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2,722,574

SWITCH

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Fig. 1

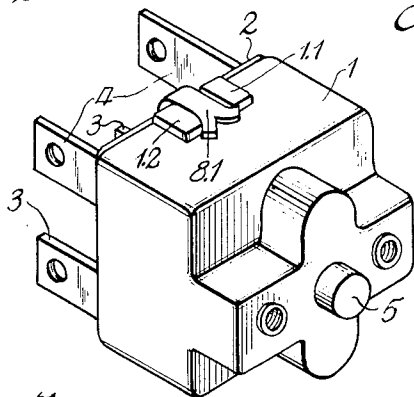


Fig. 2

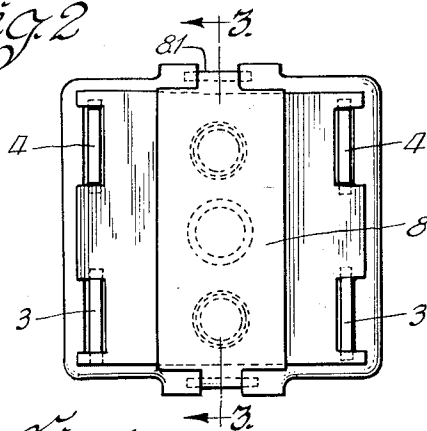


Fig. 3

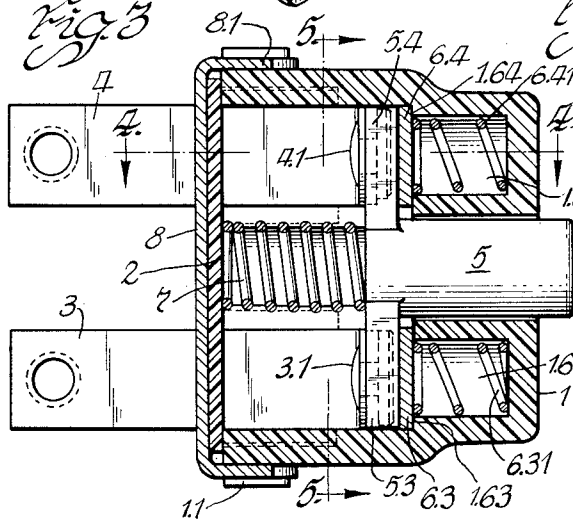


Fig. 4

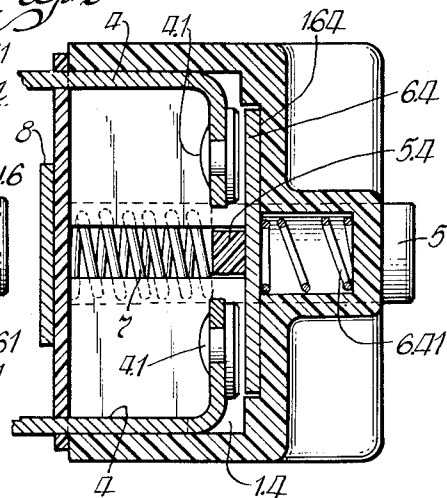


Fig. 5

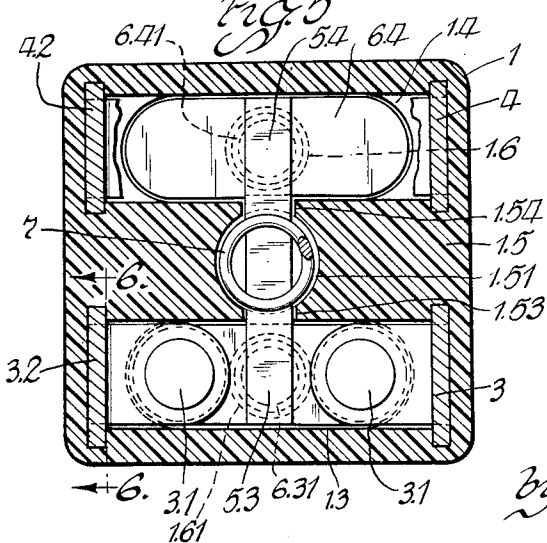
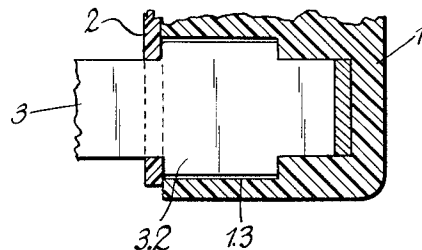


Fig. 6



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SWITCH

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3 Claims. (Cl. 200—16)

This invention relates to electric switch devices, and particularly to switches of the pushbutton type.

It is an object of this invention to provide a pushbutton switch which is capable of heavy-duty service.

It is another object of the invention to provide a switch having a simple and effective method of mounting bridging contacts for movement into and out of circuit-closing relation with a plurality of fixed contacts.

It is a further object of the invention to provide an improved switch housing for double pole pushbutton switches in which bridging contacts have free-floating cooperation with their respective fixed contacts and are maintained in insulated spaced relationship without physical attachment to the bridging contact actuating devices.

It is still another object of the invention to provide a heavy duty pushbutton switch which is simple to construct and assemble; has full floating, self-adjusting, circuit-closing elements; and will perform satisfactorily throughout a long service life.

Other features and advantages of my invention will be apparent from the following detailed description of a presently preferred embodiment read in conjunction with the annexed drawing, in which:

Fig. 1 is a perspective of the complete switch;

Fig. 2 is a rear elevation thereof;

Fig. 3 is an elevation in section on lines 3—3 of Fig. 2;

Fig. 4 is an elevation in transverse section on lines 4—4 of Fig. 3;

Fig. 5 is a plan section looking in the direction of arrows 5—5 of Fig. 3; and

Fig. 6 is a detail in section on lines 6—6 of Fig. 5, showing a preferred method of supporting the fixed contact elements within the switch casing.

Referring to Figs. 1 and 3, a single throw, double pole, switch embodying my invention includes a housing 1, preferably of molded insulation material such as a phenolic condensation product, an insulating closure plate 2, pairs of mutually spaced fixed contact elements 3, 4 having projecting terminals as shown for any suitable method of connection with electric circuit components (not shown), a pushbutton 5 arranged to support the respective bridging elements 6.3, 6.4, a spring 7 confined between base 2 and the underside of pushbutton 5, springs 6.31 and 6.41 individual to the respective bridging elements, and a metallic strap 8 having tabs 8.1 which pass between the spaced lugs 1.1 and 1.2 on the respective sides of housing 1.

In Figs. 3 and 5, it appears that the interior of the switch housing 1 is sub-divided by appropriate wall formations to provide insulated chambers within which are housed the contact pairs and associated bridging members. For example, chamber 1.3 and 1.4 are formed by the outer walls of the casing and the heavy central wall 1.5; and in centered symmetrical relationship with said chambers are cavities 1.6 and 1.61 which respectively house the springs 6.31 and 6.41. Spring 7 is confined

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within a cavity 1.51 in wall 1.5, and the respective bridging element support arms 5.3 and 5.4 are guided for easy movement toward and away from the base 2 while being held against displacement about the axis of travel by the slots 1.53 and 1.54 in the wall 1.5. Further it will be observed from Figs. 3 and 4, that the pairs of contact elements 3 and 4 have contact buttons 3.1 and 4.1 on the respective angularly offset end portions of the contact elements. Finally, it will be noted from Figs. 5 and 6 that the walls of the cavity 1.3 and 1.4 have enlarged slot portions at their ends; said slots accommodate the widened portions 3.2, 4.2 of the pairs of contact elements. For cooperation therewith, the closure plate 2 is notched to fit tightly about the contact elements as shown in Fig. 2.

It will be obvious that all of the elements may be inserted from the rear of the casing. Springs 6.31 and 6.41 are placed in their cavities and bridging elements 6.3 and 6.4 dropped into the cavities 1.3 and 1.4. The pushbutton assembly 5 may then be positioned followed by the pairs of fixed contact elements and spring 7. Then closure plate 2 and strap 8 are placed; and finally, the ends 8.1 of the plate are staked for securement between the housing lugs.

A normally open type of switch has been selected to illustrate the invention; and therefore when the final assembly step is completed, spring 7, which exerts a greater bias than the cumulative opposing biases of the springs 6.31 and 6.41, urges the pushbutton 5 to the right of Fig. 3 and causes the arms 5.3 and 5.4 to carry the associated bridging elements 6.3 and 6.4 away from the fixed contacts until said bridging elements rest in open-circuit position on the shoulders 1.63 and 1.64 at the ends of the cavities 1.3 and 1.4. In this position, the end of pushbutton 5 projects beyond the outermost wall of housing 1, and it is important to note that the extent of projection is such that depending on the device used to depress the button, the button may be moved to the left of Fig. 3 a greater distance than the space separating the bridging elements from the fixed contact points. If the switch is to be operated by finger pressure, for example, the button would project sufficiently to insure the stated amount of displacement before the finger came to rest against the end wall of the housing. On the other hand, if means such as a plunger member of smaller diameter than the pushbutton were used to depress the button, the button could, in fact, be flush with or below the end wall of the casing so long as the movement of the plunger member after engagement with the end of the button were longer than the space separating the fixed and bridging contacts.

The important aspect of the movement of said pushbutton in circuit-closing direction is that the expansion of springs 6.31 and 6.41 hold the bridging elements on their associated cross arms 5.3 and 5.4 for movement therewith until said bridging elements engage the fixed contacts. The side walls of the cavity 1.3 and 1.4 restrain the bridging elements against rotation. The cross arms separate from the bridging elements during the remainder of the pushbutton movement. The bridging elements are therefore held in closed-circuit position by the bias of their associated springs 6.31 and 6.41. These springs, being substantially at the geometrical center of their associated bridging elements and therefore symmetrically disposed relative to the fixed contacts, leave the elements free for movement into an even pressure engagement with the fixed contacts even if either or both of the pairs of contacts may be in a plane not perpendicular to the axis of movement of the pushbutton. This self-adjustability is almost literally without restraint because unlike many switch assemblies of this type, there

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is no mechanical connection between the bridging elements and the carrier arms therefor.

When the pushbutton is released, there is an interval of free movement of the carrier arms before they engage their respective bridge elements to carry them away from the fixed contact points. The inertia of the free movement brings the carrier arms sharply against the bridging elements and effectively overcomes any tendency of the bridging elements to stick on the fixed contacts. The difference in strength between the stronger spring 7 and the cumulative bias of the springs 6.31 and 6.41 may be as desired. With the relatively large mass of the fixed contact elements and bridging elements adequate heat dissipation is insured, and by using silver or silverclad metals for the contacts 3.1, 4.1 and/or the bridging contacts 6.3, 6.4 relatively high amperages may be carried without fear of contact pitting or sticking. In such constructions, the strength of spring 7 need not be much greater than the combined strength of the spring 6.31 and 6.41.

Those skilled in the art will recognize that only a simple readjustment of the contact elements and bridging elements is required to adapt the invention to a normally closed type of switch; and it will also be observed that the advantages of the bridging contact support structure apply also to single pole switch constructions.

While there has been described what are at present considered to be the preferred embodiments of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. An electric switch, comprising a body of insulation material, mutually spaced fixed contacts within a cavity in said body, a platelike bridging contact disposed within said cavity for movement into and out of circuit-closing relationship with said fixed contacts, first spring means disposed within a cavity in said body and interposed between a fixed wall thereof and said bridging contact at substantially the geometrical center thereof, said first spring means being in continuous engagement with said bridging contact to urge the same into circuit-closing relation with said fixed contacts, an arm member of insulation material guided for movement within said cavity in a plane transverse to the plane occupied by said spaced fixed contacts, said arm member being engageable with the opposite face of said bridging contact after a brief interval of free travel to move said bridging contact in the direction of movement of said arm member to disengage said bridging contact from at least one of said fixed contacts in opposition to said first spring

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means, plunger means for moving said arm member with respect to said bridging contact and a second spring means interposed between a wall of said body and said arm member in axial alignment with said plunger means to urge said arm member in contact-engaging direction.

2. An electric switch as in claim 1, in which the arm member is disposed for engagement with said bridging-contact substantially at the center of effort of said first spring means.

3. A double-pole switch of the pushbutton type, comprising a substantially hollow body portion of insulation material having a relatively thick transverse insulating wall dividing said body into a pair of contact-receiving chambers, a pair of mutually aligned, spaced, fixed contacts in each of said chambers, a pushbutton slidably housed within a cavity in said transverse wall for movement in a direction normal to the plane of said fixed contacts, arm members of insulation material extending from said pushbutton into said contact chambers and extending substantially centrally between the fixed contacts in the chambers, a platelike bridging contact positioned relatively loosely within each said chamber transversely of said arm members for movement guided by walls of said chamber into and out of circuit-closing relation with the associated fixed contacts, spring means bottomed on said body portion independent of said pushbutton and individual to each bridging contact to urge the contact into circuit-closing relation with its associated fixed contacts, other spring means disposed within said body in engagement with said pushbutton for urging said pushbutton in a direction in which the arm members thereof will engage said bridging contacts and lift them off the fixed contacts in opposition to the cumulative bias of said first-named spring means of insulation material engaging with end portions of said bridging contacts, and stop means for limiting the movement thereof in open-circuit direction to establish a predetermined gap between said fixed contacts and said bridging contacts, said pushbutton having a permitted travel in the opposite direction greater than said gap whereby before the end of said travel in said opposite direction the arm members will disengage from said bridging contacts and the said first spring means will comprise the sole means for holding said bridging contacts against said fixed contacts to complete a circuit thereacross.

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