Dec. 14, 1954 H. WINET 2,697,145

SNAP ACTION DEVICE

Filed Oct. 2, 1951

Fig. 1

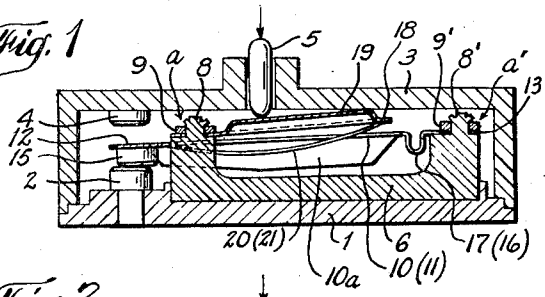

Fig. 8

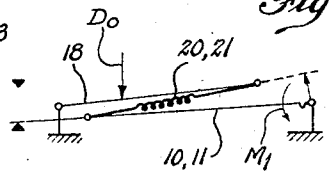

Fig. 2

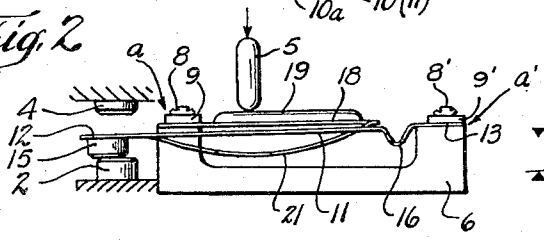

Fig. 9

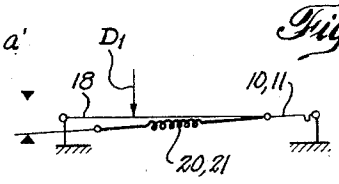

Fig. 3

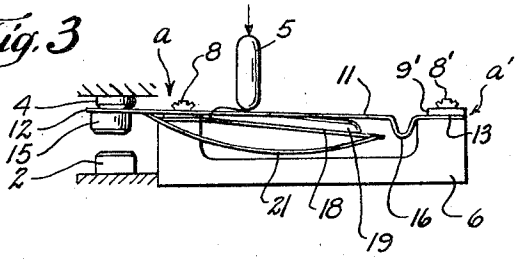

Fig. 10

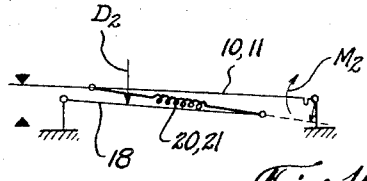

Fig. 4

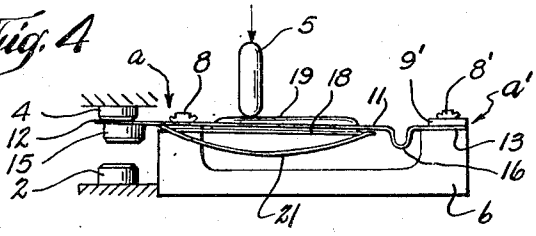

Fig. 5

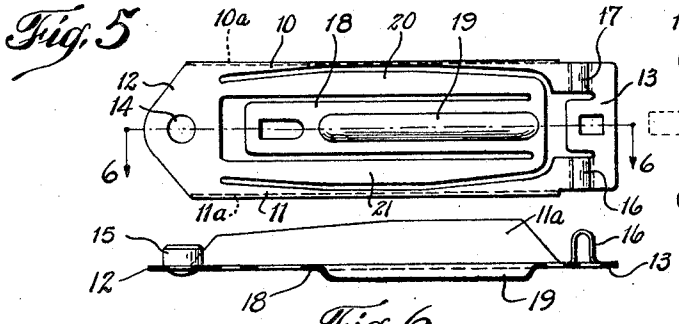

Fig. 7

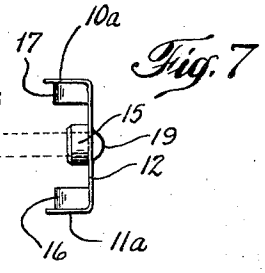

Fig. 6

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SNAP ACTION DEVICE

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7 Claims. (Cl. 200—67)

The present invention is a snap action device particularly as adapted to be used in electric switches.

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 pointed out in the appended claims.

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

An object of the invention is to provide a novel snap action device which can be made from a single blank cheaply and easily.

A further object of the invention is to provide a novel snap action device which can readily be adapted to be used with electric switches, and similar devices.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

In the drawings:

Fig. 1 is a front sectional view showing the novel snap action device mounted in a tumbler switch with the snap action device shown in its normal position of rest.

Figs. 2–4 are front elevational views of the snap action device in a tumbler switch in various operative positions. Fig. 4 illustrates the abnormal position in contrast to Fig. 1, the normal or resting position.

Fig. 5 is a top plan view of the novel snap action device.

Fig. 6 is a sectional view of the embodiment shown in Fig. 5, as viewed along line 6—6.

Fig. 7 is a side elevational view of the embodiment shown in Fig. 5.

Figs. 8 to 10 are diagrammatic representations of the trip spring in the operative positions illustrated in Figs. 1–3.

As shown in Fig. 1, the snap action device is mounted in a tumbler switch, said tumbler switch consisting of a mounting plate 1 made of insulating material, a contact 2, a housing cover 3, a second contact 4 and a switching member 5. The switching member 5 is operatively connected to the novel snap action device. The snap action device is made from a single blank and is in the form of a spring. The snap action device or spring is positioned in the housing formed by the mounting plate 1 and the cover 3, said spring locally fixed at two points *a*, *a'* to a base piece 6, the base piece 6 having the shape of a U (Figs. 1–4) formed within a plane (as shown by the dotted lines of Fig. 7). The spring may be fixed, for example, by welding with the U-shaped plane plate 6 having projections 8—8' on which washers 9, 9' are mounted. The snap action device or spring consists of two longitudinal stiffened members 10 and 11 connected integrally by end members 12 and 13. End member 12 has an aperture 14 adapted to receive a contact 15. The members 10 and 11 are stiffened by means of bending-over operations effected on the outwardly directed edges of said parts to form lips 10*a* and 11*a*. Elastically deformable U-shaped sections 16 and 17 are formed near the right end of stiffening members 10 and 11 by merely bending said members in the shape of a U out of the plane of said stiffened members. From the left stationary point *a*, there passes to the right another stiffened member 18, the stiffening of which is brought about by stamping it in the shape of a trough 19. Two compression spring parts 20 and 21 are connected at their left

end to end member 12 and at their right end to stiffened member 18. In making the spring, the spring is stamped out of an elastic piece of sheet such as bronze sheet. The members 20 and 21 must be bent upwardly when the spring is mounted in the plate 6 so that said members 20 and 21 can serve afterwards as compression springs.

Figs. 8 to 10, the diagrammatic illustrations of the spring, have been included in order to show the forces acting on the spring when in use. In the position of rest shown in Fig. 8, a turning moment M_1 acts in a counterclockwise direction on the stiffened members 10 and 11 which are connected at their left end by the end member 12 carrying the contact 15, which turning moment produces a comparatively large pressure between contacts 2 and 15. If a definite actuating pressure D_0 acts on the stiffened member 18, said member 18 is swung in a clockwise direction. This in turn causes the right end of member 18 to drop thus decreasing the turning moment M_1. As can be seen in Fig. 9, after the right end of stiffened member 18 has dropped to a certain point, the compressive force of the members 20 and 21 now acts in the plane of the stiffened members 10 and 11. A slight additional increase of the actuating pressure D_0 to D_1 produces a small shift of the stiffened member 18 which causes the spring to trip. As can be seen in Fig. 10, the turning moment now acts in the clockwise direction on the stiffened members 10 and 11. In order to return the switch to its original contact position, the pressure on the switching member 5 must be reduced from D_1 to (D_2-D_1). By moving the parts 2 and 4, it is also possible to cause the spring to trip by means of an actuating pressure in the opposite direction.

As can be seen from the relative shapes of members 16 and 17 in Figs. 1–4, the forces of different magnitude acting in the longitudinal direction of tension members 10, 11 cause the elastically deformable members 16 and 17 to change their shape so that contact 15 executes a relative motion in the horizontal direction. This has the double feature in that, first, a self-cleaning effect of the contact surfaces is obtained and secondly, contact weldings that have occurred are removed.

The snap action device or spring of this invention has many other desirable features. Since no knife edges are used as part of the device, the spring remains practically free of friction since no friction surfaces are present and only variations of internal strain appear at the bearing points. Changes in stress of the spring in consequence of wear of bearings are therefore out of question. The flexure of compression members 20 and 21 is not critical, as according to Euler the power of reaction of a leaf spring subjected to buckling stress remains almost constant for small flexures within the elastic limit, in contradistinction to the conditions obtained with regard to helical springs. This offers the advantage that the making and mounting of the spring is greatly facilitated as no narrow tolerances must be observed. For the same reasons, no adjusting members for the pressure of the spring are necessary. The electric current carrying capacity of the current carrying spring is comparatively great as no unsafe points in knife edge bearings need be taken into consideration.

As mentioned previously the spring may be stamped from a single blank which makes its production very cheap. No support members for compression members 20 and 21 are required and it is obvious that it is relatively simple to mount the spring when in use.

The invention in its broader aspects is not limited to the specific combinations and improvements 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. A snap action device made from a single blank of metal comprising two symmetrically arranged spring members acting as compression springs, said members being disposed between two stiffened members, said stiffened members being stationary at one end and connected to each other at the other end by means of a contact carrying member, each of said stiffened members having

an elastically deformable section, and a third stiffened member located between said symmetrically arranged spring members and being stationary at the opposite end at which said above two stiffened members are stationary, said third stiffened member being free at its other end and serving as an actuating member.

2. A snap action device as defined in claim 1, in which the elastically deformable section of the two stiffened members is U-shaped section bent out of the plane of the snap action device.

3. A snap action device as defined in claim 1 in which the stationary ends of the three stiffened members are supported on the outer legs of a U-shaped plane base piece.

4. A snap action device as defined in claim 3 in which the stationary ends of the three stiffened members are welded to the legs of the plane base piece.

5. A snap action device made from a single blank of metal comprising a base piece, two stiffened members connected one to the other at one end by a connecting member fixedly mounted on said base piece and at the other end by a contact carrying member, each of said stiffened members having an elastically deformable bulge projecting from the plane of the stiffened member adjacent its mounted end, two symmetrically arranged spring members disposed between said stiffened members and acting as compression springs, said spring members connected at one of their ends to said contact carrying

member and connected at their other end to a third stiffened member, said third stiffened member disposed between said spring members and fixedly mounted on said base piece at its end opposite it its end connected to said spring members, whereby said third stiffened member is an actuator.

6. A snap action device as defined in claim 5 characterized by the fact that the outer longitudinal edges of the first mentioned two stiffened members are bent over to increase the stiffening effect.

7. A snap action device as defined in claim 6 characterized by the fact that the third stiffened member is stamped with a longitudinally extending trough whereby the stiffening effect is increased.

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