June 14, 1949. R. BAIN 2,473,088

ELECTRIC SWITCH

Filed Oct. 24, 1947 2 Sheets-Sheet 1

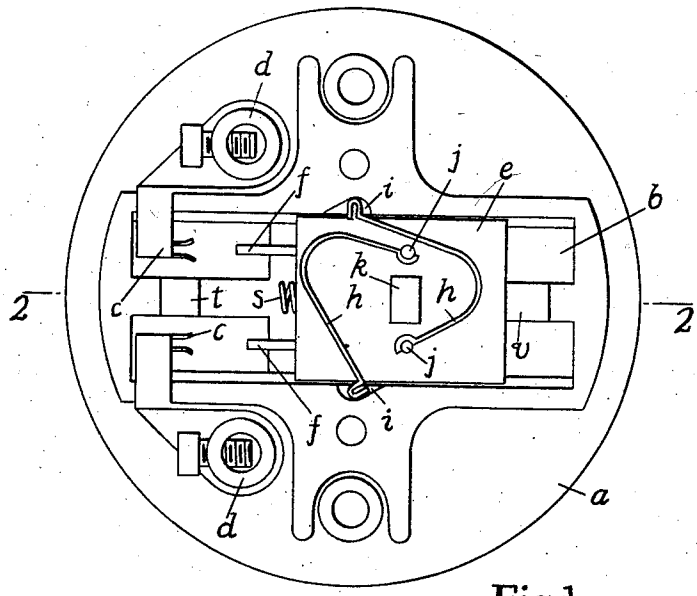


Fig.1

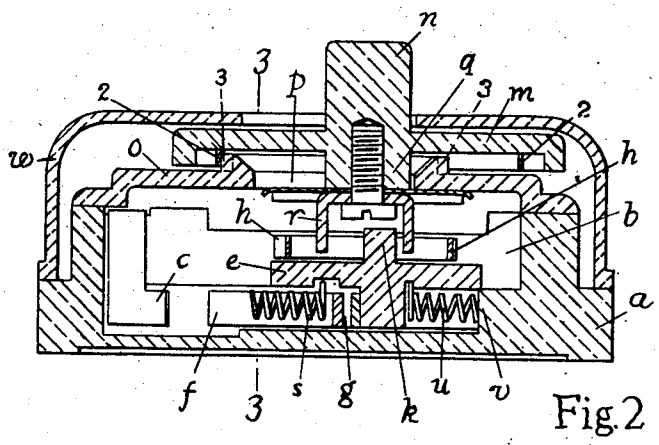


Fig.2

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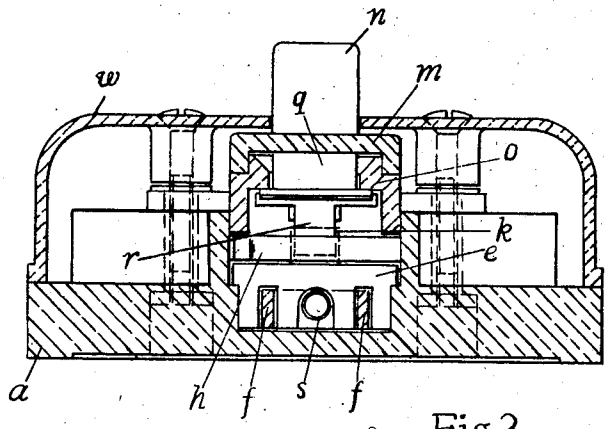


Fig.3

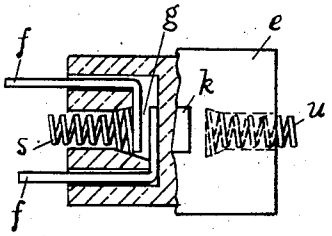


Fig.4

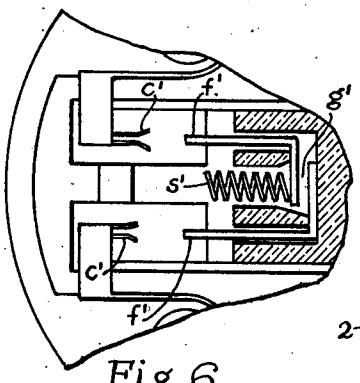


Fig. 6.

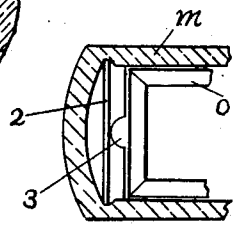


Fig.5

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UNITED STATES PATENT OFFICE

2,473,088

ELECTRIC SWITCH

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Application October 24, 1947, Serial No. 781,995
In Great Britain November 6, 1946

6 Claims. (Cl. 200—76)

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This invention relates to electric switches for use more particularly in alternating current distributing systems and of the kind adapted to control lighting or small power circuits.

The object of the present invention is to minimise in a simple and satisfactory manner, risk of accidental injury to mutually contactible ends of slidable switch contacts in the event of these contacts being engaged with complementary fixed switch contacts when a condition of short circuit exists in the system or apparatus controlled by the switch.

In the accompanying drawings:

Figure 1 is a plan of the main part of a switch embodying the invention.

Figure 2 is a sectional side elevation on the line 2—2, Figure 1, showing the main portion and also the cover and finger piece.

Figure 3 is a cross section on the line 3—3, Figure 2.

Figure 4 is part sectional plan of the slide, and Figure 5 is a part sectional plan of a portion of one end of the slidable finger piece.

Figure 6 is a part sectional fragmentary plan of the main part of a switch embodying a modified feature of the invention.

In the construction of a switch in accordance with the invention and as shown by the drawings, I employ a base *a* of any convenient size and shape and made from insulating material. Transversely across the upper side of the base is formed a shallow rectangular trough *b*. At one end of the trough are secured a pair of fixed contacts each connected to a circuit terminal *d* and each consisting of a pair of resilient metal parts *c* adapted for reception between them of a movable contact.

Within the trough is arranged a slide *e* made from insulating material. The underside of the slide is chambered to accommodate a pair of relatively slidable contacts *f* of the same length, each being shaped from a metal strip bent to an L-shape. The overlapping inner ends of these contacts within the slide lie parallel with each other and when separated form between them a so-called microgap *g* for interrupting the current. The other ends of these contacts which project to different extents beyond the slide, are adapted to be moved into and out of engagement with the fixed contacts *c*.

Across the upper side of the slide *e* are arranged a pair of similar bowed springs *h* made from steel strip. One end of one spring is engaged with a notch *i* in one side of the trough *b* and the other end is engaged with a projection *j* on the

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slide. Likewise the other spring is engaged with a notch *i* in the opposite side of the trough and another projection *j* on the slide. The two springs *h* are relatively disposed in the manner shown in Figure 1. Also on the upper side of the slide is formed a projection *k* for engagement by a slidable actuating member *m* associated with a finger piece *n*.

In the example shown, the upper side of the base *a* has secured to it a guide *o* for the said member *m*, a longitudinal slot *p* being formed in the part *o* through which extends a part *q* of the slidable member *m*, and to the inner end of the part *q* is secured a forked striker *r* adapted to act on opposite sides of the projection *k* on the slidable member *e*. The guide *o* and other parts of the switch carried on the base *a* are enclosed by a removable cover *w*.

The mode of action of the switch is as follows: Assuming it is required to move the switch from the open position shown in Figures 1 and 2 to the closed position, the finger piece *n* is moved by the user towards the left. During this movement the striker *r* bears against one side of the projection *k* on the slide *e* and thereby imparts movement to the slide. The effect of the initial part of the movement of the slide is to cause the outer end of the contact which projects to the greater extent from the slide to engage its associated fixed contact *c* and thereby momentarily arrest the said contact *f* causing the two inner ends of the slidable contacts *f* to come together and close the gap *g* between them. Also during this movement the springs *h* will be stressed to enable them to impart the final movement to the slide. After the finger piece has moved the slide *e* past its central position, the springs *h* will complete the movement of the slide *e* quickly and independently of the finger piece, causing the outer ends of both of the slidable contacts *f* to be fully engaged with the fixed contacts *c*. The finger piece *n* now lies in its other limit position. To move the switch to its open position, the finger piece is moved in the opposite direction (to the right). The effect of this is to cause the slide *e* to drag the slidable contacts *f* away from the fixed contacts *c*. But as the slidable contacts *f* are also relatively movable, the drag exerted on them by the fixed contacts *c* will cause their inner ends to separate and thereby form the small gap *g* required for the interruption of the current. This gap is formed during the first half of the movement of the finger piece, and as this movement occurs under the control of the user it will be performed relatively slowly and allow sufficient

time for the extinction of any arc which may occur between these ends of the slidable contacts. After the finger lever has moved the slide *e* past its central position, the springs *h* will effect the completion of the movement of the slide *e* for separation of the slidable contacts *f* from the fixed contacts *c* quickly and independently of the finger piece. As relatively large gaps now exist between the slidable and fixed contacts, the slidable contacts *f* are effectively isolated from the live fixed contacts *c*.

In addition to the essential component parts above described, the following additional parts are also provided. To prevent accidental separation of the inner ends of the contacts *f* when the switch is closed, the slide *e* has loosely combined with it a helical spring *s* which when the switch is closed is compressed by the abutment of one end against a stop *t* (Figure 1) in the trough *b*, and of the other end against the inner end of one of the contacts *f* thereby causing the inner ends of the contacts *f* to be held firmly together. Also on the slide *e* is loosely mounted another spring *u* which by abutment against a stop *v* in the trough *b* serves as a buffer for arresting the slide *e* without shock when the slide *e* is moved to the open position.

Also a cushioning device is preferably combined with each end of the slidable part *m*. In the example shown this comprises a blade spring 2 arranged transversely across a recess in the underside of the part *m* and adapted to co-operate with a stop 3 on the guide *o* (Figure 5) when the part *m* is to be moved to either of its limit positions.

By this invention I am not only able to provide in a very simple and compact form a small switch adapted particularly for use in alternating current circuits, but I am able to ensure adequate protection of the ends of the contacts which form the microgap against accidental injury in the event of the switch being moved to the closed position when a condition of short circuit exists in the system or apparatus controlled by the switch, as the parts forming this gap are always pressed together for closing the gap before full engagement is made with the fixed contacts.

The invention is not, however, restricted to the example described, as subordinate constructional details may be varied to suit different requirements. Thus instead of arranging the

slidable contacts to project to different extents from the slide as above described, they may be arranged to project to the same extent from the slide, in which case the fixed contacts will be made of different lengths as shown in Figure 6 wherein the parts similar to those shown in Figures 1 to 5 are indicated by the same reference characters suffixed by 1.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An electric switch comprising the combination of a base, a pair of fixed contacts on the base, a slide mounted on the base, a pair of relatively slidable contacts carried by the slide and adapted at one end to effect mutual contact and at the other end to engage the fixed contacts, a finger piece for actuating the slide, and spring means for imparting rapid movements to the slide independently of the finger piece after the latter has been moved through a predetermined initial distance, the arrangement being such that when closing the switch, the contiguous ends of the movable contacts are brought together before engagement of one of their opposite ends with the corresponding fixed contact, and when opening the switch the said contiguous ends are separated before the opposite ends are disengaged from the fixed contacts.

2. An electric switch as claimed in claim 1, in which the slidable contacts are of L-shape, the slide being chambered to accommodate the inner overlapping ends of the contacts.

3. An electric switch as claimed in claim 2 in which the slidable contacts project to different extents from the slide.

4. An electric switch as claimed in claim 2, in which the slidable contacts project to the same extent from the slide, and the fixed contacts are of different lengths.

5. A switch as claimed in claim 1 and having combined with it a spring for preventing separation of the contiguous ends of the slidable contacts when the switch is in the closed position.

6. An electric switch as claimed in claim 1 having a slidable finger piece, and spring means for transmitting movement from the finger piece to the slide.

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No references cited.