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SWITCH APPARATUS

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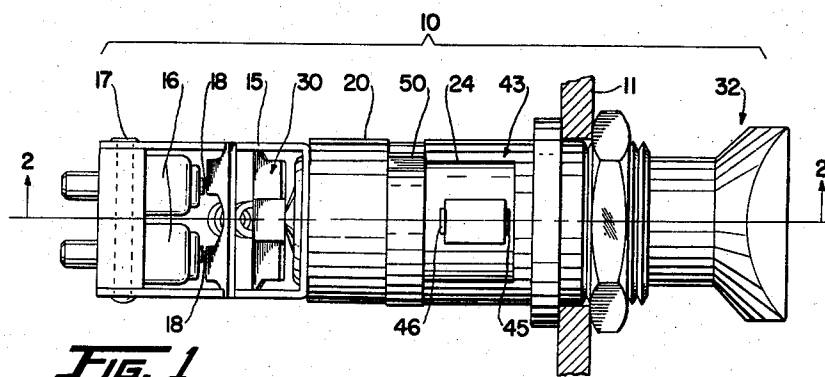


FIG. 1

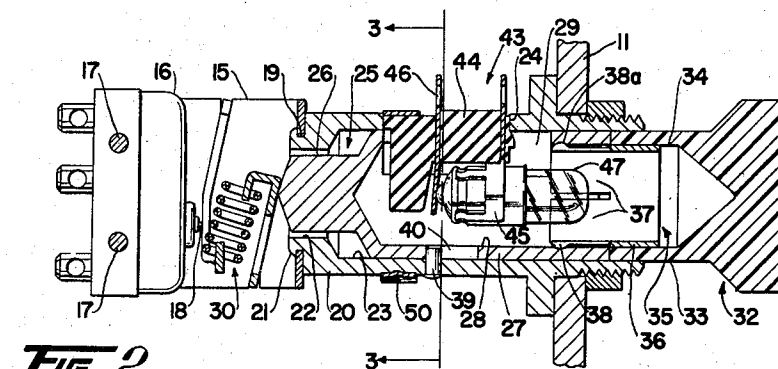


FIG. 2

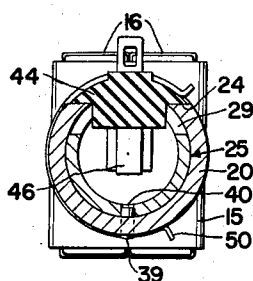


FIG. 3

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SWITCH APPARATUS

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6 Claims. (Cl. 200—167)

The present invention is directed to an illuminated push button switch device and specifically to the manner in which the illumination means is incorporated into and associated with the remainder of the structure.

There are, of course, numerous illuminated push button switch devices in the prior art. However, in most of these devices, the illumination means is movable with the push button portion of the device and is not secured to any stationary portion of the structure, and thus, is subject to any shock and vibration which affects the push button and is further subject to the shock and vibration caused by movement or actuation of the push button. The shock and vibration to which the illumination means is subjected tends to measurably shorten the life expectancy of the electric light bulb associated with the illumination means. Another disadvantage of this type of device is that either sliding contacts or flexible movable conductors are required to connect the illumination means to a source of voltage, because of the mobility of the illumination means.

There are prior art illuminated push button switch devices wherein the illumination means is operatively connected to a stationary portion of the structure. However, in some of these arrangements, it is not possible to actuate a switch disposed beyond both the push button and the illumination means because of the interference which would result between the push button and illumination means upon actuation of the push button. In these devices the switch is usually positioned proximate to the push button. In other of these devices, the illumination means when connected to a stationary portion of the structure is so disposed as to increase the overall dimensions of the device as compared to a similar device without the illumination means.

With illuminated push button switch devices usually located and secured to a control panel, or similar structure, it is often desirable to be able to service the illumination means without having to remove the device from the panel and to be able to service the illumination means both from the front of the panel for the relatively simple procedure of light bulb replacement, and from the rear of the panel for the more complex socket repair and replacement. None of the prior art illuminated push button switch devices includes an illumination means which can be serviced either by removing the push button to service the electric light bulb, or by removing the illumination means from the remainder of the push button illuminated switch device for servicing the socket, without having to remove the device from the panel, or without having to go through a major disassembly of the device.

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The illuminated push button switch device disclosed herein is comprised of an illumination means disposed between a switch and a push button and includes a sleeve which operatively connects the switch and the push button. The sleeve is provided with an opening for the disposal therethrough of the illumination means. The illumination means is fastened, by a quick release means, to the housing which supports the sleeve. The illumination means and the sleeve are so disposed with respect to each other so that movement of the sleeve, upon movement of the push button, does not interfere with the actuation of the switch by the sleeve to which it is operatively connected. Thus, a push button illuminated switch device is disclosed wherein the illumination means is secured to a stationary portion of the device, and wherein the illumination means can be serviced from two separate areas, that is, by removing the push button to service the electric light bulb or by removing the illumination means from the housing to service the socket or the light bulb, or both. Further, the illumination means is arranged with respect to the housing so as not to increase the overall dimensions of the illuminated push button switch device over a similar non-illuminated device. This is accomplished by arranging the illumination means so as to be all but completely contained within the housing of the device.

It is therefore an object of this invention to provide a unitary, compact illuminated push button switch device wherein the push button and the switch are separated by illumination means, and wherein the illumination means is secured to a stationary portion of the device.

It is a further object of this invention to provide an illuminated push button switch arrangement wherein the illumination means can be serviced from two distinct areas without requiring any extensive disassembly of the device.

These and other objects will become more apparent from a reading of the following specification and appended claims wherein:

Figure 1 is a view of the illuminated push button switch device with the illumination means in place;

Figure 2 is a cross-sectional view of the illuminated push button switch device along the lines 2—2 of Figure 1 showing the relation of the illumination means to the remainder of the structure; and

Figure 3 is a cross-sectional view of the illuminated push button switch device along the lines 3—3 of Figure 2 showing the relation of the illumination means to the housing and sleeve of the device.

Referring to Figures 1, 2, and 3, an illuminated push button switch device 10 is shown attached to a wall 11 of a control panel, or similar structure. The device 10 includes a U-shaped switch frame 15 to which a pair of snap switches 16 are attached by means of rivets 17. Each of the snap switches 16 include an operating plunger 18. A cylindrical support or housing 20 has a portion 21 which passes through an opening 19 in the frame 15 and which is staked thereto, thereby securing the frame 15 to the housing 20. The housing 20 further includes a first cylindrical longitudinal opening 22, a second cylindrical longitudinal opening 23, and a lateral wall opening 24 in communication with the opening 23.

A sleeve 25 includes a first cylindrical longitudinal portion 26, partially disposed in the opening 22 of the housing 20, and a second cylindrical portion 27 which

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is slidably disposed in the opening 23 of the housing 20. Further, the sleeve 25 has a cylindrical longitudinal opening 28 and a lateral wall opening 29 in communication with the opening 28. The wall opening 29 is of a greater dimension in the longitudinal direction of the sleeve 25 than the wall opening 24 of the housing 20 for reasons which will become apparent later. The housing 20 and the sleeve 25 are arranged so that the wall opening 24 and the wall opening 29 are contiguous.

A push button 32 formed from a light transmitting material includes a cylindrical portion 33 which is slidably disposed in the opening 23 of the housing 20 and which engages an extremity of sleeve 25. A cylindrical portion 36 of a spring member 35 is operatively fastened to the periphery of a cylindrical opening 34 of the push button 32. A second portion of the spring 35 includes a plurality of spring fingers 37 each with an enlarged portion 38 at an extremity thereof which cooperate with a counterbore 38a located in the sleeve 25 to maintain the push button 32 in place.

Disposed between the operating plungers 18 of the snap switches 16 and the left-hand extremity of the portion 26 of the sleeve 25 is a spring over-center actuating mechanism 30 arranged so that the mechanism 30 normally biases the sleeve 25 and the push button 32 to the right. A pin 39 is secured to the housing 20 and disposed in a longitudinal oblong opening 40 contained in the sleeve 25. The pin 39 and the opening 40 cooperate to determine the normal extended position of the sleeve 25 and the push button 32 under the bias of the mechanism 30. Inward movement of the push button 32 and consequent inward movement of sleeve 25 results in actuation of the mechanism 30 until the over-center point is reached, whereupon plungers 18 are allowed to move outwardly with respect to the snap switches 16. Inward movement of the sleeve 25 and the push button 32 is limited by cooperating stops, not shown, on the spring mechanism 30 and the frame 15.

Illumination means 43 is comprised of an electrical non-conducting body member 44 which supports a combined socket-terminal member 45. A second terminal member 46 is also supported by the body 44 and cooperates with a light bulb 47 and the combined socket-terminal member 45 to provide an electrical path across the terminal members when the terminal members 45 and 46 are connected to a source of voltage.

As can be best seen in Figure 3, the wall opening 24 of the housing 20 provides an opening and a support, and the wall opening 29 of the sleeve 25 provides an opening for the illumination means 43. Thus, the illumination means 43 is supported by the side surfaces of the wall opening 24 and a portion of the illumination means 43, including a portion of body 44 and terminals 45 and 46 and the light bulb 47, is disposed through the wall opening 24 and the wall opening 29. It should be here noted that the illumination means 43 and the wall openings 24 and 29 are of such dimensions and so arranged that the illumination means 43 can be inserted through and removed past the wall openings 24 and 29 with the bulb 47 in place. Further, with the illumination means 43 in place, the socket portion of the terminal member 45 is so arranged and hence the lamp 47 is so supported with respect to the opening 28 of the sleeve 25 that the longitudinal axis of the lamp 47 is substantially coaxial with the longitudinal axis of the opening 28. This allows the servicing of the lamp 47, that is removal and replacement through the opening, by merely removing the push button 32.

A resilient retaining ring 50 is disposed about the outer periphery of the housing 20 and about the outer surface of the body 44 of the illumination means 43, thereby securing one to the other.

An examination of Figure 2 of the drawing will indicate that movement of the push button 32 inward will result in the sleeve 25 being moved inward against the

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bias of the mechanism 30 causing actuation of the snap switches 16. Because of the longitudinal dimension of the lateral wall opening 29 of the sleeve 25, no interference results between the sleeve 25 and the illumination means 43 upon movement of the sleeve 25. It will be understood, of course, that the light bulb 47 will be illuminated either in the position shown, or in the actuated position, or after having been actuated and returned to a normal position remaining so until a second condition occurs, depending on how the illumination means 43 and the snap switches 16 are related and connected in circuit.

It will be appreciated that due to the arrangement of the body 44, terminals 45 and 46, and the light bulb 47 of the illumination means 43, the overall dimensions of the illuminated push button switch device are kept to a minimum and a compact structure results. This is, of course, important in applications where space is at a premium, such as in computer panels, aircraft applications, etc.

Because of the unique arrangement of the illumination means 43 with respect to the remainder of the structure, the light bulb 47 can be serviced by merely removing the push button 32. Further, the light bulb 47 and/or the terminals 45 and 46 can be serviced by merely repositioning the retaining ring 50 about the periphery of the housing 20 and removing the illumination means from the housing 20. Thus, the simple illumination servicing problems with this device can be attended to from the front of the control panel, or other structure where the device is located, whereas more extensive servicing can be undertaken from a second area located behind the control panel. Of course, both servicing areas could be located to one side of the control panel.

The illuminated push button switch device disclosed herein includes an illumination means which is fastened to a stationary portion of the structure. However, the inclusion of the illumination means does not increase the overall dimensions of the device as compared to similar devices not incorporating an illumination means. Further, the above discussed novel device allows servicing of the illumination means contained therein from two separate areas without requiring any extensive disassembly of the device.

While only one embodiment has been shown, it is obvious that other embodiments are possible, and therefore the measure of this novel advance in the art should be measured by the following claims.

I claim:

1. An illuminated push button switch actuating arrangement comprising: a cylindrical housing having a cylindrical longitudinal opening therethrough and having an opening in a peripheral portion thereof in communication with said cylindrical opening; a cylindrical sleeve having a cylindrical longitudinal opening therein and having an opening in a peripheral portion thereof in communication with said cylindrical opening, said sleeve being disposed within the cylindrical opening of said housing and having a first end portion arranged to be operatively engaged to the operator of a snap switch device, said housing and said sleeve being arranged for relative reciprocating longitudinal movement and arranged so that the peripheral openings are contiguous with respect to each other; a translucent push button resiliently connected to the second end portion of said sleeve so movement of said push button in a first direction results in movement of said sleeve to cause actuation of the switch device; an electrical lamp and socket assembly having a first portion including said lamp disposed through said peripheral openings and located within the cylindrical opening of said sleeve so that the longitudinal axis of said lamp is substantially coaxial with the longitudinal axis of the cylindrical opening of said sleeve and so that said lamp is directed toward the second end portion of said sleeve, said lamp and socket assembly having a second portion

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engaging the side surfaces of the peripheral opening in said housing and supported thereby, the peripheral opening in said sleeve and said lamp and socket assembly being arranged so as to allow longitudinal movement of said sleeve and said push button without interfering with said lamp and socket assembly; and a retaining ring disposed about the outer periphery of said housing and operatively engaged with said lamp and socket assembly for securing said lamp and socket assembly to said housing.

2. An illuminated push button control device actuating arrangement comprising: a housing having a longitudinal opening therethrough and having an opening in a wall portion thereof in communication with said longitudinal opening; a sleeve having a longitudinal opening therein and having an opening in a wall portion thereof in communication with said longitudinal opening, said sleeve being disposed within the longitudinal opening of said housing and having a first end portion arranged to be operatively engaged to a movable portion of a control device, said housing and said sleeve being arranged for relative reciprocating longitudinal movement and arranged so that the wall openings are contiguous with respect to each other; a light transmitting member operatively engaging the second end portion of said sleeve so movement of said member in a first direction results in movement of said sleeve to cause movement of the movable portion of said control device; an electrical lamp and socket assembly having a first portion including said lamp disposed through said wall openings and located within the longitudinal opening of said sleeve so that the longitudinal axis of said lamp is substantially coaxial with the longitudinal axis of the longitudinal opening of said sleeve and so that said lamp is directed toward the second end portion of said sleeve, said lamp and socket assembly having a second portion supported by said housing, the wall opening in said sleeve and said lamp and socket assembly being arranged so as to allow longitudinal movement of said sleeve and said push button without interfering with said lamp and socket assembly; and retaining means disposed about said housing and said lamp and socket assembly for securing said lamp and socket assembly to said housing.

3. An illuminated control device actuating arrangement comprising: a housing having a longitudinal opening therethrough and having an opening in a wall portion thereof in communication with said longitudinal opening; force transferring means including a portion having a longitudinal opening therein and having an opening in a wall portion thereof in communication with said longitudinal opening, said force transferring means being disposed within the longitudinal opening of said housing and having a first end portion arranged to be operatively engaged to a movable portion of a control device and having a light transmitting second end portion, said housing and said force transferring means being arranged for relative reciprocating longitudinal movement so movement of said force transferring means in a first direction results in movement of the movable portion of the control device and arranged so that the wall openings are contiguous with respect to each other; an electrical lamp and socket assembly having a first portion including said lamp disposed through said wall openings and located within the longitudinal opening of said force transferring means so that the longitudinal axis of said lamp is substantially coaxial with the longitudinal axis of the longitudinal opening of said force transferring means and so that said lamp is directed toward the second end portion of said force transferring means, said lamp and socket assembly having a second portion supported by said housing, the wall opening in said force transferring means and said lamp and socket assembly being arranged so as to allow longitudinal movement of said force transferring means without interfering with said lamp and socket assembly; and fastening means disposed about said

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housing and said lamp and socket assembly for securing said lamp and socket assembly to said housing.

4. An illuminated control device actuating arrangement comprising: a housing having a longitudinal opening therethrough and having an opening in a wall portion thereof in communication with said longitudinal opening; force transferring means having a longitudinal opening therein and having an opening in a wall portion thereof in communication with said longitudinal opening, said force transferring means being disposed within the longitudinal opening of said housing and having a first end portion arranged to be operatively engaged to a movable portion of a control device and having a removable second end portion through which light can be passed, said housing and said force transferring means being arranged for relative reciprocating longitudinal movement so movement of said force transferring means in a first direction results in movement of the movable portion of the control device and arranged so that the wall openings are contiguous with respect to each other; electric illumination means having a first portion including a lamp disposed through said wall openings and located within the longitudinal opening of said force transferring means so that the longitudinal axis of said lamp is substantially coaxial with the longitudinal axis of the longitudinal opening of said force transferring means and so that said lamp is directed toward the second end portion of said force transferring means, said illumination means having a second portion operatively fastened to said housing, the wall opening in said force transferring means and said illumination means being arranged so as to allow longitudinal movement of said force transferring means without interfering with said illumination means, said lamp arranged to be serviced by removal of said illumination means from said housing and also arranged to be serviced by removal of the second end portion of said force transferring means.

5. An illuminated control device actuating arrangement comprising: support means; force transferring means having a longitudinal opening therein and having an opening in a wall portion thereof in communication with said longitudinal opening, said force transferring means being supported by said support means and having a first end portion arranged to be operatively engaged to a movable portion of a control device and having a second end portion past which light can be transmitted, said support means and said force transferring means being arranged for relative reciprocating longitudinal movement so movement of said force transmitting means in a first direction results in movement of the movable portion of the control device; and electric illumination means operatively fastened to said support means and having a portion including a lamp disposed through the wall opening and located within the longitudinal opening of said force transferring means so that the longitudinal axis of said lamp is substantially coaxial with the longitudinal axis of the longitudinal opening of said force transferring means and so that said lamp is directed toward the second end portion of said force transferring means, the wall opening in said force transferring means and said illumination means being arranged so as to allow longitudinal movement of said force transferring means without interfering with said illumination means, said lamp arranged to be serviced by removal of said illumination means from said support means and also arranged to be serviced from the second end portion area of said force transferring means.

6. An illuminated control device actuating arrangement comprising: support means; force transferring means supported by said support means and having a first end portion arranged to be operatively engaged to a control device and having a second end portion past which light can be transmitted, said support means and said force transferring means being arranged for relative movement so movement of said force transmitting means

results in a change of condition of the control device; and electric illumination means including a lamp located relative to said force transferring means, said illumination means being operatively fastened to a portion of said support means disposed between the first end portion and the second end portion of said force transferring means, said illumination means being further located so that the longitudinal axis of said lamp is parallel with a plane connecting the first end portion of said force transferring means, said lamp arranged to be serviced by removal of said illumination means from said support means and

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also arranged to be serviced from the second end portion area of said force transferring means.

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