March 31, 1931. G. A. JOHNSON 1,799,099

DOUBLE ELECTRIC SWITCH

Filed Aug. 23, 1929

Fig. 1.

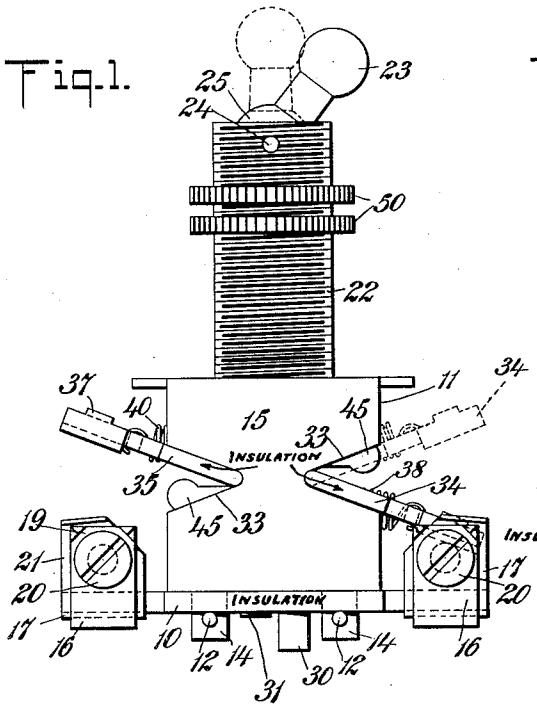


Fig. 2.

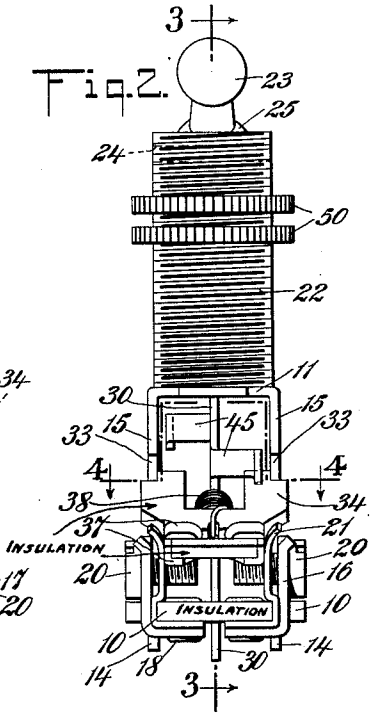


Fig. 5.

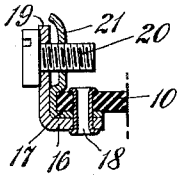


Fig. 3.

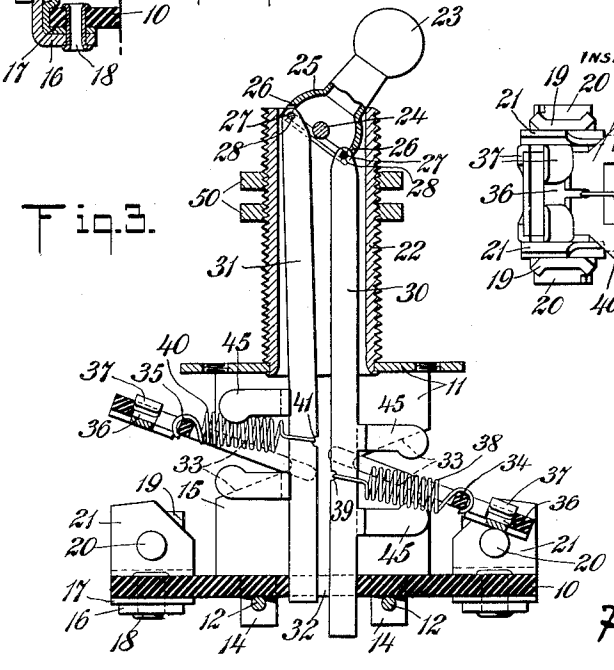
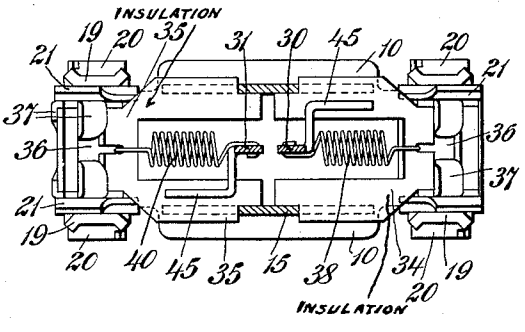


Fig. 4.



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UNITED STATES PATENT OFFICE

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DOUBLE ELECTRIC SWITCH

Application filed August 23, 1929. Serial No. 387,999.

An electric switch according to this invention has two independent circuit controlling elements with a single actuator, the aim being to provide a simple construction of this type and one in which there is no limitation on the spacing between the thumb-piece or actuator and the circuit controlling elements.

In the accompanying drawings,

Figure 1 is a side view in elevation of a switch made in accordance with this invention.

Figure 2 is an end view in elevation of the same switch.

Figures 3 and 4 are sectional views on the lines 3—3 and 4—4 respectively of Figure 2.

Figure 5 is a sectional view of a combined wire terminal and switch contact, a detail of the switch.

The body of the switch consists of a flat base piece 10 of insulating material, either fibrous or molded, and an inverted U-shaped metal frame forming a housing 11 secured to the base piece by means of pins or pieces of wire 12 passed through holes in two pairs of lugs 14 that are integral with the side members 15 of the housing and extend through the base piece 10. The base piece extends beyond the ends of the housing 11 and supports at each corner a combined wire terminal and switch contact. Each of these consists of an angle piece 16 of stiff metal and a similar piece 17 of thinner resilient metal held between the under side of the base 10 and the heavier piece 16 by the rivet 18 that holds the latter to the base. The upwardly extending leg 19 of the outer heavier piece receives a screw 20 forming therewith a binding post, while the corresponding part 21 of the thinner piece is bowed inwardly. The two units at each end face each other and form the contacts for a single pole switch.

In the top of the housing 11 is a circular opening which receives the lower end of an exteriorly threaded attaching tube 22. At its upper end, this tube supports a thumb piece 23 by means of a pivot pin 24 fixed in the walls of the tube and extending through the hollow semi-spherical skirt portion 25 of the thumb piece. This skirt portion fits the tube so that in all positions which it assumes in rocking on the pin 24 it closes the tube. The pin 24 is at right angles to the long axis of the base piece 10. On either side of the pin 24 near the rim of the skirt portion 25 there are kerfs 26 and around the outer edge of the rim is a groove 27. The kerfs receive the upper ends of rods 30, 31 (yet to be described) which have holes designed to register with the groove 27 so that a wire 28 may be passed through them and then staked to the rim of the skirt. This provides a pivotal support for the rods. The rods 30, 31 are substantially parallel and extend through a slot 32 in the base 10 which thus guides them and maintains them in line edge to edge at their lower ends.

Each side wall of the housing 11 has a V-shaped notch 33 in each lateral edge facing the switch contacts. The notches provide fulcrums for two switch arms 34, 35 made of insulating material and U-shaped, the ends of the legs resting in the notches 33. The outer end of each switch arm has a hole 36 and a metal strip 37 is laid across the under side of the end of the arm and is bent over the side edges so that its ends clinch into the said hole and secure the strip to the arm. The length of the arms is such that the metal strips 37 can rest between the resilient pieces forming the switch contacts when the arms are swung downwardly against the lower edges of the V notches.

To actuate the switch arms, that is, to rock them to the extent permitted by their engagement with the edges of the notches 33, there is a coil spring 38 held at one end in the hole 36 in the end of the switch arm 34 and at its other end to a notch 39 in the rod 30, together with a spring 40 similarly mounted between the switch arm 35 and a notch 41 in the other rod 31. The notch 39 in the rod 30 is so located that as the thumb piece moves from an upright position downwardly in a direction to drop the rod 30, the notch 39 passes from above the apex of the V notch to a level below it. So also with the notch 40 as the thumb piece is tilted in the opposite direction to drop the rod 31. It will be recognized that this movement of either operating

rod downwardly moves the spring which it engages across the dead center plane so that the effort of the spring is on the opposite side of the switch arm fulcrum. This gives the desirable snap action. When at rest, each switch arm is biased by its spring toward either its open or its closed circuit position by reason of being at one side of the dead center position of the spring.

Positive "kick-offs" are provided in the form of arms 45, one above and one below each switch arm, these kick-off arms being secured to or integral with the rods 30, 31 and offset to engage the pivot legs of the switch arms.

The way in which the switch works will be apparent from a consideration of Figures 3. With the thumb piece in its intermediate or upright position, both switch arms are in open-circuit position as both springs are above their dead center planes. When the thumb piece is tilted to the right, the rod 30 is lowered, moving the spring 38 to the other side of the pivotal axis of the arm 34 with the result that it exerts a force causing the arm 34 to swing downwardly to place the metal strap 37 at its end between the resilient contacts 21. A circuit thus is closed between the two terminals. The movement of the switch arm is assured by the engagement of the upper "kick-off" 45 with the arm 34 as the rod 30 first begins to move. At the same time, the rod 31 is lifted, making certain that the other switch arm 35 will be in open circuit position. When the thumb piece is tilted back to the vertical, the switch arm 34 is swung upwardly to open its circuit and in this position both switches are again in open-circuit position. The other switch may then be closed by tilting the thumb piece to the left, the action being the same as that just described with reference to the switch arm 34.

The switch is mounted by placing the tube in an opening in a plate or panel and then tightening the nuts 50 against opposite sides thereof. A tube of any length may be used, with rods 30, 31 of appropriate length, without affecting the operation of the switch. This is an important advantage as it is often desirable or necessary to space the switch movement proper from the thumb piece, due for instance to the presence of other parts adjacent the panel to which the switch is secured. Using the present inventive idea, the same switch movement and housing frame 11 may be used with tubes and operating rods of different lengths.

While preferably embodied in the form just described, the invention is not limited to use with the particular type of spring stressed switch shown here. For instance it may be used with a toggle type switch which is spring stressed in the sense of being biased by a spring toward either open or closed circuit position. In certain respects it is not limited to a double switch or to a double switch in which the switch arms are moved alternately to closed-circuit position. Many variations and adaptations are possible and for that reason I wish to include within the protection afforded by a patent all such constructions as come within the fair scope of the following claims.

I claim—

1. In an electric switch, separate switch arms with associated springs adapted to move the switch arms with a snap action when shifted across their respective dead center planes, a pivotally mounted thump-piece and means actuated by a tilting of said thumb-piece in different directions for selectively shifting either of said springs across its center plane, whereby either of said switch arms may be moved to closed-circuit position independently of the other.

2. In an electric switch, separate spring-stressed switch arms, a pair of substantially parallel rods, one for each switch arm and both mounted to shift lengthwise to actuate said arms, together with a single means manually operable for shifting said rods lengthwise in opposite directions.

3. In an electric switch, separate spring-stressed switch arms, a pivoted actuating member, a pair of substantially parallel rods, one associated with each switch arm and shiftable lengthwise to move it between closed and open circuit positions, said rods being connected with said actuating member on opposite sides of its pivotal axis, the arrangement being such that said member has a neutral position with both switches open and is tiltable in different directions to close said switches alternately.

4. In an electric switch, separate spring-stressed switch arms, a pair of substantially parallel rods each adapted to be shifted lengthwise to move one of said switch arms between closed and open circuit positions, and a means for controlling said rods, normally to put said switch arms in open circuit position and selectively to put either one in closed-circuit position.

5. In an electric switch, separate spring-stressed switch arms, a pair of substantially parallel rods extending near the switch arms and each adapted to be shifted lengthwise to actuate one of said switch arms, together with means engaging the ends of said rods remote from said switch arms for shifting them lengthwise in opposite directions.

6. In an electric switch, a frame, a tiltable thumb-piece, switch arms pivotally mounted on said frame with their pivot ends adjacent each other, a pair of rods connected to said thumb-piece on opposite sides of its axis, and springs connecting the switch arms with said rods at such points on the rods that one spring moves across the dead center plane of its associated arm as the thumb-piece is

tilted in one direction from its intermediate position and the other spring is smilarly moved on opposite tilting of the thumb-piece.

7. In an electric switch, a thumb piece arranged to be tilted in two directions from a mid-position, separate switch arms having limited movement and each associated with a spring means having a dead center position occupied when its switch arm is in a mid-position, whereby the arm is biased toward either end of its movement when at rest, in combination with a pair of rods connected on opposite sides of the axis of said thumb-piece and associated with said springs to move said arms with a snap action.

8. In an electric switch, a main housing, switch contacts at opposite sides thereof, switch arms mounted so that their outer ends move into and out of engagement with said contacts, a tubular member mounted on said housing, a thumb-piece pivotally mounted in said member and a pair of rods connected to said thumb-piece on opposite sides of its pivotal axis and associated respectively with said switch arms to actuate them upon tilting of said thumb-piece.

9. In an electric switch, a flat base-piece, a pair of switch contacts at one side thereof, a frame mounted on said base-piece and presenting side edges toward said contacts, said edges having V notches, a switch arm fulcrummed in said notches to swing into and out of engagement with said contacts and limited in its swing by the edges of said notches, a tubular member on said frame, a thumb-piece pivoted at the outer end of said member, a rod connected to said thumb-piece and extending through said member into said frame and a spring connected between said rod and said switch arm.

10. In an electric switch, separable switch arms with associated springs adapted to move the switch arms with a snap action in combination with a pivotally mounted thumb piece and means actuated by tilting of said thumb piece in different directions for selectively shifting either of said switch arms to or from closed circuit position independently of the other.

In testimony whereof I have signed my name to this specification.

GEORGE A. JOHNSON.