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[56]

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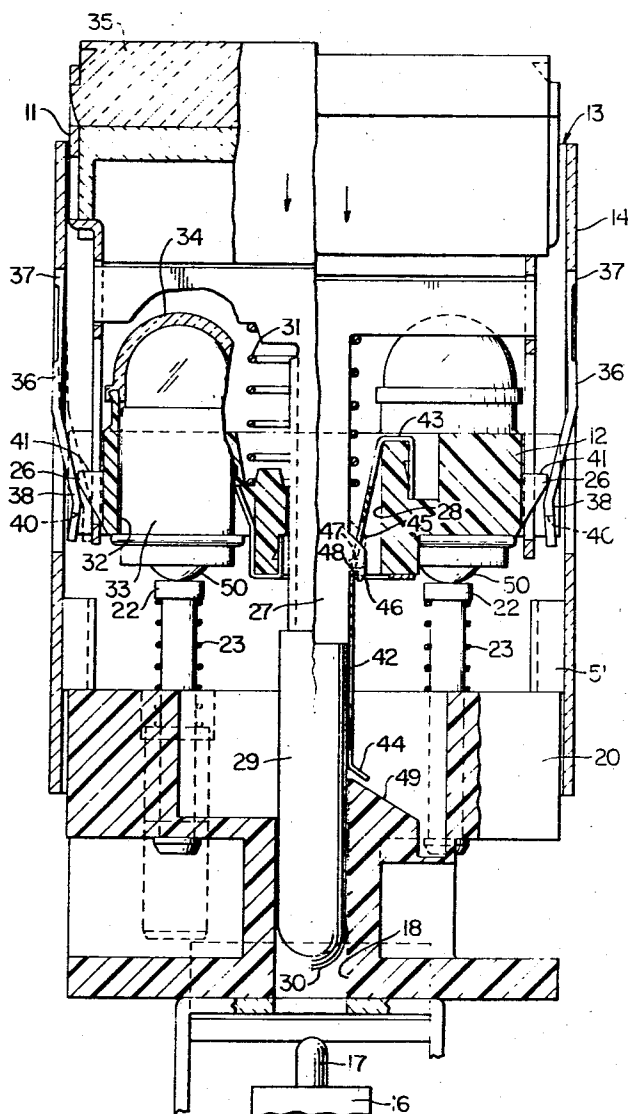
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**[54] ILLUMINATED PUSHBUTTON SWITCH
CONSTRUCTION MEANS HAVING A SAFETY SET
AND RESET MECHANISM
12 Claims, 8 Drawing Figs.**

[52] **U.S. Cl.**..... 200/167 A
[51] **Int. Cl.**..... H01h 9/18
[50] **Field of Search**..... 200/167,
169 R, 169 PB, 168 A, 159 R

ABSTRACT: A casing having an aperture for receiving a pushbutton construction means that comprises relatively movable lamp holder means and a pushing member means with the pushbutton construction means carrying a leaf spring which prevents the pushbutton construction means from actuating the electrical switch structure of the casing when the pushbutton construction means is initially inserted in the aperture means until after a releasing action on the pushbutton construction means causes the pushbutton construction means to be locked in position in the casing.



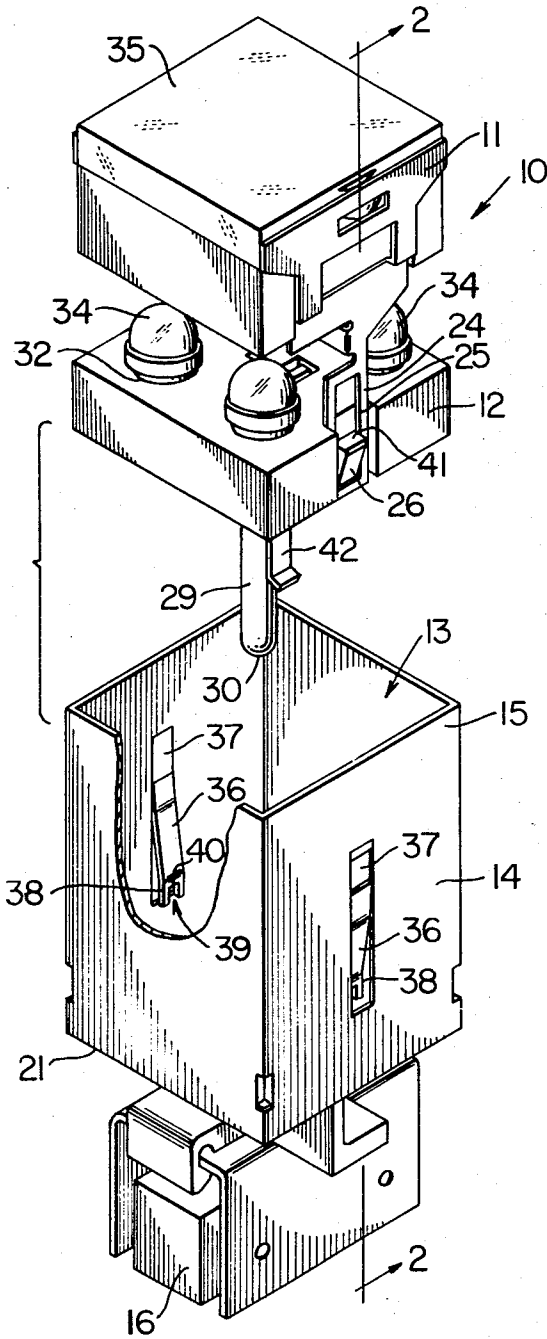


FIG. 1

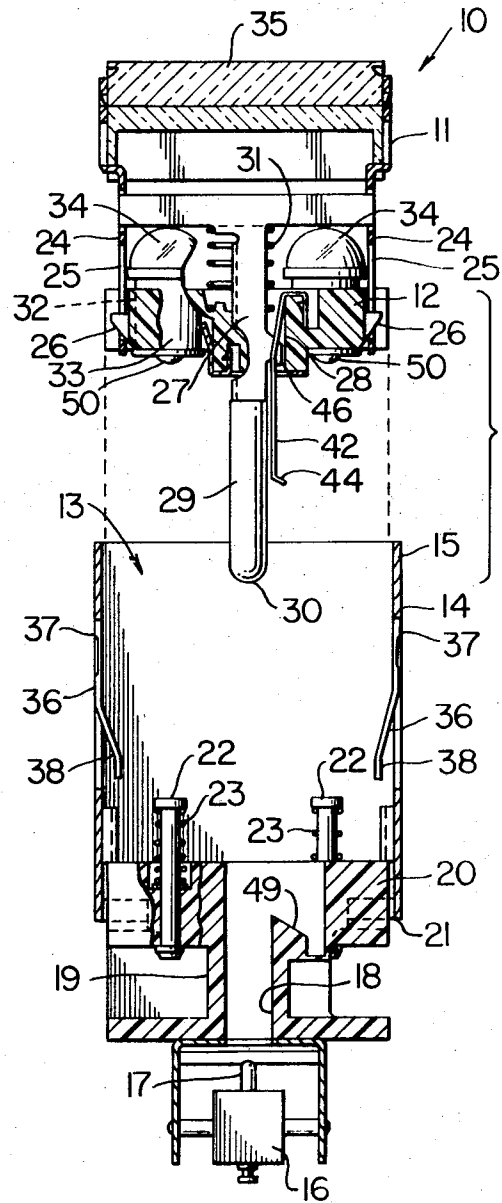


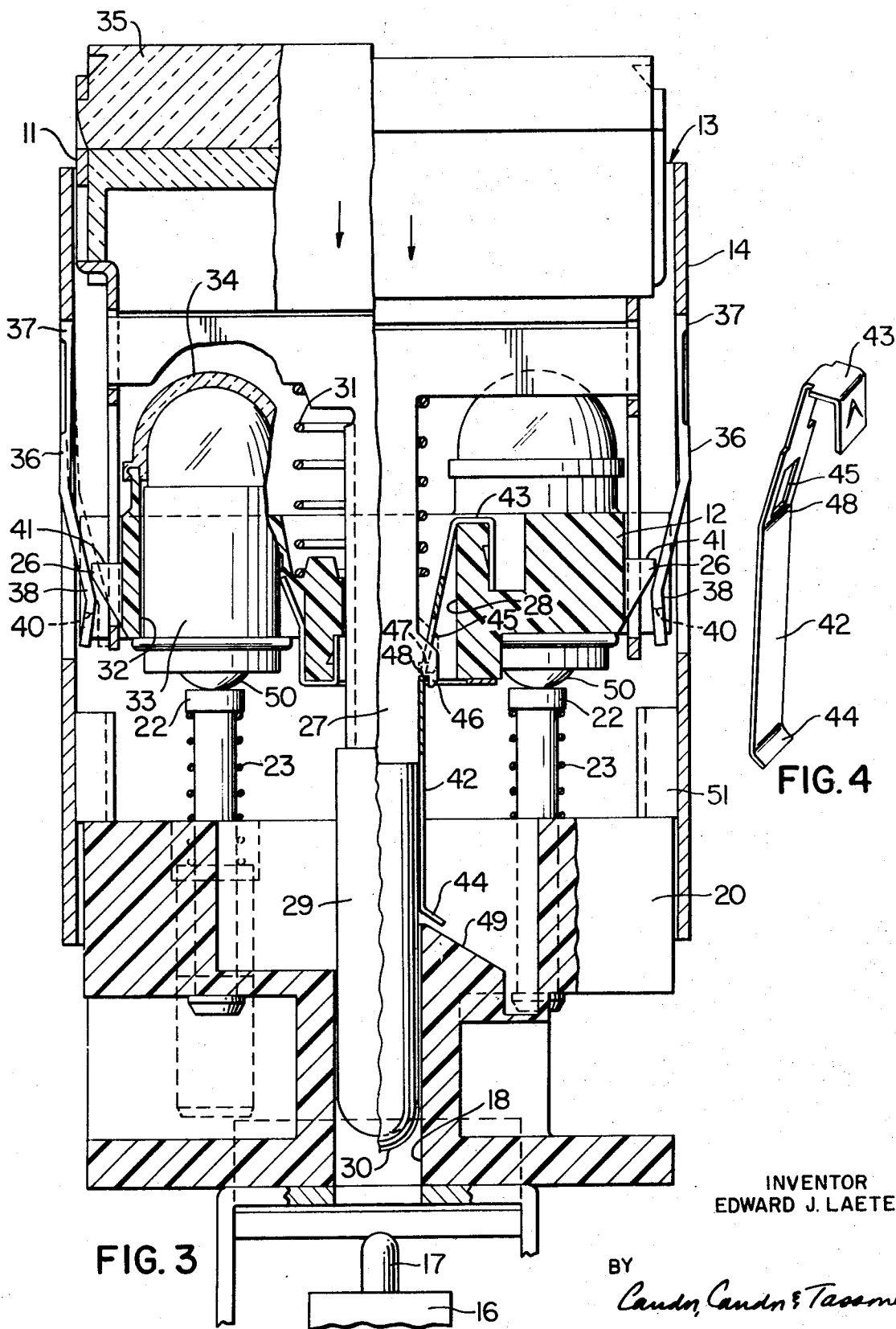
FIG. 2

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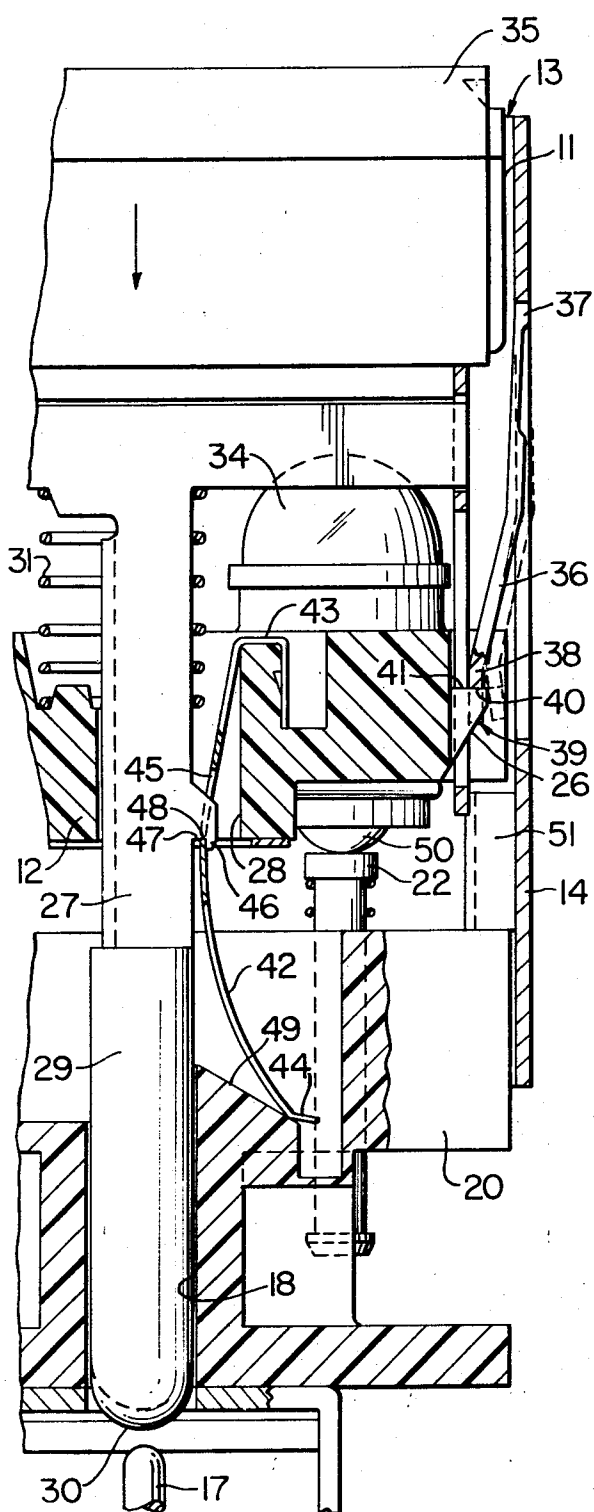


FIG. 5

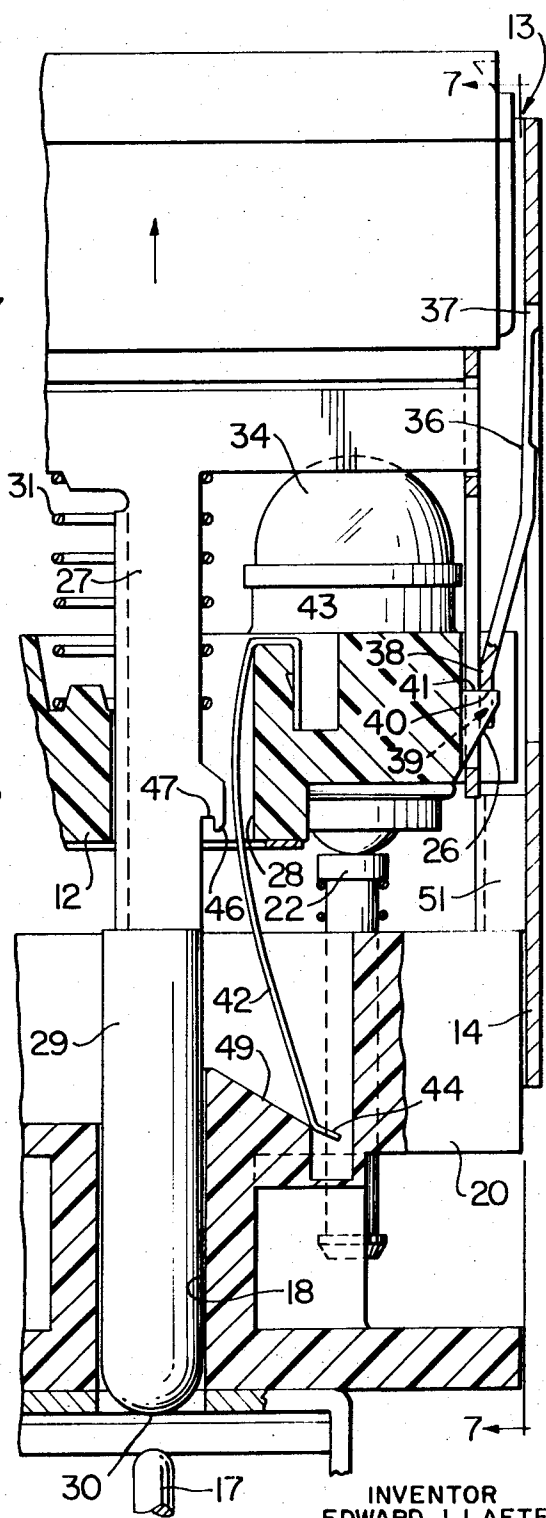


FIG. 6

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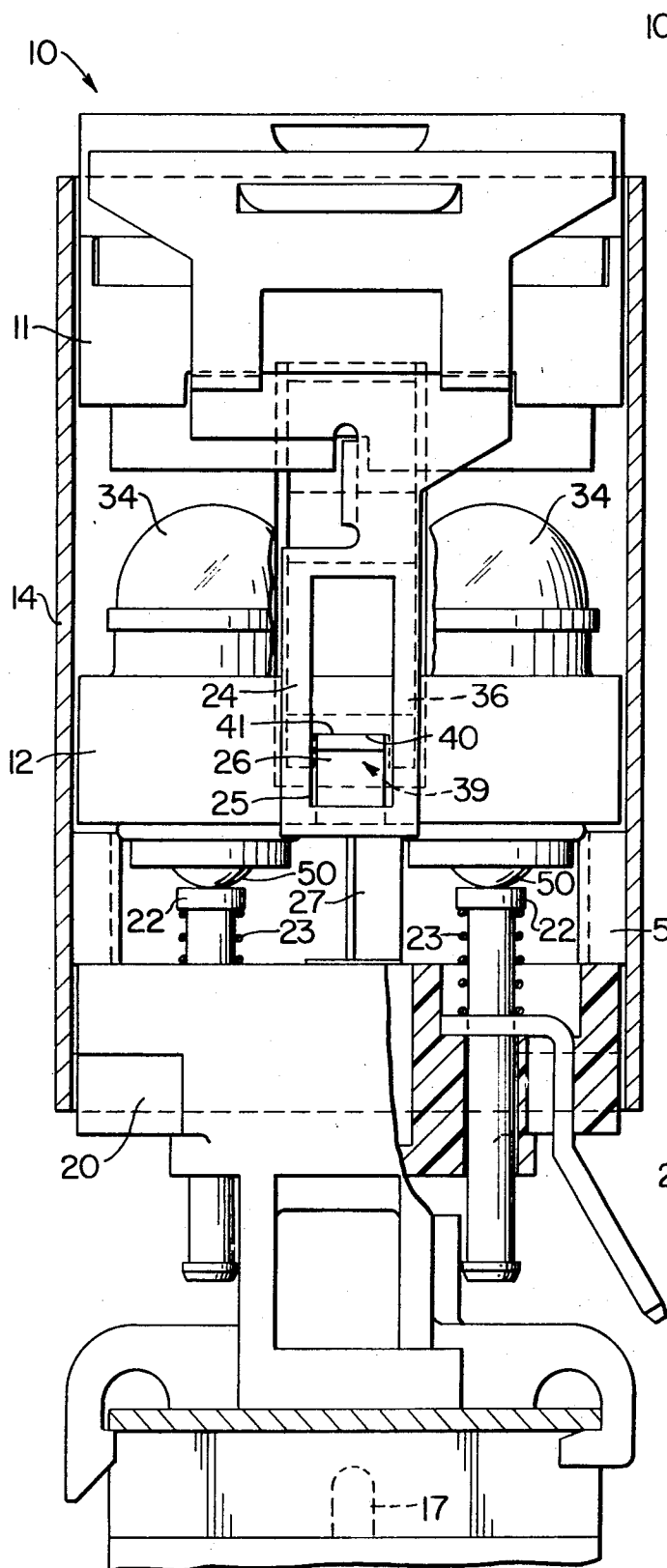


FIG. 7

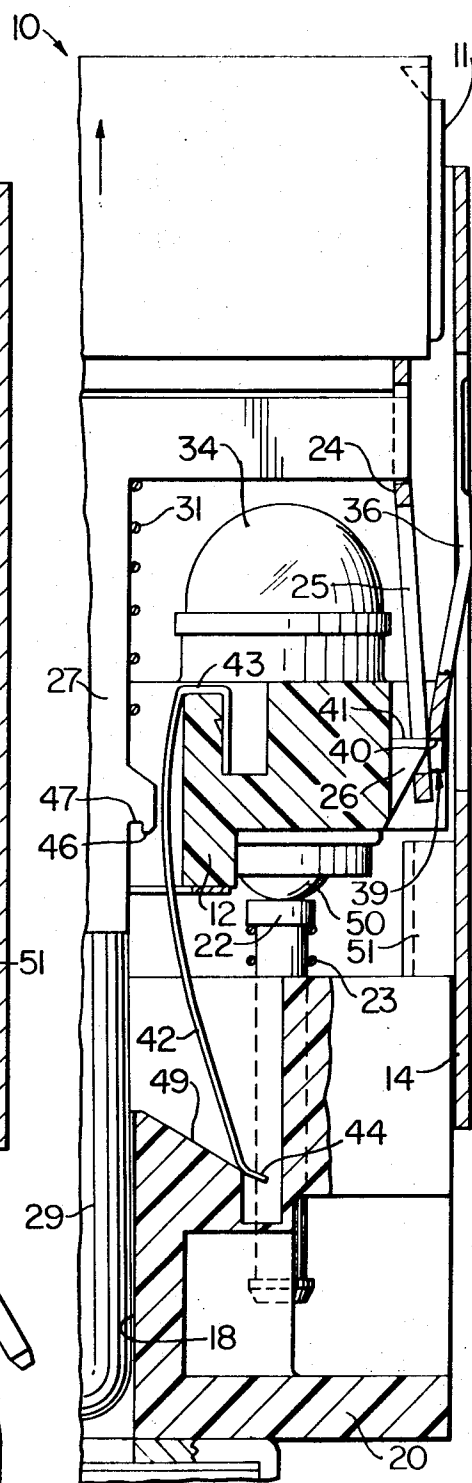


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ILLUMINATED PUSHBUTTON SWITCH CONSTRUCTION MEANS HAVING A SAFETY SET AND RESET MECHANISM

This invention relates to an improved pushbutton construction means as well as to improved parts for such a pushbutton construction means or the like.

It is well known that various pushbutton constructions have been provided wherein the pushbutton construction means is insertable into an aperture means of a casing to be locked therein so that a subsequent pushing in action on the pushbutton construction means will cause an actuator means to operate an electrical switch. Such push button construction means normally comprises a lamp holder means and a pushing member means unitarily secured together and being relatively movable so that when the pushing member means is pushed into its actuating position, the switch construction is operated. When it is desired to replace the lamps of the pushbutton construction means, the pushbutton construction means can be unlocked and removed from the casing.

However, it was found according to the teachings of the inventions set forth in U.S. Pat. Nos. 3,509,300, 3,514,564 and 3,517,148; that safety means should be provided so that upon the initial insertion of the pushbutton construction means into the casing receiving the same, the actuating means for actuating the switch construction would be prevented from inadvertently actuating such switch construction until after the pushbutton construction means has been fully locked in the casing and is thereafter conventionally operated.

Accordingly, it is a feature of this invention to provide an improved pushbutton construction means which has the aforementioned safety feature.

In particular, one embodiment of this invention comprises a casing having an aperture means and carrying an electrical switch in aligned relation with the aperture means. The pushbutton construction means comprises a pushing member means and a lamp holder means relatively movable and unitarily secured together so as to be insertable in and removable from said casing through the casing aperture means. The electrical switch is actuatable to actuated condition and unactuated condition by a pushing in action and a releasing action on the pushing member means when the pushbutton construction means is in a locked condition in the casing aperture means, the pushbutton construction means having actuating means operatively associated with the electrical switch for operating the same. Locking means are carried by the casing and the pushbutton construction means for locking the lamp holder means in a locked condition by an initial pushing in action of the pushing member means followed by a releasing action of the pushing member means. A locking release means is carried by the casing and the pushbutton construction means for releasing the lamp holder means from its locked condition. Safety means are carried by the push button construction means and are operatively associated with the actuating means thereof preventing the actuating means from actuating the electrical switch to switch actuated condition during the initial pushing in action of the pushing member means, the safety means comprising a leaf spring having one end carried by the lamp holder means and the other end free thereof and engageable with a cam means of the casing. The leaf spring has a notch therein which receives an edge means of the actuating means to lock the same together and prevent relative movement therebetween when the lamp holder means is initially inserted against stop means in the casing whereby a subsequent release action on the pushing member means is required to cause the cam means to cause the leaf spring away from the edge means of the actuator means so that the same can be subsequently actuated and thereby moved relative to the lamp holder means.

Accordingly, it is an object of this invention to provide an improved pushbutton construction means having one or more of the novel features set forth above or hereinafter shown or described.

Another object of this invention is to provide improved parts for such a pushbutton construction or the like.

Other objects, uses and advantages of this invention are apparent from a reading of this description which proceeds with reference to the accompanying drawings forming a part thereof and wherein:

FIG. 1 is an exploded, perspective view of the pushbutton construction means and the casing for receiving the same;

FIG. 2 is a view similar to FIG. 1 and is taken on line 2—2 thereof;

FIG. 3 is an enlarged partial cross-sectional view of the pushbutton construction means of FIG. 1, with the left half of FIG. 3 illustrating the pushbutton construction means moved to its initial bulb contact position and with the right half of FIG. 3 illustrating the pushbutton construction in its locked condition with the safety leaf spring thereof.

FIG. 4 is a perspective view of the safety leaf spring for the pushbutton construction of this invention.

FIG. 5 is a view similar to FIG. 3 and illustrates the pushbutton construction in its fully initially inserted position in the casing.

FIG. 6 is a view similar to FIG. 5 and illustrates the pushbutton construction means after the same has been locked in the casing construction and has been released for normal operation thereof.

FIG. 7 is a view similar to FIG. 3 and is taken along line 7—7 of FIG. 6.

FIG. 8 is a view similar to FIG. 6 and illustrates the method for initially unlocking the pushbutton construction means from the casing for a relamping operation of the pushbutton construction means.

While the various features of this invention are hereinafter described and illustrated as being particularly adapted for providing safety means for an illuminated pushbutton construction means, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide safety means for other types of pushbutton construction means as desired.

Therefore, this invention is not to be limited to only the embodiment illustrated in the drawings, because the drawings are merely utilized to illustrate one of the wide variety of uses of this invention.

Referring now to FIGS. 1 and 2, a pushbutton construction means is generally indicated by the reference numeral 10 and comprises a pushing member means 11 and a lamp holder means 12 relatively movable and unitarily secured together in a manner hereinafter described so as to be insertable in and removable from an aperture means 13 formed in the upper end 15 of a casing 14 by carrying an electrical switch 16 at the lower end thereof. The electrical switch 16 has an operating plunger 17 alignable with an opening 18 passing through a plunger guiding means 19 defined by a connector supporting base 20 secured in and closing a lower aperture means 21 of the casing 14 and carrying movable contact means 22 normally biased in the upper position by compression springs 23 in a manner fully set forth in the aforementioned copending patent applications.

The pushing member means 11 of the pushbutton construction means 10 includes a pair of legs 24 each having a longitudinal slot 25 passing therethrough and receiving an outwardly directed cam member 26 of the lamp base or holder 12 so that relative movement is permitted between the pushing member means 11 and the lamp holder 12 within the limits of the slots 25. The pushing member means 11 includes a central part 27 passing through an opening means 28 formed through the central part of the lamp holder 12 and is fixed to an actuating plunger 29 having a rounded end 30 which is insertable through the opening guide means 18 of the contact base 20 for operative association with the plunger 17 of the electrical switch 16 for operating the same in a manner hereinafter set forth.

However, it is to be understood that the plunger 29 could be carried by the base 20 and be spring biased to an up position

relative to the electrical switch 16 as described in the aforementioned copending patent applications whereby the part 27 of the pushing member means 11 is separate from the plunger 29 but is engageable with the same to operate the plunger 29.

A compression spring 31 is disposed about the member 27 of the pushing member means 11 between the pushing member means 11 and the holder means 12 to normally tend to maintain the same in the separated condition illustrated in FIGS. 1 and 2 wherein the lamp holder means 12 has the cam means 26 thereof at the lower end of the slots 25 in the legs 24 of the pushing member means 11.

The lamp holder 12 has a plurality of openings 32 for receiving the lamps 33 through the under side thereof and being adapted to shine through suitable filter caps 34 and therefore illuminate through the upper section 35 of the pushing member means 11 in a manner fully set forth in the aforementioned copending patent applications.

The casing 14 has a pair of legs 36 stamped therefrom in such a manner that the upper ends 37 of the legs 36 are integral with the casing 14 and the lower ends 38 thereof are free from the casing 14 and are notched at 39 while normally being disposed in the inward position illustrated in FIG. 2. However, when the pushbutton construction means 11 is being inserted in the aperture 13 of the casing 14 in the manner illustrated in FIG. 3, the cam members 26 of the lamp holder 12 cam against the legs 36 to move the same outwardly until the lamp holder 12 has been inserted into the aperture means 13 a distance sufficient to permit the upper edges 40 of the notches 39 to clear over the top edges 41 of the cams 26 in the manner illustrated by full lines in FIGS. 5 and 6 so that the legs 36 spring inwardly and thereby lock the lamp holder means 12 and, thus, the pushbutton construction means 10 in the casing 14 until it is desired to unlock the same therefrom.

In particular, during an unlocking operation of the pushbutton construction means 10 from the casing 14, upward pulling on the pushing member means 11 relative to the locked lamp holder means 12 in the manner illustrated in FIG. 8 causes the legs 24 of the pushing member means 11 to be cammed outwardly by the cams 26 of the lamp holder means 12 as illustrated in FIG. 8 whereby such cammed out legs 24 act against the legs 36 of the casing 14 to move the same outwardly so that the edges 40 of the notches 39 thereof clear the top surfaces 41 of the cams 26 of the lamp holder 12 whereby the lamp holder 12 will now move upwardly with the pushing member means 11 in the manner illustrated in FIG. 8.

As previously stated, one of the features of this invention is to provide a safety means for preventing the pushbutton construction means 10 from actuating the electrical switch 16 when the pushbutton construction means 10 is being initially inserted in the casing 14 to be locked therein in the manner previously described.

Accordingly, a safety leaf spring 42 is provided and has an upper end 43 secured to the lamp holder means 12 as illustrated in FIG. 3 and passes through the opening means 28 of the lamp holder means 12 so that the lower bent end 44 thereof is free from the lamp holder means 12. The safety leaf spring 42 has a longitudinal slot or notch 45 formed therein intermediate the ends 43 and 44 thereof to cooperate with an outwardly directed hook 46 formed on the member 27 of the pushing member means 11, the hook 46 defining an edge means 47 adapted to cooperate with the lower edge means 48 of the slot or notch 45 in a manner hereinafter described.

The contact base 20 of the casing 14 is formed with a slanting cam surface 49 adjacent the guide opening 18 thereof with the cam surface 49 being cooperable with the bent end 44 of the safety leaf spring 42 in a manner hereinafter described.

When the pushbutton construction means 10 is to be initially inserted in the aperture means 13 of the casing 14, it can be seen that the natural resilience of the safety leaf spring 42 causes the same to assume the position illustrated in FIG. 2 wherein the end 44 thereof is disposed closely adjacent the plunger 29 and the hook 46 of the part 27 is fully received in the notch 45 thereof with the edge 47 of the hook 46 being

spaced above the lower edge 48 of the notch 45 as illustrated in dotted lines in FIG. 3.

As the pushbutton construction means 10 is being inserted in the aperture 13 of the casing 14 as illustrated in FIG. 3, the contact ends 50 of the lamps 33 make contact against the contacts 22 of the contact base 20 whereby the force of the compression springs 23 tends to maintain the lamp holder 12 in the position illustrated by the left part of FIG. 3 so that the pushing member means 11 can be moved downwardly relative thereto for a slight distance until the hook edge 47 of the hook 46 is fully disposed against the lower edge 48 of the notch 45 to hook around the medial portion of the safety leaf spring 42 as illustrated by the right portion by full lines in FIG. 3. Thus, further downward movement of the pushing member means 11 must carry the lamp holder means 12 therewith in opposition to the force of the compression springs 23 of the movable contact members 22 of the contact base 20. Thus, as the pushing member means 11 and base 12 move in unison downwardly in opposition to the force of the compression springs 23, the lower end 44 of the leaf spring 42 cams against the cam 49 and causes the leaf spring 42 to bow in the manner illustrated in FIG. 5 until the lamp holder 12 abuts against abutment means 51 of the casing 14 whereby further downward movement of the pushbutton construction means 10 is prevented by the abutment means 51. At this time, it can be seen that the plunger 29 has its lower end 30 so spaced from the plunger 17 of the switch 16 that the plunger 29 cannot operate the switch 16 during this initial insertion of the pushbutton construction means into the casing 14 because the hook 46 of the pushing member means 11 prevents further downward movement of the pushing member means 11 relative to the lamp holder 12 and the lamp holder 12 is prevented from further downward movement by the abutments 51 of the casing 14.

However, after the lamp holder means 12 has abutted against the abutments or stops 51 of the casing 14, the operator releases the pushing member means 11 whereby the compression spring 31 between the lamp holder means 12 and the pushing member means 11 causes the pushing member means 11 to move upwardly relative to the lamp holder means 12 as the lamp holder means 12 is fully locked in the casing 14 by the legs 36 thereof in the manner previously described whereby such relative upward movement of the pushing member means 11 relative to the lamp holder means 12 clears the hook 46 of the pushing member means 11 from hooking engagement with the edge 48 of the notch 45 of the leaf spring 42 whereby the leaf spring 42 through its bowed condition by the cam 49 of the casing 14 moves out of the way of the hook 46 in the manner illustrated in FIG. 6 so that the safety leaf spring 42 is no longer permitted to be engaged by the hook 46 of the pushing member means 11. Thus, subsequently, an inward pushing movement on the pushing member means 11 causes the pushing member means 11 to move in opposition to the force of the compression spring 31 downwardly a sufficient distance so that the plunger 29 thereof can operate the actuating plunger 17 of the electrical switch 16 to an actuated condition thereof and upon a release of the pushing member means 11 be returned to the position illustrated in FIG. 6 by the compression spring 31 whereby the electrical switch 16 can be operated to an actuated condition thereof.

Therefore, it can be seen that the safety leaf spring 42 fully prevents the pushing member means 11 from actuating the electrical switch 16 during an initial insertion of the pushbutton construction means 10 within the casing 14 following a relamping operation of the pushbutton construction means or the like.

Thus, it can be seen that this invention provides an improved switch button construction means as well as improved parts therefor or the like.

While the form of the invention now preferred has been disclosed as required by the statutes, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

1. In combination:

a casing having a receiving casing aperture means;

a switch means connected to said casing;

a pushing member means and a lamp holder means relatively movably unitarily secured together as a pushbutton construction means and being insertable in and removable from said casing through said aperture means, said switch means being actuable to actuated condition and unactuated condition by pushing in action and release action on said pushing member means when said pushbutton construction means is in a locked condition in said aperture means, said pushbutton construction means having actuating means operatively associated with said switch means for operating the same and disposed in said aperture means;

locking means carried by said casing and said pushbutton construction means locking said lamp holder means in said locked condition in said casing by an initial pushing in action of said pushing member means, followed by a releasing action of said pushing member means;

locking release means carried by said casing and said pushbutton construction means for releasing said lamp holder means from said locked condition;

and safety means carried by said pushbutton construction means and being operatively associated with said actuating means, said safety means preventing said actuating means of said pushing member means from actuating said switch means to switch means actuated condition during said initial pushing in action of said pushing member means, said safety means comprising a leaf spring having one end carried by said pushbutton construction means and the other end free thereof.

2. A combination as set forth in claim 1 wherein said casing has cam means, said free end of said leaf spring being engageable with said cam means to cam said free end to various positions thereof as said pushbutton construction means is being inserted into said aperture means to be locked therein.

3. A combination as set forth in claim 2 wherein said one end of said leaf spring is carried by said lamp holder means, said leaf spring having notch means intermediate its said ends, said pushing member means having edge means engageable with said notch means to prevent movement between said lamp holder means and said pushing member means.

4. A combination as set forth in claim 3 wherein said casing carries stop means against which said lamp holder means engages to prevent further movement of said lamp holder means into said aperture means of said casing whereby upon initial insertion of said pushbutton construction means into said casing said lamp holder means abuts said stop means and movement between said pushing member means and said lamp holder means is limited by said edge means of said pushing member means engaging said notch means of said leaf spring and whereby upon release of said pushing member means to free said edge means from said notch means said cam means cams said leaf spring out of the way of further upward movement of said pushing member means relative to said lamp holder means.

5. A combination as set forth in claim 4 wherein the natural resiliency of said leaf spring is to hold said notch means thereof in the path of movement of said edge means of said pushing member means.

6. A combination as set forth in claim 4 wherein said edge means of said pushing member means is a hook.

7. In combination:

a tubular casing having a receiving casing aperture means adjacent one end and a plunger guiding means adjacent the other end;

a switch means actuating plunger adapted to reciprocate in said plunger guiding means;

a switch means connected to said casing adjacent said other end and being actuatable by reciprocation of said plunger to switch means actuated condition and an unactuated condition when said plunger is in said plunger guiding means;

a pushing member means and a lamp holder means relatively movably unitarily secured together as a pushbutton construction means and being insertable in and removable from said casing through said aperture means, said pushbutton construction means disposed in said aperture means and carrying said plunger;

locking means carried by said casing and said pushbutton construction means locking said lamp holder means in locked condition in said casing by an initial pushing in action of said pushing member means, followed by a releasing action of said pushing member means;

locking release means carried by said casing and said pushbutton construction means releasing said lamp holder means from said locked condition by a pulling out action on said pushing member means.

plunger reciprocating means connected to said pushing member means and to said plunger to reciprocate said plunger to switch means actuated condition by inward pushing in action on said pushing member means and to reciprocate said plunger to switch means unactuated condition by release of said pushing member means while said lamp holder means is in locked condition;

and safety means carried by said pushbutton construction means and being operatively associated with said plunger reciprocating means, said safety means preventing said plunger reciprocating means from reciprocating said plunger to switch means actuated condition during said initial pushing in action of said pushing member means, said safety means comprising a leaf spring having one end carried by said pushbutton construction means and the other end free thereof.

8. A combination as set forth in claim 7 wherein said casing has cam means, said free end of said leaf spring being engageable with said cam means to cam said free end to various positions thereof as said pushbutton construction means is being inserted into said aperture means to be locked therein.

9. A combination as set forth in claim 8 wherein said one end of said leaf spring is carried by said lamp holder means, said leaf spring having notch means intermediate its said ends, said pushing member means having edge means engageable with said notch means to prevent movement between said lamp holder means and said pushing member means.

10. A combination as set forth in claim 9 wherein said casing carries stop means against which said lamp holder means engages to prevent further movement of said lamp holder means into said aperture means of said casing whereby upon initial insertion of said pushbutton construction means into said casing said lamp holder means abuts said stop means and movement between said pushing member means and said lamp holder means is limited by said edge means of said pushing member means engaging said notch means of said leaf spring and whereby upon release of said pushing member means to free said edge means from said notch means said cam means cams said leaf spring out of the way of further upward movement of said pushing member means relative to said lamp holder means.

11. A combination as set forth in claim 10 wherein the natural resiliency of said leaf spring is to hold said notch means thereof in the path of movement of said edge means of said pushing member means.

12. A combination as set forth in claim 10 wherein said edge means of said pushing member means is a hook.