Aug. 18, 1970 J. F. WALDORF Re. 26,936

ILLUMINATED PUSHBUTTON SWITCHES HAVING TANDEM LAMP IMPEDANCE DEVICES

Original Filed July 24, 1961 2 Sheets-Sheet 1

Fig. 1

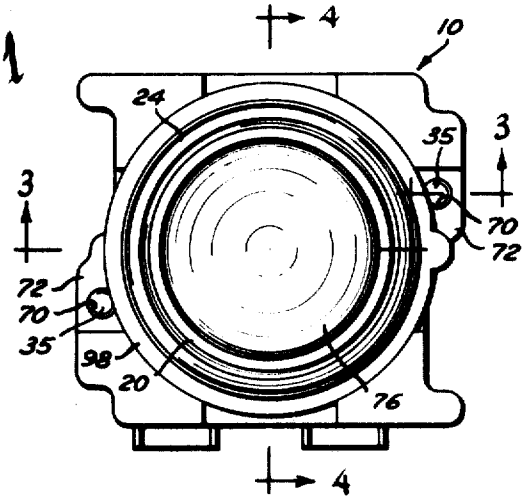


Fig. 2

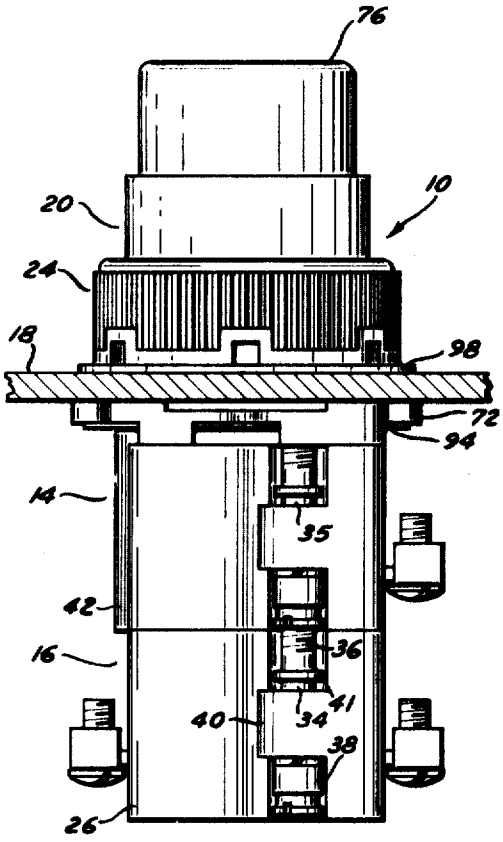
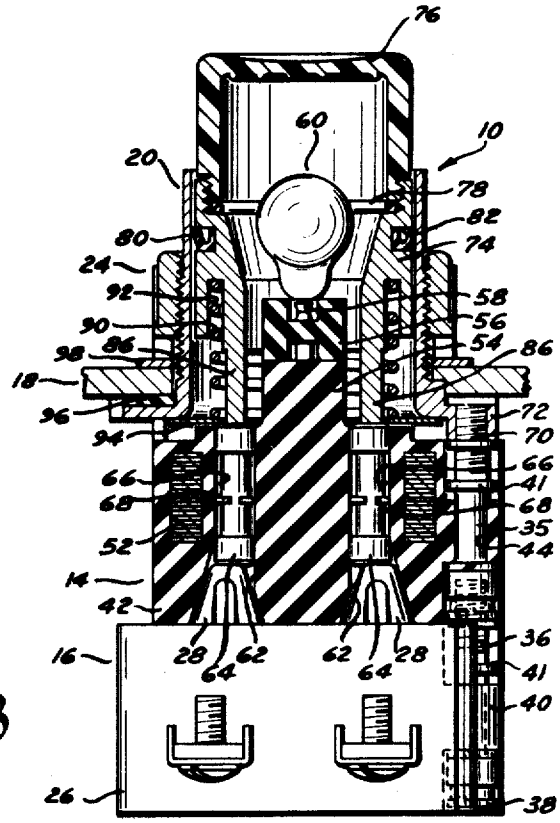


Fig. 3



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Fig. 4

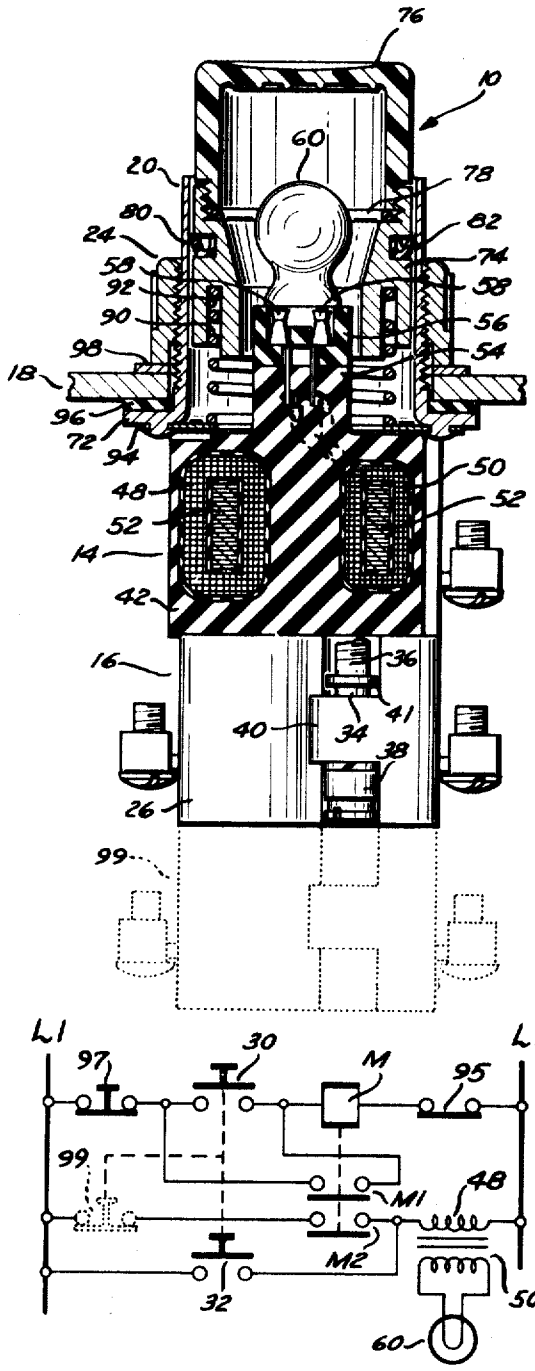


Fig. 5

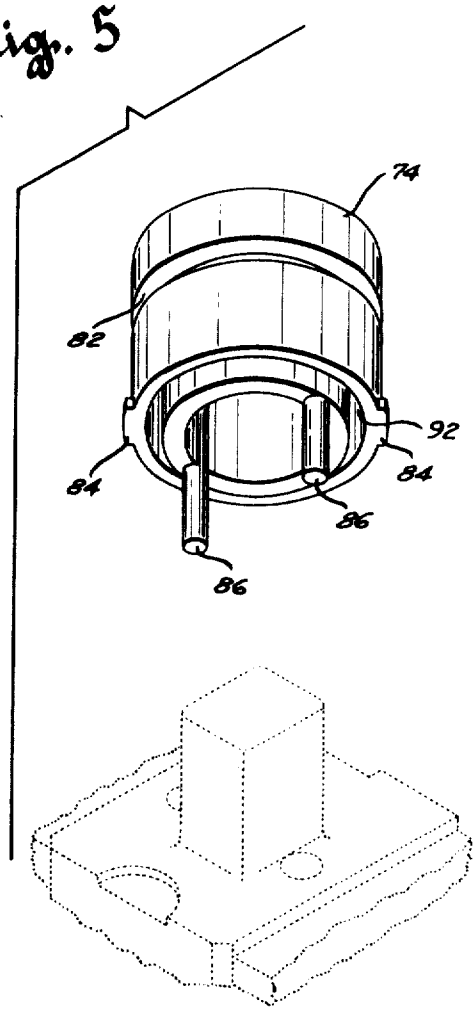


Fig. 6

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ILLUMINATED PUSHBUTTON SWITCHES HAVING TANDEM LAMP IMPEDANCE DEVICES

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Int. Cl. H01h 9/18

U.S. Cl. 200—167 5 Claims

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

An illuminated pushbutton electrical switching apparatus including tandemly mounted pushbutton operator, illuminating apparatus including a lamp and transformer block, and contact block with reciprocating means passing through the transformer block to provide operating connection between the operator and contact block.

BACKGROUND OF THE INVENTION

This invention relates generally to impedance type illuminated push button switches. A number of these systems are normally controlled from a panel on which the impedance type illuminated push buttons are mounted to provide an indication of the operational condition of each of the devices which are controlled from the panel.

In order to obtain the most efficient use of floor space these control panels must be limited in area. Illuminated push button switches presently available have a heavy duty contact block and a lamp transformer mounted on the switch in a side-by-side relation which requires a relatively large panel area.

SUMMARY OF THE INVENTION

The primary object of this invention is to provide an improved illuminated push button switch that occupies a minimum of space on a control panel.

This object in a preferred form is accomplished by mounting a transformer and contact block in a tandem relation on the push button assembly. Contact blocks such as shown in Nolden et al. Pat. 2,930,859 issued March 29, 1960, and owned by the assignee of this invention, are used in combination with a novel transformer. The transformer is mounted between the contact block and switch button assembly with any number of contact blocks mounted in tandem on the unit without any increase in the panel area required for the push button assembly. This reduction in the space required for the push button assemblies has made it possible to increase the number of buttons on the panel without increasing the size of the panel.

Another object of this invention is to provide a lamp transformer that automatically compensates for an overload in the circuit.

A further object is to provide an improved push button assembly that is easy to assemble and can be supplied as an independent unit.

Other objects and advantages will be apparent from the specification and claims, as will obvious modifications of the two embodiments shown in the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of the illuminated push button switch;

FIG. 2 is a side view of the push button switch;

FIG. 3 is a view taken on line 3—3 of FIG. 1 showing the transformer and push button assembly;

FIG. 4 is a view taken on line 4—4 of FIG. 1 showing another section of the transformer and push button assembly;

FIG. 5 is a view of the lens holder; and

FIG. 6 is a view of one electrical circuit which can be used with the illuminated push button.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, the illuminated push button switch includes a push button assembly **10** supporting a lamp transformer **14** and a heavy duty electric switch **16** in a tandem relation. The push button assembly is mounted on a panel **18** by inserting outer hollow cylindrical housing **20** through an aperture in the panel and locking the assembly to the panel by means of a clamping collar **24** threadably mounted on the cylindrical housing.

As shown in FIGS. 3 and 4, the electric switch is of the type described in the Nolden et al., patent with a rectangular molded housing **26** and a pair of depressible operating plungers **28** projecting above the housing. These switches may be either of the single circuit or double circuit type with the double circuit type shown in the drawings and the switches being either normally open or normally closed depending on the requirements of the particular circuit. In the present system switches **[20]** *30* and **32** (FIG. 6) are both normally open. Screws **34** having a threaded end **36** and a head end **38** that is kerfed, recessed and internally threaded are positioned in holes molded in section **40** on the side of the housing for securing the contact block to the transformer or to another contact block. A plastic retaining ring **41** may be provided on the screw to hold its screw on the housing when disassembled.

The transformer also has a rectangular molded housing **42** similar to the molded housing of the contact block with screws **35** provided in holes **44** molded in the housing. The transformer is of the double coil type and is molded into the housing with a primary winding **48** and a secondary winding **50** wound on a transformer frame **52**. This transformer is magnetically saturated at approximately 150% of rated primary voltage overload so that the secondary voltage ceases to rise when the primary voltage is increased. This type transformer protects the **[**amps**]** *lamp* from burn-out at primary **[**votage overoad**]** *voltage overload* such as encountered when a 110 volt device is erroneously connected to a 220 volt circuit. A lamp base **54** projects outward from the transformer housing and supports a lamp socket **56** which has terminals **58** connected to the ends of the secondary winding. A pin base type lamp **60** plugs into the terminals in the lamp socket.

The contact block is secured to the transformer by threadably engaging screws **34** with the head end of screws **35**. The switch actuating plungers of the contact block will project into indentations **62** in the transformer block for engagement by pusher pins **64** freely movable in holes **66** molded in the housing. Retaining rings **68** hold the pins in the housing. The transformer is secured to the outer housing **20** by threadably engaging screws **35** in threaded holes **70** in flange **72** of the outer housing. The lamp base will project into the hollow interior of the outer housing, with the top of the lamp located at approximately the same height as the outer housing.

The push button assembly includes a lens holder **74** that has a translucent plastic lens **76** threadably secured thereto and sealed by a flat washer or O-ring **78**. The lens holder is reciprocally movable in the outer housing

and has a resilient oil seal **80** in annular groove **82** in the side of the lens holder to slidably engage the interior surface of the outer housing. Flanges **84** on the lens holder engage grooves (not shown) at the lower end of the inner surface of the outer housing to prevent the lens holder from rotating and engage a shoulder (not shown) at the end of the groove to limit the upward travel of the lens holder in the outer housing. A pair of pins **86** extend outward from the bottom of the lens holder and are aligned with the pusher pins in the transformer. When the lens is pushed the pins will push the pusher pins against the contact block plungers to actuate the switches A compression spring **90** is positioned in groove **92** in the lens holder and acts against plate **94** united to the lens holder to bias the holder and lens in the outer position. A gasket **96** is provided between flange **72** and the panel to seal the push button switch in position. A metal washer **98** may be provided between the clamping collar and the outer surface of the panel if desired.

As seen in FIG. 6, the illuminated push button switch is used to control the operation of a motor starter or contactor M which is used to control the energization of an electric motor or some other electrical function (not shown). When the lens is depressed, normally open switches **30** and **32** will be closed energizing the motor starter M and the primary winding of the transformer. The lamp will light as soon as switch **32** is closed. The motor starter will close normally open relays M_1 and M_2. M_1 closes a holding circuit for the motor starter and M_2 closes a holding circuit for the primary of the transformer. When the lens is released both switches **30** and **32** will be opened and if the light goes out the relays have not been closed and the system is not operating. An overload switch **95** and a stop switch **97** are also provided in the line to deenergize the system at the end of an operating cycle.

Where a pretest system is desired a second contact block, shown dotted in FIG. 4, is added to the system with a normally closed switch **99** connected in series with relay contacts M_2. When the lens is pushed switches **30** and **32** will be closed and switch **99** opened. The lamp will light and the motor starter M will be energized closing the relays. The lens is released and the lamp should remain lit if the motor starter is operating. If the light should go out on the panel, the lens can be pushed to determine whether the motor starter has opened the relays or the lamp has burned out. If the latter, the lamp can be immediately replaced by merely removing the lens from the holder.

Although one embodiment of the present invention has been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. An illuminated pushbutton electric switch unit having a switch contact block with at least one reciprocable operator extending exteriorly thereof, a separate pushbutton operating assembly having a light transmitting lens, a molded insulating block immovably secured between said switch block and said operating assembly and comprising an integral portion extending into said assembly centrally thereof to which a lamp base is secured, an impedance device in said block having connection with said lamp base, terminals extending exteriorly of said block and having connection interiorly

thereof with said impedance device, and means extending through an opening in said block at one side of said lamp base mounting portion affording an operating connection between said operating assembly and the operator of said switch contact block.

2. An illuminated pushbutton electric switch unit as specified in claim **1**, wherein said impedance device is a transformer molded in situ in said insulating block, wherein the reciprocable operator extends into the opening which extends through said block and wherein a push pin is provided in said opening to afford an operating connection between said operating assembly and operator of said switch contact block.

3. An illuminated pushbutton electric switch as specified in claim **2**, wherein said switch contact block contains at least two individual switches with individual reciprocable operators, wherein said reciprocable operators each extend into separate openings extending through said molded insulating block and wherein each such opening contains a push pin providing an individual operating connection between each switch and said pushbutton operating assembly.

4. An assembly including a light module, a pushbutton operator, and a pushbutton switch, and comprising a module including a body having a front end and a rear end and a light socket at the front end,

an operator mounted on said front end of the body, and switch means mounted on the rear end of the body,

said body having a passage extending therethrough from front to rear,

a pin in said passage and movable endwise thereof and engageable at its forward end by the operator for movement endwise of the passage by the operator, and

means on the switch engageable with the rear end of the pin for movement thereby when the pin is moved by the operator.

5. A structure according to claim 4 wherein said body has a pair of parallel laterally spaced bolt accommodating passages extending therethrough from front to rear:

bolts in said passages having externally threaded shanks at their forward ends in threaded engagement with the operator and having internally threaded heads at their rear ends, and

additional bolts having externally threaded shanks at their forward ends in threaded engagement with the internally threaded heads and connecting the switch means to the rear of the body.

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