June 28, 1966 W. KLENK ETAL 3,258,558

PUSH BUTTON SWITCH

Filed March 2, 1965 2 Sheets-Sheet 1

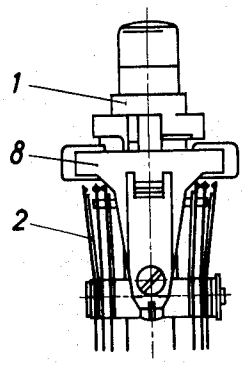


Fig.1

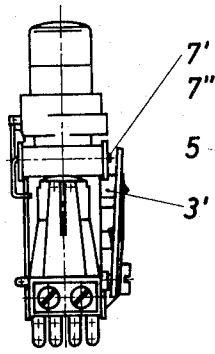


Fig.2

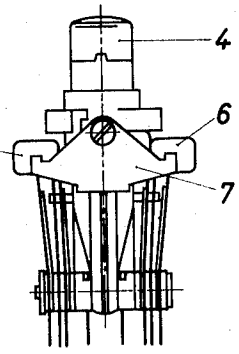


Fig.3

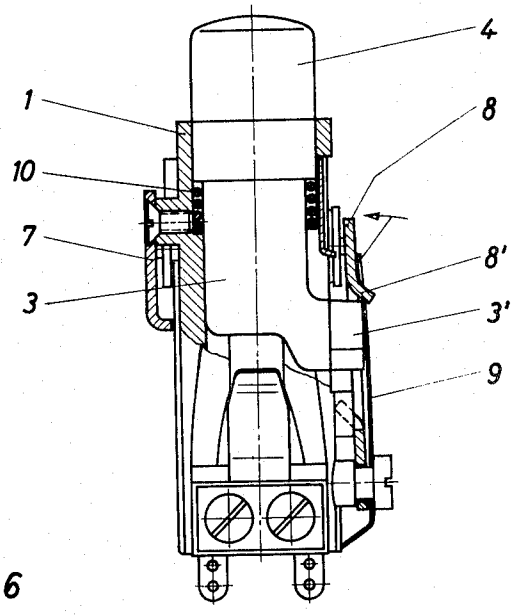
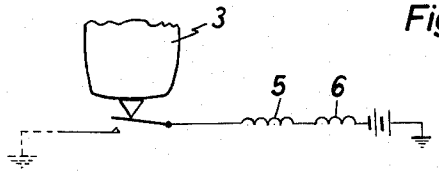


Fig.4

Fig.6



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W. KLENK ETAL

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2 Sheets-Sheet 2

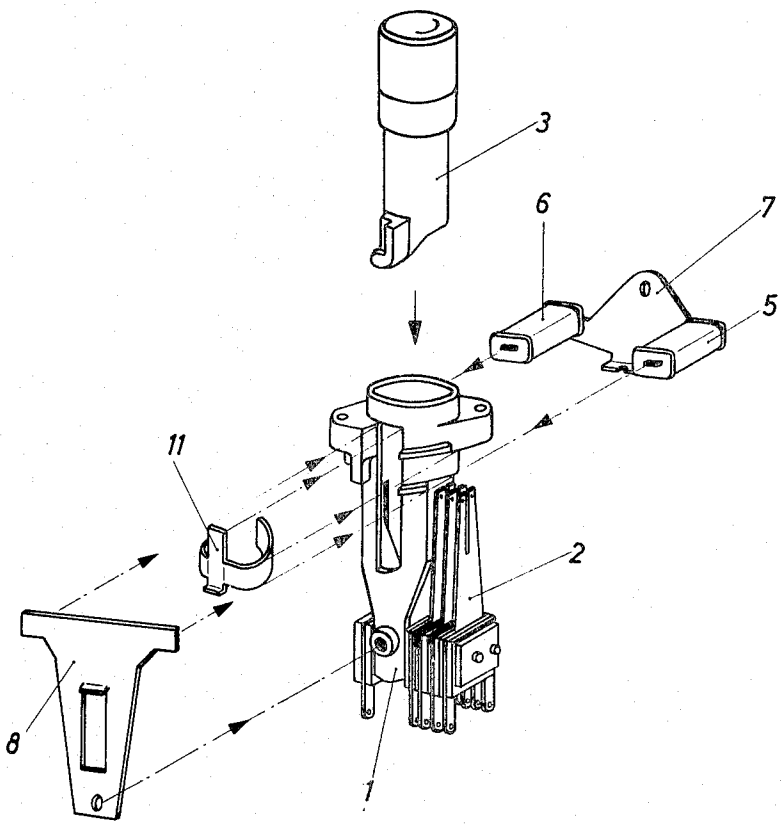

Fig. 5

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PUSH BUTTON SWITCH

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Claims priority, application Germany, Mar. 6, 1964, St 21,809
6 Claims. (Cl. 200—87)

This application relates in general to push button switches and in particular to such switches equipped with electromagnetic holding devices.

Push button switches known in the art that have such holding devices have limited the number of contact springs associated therewith to maintain reasonable dimensions. Where the contact springs have not been limited, then the electromagnets have not provided sufficient force to reliably maintain the push button switch in a depressed condition.

Accordingly, an object of this invention is to provide new and unique push button switches having holding magnets.

A more specific object of the invention is to provide push button switches having holding magnets and contact springs on both sides of the switch body.

A related object is to provide such switches with buttons that are amenable to simple and quick mounting.

In accordance with one preferred embodiment, these and other objects and features are achieved with two magnetic coils on opposite sides of the body arranged transverse to the actuating direction of the button knob and above the contact set. A trap-like lever serves as an armature pivotably mounted on the button's body.

The invention is now explained in detail with the aid of the accompanying drawings wherein:

FIG. 1 shows the front view of such luminescent push button switch;

FIG. 2 shows the lateral view of such a luminescent push button switch;

FIG. 3 shows the rear side of such a luminescent push button switch;

FIG. 4 shows a longitudinal section through the actuated button, in an enlarged scale;

FIG. 5 shows an exploded perspective view of the most important parts of said button; and

FIG. 6 schematically shows the circuit for energizing the electromagnet.

The body of the button **1** bears a two-part contact spring set **2** and serves to guide the switch piece **3**. Said piece **3** bears a button knob **4** which can be removed in order to replace the lamp. Two magnetic coils **5**, **6** are provided on opposite sides of the button's body, transverse to the actuating direction of the knob **4** and above the contact spring set **2** on a common core **7** which can be screwed to the body **1**. A T-shaped armature **8** is pivotably mounted at only one point of the body **1**; a leaf-type spring **9** actuates said armature in the direction of the arrow. The spring also serves to guide the armature **8**.

In the non-operative position the armature **8** is supported by a stud **3'** of the switching piece **3**. When the button is actuated, the holding circuit of the magnet is switched on through a contact of the contact spring set **2**, and on the other hand, the armature **8** is pressed towards the pole surfaces **7'**, **7''** of the core **7** with the aid of the leaf-type spring **9**. A flap **8'** is placed with its oblique side in front of the edge of the stud **3'** of the switch piece **3**, keeping said piece in actuated position. When the magnet is switched off, a resetting spring **10** causes restoring of the switching piece **3**, whereby the armature **8** is pushed back.

The restoring motion of the piece **3** is limited by an annular spring **11** which encompasses somewhat more than half of the circumference of the body **1**, elastically. Annular spring **11** can easily be removed to take piece **3** off the body **1**.

Since the holding magnet with two small magnetic coils is arranged in the useless or dead space of the button, the size of said button can be kept small. Simultaneously, on each side of the button a contact spring set can be arranged. The favorable type of bearing with the aid of a stud screw results in the armature **8** (lever) being extremely mobile. Thus, the contiguity of the armature and both pole surfaces **7'**, **7''**, resulting in a force flux without any air gaps and, hence, a maximum holding force. Finally, the annular spring **11** enables the simple and quick mounting of the button.

In operation, when knob **4** is in its uppermost position contact spring set **2** is in its normal unoperated condition. Armature **8** rests against stud **3'** and is thus kept away from pole surfaces **7'**, **7''**. When knob **4** is pressed down, stud **3'** passes beneath flap **8'** on armature **8** and into the slot on armature **8**. Leaf spring **9** presses armature **8** into contiguous relationship with pole surfaces **7'**, **7''**. The knob tends to move back to its normal position due to the force applied by the resetting spring **10**. It cannot do so, however, as long as magnetic forces generated by magnetic coils **5** and **6** combine with the forces of leaf spring **9** to retain the armature juxtaposed to the core **7**. As soon as the magnetic circuit of FIG. 6 is broken, the force of leaf spring **9** is insufficient to retain the push button in its actuated position against resetting spring **10**. Thus, resetting spring **10** forces the knob **4** and attached switch piece **3** back to its normal upward position.

The magnetic actuating circuit of FIG. 6 is operated when contact spring set **2** is actuated. Contact spring set **2** can be actuated either responsive to the movement of the armature towards the core, in any well known manner or responsive to the motion of the switch piece **3** as the knob is pressed down, if studs on contact spring set **2** extend through body **1** into a position wherein the studs would be pushed out by switch piece **3** as it moved downward. The magnetic circuit of FIG. 6 would be broken by contacts not shown between the ground and battery source.

While the principles of the invention have been described above in connection with specific apparatus and applications, it is to be understood that this description is made only by way of example and not as a limitation on the scope of the invention.

We claim:

1. A push button switch combination comprising a switch body, a pair of contact spring sets, each of said spring sets mounted on opposite sides of said body, push button switch piece means, stud means on said switch piece means, magnetic holding means, said magnetic holding means including coil means mounted on said body above said spring sets, tranvserse to the direction of actuation of said switch piece means energized responsive to the actuation of said switch piece means, armature means pivotably mounted on said body operated to cooperate with said stud means for holding said piece in the actuated position when said coil means is energized, and spring means for restoring said switch piece means when said coil means are de-energized.

2. The push button switch combination of claim **1** wherein said coil means comprises two coils with one of said coils mounted on each side of said switch body.

3. The push button switch combination of claim **2** wherein said two coils have a common core terminating

in two pole pieces, wherein said armature means comprises a slot for receiving said knob when said switch piece is actuated and flap means at the top of said slot angled out from said armature for preventing movement of said knob when said coils are energized and said armature is operated to a contigious relationship with said pole pieces.

4. The push button switch of claim 3 and leaf spring means for biasing said armature toward said contiguous relationship.

5. In the pushbutton switch of claim 4 wherein said armature has only one bearing point.

6. The pushbutton switch of claim 5 comprising annular C-shaped spring means elastically encompassing said body to limit the restoring motion of said switch piece.

No references cited.

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