

Nov. 5, 1968

A. W. KRIEGER

3,409,751

TOGGLE SWITCH WITH SUBDUED LIGHT INDICATOR

Filed Sept. 1, 1967

2 Sheets-Sheet 1

Fig. 1

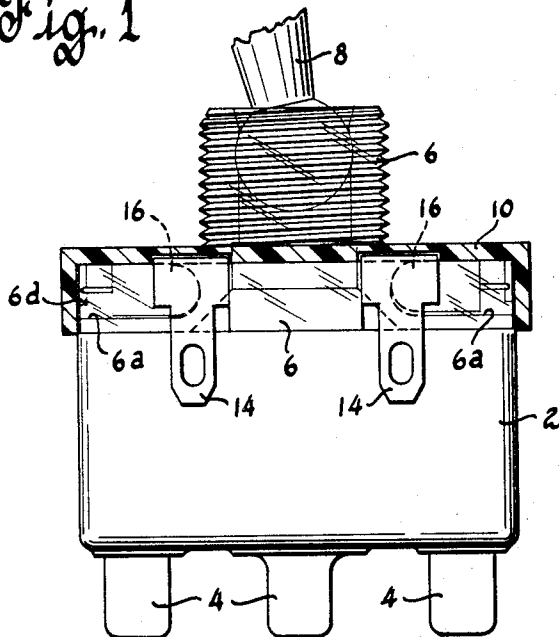


Fig. 2

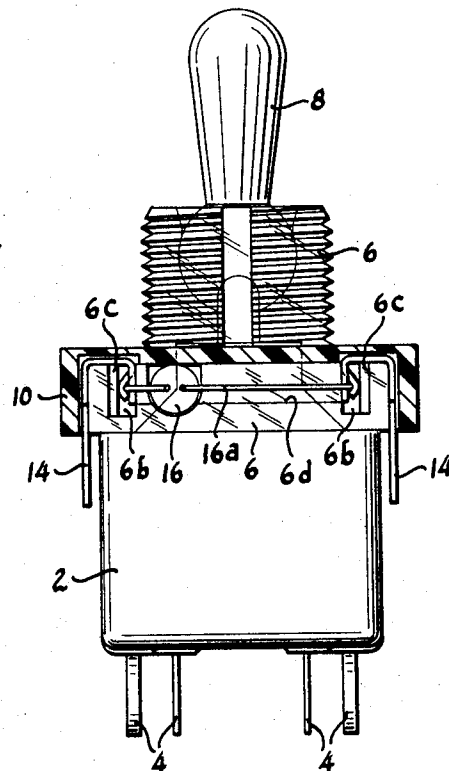
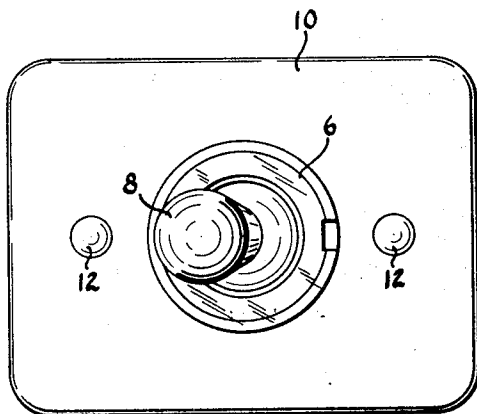


Fig. 3



Inventor
Alvin W. Krieger
By *Thm. A. Antio*
Attorney

Nov. 5, 1968

A. W. KRIEGER

3,409,751

TOGGLE SWITCH WITH SUBDUED LIGHT INDICATOR

Filed Sept. 1, 1967

2 Sheets-Sheet 2

Fig. 4

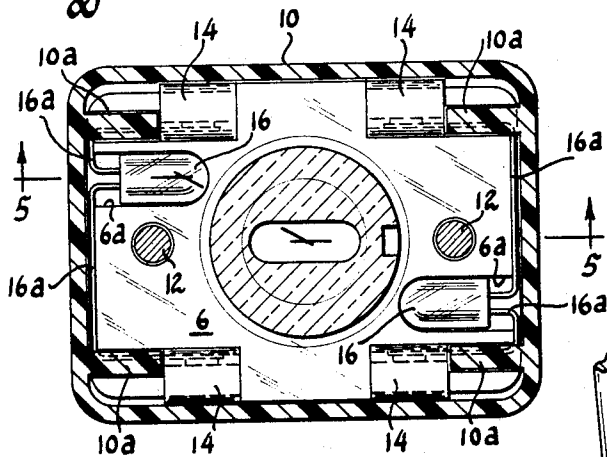


Fig. 5

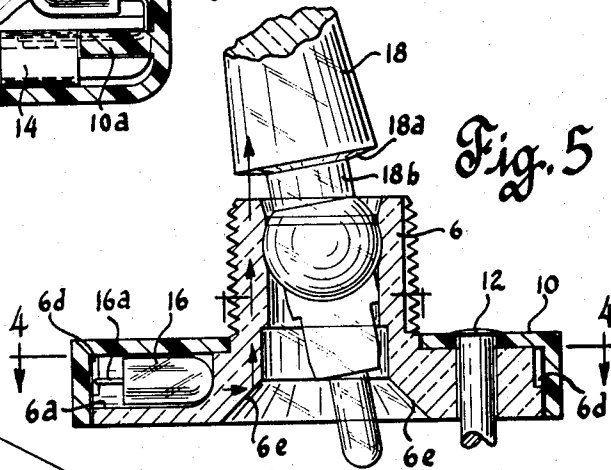
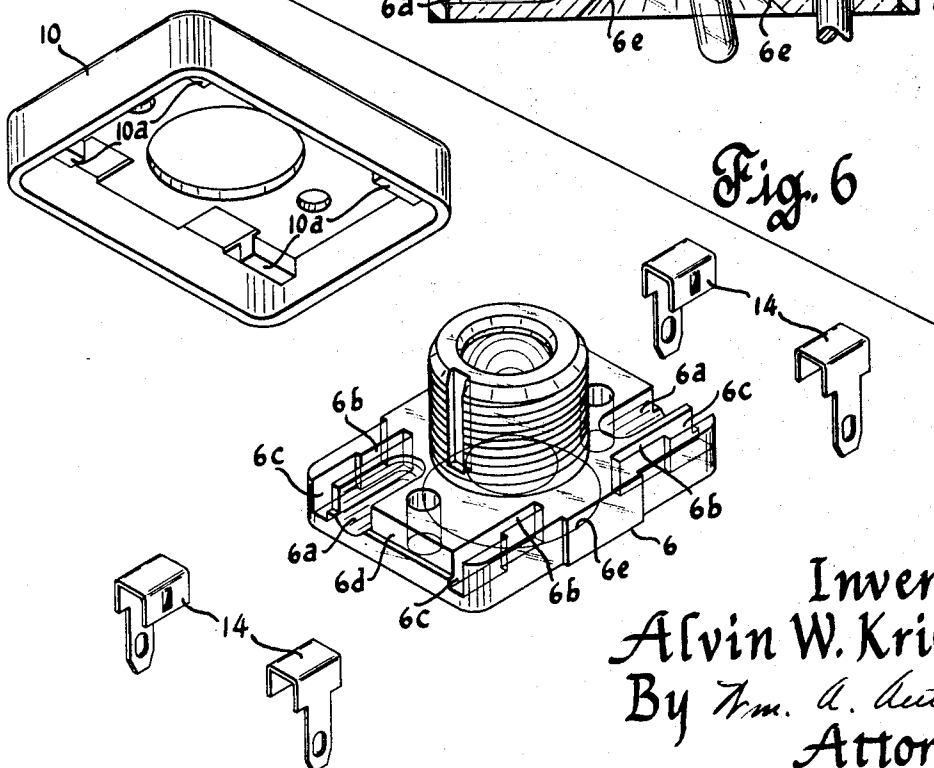


Fig. 6



Inventor
Alvin W. Krieger
By *Thm. A. Austin*
Attorney

1

3,409,751

TOGGLE SWITCH WITH SUBDUED LIGHT INDICATOR

Alvin W. Krieger, Milwaukee, Wis., assignor to Cutler-Hammer, Inc., Milwaukee, Wis., a corporation of Delaware

Filed Sept. 1, 1967, Ser. No. 665,161
11 Claims. (Cl. 200—167)

ABSTRACT OF THE DISCLOSURE

A toggle switch has an integral bushing and top plate of light transmitting material. Lamp bulbs and terminal assemblies are retained in slots in the top plate by a thin skirted, opaque cover. Angular surfaces reflect the light upwardly through the bushing as a subdued indicator of switch operation.

Background of the invention

This invention relates to the indicator art and more particularly to light indicators for switches to indicate circuit condition. Light indicators for switch operation have been known heretofore. One conventional indicator involves individually mounting a lamp near the switch on the panel and electrically connecting it to the switch to indicate its condition. However, this has the disadvantages that it involves use of panel space and cost of the indicating light and associated installation. Another known indicator involves mounting a lamp within the toggle lever of the switch. This type of indication is not only too bright for ambient light but also involves problems in connecting current to the movable lever. Other ways of indication have also been known such as mounting a lamp bulb within or below the switch, wiring it to the switch and providing some means of transmitting the light to a point where it is visible to the user. However, all of these structures have been complex, costly or did not facilitate assembly.

Summary of the invention

This invention involves a one-hole mounting switch with the face of the bushing illuminated by indirect means to present a subdued indication of circuit condition. An angular surface or bevel on an integral bushing-top-plate reflects the light through the bushing from lamp bulbs within recesses in the top plate. This manner of construction eliminates connection problems since no moving parts are involved. The illumination is pleasing because it is uniform and avoids "hot spots" of light. It requires less panel space and has esthetic value which conforms to requirements of home appliances and instruments, office equipment and some aircraft cockpit applications. It is easy to assemble and facilitates provision of different color indications by using colored lamp bulbs.

An object of the invention is to provide improved means affording a subdued light indicator for a toggle switch.

A more specific object of the invention is to provide a one-hole mounting switch with improved light indicator means built into it without requiring connection of electric current to movable parts.

Another specific object of the invention is to provide a built-in light indicator for a one-hole mounting switch which is easy to assemble and service.

Other objects and advantages of the invention will hereinafter appear.

2

Brief description of the drawings

These and other objects and advantages of the invention and the manner of obtaining them will best be understood by reference to the following description of preferred embodiments of toggle switch with subdued light indicator taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is an enlarged front elevational view of a one-hole mounting switch of the toggle lever type constructed in accordance with the invention;

FIG. 2 is an end elevational view partly in section of the switch of FIG. 1;

FIG. 3 is a top plan view of the switch of FIG. 1;

FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 5 showing the top plate;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 4 of the bushing-top-plate and cover and including a modified toggle lever; and

FIG. 6 is an exploded isometric view of the bushing-top-plate, cover and terminal connectors.

Description of the preferred embodiments

Referring to FIG. 1, there is shown a one-hole mounting switch of the toggle lever type. While a toggle lever switch has been shown for illustrative purposes, it will be apparent that the invention could be applied to one-hole mounting switches with other types of actuators such as pushbuttons or the like.

As shown in FIGS. 1—3, this switch is provided with a base 2 preferably of electrically insulating material and having a compartment therein for housing the switch mechanism and contacts. Switch terminals 4 extend out through the bottom of the base and are adapted for connection to an external circuit.

The base compartment has an open top which is closed by an integrally molded or one piece bushing and top plate 6. A switch actuator such as a toggle lever 8 is pivoted within the bushing and extends therethrough whereby to afford manual operation of the switch. A thin skirted cover 10 of opaque, preferably white material overlies the top plate and is secured to the base by a pair of rivets 12 or the like shown in FIG. 3. Alternatively, the top plate can be riveted to the base and cover 10 can be made to snap onto over the edges of the top plate. This cover has a central aperture to accommodate the bushing and when it is riveted it clamps the top plate to the base. The bushing is adapted to be inserted through a hole in a mounting panel and is externally threaded to receive a nut to secure the switch in conventional one-hole mounting fashion.

As shown in FIG. 4, top plate 6 is provided with a pair of elongated slots or recesses 6a, one extending inwardly from each end and being open at the top to allow lamp bulbs to be dropped therein. A pair of notches or grooves 6b, FIG. 6, for a pair of lamp terminals 14 are provided for each lamp. As shown in FIGS. 2, 4 and 6, these lamp terminal grooves extend inwardly from each end of the top plate near the corners generally parallel to the lamp recess and are open at the top to allow insertion of a lamp terminal therein.

Each lamp terminal as shown in FIG. 6 is a metal strap bent into a generally inverted U-shape and having one leg longer and narrower to form an external terminal as shown in FIG. 2. The shorter leg has a portion sheared and punched inwardly of the U-shape to allow insertion of the end of one of the lamp conductors between it and the shorter leg whereafter this sheared portion is pressed back to grip the conductor and make an electrical connection thereto. The bump formed by this sheared portion allows it frictionally to grip the side of the groove in

the top plate when the terminal is pressed thereinto. Associated with the lamp terminal grooves, the top plate is provided on its front and rear edges with notches generally parallel with and coextensive with such grooves to accommodate the longer leg of the terminal thereby to prevent it from interfering with cover 10 when the latter is inserted over the top plate.

Each lamp terminal groove is provided with a wider portion 6C as shown in FIG. 6 between the terminal receiving portion and the end of the top plate. These wider portions receive projections 10a integrally molded on the lower surface of cover 10 rigidly to fix the lamp terminals in place. Also a notch 6d extends along each end of top plate 6 from the lamp recess to each of the lamp terminal grooves to receive the pair of wire connections 16a between each lamp bulb 16 and its associated terminals 14 as shown in FIGS. 4 and 5.

Means are provided for reflecting the light from the lamp bulbs upwardly through the solid annular sides of the bushing. For this purpose, the top plate is provided with an angular surface or bevel 6e directly below the solid annular sides of the bushing and being circular in configuration. This bevel is preferably at an angle of 45 degrees to reflect the light, emanating horizontally from the lamps, 90 degrees so that it will travel to and be distributed uniformly around the upper annular surface of the bushing and be visible therefrom as shown by the arrows in FIG. 5. The integral top plate and bushing is made of light conducting material which may be transparent or clear plastic such as "Lexan" or the like. The light enters this material from the light bulb recess and passes horizontally therethrough until it strikes bevel 6e whereupon it is reflected upwardly through the body of the bushing to its annular upper surface. Colored lamp bulbs may be used instead of clear ones if colored light is desired. As will be apparent, one or more lamps may be used either to control the amount of illumination or to indicate the conditions of one or more circuits. Two lamps, one on each side, provide uniform illumination of the upper annular surface of the bushing. It is possible to add two more lamps (4 total) with the lamps connected in series or parallel combinations with two or four terminals to increase the illumination at the upper surface of the bushing.

As shown in FIG. 2, lamp terminals 14 extend downwardly between top plate 6 and the skirt of cover 10 in spaced relation to base 2 a sufficient distance to facilitate connection of electric conductors thereto.

The modified toggle lever 18 shown in FIG. 5 is constructed so that it will receive light from the bushing and conduct it therethrough. For this purpose, the handle portion is round and tapers from a circumference slightly above the top surface of the bushing to the end of the handle. The largest diameter is nearest the bushing and the diameter decreases therefrom to the substantially flat top at the upper end of the handle. This lever is made of clear or color transparent plastic material or the like affording passage of light therethrough.

To facilitate entry of light from the annular upper surface of the bushing into the handle, the latter is provided with a bevel 18a, immediately below its largest diameter reducing into a neck portion 18b which joins the handle to the spherical portion whereby the lever is pivotally mounted within the bushing. This bevel has an angle such that its surface is substantially parallel to the adjacent surface of the bushing when the handle is pivoted to the associated side. This parallel arrangement enhances the entry of light into the handle portion without undue reflections or scattering. Immediately below the spherical portion of the toggle lever, the hole in the bushing is oblong in shape, as shown in FIG. 4, to restrict the lever to reciprocal motion in a single vertical plane and to prevent lateral pivoting thereof.

Beveled surface 6e is constructed and arranged so that it will reflect light up through the bushing and will scat-

ter the light throughout the bushing so as to provide substantially the same intensity of illumination around the annular upper surface of the bushing. This is preferably done by providing bevel 6e with the proper angle relative to the two lamp bulbs and the bushing and highly polishing the surface thereof. An alternative way would be to polish the surface of the bevel and to apply a coating of reflective enamel or paint or material similar to that used in ordinary mirrors. All other surfaces of the top plate should be smooth and lustrous as produced in a polished die so that stray light rays emanating from the lamp bulbs are reflected back and forth until they strike the 45 degree bevel and are directed to the end of the bushing.

While the apparatus hereinbefore described is effectively adapted to fulfill the objects stated, it is to be understood that I do not intend to confine my invention to the particular preferred embodiments of toggle switch with subdued light indicator disclosed, inasmuch as they are susceptible of various modifications without departing from the scope of the appended claims.

I claim:

1. In a one-hole mounting switch having a base with an open-top compartment therein for the switch mechanism including an actuator extending into the compartment for operating the switch mechanism, the improvement comprising:

an integral top plate and bushing structure closing the top of said base and comprising light-conducting material;

means on said bushing adapting it for one-hole mounting onto a supporting panel;

means in said bushing supporting the actuator which extends therethrough for control of the switch mechanism;

at least one recess in the top plate portion of said structure;

at least one pair of notches in the top plate portion of said structure;

an electric lamp in said recess and a pair of terminals in said notches electrically connected to said lamp;

an angular polished surface at the juncture between said top plate portion and bushing on said structure for reflecting light along said bushing to and through the annular upper surface thereof;

and said lamp terminals being exposed for connection to an external circuit whereby the circle of light at the top of said bushing forms an indicator of the condition of the external circuit.

2. The invention defined in claim 1, together with: an opaque member overlying said top plate portion; and means securing said opaque member and said top plate portion to said base.

3. The invention defined in claim 1 together with: a thin member covering said top plate portion of said structure and the recess and notches therein;

and means securing said thin member and said top plate portion to said base whereby said thin member retains said lamp in its recess and retains said terminals in their notches.

4. The invention defined in claim 3, wherein: said thin member has an aperture through which the bushing portion of said structure extends and is provided with a skirt covering the edge of said top plate portion.

5. The invention defined in claim 4, wherein: said thin member is opaque so that the light from the lamp is confined to the bushing.

6. In a one-hole mounting toggle switch having a base with an open-top compartment therein for the switch contacts, the improvement comprising:

an integral top plate and bushing structure closing the top of said base and comprising light-conducting material;

5

means on said bushing adapting it for one-hold mounting onto a supporting panel;

a toggle lever extending through said bushing into said compartment;

means in said bushing pivotally supporting the toggle lever which extends therethrough for control of the switch contacts;

a recess in the top plate portion of said structure adapted to retain a small lamp bulb;

a pair of notches near the edges of said top plate portion adapted for press-fit retention of a pair of terminals;

an electric lamp bulb in said recess and a pair of terminals pressed into said notches electrically connected to said lamp bulb, the terminals having external portions for connection to an electric circuit;

an angular surface on said integral structure for receiving light from said lamp and reflecting it through the wall of said bushing portion and out through the annular upper surface thereof;

and opaque means covering the top plate portion of said integral structure to confine the light to the bushing.

7. The invention defined in claim 6, wherein said toggle lever comprises:

angular surfaces at opposite sides thereof near the upper surface of the bushing and each being arranged so that it is in substantially spaced parallel relation to the upper surface of the bushing when the handle of the toggle lever is pivoted in the corresponding direction to facilitate entry of light into the handle.

8. The invention defined in claim 6, wherein said top plate portion comprises:

6

a second recess and a second pair of notches for another lamp and associated pair of terminals located on the opposite side of the bushing from the first mentioned recess and notches to provide substantially uniform light intensity throughout the annular upper surface of the bushing.

9. The invention defined in claim 6, wherein each said terminal comprises:

a flat conductive ribbon bent into an inverted U-shaped form and having a short leg press-fitted into its notch and the other leg being longer and suspended over the edge of said top plate portion for connection to an external circuit.

10. The invention defined in claim 6, wherein said opaque means comprises:

a skirted cover of opaque material over said top plate portion secured by rivets through said top plate portion to said base.

11. The invention defined in claim 6, wherein said toggle lever comprises light conducting material for passing light that enters thereinto after leaving said bushing.

References Cited

UNITED STATES PATENTS

2,901,582	8/1959	Valverde.
3,169,506	2/1965	Morris.
3,174,023	3/1965	Doggart.
3,267,926	8/1966	Prince.
3,290,473	12/1966	Goldbeck et al.

ROBERT K. SCHAEFER, *Primary Examiner.*

H. O. JONES, *Assistant Examiner.*