

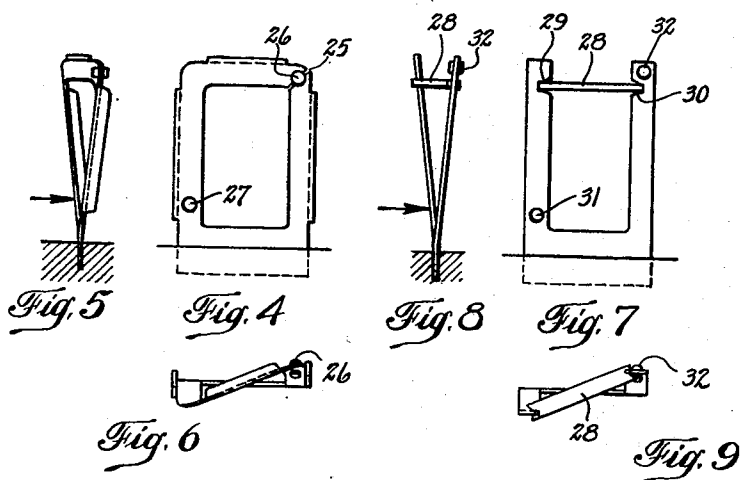
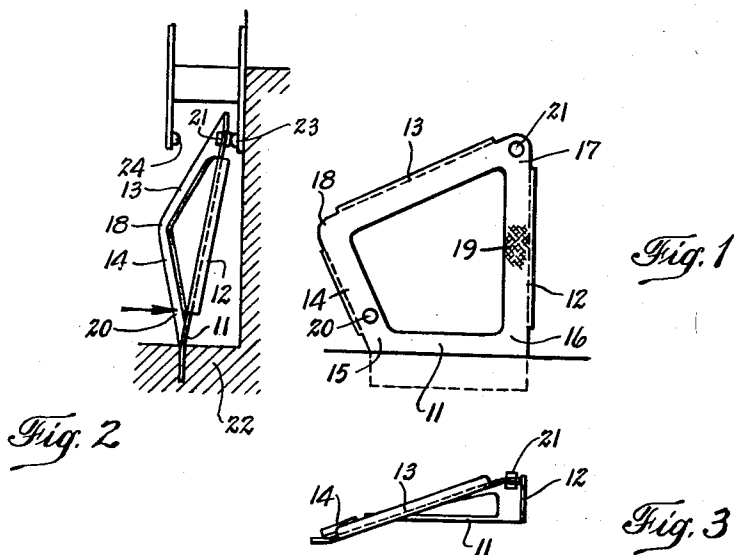
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FLEXIBLE CONTACT FOR CONTROL SWITCH

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FLEXIBLE CONTACT FOR CONTROL SWITCH

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The present invention relates to a novel improvement in flexible contacts for control switches, particularly, in control switches used in tumbler switches for regulating electrical appliances.

The objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

It is present practice to utilize flexible contacts in which the contact is clamped to a stationary body in such a manner that it may be permanently deformed under the influence of the clamping forces. If the clamping forces are stationary the application of an outside force to the contact will cause the contact to execute snap motions which are greater at certain points than the motion of the point at which the force is directed. Such a device, however, has the disadvantage that the deformation of the different points on the contact depends to a large degree on the manner in which the contact is clamped, consequently, special measures must be taken to insure an exact adjustment of the clamping. This renders the production of large quantities of such switches extremely difficult and costly.

There are other switch contacts in which a pair of parallel strips are connected across the ends by webs and in which one of the strips is shortened, as for example, by folding. This construction causes the other strip to bend in the shape of a bow and the opposite transverse web to execute snap motions if a controlling force is applied to the flexed strip. The disadvantage of this construction, however, is that the magnitude of the snap motion is practically the same as the magnitude of the motion of the force applied to the flexed strip. This type of contact, therefore, is not considered to be suitable for control functions and is limited to use in manually operated switches.

The applicant's invention comprises a flexible contact formed from flexible material. One side of the contact is fixedly positioned with respect to the switch while the opposite ends of the contact are placed under a permanent stress which deforms the opposite end in such a manner that the opposing corners are disposed on opposite sides of a plane passing through the clamped side. In other words, the unclamped portions of the contact are permanently stressed so as to form asymmetrical deformations in the remaining sides. To this end the applicant preferably provides a quadrilateral contact in which one side is clamped to the switch body. The contact is either deformed by a squeezing operation which produces an elongation in one side or a member is inserted in the contact in such a manner as to cause

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the opposing sides of the contact to spread. In such a stressed condition the contact is admirably suited to impart snap motions to certain portions thereof. These motions will occur whenever a suitable control force is applied to one side of the contact at a point adjacent to the fixed side which force will cause the opposite side of the contact to snap into a substantially opposite position.

It will be understood that the foregoing general description and the following detailed description as well as the drawings are exemplary and explanatory of the invention but are not restrictive thereof.

The accompanying drawing referred to herein and constituting a part hereof illustrate various embodiments of the invention and together with the description serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a plan view of one form which the invention may take;

Figure 2 is a lateral elevation of Figure 1 showing the contact applied to a switch mechanism;

Figure 3 is an end elevation of Figure 1;

Figure 4 is a plan view of another form of the invention;

Figure 5 is a lateral elevation of Figure 4;

Figure 6 is an end elevation of Figure 4;

Figure 7 is a plan view of a third embodiment of the invention;

Figure 8 is a lateral elevation of Figure 7, and

Figure 9 is an end view of Figure 7.

Referring at first to Figures 1-3 there is shown a quadrilateral, oblique-angled frame constructed from any suitable flexible material such as sheet metal. The side 11 of the frame serves as a clamping side and may be joined to the switch body 22 by any suitable means. The remaining free sides 12, 13, 14 have each been stiffened at the outer side by means of a longitudinal edge. Between these stiffened sides lie the flexible corner zones 15, 16, 17, 18. The side 12 has been squeezed at a point 19 in such a way that the side is given a permanent deformation, namely an elongation and the compressive stress caused thereby in the material produces an asymmetrical twist on each of the two opposite sides. Because of the stiffening of the sides with the longitudinal edges no bending occurs in these sides but the warping of the frame takes place exclusively in the corner zones. In this deformed condition the frame occupies a position in which the corners 17, 18 are each disposed upon an opposite side of an imaginary plane passing through the side 11. If a compressive force is applied to a point 20 the frame snaps into a substantially opposite position. In order to utilize this snap motion a contact rivet 21 is arranged in the corner zone 17. In the normal position of the contact the contact rivet 21 bears against a stationary contact 23, and in the operative position against the stationary contact 24. The distance between the contacts 23, 24 and the lateral deformation of the contact rivet 21 relative to the clamping side 11 are selected so that the contacts 21, 23 rest, in the inoperative position, upon each other and, in the operative position, the contacts 21, 24 touch each other before reaching dead center, so that when the controlling force is removed from the point 20 the frame snaps back into the inoperative position automatically.

The manner of clamping side 11 to the switch body 22 is not important and may take any one of many forms. The side may be screwed to the switch body, or riveted or soldered and it is of no importance whether the clamping is effected for the entire length of the side 11 or for only a portion of it, or at individual points only. Nor is the point of force application 20 bound to any particular location. The latter may be changed to cor-

respond to the magnitude of the controlling force and the control stroke desired. The closer the point 20 is to the corner zone 15 the greater must be the controlling force with a small control stroke. The closer the point is to the corner zone 18 the smaller is the controlling force required with a larger control stroke. The corner zone 18 is the limit of location for the point 20. If the point of force application is near the corner zone 15 the corner zone 18 also executes a snap motion, but one with a smaller stroke than that of the corner zone 17, because the corner zone 17 lies on the longer diagonal. If both zones 17, 18 are to have the same stroke in carrying out the control function the two diagonals must be made of the same size, i. e., the frame must be given the shape of a trapezoid or a rectangle.

Referring now to Figures 4-6 there is shown an embodiment of the invention in which the frame is formed in the shape of a rectangle. The free sides are stiffened by means of longitudinal edges. The deformation for the creation of compressive strain is attained by cutting open the frame at point 25, and providing therein a hole to receive the contact rivet 26. The diameter of the hole is somewhat smaller than the diameter of the rivet and when the rivet is inserted into the hole the opposite sides of the rectangle are spread out and assume the position shown in Figure 5. A controlling force acts at the point 27 and the two free corner zones are tilted with the same stroke.

Another embodiment of the invention is illustrated in Figures 7-9 where the side opposite the clamping side of a rectangular frame is cut out and the free ends of the two sides are spread out by inserting therebetween another side 28 which is longer than the side cut out. To this end each of the sides is provided with notches 29, 30 in which the ends of a side 28 are incased. In this manner the permanent deformation of the free sides is attained. The controlling force acts at a point 31 and the two ends of the sides are tilted with the same stroke. The contact rivet 32 is provided on only one side but it is to be understood that the other side may also be provided with a contact rivet if desired.

It will be obvious to those skilled in the art that the applicant's invention may take many forms. It is not necessary to cut the sheet metal with parallel sides to form a frame but the same snap motion may be attained with a solid sheet if the sheet is braced in consequence of a permanent deformation produced by inner compressive strains. However, if the sheet metal is cut out and the sides are stiffened by longitudinal edges a more striking snap effect is attained.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

I claim:

1. In an electrical switch, a flexible contact, said contact forming a polygonal member having one side adapted to be fixedly secured to a base and a free side disposed oppositely to the first-mentioned side and having oppositely disposed corners thereon, said contact being stressed so as to cause the corners of the free side to lie on opposite sides of the plane of the first-mentioned side whereby a force applied to the contact on a side other than the first-mentioned side will cause a snap motion in the corners of the free side.

2. A flexible contact as set forth in claim 1 in which the contact forms a quadrilateral member having parallel sides.

3. A flexible contact as set forth in claim 1 characterized in that the sides are stiffened by longitudinal flanges intermediate the corners thereof so that the stress in the contact twists the contact at the corners.

4. A flexible contact as set forth in claim 1 in which the contact is a quadrilateral formed with unequal sides so as to have unequal diagonal distances and an electrical contact point is provided at that corner of the free side which lies on the longer diagonal.

5. A flexible contact as set forth in claim 1 in which the contact is stressed by squeezing one side so as to produce an elongation therein.

6. A flexible contact as set forth in claim 2 having a rectangular-shaped contact with an opening in a corner of the contact, and a member inserted into the opening to spread the free sides of the rectangular contact thereby producing a snap motion in one side of the contact whenever a control force is exerted on the opposite side.

7. A flexible contact as set forth in claim 2 having a U-shaped contact and a member inserted between the open ends of the contact said member having a length greater than the normal distance between the open ends so that the opposite sides of the contact are disposed on opposite sides of the plane of the fixed side.

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