Feb. 22, 1938. R. H. BENTLEY 2,109,378

SNAP SWITCH

Filed July 8, 1936

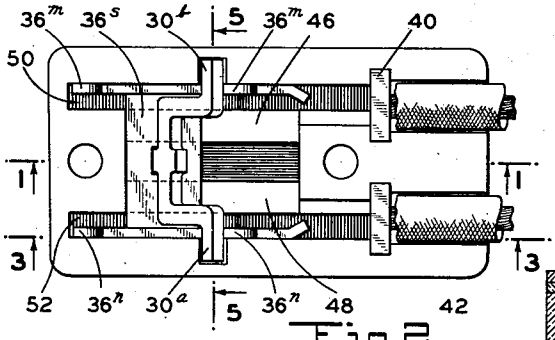


Fig. 2.

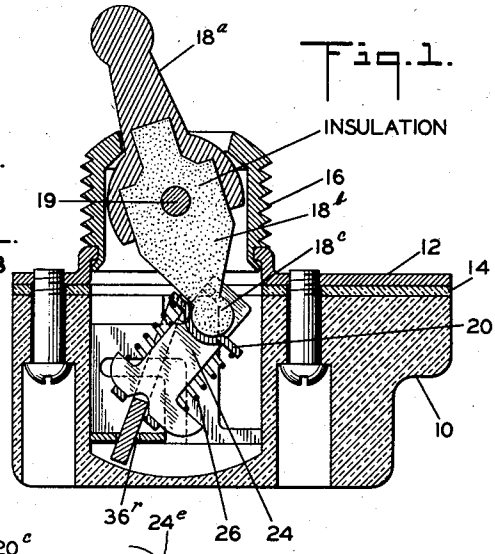


Fig. 1.

Fig. 3.

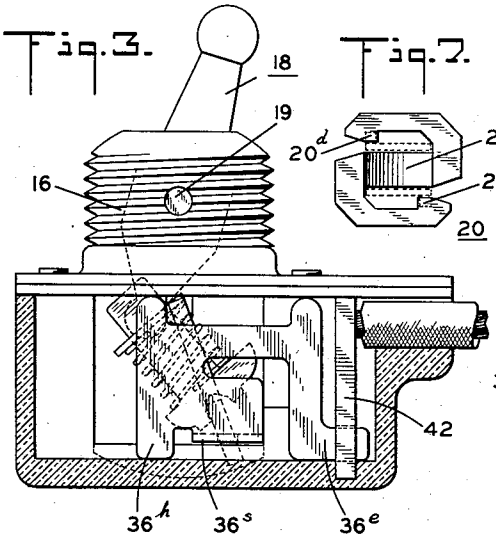
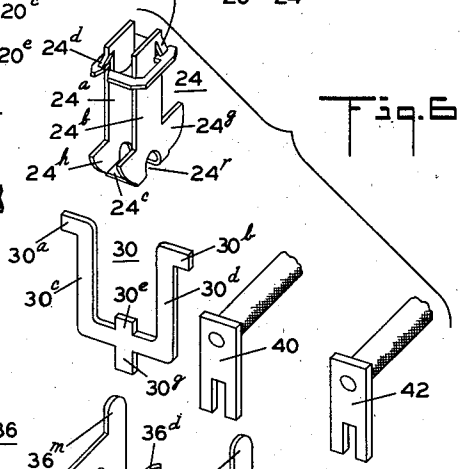


Fig. 7.

Fig. 6.



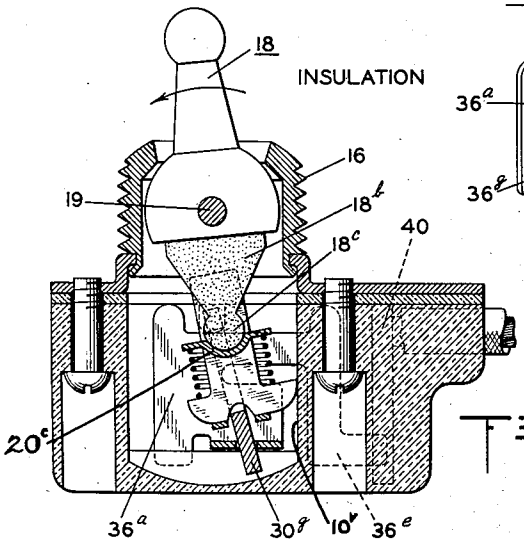


Fig. 4.

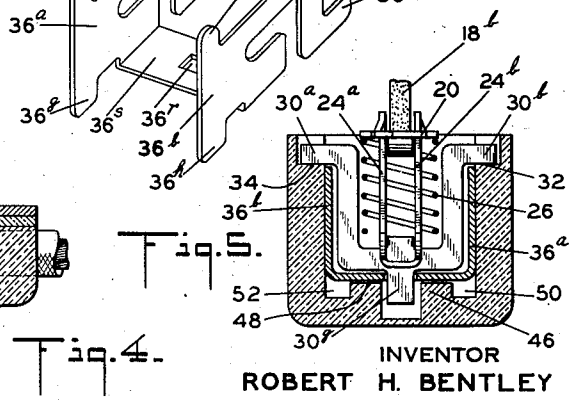


Fig. 5.

INVENTOR

ROBERT H. BENTLEY

BY HIS ATTORNEYS

Houston and Houston

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SNAP SWITCH

Robert H. Bentley, Hartford, Conn., assignor to The Arrow-Hart & Hegeman Electric Company, Hartford, Conn., a corporation of Connecticut

Application July 8, 1936, Serial No. 89,642

11 Claims. (Cl. 200—76)

This invention relates to electric snap switches. More particularly it relates to electric snap switches for use with low currents at usual house lighting voltage, although the principles of the invention are applicable to switches of larger size.

It is an object of this invention to provide a small electric snap switch which is positive and reliable in its action and which is inexpensive to construct and assemble.

Another object of this invention is to provide a snap switch in which the parts can be made by stamping operations upon sheet metal.

Another object of the invention is to improve constructions of snap switches of the above type and their operation by reducing the cost of the parts and providing a positive kick-off as the switch is moved to open circuit position.

Other objects and advantages of the invention will become apparent as it is described in connection with the accompanying drawing.

In the drawing, Figure 1 is a longitudinal section view taken through a switch embodying the principles of my invention, the section being taken along the line 1—1 of Figure 2.

Figure 2 is a plan view of the switch shown in Figure 1 but with the cover of the operating mechanism and the snapping mechanism removed.

Figure 3 is a longitudinal sectional view of the switch shown in Figures 1 and 2 with the section being taken along line 3—3 of Figure 2.

Figure 4 is a view similar to Figure 1, the parts being shown in a position between closed and open-circuit positions.

Figure 5 is a transverse sectional view through the switch shown in the previous figures with the section being taken along line 5—5 of Figure 2. In this view the top cover and operating mechanism have been broken away.

Figure 6 is an exploded perspective view showing the stationary and movable contacts and switching member and spring strut.

Figure 7 is a detail view, showing in plan, the anchor plate of the spring strut assembly.

Referring to the drawing the switch mechanism is mounted in an insulating base 10 which is provided with a cavity in its central portion for movement of the switch mechanism. A flat metallic cover 12 fits over the top of the switch base and has between it and the base a lining of sheet insulation 14. An aperture is provided in the cover directly over the cavity of the switch base, and a threaded nipple 16 is secured in this aperture by means of which the switch may be secured to an electric fixture in conventional manner.

The switch is operated by a lever designated generally by the numeral 18 comprising two parts 18^a and 18^b, the part 18^a being the handle portion projecting from the nipple 16, and the part 18^b being the operating portion and extending into the cavity in the switch base. The part 18^a may be rounded and tapering in a conventional manner while the top 18^b is flat and has a rounded end 18^c which is adapted to engage in an arcuate seat 20^c in a Z-shaped anchor plate designated generally by numeral 20. The operating lever 18 is pivotally mounted upon a transverse pin 19 passing diametrically through the nipple 16 in a conventional fashion.

An over-center spring mechanism provides the means for moving the hereinafter described movable contact 36 with a snap. This over-center spring construction comprises a strut designated generally by the numeral 24 around which is coiled a compression spring 26 which bears at its upper end against the Z-shaped anchor plate 20. The strut 24 is a sheet metal stamping having parallel legs 24^a and 24^b which are joined at their lower ends by a transverse bridge 24^c. The legs 24^a and 24^b are substantially identical with the exception of small lugs 24^d, 24^e which are struck out laterally in inclined position from the sides of the legs adjacent opposite end edges. These lugs engage with enlargements 20^d and 20^e on the ends of the Z-member 20 and prevent the removal of the Z-member from the strut by movement longitudinally along the legs 24^a and 24^b when once the Z-shaped anchor plate has been mounted upon the strut.

From the bottom ends of the legs 24^a and 24^b extend, in opposite directions, arms 24^g and 24^h, arm 24^g being longer than 24^h in order to provide a positive kick-off as will hereinafter more fully appear. The coil spring bears against the top edges of these laterally extending legs 24^g and 24^h and against the underside of the anchor plate 20 and due to its compressive strength it presses the anchor plate against the lugs 24^d and 24^e, in the absence of pressure being applied to the anchor plate by the operating member 18.

For the purpose of moving the movable contact a U-shaped switching member, designated generally by the number 30, is provided. This switching member has supporting trunnions or arms 30^a, 30^b extending laterally from its parallel leg portions 30^c and 30^d, respectively, in opposite directions and these supporting bearings or arms rest in bearing seats 32, 34 in the top parts of the

side walls of the insulated casing. A lug 30 projects upwardly between the legs 30^c and 30^d from the transverse portion of the switching member and extends into a recess 24^r formed in the transverse portion 24^c of the spring strut 24, and another lug 30^g extends downwardly from the transverse portion of the switching member in the opposite direction to the lug 30^g and in alignment therewith. This lug 30^g engages with a movable contact, designated generally by the numeral 36, in the manner now to be described.

The movable contact for the switch comprises a cradle-shaped member stamped from sheet metal and having the form as best illustrated in Figure 6. This cradle comprises parallel side walls 36^a, 36^b which are identical except for a pair of contact fingers 36^d and 36^e which extend lengthwise from the sides of the plates 36^a and 36^b at the bottom edges thereof, the end portions of these arms being bent or inclined inwardly toward each other to facilitate the engagement thereof with the fixed contacts 40 and 42 of the switch in the manner to be presently described.

The parallel side walls of the cradle are joined at the central portions of their bottom edges by a saddle 36^s which has a central recess or bearing 36^r into which the lug 30^g of the switching member extends. Preferably the width of the cradle 36 is approximately equal to that of the width of the cavity in the switch base so that the side walls 36^a and 36^b of the cradle may slide along the interior walls of the switch casing and be guided thereby. To guide the movement of the cradle at the bottom, the bottom surface of the saddle 36^s slides upon tops of parallel ridges 46 and 48 in the bottom of the cavity of the switch casing, the space between these ridges being left for movement of the lug 30^g of the switching member. Legs 36^g, 36^h at the opposite end of the side plates 36^a, 36^b from the contacts 36^d and 36^e have their bottom surfaces in alignment with the bottom surfaces of the contact fingers 36^d and 36^e and these surfaces also assist in the guiding of the movement of the cradle as they slide along the channels 50 and 52 in the casing, these channels being parallel to the ribs 46 and 48 and at the outer side of said ribs.

To guide the cradle's movement at the top, arms 36^m and 36^n extend upwardly from the side plates 36^a and 36^b at opposite ends of the plates and are rounded to minimize friction. These arms slide along the under surface of the insulating lining 14.

The fixed contacts of the switch 40 and 42 are dropped into transverse slots or grooves formed in the base at the ends of the channels 50 and 52. These contacts may be blocks stamped from sheet metal and may have lead wires soldered or otherwise suitably secured thereto and issuing from the casing through suitable channels or passages. The bottom edges of the contacts 40 and 42 are slotted providing for the entrance of the contact fingers 36^d and 36^e. Due to the inclination of these contact fingers and the resilient nature of the metal from which they are formed these fingers may readily engage with the fixed contacts and firmly press against them to give good electrical contacts.

In order to provide a positive kick-off or release of the contact fingers 36^d and 36^e from the fixed contacts, the arm 24^s of the spring strut is of sufficient length and its end surface is curved to engage the vertical wall 10^v of the cavity in the switch casing as the operating lever is moved from the position shown in Figure 3 to the position shown in Figure 1. Figure 4 shows the operating lever and switch parts in an intermediate position with the cam surface of the arms 24^s engaging the vertical wall. In the position shown in Figure 4 the movable contacts have not yet disengaged the fixed contacts but the switching mechanism is approaching dead-center position and any further movement toward or through dead-center must inevitably result in a positive pushing of the movable contact away from the fixed contacts by reason of the pushing effect of the strut against the switching member, the parts being carefully dimensioned to accomplish this result.

From the foregoing it will be apparent that as the operating lever 18 is moved from the position shown in Figure 1 to the position shown in Figure 2 the spring 36 will be compressed by reason of the downward movement of the anchor member 20 under the influence of the lower end of the operating member 18. As this spring is compressed and the strut 24 and operating lever 18 moved into alignment the mechanism will move through dead-center position and cause swinging movement of the switching member 30 in counter-clockwise direction. This swinging movement will be imparted to the movable contact cradle 36 by reason of the engagement of the lug 30^g of the switching member with the saddle 36^s, and the contact cradle and contacts 36^d and 36^e will thereupon come into engagement with the stationary contacts 40 and 42.

The principles of this invention may readily be applied to a double pole construction. In so doing the central part of the saddle 36^s would be of sheet insulation riveted to the edges of the saddle adjacent the side walls 36^a, 36^b. Additional contact fingers like 36^d and 36^e would be provided parallel to and above 36^d and 36^e. These additional fingers would engage additional stationary contacts like 40 and 42 which would be placed above the contacts 40 and 42 and insulated therefrom. The height of the contacts 40 and 42 could be reduced to accommodate the additional stationary contacts in the grooves already provided in the casing.

Many modifications within the scope of my invention will occur to those skilled in the art and therefore I do not limit my invention to the specific embodiment of the switch as shown and described in the foregoing specification.

I claim—

1. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating lever extending through said cover and having a portion extending into said cavity, a stamped sheet metal contact having a pair of parallel side plates slidable along and guided by the side walls of said cavity and connected by a saddle slidable along the bottom of said cavity, a yoke having a lug entering an aperture in said saddle for imparting movement of said yoke to said movable contact, and over-center spring means operated by said lever to move said yoke and movable contact with a snap, and a pair of stationary contacts engageable by said movable contact.

2. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating lever mounted on said cover and having a portion extending into said cavity; movable contact means having a pair of parallel side plates slidable along and guided by the side walls of said cavity and joined by a

saddle, a yoke engaging with said saddle and imparting movement of said yoke to said movable contact means, over-center spring means operated by said lever to move said yoke and movable contact means with a snap, and a pair of stationary contacts engageable by said movable contact means.

3. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating member extending through said cover and having a portion extending into said cavity, movable contact means having a pair of parallel side plates slidable along and guided by the side walls of said cavity and joined by a saddle, the bottom edges of said side plates sliding along the floor of said cavity as said movable contact means is operated, snapping mechanism to move said contact means with a snap as said operating member is operated, and fixed contacts engageable by said movable contact means.

4. A unitary spring strut assembly for electric snap switches, comprising a strut member stamped from sheet metal into U-shape having parallel arms, lateral extensions from said arms adjacent their joined ends and lugs struck from said arms adjacent their free ends, a spring coiled around said arms and resting on said extensions, an anchor plate urged against said lugs by said spring whereby said strut and spring and plate are held in unitary condition, said anchor plate being of Z-shape and having its ends pressed into engagement with said strut arms during assembly to hold said parts in assembled condition.

5. A unitary spring strut assembly for electric snap switches, comprising a strut member stamped from sheet metal into U-shape having parallel arms, lateral extensions from said arms adjacent their joined ends and lugs struck from said arms adjacent their free ends, a spring coiled around said arms and resting on said extensions, an anchor plate urged against said lugs by said spring whereby said strut and spring and plate are held in unitary condition, the transverse portion of said U-shaped strut having an aperture for reception of a part of a switch yoke, and said strut arms having recesses communicating with said aperture for another part of a switch yoke.

6. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating lever mounted on said cover and having a portion extending into said cavity, movable contact means having a pair of parallel side plates slidable along and guided by the side walls of said cavity and joined by a saddle, a yoke engaging with said saddle and imparting the movement of said yoke to said movable contact, said movable contact means having resilient contact fingers at one edge of said side plates, stationary contacts engageable by said fingers, and over-center spring means operated by said lever to move said yoke and movable contact means with a snap.

7. In an electric switch, an insulating casing having a cavity therein for switch mechanism, a metal cover plate with an aperture therein, a nipple secured in said aperture, an operating lever pivotally mounted in said nipple and having a handle portion extending out of one end of the nipple and having an operating portion extending out the other end of the nipple into said cavity, a switching yoke mounted in said casing, a spring strut unit engaged with said operating lever and said yoke for causing said yoke to move with a snap motion as said lever is operated, said spring strut unit comprising a strut and a spring surrounding said strut and an anchor plate, a movable contact slidable along the bottom of the casing, said contact being stamped from sheet metal into U-shape, said contact having an aperture for receiving a portion of said yoke whereby motion of said yoke is transmitted to said contact.

8. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating member extending through said cover and having a portion extending into said cavity, movable contact means having a pair of parallel side plates slidable along and guided by the side walls of said cavity and joined by a sadde, the floor of said cavity having parallel ribs formed thereon, the bottom edges of said side plates sliding along the floor of said cavity and said saddle sliding upon said ribs as said movable contact means is operated, snapping mechanism to move said contact means with a snap as said operating member is operated, and fixed contacts engageable by said movable contact means.

9. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating lever extending through said cover and having a portion extending into said cavity, movable contact means having a pair of parallel side plates slidable along and guided by the side walls of said cavity and joined by a saddle of insulating material, a yoke engaging with said saddle and imparting movement of said yoke to said movable contact means, over-center spring means operated by said lever to move said yoke and movable contact means with a snap, and a pair of stationary contacts engageable by said movable contact means.

10. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating member extending through said cover and having a portion extending into said cavity, movable contact means having a pair of parallel side plates slidable along and guided by the side walls of said cavity and joined by a saddle of insulating material, the bottom edges of said side plates sliding along the floor of said cavity as said movable contact means is operated, snapping mechanism to move said contact means with a snap as said operating member is operated, and fixed contacts engageable by said movable contact means.

11. In an electric snap switch, an insulating base having a cavity therein for switch mechanism, a cover, an operating lever mounted on said cover and having a portion extending into said cavity, movable contact means having a pair of parallel side plates slidable along and guided by the side walls of said cavity and joined by a saddle of insulating material, a yoke engaging with said saddle and imparting the movement of said yoke to said movable contact, said movable contact means having resilient contact fingers at one edge of said side plates, stationary contacts engageable by said fingers, and over-center spring means operated by said lever to move said yoke and movable contact means with a snap.

ROBERT H. BENTLEY.