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A. K. WHYTE ET AL

2,424,527

ELECTRIC SWITCH

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Fig. 1.

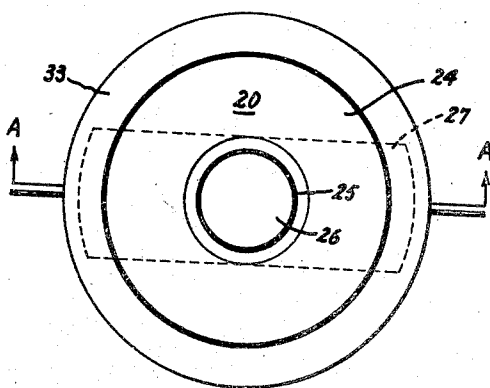


Fig. 2.

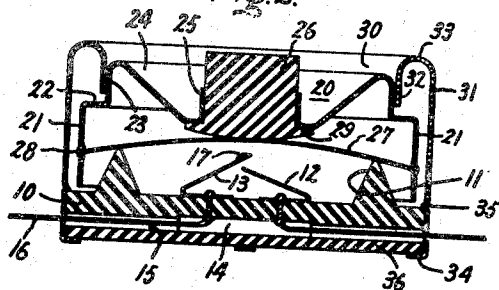
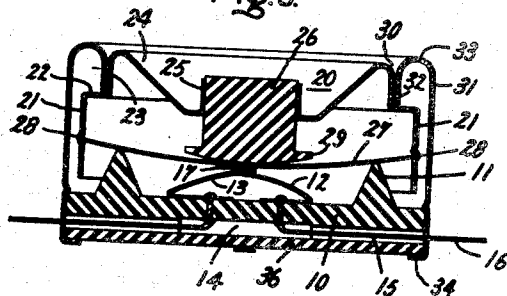


Fig. 3.



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ELECTRIC SWITCH

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8 Claims. (Cl. 200-67)

1 Our invention relates to electric switches and more particularly to a push button type switch operable with a snap action to closed and opened positions.

It is the object of our invention to provide a novel snap action push button type electric switch of an economical construction having a minimum number of parts, which is reliable in operation and which is protected against accidental operation.

For a complete understanding of our invention reference should be had to the following detailed description taken in conjunction with the accompanying drawings of a switch in accordance with our invention in which like reference characters designate like parts and in which Fig. 1 is a plan view of an electric switch embodying our invention; Fig. 2 is a cross section on the line A-A of the switch shown in Fig. 1, the switch mechanism being in the "off" position; and Fig. 3 is a view similar to Fig. 2 except the switch is in "on" position.

Referring to the drawings, a disc 10 of insulating material constitutes a base. A concentric circular ridge 11, in the form in cross-section of an inverted V, projects integrally from the top surface of the disc. The apex of the ridge 11 is spaced a substantial distance from the outer periphery of the disc, as shown in the drawings about one third of the radius of the disc. A pair of spring contact strips 12 and 13 respectively are riveted to the central portion of the base 10, their free ends in overlapping relation one above the other and normally spaced apart. A recess 14 is provided centrally in the side of the disc remote from the contacts to accommodate the rivet heads within the plane of the bottom of the disc. A pair of grooves 15 in the bottom of the disc 10 extend radially from the recess 14 to the periphery to accommodate lead wires 16, for the contacts. A button 17 of insulating material is secured to the top surface of the upper contact strip 13.

A carrier unit generally designated at 20 is mounted on the base 10 whereby the spring contacts 12 and 13 may be closed and maintained closed and whereby the unit may be independently actuated to release the contacts. The unit 20 consists of a cup-shaped member having a side wall 21. The bottom of the cup-shaped member 20 is shaped to provide an annular shoulder 22 extending inwardly from the wall 21 at right angles thereto, then an annular wall 23 of substantial height extending upwardly from the wall 22 in a direction axially of the cup, then a portion bent downwardly and inwardly providing an annular shoulder 24, and terminating in

2 an upstanding flange 25 defining an opening. The flange 25 provides a bearing surface for guiding a push button 26 of insulating material mounted therein. A flat spring 27 of substantial width and slightly longer than the inside diameter of the unit 20 is mounted in a recess 28 in the side wall 21 thereof. This spring retaining recess 28 is provided by corrugations extending around the periphery of the cup wall 21. The spring 27 accordingly when sprung into the recess 28 extends diametrically across the cup in any radial position in which it may be inserted and due to its length with respect to the cup it assumes one of two bowed positions. In the upper bowed position of the spring shown in Fig. 2, it engages the bottom of the push button 26 and holds it in its upper position with its shoulders 29 engaging the under side of bottom wall of the cup 21 below the flange 25. When the unit 20 is assembled on the base member 10, it is supported thereon as shown in Figs. 2 and 3 by the spring 27 resting on diametrically opposite sections of the ridge 11 with the push button lying directly above the contact button 17. The ridge 11 therefore provides a pair of fulcrums spaced from the restrained ends of the spring.

A casing generally indicated at 30 is secured to the base 10. The casing consists of a cylindrical wall 31 with its upper end turned inwardly providing a downwardly extending flange 32 with a shoulder 33 between them. The base 10 may be conveniently secured in the casing 30 by integral tangs 34 formed on the bottom edge of the wall 31 and deformed to press it against a ridge 35 rolled in the wall 31. A cover plate 36 which may be of insulating material such as hard fibre is interposed between the tangs 34 and the bottom of the base 10. The internal diameter of the flange 32 is slightly greater than the external diameter of the vertical wall 23 of the unit 20 to which it acts as a bearing and guiding surface.

When the push button 26 is depressed from its position shown in Fig. 2, the spring 27 is deformed downwardly about the fulcrums provided by the ridge 11. When deformed sufficiently its central part between its supports on the ridge 11 passes overcentre with a snap action and engages the insulating button 17 on the spring 13 pressing it downwardly into engagement with the spring 12 thereby closing the circuit with a wiping action. During the operation above described, the outer ends of the spring 27 beyond the supporting ridge 11 are permitted to move upwardly carrying with them the member 20 till the wall 22 thereof engages the lower end of the flange 32 of the casing which acts as a stop for the member 20 in its upward motion. The contacts are held in closed

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position as illustrated in Fig. 3 by the lower bowed form which the spring assumes and the stop provided by the engagement of the wall 22 with the wall 32.

To open the switch contacts, the carrier unit 20 acts as an operating member. Pressure on the annular shoulder 24 of unit 20 is transmitted to the ends of the spring 27 causing the spring to deform fulcrumed by the ridge 11, and the section of spring 27 between the pair of fulcrums passes overcentre and assumes its upper bowed position illustrated in Fig. 2, thus permitting the contacts 12 and 13 to assume their open position.

The dimensions of the push button, unit 20 and casing 30 are selected so that in both the operative positions of the push button and the member 20 as illustrated, their exposed top surfaces are beneath the level of the shoulder 33 of the casing. This militates against accidental operation of either of the members.

It will be observed that we have provided a rugged switch of a few sturdy parts which are easily assembled and certain in action. The single spring is positively actuated by two separate devices whereby when assembled in its carrier member it assumes either an upper or lower bowed position. Each of the separate devices when actuated causes the spring to snap from one position to the other.

While we have shown a particular embodiment of our invention it will, of course, be understood that we do not wish to be limited thereto since various modifications may be made and we contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric switch comprising a flat spring restrained in a member whereby it may assume either an upper or a lower bowed position, means on said member to operate said spring from its upper to its lower bowed position, said spring mounted on a pair of spaced fulcrum points whereby pressure on said member causes movement of said spring from its lower to its upper position, means limiting the movement of said member in a direction away from the said fulcrum points, and contacts arranged to be closed by said spring when it is in one of its bowed positions and to be opened when said spring is in the other of its bowed positions.

2. The device as claimed in claim 1 in which a pair of contacts normally spring biased to open position are arranged between the fulcrum points and located in a position to be moved to closed position when said spring assumes its lower bowed position.

3. The device as claimed in claim 1 in which the operating means on the member is a push button supported for reciprocal action thereon.

4. An electric switch comprising a pair of relatively moving contacts, means to operate the contacts to open and closed positions comprising a flat spring restrained in a carrier whereby it may assume either an upper or a lower bowed position, an operating member mounted on said carrier and engaging the middle portion of said spring and movable to deform said spring and cause it to pass from its upper to its lower bowed position, a pair of fulcrums one on each side of said contacts, said spring resting on said fulcrums at points spaced from each end thereof, said carrier mounted to permit movement thereof towards and away from the pair of fulcrums

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whereby pressure on the carrier will cause the spring to deform from its lower bowed position and assume its upper position.

5. A push button type electric switch comprising a base carrying a pair of spring biased normally open contacts, an operating member carrying a flat spring strip capable of assuming either an upper or a lower bowed position, an enclosing case in which said base and operating member are mounted, a push button protruding through a centrally defined opening in said operating member whereby pressure thereon will snap said flat spring strip from its upper to its lower bowed position closing said spring biased contacts, said operating member mounted whereby pressure on the top surface thereof will snap said metal strip to its upper position thereby releasing said spring biased contacts to their normally open position.

6. A push button type electric switch comprising a base carrying at least one contact and having a pair of diametrically opposed raised fulcrum points near its outer periphery, a flat spring resting on said fulcrum points, a vertically movable carrier member acting as one operating member and having a diameter substantially less than the length of said flat spring strip, said carrier having diametrically opposed recesses in its inner walls to restrain said spring in either an upper or lower bowed position, a centrally defined recess in said carrier member, a second operating member protruding through said centrally defined recess and resting on said spring when said spring is in its upper bowed position, an outer case enclosing said operating members and said base.

7. An electric switch comprising a base member having an annular ridge projecting from the upper surface thereof, a pair of contacts normally spring biased to open position located on the base centrally of the said annulus, an operating member supported on said base for operating said contacts to closed and opened positions comprising a carrier unit having a flat spring mounted thereon whereby it is restrained to assume either an upper or a lower bowed position, a push button supported in said carrier unit in a manner to engage the middle portion of said spring, and an enclosing casing provided with means to guide said carrier unit in a direction to and from the base, said carrier unit being located in said casing with said spring resting on diametrically opposite points of said annular fulcrum with the contacts within the range of movement of the central portion of said spring.

8. An electric switch comprising a base having an annular ridge projecting from the upper surface thereof, a casing secured to the base, said casing having a circular side wall turned inwardly at its upper edge to provide a circular flange parallel therewith and spaced above said ridge, a switch operating member comprising a cup-shaped shell having an annular wall portion cooperating with said inturned flange for guiding it towards and away from the base, a flat spring restrained between the side walls of said shell whereby the spring may assume either an upper or a lower bowed position, a push button centrally located in the bottom of said cup-shaped shell and engaging the middle portion of said spring, the cup-shaped shell and the annulus being proportioned and arranged whereby said spring rests on diametrically opposite portions of said annulus, and a pair of contacts normally spring biased to open position located on said

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base within the range of movement of the central portion of said spring.

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REFERENCES CITED

The following references are of record in the file of this patent:

Number
5 1,939,286
2,409,483
2,381,835
2,343,060
2,170,748

6

UNITED STATES PATENTS

Name	Date
Spencer -----	Dec. 12, 1933
Gandelot -----	Oct. 15, 1946
Moorhead -----	Aug. 7, 1945
Horning -----	Feb. 29, 1944
Eaton -----	Aug. 22, 1939