April 13, 1965 E. W. PANICCI ETAL 3,178,528

OPEN BLADE SNAP ACTION SWITCH

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FIG. 1.

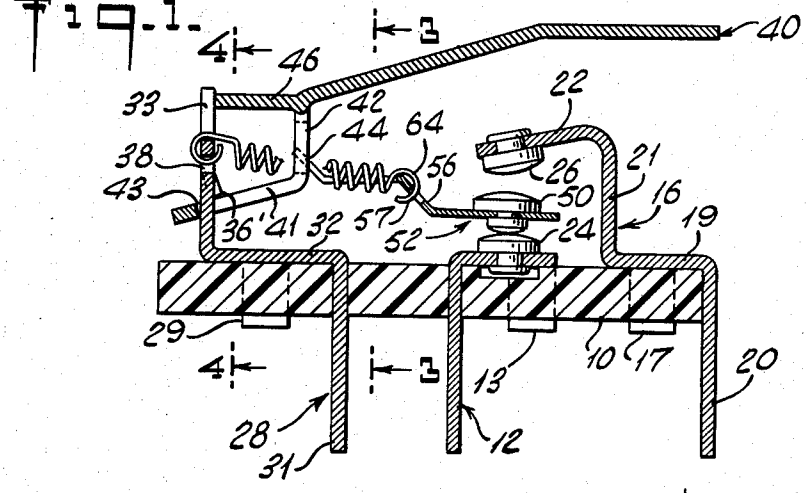


FIG. 5.

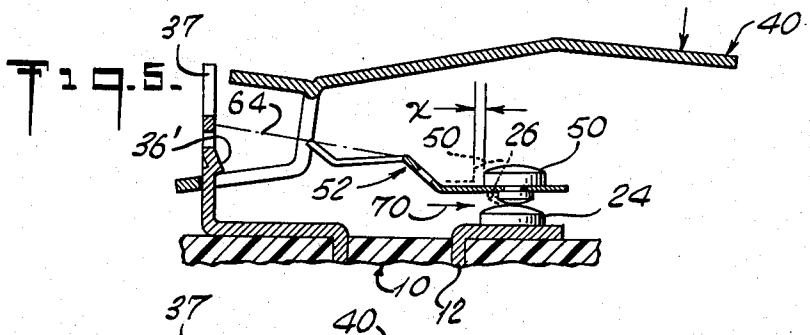


FIG. 6.

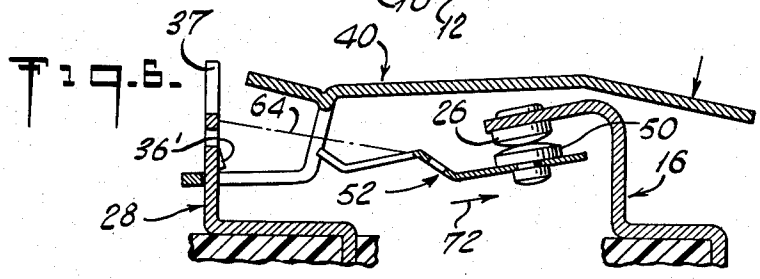
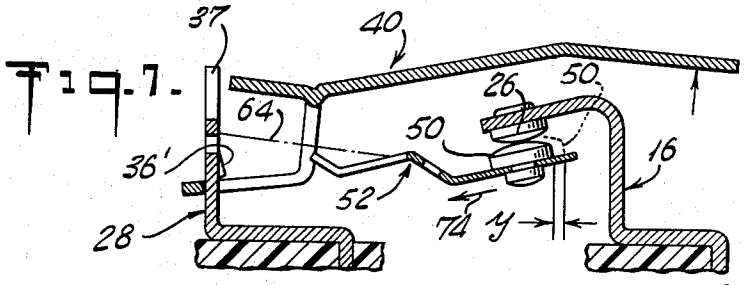


FIG. 7.



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Fig. 2.

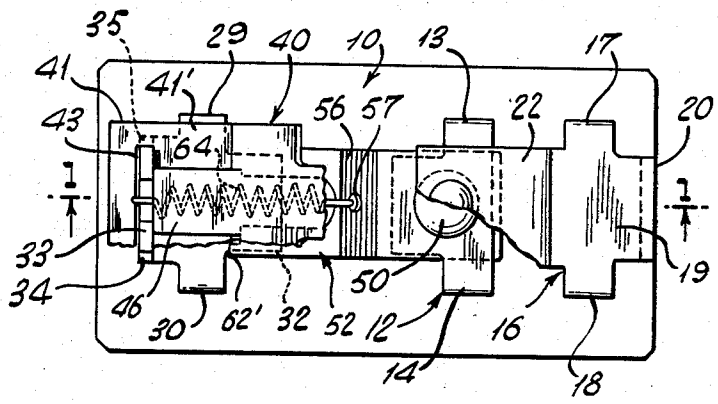


Fig. 3.

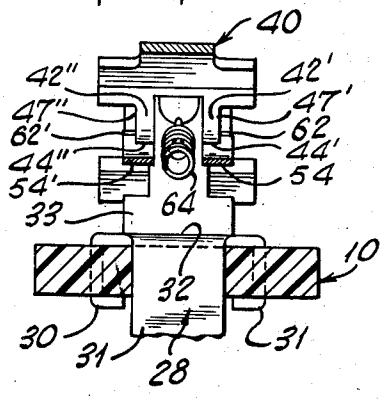
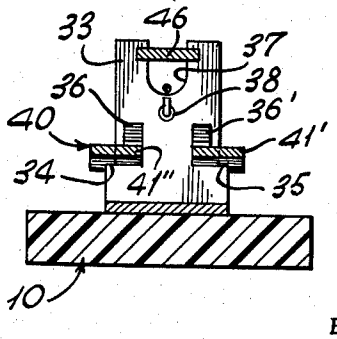


Fig. 4.



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FIG. 8.

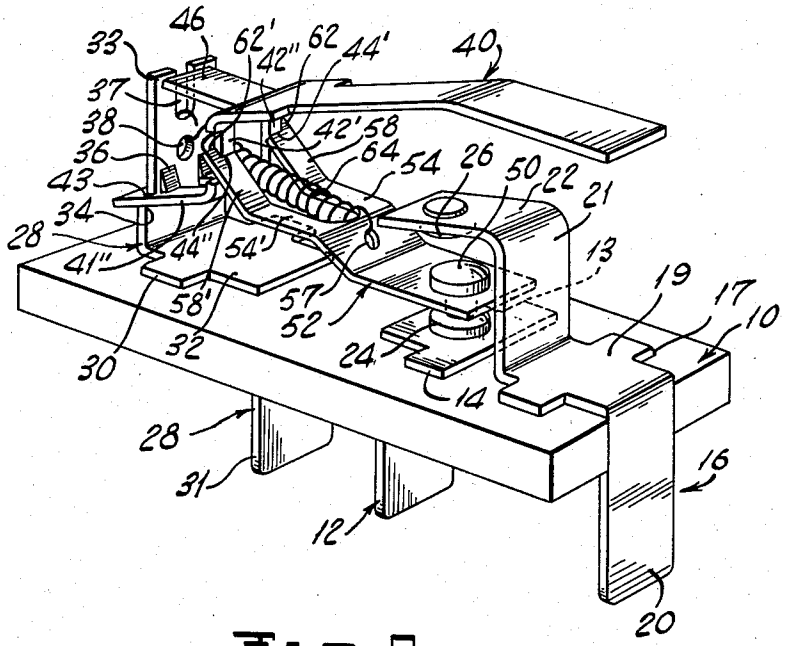
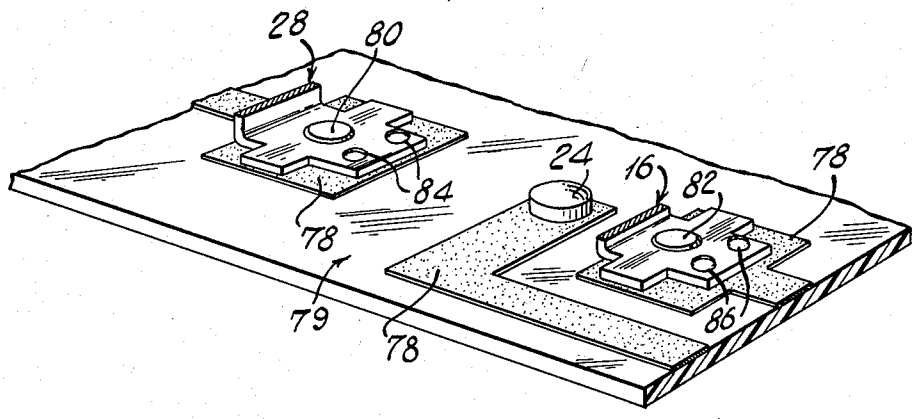


FIG. 9.



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OPEN BLADE SNAP ACTION SWITCH

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2 Claims. (Cl. 200—67)

This invention relates to switches. More particularly, this invention relates to small, precision type snap switches which may or may not be enclosed in a housing.

Today, large quantities of small, precision type snap switches are being employed in almost every facet of industry. There is a continuing demand for inexpensive and reliable snap switches of high precision to prevent costly breakdowns in the complex industrial equipment with which they are employed.

Accordingly, it is an object of this invention to provide a snap switch of simple, low cost construction and long operating life.

Another object of the invention is to provide a contact wiping action for a snap switch in order to rid the contacts of foreign matter and minimize switch failures.

Still another object is to provide a snap switch having long life with a large operating travel.

Still another object of this invention is to provide a snap switch particularly adapted for use with different types of mounting means.

Yet another object is to provide a snap switch which may be assembled without the use of screws, rivets or the like.

In accordance with one embodiment of this invention, an actuator arm is pivotally mounted on a pivot post opposite a pair of stationary contacts. A movable switch blade is mounted on the actuator between the post and the stationary contacts, and a tension spring is inter-connected between the spring blade and the post. When the actuator arm is pushed downwardly the mounted portion of the spring blade is moved beneath the tension center of the system, causing the switch blade to move between the stationary contacts with a snap action. Because of the pivotal movement of the actuator arm, the switch blade is also caused to move in a direction away from the pivot post, causing the movable contact to wipe across the face of the stationary contacts. When pressure is removed from the actuator arm, the tension spring returns the system to its initial position which is determined by a stop member connected to the actuator arm and adapted to abut against the post.

The manner in which the above objectives are accomplished will be more fully described with reference to the following specifications and drawings wherein:

FIGURE 1 is a cross-sectional view of the snap switch according to the invention.

FIG. 2 is a top view of the switch.

FIG. 3 is a sectional view along the line 3—3 of FIGURE 1.

FIGURE 4 is a sectional view along the line 4—4 of FIGURE 1.

FIGURES 5–7 are cross-sectional views similar to FIGURE 1 illustrating the wiping section of the contacts during switching.

FIGURE 8 is a perspective view of the invention; and

FIGURE 9 illustrates another method of mounting the switch.

Referring to FIGURES 1–4 and 8 the switch is shown mounted on an insulation board 10. A first terminal 12 for a stationary contact is secured to board 10 by means of vertically bent securing lugs 13 and 14 and a downwardly extending connecting post 15 which passes through board 10. A second terminal 16 is similarly mounted on

board 10 by means of securing lugs 17 and 18 extending from a horizontal portion 19 of the terminal. A vertical connecting post 20 extends downwardly past the end of insulation board 10.

As shown, terminal 16 also includes an integrally formed vertical portion 21 and a downwardly slanted portion 22. A pair of oppositely disposed stationary contacts 24 and 26 are mounted in a conventional manner on the horizontal portion of the terminal 12 and the under-surface of slanted portion 22 of terminal 16, respectively.

A pivot post 28 is mounted on the insulation board opposite the stationary contacts 24 and 26 and also serves as the common terminal of the switch. This terminal is mounted in a manner similar to the terminals for the stationary contacts by means of securing lugs 29 and 30 and a connecting post 31 extending downward through insulation board 10. Pivot post 28 includes an integrally formed horizontal portion 32 extending toward the rear of the switch and from which the securing lugs 29 and 30 extend. A vertical portion 33 extends upwardly from horizontal section 32 and is shaped to provide two pivot shoulders 34 and 35 (FIG. 4), which in combination with two small projections 36 and 36′ provide a pivot means for the actuator arm of the switch. The top of the pivot post 28 includes a slot 37 and immediately beneath the slot a small aperture 38 is provided to anchor the tension spring in a manner to be described.

The actuator arm of the system is shown at 40 and includes a generally horizontal end portion 41 having a lateral slot 43 towards its rear end. Slot 43 is sufficiently wide to permit the actuator arm to pass over the upstanding portion 33 of pivot post 28 and permit the actuator arm to rest on pivot shoulders 34 and 35. The end portion 41 of the actuator comprises two legs 41′ and 41″ which have sufficient width with respect to post 28 to extend inwardly beneath projections 36 and 36′ respectively.

Integrally formed with the actuator legs 41′ and 41″ is a vertical portion 42 comprising two legs 42′ and 42″ which have vertical cutout portions 47′ and 47″ in their outer sides and two horizontal notches 44′ and 44″ on their forward facing surfaces to pivotally support the spring blade in a manner to be further described. The upper ends of vertical legs 42′ and 42″ are inter-connected and extend outwardly in a generally horizontal direction over the stationary contacts. Integrally formed therewith is a horizontal, rearwardly extending stop portion 46 which limits the upward movement of actuator arm 40 by abutment against vertical portion 33 of pivot post 28. The stop 46 may be formed from the actuator arm by simply bending up a slotted section of the actuator arm to form the horizontal and vertical legs and cutting the section to the desired size. It is obvious that the actuator arm may have various shapes and sizes, or, when necessary, may include a suitable electrical insulator to isolate the switch from the actuating mechanism.

A movable contact 50 is disposed between stationary contacts 24 and 26 and mounted on a rigid switch blade 52. Switch blade 52 includes two horizontal, rearwardly extending legs 54 and 54′ having upwardly slanted portions 58 and 58′, respectively. The rear edges of the slanted portions 58 and 58′ may be received in the notches 44′ and 44″, respectively, of the actuator arm 40. The switch blade also includes two small ears 62 and 62′ which extend rearwardly from the outer sides of legs 54 and 54′, respectively, into slots 47′ and 47″, respectively, of the actuator arm to prevent lateral displacement of the switch blade. The two legs 54 and 54′ are joined at their forward extremity to form a downwardly slanted part 56 extending toward the stationary contacts. A small aperture 57 is provided in slanted part 56 to enable inter-

connection between the switch blade and the tension member.

In the present embodiment, the tension member comprises a horizontally disposed coil spring 64 having one end passing through the slotted portion 37 and aperture 38 of pivot post 28, and the other end mounted in the aperture 57 of the switch blade 52. Spring 64 passes between the legs 54 and 54' of the switch blade, and through the vertical legs 42' and 42'' of the actuator arm.

In its normal position the actuator arm is restrained from counter-clockwise rotation by stop member 46, while vertical movement of the arm is inhibited by shoulders 34 and 35 and projections 36 and 36'. The lateral slot 43 in the horizontal portion 41 of the actuator arm in conjunction with the upstanding portions 33 of the pivot post 28 prevents lateral displacement of the actuator. The force of the spring braces the pivot edges of the switch blade against the notches 44' and 44'' of the actuator arm, and prevents any vertical displacement of the pivot point of the switch blade with respect to the actuator arm. As previously discussed the ears 62 and 62' prevent lateral displacement of the switch blade.

The operation of the switch is shown most clearly in FIGURES 5–7. In FIGURE 5 the actuator arm has been rotated slightly clockwise about pivot post 28. As the actuator arm rotates, the notches 44 and 44' also rotate about the same point causing the spring blade 52 to move forward a distance x in the direction of arrow 70. When the actuator arm is moved a sufficient distance to move the pivoted end of the switch blade beneath the snap center of the switch system, the switch blade moves from the lower stationary contact to the upper stationary contact with a snap action. The upper stationary contact 26 is positioned at an angle with respect to the lower contact 24, so that the plane of movable contact 50 is always parallel to whichever contact it is touching. Thus, continued downward movement of the actuator arm will cause the switch blade to move in the direction of the arrow 72 resulting in a wiping action between the movable contact 50 and the upper stationary contact 26. The downward movement of the actuator is limited by abutment against terminal 16.

When the actuator arm is thereafter released, it rotates in a counter-clockwise direction because of the force exerted by the tension spring 64. As the arm rotates, the notches 44 and 44' also rotate causing the switch blade to move backward in the direction of arrow 74. The movable contact is then moved a distance y as it wipes across the upper stationary contact, until the pivot point of the switch blade is moved above the snap center of the system causing the switch blade to move from the upper to the lower stationary contact with a snap action.

An alternative method of constructing the switch is shown in FIGURE 9 wherein the switch is shown adapted for use so there are no projections of the lower terminals.

In FIGURE 9 the switch is shown mounted on the conducting strips 78 of a printed circuit 79. The pivot post 28 is mounted by means of a rivet 80 and the upper stationary contact terminal 16 is mounted by means of a rivet 82. Small projections 84 and 86 extend into the board of printed circuit 79 to ensure good electrical contact therewith and prevent the terminals from rotating. The lower contact 24 may be mounted directly on the printed circuit. Of course, many other terminal ends may be used within the scope of the invention; in fact, although a preferred embodiment has been described, many modifications thereof may be made within the scope of the invention, and the invention should not be limited except as defined in the following claims.

What we claim is:

1. A snap action switch comprising an insulated base, first and second terminals mounted on said base, said terminals having oppositely disposed portions and respective stationary contacts mounted thereon, a third terminal mounted on said base away from said contacts and including a pivot post generally perpendicular to said base, a thin actuator arm pivotally braced against the face of the pivot post facing the stationary contacts, said actuator arm extending from said post toward said stationary contacts and including two spaced apart legs generally transverse with respect to said base, the portion of the actuator arm intermediate said legs being bent toward said pivot post and normally abutting against said post to limit the return of said actuator, a switch blade having two stressed legs pivotally mounted in the planar surfaces of said spaced apart legs, the free end of said switch blade extending outwardly between said stationary contacts, a movable contact mounted on said switch blade between said stationary contacts, a stressed member extending between said spaced apart legs and connected at one end to said switch blade near the junction of said stressed legs and connected at its other end to said pivot post, whereby movement of said actuator arm moves the pivotally mounted portion of the switch blade beneath the snap center of the system, causing the movable contact to move between said stationary contacts with a snap action.

2. A snap action switch according to claim 1, wherein said pivot post includes upwardly facing shoulder portions on which said actuator rests.

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