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Keranen

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[54] **SWITCH HAVING A SHOCK-PROOF LIGHTED TOGGLE SWITCH**

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[52] **U.S. Cl.** .....**200/167 A,** 200/166 H, 200/67 A

[51] **Int. Cl.** **H01h 9/18**

[58] **Field of Search** ....200/167 A, 166 H, 67 A, 67 F

[56] **References Cited**

UNITED STATES PATENTS

2,725,438	11/1955	Bentley	200/67 F
2,743,330	4/1956	Ludwig	200/67 A
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[57] **ABSTRACT**

A switch having a lamp inside its toggle lever to serve as an indicator of the operating condition. An incandescant lamp having high visibility at some distance is preferred over neon lamps although it is more susceptible to damage under snap-action shock. To insure long life, a pair of shock absorbers are mounted near the lower end of the toggle lever to cushion the latter and thus prevent damage to the thin lamp filament.

6 Claims, 2 Drawing Figures

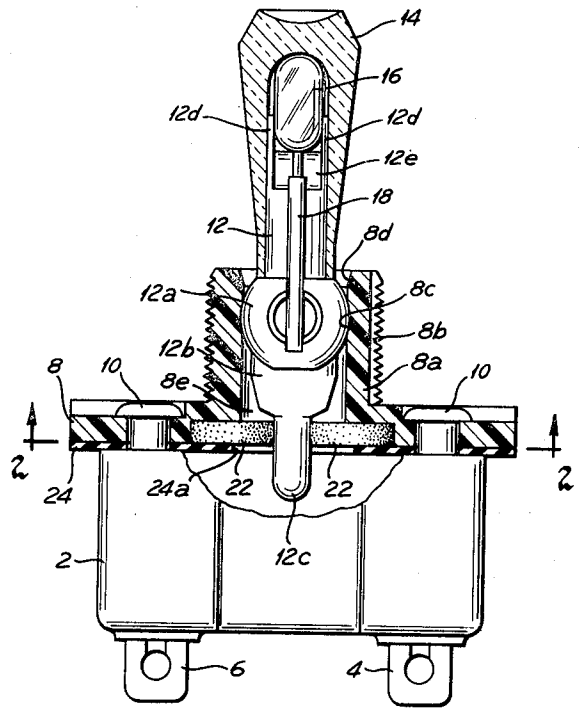


Fig. 1

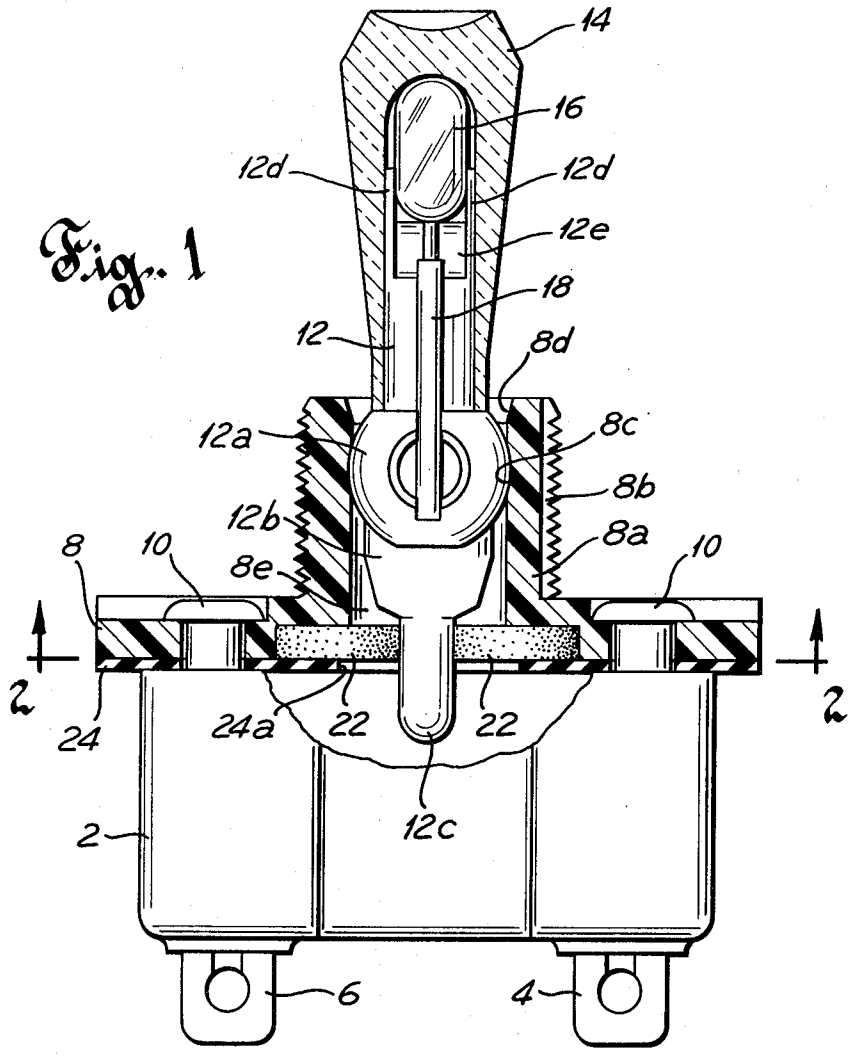
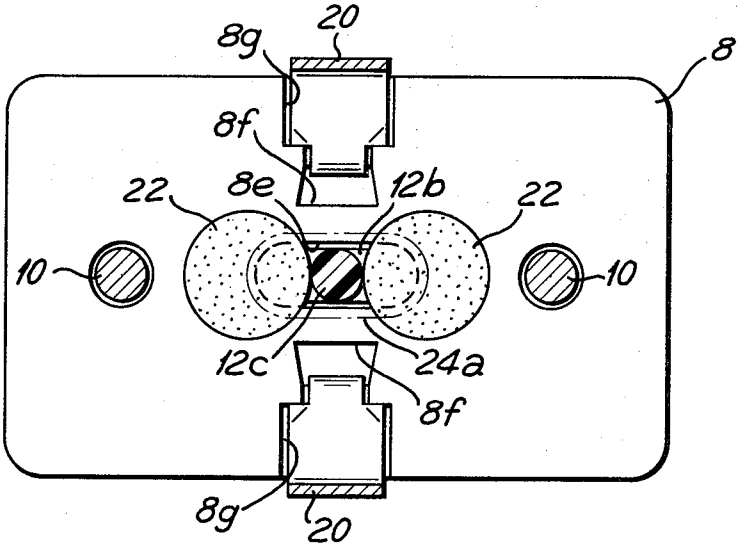

14
16
12d
12d
12e
18
12
8d
12a
8c
8b
12b
8a
8
10
8e
10
2
2
24
24a
22
22
12c
2
6
4

Fig. 2


20
8g
8
8f
22
8e
12b
22
10
10
12c
24a
8f
8g
20

SWITCH HAVING A SHOCK-PROOF LIGHTED TOGGLE SWITCH

BACKGROUND OF THE INVENTION

Lighted toggle lever switches have been known heretofore. My prior U.S. Pat. No. 3,614,362, dated Oct. 19, 1971, shows a toggle lever switch having a transparent or translucent hollow toggle lever handle and an indicator lamp bulb therewithin. While neon bulbs provide useful indication visibility when a clear plastic handle is used and can withstand the shock of the snap-action operation of the toggle lever, it has been found that when a colored handle is used, the light coming therethrough from a neon lamp cannot be clearly seen at the required distances. Consequently, it has become necessary to use an incandescent lamp bulb that is much brighter. However, such incandescent lamp bulb has a very thin filament in small lamp bulbs such as this and is subject to damage and failure due to the shock from the snap-action operation of the toggle lever.

This invention relates to improvements thereover.

SUMMARY OF THE INVENTION

This invention relates to a switch having an incandescent lamp lighted toggle lever.

An object of the invention is to provide an improved incandescent lamp lighted toggle lever switch.

A more specific object of the invention is to provide a toggle lever switch with shock absorber means preventing damage to the incandescent lamp mounted within the toggle lever.

Another specific object of the invention is to provide a switch with toggle lever cushioning means enabling use of a high visibility low D.C. voltage incandescent lamp within the toggle lever without danger of snap-action damage to the thin filament thereof.

Other objects and advantages of the invention will hereinafter appear.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an enlarged front elevational view of the switch with the cover and handle of the toggle lever shown in section along the center-line plane transverse to the pivotal axis; and

FIG. 2 is a bottom view of the cover and toggle lever assembly taken along line 2—2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a switch constructed in accordance with the invention that may have, for example, a single-pole double-throw switch action. This switch is provided with an insulating base 2 housing the switch contacts.

In the single-pole double-throw version illustrated, two pairs of switch terminals 4 and 6 extend out through the bottom of the base for connection to an external circuit. These terminals are integral with or connected to respective stationary contacts within the base. The contacts of the two pairs thereof are alternately bridged by a movable bridging contact when the toggle lever is moved between its two operating positions as disclosed in my aforementioned U.S. Pat. No. 3,614,362.

The open top of the base is closed by an insulating cover 8 that is rigidly secured to the base by a pair of rivets or bolts 10 or the like to provide a switch housing. Integrally formed with the cover is an externally threaded bushing 8*a* that extends up from the center thereof and is provided with a keyway 8*b* along one side thereof for nonrotatably holding a keyed washer when a nut is threaded thereon to mount the switch to a hole in a panel.

As shown in FIG. 1, the inside of the bushing is provided with a suitable configuration for snap-in mounting of a toggle lever for movement in the plane of FIG. 1 without allowing it to wobble transverse from its proper plane of movement. For this purpose, the bushing which is of plastic material has molded therein a socket 8*c* for the spherical portion 12*a* of the toggle lever. The upper sides of this socket diverge to the top of the bushing to form a frusto-conical opening 8*d* through which the spherical portion of the toggle lever may be snapped into its pivotal seat. The lower portion of the bushing below the spherical socket is provided with a reduced opening 8*e* oblong in horizontal cross-section as shown in FIG. 2 to guide the lower portion 12*b* (directly below the spherical portion) of the toggle lever in the plane of its movement.

As shown in FIG. 1, the reduced lowest end portion 12*c* of the toggle lever extends part-way down into the upper portion of the base and is adapted to engage the upper end cap of an overcenter, toggle-action compression spring or the like for obtaining snap-action of the movable contact when the handle is actuated from one operating position to the other.

As shown in FIG. 1, toggle lever 12 has mounted thereon a snap-in or friction-held removable hollow handle 14 covering a lamp bulb 16. The upper end of toggle lever 12 is provided with a lamp socket. For this purpose, this upper end is formed with a pair of spaced, flat upward projections 12*d* connected at their lower portions by a narrow web 12*e* to provide a seat for the lamp bulb. A pair of grooves extend down through the upper portion of the toggle lever, one on each side of the narrow web, and terminate in lateral holes extending in opposite directions in spherical portion 12*a* on the axis of rotation thereof. A pair of small diameter connector or conductor tubes 18 extend down through these grooves for receiving the two lamp bulb leads. A pair of resilient connectors such as helical compression springs extend through these lateral holes and are compressed between conductor tubes 18 and the upper end portions of lamp terminals 20 as shown in the aforementioned U.S. Pat. No. 3,614,362, these lamp terminals being partly shown in FIG. 2.

As shown in FIG. 2, bushing 8*a* is provided with two vertical openings 8*f* therethrough, one on each side, communicating with the lower and upper ends of the bushing and with the lateral holes in the spherical portion of the toggle lever. Thus, lamp terminals 20 may be inserted up through the respective openings slightly past the lateral openings so that the connector springs bear thereagainst and electrically connect the lamp conductor tubes thereto. These lamp terminals are formed with a horizontal offset at about their midpoint as shown in FIG. 2 so that they extend laterally out between cover 8 and the retainer plate hereinafter described, there being grooves 8*g* in the lower surface

of the cover therefor. These lamp terminals then extend down in spaced apart relation with the external walls of the base so that suitable complementary terminals can be secured thereto connect the lamp to an external circuit.

While a neon bulb can withstand considerable snap-action shock, it does not provide enough illumination to enable the indicator to be seen at the required distance, particularly when a colored "lexan" cap or handle **14** is used. Therefore, an incandescent lamp bulb is preferred because it provides much greater illumination to enable the lighted colored handle to be seen from as far away as across the room. However, an incandescent bulb has a thin filament that cannot withstand the snap-action shock, causing it to become damaged and to fail.

In typical applications, lamps having ratings from 3 to 28 volts are used. At ratings of 5 volts and above, the filament wire is very thin and does not take the shock. Prior to this invention, consistent life operation could not be obtained, and the trouble got worse on applications going from 3 volt lamps toward 28 volt lamps. A neon lamp requires 110 volts A.C. whereas incandescent lamps can be operated on computers and the like from their standard 5 volts D.C. supply which is more convenient.

To solve this problem, cushioning means was provided for the toggle lever. For this purpose, a pair of round slots were provided in the bottom surface of the cover and a pair of resilient discs **22** of silicone rubber or the like were inserted in these slots, one on each side of the reduced lowest end portion **12***c* of the toggle lever. These rubber discs are positioned so that the peripheral edges thereof touch the opposite sides of the toggle when the toggle lever is at the center as shown in FIG. **2**, or with not more than a small amount of compression of the discs in this position. Then in each operating position of the switch, such as the single-pole double-throw version illustrated, one of the rubber discs will be compressed to take up the shock of the snap-action produced by the overcenter spring hereinbefore mentioned that operates the movable contact.

A flat, thin insulating plate **24** shown in FIG. **1** is placed directly below cover **8** to retain these rubber discs in their slots. This insulating retainer plate is coextensive with the lower surface of the cover and is provided with a clearance aperture **24***a* that is oblong in shape and slightly longer in horizontal length as shown in FIG. **1** than opening **8***e* in the bushing and of substantially the same width as the opening in the bushing. Although retainer plate **24** is not shown in FIG. **2**, the shape of its opening slightly exaggerated in width is shown by dot-dash line **24***a* in FIG. **2**. This insulating plate underlies a large portion of rubber discs **22** and is clamped between the cover and base to retain them in their slots in the cover.

While the apparatus hereinbefore described is effectively adapted to fulfill the objects stated, it is to be understood that the invention is not intended to be confined to the particular preferred embodiment of switch having a shock-proof lighted toggle lever disclosed, in as much as it is susceptible of various modifications without departing from the scope of the appended claims.

I claim:

1. In a switch, the combination comprising:

an insulating housing enclosing contacts;

an upstanding bushing at the top of the housing;

a toggle lever extending through said bushing and pivotally mounted therein for operating the contacts;

an incandescent lamp bulb within said toggle lever and means electrically connecting said lamp bulb to terminals on the housing;

and shock absorber means for said toggle lever comprising:

a pair of slots within the top of said housing at the lower end of said bushing, one on each side of said toggle lever;

and a pair of compression members in said slots disposed to be engaged by said toggle lever in respective operating positions thereof to reduce the shock transmitted to said lamp bulb thereby to enable use of an incandescent lamp bulb for greater visibility at a distance.

2. The invention defined in claim **1**, wherein said shock absorber means also comprises:

an insulating plate secured to said housing and covering substantial portions of said compression members to retain the same in their slots.

3. The invention defined in claim **1**, wherein said pair of compression members comprise:

a pair of soft silicon rubber discs, each having a peripheral edge disposed to be compressed in a respective operating position of said toggle lever.

4. In a snap-action switch having an open-top base enclosing snap-action switch contacts, a cover closing the top of the housing including an upstanding bushing, and a toggle lever mounted in the bushing for pivotal movement to actuate the switch contacts, the improvement comprising:

a filament type lamp bulb mounted in the upper portion of the toggle lever for indicating the operating condition of the switch;

a light transmitting cover mounted on said toggle lever over said lamp bulb and serving also as a handle by which said toggle lever is operated;

shock absorber means for said switch comprising:

a pair of cavities in the cover at the lower end of the bushing, one on each side of said toggle lever;

and a pair of resilient members in said cavities having one side in close proximity to the opposite sides of the lower end portion of said toggle lever to cause one of said resilient members to be compressed when the toggle lever is pivoted from one operating position to the other thereby to absorb enough of the snap-action shock to enable use of a filament type lamp bulb having greater indicating visibility at a distance and affording a practical number of operations without lamp failure.

5. The invention defined in claim **4**, wherein said pair of resilient members comprise:

a pair of silicone rubber discs disposed in a plane transverse to the pivotal plane of said toggle lever and each having a peripheral edge portion in close abutting proximity to the lower end portion of said toggle lever when the latter is at center, the two discs being on respectively opposite sides of said toggle lever so that one thereof becomes compressed in each operating position of said toggle lever to absorb the snap-action shock due to operation of contacts and thus increase the life of the filament type indicator lamp bulb.

6. The invention defined in claim 5, wherein said shock absorber means for said switch also comprises:

an insulating plate clamped between said base and cover and having an aperture providing clearance for the lower end portion of said toggle lever and underlying substantial portions of said silicone rubber discs to retain them in said cavities.

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