



# UNITED STATES PATENT OFFICE.

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## SNAP SWITCH.

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This invention relates to electrical switches and has for an object to provide an improved switch mechanism of the snap action type which will be positive and reliable in operation, and in which there will be no danger of the contacts freezing and thus causing failure of the switch to operate.

In carrying out my invention I provide in addition to the usual spring operating mechanism a positively acting means for imparting initial movements to the contact carrier, thus the contacts are started with a positively operating means from the stationary position and the spring provides quick movement for the remainder of the throw of the switch elements.

With the foregoing and other objects in view I have devised the constructions illustrated in the accompanying drawing, in which—

Fig. 1 is a side elevation of one form of my switch with the contacts in one extreme position.

Fig. 2 is a longitudinal sectional view on an enlarged scale through the form of switch mechanism shown in Fig. 1, showing the positions of the elements immediately prior to initial movement of the contact carrier.

Fig. 3 is a transverse sectional view through the switch mechanism of Figs. 1 and 2.

Fig. 4 is a top plan view of another form of switch showing the application of my invention thereto.

Fig. 5 is a side elevation of the form of switch shown in Fig. 4 with the contacts in one extreme position.

Fig. 6 is a longitudinal sectional view on an enlarged scale through the form of switch mechanism shown in Figs. 4 and 5 showing the positions of the elements immediately prior to initial movement of the contact carrier.

Fig. 7 is a transverse sectional view through the switch mechanism of Figs. 4, 5, and 6, and

Fig. 8 is a view of the contact blades and head upon which they are mounted.

In Figs. 1, 2, and 3 I have illustrated the

principle of my invention as applied to one form of switch operating mechanism the form shown being a push button switch. The switch mechanism is mounted upon a supporting yoke 46 secured to an insulating block 47 and provided with openings through which push buttons 48 are guided for reciprocating movement. Between the buttons the yoke is provided with depending flanges or wings 49 on which the switch mechanism is mounted. These wings are recessed adjacent the lower ends thereof to receive reduced portions 50 of pin 51 upon which a pair of rockers 52 are mounted, these rockers also having notches adapted to receive reduced portions 53 of the pin 51 to form a pivot therefor. These wings 49 are also provided with notches 54 in which is seated so as to pivot therein one edge of the contact carrier 55 which has a central recess 56 for a purpose presently to be described. The contact element 57 is secured to one end of this carrier and in the same manner as in the first form.

Carried by and between the rockers 52 is a pin 58 having reduced ends 59 seated in openings in these rockers and mounted on this pin is a coil spring 60 having oppositely extending free ends 61 projecting through openings 62 adjacent the free ends of the stirrup 63, this stirrup being of the same shape as that employed in the first form and seated at its apex upon the edge of the contact carrier 55 opposite to its pivotal edge. The rockers 52 are provided with recesses 64 in which the stems 65 secured to the push buttons are seated, these stems being also provided with openings through which the guide arms 66 project and act as guides during the operation of the rockers when the buttons are reciprocated. On opposite sides of the contact carrier the rockers are provided with cam surfaces 67 and 68 which function the same as the cam surfaces 43 of the first form, the operation being as follows:

Assuming the switch element is at rest, as viewed in Fig. 1, pushing inwardly on the lower push button will rotate the rockers 52 counterclockwise about their pivot pin

51 to the position shown in Fig. 2 and as the center of the pin 58 carrying the spring is swung about the pivot 51 it will move a greater distance from the free edge 69 of the contact carrier. Therefore, the free arms of this spring will be drawn together winding the spring or putting it under tension until it reaches the position shown in Fig. 2 where the center of the pin 58 passes through the center line 70 of the contact carrier. This will transfer the pull of the spring to the other side of this carrier and will swing the free edge of the contact carrier about its pivotal edge clockwise as viewed in this figure to shift the contact element. At about the time the center of pin 58 passes through this line the cam surface 67 engages the edge of the contact carrier as shown, and positively imparts the initial movement to this member. After the contact has been swung, pressing on the other push button will swing the rockers in the opposite direction, the operation being exactly reversed with the cam 68 imparting the initial movement to the contact carrier at about the time the center of the pin 58 passes through the center line of the carrier.

Referring to the form of mechanism illustrated in Figs. 4, 5, 6, and 7, this mechanism is mounted within the recess 10 within an insulating block 11. The mechanism may be used on different types of switches but for the purpose of illustration I have shown it as used with a single switch element 12 adapted to make electrical connection between the two stationary contacts 13 and 14 which are arranged to be connected to the lead wires, not shown, by suitable bindingposts 15, these bindingposts and contacts being secured in the block by any suitable means, such as screws 16.

The switch operating mechanism is mounted in a supporting yoke 17 which is secured to the insulating block by suitable screws extending through the same, not shown. This yoke is provided with a pair of spaced depending flanges or wings 18 by which the various parts of the mechanism are carried. The contact carrier comprises a flat bridge piece 19 preferably of drawn stock and having a central notch 20 therein for a purpose presently to be described. Secured to one end of the bridge piece 19, as by upsetting the latter, is a head 21 of insulating material to which is secured the contact blade 22 by any suitable means, such as rivets 23. The carrier 19 has one edge thereof seated in notches 24 in the wings 18 in which it may rock under the action of the operating mechanism, there being inclined edges 25 leading from these notches against which the contact carrier rests when in its extreme positions.

Pivoted between the wings 18 by any suitable means, as pin 26, is a rocker 27 pro-

vided with suitable operating means such as the knob 28. This rocker is substantially U-shaped in cross section as shown in Fig. 7 having two parallel spaced side members 29 connected at the upper end by the crossbar 30 to which the operating knob 28 is secured preferably by upsetting the inner end thereof. The stem of the knob is shouldered at 31 so that there may be secured between this shoulder and the crossbar an indicating plate 32 provided with indications thereon such as "On" and "Off" which may be observed through an opening 33 in the face plate 34. At their free ends the sides 29 of the rocker are provided with notches 35 to receive a pin 36, this pin being reduced at its ends as at 37 to provide bearings to extend into these notches and provide shoulders to keep the pin in position between the side members. Mounted on this pin and between the side members is a coil spring 38 having its free ends 39 projecting in opposite directions from the body thereof and extending through openings 40 adjacent the free ends of a stirrup 41. This stirrup is preferably a piece of sheet metal bent substantially V-shaped as shown in Fig. 6 and resting at its apex on the edge of the contact carrier 19 opposite the edge which is seated in the notches 24. The side members 29 are provided with transverse openings 42 therethrough through which the contact carrier 19 extends and the inner side walls 43 thereof are so located as to provide cam surfaces to engage the contact carrier 19 on opposite sides thereof adjacent its swinging edge to impart to this member its initial movements upon movement of the rocker to operate the switch. This operation is as follows:

Assuming the switch is in closed position, as shown in Fig. 5, movement of the knob 27 upwardly will swing the rocker about its pivot 26. This movement will swing the center of pin 36 carrying the spring 38 about the pivot 26 and as the contact carrier remains stationary until the parts reach the position illustrated in Fig. 6, the distance between the free edge of the contact carrier and the center of pin 36 will increase during this movement so that the free arms of the spring will be drawn together by the stirrup and the spring will be wound or placed under tension. As the center of pin 36 passes through center line 45 of the contact carrier the pull of the spring will be transferred to the opposite side of this center line and will swing the free edge of the carrier about its pivotal edge to the left or counterclockwise as viewed in Fig. 6.

In order to positively impart to the contact carrier its initial movements the inside walls or cam surfaces 43 of the openings through the rocker are so arranged that as this rocker is swung on its pivot one of

these cam surfaces, the right hand one as viewed in Fig. 6, will contact with the right hand side of the contact carrier adjacent its upper or swinging edge at about the time the center of the pin 36 passes through the center line 45, so that further movement of the rocker will positively push the swinging edge of the contact carrier to the left or counterclockwise, as viewed in Fig. 6, and impart its initial movement thereto. As this is a positive movement, if the contacts should tend to stick they would be loosened by this action, and allow the spring to act to quickly give the contacts their further movement. In other words, the spring is not depended upon to give the initial movements to the contact element. The operation of the contact carrier in the opposite direction is merely the reverse of the operation just described upon movement of the knob 28 to the left or counterclockwise as viewed in Fig. 6.

Having thus described the nature of my invention, what I claim is:

1. In a device of the character described, a support, a contact carrier comprising a flat bridge piece pivotally mounted in said support on one of its side edges, a rocker pivotally mounted in said support, operating means connecting the rocker and carrier including a spring, and inclined cams carried by the rocker on opposite sides of the contact carrier arranged to engage the free edge of the carrier on operation of the rocker and by camming action thereon to impart the initial movements to the carrier.

2. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, a spring carried by said rocker eccentric to the axis of oscillation thereof and provided with arms extending on opposite sides of its connection with the rocker, a stirrup connecting said arms with said contact carrier at a point eccentric to the axis of oscillation of the latter, and means carried by the rocker on opposite sides of the carrier arranged to positively impart the initial movements to said carrier.

3. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, a spring carried by said rocker eccentric to the axis of oscillation thereof, a stirrup connecting said spring with said contact carrier at a point eccentric to the axis of oscillation of the latter, and means connected with the rocker arranged to positively impart the initial movement to the carrier.

4. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, and a spring device connecting said carrier and rocker and engaging both of said parts at points eccentric to the axes of oscillation thereof, said spring device comprising a coil spring carried by one of said parts, means for connecting the ends of said

spring with the other of said parts, the ends of said spring being disposed toward the point of connection of said connecting means with said last named part, and means carried by the rocker adapted to engage the carrier to positively impart the initial movements to said carrier.

5. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, a coil spring carried by said rocker eccentric to the axis of oscillation thereof, means for connecting the ends of said spring with said contact carrier at a point eccentric to the axis of oscillation of the latter, said ends being disposed toward the point of connection of said connecting means with said contact carrier, and said rocker being provided with a cam surface arranged to engage the carrier to impart the initial movement thereto.

6. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, a stud carried by said rocker eccentric to the axis of oscillation thereof, a coil spring on said stud, means for connecting the ends of said spring with said contact carrier at a point eccentric to the axis of oscillation of the latter, said ends being disposed toward the point of connection of said connecting means with said contact carrier, and means carried by the rocker on opposite sides of the carrier arranged to engage the said carrier to positively impart the initial movements thereto.

7. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, a coil spring carried by one of said parts eccentric to the axis of oscillation thereof, a stirrup connecting the ends of said spring with the other of said parts at a point eccentric to the axis of oscillation of the latter, and means connected with the rocker arranged to engage the carrier to positively impart the initial movements thereto.

8. In a switch, a support, a contact carrier comprising a flat bridge piece having one of its edges in rocking engagement with said support, a rocker for operating said contact carrier, a coil spring carried by said rocker eccentric to the axis of oscillation thereof, a stirrup connecting the ends of said spring with the opposite edge of said bridge piece, and means carried by the rocker arranged to engage the swinging edge of the bridge piece to positively impart the initial movement thereto.

9. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, a coil spring carried by said rocker eccentric to the axis of oscillation thereof, a stirrup connecting the ends of said spring with said contact carrier at a point eccentric to the axis of oscillation of the latter, and means carried by the rocker on opposite

sides of the carrier arranged to engage said carrier to positively impart the initial movements thereto.

10. In a switch, an oscillating contact carrier, an oscillating rocker for operating said carrier, a coil spring carried by said rocker eccentric to the axis of oscillation thereof, a flexible stirrup connecting the ends of said

spring with said contact carrier at a point eccentric to the axis of oscillation of the latter, and said rocker being provided with cam surfaces on opposite sides of said carrier arranged to engage the carrier to impart the initial movements thereto. 10

In testimony whereof I affix my signature.  
ALEXANDER H. TRUMBULL.