No. 806,735. PATENTED DEC. 5, 1905.

C. E. CARPENTER.

ELECTRIC CONTROLLING AND REVERSING SWITCH.

APPLICATION FILED FEB. 3, 1905.

Fig. 1

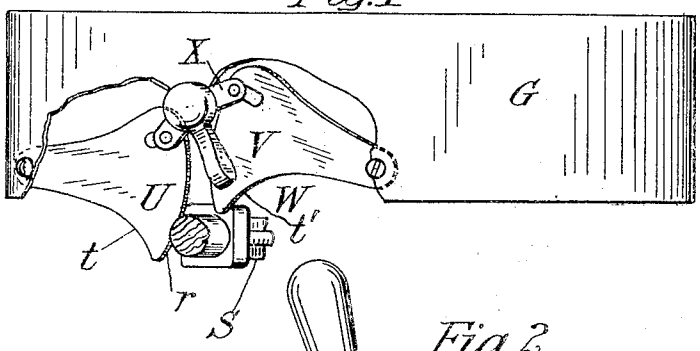


Fig. 2

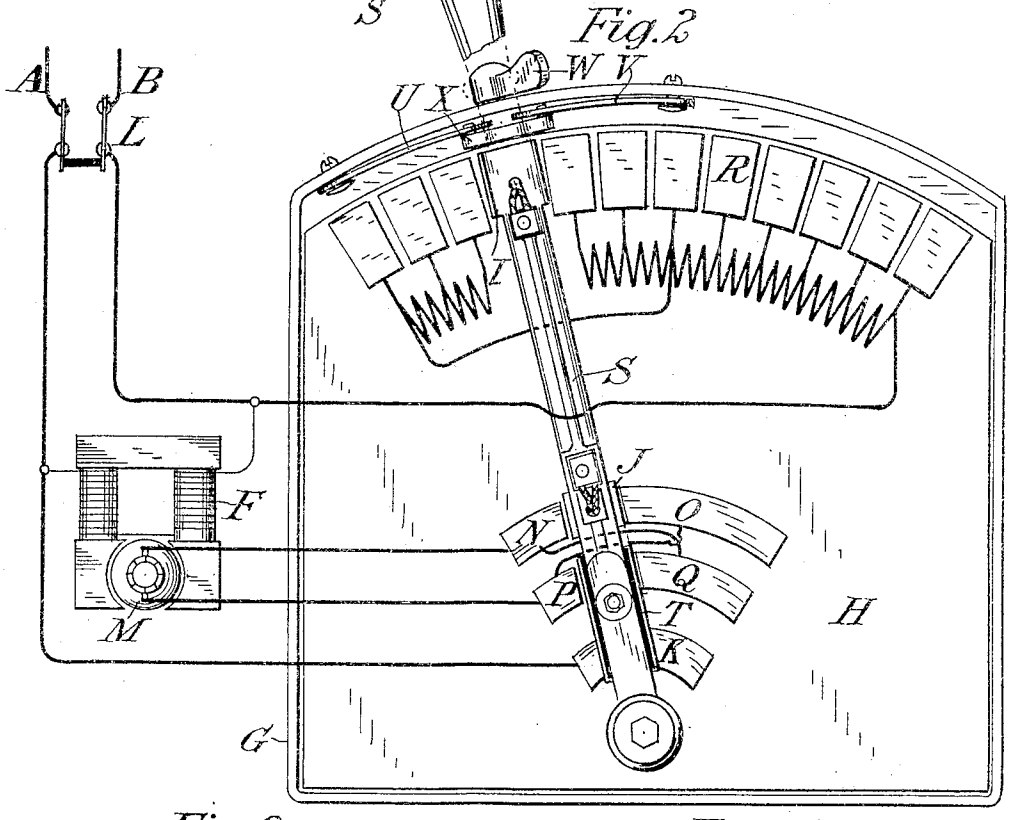


Fig. 3

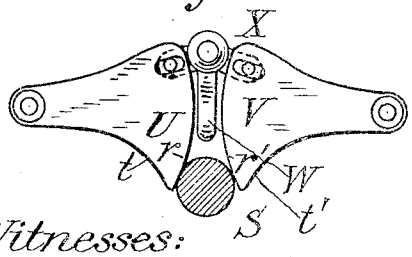
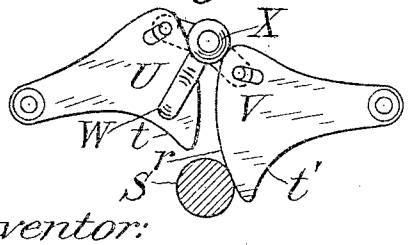


Fig. 4



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UNITED STATES PATENT OFFICE.

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ELECTRIC CONTROLLING AND REVERSING SWITCH.

No. 806,735. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed February 3, 1905. Serial No. 243,946.

To all whom it may concern:

Be it known that I, CHARLES E. CARPENTER, a citizen of the United States of America, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Electric Controlling and Reversing Switches, of which the following is a specification.

My invention relates to a suitably-constructed stop for the movable member of a combined controller and reversing-switch for an electric motor. The movable member has a unitary path of movement for both control and reversal, reversal being effected by operation of the movable member to either side of an intermediate position in which the armature-circuit is broken or there is substantially no current-flow and control in either direction is effected by operation of the movable member along the path of movement at either side of the intermediate position, depending on the direction of operation. The intermediate position is a position where the motor speed will be reduced or the motor will stop, so that reversal can be effected without injury to the motor. The object of the stop is to prevent a too sudden operation of the movable member past the intermediate slow-speed or stop position and to require a pause in the operation of the movable switch member while the stop is manipulated to permit the switch to be moved to the other side for effecting reversal.

One object of the invention is to provide a stop of such design that it will act as such only when the movable switch member is at the intermediate position and will not interfere with the free operation of the switch at either side of the intermediate position and from either side of the intermediate position to the intermediate position for the purpose of speed-control or stopping.

Another object of the invention is to so organize the stop that the switch member can be operated to the identical intermediate or stop position without interruption from any controller position at either side of the intermediate position, according to the way that the stop is manipulated when the movable switch member is at the intermediate position.

Another object of the invention is to so construct the stop that it can be readily applied to existing switch mechanism without requiring any modification of the movable member of the switch.

Another object of the invention is to so construct the stop that in the event of its having been misplaced or retracted when the movable switch member is away from the intermediate position the switch member will act upon and reset the stop when moved toward the intermediate or stop position.

In the accompanying sheet of drawings, which forms a part of this application, Figure 1 is a top view of an electric-motor controller and reversing-switch of the lever type embodying the stop to which my invention particularly relates, the handle of the lever and the casing being broken away. Fig. 2 is a front view of the controller and reversing-switch, together with a motor and a diagrammatic representation of the connections between the leads of the motor and the switch. Fig. 3 is a detail of the stop in position to lock the lever at the intermediate position. Fig. 4 is a detail of the stop in position to permit movement of the lever between the intermediate position and control position at the left of the intermediate position.

Two conductors A B supply the current through a main switch L and a suitable motor-controller to an electric motor comprising the armature M and field F.

The electric-motor controller in connection with which my invention is herein illustrated comprises a slate slab H, which carries rheostat-contacts R and contacts N O, P Q, and K, by which the armature connections are reversed. This slab is mounted in a cast-iron frame G, and the whole constitutes the fixed member of the controller, as illustrated. A manually-operated lever S is pivoted to the slate and carries a contacting part I, which traverses the rheostat-contacts, and a contact J, which connects the lever with the fixed contacts N or O. The lever also carries a bridging contact, which is insulated from the lever. The lever and these contacts constitute the movable member of the controller, as illustrated. The bridging contact T connects fixed contacts P or Q with contact K. The connections with the contacts N and P or O and Q are changed when the lever which forms the movable member of the switch is carried past an intermediate position, which is the position in which the

lever is illustrated. At this intermediate position the lever is either on the end rheostat-contacts for control in either direction, which include all the resistance of the rheostat, or preferably, as shown, off from the last of these resistance-sections, so that the armature-circuit is interrupted. This intermediate position is the stop position of the switch to which the operator brings his switch-lever when he desires to stop the motor. As this operation is often performed suddenly in an emergency, it is important that means be provided to prevent the operator from carrying the lever suddenly past this point, since such operation would restore the armature-circuit to the motor with connections for reverse operation and there would be an unsafe current-flow until the motor could stop and reverse.

In the controller as illustrated forward operation of the motor is effected at positions of the lever to the right of the intermediate position and reverse operation at the lesser number of positions at the left of the intermediate position, as it is intended only to permit the operation of the motor slowly in the reverse direction. It is therefore not as important to prevent a sudden change of connection from the comparatively slow reverse speed to a forward speed as from a forward speed to a reverse speed, and while both are prevented by the stop mechanism illustrated this stop mechanism will for simplicity be described first as though its function was only to prevent such movement of the lever from a forward to a reverse position and not from a reverse to a forward position. The stop is a wing-shaped piece U, pivoted to the upper rim of the cast-iron frame, and hence carried by the fixed member of the switch. This stop member may be projected into or retracted from the path of travel of the lever, and when projected into the path of travel of the lever it opposes on one side a face *r*, against which the shank of the lever impinges when brought to the intermediate position from any forward operated position. The other face *t* of the stop is inclined to the path of travel of the lever, so that when the lever is brought toward the intermediate position from a reverse operated position the lever will push this stop out of its path, and hence the stop will not interfere with the free movement of the lever from a reverse position past this stop to the intermediate position in event of the stop being projected into the path of travel. The stop is projected into and retracted from the path of travel manually by means of a lever W and gear X, also pivoted to the rim of the cast-iron frame and geared to the stop. It is to be noted that while the stop acts as a lock for the lever at the intermediate position the lever does not at any operated position lock the stop in either projected or retracted position, so that the two do not "interlock," as this term is commonly applied. Such interlock is not necessary, since the stop and its connections have no electrical contact-making function. The lever therefore requires no peculiarity of construction for the proper operation of the stop in conjunction therewith. As in consequence the stop can be freely retracted in an operated position of the lever, means are provided for projecting the stop automatically into engaging position, if it is not in such position, on bringing the lever toward the intermediate position at which it is required to arrest the movement of the lever. For this purpose a wing-shaped piece V is pivoted to the rim of the cast-iron frame, where it will be engaged by the lever just before the lever reaches the intermediate position and be pushed down by the lever. This also gears with the gear X, and when pushed down serves to project the stop U to its operated position. As shown, the wing V is of the same form as the stop U and is so placed that it has the additional function of acting as a stop for the lever when brought to the intermediate position from a reverse position. The stop U also has the additional function of serving as a setting member for the stop V in event of the stop V having been retracted while the lever is at a reverse position, so that the objects of my invention may be carried out in a more perfect manner.

Many modifications may be made in the details of construction of my invention without departing from the principles of construction herein set forth and claimed or without sacrificing the objects herein set forth.

In practice this invention is applied to switches which embody, in addition to the features herein illustrated, other details—such, for example, as are shown in United States Patent No. 768,214, granted August 23, 1904, on application by me.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electric-motor controller and reverser having a fixed member and a movable member for effecting motor reversal and control, a stop carried by the fixed member and engaging with the other member only at an intermediate position in which there is substantially no current-flow, and means for retracting the stop when the movable member of the controller is at said intermediate position to permit the movable member to pass the intermediate position, substantially as described.

2. In an electric-motor controller and reverser having a fixed member and a movable member for effecting motor reversal and control, a stop carried by the fixed member and engaging with the other member only at an intermediate position in which there is substantially no current-flow, operative connections between the movable member and the stop for projecting the stop into engaging position when the movable member is brought

to the said intermediate position, and means for retracting the stop when the movable member of the controller is at said intermediate position to permit the movable member to pass the intermediate position, substantially as described.

3. In an electric-motor controller and reverser having a fixed member and a movable member for effecting motor reversal and control, a stop carried by one of the members and having two parts engaging with the other member only at an intermediate position, one engaging part serving to prevent movement of the movable member from the intermediate position in one direction, and the other engaging part serving to prevent movement of the movable member in the contrary direction, and connections between the engaging parts to prevent their concurrent retraction, substantially as described.

4. In an electric-motor controller and reverser having a fixed member and a movable member for effecting motor reversal and control, a stop carried by the fixed member and having two parts engaging with the movable member only at an intermediate position, one engaging part serving to prevent movement of the movable member from the intermediate position in one direction, and the other engaging part serving to prevent movement of the movable member in the contrary direction, and connections between the engaging parts to prevent their concurrent retraction, substantially as described.

Signed by me at New York city, New York, this 2d day of February, 1905.

CHARLES E. CARPENTER.

Witnesses:

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