

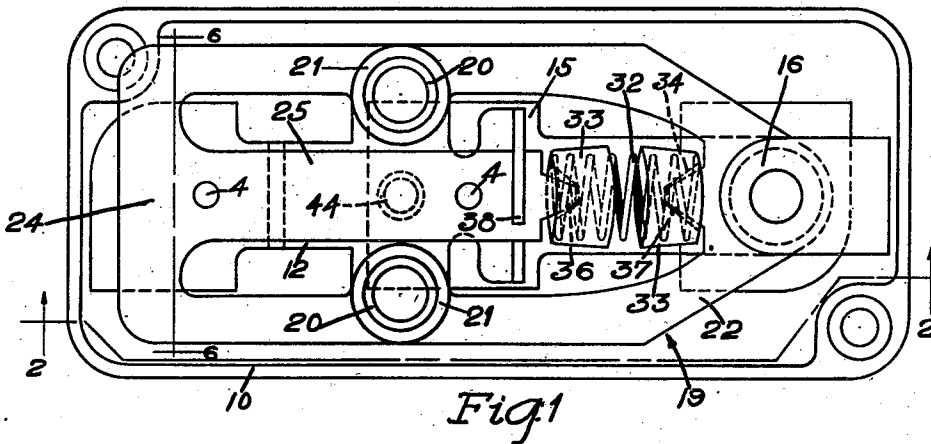
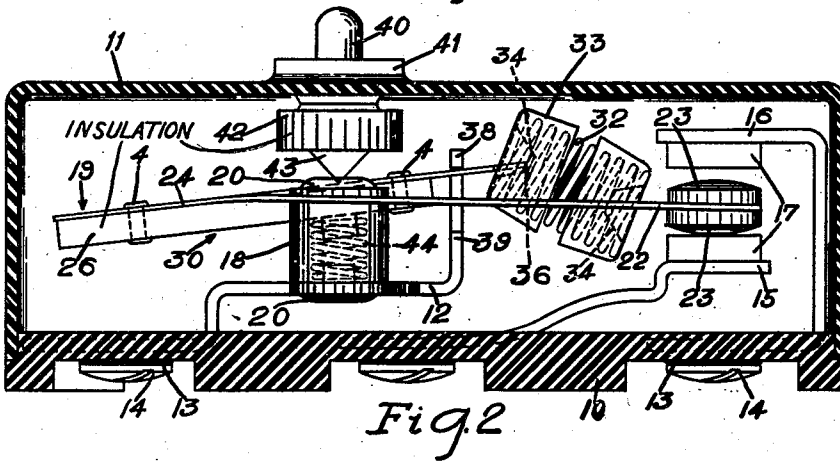
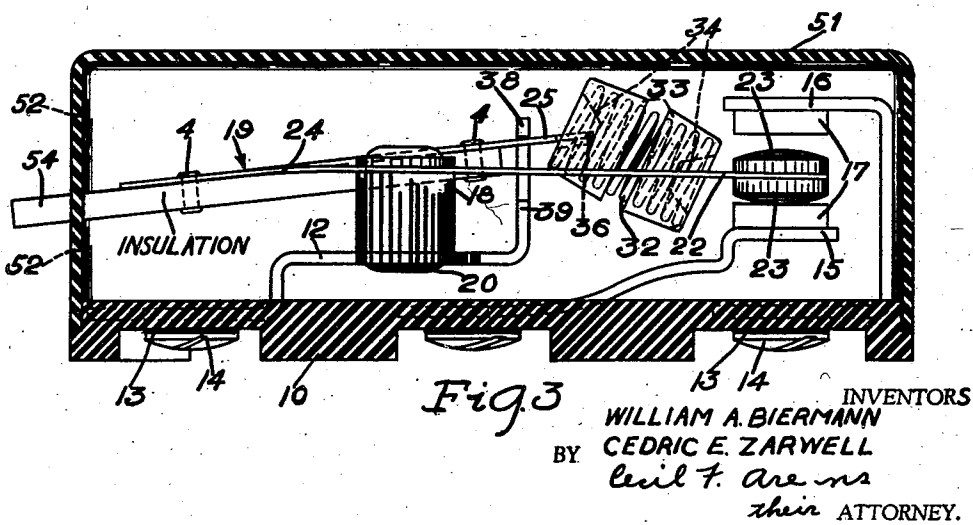
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SNAP ACTION SWITCH

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SNAP ACTION SWITCH

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This invention relates to electric circuit interrupters, and more particularly to that type of interrupter commonly known in the art as a snap action switch and may be employed where a quick make and/or quick break of the electrical contacts is required.

Another object of the novel invention is to provide a snap action switch which maintains a constant maximum contact pressure up to the breaking point.

A still further object of the device of this invention lies in the provision of a circuit interrupter of the snap action type wherein the pivot point of the actuating member is moved when it is desired to break the circuit in order to decrease the time interval between maximum contact pressure and no-contact contact pressure to a minimum.

A further important improvement lies in the use of a device of this invention using a floating pivot where it is imperative that the actuating means overtravel or go beyond the actual distance required to snap the switch from one position to another.

Another important feature resides in the simplicity of construction and assembly of parts.

A still further object resides in the provision of a compensating member which permits the use of a compression spring which need not be balanced for use with a single piece of stock but may be used with a variety of stock of different thicknesses.

An ideal switch of this type would be one in which the time interval between maximum contact pressure and no-contact pressure would be zero. Of course, it is theoretically impossible to have such a condition of zero time but this time interval can be reduced to a minimum and it is a purpose of our invention to do this. It is well known in the art that maximum contact pressure is desired at all times up to the break point to prevent frying or burning of the contacts.

Our invention further resides in the combination, construction and arrangement of parts shown in the accompanying drawing, and while we have illustrated therein preferred embodiments it is to be understood that the same are susceptible of modification and change without departing from the spirit of our invention.

In the drawing:

Figure 1 is a top plan view of the preferred form of the device of this invention with the cover removed.

Figure 2 is a vertical cross-section partly in elevation taken on the line 2-2 of Figure 1.

Figure 3 is a vertical sectional view partly in elevation of a modified form of this invention.

Referring in detail to the drawing and more particularly to Figure 1, the illustrated embodiment of our novel invention comprises a base 10 which may be made of any insulating material or plastic composition such as Bakelite or the like. Removably secured to the base 10 is a cover 11 which may be made of the same material as the base. A switch supporting bracket 12 is securely mounted to the base 10 by tubular rivets 13 which are drilled and tapped for the reception of conductor holding screws 14. Contact supports 15 and 16 which are made of electrical conducting material are also rigidly secured to the base 10 by tubular rivets 13 which are tapped for the reception of screws 14. Contacts 17 which may be of any suitable material such as silver are riveted or otherwise securely fastened to the contact supports 15 and 16 in some conventional manner.

Two upstanding posts 18 disposed on either side of the supporting bracket 12 and integral therewith or fastened thereto carry the switch blade designated generally by the numeral 19. The switch blade 19 which is in the form of a leaf spring or resilient strip and which may be made of any suitable electrical conducting material is securely fixed to the upstanding posts 18 by rivets 20 which are adapted to interengage the posts 18 and support 12. A washer disposed between the head of the rivet 20 and the resilient strip 19 provides a more positive means for holding said resilient strip securely to the upstanding post 18. The switch blade or resilient strip 19 is comprised of a front cantilever member 22 which carries the contacts 23, and a second or rear cantilever member 24 which carries the center actuating member 25. The center member 25 is an integral part of the switch blade 19 in the present embodiment but this is a matter of mechanical expedient or production advantage. The center actuating member 25 is reinforced with a substantially non-resilient element 26 to form a rigid center member 30. The non-resilient element 26 is secured to the member 25 in any suitable manner such as rivets 4.

The non-resilient element 26 and the resilient member 25 pivot about an imaginary axis 6 of the rear cantilever member 24 and are free to move upwardly or downwardly, thereby providing a floating pivot for said member 30. Interpolated between the center member 25 and the front cantilever member 22 is a compression spring 32 constrained in position by the spring retaining

cups 33 which are recessed at 34 to engage the bearings 36 and 37 which are an integral part of the members 25 and 22 respectively.

The supporting bracket 12 is upturned at one end to form stops 38 and 39 which restricts the vertical movement of the rigid member 30. An actuating stem 40 is slidably fitted into the hub portion 41 which is an integral part of cover 11 and terminates on the inside of said cover. An enlarged button 42 having a conical element 43 integral its lower end is securely attached to the stem 40 and limits the upward movement of said stem. The conical element 43 may be made to contact the rigid member 30 and successfully actuate it, any place between a center line drawn transversely through the posts 18 and the pivot point 6 of the rigid member on the rear cantilever arm. A compression spring 44 is disposed beneath the rigid actuating member 30 and is in vertical axial alignment with the actuating stem 40 and conical element 43. The upper convolutions of the spring 44 abut the rigid member 30 and the lower convolutions abut the supporting bracket 12. Both the upper and lower convolutions of the spring encircle integral projections of the members 30 and 12 respectively to constrain the spring in position. Depressing the stem 40 moves the actuating arm 25 downwardly and compresses the spring 44 disposed beneath said arm. The force built up in the spring 44 urges the actuating arm 25 upwardly to the position shown in Figure 2 when the external force is removed from the stem 40.

The modified form of this invention comprises a base 10, and a cover 51 having a slot 52 in one of its ends thru which a rigid actuating arm 54 extends. A supporting bracket 12, and contact supports 15 and 16 are mounted on the base 10 in the manner described in the preferred embodiment of our invention. The supports 16 and 15 carry the contacts 17 which co-act with the contacts 23 carried by the cantilever arm 22. Upstanding posts 18 which may be an integral part of the supporting arm 12, or riveted thereto, carry the switch blade 19, said switch blade being fixed to the posts in the same manner as hereinbefore set forth. The switch blade or resilient strip 19 has a front cantilever member 22 and a rear cantilever member 24 to which is pivotally secured and integral therewith a center actuating member 25. The member 24 need not be in the form of a cantilever but may be a coiled spring or other flexible means for providing a movable pivot for the center member. The actuating arm 54 which is a non-resilient material is fixedly connected to the members 24 and 25 to provide a rigid center member for operating the contact carrying member 22.

The flexible rear cantilever arm 24 provides a movable or floating pivot for the rigid actuating arm 54. The center actuating member 25 of the resilient strip 19, to which the rigid member 54 is immovably connected rotates with the actuating arm 54 when a force is applied at any point between the pivot axis of said arm and an infinite number of points to the left of said pivot axis as viewed in Figure 3. The pivot axis of this arm which pivots about the rear cantilever may be found mathematically or empirically. The stops 38 and 39 are an integral part of the upturned element of the supporting arm 12 and limit the throw of the member 25 vertically. A compression spring 32 is disposed between the end of member 25 and the cantilever member 22. The ends of the spring abut cupped shaped elements

33 which are recessed for the reception of bearings such as 36 and 37.

Many of the parts shown in the modified form are interchangeable with similar parts of the preferred embodiment as indicated by the parts having the same numeral in both forms of the invention. The major difference in the two devices lies in the point of application of the actuating force to the actuating arms.

A force applied to a predetermined point on the actuating arm of either embodiment of our invention will (referring to Figures 2 and 3) first move the pivot point about which the actuating arm theoretically revolves and then the continued application of this force will bring the actuating arm and its supporting member into balance with the force components of the front cantilever member and the coiled spring. After equilibrium is reached the continued application of force will cause the switch to snap across center.

Moving the pivot point of the actuating lever enables us to maintain a maximum contact pressure up to the breaking point of the circuit. This is because the toggle action of the actuating arm is delayed until the final snap action over center is required. The force applied to the actuating arm may be in the form of a manually operated button as shown, temperature responsive element and etc.

Having described the invention, we claim:

1. In a device of the character described, a supporting bracket, a resilient strip mounted on the supporting bracket beyond its mid-point, and electrical contacts carried by one end of said strip and a rigid actuating member carried by the other end of said strip, a center member fixed to said rigid actuating member, a spring interposed between said center member and the resilient strip, actuating means for said actuating member, stops for said center member, and contact supports having contacts thereon for cooperating with said electrical contacts carried by said strip.

2. A snap action switch comprising a supporting bracket having a leaf spring secured thereto, said leaf spring having two free ends free to move vertically, a non-resilient actuating member hingedly attached to one end of the leaf spring and free to rotate centrally of said leaf spring, center member integrally related to said leaf spring and secured to the non-resilient member and adapted to rotate therewith, means providing a floating pivot for said non-resilient member, current carrying contacts carried by the other end of said leaf spring, a compression spring interposed between said center member and the other end of said leaf spring, contact carrying supports having electrical contacts thereon, said electrical contacts co-operating with the current carrying contacts on said leaf spring to complete an electrical circuit, stops associated with said supporting bracket.

3. A snap action switch comprising a supporting bracket having a leaf spring secured thereto, said leaf spring having ends free to move vertically, a non-resilient actuating member hingedly attached to one end of the leaf spring and free to rotate about one end of said leaf spring, a center member secured to the non-resilient member, one of said free ends of said leaf spring providing a floating pivot for said non-resilient member, current carrying contacts carried by the other end of said leaf spring, a compression spring interposed between a point adjacent one

end of said non-resilient member and said leaf spring, contact carrying supports having electrical contacts thereon, said electrical contacts cooperating with the current carrying contacts on said leaf spring to complete an electrical circuit, stops associated with said supporting bracket.

4. A switch blade provided with a center member hingedly connected thereto, a supporting bracket for said switch blade, a compression spring interposed between said center member and one end of said switch blade and normally biasing the center member away from the switch blade, a non-resilient member carried by the other end of said switch blade and secured to said center member, said non-resilient member being free to rotate about a movable pivot axis and thereby provide a delayed toggle action for said switch blade, stops for said center member, current carrying contacts on one end of said switch blade, electrical contacts cooperating with said current carrying contacts.

5. In a device of the character described comprising two cantilever members, a supporting bracket for said cantilever members, said cantilever members having their free ends oppositely disposed and movable in the same direction when actuated with respect to said supporting bracket, an actuating member carried by one of said cantilevers and free to move vertically to change the pivot axis of the actuating member, a spring interposed between the actuating member and the other cantilever member whereby said cantilever member is biased to build up a vertical component of force in said cantilever member, contact carrying supports cooperating with said last named cantilever member, and stops for limiting the vertical movement of the actuating member, means for rotating the actuating member.

6. In a device of the class described, the combination of a switch supporting bracket, a flexible cantilever member on either side of said bracket the free ends of which are adapted to move vertically, a non-resilient actuating arm connected to the free end of one of said cantilevers and free to move vertically with said cantilever to change the pivot point of said non-resilient member, center member fixed to said resilient member, current carrying contacts carried by the other cantilever, a spring interposed between said center member and the last named cantilever member, contact carrying supports having electrical contacts thereon which cooperate with the contacts carried by one of said cantilevers, stops for said actuating member.

7. In a device of the class described, the combination of a switch supporting bracket, a resilient cantilever member on either side of said

bracket the free ends of which are adapted to move vertically, a non-resilient actuating arm connected to the free end of one of said cantilevers and free to move vertically with said cantilever to change the pivot point of said non-resilient member, a center member fixed to said non-resilient member, external means for operating said actuating member, means disposed adjacent said actuating member for returning said actuating member to normal position, current carrying contacts carried by the other cantilever, a spring interposed between the center member and said last named cantilever member, contact carrying supports having electrical contacts thereon which cooperate with the contacts carried by one of said cantilevers, stops for said actuating member.

8. In a device of the class described, the combination of a switch supporting bracket, a switch blade mounted on said supporting bracket and comprising two cantilever members acting on opposite sides of the supporting bracket, an actuating member hingedly connected to one of said cantilever members, a coiled spring interposed between said actuating member and the other of said cantilever members, means associated with said switch blade to compensate for different balanced coiled springs, electrical contacts carried by one of said cantilevers, contact carrying supports having contacts affixed thereto and cooperating with the contacts on said cantilever, stops for said actuating member.

9. In a device of the class described, the combination of a base, a cover having an opening therein and adapted to fit the base, a switch supporting bracket mounted on the base, a switch blade secured to the supporting bracket and forming a front and a rear cantilever member, said front and rear cantilever being hingedly connected to said switch supporting bracket, a rigid actuating member hingedly connected to the rear cantilever member and having a movable pivot axis, a spring between the rigid actuating member and the front cantilever member, contacts carried by the front cantilever member, contact carrying supports having current carrying contacts associated therewith, said contact carrying supports being mounted on said base, an external actuating pin extending through said cover and terminating within said cover, means for returning said rigid actuating member to its normal position after the external actuating pin is released, and stops for limiting the vertical travel of said rigid actuating member.

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