

July 8, 1958

W. R. EDWARDS
MINIATURE SNAP SWITCH

2,842,632

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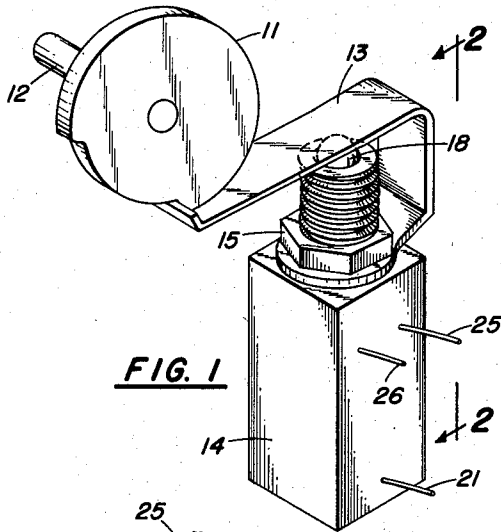


FIG. 1

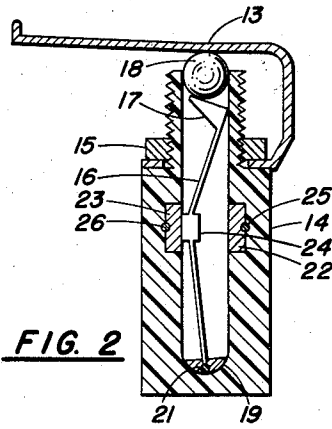


FIG. 2

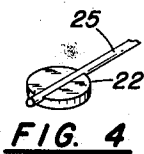


FIG. 4

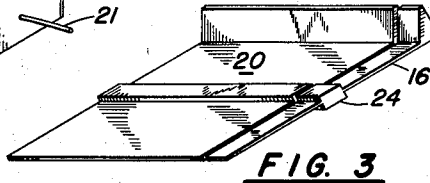


FIG. 3

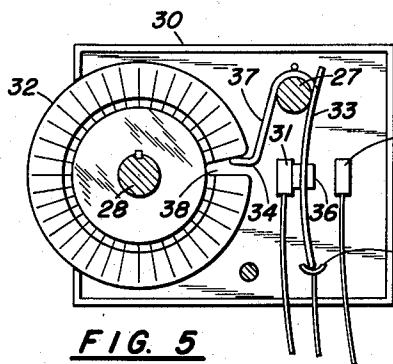


FIG. 5

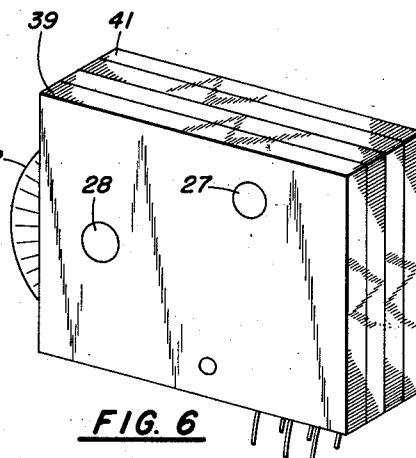


FIG. 6

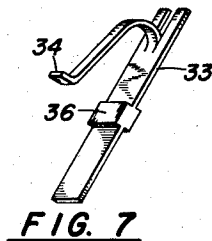


FIG. 7

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MINIATURE SNAP SWITCH

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7 Claims. (Cl. 200-67)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to a miniature snap switch and more particularly to a miniature snap switch having a very short length of travel for the snap spring or strip.

The advantages of a switch operating with a snap action, both in making and breaking the circuit, have been long recognized by those skilled in the art. Switches of this type have a relatively long length of travel for the snapping spring, thus heretofore precluding manufacture of miniature type snap switches.

An object of the present invention is to provide a snap action miniature switch of simple and compact construction.

Another and more particular object of the invention is to provide a switch of the character described wherein a compressive force is applied to a movable contact bearing member to affect actuation thereof.

A further object is to provide in a switch of the character described a contact bearing member of novel configuration which permits the size of the switch to be reduced to a minimum.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 shows a perspective view of one embodiment of the invention.

Fig. 2 is a sectional view taken on the line 2-2 switch shown in Fig. 1.

Fig. 3 shows a sheet of milled stock with a single movable contact member cut therefrom.

Fig. 4 shows a stationary contact attached to a lead of the switch shown in Fig. 2.

Fig. 5 shows another embodiment of the present invention for gang switching.

Fig. 6 shows an arrangement of ganged switches.

Fig. 7 shows the movable contact and movable contact bearing member used in the embodiment of Fig. 5.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Fig. 1 an actuating cam 11 secured to an operating shaft 12 and engaging an actuating arm 13 secured to the switch housing 14 by means of a nut 15. The housing 14 is recessed to receive a movable resilient contact bearing member 16 having an upper head 17 shaped to receive a nylon ball actuator 18. The lower end of the movable contact member 16 rests in a cupped recess 19 and is always electrically connected to a common lead 21.

Fixed contacts 22 and 23 are mounted on opposite sides of the inner wall of the housing 14 to be engaged by the movable contact member 24. Lead wires 25 and 26 are connected to contacts 22 and 23 respectively.

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The contact bearing member 16 is preferably cut or sliced from a thin sheet of stock 20 which has been milled to the proper shape, as shown in Fig. 3.

Lead wire 25 is soldered in a groove of the fixed contact 22 as shown in Fig. 4. The lead wire protrudes beyond the edge of the contact to insure that the lead is secure. Lead wire 26 and contact 23 are soldered in the same manner as described above.

In operation of the switch shown in Figs. 1 and 2, the contact bearing member 16 is normally maintained in a bowed position with the movable contact 24 in engagement with the fixed contact 23. Upon rotation of the cam 11, the upper lip of the actuating arm 13 engages the cam surface which forces the actuating arm down against the ball 18. As the ball 18 moves inwardly, the free end of head 17 will tend to rotate about the attached end of said head 17. This produces a moment on contact bearing member 16 in a direction which causes the central portion thereof, carrying the contact 24, to snap to the opposite side of the inner surface of the housing 14; thus, contact between contacts 23 and 24 is broken and contact between contacts 22 and 24 is made. Since the contact bearing member 16 is in compression there are forces tending to restore the member 16 to an unstressed position. Hence, upon releasing the force tending to rotate the head 17, the contact bearing member 16 will snap back to its original position.

Referring now to Fig. 5, there is shown a base member 30 having shafts 27 and 28 and contacts 29 and 31 mounted thereon. Cam 32 is keyed to shaft 28. A snap spring movable contact bearing member 33 shown in Fig. 7 is shaped to curve more than half way around the shaft 27 and has a lip portion 34 engaging the cam 32. The other end of said contact bearing member is pivotally mounted in a cupped contact 35. Movable contact 36 is mounted on the movable contact bearing member 33 between the two fixed contacts 29 and 31. Cam 32 has a scored rim with score lines every ten degrees making it possible to break away any portion of the rim to give any desired dwell time for the lip 34 on cam 32.

In operation the portion 37 of the snap spring 33 is placed under compression when the lip 34 rides out of the slot 38 of the cam 32 to cause the contact bearing member 33 to snap from the left to the right and thereby break the contact with contact 31 and make contact with the contact 29. Contact 36 will remain in engagement with contact 29 until the lip 34 has dropped into the slot 38.

Fig. 6 shows two switches 39 and 41 of the type shown in Fig. 5 ganged together.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In a switch of the character described; a housing having a tubular recess open at one end and closed at the other, first and second fixed contacts mounted on opposite sides of said recess and a third fixed contact mounted in the closed end of said recess, a resilient contact bearing member having one end pivotally engaging said third fixed contact and the contact thereof normally engaging said first fixed contact, said member being movable between said first and second contacts, a shoulder extending from and integral with the other end of said member and means for actuating said contact bearing member comprising a ball disposed in the outer portion of said recess and in engagement with said shoulder operable to apply a rotational force to the shoulder of said contact bearing member to cause said bearing mem-

ber to snap from said first fixed contact to said second fixed contact.

2. Apparatus as recited in claim 1 wherein said movable member is a ball.

3. In a switch of the character described; a housing 5 having a recess therein, first and second fixed contacts mounted on opposite sides of said recess and a third contact mounted in the base of said recess, a resilient contact bearing member operable between said first and second fixed contact, a ball disposed in the outer portion 10 of said recess in engagement with one end of said resilient member, the other end of said contact bearing member being pivotally mounted on said third fixed contact, an actuating arm attached to said housing and engaging said ball, whereby upon applying a force to said 15 actuating arm, said ball will cause said flexible member to snap from one of said fixed contacts to the other of said fixed contacts.

4. A switch as claimed in claim 3 wherein said ball 20 is made of nylon.

5. In a switch of the character described, a base member having first and second shafts mounted thereon, a cam keyed to said first shaft, said cam having a scored rim with a plurality of score lines spaced along the circumference thereof whereby any portion of the rim may 25 be broken away, a pair of fixed contacts mounted on said base member, a resilient contact bearing member operable between said fixed contacts, said contact bearing member being shaped to curve around said second shaft, one end of said contact bearing member forming 30 a lip to be engaged by said cam, the other end of said contact bearing member pivotally mounted on a contact mounted on said base, said one end terminating in the region between said second shaft and said other end, 35 whereby upon rotation of said cam a force is applied to said one end of said contact bearing member to cause

said resilient member to snap from one of said fixed contacts to the other of said fixed contacts, the dwell time of said switch being determined by the extent of the broken away portion of said cam.

6. In a switch of the character described; a housing having a recess therein, first and second fixed contacts mounted on opposite sides of said recess and a third contact mounted in the base of said recess, a resilient contact bearing member operable between said first and second contacts, a shoulder extending from and integral with one end of said member, the other end of said member being pivotally mounted on said third fixed contact, a ball disposed in the outer portion of said recess and in engagement with said shoulder, an actuating arm attached to said housing and engaging said ball, whereby upon applying a force to said actuating arm, a force is transmitted through said ball to said shoulder to cause said member to snap from one of said fixed contacts to the other of said fixed contacts.

7. A switch as claimed in claim 6 wherein said ball is composed of nylon.

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CERTIFICATE OF CORRECTION

Patent No. 2,842,632

July 8, 1958

William R. Edwards

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 46, before "switch" insert -- of the --; column 3, lines 3 and 4, strike out "2. Apparatus as recited in claim 1 wherein said movable member is a ball."; column 3, lines 5, 19, 21, and column 4, lines 5 and 20, for the claims now appearing numbered "3, 4, 5, 6, and 7" read -- 2, 3, 4, 5, and 6 --; column 3, line 10, for "contact" read -- contacts --; in the heading to the printed specification, line 5, for "7 Claims." read -- 6 Claims. --.

Signed and sealed this 4th day of August 1959.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents