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ILLUMINATED OIL-TIGHT PUSHBUTTON

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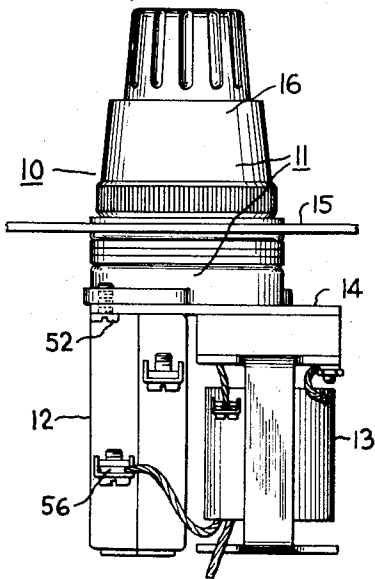


Fig. 1

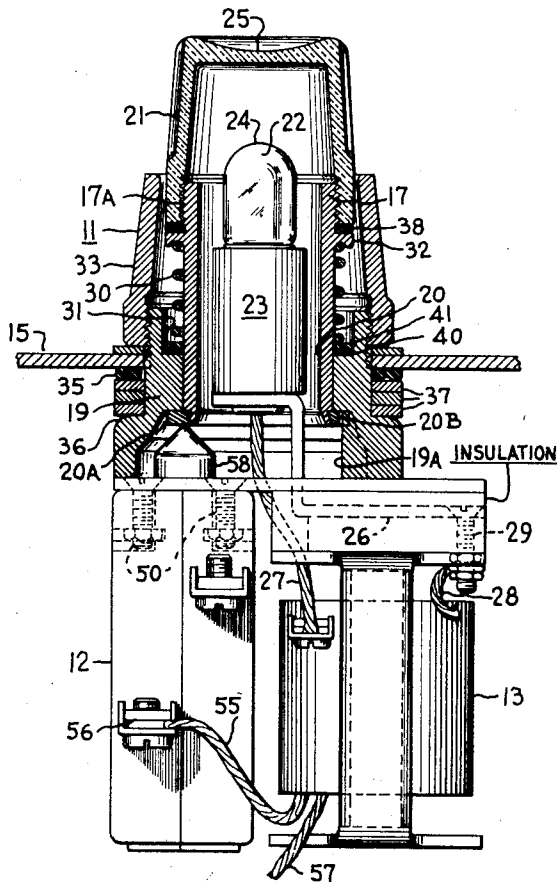


Fig. 2

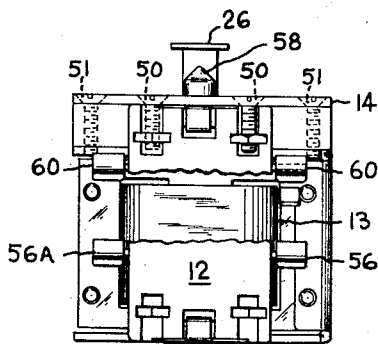


Fig. 3

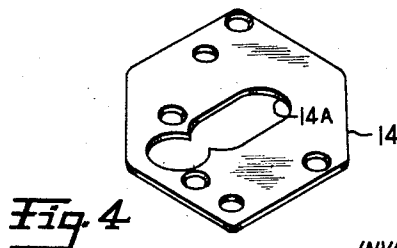


Fig. 4

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ILLUMINATED OIL-TIGHT PUSHBUTTON

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2 Claims. (Cl. 317—99)

This invention relates to illuminated pushbutton apparatus and more particularly to industrial illuminated pushbutton switch units having provision for preventing the leakage of oil through the pushbutton unit or its mounting on a panel.

In industrial control panels it is often desired that there be some immediate visual indication of the condition of electrical circuits controlled by the various pushbuttons. In the usual case a separate lamp is located in the panel immediately above the pushbutton and wired into the circuit controlled by the pushbutton switch. In some cases, however, the pushbutton itself is illuminated by an internal lamp. The construction and use of such illuminated pushbuttons has, however, heretofore involved several objections or difficulties; for example, loss of illumination as the button becomes dirty, difficulty in replacing the internal lamp, and breakage of leads to the lamp as a result of movement of the lamp when the button is depressed. Where it is desired that such illuminated pushbutton switch units be made oil tight, the difficulties are aggravated by the necessity to provide oil tight seals wherever the component parts of the pushbutton are interfitted or made discontinuous.

Accordingly, an important object of the invention is to provide an industrial type illuminated oil tight pushbutton switch unit which overcomes all of the objections and difficulties of prior illuminated pushbuttons mentioned above.

More specifically, it is an object of the invention to provide an illuminated pushbutton switch unit which retains a good measure of illumination even if the depressed end of the pushbutton member becomes dirty, in which the lamp may be easily replaced, and in which there is no problem of breakage of leads to an internal lamp.

Another specific object of the invention is to provide an illuminated industrial type pushbutton switch unit which is oil-tight.

A further object of the invention is to provide illuminated pushbutton apparatus in which a transformer for the lamp is carried by the pushbutton assembly.

A still further object of the invention is to provide an illuminated pushbutton apparatus in which the electric switch controlled by the pushbutton and the transformer for the lamp are all assembled together with the pushbutton assembly to form an integrated unit.

In general, in accord with the invention, a lamp and lamp socket are located within a hollow cylindrical reciprocable actuating member or pushbutton having a light transmitting manually depressible end portion. The lamp is supported in a stationary manner within the actuating member which reciprocates independently of the lamp. The light transmitting end portion of the actuating member extends a considerable distance from the end of the lamp to permit such independent reciprocation and is removable from the front to permit easy access to the lamp. A considerable distance of the sides of the light transmitting portion of the actuating member is preferably exposed

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such that it will transmit considerable light even though the depressible end surface of the light transmitting portion may become dirty.

In accord with further important features of the invention the pushbutton mounting or supporting means carries at its rear a transformer for the lamp and an electric switch for operation by the lower end of the reciprocating actuating member. Preferably, the transformer is mounted alongside the electric switch and mechanically supports the lamp in a stationary manner within the actuating member.

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, together with further objects and advantages thereof may be easily understood by referring to the following description taken in connection with the accompanying drawing in which:

Figure 1 is a side elevation view of an integral illuminated oil-tight pushbutton unit embodying the invention,

Figure 2 is a similar view of the apparatus of Figure 1 showing a cross-section of the pushbutton assembly,

Figure 3 is another side view of the switch and transformer portion of the pushbutton apparatus of Figure 1, and

Figure 4 is a perspective view of a mounting plate for the switch, transformer and pushbutton assembly.

Referring to Figure 1, one embodiment of the invention is shown in the form of an integral pushbutton apparatus or unit indicated generally by the numeral 10 and comprising an illuminated pushbutton assembly 11, an electric switch 12 operated by assembly 11 and a transformer 13 for the lamp within the pushbutton assembly 11. Switch 12 is shown as being of the type described in U.S. Patent 2,712,580, granted to H. A. Nickell and Thomas I. Maslin on July 5, 1955. Pushbutton assembly 11, switch 12 and transformer 13 are all preferably fastened together by means of a common mounting base or plate 14. The entire pushbutton apparatus 10 may then be mounted on a control panel 15 with only the upper or forward portion 16 of pushbutton assembly 11 extending beyond the front face of panel 15.

The construction of pushbutton assembly 11 is shown in Figure 2. A cylindrical hollow slidable pushbutton actuating member 17, open at its lower end 18, is supported for reciprocation within suitable pushbutton base member in the form of a hollow metal cylinder 19. Actuating member 17 has a lower metal portion 20 which slides within the internal bore of pushbutton base cylinder 19 and has an upper cup-shaped light transmitting end portion 21 threaded at 17A to its lower portion 20. An annular member 20A secured to the bottom end of actuating member 17 has a small recess or keyway 20B which rides over an inwardly directed ridge or key 19A in cylinder 19 to prevent rotation of actuating member 17. A lamp 22 and a lamp holder or socket 23 are located within the hollow actuating member 17 with the upper end 24 of lamp 22 located a considerable distance below the manually depressible front end 25 of the light transmitting portion 21 of actuating member 17. Lamp socket 23 may, if desired, be mounted on mounting plate 14 but is preferably mounted, as shown, on the upper end of transformer 13 by a separate mounting bracket 26 passing through an aperture 14A in plate 14. Lamp 22 is also connected to the secondary winding of transformer 13 through leads 27 and 28 and through mounting bracket 26 and connecting screw 29. Transformer 13, socket 23 and lamp 22 thus form a lighting unit which may be assembled and sold separately for use with pushbutton assembly 11.

Actuating member 17 is biased forward by means of a helical spring 30 seated within a cavity 31 in the upper end of cylindrical base 19 and extending into engagement

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with the under-surface of an annular lip 32 in metal portion 20 of actuating member 17. An annular collar member 33 threaded to the upper end of pushbutton base member 19 surrounds the lower portion 20 of actuating member 17 in slightly spaced relation thereto and serves with the base 19 as a pushbutton housing to protect the spring and actuating member as well as to fasten the pushbutton unit on panel 15.

The pushbutton assembly 11 is made impervious to the leakage of oil through the parts of the pushbutton assembly 11 or its mounting by means of oil seals at three different locations of the apparatus. One of the oil seals comprises a resilient ring 35 located between panel 15 and a plurality of washers 37 resting on an annular shoulder 36 of cylinder 19. Tightening of a collar 33 down on cylinder 19 compresses resilient ring 35 tightly against pushbutton base 19 so as to prevent leakage past the outer surface of base 19 on the under surface of panel 15.

The second oil seal comprises another resilient ring 38 located between the bottom end of the light transmitting portion 21 of actuating member 17 and the upper surface of lip 32 of actuating member 17. As the light transmitting portion 21 is tightened down upon the upper end of the pushbutton's lower portion 20, resilient ring 38 is tightly clamped against the outer surface of this lower portion 20 and prevents leakage of oil through the threaded inter-engagement 17A of the two portions.

A third oil seal is located at the bottom of cavity 31 of pushbutton base 19 and comprises a resilient or fiber gasket on washer 40 which wipes leakage against the outer surface of lower portion 20 of actuating member 17. This sealing washer is held down by a steel washer 41 under the force of spring 30, and prevents the leakage of oil through the inter-fitting bearing surfaces between pushbutton base 19 and pushbutton member 17.

In the assembly of the pushbutton apparatus 10, transformer 13 and switch 12 are first secured to mounting plate or base 14 by any suitable means such as screws 50, 51; the transformer 13 carrying the lamp socket 23 and lamp 22 mounted thereon and electrically connected thereto. The pushbutton assembly 11 is then fitted over the lamp and lamp socket and fastened down to mounting plate 14 by any suitable means such as screws 52, Figure 1. This apparatus is then inserted within a suitable hole in panel 15 and fastened down to the panel by tightening down of collar 33 on cylinder 19. Suitable electrical connections to the transformer and to the switch may be made either before or after the mounting of the pushbutton apparatus into the panel. Where it is desired that the lamp be interlocked with the electric switch 12 so as to indicate an "off" or "on" condition of the electric switch, one of the primary leads 55 of transformer 13 may be connected to one of the terminals 56 of switch 12. A source of alternating current would then be connected between the other primary lead 57 and another terminal 56A of the switch which is in electrical circuit with terminal 56 when the operating button 58 of switch 12 is in one of its two operating positions. Many other circuit connections well known to those skilled in the art may be used in which the energization of transformer 13 is either dependent or independent of the operation of switch 12. It will be appreciated, for example, that the remaining terminals 60 may be used in an energizing circuit for a separate load device.

If lamp 22 should burn out it may be easily replaced by merely unscrewing the upper portion 21 of actuating member 17. The lamp 22 will then be exposed for removal and exchange.

While we have described above a particular embodiment of the invention, many modifications may be made, and we intend, therefore, by the appended claims to

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cover all such modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An integral illuminated pushbutton switch unit comprising an apertured base plate, an electric switch fixed to one side of said plate and having a movable operating member extending through said apertured plate to the opposite side thereof, a cylindrical pushbutton housing mounted upon said opposite side of said plate and enclosing the extended portion of said switch operating member, a cylindrical light transmitting pushbutton actuating member slidably mounted in said housing for movement toward and away from said switch, said pushbutton actuating member having an inner end disposed to engage and move said switch operating member, spring means biasing said actuating member to an outer position away from said switch, a lamp transformer mounted upon said one side of said base plate in proximate side by side relation with said electric switch, a mounting bracket fixed to said transformer and extending through said apertured plate to said opposite side thereof, and an electric lamp socket fixedly mounted upon said bracket and disposed substantially centrally within said slidable cylindrical pushbutton actuating member.

2. An integral illuminated pushbutton switch unit comprising an apertured base plate, an electric switch fixed to one side of said base plate and having a movable operating member extending through said apertured plate to the opposite side thereof, a cylindrical pushbutton base member fixed to said opposite side of said base plate and enclosing the extending portion of said switch operating member, said pushbutton base member having a lower annular shoulder and a threaded upper portion, a cylindrical pushbutton actuating member slidably mounted in said cylindrical pushbutton base member and extending upwardly beyond said base member, said actuating member having an inner end disposed to engage and move said switch operating member, a light transmitting cap covering the extending outer end of said switch actuating member, spring means interposed between said actuating member and said pushbutton base member for biasing said actuating member to an outer position away from said base plate, a lamp transformer mounted upon said one side of said base plate in proximate side by side relation with said electric switch, a supporting bracket fixed to said transformer and extending through said apertured plate, an electric lamp socket fixedly mounted upon said bracket substantially centrally within said slidable pushbutton actuating member, and a cylindrical housing collar threadedly mounted upon said upper portion of said pushbutton base member to encase said slidable actuating member and to provide for mounting said unit upon a supporting panel by clamping said panel between said annular shoulder and said cylindrical collar.

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