Jan. 14, 1964 G. R. McKNIGHT 3,118,038

LIGHTABLE PUSH-BUTTON SWITCH ASSEMBLY

Filed Sept. 7, 1961

Fig.1

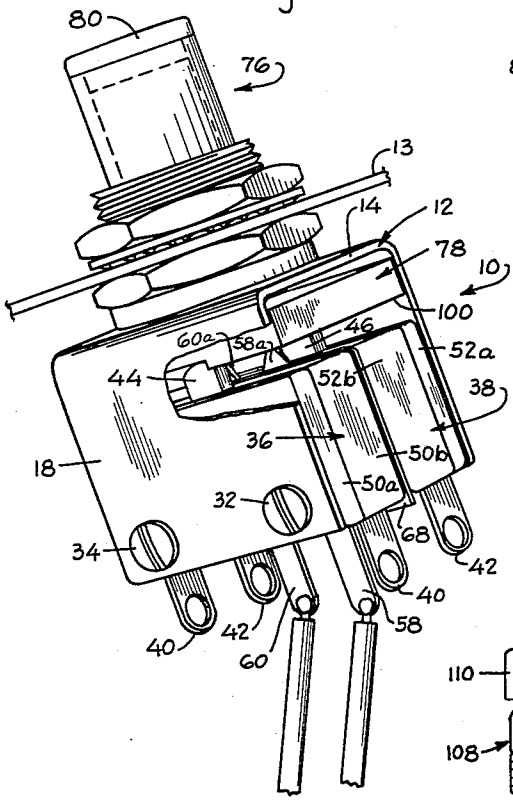


Fig.2

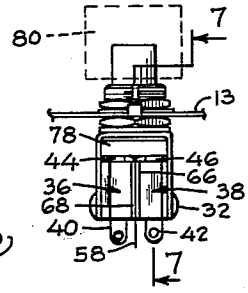


Fig.3

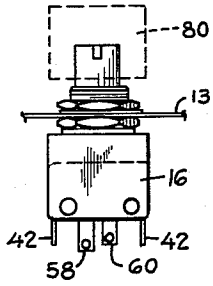


Fig.4

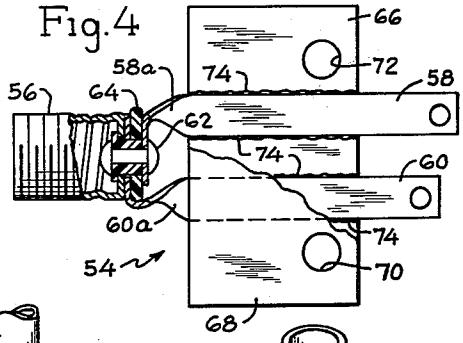


Fig.5

Fig.6

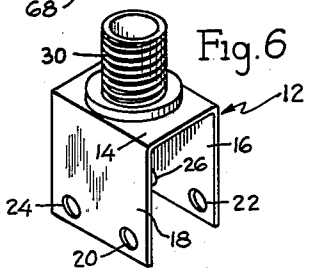


Fig.7

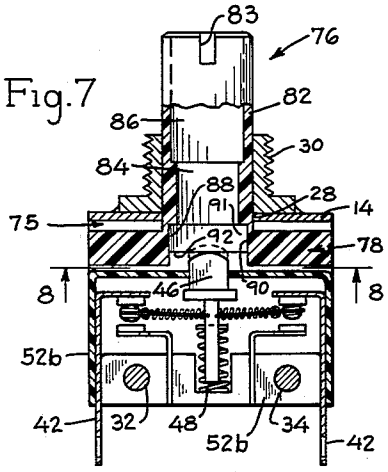


Fig.8

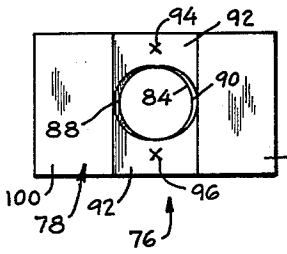
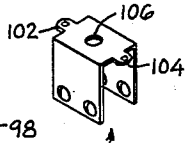


Fig.9



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LIGHTABLE PUSH-BUTTON SWITCH ASSEMBLY

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12 Claims. (Cl. 200—167)

This invention relates in general to a push-button switch assembly and more particularly relates to a lighted push-button switch assembly.

In the electronic control field, there has long existed a problem of obtaining a compact, highly reliable, precision, lighted push-button switch unit. Precision switches per se have been developed to a high degree of reliability and compactness. However, lighted switch button units, because of the complex extra functions desired, have not heretofore reached a high degree of precision reliability and compactness at a low cost.

It is the general object of this invention to provide a precision lighted switch button unit which utilizes standard switching units without derating the reliability thereof.

A further object of this invention is to provide a lighted switch button unit which is simple in construction and provides easy access for removal and replacement of a lamp in the assembly.

It is a further object of this invention to provide an improved circuit controlling device which is of rugged construction and which provides easy access to all electrical terminals for wiring thereof.

A still further object of this invention is to provide a lighted push-button associated with two standard switches and a bracket means wherein the lamp holder means is fixed to the switch casing means and the return bias for the lighted button is provided solely by the biasing means in the interior of the switches.

Another object of this invention is to provide an assembly as above described which is well adapted for mass manufacturing techniques, is easy to assemble and maintain, is pleasing in appearance, has a long field life, and is otherwise well adapted for the purposes for which it was designed.

The novel features that are characteristic of the invention are set forth with particularity in the appended claims. An understanding of the invention both as to its organization and its mode of operation, together with additional objects and advantages thereof, will best be understood by reading the following description in conjunction with the accompanying drawings, wherein:

FIGURE 1 is an enlarged perspective view of the lighted push-button assembly assembled to a panel;

FIGURE 2 is an end view of the assembly shown in FIGURE 1;

FIGURE 3 is a front elevational view of the assembly depicted in FIGURES 1 and 2;

FIGURE 4 is an enlarged fragmentary view, partially in section, showing one of the component parts of the assembly;

FIGURE 5 is a detached view of a lamp and a lamp removal means for association with the assembly shown in FIGURE 4;

FIGURE 6 is an isometric perspective view of one component of the assembly shown in FIGURES 1 through 3;

FIGURE 7 is a partial sectional view along lines 7—7 of FIGURE 2;

FIGURE 8 is a view in full line of the underside of the push button taken along lines 8—8 of FIGURE 7; and

FIGURE 9 is an isometric perspective view, in reduced scale, showing an alternate form of bracket means.

The lighted push button assembly 10 comprises a U-shaped bracket member 12 which is adapted to be mounted to an apertured work panel 13 by suitable hardware as shown in FIGURES 1 through 3. Bracket 12 has a bail portion 14 and a pair of generally parallel legs 16 and 18. The legs 16 and 18 are apertured by aligned apertures 20, 22 and 24, 26 as shown for mounting the switch units and lamp holder unit as shall be later described. The bail portion 14 is apertured at 28 (see FIG. 7) said aperture 28 being located in the mid portion of the bail 14. A threaded neck portion 30 may be suitably mounted to bail portion 14 in alignment with the aperture 28.

Precision switch means 36 and 38 are adapted to be mounted within the area between bracket legs 16 and 18 on suitable bolts or rivets 32 and 34 which extend through the apertures 20, 22 and 24, 26 as well as through suitable cross mounting bores in the respective switch means 36 and 38. Switch means 36 has terminals 40 extending therebelow for electrical connection thereto and switch means 38 has terminals 42 similarly disposed. Projecting above the outer casings of the individual switch means 36 and 38 are switch actuator buttons 44 and 46. It is important to note that the particular details of the switch are not important except that the switch actuator buttons 46 and 44 must be of the type which are biased towards a return position by a suitable biasing means such as 48. (See FIGURE 7.) While I have elected to show a two terminal switch, it will be appreciated that many other configurations and varieties of switches may be substituted therefor. Each switch casing may be of plastic and made up of two mating portions 50*a* and 50*b* and 52*a*, 52*b*. The switches 36 and 38 are here disposed in generally parallel mirror image relationship. It will be noted that the switch operators 44 and 46 are disposed in spaced parallel side by side relationship and protrude from the tops of the respective casings a predetermined distance.

A lamp holder means 54 is fixedly mounted intermediate the two switch means 36 and 38 on the two cross mounting pins 32 and 34. The lamp holder unit 54 essentially comprises a metallic socket base means 56 and a pair of flat spaced terminal strips 58 and 60 which are somewhat elongated in nature so as to extend below the switch units as shown in FIGS. 1 and 3. Terminal strip 60 is twisted 90° adjacent to the socket 56 and is in direct electrical circuit thereto. Terminal 58 is mounted to socket 56 through an eyelet 62 so as to provide a conventional lamp circuit assembly. Insulation 64 is provided to electrically isolate the socket 56 and eyelet 62. Terminal strip 58 is also twisted 90° at 58*a* as shown. The mid portions of the terminal strips 58 and 60 are held in fixed insulated spaced relationship to each other by a pair of flat insulating sheets 66 and 68. Sheets 66 and 68 may be formed of a fiberglass mat bonded together with a suitable epoxy resin or any other suitable high dielectric material which is thin, flexible, and has high dielectric strength. Sheets 66 and 68 are each apertured at 70 and 72, the apertures being spaced apart and of sufficient size so as to fit over mounting fasteners 32 and 34 respectively. It is preferred that the sheets 66 and 68 be sufficiently stiff and thin so that when the flat terminals 58 and 60 are bonded thereto by suitable cement 74, the entire lamp holder assembly 54 may be mounted on the fasteners aforementioned intermediate the two switch means 36 and 38. It will be noted that the switch casing portions 50*b* and 52*b* also support and mount the lamp holder means 54. The sheets 66 and 68 are preferably at least as large as the switch casing means and if desired may extend down on the bottom side of the assembly 10 if additional electrical isolation in this area is desired.

By the mounting arrangement shown, the socket 56 is disposed intermediate the two switch casings and the switch actuators 44 and 46, and projects above the tops

of the casings. The lamp holder means is firmly fixed in non-movable relation to the bracket 12 and the switch means 36 and 38. The socket 56 is arranged to be in alignment with the neck portion 30 of the bracket means 12 and concentric with aperture 28 in the bracket portion 14.

A pellucid lighted push-button means 76 has a base portion 78 which is smaller than and adapted to be confined in the area 75 between the tops of the casings for the switch means 36 and 38 and the underside of the bail portion 14 of the U-shaped bracket means 12. The push-button means 76 is preferably made of plastic and due to the size and configuration is relatively light in weight. The plastic material is pellucid, i.e. either transparent or translucid, colored or clear depending on the characteristics desired. The base portion 78 preferably has a width of such size that it will be guided by the arm portions 16 and 18 of the U-shaped bracket means when the push-button means 76 is reciprocated in the area 75. A removable cap 80 of any suitable configuration and style is mounted on the top side of an integral neck portion 82 of push-button means 76 and may be attached to the neck 82 by a notch arrangement 83 as shown in FIG. 7. Any other conventional, easily removable fastening means may be used to attach the cap 80 to the neck.

The push-button means 76 is formed with a central through bore 84 coextensive the neck 82 and of sufficient size to accommodate the lamp socket base 56 therewithin. A counter bore 86 is formed in the top portion of the neck concentric with bore 84. A pair of offset recess portions 88 and 90 are formed adjacent the bottom of bore 84 making a somewhat elliptical counter bore 91 in plan view as shown in FIG. 8. Offset bore portions 88 and 90 accommodate the half twists of the flat terminals 58*a* and 60*a*. The bottom side of the button base 78 has a shallow transverse groove 92 which is at least as wide as counter bore 91. The groove 92 traverses the mid portion of the base and presents substantially flat surfaces in the base thereof which are adapted to engage the individual switch operators 44 and 46 approximately at the points 94 and 96 as shown in FIG. 8. The bottom surfaces 98—100 of the base 78 may act as a stop when the depth of the groove is such that portions 98—100 engage the top surfaces of the switch means 36 and 38 to prevent over travel of the button 76.

An alternate form of bracket means 12′ is shown in FIG. 9 having a pair of coplanar tabs 102 and 104 which are adapted to mount the bracket means 12′ to the under side of a panel where a short axial height of button is desired. A central aperture 106 is provided for receiving the neck of the pellucid push-button.

The lamp 108 (see FIG. 5) is adapted to be mounted and dismounted within the lamp base 56 by the use of hollow flexible tubing 110. The counter bore 86 in the neck 82 of the button 76 is of sufficient size to accommodate the tube 110.

The operation of the device is exceedingly simple. The push-button 76 is actuated by engagement of a cap 80 either manually or by any other suitable means, and the switch is actuated against the bias of the interior switch springs 48. The return biasing force for button 76 is provided solely by the biasing force of the switch actuators and the lamp holder means 54 is not disturbed by actuation of the switches 36 and 38.

It will be noted that the total assembly is compact, rugged, shock resistant, simple to assemble, and does not derate the precision switches 36 and 38. The terminals 58 and 60 are exposed for easy attachment to wiring as suitable and desired.

Although specific embodiments of the invention have been shown and described, it is with full awareness that many modifications thereof are possible. The invention, therefore, is not to be restricted except as insofar as is necessitated by the prior art and by the spirit of the appended claims.

What is claimed as the invention is:

1. A switch assembly comprising switch means having exterior housing means, actuator means for said switch means having a portion extending through said housing means and movable along a predetermined axis, biasing means for said switch actuator means, lamp means fixed to said housing means in spaced relation to said actuator means and aligned in parallel relation to said predetermined axis, bracket means fixed to said housing means having a portion thereof in proximity to said lamp means, and a hollow lightable push-button means mounted for relative movement in parallel relation to said predetermined axis on said bracket means with a portion disposed in engagement with said actuator means, the hollow portion of said push-button means being aligned with said lamp means whereby said push-button means may be actuated against said biasing means mechanically independent of said lamp means.

2. A switch assembly comprising switch means having housing means enclosing movable contact means, actuator means for said movable contact means of said switch means having a portion exterior of said housing means and operable upon movement thereof to move said movable contact means, biasing means for said actuator means, lamp means including terminal means fixedly mounted to and directly supported by said housing means, bracket means fixed to said housing means having a portion thereof in proximity to said lamp means, and hollow pellucid push-button means mounted for relative movement on said bracket means with a portion disposed in engagement with said actuator means, the hollow portion of said push-button means being aligned with said lamp means whereby said push-button means may be actuated against said biasing means without disturbing said lamp means.

3. A switch assembly comprising switch means having housing means enclosing movable contact means, actuator means for said movable contact means of said switch means having a portion exterior of said housing means and operable upon movement thereof to move said movable contact means, biasing means interior of said housing means for said actuator means, lamp holder means directly supported by and fixed to said housing means in horizontally spaced relation to said actuator means, unitary bracket means having a first, second and third portion, said first portion being fixed to said housing means, said second portion being in proximity to said lamp holder means, and hollow pellucid push-button means mounted for guided relative movement on said third portion of said bracket means with a portion of said push-button means being disposed in operative engagement with said actuator means, the hollow portion of said push button means being aligned with said lamp holder means whereby said push-button means may be actuated against said biasing means without disturbing said lamp holder means.

4. A compact push-button switch assembly comprising first and second switch means disposed in side-by-side fixed relation and each having an outer casing, first and second switch actuator means extending through said respective outer casings in side-by-side spaced relation, lamp means including terminal means depending therefrom disposed intermediate said outer casings and said first and second switch actuators with said terminal means extending between and below said outer casings, switch mounting means engaging each of said switch means to mount each of same to a work panel, and lightable push-button means mounted on said switch mounting means for relative movement thereto, said push button means actuating each of said switch actuator means without contact with said lamp means.

5. A push-button switch assembly comprising first and second switch means disposed in side by side fixed rela-

tion and each having an outer casing, first and second switch actuator means extending through the upper portions of said respective outer casings in side by side horizontally spaced relation, lamp means having a portion disposed intermediate and above said outer casings and said first and second switch actuators with the terminals being supportedly mounted between said outer casings, switch mounting means engaging each of said switch means and being adapted for mounting each of same to a work panel, and pellucid push-button means mounted on said switch mounting means for relative movement thereto, said push button means being configured to engage each of said switch actuator means without contact with said lamp means.

6. A push-button switch assembly comprising first and second switch means disposed in side by side fixed relation and each having an outer casing, first and second switch actuator means extending through the tops of said respective outer casings in side by side spaced relation, biasing means interior of said outer casings for returning said switch actuator means to an extended position, lamp holder means disposed intermediate said outer casings and said first and second switch actuators with terminals being supportedly mounted on said outer casings, switch mounting means engaging each of said outer casings to mount each of same to a work panel, and pellucid push-button means mounted on said switch mounting means for relative movement thereto, said push button means being configured to engage each of said switch actuator means without contact with said lamp holder means and being actuatable solely against the bias of said biasing means.

7. The assembly set forth in claim 6 wherein the switch mounting means is in the form of an inverted U-shaped member having an apertured bail portion and a pair of generally parallel leg portions, said leg portions being fixed to said outer casings and said bail portion being spaced from the tops of said switch actuator means.

8. The assembly set forth in claim 7 wherein the hollow pellucid cover means has a base portion and a neck portion, the base portion being confined between the legs of said U-shaped member between the bail portion and the switch casings, the neck portion extending through the apertured bail portion for actuating engagement thereof.

9. The assembly set forth in claim 6 wherein the lamp holder means comprises first and second relatively flat terminal means of substantial length fixed to lamp base means, first and second insulating sheet means fixedly mounted to said flat terminal means intermediate the ends thereof to form an insulating support therefor, said insulating sheets being mounted intermediate the outer casings of said side by side switch means and apertured to receive fastener means of said switch mounting means.

10. The assembly set forth in claim 9 wherein each of said flat terminal means is twisted 90° adjacent to said lamp base means and said hollow pellucid push-button means is formed with counter bore means accommodating the twisted portions of said flat terminal means therewithin.

11. A push-button switch assembly comprising first and second switch means disposed in side by side fixed relation and each having an outer casing, first and second switch actuator means extending through the tops of said respective outer casings in side by side spaced relation, biasing means interior of said outer casings for returning said switch actuator means to an extended position, lamp holder means disposed intermediate said outer casings and said first and second switch actuators, said lamp holder means comprising a lamp base and a pair of elongated flat terminals extending below said outer casings with said base being above said casings, switch mounting means comprising inverted U-shaped bracket means having an apertured bail portion and a pair of apertured parallel leg portions, fastener means disposed in said apertures of said leg portions and engaging each of said outer casings to mount each of same to said bracket means, and hollow pellucid push button means having a first portion mounted in said aperture means of said bail portion of said bracket means and surrounding said lamp base and a second portion confined and guided between said bracket leg portions for relative movement thereto, said push-button means second portion being configured to engage each of said switch actuator means without contact with said lamp holder means and being actuatable solely against the bias of said biasing means.

12. A lighted push-button switch comprising movable contact means having an at-rest position and movable to a second position, means biasing said movable contact means to its at-rest position, housing means for said movable contact means, lamp means mounted on said housing means, light weight lightable push-button means, and means mounting said lightable push button means for movement relative to said housing means and said lamp means to operate said movable contact means without moving said lamp means, said lightable push-button means being surroundedly mounted relative to said lamp means and biased solely by said biasing means for said movable contact means.

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