

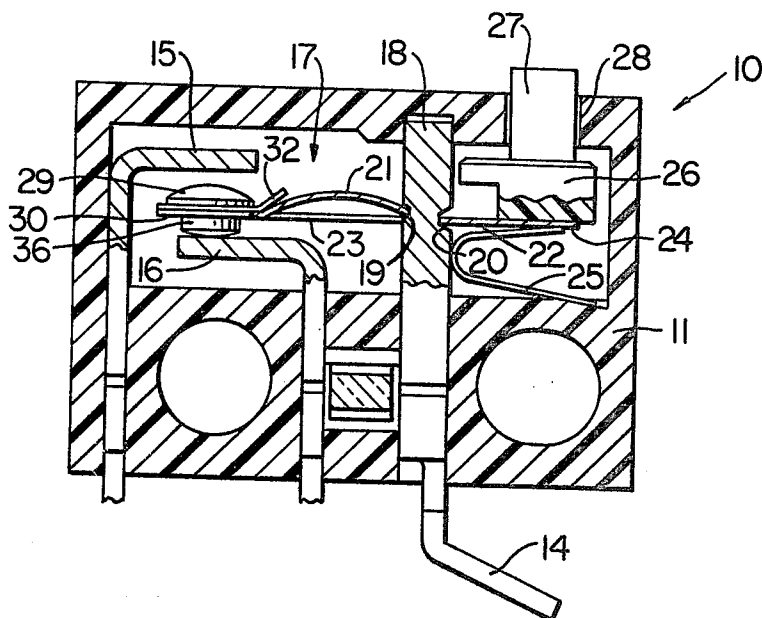
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 [21] Appl. No. **801,488**
 [22] Filed **Feb. 24, 1969**
 [45] Patented **Feb. 16, 1971**
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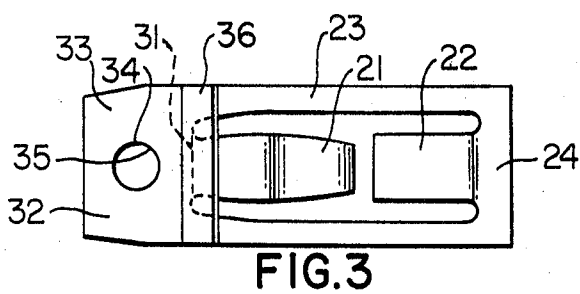
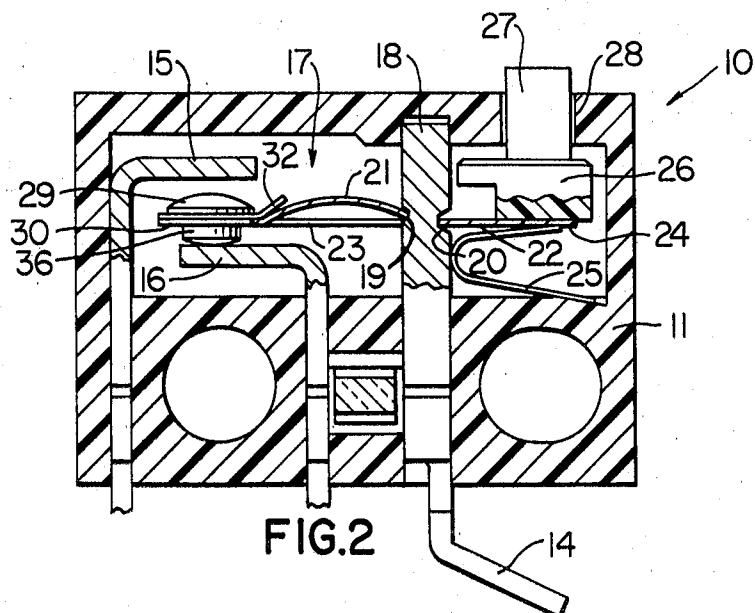
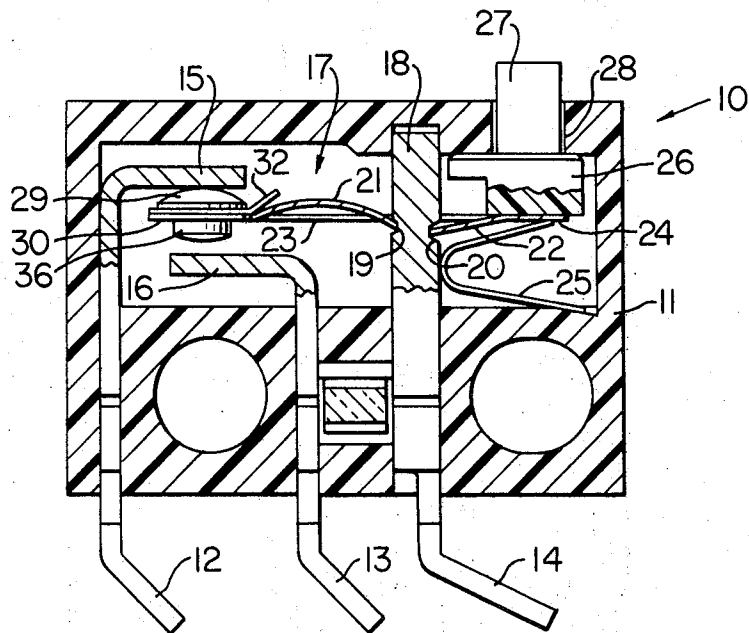
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[54] **ELECTRICAL SWITCH CONSTRUCTION WITH SHIELD**
10 Claims, 3 Drawing Figs.

[52] U.S. Cl..... **200/166,**
200/67
 [51] Int. Cl..... **H01h 9/30**
 [50] Field of Search..... **200/67D,**
146, 166B8, 166C

ABSTRACT: An electrical switch construction having a movable switch blade carrying an electrical contact means to be moved into and out of electrical contact with another contact means of the switch construction so as to be adapted to make and break an electrical circuit, a shield being carried by the movable blade to prevent an electrical arc from impinging against a flexure point of the blade as the blade moves the contact means thereof out of contact with the other contact means to break the electrical circuit.





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ELECTRICAL SWITCH CONSTRUCTION WITH SHIELD

This invention relates to an improved electrical switch construction and to a method for making such a switch construction or the like.

It is well known from the copending Pat. application Ser. No. 674,186, filed Oct. 10, 1967, that relatively small electrical switch constructions can be made wherein an electrical contact means is carried by a snap blade to be moved into and out of contact with a stationary contact of the switch construction.

However, it has been found, according to the teachings of this invention, that such small switch construction is not readily adaptable to overcome an arcing problem that exists when the movable contact means is moved away from the fixed contact means to break the electrical circuit through the switch construction because such electrical arcing impinges against a flexure point of the snap blade and thereby subsequently causes the blade to fracture or break at the flexure point thereof after a certain time period of use of the switch construction.

It has also been found according to the teachings of this invention that if such prior known snap-acting blade is made larger or thicker to withstand the heat being applied thereto by the aforementioned arcing, not only is the cost of such switch construction increased, but also the accuracy thereof is diminished.

Therefore, it is a feature of this invention to provide means for preventing the aforementioned electrical arcing from adversely affecting such a snap blade or the like.

In particular, one embodiment of this invention provides a metal shield that is carried by the movable blade and is so constructed and arranged that the same prevents the electrical arc from impinging against the blade as the blade moves the contact means thereof out of contact with the other contact means to break the electrical circuit, the shield comprising a generally L-shaped metal member having one of the legs thereof attached to the blade by the contact means thereof so as to be stacked between the contact means and the blade and having the other leg thereof angularly disposed relative to the blade to redirect the aforementioned electrical arc away from the flexure point of the switch blade.

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

Another object of this invention is to provide an improved method for making such a switch construction or the like, the method of this invention having one or more of the novel features set forth above or hereinafter shown or described.

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

FIG. 1 is a cross-sectional view of the improved switch construction of this invention;

FIG. 2 is a view similar to FIG. 1 and illustrates the switch construction in another operating position thereof;

FIG. 3 is a top view of the switch blade of the switch construction of FIG. 1 with the protective shield being superimposed thereon in its assembled position.

While the various features of this invention are hereinafter described and illustrated as being particularly adapted to provide electrical arc redirecting means for a snap switch construction of miniature size, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide improvements in other types of electrical switches 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, the improved electrical switch construction of this invention is generally indicated by

the reference numeral 10 and comprises the basic switch structure fully disclosed and claimed in the aforementioned copending patent application whereby the various details thereof will now be described in only sufficient detail to understand the present invention as the copending patent application can be referred to for a further description of the specific details and operation of the switch construction 10.

The switch construction 10 comprises a housing means 11 carrying three terminals 12, 13, and 14 projecting therefrom with the inner ends 15 and 16 of the terminals 12 and 13 being disposed within a chamber 17 formed in the housing means 11 and defining spaced fixed contact means of the switch construction 10. The other terminal 14 comprises a pivot post means 18 disposed within the chamber 17 and having opposed notches 19 and 20 therein respectively to receive bowed tongues 21 and 22 of a switch blade 23 having one end 24 thereof bearing against one leg of a U-shaped leaf spring 25 on one side thereof and against a movable plunger means 26 on the other side thereof. Since the switch blade 23 is electrically conductive, the engagement of the tongues 21 and 22 thereof with the post 18 electrically connects the blade 23 to the terminal 14.

The movable plunger means 26 has a portion 27 projecting out of an opening 28 in the housing means 11 so that when the plunger portion 27 is pushed inwardly from the normal position illustrated in FIG. 1, to the position illustrated in FIG. 2 in opposition to the force of the leaf spring 25, the switch blade 23 snaps downwardly from the position of FIG. 1 to the position of FIG. 2 and when the pushbutton 27 is released to permit the spring 25 to move the end 24 of the blade 23 upwardly back to the position in FIG. 1, the blade 23 automatically snaps from the position illustrated in FIG. 2 back to the position illustrated in FIG. 1.

The switch blade 23 carries an electrical contact means 29 on the left-hand end 30 thereof which is normally held in electrical contact with the fixed contact 15 to complete an electrical circuit between the terminals 12 and 14 as illustrated in FIG. 1 and when the plunger 27 is depressed downwardly as illustrated in FIG. 2, the switch blade 23 snaps the movable contact 29 thereof out of electrical contact with the fixed contact 15 and into electrical contact with the fixed contact means 16 as illustrated in FIG. 2 to complete an electrical circuit between the terminals 13 and 14, if desired.

However, as previously mentioned, it has been found that when the blade contact 29 breaks away from the fixed contact 15 to terminate the electrical circuit between the terminals 12 and 14, electrical arcing takes place with such arcing tending to impinge against a flexure line 31, FIG. 3, formed in the switch blade 23 that permits the tongue 21 of the blade 23 to bow so that the subsequent repeated heating of the flexure point or area 31 of the blade 23 by the opening and closing action of the switch 10 causes the tongue 21 to fracture or break at the flexure point 31, thereby preventing long life for the switch construction 10.

However, according to the teachings of this invention, an arc redirecting shield 32 is provided and comprises a metal member formed in substantially an L-shape so that one leg or portion 33 thereof is disposed against the upper side of the left-hand end 30 of the blade 23 and has an opening 34 passing therethrough in aligned relation with a similar opening 35 in the end 30 of the blade 23 whereby a part 36 of the contact means 29 can pass through the aligned openings 34 and 35 of the shield 33 and blade 23 and be secured against the other side of the blade 23. In this manner, the shield 32 is secured to the blade 23 in stacked relation between the movable contact means 29 and the end 30 of the blade 23. The other leg or portion 36 of the shield 32 is angularly disposed relative to the portion 33 thereof and extends upwardly from the blade 23 as illustrated in FIGS. 1 and 2 so as to face toward the fixed contact 15 whereby when the blade 23 snaps from the position illustrated in FIG. 1 to the position illustrated in FIG. 2, the shield 32 will be impinged by the electrical arcing taking place during the breaking of the movable contact 29 away from the

contact 15 so as to redirect such arc away from the flexure point 31 of the switchblade 23 whereby the flexure point 31 of the switchblade 23 will not be subjected to impingement by such arcing to heat the same that causes the aforementioned deterioration in the flexure area 31.

In this manner, the shield 32 has been found to extend the life of the switchblade 23 without requiring an enlargement or thickening of the parts of the switchblade 23 which would add greatly to the cost thereof as well as to the accuracy of operation of the switch construction 10, particularly when the switch construction 10 is made of subminiature size.

In the embodiment of the shield 32 illustrated in the drawings, the same is made of the same width as the switchblade 23 and is formed of antimagnetic material, such as stainless steel or the like. Any arcing that occurs at the contacts during operation in a circuit sets up an electromagnetic field. The shield 32, when made of antimagnetic material, will not interact with the electromagnetic field to influence the movement of the switchblade 23.

Further, in one embodiment of the shield 32 of this invention, the leg or portion 33 thereof had a length of approximately 0.07, plus or minus 0.002, of an inch, the leg or portion 36 thereof had a length of approximately 0.035, plus or minus 0.002, of an inch, the shield 32 had a thickness of approximately 0.0015 of an inch and the largest width of the shield 32 was approximately 0.120, plus or minus 0.002, of an inch.

Accordingly, it can be seen that this invention not only provides an improved electrical switch construction, but also this invention provides an improved method for making such a switch construction to eliminate an adverse electrical arcing problem thereof.

I claim:

1. In an electrical switch construction having a movable switch blade carrying electrical contact means to be moved into and out of electrical contact with another contact means of said switch construction so as to be adapted to make and break an electrical circuit, the improvement comprising a shield carried by said blade to prevent an electrical arc from impinging against said blade as said blade moves said contact means thereof out of contact with said other contact means to break said electrical circuit, said shield disposed between said other contact means and said blade.

2. In an electrical switch construction as set forth in claim 1, the further improvement wherein said blade has a flexure area that is shielded from said arc by said shield.

3. In an electrical switch construction as set forth in claim 2, the further improvement wherein said shield is L-shaped and has one of the legs thereof secured to said blade.

4. In an electrical switch construction having a movable

switch blade carrying electrical contact means to be moved into and out of electrical contact with another contact means of said switch construction so as to be adapted to make and break an electrical circuit, the improvement comprising a shield carried by said blade to prevent an electrical arc from impinging against said blade as said blade moves said contact means thereof out of contact with said other contact means to break said electrical circuit, said shield is secured to said blade by said contact means.

5. In an electrical switch construction having a movable switch blade carrying electrical contact means to be moved into and out of electrical contact with another contact means of said switch construction so as to be adapted to make and break an electrical circuit, the improvement comprising a shield carried by said blade to prevent an electrical arc from impinging against said blade as said blade moves said contact means thereof out of contact with said other contact means to break said electrical circuit, said blade having an opening therein receiving part of said contact means securing said contact means thereto, said shield having a portion thereof provided with an opening aligned with said blade opening and receiving part of said contact means whereby said shield is secured to said blade by said contact means in stacked relation between said contact means and said blade.

6. In an electrical switch construction as set forth in claim 5, the further improvement wherein said shield has another portion thereof angularly disposed relative to said first-named portion thereof and extending away from said blade in a direction to face toward said other contact means.

7. In an electrical switch construction as set forth in claim 6, the further improvement wherein at least one of said portions of said shield has a width substantially the same as the width of said blade.

8. In an electrical switch construction as set forth in claim 7, the further improvement wherein the remainder of said shield has a width substantially the same as the width of said blade.

9. In an electrical switch construction having a movable switch blade carrying electrical contact means to be moved into and out of electrical contact with another contact means of said switch construction so as to be adapted to make and break an electrical circuit, the improvement comprising a shield carried by said blade to prevent an electrical arc from impinging against said blade as said blade moves said contact means thereof out of contact with said other contact means to break said electrical circuit, said shield is formed from antimagnetic material.

10. In an electrical switch construction as set forth in claim 1, the further improvement wherein said blade is snap-acting.