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Groezinger

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[54] **RELAMPING ARRANGEMENT FOR ILLUMINATED PUSHBUTTON**

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[52] **U.S. Cl.** ..... **200/167 A,** 240/2 S

[51] **Int. Cl.** **H01h 9/16,** H01h 9/18

[58] **Field of Search** ..... 240/25, 52.1, 44.27, 240/44, 45, 122, 151, 152; 200/167 A; 340/381

[56] **References Cited**

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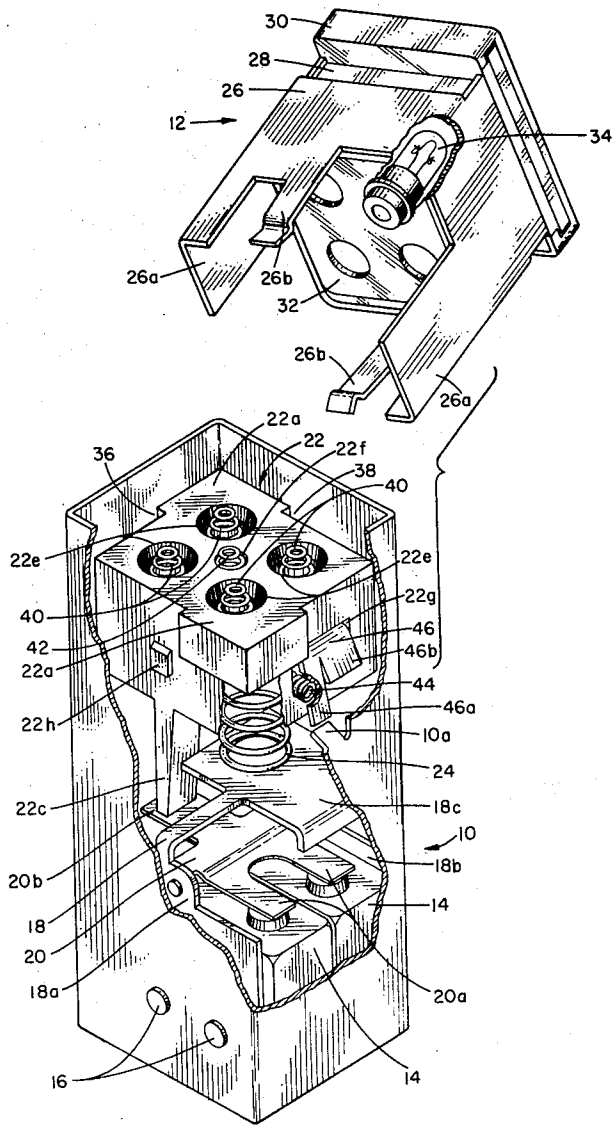
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Attorney—Philip J. Zrimsek et al.

[57] **ABSTRACT**

An illuminated pushbutton switch having a pushbutton which is removable from the remainder of the structure so as to allow for relamping and a defeatable movement limiting device which upon reassembly of the pushbutton initially prevents switch actuation.

8 Claims, 5 Drawing Figures



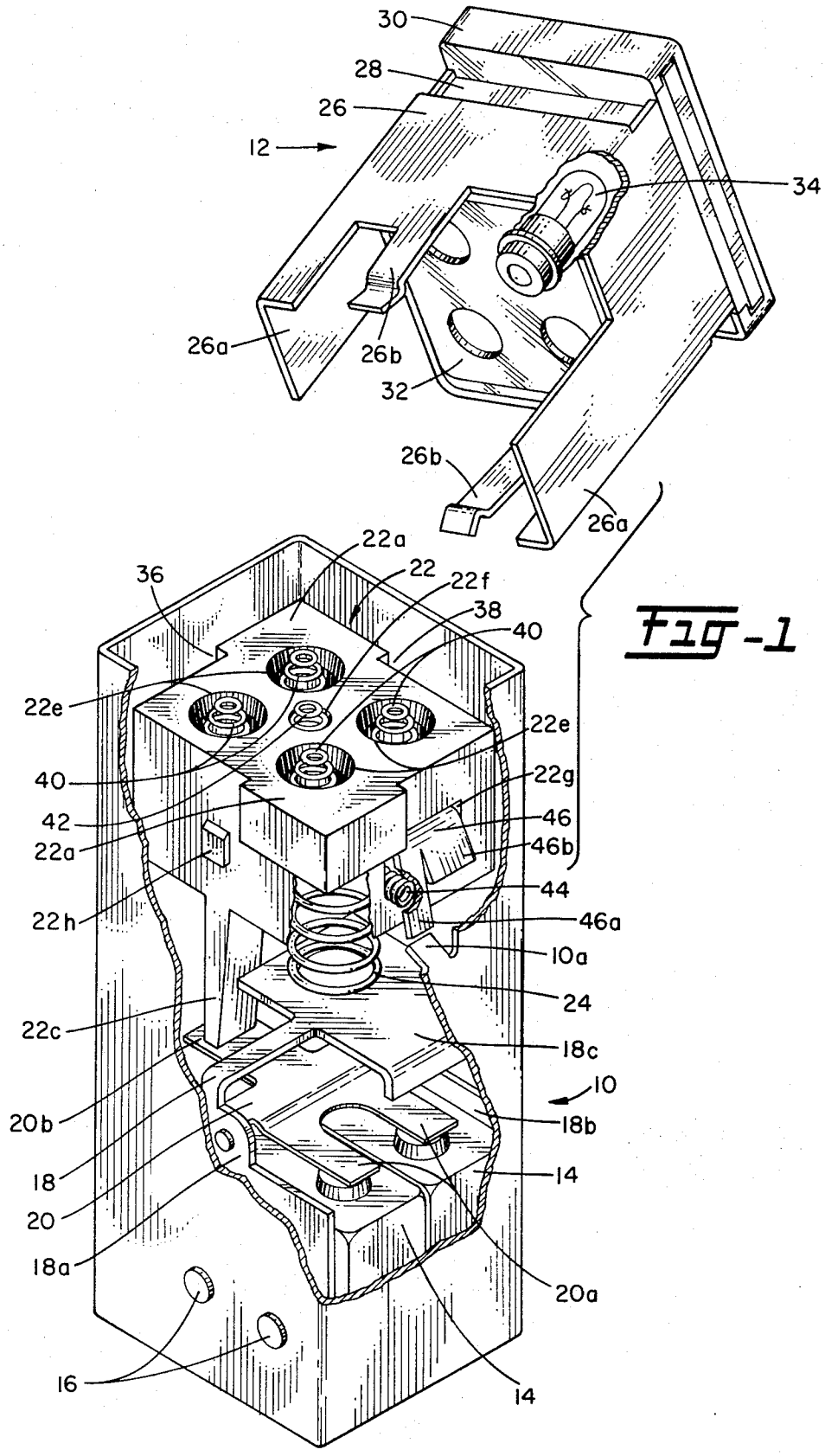

30
28
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12
34
26a
26b
32
26b
26a
22a
36
22
22f
38
40
22e
22e
40
22g
42
46
22a
46b
44
22h
46a
10a
24
22c
18c
10
20b
18b
18
14
20
18a
20a
16
14

Fig-1

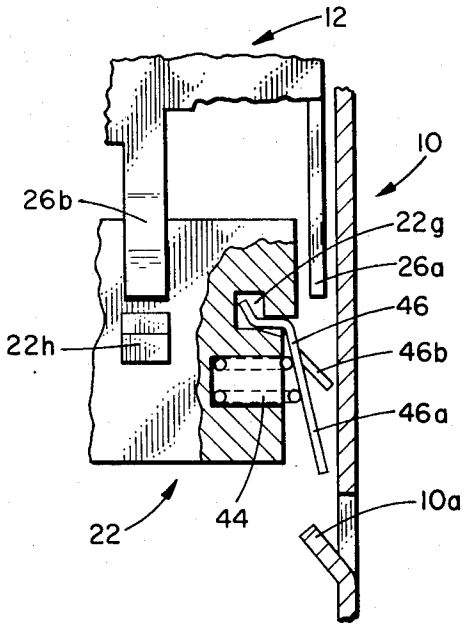


Fig_2A

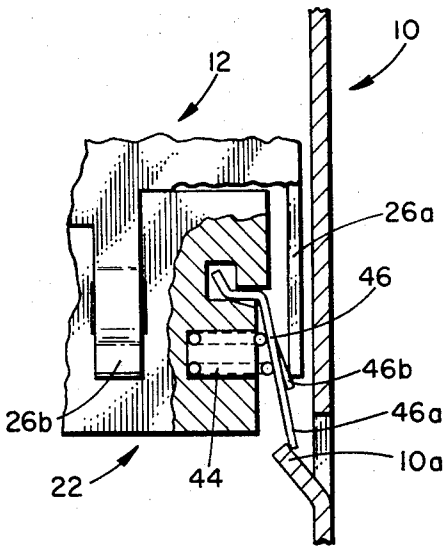


Fig_2B

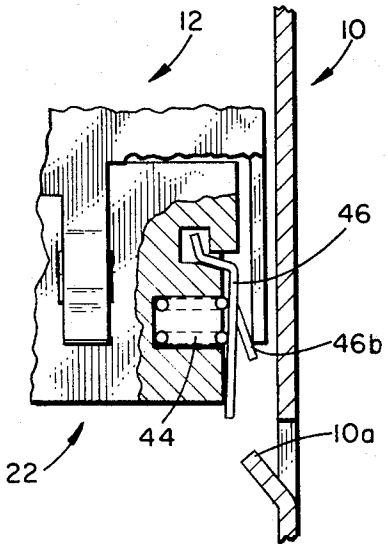


Fig_2C

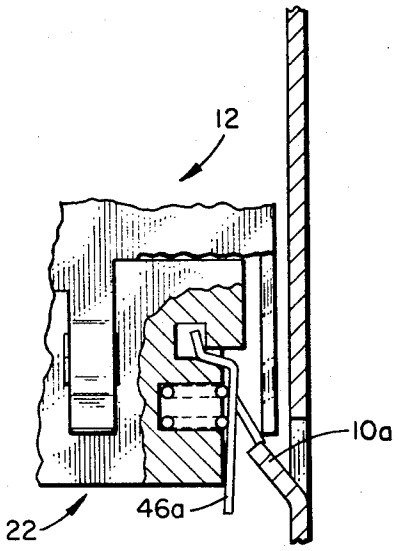


Fig_2D

RELAMPING ARRANGEMENT FOR ILLUMINATED PUSHBUTTON

The present invention can be utilized in illuminated pushbutton switches and specifically those types that require removal of the pushbutton from the pushbutton housing so as to allow servicing of the lamps. More particularly, the present invention is directed to an arrangement which allows lamp servicing to take place followed by a reassembly of the pushbutton into the housing without the possibility of switch actuation taking place during the reassembly.

Typically, illuminated pushbutton switches include lamps to provide the illumination. Also typically, such lamps need to be periodically replaced because of "burn out". Where illumated pushbutton switches are constructed such that the lamp replacement requires removal of not only the lamp but of the pushbutton from the pushbutton housing, they are also constructed such that reassembly of the pushbutton into the housing can easily bring about switch actuation. There are many illuminated pushbutton switch applications that can not tolerate random switch actuation and it is with these applications that the present invention is concerned.

To preclude switch actuation upon reassembly of the pushbutton into the housing of an illuminated pushbutton switch after lamp servicing, I have conceived an arrangement whereby the pushbutton is physically incapable of affecting the switch actuating means to bring this about. Thus, my concept includes interference portions associated with the housing and the switch actuating means which engage during inward assembly movement of the pushbutton into the housing and after the pushbutton is detentably secured in place. This engagement of the interference portions precludes movement of the switch actuating means thereby preventing switch actuation. However, upon release of the pushbutton to its "at rest" position, a relocation of one of the interference portions takes place so that upon subsequent inward movement of the pushbutton movement of the switch actuating means to cause switch actuation can arise.

My arrangement can be easily formed utilizing existing portions of the housing and the pushbutton of an illuminated pushbutton switch and requires but a single additional component as will become apparent below.

It is, therefore, an object of the present invention to provide a relamping arrangement for an illuminated pushbutton switch of the type including a removable pushbutton which can be reassembled into the pushbutton housing without bringing about switch actuation during the process.

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

FIG. 1 is a perspective view, partially broken away, of an illuminated pushbutton switch incorporating the invention with a combined pushbutton-lamp support shown disassembled from the remainder of the structure;

FIG. 2A is a partial view of the arrangement of FIG. 1 showing the initial stage of assembly of the pushbutton-lamp support in the housing;

FIG. 2B is a view showing the pushbutton-lamp support detentably secured in place with movement of the switch actuating means being limited because of the interference portions;

FIG. 2C is a view showing the arrangement in the "at rest" condition with the interference portion associated with the switch actuating means being relocated and arranged to allow for switch actuation; and

FIG. 2D is a view showing the arrangement in the switch actuating position.

In FIG. 1, an illuminated pushbutton switch is shown to comprise a tubular housing **10** and a combined pushbutton and illumination means or lamp support **12.**

A pair of switches **14** which may be of the general type disclosed in the Martin U.S. Pat. No. 2,644,052 are secured in place by rivets **16** or comparable fasteners at the lower longitudinal extremity of the housing **10.** Also secured in place by the rivets **16** is an inverted U-shaped plate member **18,** the leg portions **18***a* and **18***b* of which straddle the switches **14.** The plate member **18** pivotally supports switch actuating lever **20,** the bifurcated extremities **20***a* of which overlie the plungers, not shown, of the switches **14.** The lever **20** is biased by means, not shown, in a clockwise direction as viewed in FIG. 1 so as to maintain the switches in an initial condition.

Located at the opposite longitudinal extremity of the housing **10** from the switches **14** is a terminal block and switch actuating means **22** which includes opposite protrusions **22***a* for guiding such means in its movements in the housing. The terminal block and switch actuating means **22** is arranged for longitudinal inward movement against the bias of return spring **24** which is disposed between such means and connecting portion **18***c* of the plate member **18** but limited against outward movement by cooperating stop portions, not shown, provided on the housing and the terminal block and switch actuating means. A depending finger **22***c* is provided on the terminal block and switch actuating means **22** which is arranged to engage extremity **20***b* of the lever **20** and cause counterclockwise rotation of the lever as viewed in FIG. **1,** with consequent change in the condition of the switches **14,** upon inward movement of the terminal block and switch actuating means against the bias of the return spring **24.** Subsequent outward movement of the terminal block and switch actuating means **22** under the influence of the return spring **24** of course causes a reverse rotation of the lever **20** to take place and thereby causes the initial condition of the switches **14** to arise.

The pushbutton-illumination means **12** includes a skirt member **26** with depending L-shaped fingers **26***a* and depending detent fingers **26***b*. At the upper extremity of the skirt member **26** a light box **28** is appropriately secured for supporting a light transmitting screen **30** at one end and a combined socket and terminal member **32,** which may be of the type disclosed in the Ditsworth et al U.S. Pat. No. 3,264,468, at the other end for supporting one or more flange base lamps **34.**

In assembly, the pushbutton-illumination means **12** cooperates with the housing **10** and the terminal block and switch actuating means **22** such that the L-shaped fingers **26***a* and the detent fingers **26***b* freely move in the openings provided between the side walls of the housing and the terminal block and switch actuating means, as at **36** and **38.** Such assembly allows engagement between the bases of the lamps **34** and terminal springs **40** which are appropriately supported and electrically connected in the openings **22***e* of the terminal block and switch actuating means **22** and engagement between the common terminal element of the socket

and terminal member 32 with common terminal spring 42 which is appropriately supported and electrically connected in opening 22*f* of the terminal block and switch actuating means. Such assembly further allows the upright portions of the L-shaped fingers 26*a* to be associated with oppositely disposed coil springs 44 biased, rigid interference portions 46, one of which is shown, which in turn are arranged to be associated with oppositely disposed rigid interference portions 10*a*, one of which is shown, provided in the housing 10 and allows detent fingers 26*b* to be associated with oppositely disposed cam protrusions 22*h*, one of which is shown, all of which will be more fully described below. In passing, it should be noted that if the housing 10 is comprised of a plastic material, the interference portions 10*a* can be integrally formed as shown and if comprised of metal can be struck from the side wall thereof.

Referring now to FIGS. 1 and 2A–2D, the operation of the relamping arrangement and invention hereof will be described.

Assume the illuminated pushbutton switch is initially disassembled as shown in FIG. 1 and the lamps 34 have been serviced so that reassembly can take place. Thereupon the pushbutton-illumination means 12 is inserted into the housing 10 as particularly shown in Fig. 2A and located proximate the yet unmoved terminal block and switch actuating means 22 such that the detent fingers 26*b* do not engage cam protrusions 22*h* and L-shaped fingers 26*a* do not engage interference portions 46 which are in the form of levers having bifurcated extremity 46*a* and hinged extremity 46*b* pivotally supported in openings 22*g*, one of which is shown, of the terminal block and switch actuating means. In this condition, the levers 46 are biased by coil springs 44 so extremities 46*a* overlie the interference portions 10*a* but remain disengaged therefrom.

As shown in FIG. 2B, further longitudinal inward movement of the pushbutton-illumination means 12 into the housing 10 causes engagement between the detent fingers 26*b* and the top surfaces of cam protrusions 22*h* with resulting downward movement of the terminal block and switch actuating means 22 against the bias of the return spring 24 until extremities 46*a* engage interference portions 10*a*. Thereupon further inward movement of the terminal block and switch actuating means 22 is precluded but relative movement between the pushbutton-illumination means 12 and the terminal block and switch actuating means takes place resulting in a detentable securing being set up therebetween as the detent fingers 26*b* ride over cam protrusions 22*h*. Also during the relative movement just referred to, the L-shaped fingers 26*a* engage hinged extremities 46*b* placing a side thrust on levers 46 opposite to the bias provided by coil springs 44. It should be noted the pushbutton-illumination means 12 and the terminal block and switch actuating means 22 are so designed that the detentable securing between the forementioned means gives rise to essentially a unitary assemblage without any discernible movement possible therebetween.

FIG. 2C shows the arrangement with the unitary detentably secured assemblage of the pushbutton-illumination means 12 and the terminal block and the switch actuating means 22 having been moved outwardly by the bias provided by the return spring 24 to the "at rest" condition in the housing 10 so as to thereafter allow actuation of the switches 14 due to the relative positions of the interference portions 10*a* and the levers 46. Thus, it will be noted that the lever 46 is relocated relative to its position of FIG. 2A and from that of FIG. 2B and against the bias of coil springs 44 by L-shaped fingers 26*a* acting on the hinged extremities 46*b*.

From the foregoing, it will be appreciated that a subsequent longitudinal inward movement of the assemblage of the pushbutton-illumination means 12 and the terminal block and switch actuating means 22 from the position shown in FIG. 2C to that shown in FIG. 2D will allow extremities 46*a* to clear interference portions 10*a* and bring about actuation of the switches 14 which actuation was not possible during the assembly process.

Of course to service the lamps 34 of an assembled illumination pushbutton switch merely requires an outward movement of the pushbutton-illumination means 12 and a disabling of the detentable securing between such means and the terminal block and switch actuating means 22. After lamp servicing, the cycle described above is repeated.

It will be noted that the arrangement which precludes switch actuating during reassembly of the illuminated pushbutton switch involves portions of what would be existing elements in such a switch, that is, the housing 10 and pushbutton-illumination means 12. Specifically, the interference portions 10*a* and the L-shaped fingers 26*a* would at most require only modifying what already exists to provide the desired structure. All that is additionally required is a biased interference portion which in the present embodiment corresponds to lever 46.

Other forms of my invention are possible. Therefore, my contribution should be determined from the following claims.

I claim:

1. An illuminated pushbutton switch comprising:

A. a tubular housing having a switching mechanism at a longitudinal extremity thereof and further having an outwardly biased, longitudinally movable input mechanism at the opposite longitudinal extremity thereof for actuating said switch mechanism;

B. said input mechanism including switch actuating means and pushbutton means which is arranged to be detentably secured within said housing for selective removal so as to allow illumination servicing;

C. and defeatable movement limiting means including an interference portion on said housing and an interference portion on said switch actuating means;

D. said interference portions being engageable upon initial introduction and inward movement of said pushbutton means into said housing against said bias to limit inward movement of said switch actuating means and thereby preclude actuation of said switch mechanism while allowing said pushbutton means to be detentably secured within said housing;

E. one of said interference portions being in continuous engagement with said pushbutton means and being relocated relative to the other of said interference portions by said pushbutton means upon subsequent bias provided by said pushbutton means upon outward movement of said input mechanism so that upon further inward movement of said input mechanism said engagement between said interference portions is not established

thereby allowing full inward movement of said input mechanism and actuation of said switch mechanism.

2. The arrangement of claim 1 wherein the interference portion engaged and relocated by said pushbutton means is the one on said switch actuating means.

3. The arrangement of claim 2 wherein said interference portions are rigid members.

4. The arrangement of claim 3 wherein the rigid member on said switch actuating means is a lever pivoted therein.

5. The arrangement of claim 4 wherein said lever is biased toward a depending element of said pushbutton means so as to allow engagement thereby and relocation thereof.

6. The arrangement of claim 5 wherein the rigid member on said housing is integrally formed therefrom.

7. The arrangement of claim 6 wherein the integrally formed rigid member is struck from a side wall of said housing.

8. The arrangement of claim 7 wherein the illumination is provided by light sources carried by said pushbutton means.

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