

Feb. 7, 1967

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3,303,295

PUSHBUTTON SELECTOR SWITCHES

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3 Sheets-Sheet 1

Fig. 1

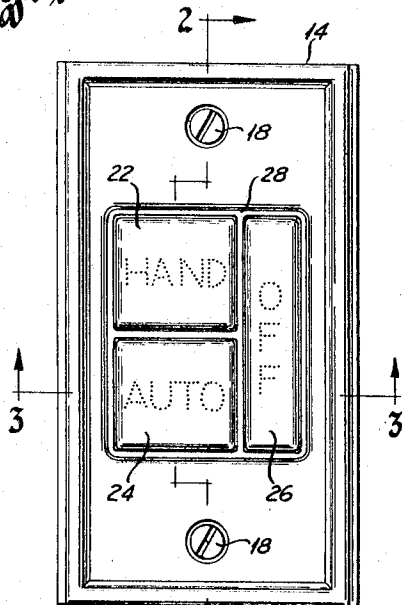


Fig. 2

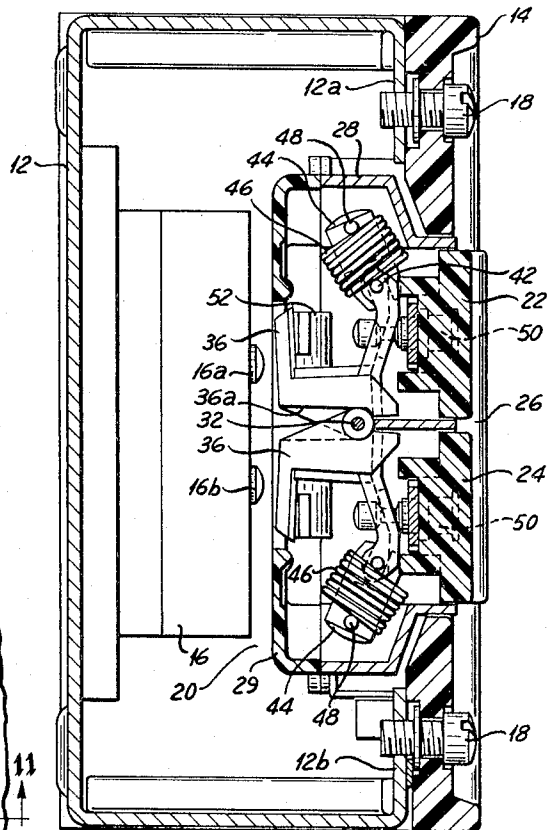


Fig. 10

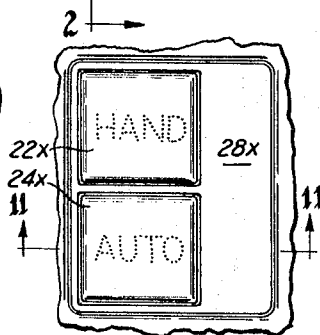


Fig. 3

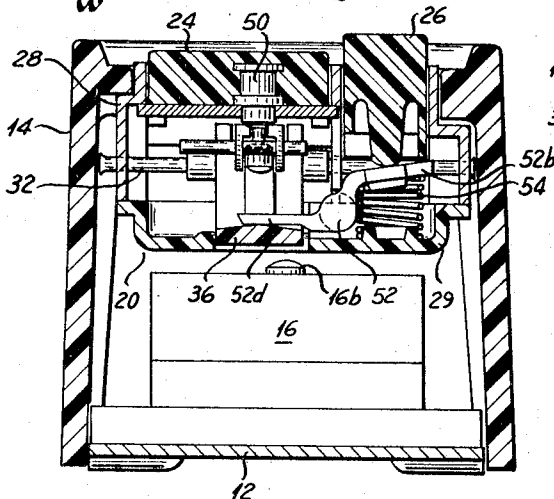
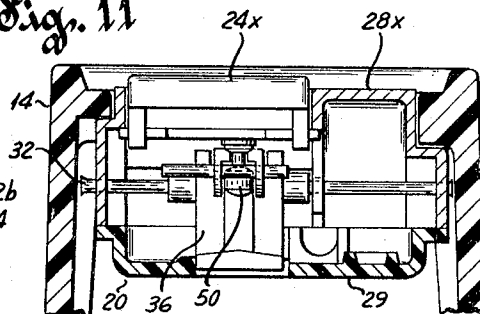


Fig. 11



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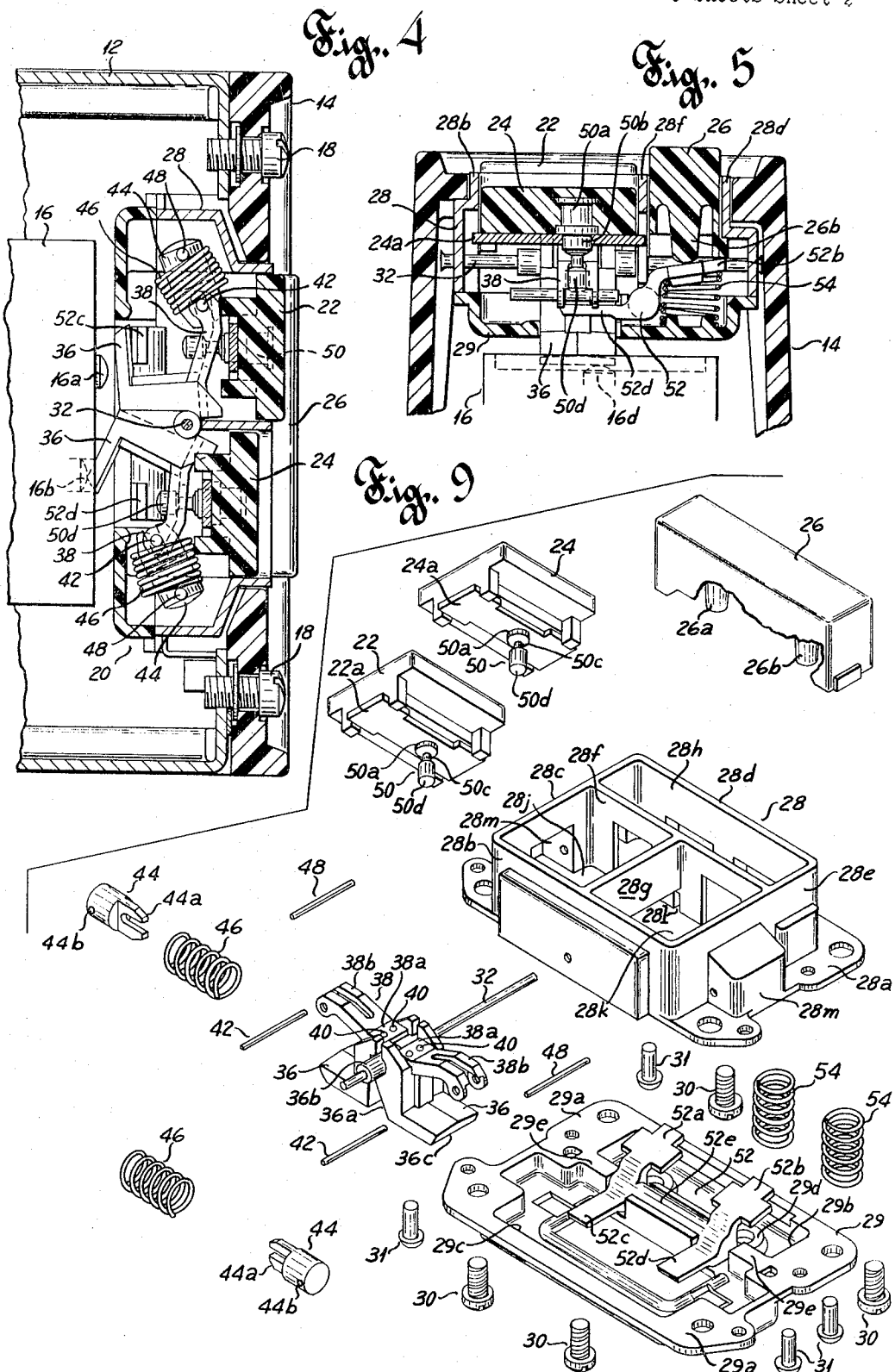
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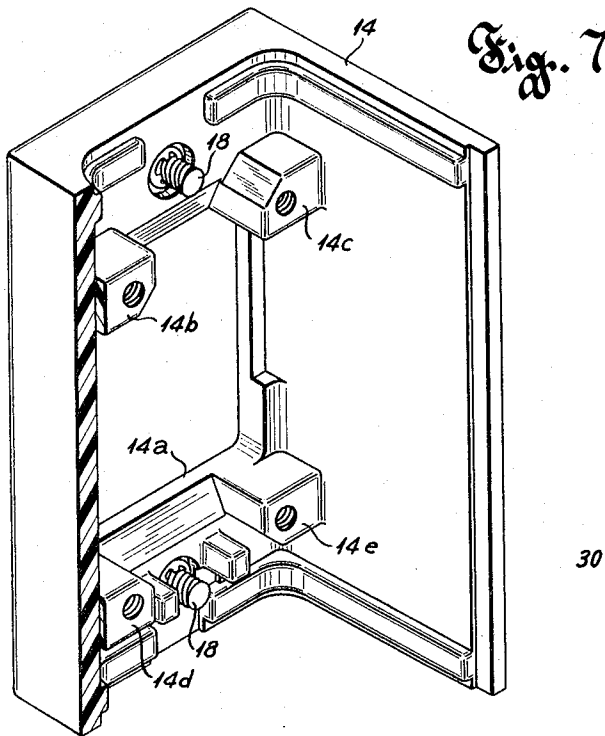
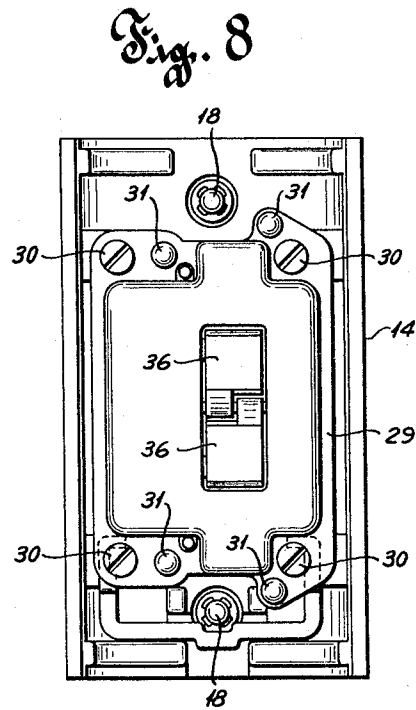
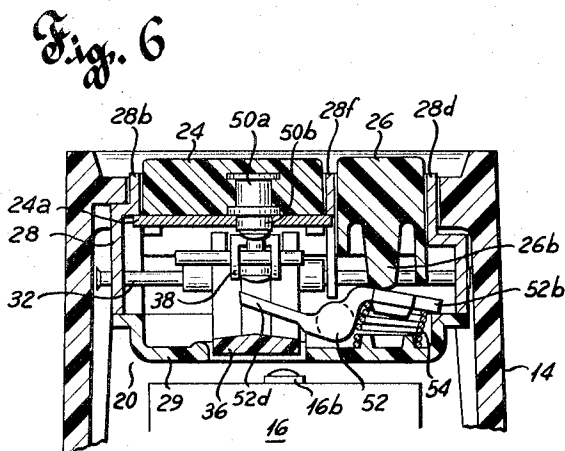
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PUSHBUTTON SELECTOR SWITCHES

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PUSHBUTTON SELECTOR SWITCHES

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4 Claims. (Cl. 200-5)

This invention relates to pushbutton type selector switches.

Two and three maintained position rotary selector switches the quite commonly used for setting an electrical control system in "on-off," "Mode A," "Mode B" or "Mode A"- "off," "Mode B" operating conditions. It is a primary object of the present invention to provide novel selector switches of the pushbutton type affording the same type of circuit operating conditions.

A more specific object is to provide a selector switch operating mechanism of the pushbutton type wherein two similar, but separate switch operating conditions are afforded by alternate operation of two pushbuttons, and wherein release or "off" switch operating condition is provided whenever a third pushbutton is operated following establishment of one or the other of said two maintained switch operating conditions.

A further object is to provide a pushbutton mechanism of the aforementioned type which can readily be made into a two pushbutton mechanism affording such similar, but separate switch operating conditions by omission of the third pushbutton and a few simple parts associated therewith.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawings illustrative preferred embodiments of the invention which will now be described in detail, it being understood that the embodiments illustrated can be modified with respect to details without departing from the scope of the appended claims.

In the drawings:

FIGURE 1 is a front elevational view of the three-position pushbutton selector switch incorporating the invention;

FIG. 2 is a sectional view to larger scale taken along the line 2-2 of FIG. 1;

FIG. 3 is a sectional view taken along the line 3-3 of FIG. 1;

FIG. 4 is a partial sectional view similar to FIG. 2 but showing the selector mechanism in a different operating condition;

FIG. 5 is a fragmentary sectional view similar to FIG. 3 but showing the selector mechanism in the same operating condition as FIG. 4;

FIG. 6 is a view like FIG. 5, but showing the selector mechanism in still another operating condition;

FIG. 7 is a view in perspective with a side partially broken away of the enclosure cover;

FIG. 8 is a rear view of the enclosed cover with the selector mechanism secured thereto;

FIG. 9 is an exploded view of the parts of the pushbutton selector mechanism shown in FIGS. 2 to 6;

FIG. 10 is a fragmentary view of a modified form of selector switch affording two-position operation; and

FIG. 11 is a fragmentary sectional view to larger scale taken along the line 11-11 of FIG. 10.

The drawings show a pushbutton switch assembly comprising a metal base or frame 12 and a U-shaped, wrap-around cover 14 formed of a molded insulating material, and a dual, momentary type of switch unit 16, having individual actuators 16a and 16b, mounted on base 12 within the confines of cover 14. Cover 14 is secured to base 12 by screws 18 which penetrate openings in the front face of the cover and take into threaded openings in

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integral depending tabs 12a and 12b of base 12. The switch unit further comprises the operating pushbuttons 22, 24 and 26 which will now be described in detail in connection with FIGS. 2 to 9.

The pushbutton selector unit 20 is mounted in a housing comprising a frame 28 and a cover 29. The housing extends through the rectangular opening 14a of cover 14 and is secured at the rear side thereof by screws 30 that penetrate aligned receiving openings in the four corners of frame 28 and cover 29 and take down into openings in the bosses 14b to 14e formed in the rear surface of cover 14. Frame 28, which is preferably formed of a die cast metal, has a base flange portion 28a, rectangular side wall portions 28b to 28e, and compartment dividing walls 28f and 28g. Cover 29a has a flange portion 29 which is adapted to mate with and is secured by rivets 31 to the flange 28a of frame 28. Cover 29, which is preferably formed of a plastic molding material, has recess 29b underlying compartment 28h and a recess 29c underlying compartments 28j and 28k of frame 28.

A pin 32 is afforded rotatable bearing support in the walls 28b and 28d of frame 28 and underlies partition 28g and passes through a clearance slot 28i formed in partition 28f. A pair of like switch operating lever assemblies are rotatably mounted on pin 32, and each comprises a switch actuator lever 36 which has a bearing journal portion 36b and a bifurcated toggle lever 38. Levers 38 at the root portions 38a are secured to each of the levers 36 by a pair of drive screws 40. The ends of the spaced arms 38b of levers 38 are provided with aligned openings through which project toggle pins 42.

The bifurcated tongues 44a of each of a pair of toggle spring guides 44 straddles a pin 42. Helical compression springs 46 surround each of the guides 44 and at corresponding ends bear against the pins 42. The guides have cylindrical portions 44b having openings to accommodate pivot pins 48 which extend through aligned openings in opposite side walls of the dormer-like portions 28m of the frame 28.

Each of the pushbuttons 22 and 24 has a toggle operating pin 50 and flanged portions 50a thereof are embedded in the body of the buttons during molding of the latter. A cylindrical portion 50b which extends immediately below the lower surfaces of the pushbuttons is adapted to engage at the lower shoulder formed between it and a shank portion 50c of reduced diameter against the arms 38b of the levers 38. The shank portions 50c pass downwardly between the arms 38b and merge with enlarged cylindrical ends 50d of the pins 50 which underlie the arms 38b.

As shown in FIG. 2, both pushbuttons 22 and 24 are in extended positions and their respective toggle actuating mechanisms assume like operating positions. Now let it be assumed that button 24 is pushed inwardly. In so doing the shouldered end of the portion 50b moves lever 38, and hence its associate lever 36 clockwise. As lever 36 moves clockwise the lower surface of the portion 36c engages with actuator 16b of the switch unit 16 to move it inwardly. As lever 38 moves clockwise the pin 42 moves to the left in the slot in portion 44a of the spring guide 44 and compresses spring 46. When pin 42 moves across the line between pins 32 and 48 the stored energy in the spring 46 causes snap action motion to complete the clockwise movement of levers 36 and 38 and consequent inward movement of actuator 16b to the positions depicted in FIG. 4. Due to the sloping surface 36a formed across approximately one-half the width of each of the levers 36 the last mentioned clockwise movement of one, as shown in FIG. 4, occurs without effecting movement of the other.

The switch operated by actuator 16b will be maintained in the last mentioned upward position so long as push-

button 24 remains depressed. If pushbutton 22 is now depressed, corresponding operation of its toggle mechanism will occur to move actuator 16a of the switch to inward position. The lever 36 associated with button 22 will move counterclockwise as viewed in FIGS. 2 and 4. In so moving, because of its engagement with the other lever 36, it will move the latter counterclockwise. As the lever 36 associated with button 24 moves counterclockwise it moves its associated lever 38 in the same direction and affords operation of its toggle mechanism opposite to that afordescribed to thus effect return to the position depicted in FIG. 2.

It will be appreciated that as so far described, pushbuttons 22 and 24 can be depressed alternately to provide like, but separate toggle, snap action inward depression of their respectively associated switch operators 16a and 16b. Either of the latter are thus maintained in inward position until their associated toggle operating mechanism and pushbuttons are oppositely operated by the inward depression of the other pushbutton. The laterally projecting edges of plates 22a and 24a which are secured to the lower surfaces of buttons 22 and 24 by ring staking them to the pins 50, limit the outward movement of the pushbuttons 22 and 24 by the engagement of such plates against inside shoulders of frame 28 as best shown in FIGS. 3, 5 and 6.

Pushbutton 26 is provided to return either of the pushbuttons 22 or 24, their toggle operating mechanisms to corresponding positions, and thus the switch actuators 16a or 16b, as the case may be, to normal outward extended position in the switch unit. Pushbutton 26 has a pair of spaced projections 26a and 26b extending downwardly and, each thereof engages with the upper surfaces of the portions 52a and 52b of a lever 52. Coiled compression springs 54 at one end are disposed about annular boss portions 29d molded in the floor of recess 29b and bear at their opposite ends against the lower surfaces of the portions 52a and 52b. The portions 52a and 52b are integrally connected with extensions 52c and 52d which respectively project through notches in the partition 29e of cover 29 and partition 28f of frame 28 and underlie the levers 38 of the toggle mechanisms operated by pushbuttons 22 and 24. Portions 52a and 52c are connected to the portions 52b and 52d by an integral trunnion portion 52e which seats in a socket formed by partition 29e and a rib 29f formed in the floor of recess 29b of cover 29.

When pushbutton 26 is pushed inwardly of frame 28 the projections 26a and 26b bearing against the portions 52a and 52b of pivot lever 52 clockwise as viewed in FIGS. 3 and 5. If, for example, the switch unit is then in the operating condition depicted in FIGS. 4 and 5, the portion 52d would engage with the lever 38 associated with pushbutton 24 and move it counterclockwise (as viewed in FIG. 5). This causes overcenter toggling action to move the toggle mechanism and pushbutton 24 to the operating condition depicted in FIGS. 2 and 3. It will be apparent that as pushbutton 22 was in the assumed initial extended condition its toggle mechanism would be in the position depicted in FIG. 4 and then depression of pushbutton 26 would not have any effect on it or its associated toggle operating mechanism.

It will be apparent that if pushbutton 22 were depressed and pushbutton 24 in extended position when pushbutton 26 is depressed that the former and its associated toggle mechanism would be operated to return button 22 to extended position and release switch operator 16a to return to its normal extended position in switch unit 16.

FIGS. 10 and 11 show a modified version wherein pushbutton 26, lever 52, and the springs 54 are omitted, additionally the frame 28 is modified to provide only cavities for pushbuttons 22 and 24; the portion 28x providing a cover fill-in for the area taken up by pushbutton 26 in the version of FIGS. 1 to 9. It will, of course, be seen that with only pushbuttons 22 and 24 and their associated

toggle mechanisms that one or the other of the switch actuators 16a or 16b will be maintained in inward depressed position corresponding to whichever of the pushbuttons 22 and 24 is depressed.

It will be appreciated that the version of FIGS. 10 and 11 could be used to effect "on-off" operation of a single, momentary type switch having a single actuator, like actuators 16a and 16b. In the latter case only one of the levers 36 would be in line with and engage the switch actuator. The other lever 36, toggle mechanism and pushbutton associated therewith in that case would be used to effect "off" condition of the switch. Of course, when used with the switch unit 16 disclosed in FIGS. 1 to 9, the version of FIGS. 10 and 11 will provide alternate "on" and "off" or "Mode A-Mode B" type of operation.

I claim:

1. In a selector operating mechanism for switches, in combination, a pair of like, overcenter spring toggle mechanisms each having a pushbutton depressible from an extended position to cause operation of its toggle mechanism from a first to a second stable position and each having a switch operating lever connected to said toggle mechanism for pivotal movement from a switch released to switch operating maintained position, said switch operating levers having and being mounted on a common pivot pin for pivotal movements in mutually opposed directions and having opposed complementally formed portions so that when either lever is pivoted to its switch operating position it will not engage the other lever if the latter is in its switch release position but will engage said other lever if the latter is in its switch operating position and pivot it to its switch release position and effect consequent return of the toggle mechanism and pushbutton operatively connected to said other lever to their respective first stable and extended positions.

2. In a three-way selector operating mechanism for a pair of switches, in combination, a pair of like, overcenter spring toggle mechanisms each having a pushbutton depressible from an extended position to cause operation of its toggle mechanism from a first to a second stable position and each having a switch operating lever connected to said toggle mechanism for pivotal movement from a switch released to a switch operating maintained position, said switch operating levers having and being mounted on a common pivot pin for pivotal movements in mutually opposed directions and having complementally formed portions so that pivotal movement will cause the other lever if then in its switch operating maintained position to be pivotally moved to its switch release position and cause consequent return of the toggle mechanism and pushbutton operatively connected to said other lever to their respective first stable and extended positions, a third pushbutton, and a third pivotally mounted lever biased to normally hold said third pushbutton in extended position and pivotally movable by depression of said third pushbutton to cause operation of either toggle mechanism then in its second stable position to thereby cause consequent operation of the lever and pushbutton operatively connected thereto to their respective switch release and extended positions.

3. The combination according to claim 2 wherein said third lever has its pivot axis transverse to the pivot axis of said switch operating levers and has arms individual to and underlying each of said toggle mechanisms.

4. In a three-way pushbutton selector switch unit, in combination, a base, an enclosing cover removably secured to said base, a pair of switches mounted on said base and having reciprocable operators normally biased to extended positions toward said cover, a selector operating mechanism mounted in said cover over said switches and comprising a pair of like, overcenter spring toggle mechanisms each having a pushbutton depressible from an extended position to cause operation of its toggle mechanism from a first to a second stable position and each

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having a lever connected to said toggle mechanism so that upon the aforementioned operation of the latter, said lever is pivotally moved from a switch operator disengaged position to engage and move one of said switch operators to a depressed operating position, said levers having and being mounted on a common pivot pin and having complementally formed opposed portions so that the aforementioned pivotal movement of either lever will cause the other lever if then in its switch depressed operating position to be pivotally moved to its switch operator disengaged position and cause consequent return of the toggle mechanism and pushbutton operatively connected to said other lever to their respective first stable and extended positions, a third pushbutton, and a third pivotally mounted lever biased to normally hold said third pushbutton in extended position and pivotally movable by

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depression of said third pushbutton to cause operation of either toggle mechanism then in its second stable position to its first stable position and thereby cause consequent operation of the lever and pushbutton operatively connected thereto to their respective switch operator disengaged and extended positions.

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