United States Patent [19]

Velez

[11] **3,742,172**

[45] **June 26, 1973**

[54] **WALL-SWITCH-MOUNTED EXTENSION OPERATOR FOR TOGGLE SWITCH**

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[22] Filed: **Dec. 23, 1971**

[21] Appl. No.: **211,747**

[52] **U.S. Cl.** ..... **200/172 A,** 200/153 P

[51] **Int. Cl.** **H01h 3/40**

[58] **Field of Search** ..... 200/172 A, 172 R, 200/153 P

[56] **References Cited**

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[57] **ABSTRACT**

This amusement device enables a small child to actuate the operating lever of a toggle switch by swinging an imitation double-pole single-throw knife switch having knurled or toothed quadrant gears on the inner ends of its blades meshing with correspondingly-knurled or toothed gears rotatably mounted in a flanged casing bolted to the toggle switch. Pivoted to the peripheries of the casing-mounted gears are the lower ends of links, the upper ends of which are pivoted to a slide containing a vertical coupling slot, through which the wall switch operating lever projects. In a modification, the knife switch blades carry quadrant gears which are of approximately half the radii of the casing-mounted gears such that an approximately 180 degree swing of the knife switch blades produces an approximately 90 degree travel of the wall switch lever.

6 Claims, 4 Drawing Figures

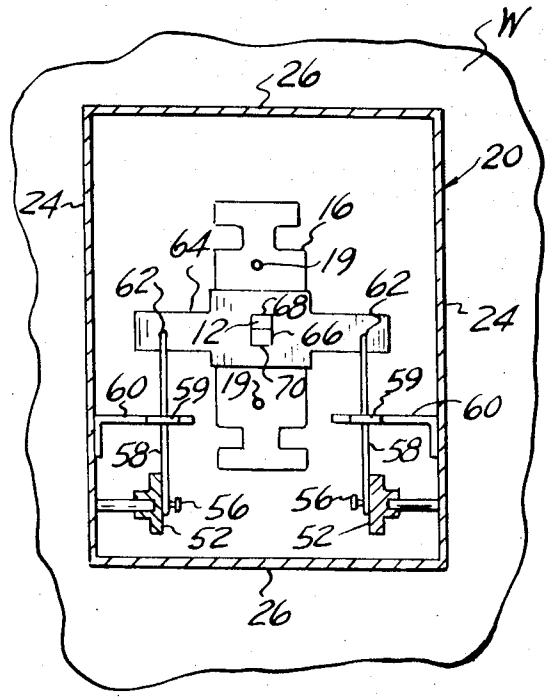


FIG. 1

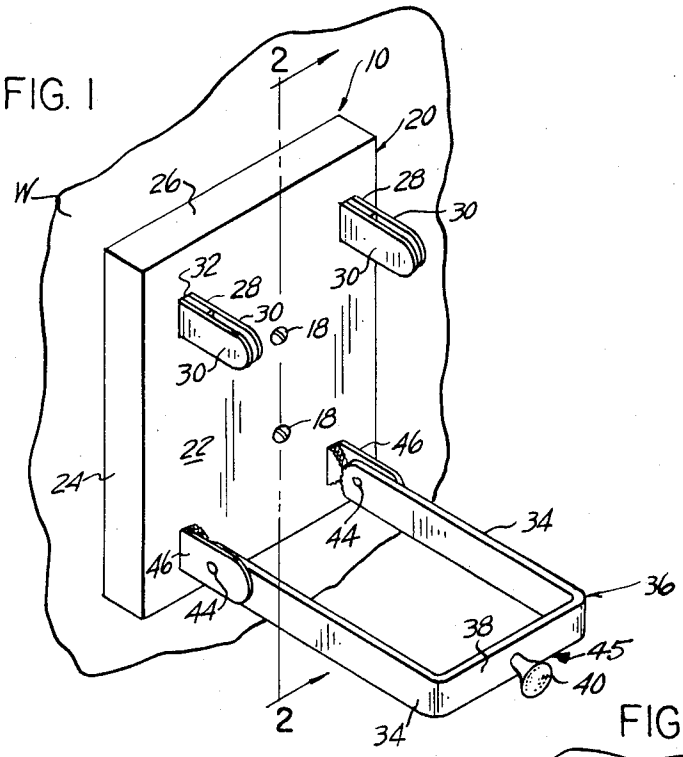


FIG. 3

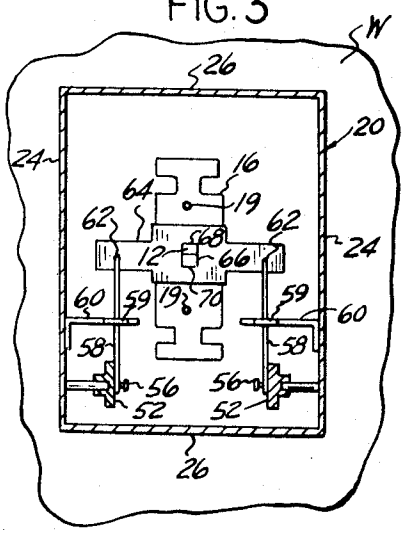


FIG. 2

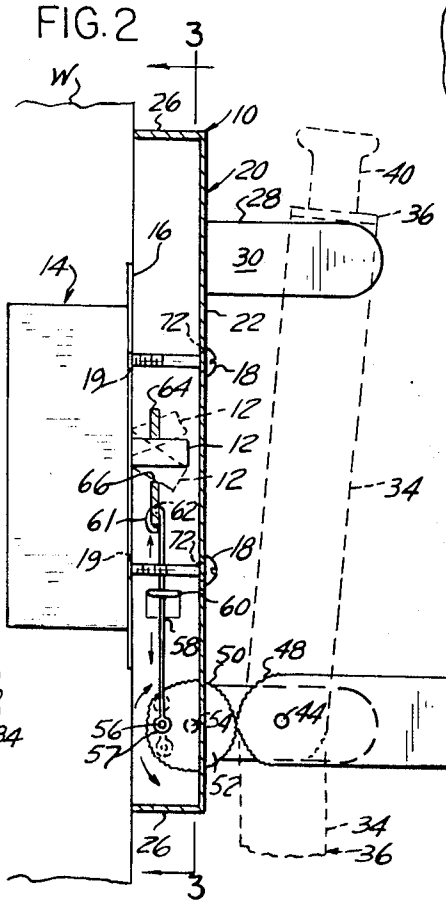
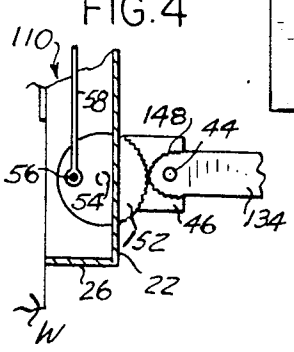


FIG. 4



WALL-SWITCH-MOUNTED EXTENSION OPERATOR FOR TOGGLE SWITCH

BACKGROUND OF THE INVENTION

Hitherto toggle switch operators have been provided wherein tilting of a finger lever or rotation of a knob shifts a link coupled to the switch lever, also wherein separate "off" and "on" pull cords pull, in opposite directions, a slide coupled to the switch lever.

SUMMARY OF THE INVENTION

The invention resides in the provision of a toy knife switch, the blades of which are geared to a rotary disc having an off-center pivot to which is connected the lower end of a link, the upper end of which is connected to a slide having a slot fitting over the toggle switch lever so as to shift that lever in response to swinging of the switch blades.

In the drawing,

FIG. 1 is a perspective view of a cover-plate-mounted extension operator for a toggle wall switch, according to one form of the invention, with the knife switch blades and other moving parts in mid position with the blades midway between the "on" and "off" positions (shown in dotted lines);

FIG. 2 is a vertical section, upon an enlarged scale, taken along the line 2—2 in FIG. 1;

FIG. 3 is a vertical section upon a reduced scale, taken at right angles to the section of FIG. 2, upon the line 3—3 in FIG. 2; and

FIG. 4 is a fragmentary vertical section similar to the lower portion of FIG. 2 but showing a modification wherein the switch blade gears are of one-half the diameter of the casing gears for producing a ninety-degree swing on the toggle switch lever for a one hundred eighty degree swing of the knife switch blades.

Referring to the drawing in detail, FIGS. 1 and 2 show a wall switch extension operator, generally designated 10, for moving the actuating lever 12 of a conventional wall mounted toggle switch 14 with the usual mounting flanges or tabs 16 which are secured to the wall W in the conventional manner. For the purpose of the present invention the short screws (not shown) which secured the facia plate (not shown) to the switch 14 have been removed with or without the facia plate and replaced by long screws 18 threaded into the same screw holes 19. The screws 18 serve to secure the casing 20 of the extension operator 10 to the wall-mounted toggle switch 14.

The casing 20 (FIGS. 1 and 2) is in the form of a shallow open-topped box with a bottom wall or base 22, side walls 24 and end walls 26, the casing 20 being preferably formed as a stamping with the walls 24 and 26 integral with the base 22. Secured to and projecting in a forward direction from the vertical base 22 near the upper end wall 26 are two laterally-spaced switch-blade-holding frictional detent clips 28 (FIG. 1), each consisting of a pair of narrowly spaced spring fingers 30 separated from one another at their rearward ends by spacers 32 in such a manner that the spring fingers 30 yieldingly and frictionally engage the elongated flat blade arms 34 of the U-shaped movable knife switch member, generally designated 36, consisting of the blade arms 34, a cross bar 38 interconnecting the arms 34, and a handle or knob 40 secured to the cross bar 38 by a screw 42.

The blades 34 of the movable knife switch member 36 at its inner ends are drilled at their inner ends to receive pivot pins or fasteners 44 by which it is pivotally mounted on mounting lugs 46 projecting outward from and secured to the base 22 of the casing 20. The inner ends 48 of the switch blades 34 are circularly arcuate and are knurled or toothed to interengage with the correspondingly knurled or toothed peripheries 50 (FIG. 2) of toothed gears or knurled wheels 52 of approximately the same radii. The latter are rotatably mounted on shafts or pins 54 which in turn are mounted on and project toward one another from the side walls 24 of the casing 20.

Mounted on and projecting toward one another from the gears 50 near the peripheries thereof are crank pins 56 upon which are pivotally mounted the looped lower ends 57 of connecting rods or links 58 which pass upward through apertures 59 in angle guide arms 60 welded or otherwise secured to the inner sides of the side walls 24 and terminate in bent upper ends 61 passing through apertures 62 in the opposite outer ends of a slide 64 (FIG. 3). The slide 64 is provided at its mid portion with a vertically-elongated coupling slot 66 having a width approximately the same as the width of the toggle switch actuating lever 12 and a length approximately twice its width. The vertical length of the slot 66 is such that its upper and lower ends 68 and 70 are separated from one another by a distance which will cause the cross slide 64 to undergo such lost motion as will result in an approximately 90 degree swing of the toggle switch operating lever 12 through a distance of approximately one-half inch in response to an approximately 180 degree swing of the knife switch member 36.

In the installation of the wall switch extension operator 10, let it be assumed that the installer optionally removes the cover plate or facia plate (not shown) of the wall-mounted toggle switch 14, but does remove the short screws holding it in place, and that the switch lever 12 is in its lowermost "off" position. With the switch blade member 36 swung downward into its lowermost "off" position, the installer then places the casing 20 of the extension operator 10 against the wall W and lines up the holes 72 in the base 22 of the casing 20 with the screw holes 19 of the switch 14 and inserts the long screws 18 after passing the slot 66 of the slide 64 over the toggle switch actuating lever 12. The installer then tightens the screws 18 so as to bolt the extension operator 10 firmly to the wall W.

In the operation of the wall switch extension operator 10, let it first be assumed that the switch blade member 36 is in its lowermost vertical "off" position as shown in the lowermost dotted line position thereof in FIG. 2. In this position the toggle switch lever 12 is also in its lowermost dotted line "off" position of FIG. 2. To shift the toggle switch lever 12 upward through its mid-position solid-line location to its uppermost "on" position shown in the uppermost dotted lines thereof, the operator grasps the knob 40 and swings the switch blade member 36 upward through the solid line mid position thereof (FIG. 2) approximately 180 degrees to its uppermost dotted line position with the upper ends of the switch blades engaging the detent spring fingers 30. In so doing he causes the knurled or toothed arcuate end portion 48 of each switch blade 34 to rotate the gears 52 by reason of the interengagement of the teeth or knurled portions 48 and 50 with one another. The

rotation of the gears **52** causes their crank pins **56** to move from their lowermost dotted line positions to their uppermost dotted line positions (FIG. **2**), consequently moving the connecting rods **58** and cross slide **64** upward. During the initial part of the upward movement of the cross slide **64**, the lower edge **70** of the slot **66** moves upward in lost motion until it engages the toggle switch operating lever **12**, whereupon its continued upward motion shifts the toggle switch operating lever **12** upward into its upper dotted line or "on" position.

The modified wall switch extension operator, generally designated **110** shown in fragmentary vertical section in FIG. **4** is generally of the same construction as the toggle switch operator **10** shown in FIGS. **1, 2** and **3**, and corresponding parts of substantially the same construction are therefore designated by the same reference numerals. On the other hand, parts of different construction are designated by the same reference numerals increased by **100**. In particular, the diameters of the arcuate gear teeth **148** on the inner ends of the switch blades **134** are approximately one-half of the diameters of the gears **152** and the slot (not shown in FIG. **4**) corresponding to the slot **66** is shorter, so that it does not produce a lost motion connection with the wall switch operating lever **12**. As a consequence, when the switch blades **134** are swung upward 180 degrees from their lowermost "off" positions to their uppermost "on" positions analogous to the corresponding dotted line positions shown in FIG. **2** into engagement with the spring fingers **30** of the detent clips **28**, the larger gears **152** rotate only about one-half the circumferential distances of the smaller arcuate gear teeth **148**, namely about 90 degrees, thereby causing the crank pins **56** to move upward approximately 90 degrees. This action causes the connecting rods **58** to move the cross slide **64** upward in substantially constant engagement with the toggle switch operating lever **12** to move it approximately 90 degrees from its lowermost "off" position to its uppermost "on" position, thereby turning on the lights in the room.

It will be understood that in an actual double-pole single-throw knife switch used in closing and opening electrical circuits directly, the cross bar **38** is a separate member from the blade arms **34** and is of electrically-insulating material in order to prevent a short circuit. As the present invention is a toy, however, and as no part of it actually carries electric current, such insulation is unnecessary. In order to impart realism to its appearance, nevertheless, the cross bar **38** in the actual toy switch operator **10** would preferably be coated with a suitable pigment of distinguishing color, such as, for example, black enamel to simulate the black insulating material used in real knife switches.

Since in the modern wall-mounted mercury switch the "up" position of the actuating lever **12** is the "on" position of the switch for closing the electrical circuit, the switch operator **10** employs the reversing mechanism shown in the drawings in order to move the wall switch actuating lever **12** upward while the knob **40** of the knife switch member **36** is moved downward, and vice versa as indicated by the arrows and dotted lines in FIG. **2**.

I claim:

1. A knife-switch-simulating extension operator for shifting the toggle switch lever of a wall switch having a removable screw-attached facia plate, said extension operator comprising

a casing having a base,

means for securing said casing to the switch,

a slide reciprocably mounted in said casing for motion along a vertical path of travel adjacent said base and having a coupling portion adapted to engage the switch lever,

an elongated knife switch blade means pivotally mounted on said base and swingable relatively thereto in an arcuate path between an upper "on" position and a lower "off" position corresponding to energization and deenergization respectively of the switch,

detent means for yieldingly holding said switch blade means in its upper "on" position,

link means connected to said slide and extending downward therefrom,

and gearing operatively connecting said switch blade means to said link means and responsive to upward swinging of said switch blade means to move said link means and slide upward and consequently shift the switch lever from its lower "off" position to its upper "on" position.

2. A knife-switch-simulating extension operator, according to claim **1**, wherein said switch blade means includes a pair of switch blade members disposed in spaced parallel relationship and a cross member interconnecting said blade-simulating members.

3. A knife-switch-simulating extension operator, according to claim **1**, wherein said gearing includes a peripherally-roughened circularly-arcuate driving portion associated with said switch blade means in spaced relationship to the pivotal mounting thereof on said base, and crank means pivotally mounted on said base in operative connection with said link means and having a roughened circularly-arcuate peripheral driven portion disposed in driven engagement with said arcuate driving portion.

4. A knife-switch-simulating extension operator, according to claim **1**, wherein said slide is horizontally elongated with said coupling portion disposed intermediate the ends thereof and wherein said link means includes a pair of links disposed in spaced parallel relationship and connected at their upper ends to said slide.

5. A knife-switch-simulating extension operator, according to claim **1**, wherein said coupling means includes a vertically-elongated slot in said slide providing a lost-motion connection between said slide and the toggle switch actuator such that an approximately **180** degree motion of said knife switch lever simulator produces an approximately **90** degree motion of the toggle switch actuator.

6. A knife-switch-simulating extension operator, according to claim **1**, wherein said mechanism includes a peripherally-roughened circularly-arcuate driving portion associated with said switch lever simulator disposed at a predetermined radius from the pivotal mounting thereof on said base and crank means pivotally mounted on said base in operative connection with said link means and having a roughened circularly-arcuate peripheral driven portion disposed at a radius from the pivotal mounting thereof a plurality of times of said predetermined radius and disposed in driven engagement with said driving portion such that an approximately **180** degree motion of said knife switch lever simulator produces an approximately **90** degree motion of the toggle switch actuator.

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