

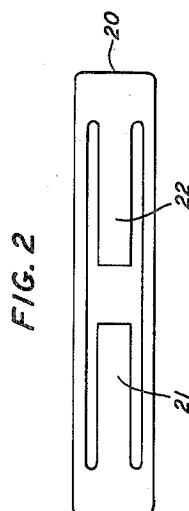
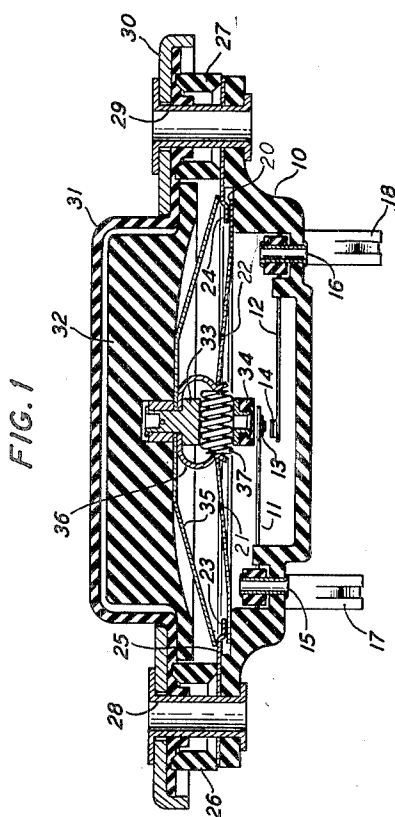
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SNAP SWITCH

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## SNAP SWITCH

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This invention relates to electrical switches and more particularly to improvements in snap switches.

In some switches, such as the press-to-talk switch employed in some types of telephone handsets, it is desirable that the force needed to maintain the switch in operated position be small to avoid fatigue. This may be done with a snap switch having its spring or springs normally biased to one side of a neutral position and operable to an oppositely biased position. Certain switches having facing, double cantilever springs are of this type. One difficulty which has been encountered after continued use of such switches is unsatisfactory operation due to wear on parts of the springs.

It is an object of this invention to improve the structure and the organization of the parts of snap switches.

A feature of this invention lies in the organization of operating springs and their cooperating elements in a double cantilever, snap switch to improve the operation and wearability thereof.

A further feature of this invention resides in an auxiliary spring for aiding in compensating for a wear condition in springs of a double cantilever, snap switch.

Other and further objects and features of this invention will appear more fully and clearly from the following description of an illustrative embodiment thereof taken in connection with the appended drawing in which:

Fig. 1 is a sectional view of one embodiment of the invention; and

Fig. 2 is a plan view of a spring used in the device of Fig. 1.

The switch assembly comprises an elongated base or housing 10 within which switch elements are mounted. These elements comprise springs 11 and 12 having on their respective adjacent ends facing contacts 13 and 14. The springs 11 and 12 are secured to the housing by suitable fastening means such as the tubular rivets 15 and 16. Terminals 17 and 18 for making external connections are also retained by the rivets 15 and 16. The switch may be of the single pole type with one set of springs, contacts and terminals or of the double pole type with another set of springs, contacts and terminals adjacent those described.

A spring 20 having inwardly extending tongues or cantilever spring arms 21 and 22, as shown in Fig. 2, is seated on ledges at either end of the base or housing 10 and is held in place by offset projections 23 and 24 of a slotted plate 25, which is preferably of metal.

The plate 25 is held in place on the housing 10 by bushings 26 and 27, which are secured by fastening means such as the tubular rivets 28 and 29.

A skirted cover plate 30, preferably of metal and having an elongated central orifice, clamps a flexible boot or protective cover 31 against the bushings 26 and 27. This plate is also retained by the rivets 28 and 29. The boot 31 is made of rubber or other suitable flexible rubber-like material and covers an operating bar or button 32, which projects through the orifice in the cover plate 30.

The bar 32 is secured to one end of a plunger 33 which is preferably made of metallic material. On the other

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end of the plunger is a switch operating tip 34 of insulating material.

Secured to the plunger 33 are a return spring 35 and a spring clip 36. The return spring 35 is bowed with its ends supported by the housing 10 by way of the slotted plate 25. The spring clip 36 has re-entrant ends for retaining the free ends of the tongues or cantilever springs 21 and 22. A coil spring 37 is housed in a transverse bore through the plunger 33 and urges the tips of the clip 36 toward the ends of the tongues 21 and 22.

The switch is shown in Fig. 1 in its unoperated position with the arms 21 and 22 deflected toward the operating bar 32 and the return spring 35 in full bowed condition. Pressure on the bar 32 through the boot 31 moves the plunger 33 to its operated position with the springs 21 and 22 deflected toward the switch and the return spring 35 partially flattened. The plunger 33 in this position presses the switch contacts together. Upon release of pressure on the bar 32, the return spring, as its name implies restores the parts to their unoperated condition. Because of the snap or throw-over action of the cantilever springs or tongues 21 and 22, the force required to hold the switch closed is considerably less than that required to operate it.

As has been noted, wear between the re-entrant portions of the clip 36 and the ends of the tongues 21 and 22 tends to make a switch of this type less effective as it ages. The clip will spread of its own elasticity to compensate for this wear only to a limited degree. The coil spring 37, however, is effective to urge the parts together even though the wear may be considerable. The effective life of the switch is thereby greatly increased.

What is claimed is:

1. A snap switch comprising a housing, a flat, elongated spring means having its ends seated on spaced portions of the housing, stop means at each of said spaced portions to restrain the ends of said spring means, said spring means including two cantilever elements inwardly directed from said ends and extending along its longitudinal axis, the adjacent ends of said elements being spaced to accommodate a U-shaped spring clip having re-entrant tips for receiving the ends of said elements, the spacing between said ends of the elements being less than that between the tips, whereby said elements are urged out of the plane of the spring means, an axially movable switch operating plunger within and secured to said clip with its axis perpendicular to the plane of the spring means, normally open, spring mounted switch contacts adjacent one end and in the path of said plunger, and an operating button on the other end thereof; a bowed return spring secured to the plunger and bearing on the stop means for biasing said plunger away from the switch contacts, and an expanding coil spring housed in the plunger between the tips of said clip to aid in biasing said tips toward the cantilever elements of the flat spring means.

2. A snap switch comprising a base, a flat, elongated spring means having its ends seated on the base, stop means secured to said base to restrain the ends of said spring means, said spring means including two cantilever elements directed inwardly from said ends, the adjacent ends of said elements being spaced to accommodate a U-shaped spring clip, an axially movable switch operating plunger secured to said clip with its axis perpendicular to the plane of the spring means, spring mounted switch contacts adjacent one end and in the path of said plunger, and an operating button on the other end thereof; a return spring having its mid-portion secured to the plunger and its ends resting on the stop means, for biasing said plunger away from the switch contacts, and a coil spring within said clip to aid in biasing portions thereof toward the cantilever elements of the flat spring means.

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3. A snap switch comprising a housing, a flat, elongated spring means having its ends seated on the housing, stop means secured to said housing over the ends of said spring means to restrain said ends, said spring means including two cantilever elements directed inwardly from said ends, the adjacent ends of said elements being spaced to accommodate a U-shaped spring clip having re-entrant tips for receiving the ends of said elements, the spacing between said ends of the elements being less than that between the tips, an axially movable switch operating plunger secured to said clip with its axis perpendicular to the plane of the spring means, normally open, spring mounted switch contacts adjacent one end and in the path of said plunger, and an operating button on the other end thereof; a bowed flat return spring secured to the plunger and supported by the housing for biasing said plunger away from the switch contacts, and a coil spring between the tips of said clips to aid in biasing said tips toward the cantilever elements of the flat spring means.

4. A snap switch comprising a housing, a flat, elongated spring means having its ends seated on spaced portions of the housing, stop means at each of said spaced portions to restrain the ends of said spring means, said spring means including two cantilever elements inwardly directed from said ends and extending along its longitudinal axis, the adjacent ends of said elements being spaced to accommodate a U-shaped spring clip having re-entrant tips for receiving the ends of said elements, an axially movable switch operating plunger secured to said clip with its axis perpendicular to the plane of the spring means, switch contacts adjacent one end of said plunger, and an operating button on the other end thereof; a flat return spring secured at its mid-portion to the plunger for biasing said plunger away from the switch contacts, and a spring housed in the plunger between the tips of said clip to aid in biasing said tips toward the cantilever elements of the flat spring means.

5. A snap switch comprising a base, an elongated spring seated on spaced portions of the base, means at each of said spaced portions to restrain the ends of said spring, said spring including two tongues inwardly directed from said ends, the adjacent ends of which are spaced to accommodate a U-shaped spring clip, an axially movable switch operating plunger secured to said clip with its axis perpendicular to the plane of the spring, contacts adjacent one end and in the path of said plunger, and an operating button on the other end thereof; a bowed return spring secured to the plunger and sup-

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ported by the base for biasing said plunger away from the switch contacts, and an expanding coil spring housed in the plunger and within said clip to aid in biasing said clip toward the tongues of the elongated spring.

6. A snap switch comprising a housing, a flat, elongated spring means having its ends seated on spaced portions of the housing, means at each of said spaced portions to restrain the ends of said spring means, said spring means including two cantilever elements inwardly directed from said ends and extending along its longitudinal axis, the adjacent ends of said elements being spaced to accommodate a U-shaped spring clip having re-entrant tips for receiving the ends of said elements, the spacing between said ends of the elements being less than that between the tips, whereby said elements are urged out of the plane of the spring means, an axially movable switch operating plunger within and secured to said clip with its axis perpendicular to the plane of the spring means, switch contacts adjacent one end and in the path of said plunger, and an operating button on the other end thereof; a bowed return spring secured to the plunger and supported by the housing for biasing said plunger to non-operating position, and an expanding coil spring housed in the plunger between the tips of said clip to aid in biasing said tips toward the cantilever elements of the flat spring means.

7. A switch assembly comprising a base, cooperating contact means, and operating means for said contact means mounted on said base, said operating means comprising a flat spring having, oppositely located projections extending inwardly from the outer ends thereof, an expandable member between said projections and secured to a contact closing plunger, spring means within the plunger and the expandable member for urging portions of said member into contact with said projections, a bowed, flat spring biasing the plunger away from the contacts, and manually operable means attached to the plunger for moving said plunger to contact closing position.

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