

S. M. WARD, JR.
 CONTROLLER SWITCH FOR ELECTRIC MOTORS.
 APPLICATION FILED MAR. 17, 1909.

961,185.

Patented June 14, 1910.

Fig. 1.

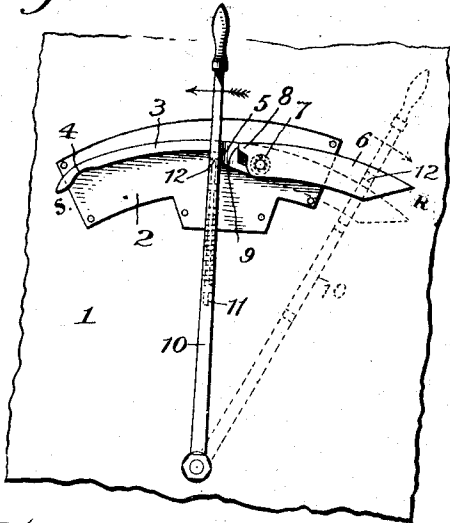


Fig. 2.

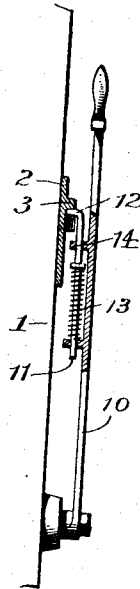


Fig. 4.

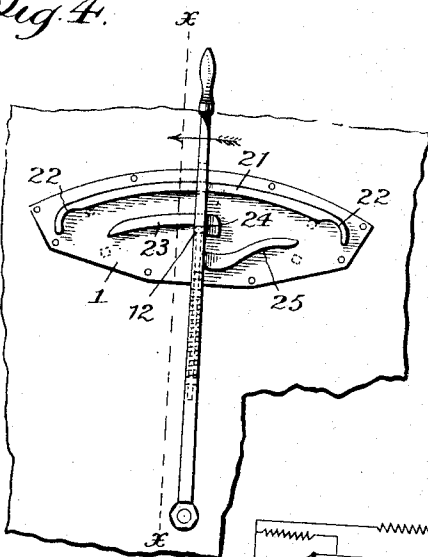


Fig. 5.

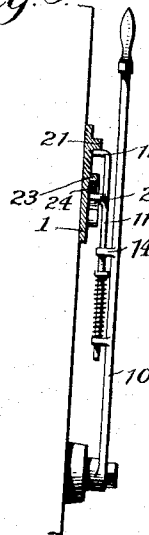


Fig. 6.

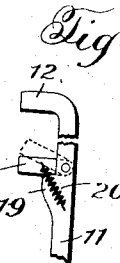
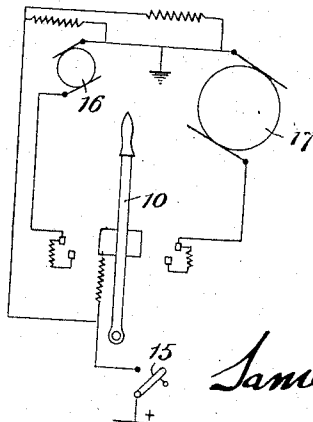


Fig. 3.



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CONTROLLER-SWITCH FOR ELECTRIC MOTORS.

961,185.

Specification of Letters Patent. Patented June 14, 1910.

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To all whom it may concern:

Be it known that I, SAMUEL M. WARD, Jr., citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Controller-Switches for Electric Motors, of which the following is a specification.

My invention relates to controller switches for electric motors and more particularly to starting switches of that type in which there is an intermediate or "off" position and two operative positions, the switch being so arranged that it must be thrown to a predetermined or starting position before it is thrown to the running position.

The object of my invention is to produce a simple and inexpensive switch of this type which may be readily applied to any controller casing; and the invention will best be understood by the following description in connection with the accompanying drawings in which—

Figure 1 is an elevation of a controller casing to which the invention is applied. Fig. 2 is a side view of the switch handle. Fig. 3 shows a diagram of circuits in connection with which the switch may be used. Fig. 4 is a modification of the controller switch. Fig. 5 is a sectional view of the same on line $x-x$; and Fig. 6 is an enlarged view of a part on the handle with the handle at its central position in its movement from the starting to the running position.

Referring to the drawings, 1 is a casing upon which a plate 2 having a lateral projecting ridge or cam surface 3 is secured. The cam surface is slightly curved having a recess 4 at one end and a thickened portion at the other end forming a shoulder 5. Adjacent this thickened portion is pivoted a latch 6 which is held in its full line position by a spring 7. A projection 8 on the latch engages a shoulder 9 to prevent further upward movement of the latch.

The switch handle 10 pivoted to the casing, carries a bolt 11 having a lateral projection 12; the bolt being held normally in its upper position by a spring 13: in which position the bolt is held from further upward movement by engagement of a collar or flange on the bolt, with an eye 14 on the handle.

Fig. 3 shows diagrammatically a small and a large motor which may be used for driving a printing press. When switch 15 is closed the fields of both motors are en-

ergized. When the switch 10 is thrown to the left the small motor 16 is started up to bring the press up to speed, after which the switch is thrown to the right to start up the large motor 17.

The operation of the device, as thus explained, is as follows—With the switch in the position shown in Fig. 1, the handle is prevented from being thrown to the right (the running position) by the engagement of projection 12 with shoulder 5. If the handle is now thrown to the left until projection 12 rests in recess 4, the switch will be in the starting position and small motor 16 (Fig. 3) will be started. When the press has been brought up to speed the handle is moved farther to the left until the projection 12 slips from under the cam surface 3 and is thrust by spring 13 to its upper position, so that the handle may now be thrown to the right. In throwing the handle to the right the under side of projection 12 rides on the upper edge of latch 6 forcing it down into the dotted line position, (Fig. 1). Just before the handle reaches the running position in which position large motor 17 is thrown in circuit the projection 12 rides off of the latch and the latter is thrown to its upper position by spring 7. When it is desired to stop the press the handle is again thrown to the center or off position, the projection 12 now riding upon the under side of the latch, thus compressing spring 11 until the off-position is reached, when the bolt is thrust upward by the spring into the position shown in Fig. 1 where the engagement of projection 12 with shoulder 5 prevents the switch from again being thrown to the right before it is thrown to the left.

Fig. 4 shows a modified arrangement for preventing the switch being first thrown to the right. The plate 1 has three lateral projecting ridges or cam surfaces instead of one, and on the bolt 11 mounted on the handle is pivoted an auxiliary projection or finger 18 which is held down on a shoulder 19 by a spring 20. One of the cam surfaces 21 on plate 1 is curved with a recess 22 at each end; and a second cam surface 23 has a shoulder 24 at one end, while a third cam surface 25 below the others is formed tapering and sloping downward from right to left. The operation is as follows—With the switch in the intermediate position, as shown in Fig. 1; the projection 12 on the bolt en-

gages shoulder 24 on cam surface 23 and prevents the switch being thrown to the right. If the switch is now thrown to the left projection 12 rides beneath cam surface 23 until the switch reaches the starting position, when spring 13 will thrust the bolt upward forcing projection 12 into recess 22 at the left; at which position motor 16 is started up.

If the handle is now thrown to the running position, projection 12 rides along in engagement with the under side of cam surface 21 compressing spring 13 sufficiently to allow finger 18 to pass between the lower edge of shoulder 24 and cam surface 25. As the handle is moved farther to the right the under side of finger 18 engages the upper side of cam surface 25, tilting the finger up to the dotted line position (Fig. 6) since the distance between cam surfaces 21 and 25 at this point is less than the distance between projection 12 and finger 18. Just before the handle reaches the running position (recess 22) the finger 18 leaves the cam surface 25 and is snapped down on shoulder 19 by spring 20. When it is desired to stop the press the handle is thrown to the center or "off" position and finger 18 will now engage the under side of cam surface 25, forcing the bolt down against spring 13 and allowing projection 12 to pass between shoulder 24 and the upper side of cam surface 25; so that after finger 18 passes off of the thickened part of surface 25, the spring 13 will throw bolt 11 upward and projection 12 will again engage shoulder 24 to prevent the handle being thrown to the right before it is first thrown to the left. It is necessary in the construction shown in Fig. 4 that the distance between projection 12 and finger 18 be greater than the distance between cam surface 21 and the lower end of shoulder 24, so that when projection 12 is in engagement with surface 21 the finger may pass below the shoulder when the switch is being thrown from the starting to the running position. It is also necessary that the distance between surfaces 21 and 25 near the running position must be less than the distance between the projection 12 and finger 18, so that the finger will engage the lower side of surface 25 when the switch is thrown from the running to the "off" position; and it is likewise necessary that the lower edge of surface 25 should project down sufficiently so that finger 18, riding under the lower edge of this cam surface will draw the bolt down sufficiently to permit projection 12 to pass below shoulder 24 when the switch is thrown to the "off" position.

While I have shown the invention as applied to the starting of two motors, it may obviously be applied to any use well known in the art, for instance, in connec-

tion with compensators for starting alternating current motors, or in signaling where it is desired to close a circuit to a signal before a circuit is closed to throw a track switch or to operate a signal before the track-switch is manually thrown. In such cases the position of the handle, with the track-switch in its normal position, will be considered the "intermediate" or "neutral" position of said handle; and the positions of said handle for the signal and for throwing the track-switch, will be considered respectively as the "starting" and the "running" positions herein mentioned; or vice versa according to the use intended, it being understood that the claims are intended to cover the use of such a handle as herein described, for any of the many uses to which it may be put, or in connection with valves for pneumatically controlled motors; and the part 3 may be integral with and form the tail of latch 6.

While I have described my invention with particularity in the form and manner shown, what I desire to secure by Letters Patent of the United States is:—

1. The combination of a casing, a handle having two operative positions and an intermediate position, a quick acting movable member on the handle, and a part on the casing coöperating with said movable member, whereby the handle must be thrown in one direction each time before it is thrown in the other direction.

2. The combination of a switch member having two operative positions and an intermediate neutral position, a stationary frame, a part on the frame having a shoulder, and a movable part on the switch member coöperatively related with said shoulder part and movable above and below the same for preventing said switch member from being moved in one direction without first being moved in the other direction.

3. In a motor controller, the combination of a casing, a switch having a starting and a running position and an intermediate position, a handle for the switch, a longitudinally movable bolt on the handle, a cam surface on the casing for engaging with said bolt, and a spring for moving the bolt from alinement with said surface, whereby the handle must be thrown to the starting position before it is thrown to the running position.

4. In a motor controller, the combination of a casing, a switch having a starting and a running position and an intermediate position, a handle for the switch, a longitudinally movable bolt on the handle biased to one position, a laterally projecting cam surface on the controller casing having a shoulder coöperating with said bolt, and means for moving the bolt to its biased position when the handle is thrown from the neutral

position, whereby the handle must be thrown to the starting position before it is thrown to the running position.

5 The combination of a casing, a handle having a starting and a running position and an intermediate neutral position, a movable member on the handle having a lateral projection, and means on the casing for engaging said lateral projection to prevent the handle being thrown to one of said operative positions before it is thrown to the other position and for engaging said movable member in throwing the handle to the latter position.

15 6. In a motor controller, the combination of a casing, a switch member having a starting and a running position and an intermediate position, a projection on the casing, a movable bolt on the switch member for coöperatively engaging said projection, and a spring for thrusting the bolt from alignment with said projection when the handle is moved, whereby the handle must be thrown to the starting position before it is thrown to the running position.

7. In a motor controller, the combination of a casing, a switch having a starting and a running position and an intermediate position, a handle for the switch, and a longitudinally movable bolt on the handle biased to one position, a shoulder on the casing coöperating with the bolt to prevent the handle from being thrown to the running position, a cam surface on the controller for forcing the bolt from its biased position in throwing the switch to its starting position, and means on the casing for again forcing the bolt from its biased position and guiding it into engagement with said shoulder when the switch is thrown from the running to the off position.

8. In a motor controller, the combination of a casing, a controller handle having a starting and a running position and an intermediate position, a longitudinally movable bolt on the handle having a lateral projection, a cam surface on the casing having a shoulder engaging said projection for preventing the switch from being first thrown to the running position, said cam surface forcing the bolt down when the switch is thrown to the starting position and then releasing it, a spring for forcing the bolt upward when it leaves said surface and means for again forcing the bolt downward in throwing the switch from the running to the off position, said bolt being thrown upward into engagement with said shoulder when

disengaged from said means at the off position. 60

9. In a motor controller, the combination of a casing, a controller handle having a starting and a running position and an intermediate position, a movable bolt on the handle, a stationary cam surface on the controller casing coöperating with said bolt for preventing the handle from being first thrown to the running position, and a pivoted member on the casing coöperating with the bolt for guiding it into engagement with the cam surface when the handle is thrown from the running to the off position. 65 70

10. In a motor controller, the combination of a casing, a switch having a starting and a running position and an intermediate position, a handle for said switch, a movable bolt on the handle, and a stationary cam surface and a movable member on the casing coöperating with said bolt, whereby the handle must be thrown to the starting position before it is thrown to the running position. 75 80

11. The combination of a casing, a switch having a starting and a running position and an intermediate position, a handle for said switch, a movable bolt on the handle, a stationary cam surface on the casing having a shoulder coöperating with said bolt to prevent the handle from being first thrown to the running position, and a movable member on the casing coöperating with the bolt and guiding it into engagement with the said shoulder when the handle is thrown from the running to the off position. 85 90

12. The combination of a casing, a switch having a starting and a running position and an intermediate position, a handle for said switch, a movable bolt on the handle, a stationary laterally projecting cam surface on the casing having a shoulder coöperating with said bolt to prevent the handle from being first thrown to the running position, a spring tending to hold the bolt in its upper position, and a pivoted member on the casing engaged by the bolt and moved from its normal position in throwing the handle to the running position, said pivoted member engaged by the bolt and guiding it to its normal position when the handle is thrown to the off position. 100 105

In testimony whereof I affix my signature, in presence of two witnesses. 110

SAMUEL M. WARD, JR.

Witnesses:

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A. E. T. HANSMANN.