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CIRCUIT CONTROLLER

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Fig. 1.

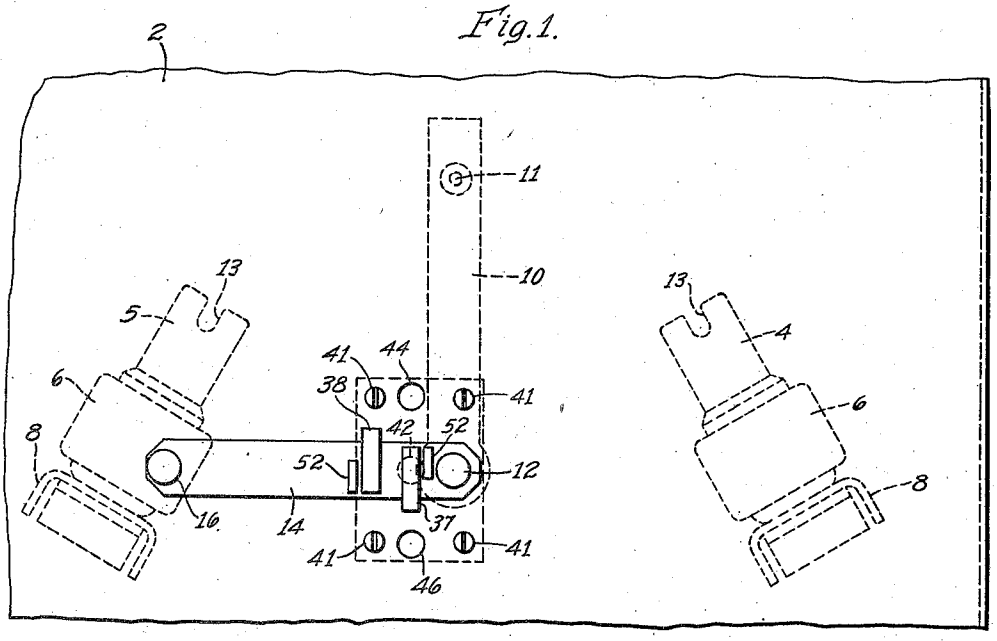


Fig. 2.

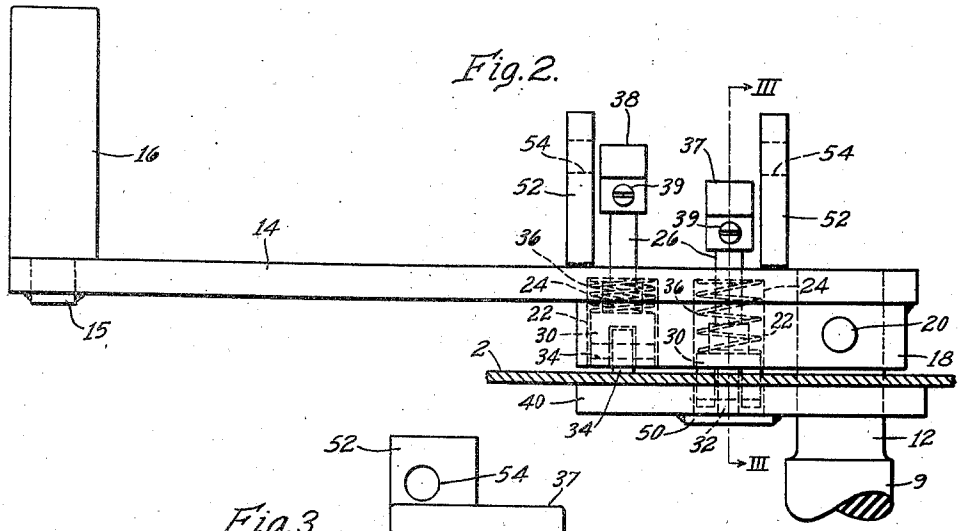
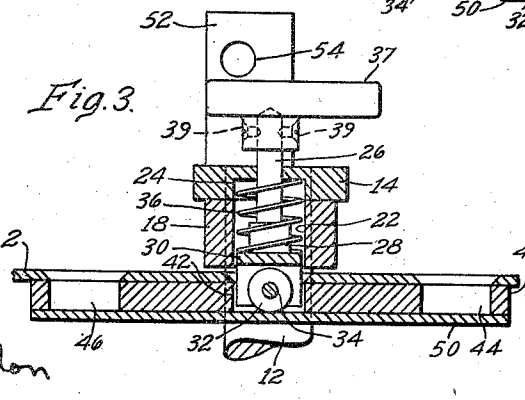


Fig. 3.



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CIRCUIT CONTROLLER

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1

This invention relates generally to electric circuit controllers, and more specifically to locking means for electric switches.

One object of this invention is to provide a switch with novel means for holding the switch at a plurality of different positions, which is efficient in operation and relatively simple in construction.

A more specific object of the invention is to provide novel means for releasably latching a switch in a plurality of different positions, which latching means is adapted to receive locking means at one or more positions to positively lock the switch against unauthorized operation.

Another object of this invention is to provide a double-throw switch having two closed circuit positions and an intermediate open circuit position, with novel means for releasably latching said switch in each position arranged to be readily operable to effect automatic latching in the intermediate position of the switch when the switch is moved from one closed circuit position, while at the same time being operable in a more difficult manner from one closed circuit position to the other without automatic latching at the intermediate position.

These and other objects of this invention will become more apparent upon consideration of the following detailed description of a preferred embodiment thereof, when taken in connection with the attached drawing, in which:

Figure 1 is a fragmentary elevational view of a switch housing and a switch constructed in accordance with the invention;

Fig. 2 is an enlarged partial cross-sectional view taken through one wall of the switch housing and illustrating the switch actuating means in elevation, and

Fig. 3 is a transverse section view taken substantially on the line III—III of Fig. 2.

In Fig. 1 of the drawing, there is illustrated one wall 2 of a switch housing of conventional type, preferably having the walls thereof of sheet metal or the like. Within the switch housing there is mounted a pair of stationary contact tongues 4 and 5, each mounted on separate insulators 6 supported within the housing on transversely extending spaced channel supports 8. At a point intermediate contact tongues 5 and 6 a switch blade 10 is rotatably mounted by means of a rotatable actuating shaft 12, supported in suitable bearings provided on opposite side walls of the switch housing. Switch blade 10 is mounted on an insulated portion 9 of shaft 12, and is preferably of the split type having spaced sides

2

secured against relative separation at their outer ends by a bolt 11, so that when the blade is pivotally moved to engage contact tongue 4 or 5, the contact tongue will be received between the sides of split blade 10, with connecting bolt 11 received in a notch 13 provided in the outer end of each contact tongue. It is to be understood, that for multiple phase circuits, duplicate switch blades will be mounted in insulated spaced relation on actuating shaft 12, and corresponding duplicate sets of contacts 4 and 5 will be mounted in the housing in a manner well known in the art.

At the outside of the switch housing there is provided an actuating handle 14 secured on the outer end of actuating shaft 12, in a manner to be described. Actuating handle 14 is provided with a handgrip 16 at the outer end thereof rotatably mounted with respect to handle 14, for example, as on a pivot pin 15 secured to the handle. The handle 14 has secured at the inner end thereof a supporting bar 18 which may be secured thereto as by welding or the like. A pin 20 is provided through apertures in supporting bar 18 and actuating shaft 12 to secure the handle structure for rotation with the shaft. Supporting bar 18 is provided with a pair of longitudinally spaced openings 22 extending therethrough, which are aligned with correspondingly spaced recesses 24 of the same size provided in the underside of handle 14. The top wall of each recess 24 is provided with a small opening for slidably receiving a plunger rod 26 therein. Each plunger rod 26 is provided with an enlarged head 28 (see Fig. 3) within opening 22 adapted to engage the top of recess 24 when the plunger rod is moved upwardly, as viewed in Figs. 2 and 3, to limit upward movement of the rod. To the head 28 of each plunger rod 26, there is secured a U-shaped bracket 30 adapted to receive a roller 32 rotatably mounted between the sides of the U-shaped bracket, as by a pivot pin 34. A coil compression spring 36 is provided within opening 22 and recess 24, and the spring reacts between U-shaped bracket 30 on the plunger rod, and the upper end of recess 24, to normally bias the plunger rod downwardly towards wall 2 of the switch housing. Each plunger rod is provided with a latch handle at its upper end, with the one closest to the actuating shaft 12 having a generally T-shaped handle 37 secured thereto, for example as by screws 39, with the cross part of the latch handle extended laterally to one side of actuating handle 14. The other plunger 26 is provided with a latch handle 38, similar in con-

struction to latch handle 37, but being extended to the opposite side of actuating handle 14.

For co-operation with the plungers controlled by latch handles 37 and 38, a latch plate 40 is secured to the inner side of housing wall 2, as by screws 41, at a position at the inner end of actuating handle 14. As illustrated in Figs. 1 and 2 of the drawing, latch plate 40 is provided with a relatively large opening at one side thereof forming a bearing for actuating shaft 12, and is provided with three spaced openings 42, 44, and 46 arranged in a line longitudinally of the latch plate. These three openings are aligned with correspondingly spaced openings in wall 2 which are flared outwardly as clearly illustrated in Fig. 3. A cover plate 50 is welded or otherwise secured to the inner side of latch plate 40 to cover openings 42, 44 and 46.

Switch blade 10 is illustrated in Fig. 1 as being at a position intermediate contact tongues 4 and 5, and latch handle 37 has plunger roller 32 associated therewith, received in opening 42 being held in this position by spring 36, to latch actuating handle 14 in the position illustrated, and thus latch the switch blade at the intermediate open circuit position illustrated. It will be observed that the opening 42 in housing wall 2 is positioned at the same radius from the axis of actuating shaft 12 as the actuating plunger associated with latch handle 37. On the other hand, openings 44 and 46 in housing wall 2 are provided at the same radius from the axis of actuating shaft 12 as the plunger associated with latch handle 38. Accordingly, if it is desired to move switch blade 10 from its central position into engagement with contact tongue 4 or 5, it is necessary to retract latch handle 37 by pulling outwardly thereon, whereby handgrip 16 may be grasped to move actuating handle 14 in either direction to rotate actuating shaft 12, and with it switch blade 10 into engagement with contact tongue 4 or 5. When blade 10 is fully engaged with contact tongue 4 or 5, the roller 32 associated with latch handle 38 will drop into opening 44 or 46, to automatically latch the switch in closed-circuit position. At this position, latch handle 38 will be depressed whereas latch handle 37 will be raised to clearly indicate which latch handle must be actuated to release the switch for movement to a different position.

It will be observed that with the structure described above the handle and latching structure are arranged as an integral unit, and move as a unit in actuating the switch from one position to another. Furthermore, latching plate 40 being mounted on the inner side of housing wall 2 is concealed from view, thus providing a structure with a minimum of exposed parts. Another feature of this invention is the provision of both latch structures in duplicate form, since latch handles 37 and 38 are identical in structure, differing only in that they are mounted 180° apart on their respective plunger rods 26. The provision of rollers 32 on the plunger rods tends to eliminate friction of the latch parts in operating the switch as well as undesirable scraping noises. In operating the switch from one position to another, it is merely necessary to raise the latch handle which is depressed, thus leaving the latch plunger associated with the other latch handle free to automatically snap into place at the position to which the switch is actuated. When moving from one closed circuit position to the other, automatic latching at the intermediate position will ordinarily occur. However, if desired, this

can be eliminated by holding both latch handles 37 and 38 in raised position. This mode of operation is generally not desired, particularly if the switch is used in switching from one feeder to another, and hence it is rendered relatively difficult as both latch handles must be held raised at the same time that the actuating handle 14 is manipulated. As previously pointed out, there is never any doubt on the part of the operator as to which latch pin must be raised to release the switch for operation, because in each of the three positions of the switch one latch handle will always be depressed and the other one will always be raised. By having the latch handles 37 and 38 extend laterally beyond actuating handle 14 in opposite directions, they are easier to lift without interfering with each other.

In order to prevent rotation of latch handles 37 and 38 and to lock the latch handles in a depressed position, there is provided adjacent each handle a lock bar 52 which extends outwardly from actuating handle 14, being secured thereto in any desired manner, such as by welding or the like. Each lock bar 52 is provided with an opening 54 therethrough positioned to be blocked by the adjacent latch handle in its raised position, but adapted to be uncovered when its adjacent latch handle is received in an opening 42, 44 or 46. It will be observed that lock bars 52 are located close enough to latch handles 37 and 38, respectively, as to prevent rotation thereof, and to therefore hold the handles in the positions illustrated in Fig. 1 and maintain rollers 32 properly positioned. Openings 54 in the lock bars when uncovered by the adjacent latch handle being in a depressed position, may receive a locking means such as a padlock or the like, to lock the adjacent latch handle in its depressed position, and thereby prevent operation of the switch from any of its three positions by other than authorized persons. Furthermore, with the construction illustrated, there is never any doubt as to where the padlock or other locking means should be inserted, because in each position of the switch one hole 54 will be blocked and only one will be unblocked to permit insertion of a locking means therein.

In some cases it may not be desirable to provide for latching or locking of the switch at an intermediate open position, in this event latch handle 37 and its associated latch parts together with opening 42 in housing wall 2 may be omitted.

From the foregoing it is apparent that the particular switch actuating means disclosed herein permits definite latching of a switch in at least three positions, in each of which provision is made for locking, as by a padlock or the like. Furthermore, ordinarily in moving from one latched position of the switch to another the switch is automatically latched in the next position to which it is moved, but it is possible by a relatively difficult manipulation to move the switch from one closed position to the other without automatic latching in the intermediate open-circuit position.

Having described a preferred embodiment of the invention in accordance with the patent statutes, it is desired that the invention be not limited to this particular structure, inasmuch as it will be obvious to persons skilled in the art that many modifications and changes may be made therein without departing from the broad spirit and scope of the invention. Accordingly, it is desired that this invention be interpreted as

broadly as possible, and that it be limited only as required by the prior art.

We claim as our invention:

1. In a circuit controller, separable contacts one of which is mounted on a support for movement into and out of engagement with the other of said contacts, a manually operable actuating member for said movable contact, first manually releasable means for latching said movable contact at a closed circuit position where it is in engagement with the other of said contacts, second manually releasable means which is separate from and independent of said first means for latching said movable contact at an open circuit position, and said latching means being co-operatively associated with said actuating means and with said support.

2. In a circuit controller, separable contacts one of which is mounted on a support for movement into and out of engagement with the other of said contacts, a manually operable actuating member for said movable contact, said actuating member having a handle portion, manually releasable means for latching said movable contact at a closed circuit position where it is in engagement with the other of said contacts, second manually releasable means which is separate from and independent of said first means for latching said movable contact at an open circuit position, and said latching means being spaced from said handle portion and co-operatively associated with said actuating means and with said support.

3. In a circuit controller, separable contacts one of which is mounted on a support for movement into and out of engagement with the other of said contacts, a manually operable actuating member for said movable contact, manually releasable means for latching said movable contact at a closed circuit position where it is in engagement with the other of said contacts, second manually releasable means which is separate from and independent of said first means for latching said movable contact at an open circuit position, said latching means being co-operatively associated with said actuating means and with said support, and means located adjacent at least one of said latching means for receiving locking means to prevent unauthorized release of at least said one latching means.

4. In a circuit controller, separable contacts one of which is mounted on a support for movement into and out of engagement with the other of said contacts, a manually operable actuating member for said movable contact, manually releasable means for latching said movable contact at a closed circuit position where it is in engagement with the other of said contacts, second manually releasable means which is separate from and independent of said first means for latching said movable contact at an open circuit position, said latching means being co-operatively associated with said actuating means and with said support, and said manually releasable means having hand engaging portions extending laterally of said actuating member in opposite directions, respectively.

5. In a circuit controller, spaced contacts mounted on a stationary support, a contact member mounted on said support for movement into and out of engagement with said contacts, respectively, a manually operable actuating member for said movable contact member, a pair of separate and independent manually releasable latch means mounted on said actuating member for co-operation with said support to latch said movable contact member at a plurality of different positions, one of said latch means adapted to latch said movable contact member at each of its closed circuit positions, and the other of said latch means adapted to latch said movable contact member at an intermediate open circuit position.

6. In a circuit controller, spaced contacts mounted on a stationary support, a contact member mounted on said support for movement into and out of engagement with said contacts, respectively, a manually operable actuating member for said movable contact member, a pair of manually releasable latch means mounted on said actuating member for co-operation with said support to latch said movable contact member at a plurality of different positions, one of said latch means adapted to latch said movable contact member at each of its closed circuit positions, the other of said latch means adapted to latch said movable contact member at an intermediate open circuit position, and means located adjacent each of said latch means for receiving locking means to prevent unauthorized release of said latch means.

7. In a circuit controller, spaced contacts mounted on a stationary support, a contact member mounted on said support for movement into and out of engagement with said contacts, respectively, a manually operable actuating member for said movable contact member, a pair of manually releasable latch means mounted on said actuating member for co-operation with said support to latch said movable contact member at a plurality of different positions, one of said latch means adapted to latch said movable contact member at each of its closed circuit positions, the other of said latch means adapted to latch said movable contact member at an intermediate open circuit position, and said manually releasable means having hand engaging portions extending laterally of said actuating member in opposite directions.

8. In a switch, contact means mounted on a stationary support, movable switch blade means and a rotatable actuating shaft for actuating said blade means into and out of engagement with said contact means, an actuating handle on said shaft, a stationary latch plate located in proximity to said handle, a plurality of latch plungers mounted on said handle for movement substantially transversely of said handle toward and away from said plate, said plungers being biased toward said plate, and said plate having a plurality of spaced recesses for receiving said plungers to latch said blade means at different positions thereof.

9. In a switch contact means mounted on a stationary support, switch blade means and a rotatable actuating shaft for actuating said blade means into and out of engagement with said contact means, an actuating handle on said shaft, a stationary latch plate located in proximity to said handle, a plurality of latch plungers mounted on said handle for movement substantially transversely of said handle toward and away from said plate, said plungers being biased toward said plate, said plate having a plurality of spaced recesses for receiving said plungers to latch said blade means at different positions thereof, and said plungers having handgrip portions extending laterally in opposite directions for retracting said plungers.

10. In a switch, contact means mounted on a

stationary support, switch blade means and a rotatable actuating shaft for actuating said blade means into and out of engagement with said contact means, an actuating handle on said shaft, a stationary latch plate located in proximity to said handle, a plurality of latch plungers mounted on said handle for movement substantially transversely of said handle toward and away from said plate, said plungers being biased toward said plate, said plate having a plurality of spaced recesses for receiving said plungers to latch said blade means at different positions thereof, a locking member secured on said handle and located in proximity to each of said plungers, each of said locking members having an opening positioned to be blocked by the adjacent plunger when retracted but adapted to be unblocked when the adjacent plunger moves into one of said recesses so as to be capable of receiving locking means in a position to prevent unauthorized retraction of the associated plunger.

11. In a switch, spaced contact means mounted on a stationary support, switch blade means and a rotatable actuating shaft for actuating said blade means into and out of engagement with said contact means, an actuating handle on said shaft, a stationary latch plate located in proximity to said handle, a plurality of latch plungers mounted on said handle for movement substantially transversely of said handle toward and away from said plate, said plungers being biased toward said plate, said plate having spaced recesses for receiving one of said plungers to latch said blade means at each of its closed circuit positions, and another recess in said plate for receiving the other of said plungers to latch said blade means at an intermediate open circuit position.

12. In a switch, a housing, switching means in said housing comprising contact means and movable blade means, a rotatable actuating shaft for actuating said blade means into and out of engagement with said contact means, said shaft extending through an opening in one wall of said housing and having an actuating handle thereon at the outside of said housing, a latch plate secured to the inner side of said one wall adjacent said opening, a plurality of latch plungers movably carried by said handle and biased toward said one wall, and said one wall and plate having openings for receiving said plungers to latch said handle and blade means at different positions thereof.

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