Aug. 11, 1953 R. J. WELLWORTH 2,648,730

SNAP SWITCH

Filed Aug. 18, 1950

Fig. 1.

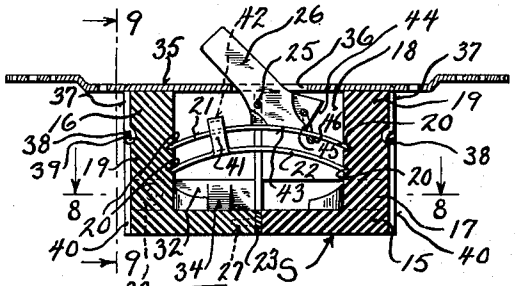


Fig. 2.

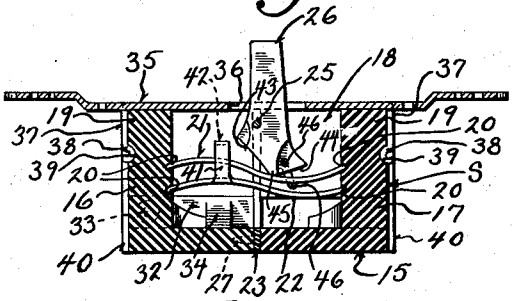


Fig. 3.

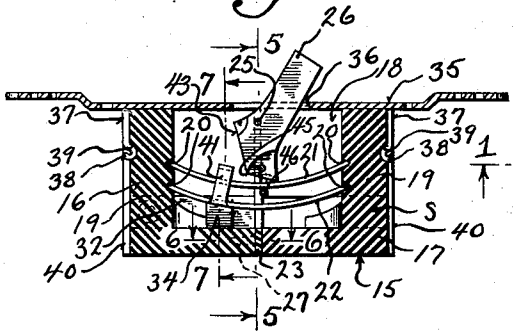


Fig. 4.

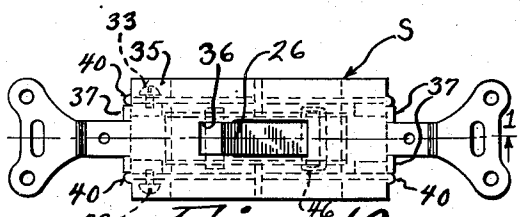


Fig. 10.

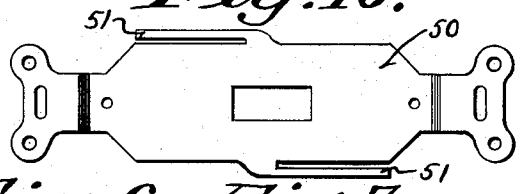


Fig. 5.

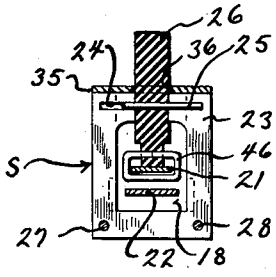


Fig. 6.

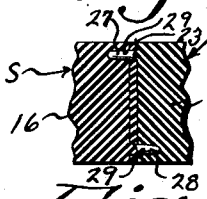


Fig. 7.

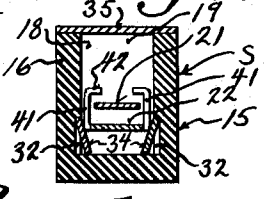


Fig. 9.

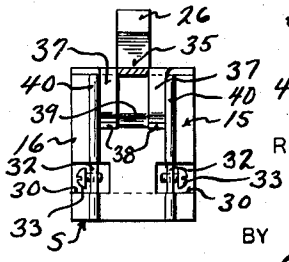


Fig. 11.

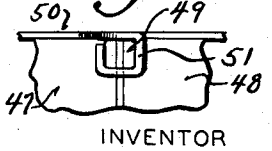
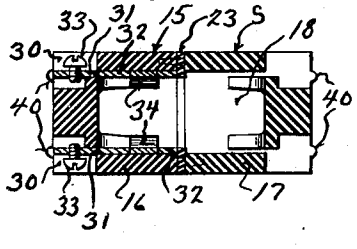


Fig. 8.



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SNAP SWITCH

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Application August 18, 1950, Serial No. 180,137

5 Claims. (Cl. 200—67)

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This invention appertains to switches for controlling one or more circuits, and more particularly to a novel electric switch of the snap type.

One of the primary objects of the invention is to provide a manually operated switch of a simple and durable construction in which a desirable quick closing and opening of the circuit or circuits is had, whereby to eliminate arcing and sparking at the contact points.

Another salient object of the invention is to provide means for delaying the snap action of the switch for opening and closing the circuit until the operating lever or button, as the case may be, is actuated by the operator to its full open or closed position, so as to insure the proper operation of the switch on each movement thereof.

A further object of the invention is to provide a dual snap spring action switch, embodying a pair of like bowed springs, with means for actuating one of the springs from a switch lever or the like and means for operating the other spring from the first spring for opening and closing circuits.

A further important object of the invention is to provide novel means for forming the switch housing from like, companion molded half sections, with means including the supporting bridge plate for effectively uniting and closing the sections, whereby the switch can be easily and economically manufactured and assembled.

A still further object of the invention is to provide novel means for assembling and supporting the pivot pin for the switch lever between the companion housing sections.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts as will be hereinafter more specifically described and claimed, and illustrated in the accompanying drawing, in which drawing,

Figure 1 is a longitudinal sectional view through a switch constructed in accordance with this invention, the section being taken on the line 1—1 of Figure 4, looking in the direction of the arrows.

Figure 2 is a view similar to Figure 1, and showing the switch in its partially operated position and just prior to the movement of one bowed spring to its circuit closing position.

Fig. 3 is a view similar to Figures 1 and 2 and showing the switch in its circuit closing position.

Figure 4 is a top plan view of the switch.

Figure 5 is a transverse sectional view through

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the switch, taken on the line 5—5 of Figure 3, looking in the direction of the arrows and illustrating the novel mounting of the pivot pin for the switch lever.

Figure 6 is a fragmentary detail longitudinal sectional view, taken on the line 6—6 of Figure 3, looking in the direction of the arrows, illustrating the interconnection of the companion half sections of the housing.

Figure 7 is a transverse sectional view, taken on the line 7—7 of Figure 3, looking in the direction of the arrows.

Figure 8 is a longitudinal sectional view through the switch, taken on the line 8—8 of Figure 1, looking in the direction of the arrows, illustrating the means for mounting the stationary contacts in place.

Figure 9 is an end elevational view of the switch.

Figure 10 is a top plan view of a slightly modified form of a supporting bridge plate for connecting the companion half sections of the housing.

Figure 11 is a fragmentary side elevational view illustrating the modified form of the supporting bridge plate in position for connecting companion housing half sections.

Referring to the drawing in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter S generally indicates the improved switch and the same includes a switch housing 15 for receiving various operating parts of the switch as will later appear. The housing 15 is formed from a pair of like companion half sections 16 and 17. These sections are molded from suitable dielectric material and can be formed from the same die or mold. The sections when placed together define an interior compartment 18 and the end walls 19 of the compartment are provided with transversely extending grooves or recesses 20, into which are fitted the normally spaced inner and outer bowed leaf springs 21 and 22. The leaf springs 21 and 22 are formed from spring metal and are normally arched as shown in Figures 1 and 3. Between the adjacent ends of the housing sections 16 and 17 is placed a substantially U-shaped barrier plate 23 also formed of dielectric material, and the plate 23 adjacent to its outer end is provided with recesses 24, which receive the pivot pin 25 for the operating switch lever 26. When the sections 16 and 17 are assembled, the adjacent ends of the sections 16 and 17 close the opposite sides of the recesses 24 and prevent displace-

ment of the pivot pin 25. As best shown in Figure 6, pins 27 can be molded on the sections 16 and 17 and these pins are received in locating sockets 28, also molded in the sections 16 and 17. The barrier plate 23 is provided with openings 29 for receiving these pins.

The sections 16 and 17 are also provided with end recesses 30 and openings 31. The openings 31 communicate with the recesses and the interior of the compartment 18, and receive stationary contact strips 32. In the present instance, I have only shown two contact strips 32 for the purpose of simplicity and it is to be understood that where more than one circuit is to be controlled, like contact strips 32 can be used on the other side of the housing from the two contact strips 32 shown and above the springs 21 and 22. It is to be noted that the inner ends of the contacts 32 abut against the barrier plate 23. The outer ends of the strips 32 carry screws 33, whereby electric conductor wires can be connected to the strips and these wires and screws are received within the recesses 30. The strips have struck out therefrom, contact tongues 34.

Where a single circuit is being controlled, I employ a bridge and supporting plate 35 of the type shown in Figures 1 to 7, inclusive. The intermediate portion of the plate 35 is provided with a slot 36 for the reception of the switch lever 26, and the ends of the plate are formed in the usual manner for the reception of fastening elements, not shown, for connecting the switch with the outlet box, also not shown. In accordance with this invention, the plate 35 has formed thereon adjacent to its opposite ends, inwardly extending resilient arms 37 and the inner ends of the resilient arms terminate in rolled beads 38, which are adapted to snap into the grooves 39, formed in the opposite ends of the switch housing 15. The outer faces of the end walls 19 of the switch housing 15, can be provided with ribs 40 which form guides for the resilient arms 37 and obviously when the bridge plate 35 is snapped over the housing 15, the arms 37 will function to hold the sections 16 and 17 of the housing in their assembled position.

Now, referring to the companion bowed springs 21 and 22, it is to be noted that the inner spring 22 has formed thereon side contact arms 41 which lie on opposite sides of the outer spring 21. The outer ends of the contact arms 40 are provided with inwardly directed fingers 42, which extend over the outer spring 21. These springs 21 and 22 and the contact arms 41 form an important part of the invention, as will now appear, and it is to be noted that the contact arms 41 engage and are in transverse alignment with the contact tongues 34 of the contact strips 32 when the springs are bowed to their innermost position, as shown in Figures 3, 5 and 7. The switch lever 26 extends inwardly toward the springs 21 and 22 and the lower end thereof, is provided with oppositely directed arcuate faces 43 and 44, which define an intermediate bearing edge 45. Normally, the arcuate face 43 conforms to the curvature of outer spring 21, when the switch is in its off position, as shown in Figure 1. The inner end of the lever 26, carries a pivoted loop 46 adjacent to the face 44, and this loop receives the outer spring 21. By referring to Figures 1, 2 and 3, it is to be noted that the loop 46 is on one side of the transverse center of the springs 21 and 22 and that the contact arms 41 are on the other side of the transverse center of the springs.

In operation of the switch and considering that the switch is in its open position, as shown in Figure 1, then the springs 21 and 22 are bowed outwardly in substantially parallel relation with the contact arms 41 out of contact with the tongues 34. To close the circuit, the switch lever 26 is swung on its pivot pin 25 to the right (see Figure 2), and the bearing edge 45 will force the outer spring 21 into a substantially S-shape, and as the spring takes this shape, the same moves the inner spring 22 into an S-shape with the contact arms 41 still above the contact tongues 34. As the lever is swung further to the left, the spring 21 will be snapped into its lower bowed position, and as the spring snaps to its full bowed position, the same will contact and snap the spring 22 to its full inner bowed position with the contact arms 41 into engagement with the contact tongues 34, which will instantly bridge and complete a circuit (see Figure 3).

To break the circuit, the lever 26 is moved to the left and the loop 46 will pull up on the outer spring 21 and again move the same initially into its S-shape, and upon continued movement of the lever to its completed position the spring will be bowed to its full outward position. As the spring 21 snaps into its outward bowed position, the same will engage the fingers 42 and quickly snap the inner spring 22 to its full outwardly bowed position (see Figure 1). Thus the circuit will be quickly broken.

By employing the like springs 21 and 22, the snap action of the spring 22 to its circuit making and breaking position is delayed until the lever 26 is substantially to its complete open or closed position.

In Figures 10 and 11, I have shown a slightly modified form of means for uniting the housing sections of the switch. In this form, housing sections 47 and 48 are provided with like laterally extending molded lugs 49. A supporting bridge plate 50 is employed having bendable oppositely extending legs 51 formed on the sides thereof. When the bridging plate 50 is associated with the housing sections 47 and 48, the legs 51 are bent around the laterally extending lugs 49 to firmly connect the sections 47 and 48 together.

Changes in details may be made without departing from the spirit or the scope of this invention, but what I claim as new is:

1. In an electric switch, an insulating switch housing having a switch chamber therein, stationary spaced contacts in said chamber, an inner contact bowed leaf spring in said chamber, an outer similar control bowed leaf spring in said chamber, the end walls of said chamber having spaced notches receiving the ends of said springs, said inner contact leaf spring having contact arms engageable with the stationary contacts in one position, said arms having inwardly extending legs disposed over the outer control spring, a pivoted trip lever carried by the housing engaging the outer control spring for moving said spring inwardly, and a loop embracing said control leaf spring carried by said lever for bowing the control spring outwardly upon movement of the lever in one direction, said legs on said contact arms being engaged by the control spring during outward movement of the control spring for snapping the contact spring to an outward bowed position.

2. In an electric switch, an insulating switch housing having a switch chamber therein, sta-

tionary spaced contacts in said chamber, an inner contact bowed leaf spring in said chamber, an outer similar control bowed leaf spring in said chamber, the end walls of said chamber having spaced notches receiving the ends of said springs, said inner contact leaf spring having contact arms engageable with the stationary contacts in one position, said arms having inwardly extending legs disposed over the outer control spring, a pivoted trip lever carried by the housing engaging the outer control spring for moving said spring inwardly, and a loop embracing said control leaf spring carried by said lever for bowing the control spring outwardly upon movement of the lever in one direction, said legs on said contact arms being engaged by the control spring during outward movement of the control spring for snapping the contact spring to an outward bowed position, the inner end of said lever having oppositely directed faces defining an intermediate control spring engaging edge.

3. In an electric switch, an insulating switch housing including a pair of like companion molded half sections, said sections defining an interior switch chamber, locating pins and sockets on the inner ends of the sections, stationary contacts in said chamber, the end walls of said chamber having spaced notches, an inner normally bowed contact spring and an outer normally bowed control spring, the ends of said springs being received in said notches, a trip lever for actuating the control spring, means for actuating the contact spring from the control spring, and a supporting bridge plate for the housing having means engageable with the housing sections to hold said sections in an assembled position.

4. In an electric switch, an insulating switch housing including a pair of like companion molded half sections, said sections defining an interior switch chamber, locating pins and sockets on the inner ends of the sections, stationary contacts in said chamber, the end walls of said chamber having spaced notches, an inner

normally bowed contact spring and an outer normally bowed control spring, the ends of said springs being received in said notches, a trip lever for actuating the control spring, means for actuating the contact spring from the control spring, a supporting bridge plate for the housing having means engageable with the housing sections to hold said sections in an assembled position, a barrier plate between said sections forming a stop for the stationary contacts, said barrier plate having recesses therein, and a pivot pin for said trip lever received in said recesses, the adjacent ends of the housing sections forming closures for said recesses.

5. In an electric switch, an insulating switch housing including a pair of like companion molded half sections, said sections defining an interior switch chamber, locating pins and sockets on the inner ends of the sections, stationary contacts in said chamber, the end walls of said chamber having spaced notches, an inner normally bowed contact spring and an outer normally bowed control spring, the ends of said springs being received in said notches, a trip lever for actuating the control spring, means for actuating the contact spring from the control spring, laterally extending lugs on the inner ends of said housing sections, and a supporting bridge plate for the housing having means engageable with the housing sections to hold said sections in an assembled position, said means including bendable legs on the sides of the supporting bridge plate engaged about said lugs.

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