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PUSH BUTTON DEVICE FOR A TOGGLE SWITCH

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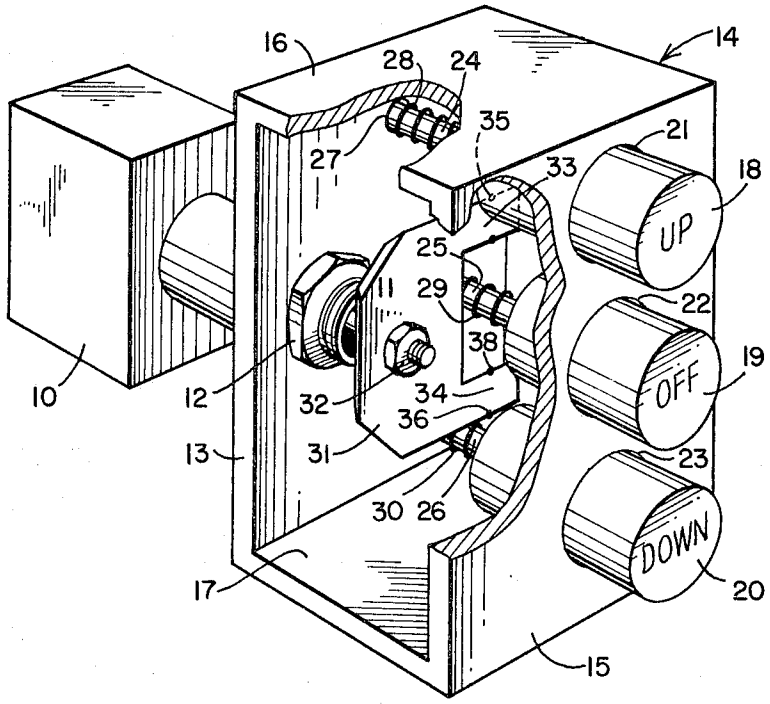


FIG. 1

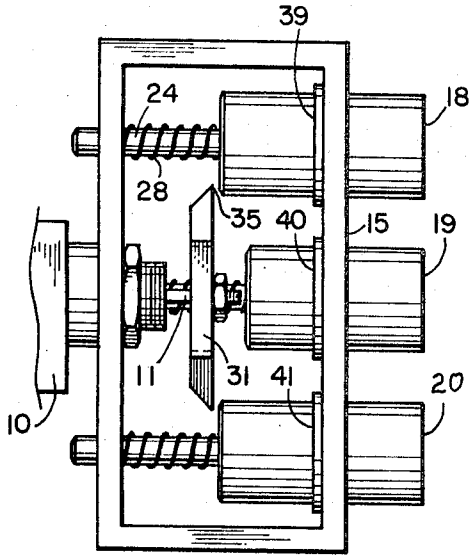


FIG. 2

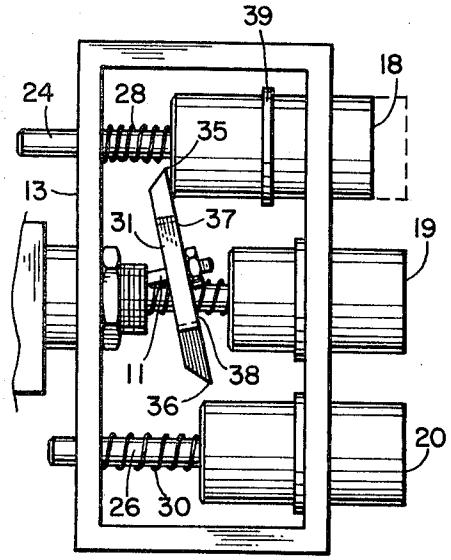


FIG. 3

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PUSH BUTTON DEVICE FOR A TOGGLE SWITCH

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ABSTRACT OF THE DISCLOSURE

This disclosure relates to a push button device for operating a toggle switch so that conventional type toggle switches may readily be converted by the device to push button operation. Essentially, the device comprises a frame for mounting the toggle switch with the operating lever of the toggle switch extending into the frame. Also mounted on the frame are three aligned push buttons biased to outer positions but movable to inward positions along parallel axes. The position of the operating lever of the toggle switch is at the same level as the axis of movement for the center push button and when the operating lever of the toggle switch is in a neutral position, it is parallel to this axis. An actuating plate is secured to the operating lever of the toggle switch and lies in a plane generally normal to the axes of movement of the various push buttons. The arrangement is such that portions of this plate are juxtaposed the outer push buttons such that pushing of either one of these outer push buttons will cant the plate and thereby move the operating lever of the toggle switch to one position or the other. The center push button in turn is arranged to engage another portion of the plate to return the plate to its original position and thus restore the operating lever of the toggle switch to its center or off position.

Many industrial as well as domestic electrical operations are performed by toggle switches. The most common type of toggle switch includes an elongated operating lever which normally extends from the switch body in a general straight line direction. This lever is arranged to be urged upwardly to close one set of switches within the toggle switch body or downwardly to close another set of switches within the toggle switch body. The center position of the lever in turn normally constitutes an off position for the toggle switch.

When toggle switches of the foregoing type are used to operate electrical motors, it is common practice to have, for example, the up position of the switch operate the motor in one direction and the down position operate the motor in a reverse direction, the center position turning the motor off. With this arrangement, there is a natural tendency for an operator, when he desires to reverse the direction of the operating motor, to simply move the toggle switch operating lever from one extreme position such as the up position to the other extreme position such as the down position in one physical movement. As a result, the reversing of the motor takes place too fast and damage may occur to electrical portions of the circuit as a consequence of back voltages. In such motor applications, it is desirable to operate the toggle switch from one operating position to its off position and wait until the motor has stopped before starting it in a reverse direction.

There are other situations in which the proper positioning of a toggle switch operating lever might be confusing to an operator. This confusion primarily results from the fact that the operating lever itself is pivoted at a point close to the surface mounting from which it protrudes and it is not always easy to detect its position or to label proper positions for the toggle switch. Such is particularly the case when the movement necessary to effect

switch contacts within the toggle swich body is relatively slight. As a consequence, it is often desirable to provide push button type switches, not only to enable easy labeling of the switches and to simplify operator control, but to "dress up" the appearance of the equipment with which the switch is employed. The provision of push button switches, however, can become costly as compared to providing readily available toggle switches, and can also add to the general problems of assembling the equipment with which the switches are used.

With the foregoing considerations in mind, it is a primary object of the present invention to provide a push button device for operating a conventional type toggle switch in such a manner that all of the advantages of push button type switches may be provided without having to sacrifice the simplicity and economy of employing toggle switch bodies in the equipment itself.

More particularly, it is an object to provide a push button device which may readily be sold as a separate unit and which may readily be adapted to conventional toggle switches wherever they are employed to enable operation of the toggle switch by push buttons.

Still another important object is to provide a push button device in accord with the foregoing objects wherein the toggle switch must be returned to a center position from one of its operating positions before it can be moved to another of its operating positions to the end that safe operation of the switch is assured and rapid reversing of a motor controlled by the switch with the attendant problems as outlined heretofore are avoided.

Briefly, these and other objects and advantages of this invention are attained by providing a compact frame structure including means for mounting a conventional toggle switch. At least two push buttons and preferably three push buttons in the case of the conventional three position toggle switch, are mounted in the frame for in and out movement. An actuating means in turn is arranged to be secured to the operating lever of the toggle switch and includes portions positioned to be respectively engaged by the push buttons when the buttons are pushed inwardly in such a manner as to move the operating lever and thereby enable operation of the toggle switch by the push buttons.

A better understanding of the invention will be had by now referring to a preferred embodiment thereof as illustrated in the accompanying drawings, in which:

FIGURE 1 is a perspective view partly broken away showing the push button device of this invention for operating a toggle switch;

FIGURE 2 is a side elevational view of the structure of FIGURE 1 with the toggle switch in a center or off position; and,

FIGURE 3 is a view similar to FIGURE 2 but illustrating the relative positions of components of the device when the toggle switch is moved to one of its operating positions.

Referring first to FIGURE 1, there is illustrated a conventional toggle switch body **10** from which there extends an operating lever **11** and mounting structure **12**. The elements described thus far are entirely conventional.

In accordance with the present invention, rather than mounting the toggle switch to a front panel of any particular control equipment with which the toggle switch is employed, the mounting for the switch is effected about an opening on the rear wall **13** of a frame structure designated generally by the arrow **14**. In the particular embodiment illustrated, the frame **14** includes a front wall **15** in spaced parallel relationship to the rear wall **13**. The front and rear walls **13** and **15** may be held in proper position by top and bottom connecting members **16** and **17** so that the frame **14** appears as generally a rectangular open box.

The front wall 15 serves to mount three push buttons designated 18, 19, and 20 preferably in a vertical line as shown. The push buttons are mounted within suitable openings 21, 22, and 23 in the front wall and are guided for in and out movement by suitable button shafts such as indicated at 24, 25, and 26. These shafts are received through suitable guiding openings in the rear wall 13, such as indicated at 27 for the upper push button shaft 24. Biasing springs 28, 29, and 30, respectively, are provided to bias the push buttons to their outer positions such that they will return to the positions illustrated in FIGURE 1 after being urged inwardly and released.

From the description of FIGURE 1, it will be evident that the push buttons are capable of in and out movement along axes that are parallel to each other. These axes in turn are parallel to the axis of the operating lever 11 of the toggle switch 10 when the operating lever is in its center position. This latter axis is preferably on the same level as the axis for the center push button shaft 29.

In order to enable movement of the operating lever 11 of the toggle switch to an up position from its center position or alternatively to a down position from its center position, there is provided an actuating means in the form of a plate 31, preferably C shaped as shown. This plate 31 is secured to the end of the operating lever 11 of the toggle switch 10 by removing the conventional operating knob on the operating lever of the toggle switch and threading thereon suitable nuts, one of which is shown at 32, to secure the plate 31 in the position illustrated. In this position, the plane of the plate 31 is normal to the direction of the operating lever 11. The plane of the plate 31 is also normal to the axes of movement of the various push buttons.

Sill referring to FIGURE 1, it will be noted that the plate 31 includes upper and lower arms 33 and 34 to define the general C shape. The upper edge portion of the arm 33 is indicated at 35 and constitutes one portion of the plate 31 in a position to be engaged by the upper push button 18. Similarly, the lower edge of the lower arm 34, as indicated at 36, constitutes another portion of the plate positioned to be engaged upon operation of the lower push button 20. The inner edge portion 37 of the upper arm 33 and the inner edge portion 38 of the lower arm 34 constitute portions of the plate adapted to be positioned for engagement by the center push button 19 only when the plate 31 is canted from the position illustrated in FIGURE 1.

The foregoing, as well as the entire operation of the push button device, will be better understood by now referring to FIGURES 2 and 3 wherein it will be noted that the outward positions of the buttons are limited by suitable stop rings 39, 40, and 41. In FIGURE 2, the position of the operating lever 11 of the toggle switch 10 is in its center or off position. In this position, if the center push button 19 is urged inwardly, it will simply pass between the arms of the C shaped plate 31, the button not engaging any portions of the plate. However, if either one of the outer push buttons is operated, the operating lever 11 of the toggle switch will be thrown in one or the other of its operative positions.

For example, assume that the up push button 18 is urged inwardly. In this event, the lower edge of the inner end of the push button 18 will engage the portion 35 of the plate and cant the plate to the position illustrated in FIGURE 3. Because of the arrangement of the plate and lever, the lever 11 will thus be moved to its up position and this lever 11 will stay in this up position until it is positively returned to its center position or moved to its lower position. Thus, after the push button 18 has been urged inwardly to the position illustrated in FIGURE 3 to cant the plate 31, release of the push button 18 will simply result in its being returned by the spring 28 to its original position as indicated in dotted lines in FIGURE 3.

It will be noted from the canted position of the plate 31 in FIGURE 3 that the lower portion 36 is moved past the inner end of the lower push button 20 to the position illustrated, such that if the lower button 20 is urged inwardly, it will have no effect on the operating lever 11 of the switch. However, it will also be noted that when the plate 31 is in its canted position, the edge portion 38 is raised slightly and thus brought into a position to be engaged by the center push button 19 if this center push button 19 is now operated. Therefore, it is necessary to operate the center push button 19 to return the plate to the position illustrated in FIGURE 2 before the plate can be canted in an opposite direction by means of the lower push button 20.

The same situation obtains if the plate 31 were canted in an opposite direction by initial operation of the lower push button rather than the upper push button. In this latter event, the upper edge portion 35 would pass the inner end of the upper button 18 so that once the plate were canted in an opposite direction, operation of the upper push button would have no effect. Before the switch could be operated by the upper button, it would again be necessary to return the plate to a neutral position by operation of the center push button 19. In this latter instance, the center push button 19 would engage the portion 37 of the plate 31 in FIGURE 3 if the plate were canted in an opposite direction.

From the foregoing description, it will be evident that the operation of the toggle switch has been simply and economically converted into a push button system wherein easy labeling of operation of the push buttons can be effected as illustrated in FIGURE 1, and wherein, in addition, it is always necessary to switch the toggle lever 11 to a center or off position before it can be switched to its reverse position.

While the invention has been described wtih respect to a three-position toggle switch, it is evident that the same principles are applicable to a simple single-throw type toggle switch having only two positions. In this latter event, there would be required only two push buttons properly positioned to engage an upper and lower portion of the actuating plate respectively, in a manner to rock the plate between two canted positions which would serve to throw the operating lever between two positions. The invention, accordingly, is not to be thought of as limited to the exact embodiment set forth merely for illustrative purposes.

What is claimed is:

1. A push button device for a toggle switch comprising: a frame including front and rear parallel walls in fixed spaced relationship; a toggle switch having an operating lever; means for mounting said toggle switch in said frame including an opening in said rear wall through which said operating lever of said toggle switch extends; at least two push buttons mounted in said front wall such that inward movement is in a direction generally parallel to the axis of said operating lever, and actuating means comprising a flat plate secured to said lever with its plane normal to said axis of said lever, portions of said plate spaced laterally from the point of securement of said plate to said lever being positioned to be respectively engaged by said push buttons when pushed inwardly in such a manner as to move said operating lever and thereby enable operation of said toggle switch by said push buttons.

2. A device according to claim 1, including spring means biasing said push buttons to an outer position.

3. A push button device comprising: a toggle switch having a toggle lever movable from a center position to an up position or a down position wherein said lever remains in its center position or in its moved positions until positively moved to a new position; a frame mounting said toggle switch in a given position; a center push button; and outer push buttons defined by an up push button above said center push button and a down push button below said center push button, said push buttons

being mounted in said frame for in and out movement; and an actuating means secured to said lever of said toggle switch, portions of said means being in positions to be engaged by said push buttons such that pushing of one of said outer push buttons engages a portion of said means to cant said means in a manner to move said lever from its center position, canting of said means moving another portion of said means out of position such that it cannot be engaged by the other of said outer push buttons, and said canting of said means moving still another portion of said means into position to be engaged by said center push button, whereby said means must be returned to its uncanted position to return said lever to its center position by operating said center push button before it can be moved by the other of said outer push buttons.

4. A device according to claim 3, including spring means for each of said push buttons biasing said push buttons outwardly.

5. A device according to claim 3, in which said actuating means constitutes a flat plate mounted to the end of said lever with its plane normal to said lever and to the in and out directions of movements of said push buttons when said lever is in its center position, said portions of said plate being defined by upper and lower arms positioned for respective engagement by said upper and lower

push buttons, the point of securement of said plate to said lever being at the same level as said center push button when said lever is in its center position.

6. A push button device for a toggle switch comprising: a frame including front and rear walls in fixed spaced relationship; mounting means in said rear wall for mounting said toggle switch having an operating lever such that said lever extends toward said front wall; at least two push buttons mounted in said front wall such that inward movement is in a direction towards said rear wall; and an actuating means adapted to be secured to the lever adjacent to said push buttons, the relative positions of said push buttons and actuating means for said toggle switch being such that spaced portions of said actuating means will be respectively engaged by said push buttons to operate said toggle switch when said toggle switch is mounted in said rear wall.

References Cited

UNITED STATES PATENTS

2,958,858 11/1960 Eversole ---------- 200—172

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