, my invention in the several forms shown is equally well adapted to reversing-switches of that type which have other positions in which one or more of the motors are cut out of circuit, it being necessary in such a case to correspondingly increase the length of the slot *g*.

It is obvious that instead of the cam arrangement shown in Fig. 3 other mechanical means may be employed to effect the elevation and depression of the reverse-switch handle at predetermined times; also, that various arrangements of guards for preventing access to the handle of one or both switches may be used and that various other changes may be made in the mechanical details of the device, all without departing from the spirit and

scope of my invention as pointed out in the appended claims. Hence I do not wish to be limited to the particular embodiments of my invention which I have herein shown and described. I also desire to be understood that I use the term "handle" herein and in the claims to include any operating device for the switch-shafts.

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

1. In a controller for electric motors, the combination with two rotary switches, and an operating-handle for each switch, of means for preventing operative access to the handle of one switch unless the other switch is in a predetermined position.

2. In a controller, the combination with a regulating-switch, a reversing-switch, and an operating-handle for each of said switches, of means for preventing operative access to the handle of the reversing-switch unless the regulating-switch is in a predetermined position.

3. In a controller, the combination with a regulating-switch, a reversing-switch, and an operating-handle for each of said switches, of means for preventing operative access to the handle of the regulating-switch unless the reversing-switch is in a predetermined position.

4. In a controller, the combination of a regulating-switch, a reversing-switch, an operating-handle for each of said switches, and means for preventing access to the handle of either switch unless the other switch has first been moved to a predetermined position.

5. In a controller, the combination with two rotary switches, and an operating-handle for each switch, means for preventing operative access to the handle of the reversing-switch under certain conditions, and means for permitting operative access thereto controlled as to each handle by the operation of the other switch.

6. In a controller, the combination of a regulating-switch, a reversing-switch, an operating-handle for each switch, means for preventing operative access to the handle of the reversing-switch under certain conditions, and means controlled by the operation of the reversing-switch whereby such access is permitted when the regulating-switch is in a predetermined position.

7. In a controller, an operating-handle having two positions, in one of which only is the handle operatively accessible, and means actuated by the operation of the controller to move said handle from one position to the other at predetermined times.

8. In a controller, the combination of a reversing-switch, a regulating-switch, a handle for each of said switches, having two positions, means for preventing operative access to each handle in one position thereof, and means for moving said handles from one position to the other, the means for moving each

handle being actuated and controlled by the movement of the other switch.

9. In a controller, the combination with a regulating-switch, a reversing-switch, and a handle for each of said switches, the handle for the reversing-switch having two positions, guard devices for preventing access to said handle in one of said positions, and actuating devices operated by the movement of the regulating-switch for moving said handle from one to the other of its positions.

10. In a controller, a vertically-movable operating-handle for one moving element of the controller, and actuating devices operated by a second moving element of said controller for effecting a vertical movement of said handle, together with a guard for preventing access to the said handle in one position thereof.

11. In a controller, the combination with a reversing-switch, a regulating-switch, and independent handles for the said switches, of guards for preventing operative access to said handles except under predetermined positions, said guards also forming means to prevent removal of the said handles except at the off positions of their respective switches.

12. In a controller, the combination with a regulating-switch, a reversing-switch, and a handle for each of said switches, of a guard device arranged to prevent operative access to the reversing-switch handle, means actuated by the regulating-switch for exposing the said handle when the controlling-switch is at off position, and means for permitting removal of the said handles from their respective switches when the latter are at their off positions.

13. In a controller, the combination with a regulating and a reversing switch, and handles for operating the said switches, of a casing having pockets to receive the said handles, and actuating devices controlled by the operation of the respective switches for raising said handles out of said pockets at predetermined times.

14. In a controller, the combination with a reversing-switch, a regulating-switch, and handles for operating the said switches, of a casing having a pocket to receive the handle of the reversing-switch, and means actuated by the movement of the regulating-switch to raise the said handle out of said pocket.

15. In a controller, the combination with a regulating-switch, a reversing-switch, and handles for operating the said switches, capable of a vertical movement, of a casing having guard-pockets adapted to receive said handles, a cam mounted on the shaft of each of said switches and arranged to effect vertical movements of the respective handles, and a pivoted lever having one arm in engagement with each of said cams.

16. In a controller, the combination of a regulating-switch, a reversing-switch, and handles for operating the said switches, capable of a vertical movement, a guard-pocket

for the handle of the reversing-switch, a cam on the regulating-switch, and a lever operated by said cam to raise and lower the said handle.

- 5 17. In a controller, the combination of a regulating-switch, a reversing-switch, and handles for operating the said switches, of a casing having guard-pockets to receive the said handles, and cam and lever devices ac-
10 tuated by movement of the said switches to raise and lower the said handles from and into the said pockets at predetermined times, said guard-pockets also forming means to pre-
15 vent the removal of the said handles except when their respective switches are at off position.

18. In a controller, the combination of a regulating-switch, a reversing-switch, and handles for operating the said switches, the
20 shafts of said switches having the portions which receive the said handles formed in separate sections, of cams secured to the handle-

sections of the said shafts and rotatably but slidably engaged with the main shaft-sections, and a pivoted lever having its arms en- 25 gaging the respective cams to impart vertical movement thereto, together with a casing having pockets or guards to receive the said handles and prevent operative access thereto except at certain times. 30

19. In a controller, a casing formed with a circular pocket in its top or cover portion to receive an operating-handle of the controller, and a guard-plate partially closing the top of the pocket, and having a slot to permit the 35 handle to be inserted and removed there-through.

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

GEORGE H. PARMELEE.

Witnesses:

BLANCHE M. SMITH,
H. W. SMITH.