July 16, 1968 J. F. WALDORF ETAL 3,392,598

PUSHBUTTON ADAPTER FOR ELECTRICAL SWITCH ASSEMBLY WITH LATCHED AND MOMENTARY PUSHBUTTONS

Filed Feb. 24, 1966 2 Sheets-Sheet 1

Fig. 1

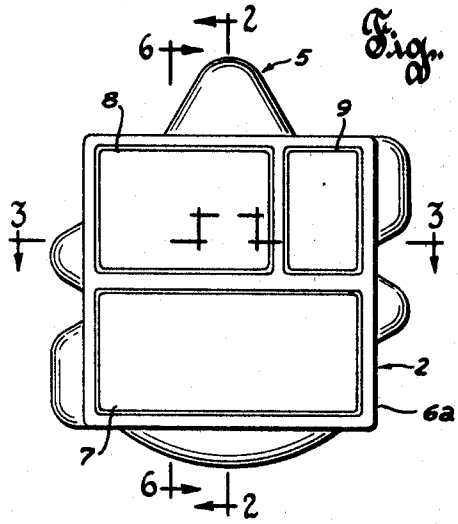


Fig. 2

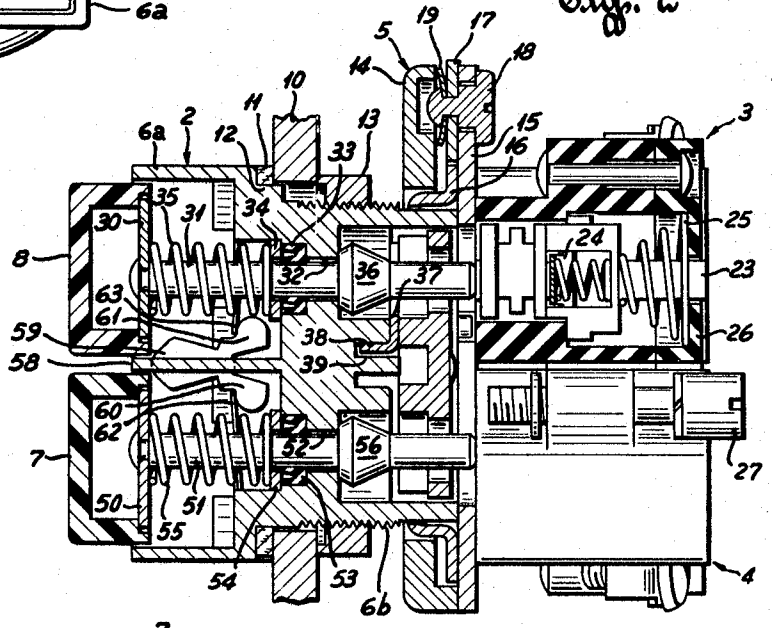
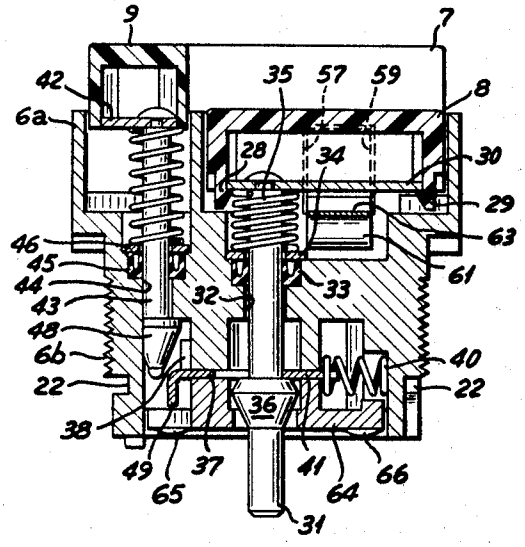


Fig. 3



Inventors
Joseph F. Waldorf
Marian M. Rzepecki
Allan P. Charbonneau.
By Thomas E Tarpley
Attorney.

July 16, 1968 J. F. WALDORF ET AL 3,392,598

PUSHBUTTON ADAPTER FOR ELECTRICAL SWITCH ASSEMBLY WITH LATCHED AND MOMENTARY PUSHBUTTONS

Filed Feb. 24, 1966 2 Sheets-Sheet 2

Fig. 4

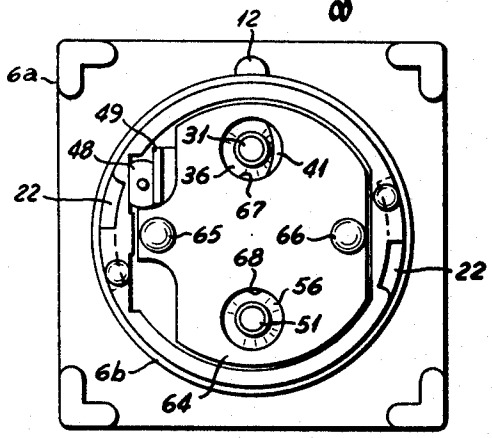


Fig. 5

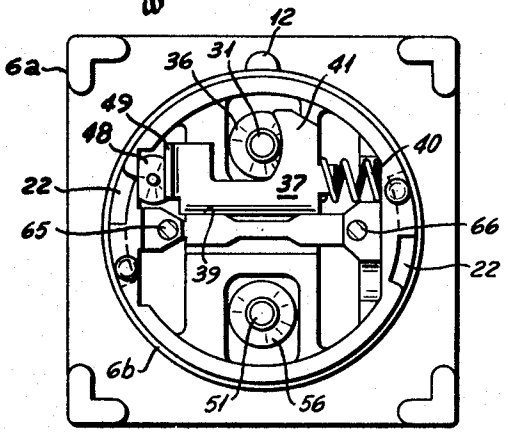
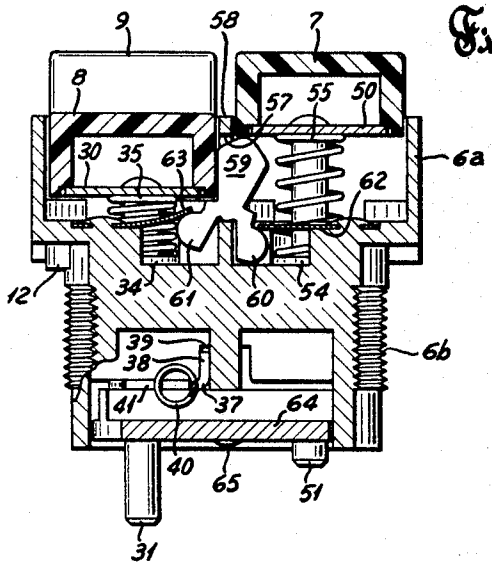


Fig. 6



Inventors
Joseph F. Waldorf
Marian M. Rzepecki
Allan P. Charbonneau
By Thomas E Toepfer
Attorney

United States Patent Office 3,392,598 Patented July 16, 1968

3,392,598

PUSHBUTTON ADAPTER FOR ELECTRICAL SWITCH ASSEMBLY WITH LATCHED AND MOMENTARY PUSHBUTTONS

Joseph F. Waldorf, New Berlin, Marian M. Rzepecki, Milwaukee, and Allan P. Charbonneau, Wauwatosa, Wis., assignors to Cutler-Hammer, Inc., Milwaukee, Wis., a corporation of Delaware

Filed Feb. 24, 1966, Ser. No. 529,785
4 Claims. (Cl. 74—483)

ABSTRACT OF THE DISCLOSURE

Manually operated pushbutton electrical apparatus of the one-hole mounted variety having a latching pushbutton with associated latching and latch releasing mechanisms, and a momentary non-latching pushbutton, all mounted within a unitary pushbutton adapter with contact blocks attached to the rear thereof.

This invention relates to a unitary pushbutton adapter for electrical switch assemblies having multiple pushbutton operators and more particularly to a pushbutton adapter having interlocked momentary and latched pushbutton operators.

Manually operable one-hole mounting pushbutton adapters for oiltight heavy duty electrical switch assemblies have been conventionally constructed with one pushbutton per adapter to operate one or more switch units assembled with the adapter. In order to accomplish multiple switching functions, it has been usually necessary to use a plurality of individual pushbutton units or a multiple position rotary switch or the like.

It is therefore an object of this invention to provide in a pushbutton switch assembly, a pushbutton adapter which combines certain switching capabilities of a multiple position rotary switch or the like with the operating, indicating and safety advantages of pushbuttons in a compact unitary pushbutton operated electrical switch assembly.

It is a more specific object to provide an adapter of the aforedescribed type having multiple pushbutton operators consisting of a momentary pushbutton operator and a latched pushbutton operator with latch releasing means, the operation of the two pushbutton operators being interlocked.

It is another specific object of this invention to provide an improved pushbutton interlocking means for an adapter of the aforedescribed type.

Other objects and advantages of the invention will be evident to those skilled in the art upon reference to the following description and claims.

While the device hereinafter described is adapted to fulfill the objects stated, it is to be understood that it is not intended that the invention be confined to the particular preferred embodiment disclosed since it is susceptible of various modifications without departing from the scope of the appended claims.

In the accompanying drawings:

FIGURE 1 is a front elevational view of a pushbutton electrical switch assembly embodying the invention;

FIG. 2 is a partially sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a sectional view of the pushbutton adapter of FIG. 1 taken on line 3—3 of FIG. 1;

FIG. 4 is a rear elevation view of the pushbutton adapter shown in FIG. 3;

FIG. 5 is a view similar to FIG. 4 but with a rear plate removed to show the interior of the adapter; and

FIG. 6 is a sectional view of the adapter taken on line 6—6 of FIG. 1.

Referring to the drawings, the electrical switch assembly shown in FIGS. 1 and 2 comprises an adapter 2 and a pair of identical contact blocks 3 and 4 fastened to the rear of adapter 2 by means of a mounting device 5.

The adapter has a die cast frame or retainer 6 having a rectangular front portion 6*a* in which there are mounted a momentary pushbutton 7, a maintained or latched pushbutton 8, and a release pushbutton 9 which functions to release latched pushbutton 8. Retainer 6 is adapted to be mounted within a hole in a panel 10 (FIG. 2) with rectangular portion 6*a* in front of the panel 10. A rearwardly extending portion 6*b* of retainer 6 is a round cylindrical bushing which passes through the aperture in panel 10. A gasket 11 is interposed between retainer 6 and panel 10 for sealing purposes. A key 12 is formed on the periphery of portion 6*b*, to index with a keyway formed in the otherwise circular mounting hole in panel 10 to thereby prevent unwanted rotation of retainer 6. A nut 13 is turned upon the threaded periphery of bushing 6*b* to tighten against the rear of panel 10 to securely fasten retainer 6 to panel 10.

Mounting device 5 comprises a housing member 14, a rear plate 15 and a latch ring 16. Housing member 14 is fastened to plate 15 and latch ring 16 is rotatably held therebetween. A gear 17 is attached to a rotatable shaft 18 and engages the periphery of latch ring 16. A spring washer 19 is also mounted on shaft 18. Mounting device 5 is attached to bushing 6*b* by turning shaft 18 to thereby rotate latch ring 16. A pair of lugs (not shown) on latch ring 5 then engage a pair of grooves 22 formed in bushing 6*b* to firmly attach mounting device 5 to bushing 6*b*. Each of contact blocks 3 and 4 is of the type having a plunger 23 and a bridging contact member 24 which may be reciprocably actuated. A return spring 25 is interposed between a housing 26 and plunger 23 to provide a return force thereto. Each of contact blocks 3 and 4 is fastened to plate 15 by a pair of screws such as screw 27 shown in FIG. 2 which may be turned to engage a threaded hole (not shown) in plate 15. The structure of such contact blocks, the structure of mounting device 5, and the method of mounting the pushbutton assembly are more completely described in the copending application Ser. No. 520,444 filed Jan. 13, 1966, by Roy A. Mukai, Allan P. Charbonneau, Joseph F. Waldorf and Robert Pearson, and assigned to the present assignee, now Patent No. 3,322,926, issued May 30, 1967.

Pushbutton 8 has a pair of resilient lugs 28 and 29 which extend from the back thereof to snap over the edges of a plate 30, as shown in FIG. 3. Plate 30 is riveted to the end of a pushrod 31 which is loosely supported in an aperture 32 in retainer 6 for reciprocatory movement therein. An elastic seal 33 surrounds pushrod 31 to prevent the passage of oil or other fluids through aperture 32. A washer 34 covers seal 33. A compression spring 35 is placed between washer 34 and plate 30 to provide a return force to pushbutton 8. An enlarged portion 36 is formed on pushrod 31 behind aperture 32 to serve as a return stop by engagement with the rear wall of retainer 6. Enlarged portion 36 also forms part of a latching mechanism which includes a generally C-shaped sliding latch 37, best shown in FIG. 5. Latch 37 is of sheet metal construction and has an edge 38 bent forwardly to slidingly engage a groove 39 formed in retainer 6 to serve as a guide for the reciprocal movement of latch 37. A compression spring 40 is interposed between latch 37 and retainer 6 so that the curved arm 41 of latch 37 is biased toward pushrod 31 to engage the forward edge of enlarged portion 36 when pushrod 31 is fully de-

pressed. Portion 36 has two frusto-conical surfaces base-to-base. The rearmost conical surface serves as a camming surface and, by engagement with arm 41, moves latch 37 against the biasing force of spring 40 while pushrod 31 is being depressed.

In order that pushbutton 8 be released from its latched depressed position, the lach release pushbutton 9 is provided. Pushbutton 9 is mounted on a plate 42. Plate 42 is riveted to the forward end of a pushrod 43 which is slidingly supported in an aperture 44 in retainer 6. An elastic sealing ring 45 surrounds pushrod 43 to prevent passage of liquids through aperture 44. A washer 46 covers sealing ring 45. A compression spring between washer 46 and plate 42 provides a return force to pushbutton 9. At the rearmost end of pushrod 43 there is formed a conical camming member 48 which is flattened on one side to conform to the adjacent wall of retainer 6. Conical cam 48 also serves as a return stop by engagement with retainer 6. A tab 49 is bent rearwardly from latch 37 to form a cam follower surface which cooperates with cam 48. As pushbutton 9 is depressed the cam 48 engages tab 49 to move latch 37 against the biasing force of spring 40 and thereby move arm 41 out of engagement with the forward edge of portion 36 and release pushbutton 8 to return to its released position. The release of pushbutton 8 also causes the release of plunger 23 of contact block 3 which then returns to its normal position.

There is a momentary pushbutton 7 in the lower half of adapter 2. Pushbutton 7 is mounted on a plate 50 which is riveted to the end of a pushrod 51. Pushrod 51 is slidingly supported in an aperture 52 in retainer 6. A sealing ring 53 surrounds pushrod 51 to prevent passage of liquids through aperture 52. A washer 54 covers seal 53. A compression spring 55 is interposed between washer 54 and plate 50 to provide a return force to pushbutton 7. An enlarged portion 56 is formed on pushrod 51 behind aperture 52 to act as a return motion stop. The rearmost end of pushrod 51 communicates with the plunger of contact block 4 to actuate contact block 4 when pushbutton 7 is depressed.

Interlocking means are provided to prevent simultaneous depression of pushbuttons 7 and 8. A rectangular aperture 57 is formed in a wall 58 which separates pushbutton 7 from pushbutton 8. An interlock 59 is placed in aperture 57 with a pair of legs 60 and 61 straddling the rear edge of aperture 57. Interlock 59 pivots upon wall 58 at the juncture of legs 60 and 61. A pair of cantilever flat springs 62 and 63 are each fastened at one end to retainer 6 and at their other ends, bear rearwardly against the respective ends of legs 60 and 61. The resilient equal pressure of springs 62 and 63 tend to keep the wedge-shaped end of interlock 59 centered within wall 58 and extending equally into cavities below pushbuttons 7 and 8 as shown in FIG. 2. As one or the other of pushbuttons 7 and 8 is depressed, the engagement of the depressed pushbutton forces the wedge shaped end of interlock 59 toward and under the opposite pushbutton to there interfere with and prevent the depression of the opposite pushbutton as shown in FIG. 6. As interlock 59 moves to one side or the other, it pivots upon wall 58 against the centering pressure of one or the other of springs 62 and 63. Simultaneous depression of pushbuttons 7 and 8 is thereby prevented.

A rear plate 64 holds latch 37 in place and is riveted to the rear of retainer 6 by rivet portions 65 and 66. FIG. 4 shows plate 64 in place and FIG. 5 shows the adapter mechanism with plate 64 removed. A pair of holes 67 and 68 are provided to accommodate the ends of pushrods 31 and 51.

We claim:

1. A unitary pushbutton adapter of the one-hole mounting variety for operating a plurality of reciprocally actuable electrical switching means attached thereto comprising:

a retainer member having a front side and a rear side adapted to be mounted in a hole in a mounting panel with first and second reciprocally actuable electrical switching means attached to the rear side thereof;

momentary pushbutton means extending through and reciprocally supported within said retainer and having a released position and a depressed position, said momentary pushbutton means being manually operable from the front side of said retainer, for engaging and actuating said first switching means when depressed;

means for biasing said momentary pushbutton means to its released position whereby said momentary pushbutton means returns to said released position when the manual depressing force is released;

latched pushbutton means extending through and reciprocally supported within said retainer and having a released position and a depressed position, said latched pushbutton means being manually operable from the first side of said retainer, for engaging and actuating said second switching means when depressed;

means for biasing said latched pushbutton means to its released position;

latching means supported by said retainer for latching said latched pushbutton means in its depressed position;

latch releasing means for releasing said latching means comprising release pushbutton means reciprocally supported within said retainer and manually operable from the front side of said retainer between a normal position and a depressed position for engaging and moving said latching means when depressed to thereby release said latched pushbutton means; and

means for biasing said release pushbutton means to its normal position.

2. The invention as defined in claim 1, together with interlocking means for interlocking the operation of said momentary pushbutton means and said latched pushbutton means whereby depression of said momentary pushbutton means prevents depression of said latched pushbutton means and vice versa.

3. The invention as defined in claim 2, in which said interlocking means comprises an interlock member movably mounted on said retainer bteween said momentary pushbutton means and said latched pushbutton means for being engaged by either of said momentary or latched pushbutton means when depressed to be moved toward the other of said momentary and latched pushbutton means and interfere with and thereby prevent the depression of the other of said momentary and latched pushbutton means.

4. The invention as defined in claim 3 in which:

said retainer includes a wall separating said momentary and latched pushbutton means; and

said interlock member is pivotally mounted in said wall; together with:

a pair of similar cantilever springs mounted on said retainer and resiliently bearing on opposite sides of said interlock member for biasing said interlock member to a central position between said momentary and latched pushbutton means.

References Cited

UNITED STATES PATENTS

2,843,686	7/1958	Ballou.	
2,713,092	7/1955	Rucks et al.	74—483
3,322,927	5/1967	Waldorf et al.	200—172

FRED C. MATTERN, JR., *Primary Examiner.*

W. S. RATLIFF, *Assistant Examiner.*