This invention relates primarily to snap acting mechanisms, and more particularly to a snap acting leaf-spring type electric switch, and to an improved terminal for such a switch and to an improved supporting means for the terminal. However, it will become apparent as the description proceeds that the invention is not limited in its application to snap acting switches, and that the concepts of the invention are applicable to slow acting switches, relays, circuit breakers, and the like.

This application is a division of co-pending application Serial No. 575,467 filed April 2, 1956, for Snap Acting Mechanism, which application has now issued as Patent 2,964,602.

It is an object of this invention to provide means for prolonging the contact life of a switch mechanism, thereby making the mechanism capable of standing many millions of circuit openings and resultant arc formations.

It is another object of this invention to provide improved and simplified means for installing an electric terminal within a switch housing.

In accordance with these and other objects which will become apparent hereinafter, preferred forms of the present invention will now be described in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a partially broken away illustrating a form of switch constructed in accordance with the present invention;

FIG. 2 is a longitudinal section of the switch shown in FIG. 1;

FIG. 3 is a view taken on line 3-3 in FIG. 2, illustrating one half of the switch separated at the parting line between the two sections of the switch housing;

FIG. 4 is a bottom plan view of the switch viewed as indicated by arrow 4 in FIG. 2.

In the drawings the present invention is shown as a component of an electric switch. The switch comprises a leaf spring means in the form of a rectangular, unbroken leaf or sheet 36 of stiff, springy material such as beryllium copper. The leaf 36 is pivotally journaled at each end in a support means shown generally at 37. The lower journal axis 38 consists of a pivot shaft 39 journaled at each end in hubs 41 formed at the respective ends of an open-ended frame 42. The frame 42 consists of a pair of parallel arms 43 which are spanned at their upper ends by an integrally formed cross piece or arm 44.

The upper journal axis 46 comprises a shaft 47 relived at 48 to form a journal portion journaled in a semi-circular cavity in a bearing member 49. Opposite the bearing cavity in the member 49 is a transverse pivot pin 51 which is in turn journaled in the cross piece 44 of the frame 42. The lower end of the leaf 36 resides in a longitudinal slot 52 in the shaft 39 and the upper end of the leaf 36 resides in a slot 53 in the shaft 47. The straight line distance between the ends of the leaf 36 when thus mounted in the shafts 39 and 47, respectively, is less than the actual length of the leaf 36 itself, thereby forcing the leaf to assume a bowed or arched attitude, as shown in FIG. 2.

Near the upper end of the leaf 36, that is the end mounted in the shaft 47, the leaf 36 has secured there against an operating means in the form of an electric contact 54, which moves back and forth (FIG. 2) as the leaf 36 is snapped from one side to the other. A similar contact 56 is provided on the opposite side of the leaf 36, as shown in FIG. 2. The contacts 54 and 56 extend laterally across the full width of the leaf 36 as shown in FIG. 3.

In the position shown in FIG. 2, the operating means or contact 54 bears forcefully against an operated means, in this instance being an abutment means in the form of a stationary contact 57 fixedly mounted with respect to the support means 37. The positioning of the contact 57 is such that when the leaf is arched to the left as shown in FIG. 2, the contact 54 bears firmly and forcefully against the stationary contact 57 to maintain good electrical contact.

A similar stationary contact 58 is positioned on the opposite side of the leaf 36 and is engaged by the contact 56 when the leaf 36 is snapped to the other side of a line joining the axis 38 and 46, as shown by the arrowed line 59.

The contact 57 is one of a pair of contacts 57 and 61 (FIG. 3) which are bridged by the movable contact 54 carried by the leaf 36 when the leaf is snapped into the position shown in FIG. 2. Similarly, the contact 58 is one of a pair (the other not being shown) which are bridged by the movable contact 56 when the leaf is snapped to the right, in FIG. 2. The four contacts thus described are secured to and in electrical conducting relation with four electrically isolated terminals that emerge from the top of the support means 37 and which will be described more in detail hereinafter.

In accordance with the present invention, several means are provided for prolonging switch life by extending contact life. One of the reasons for the deterioration of contact surfaces in switches is the fact that the heat generated by the arc which is formed whenever the switch is opened is not dissipated rapidly enough, and as a result the localized temperature of the switch contact becomes very high. This may be true even though other parts of the switch remain relatively cool. The problem then is one of immediate and rapid heat dissipation away from the local area of the arc. While this may be achieved by the use of terminals that are relatively large and heavy, there is a serious disadvantage that large terminals projecting from the switch housing result in relatively small clearances between the terminals with consequent danger of short circuits as wires must be secured to the terminal. In accordance with the present invention, the terminals 97 to which the respective contacts 57, 58, 61, etc., are secured, are made with that portion of the terminal which is inside the housing and immediately adjacent the contacts relatively large. At the same time, only a relatively small or narrow elongate portion 98 projects through the wall of the housing 62 to become the external terminal to which the wires are connected. The mass of the terminal 97 within the housing is several times that of the mass 98 which is outside of the housing and the terminal is made of a material having a high specific heat, such as copper. The terminals thus constitute relatively large heat sinks for the temporary storage of high temperature heat generated by arcing at the relatively thin contacts 57 etc., which are preferably made of a precious metal having high heat conductivity such as silver. Since the arcing time is a relatively minor fraction of the total switching cycle, the heat generated by the arc at the contacts 57 etc. is rapidly dissipated into the much larger mass of the terminal 97 without appreciably raising the temperature of the terminal 97. From the heat sunk constituted by the terminal 97 the heat is continuously conducted through the external portion 98 to the ambient atmosphere.

The casing or housing 62, which is preferably formed of non-conducting material, is made in two sections, with the parting line normal to the shaft means 71 as shown at
101. The two sections of the housing 62 are held together by hollow rivets 102 which parallel the shaft means 71. In this way, a number of switches may be ganged together by passing mounting bolts, one through each of the rivets 102, and paralleling the shaft 72.

In accordance with the present invention, simple, yet sturdy means are provided for securing the terminal 97 within the housing 62. As shown in Figs. 1, 2, and 3, the external portions 98 of the terminals 97 pass through corresponding rectangular openings 103 formed in the top wall of the housing 62. The inner end of each terminal 97 is provided with a laterally projecting toe or boss 104 adapted to engage in a notch 106 formed in the side wall 107 of the housing 62, to create a notch and boss engagement between the terminal and the housing. The terminal 97 is pressed into the rectangular passage 103 from the inside, until the toe 104 snaps into position in the notch 106. In this way, the terminals are held firmly and securely in position without requiring any bonding substance.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein, but is to be afforded the full scope of the claim.

What is claimed is:

1. terminal having an enlarged portion located inside said casing immediately adjacent said outwardly projecting terminal and consisting of a volume of metal at least twice as great as the volume of metal contained in said outwardly projecting terminal; each said enlarged portion having a relatively thin stationary contact secured directly thereto; said outwardly projecting terminal and said enlarged portion being formed from a single piece of metal having a high specific heat value, such as copper; said stationary contact being formed of a corrosion resistant metal possessing high heat conductivity, such as silver; the securement embracing the entire mating area between said stationary contact and said enlarged portion.

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