

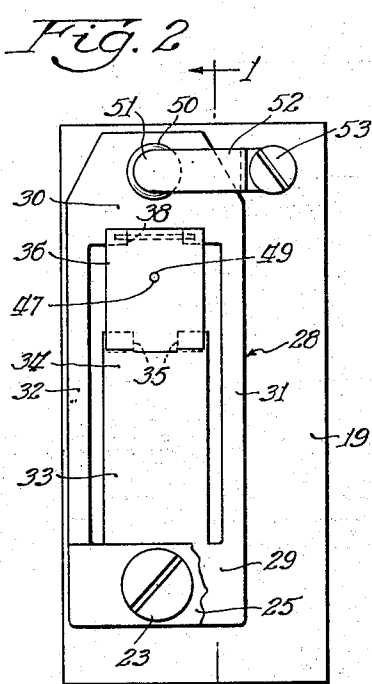
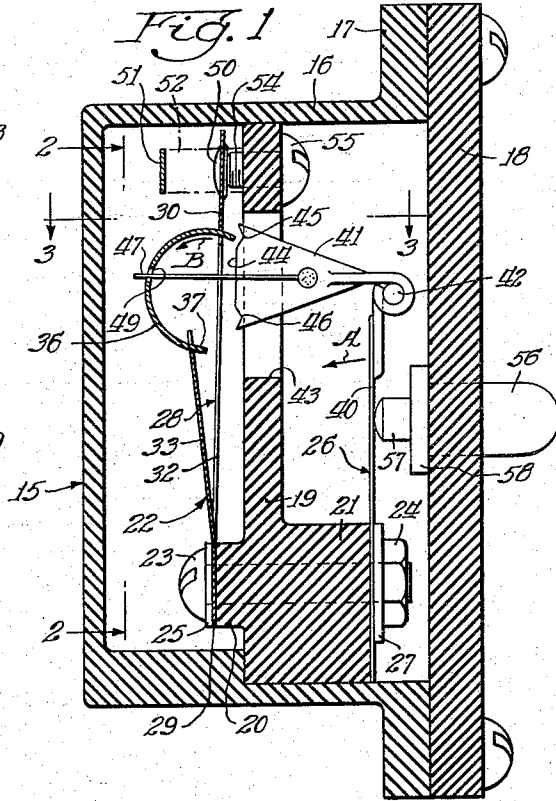
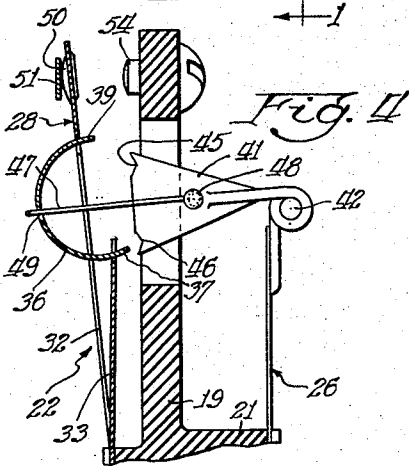
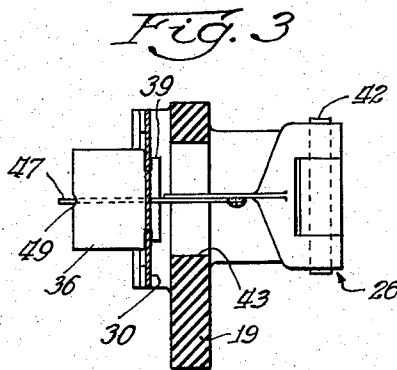
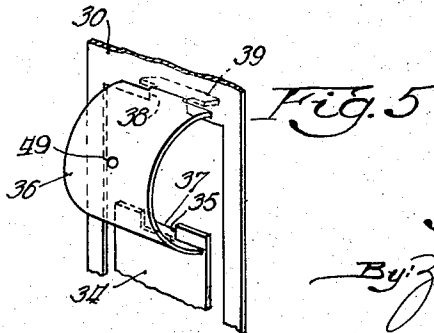
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SWITCH

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SWITCH

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3 Claims. (Cl. 200—67)

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The present invention relates to an electrical switch that has an "on" and "off" position, each of which positions can be positively held.

More specifically the invention has to do with that type of snap-acting switch commonly known in the electrical trade as a microswitch wherein only very short movements of an arm are required to move an electrical contact member between the "on" and "off" positions of the switch. The usual microswitch, however, is a snap-acting type of switch that is spring biased in either the "on" or "off" position and requires constant pressure against the movable contact member to hold the member in the other position.

The switch forming the subject matter of the present invention differs from the conventional microswitch in that provisions are made for positively holding the contact member in both the "on" and the "off" positions.

The primary advantage of the present invention is that all of the advantages of a conventional microswitch are embodied in a switch that is adapted to hold both the "on" and the "off" positions. Very little force is needed to actuate the switch and the distance of travel of the member that actuates the switch is very short as is characteristic of the conventional microswitch.

The foregoing constitute some of the objects and advantages of the present invention, others of which will become apparent from the following description and the drawings, in which

Fig. 1 is a longitudinal sectional view through the switch and the housing surrounding same, the view being taken on the line 1—1 of Fig. 2;

Fig. 2 is an elevational view of the switch shown in Fig. 1 with the housing removed, the view being taken in the direction of the arrows 2—2 of Fig. 1;

Fig. 3 is a transverse sectional view through a portion of the switch, the view being taken on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view corresponding to Fig. 1, but illustrating the switch parts disposed in the closed circuit position rather than in the open circuit position; and

Fig. 5 is an enlarged fragmentary perspective view of the spring element employed in the switch shown in Fig. 1.

For purposes of illustration a single embodiment of the present invention has been selected, it being recognized however that many modifications may be made without departing from the intended scope of the invention.

Referring to the drawings the present embodiment of the invention is illustrated in the

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form of a switch that is mounted in a housing generally indicated at 15 that comprises a box 16 having a peripheral flange 17 to which is secured a removable cover plate 18.

The switch comprises a frame member 19 that is suitably mounted in the housing 15. This frame member 19 has at one end a projecting portion 20 that extends outwardly from one face of the frame member 19 and a second projecting portion 21 that extends beyond the opposite face of the frame member. Extending substantially parallel with respect to the frame member 19 is a movable contact member generally indicated at 22 that is secured at one end to the projecting portion 20 of the frame member 19 by means of a bolt 23 that passes through the projecting portions 20 and 21. The bolt 23 is threaded at its opposite end to receive a nut 24. A washer 25 is disposed between the head of the bolt 23 and the contact member 22. At the opposite side of the frame member 19 is a switch actuating member generally indicated at 26 that is secured at one end to the projecting portion 21 of the frame member 19 by means of the bolt 23 and nut 24. A washer 27 is mounted between the nut 24 and the actuating member 26.

The contact member 22 comprises a frame-like contact portion 28 (Fig. 2) that includes lower and upper parallel portions 29 and 30 connected by side portions 31 and 32. A central portion 33 is integral with the lower portion 29 and extends toward the opposite end portion 30 but terminates short of the end portion 30 as at 34. This central portion 33 has a width less than the distance between the side portions 31 and 32 as best indicated in Fig. 2. Adjacent to the free end 34 of the central portion 33 is a notch 35. An arcuate spring 36 (Fig. 1) is provided with an ear 37 at its lower edge, which ear is adapted to project into a notch 35 in the central portion 33. As best shown in Fig. 5 the end portion 30 of the contact member 28 is provided with a notch 38 that is adapted to receive an ear 39 on the corresponding end of the arcuate spring 36 to hold the upper end of the spring in place.

The actuating member 26 (Fig. 1) comprises a leaf spring 40 that has attached to its free end an arm 41 that is pivoted at 42. This arm 41 projects through an aperture 43 in the frame member 19 and in the form shown is provided with a relatively wide spring engaging edge 44 including a pair of engaging notches 45 and 46. As best shown in Fig. 4 the relatively fine wire-like guide member 47 is fixed at 48 to the side of the arm 41 and the arcuate spring 36 is

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provided with an aperture 49, through which aperture the guide member 47 projects. This wire-like guide member 47 though fixed at 48 to the arm 41 is adapted to flex though it has the characteristics of a spring that constantly tends to maintain its normal position substantially along the central axis of the arm 41.

The free end of the contact portion 28 of the contact member 22 is provided with a contact engaging surface 51 that is adapted to engage a cooperating surface 51 (Fig. 1) on the end of an electrical conductor 52. This conductor 52 is secured to the frame 19 at 53 (Fig. 2) and is normally spaced from the frame member 19 as indicated in Fig. 1. A stop 54 is provided by the end of a screw 55 that passes through the frame member 19 and is adapted to limit the movement in one direction of the contact portion 28 of the contact member 22.

Projecting through the cover plate 18 is a switch button 56 that is provided on its inner end with a boss 57 that engages the leaf spring 40 of the actuating member 26. An annular shoulder portion 58 is provided between the boss 57 and the enlarged portion of the actuating button 56 and is adapted to engage the inner face of the cover plate 18 as best shown in Fig. 1. In operating the switch pressure is applied onto the actuating button 56 so as to move this button to the left (Fig. 1). This movement of the button 56 rotates the leaf spring 40 in the direction of the arrow A so as to move the arm 41 to the left until the notch 45 in the engaging surface 44 engages the adjacent end of the arcuate spring 36. Upon further movement of the button 56 to the left force is transmitted through the arm 41 so as to force the adjacent edge of the arcuate spring 36 in the direction indicated by the arrow B causing the spring 36 to rotate and carry with it the contact portion 28 of the contact member 22 so that this contact portion 28 moves from its position shown in Fig. 1 in a direction toward the contacting surface 51. During this movement the rotation of the arcuate spring 36 in a counterclockwise direction moves the central portion 33 of the contact member 22 in a clockwise direction so as to bring the central portion 33 and the contact portion 28 into the same plane. This relative movement as between the central portion 33 of the contact portion 28 of the contact member 22 shortens the distance between the notches 35 (Fig. 2) and the nearest edge of the end portion 30 thereby compressing the arcuate spring 36. This relative position between the central portion 33 and the contact portion 28 of the contact member 22 corresponds with a dead-center position so that upon further movement of the arm 41 to the left with the resulting counterclockwise movement of the arcuate spring 36 the central portion 33 of the contact member 22 passes the dead-center position with respect to the contact portion 28 and the force of compression in the arcuate spring 36 is released so as to snap the contact portion 28 of the contact member 22 to its extreme left position shown in Fig. 4 with the contact surface 50 against the face of the cooperating engaging member 51. In this position shown in Fig. 4 an electrical circuit through the switch is completed, the circuit comprising the cooperating surfaces 50 and 51, the contact portion 28 of the contact member 22 and lead wires (not shown) that would normally be electrically connected to the bolt 23 and screw 53.

While the arm 41 is moving in the direction of

the arrow A in Fig. 1 the arm is prevented from rotating about the pivot point 42 on the free end of the leaf spring 40 by the cooperation between the notch 45 in the engaging edge 44 and the adjacent end of the arcuate spring 36. During this same movement the arcuate spring 36 is caused to rotate in a counterclockwise direction as previously described so that the guide member 47 is distorted or bent downwardly out of its normally relative position with respect to the arm 41. As soon as the dead-center position of the central portion 33 of the contact member 22 is passed through the arcuate spring 36 is caused to rotate rapidly to the position shown in Fig. 4 so that the upper edge 39 of the arcuate spring 36 moves out of engagement with the slot 45 in the arm 41 at which time the guide spring 47 is allowed to return to its normal straight position so as to move the arm 41 about the pivot point 42 to the lower position shown in Fig. 4. Slot 46 is now aligned with the lower edge 37 of the arcuate spring 36. When the actuating button 56 is allowed to return to the position shown in Fig. 1 the circuit through the switch is now maintained closed. To open the circuit through the switch pressure is again applied to the actuating button 56 so as to move the leaf spring in the direction of the arrow A, but in this instance the lower edge 37 of the arcuate spring 36 is engaged in the notch 46 so that the arcuate spring is now rotated in a clockwise direction, thereby returning the central portion of the contact member 22 to the dead-center position with respect to the contact portion 28 and upon further movement of the button 56 this dead-center position is passed so that the arcuate spring 36 forces the contact portion 28 rapidly away from the engaging surface 51 to the position shown in Fig. 1, thereby snapping the switch to its open position. Force on the actuating button 56 is then released and the parts returned to their relative position shown in Fig. 1 with the arm 41 in its uppermost position where the notch 45 is aligned with the upper edge 39 of the arcuate spring 36.

Thus there is disclosed an effective "on" and "off" switch that is adapted to hold either position.

I claim:

1. A switch of the class described comprising a circuit contacting member and a cooperating member, each having a free end, the free ends being spaced apart, an arcuate shaped spring interposed between the free ends and having portions pivotally secured to the members adjacent to their free ends, an actuating member including a pivoted arm adapted to actuate alternatively the contacting member and the cooperating member adjacent to said free ends, and a guide spring normally centering the arm relative to the arcuate spring.

2. A switch of the class described comprising a circuit contacting member and a cooperating member, each having a free end, the free ends being spaced apart, an arcuate shaped spring interposed between the free ends and having portions pivotally secured to the members adjacent to their free ends, an actuating member including a pivoted arm adapted to actuate alternatively the contacting member and the cooperating member adjacent to said free ends, and a guide spring normally centering the arm relative to the arcuate spring, the contacting member and cooperating member being adapted to pivot with respect to each other and to assume

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a dead-center relationship with respect to each other, the arcuate spring normally urging the contact member and cooperating member out of dead-center relationship.

3. A device of the character described comprising a circuit contacting member and a cooperating member, each having a free end and the free end of each member having a support which is spaced from the support of the other member, a normally flat spring interposed between and having smooth portions resting upon the said supports, and said supports being in sufficiently close proximity to each other to hold said spring under compression with portions thereof in the form of an arm, means for maintaining said spring in operative association with said members and for rocking it upon its support, said means including means on the cooperating member loosely interconnected with a portion of the spring so as to engage said spring and move it bodily upon said supports with a rocking action during move-

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ment of said cooperating member, and means on the contacting member loosely interconnected with another portion of said spring which permits a rocking movement of said spring upon the support of the cooperating member, an actuating member including a pivoted arm adapted to actuate alternatively the contacting member and the cooperating member adjacent to said free ends, and a guide spring normally centering the arm relative to the arcuate spring.

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