Nov. 4, 1969 A. L. EHRENFELS ETAL 3,476,898

PIVOT FOR SNAP-ACTING SWITCH

Filed Aug. 18, 1967

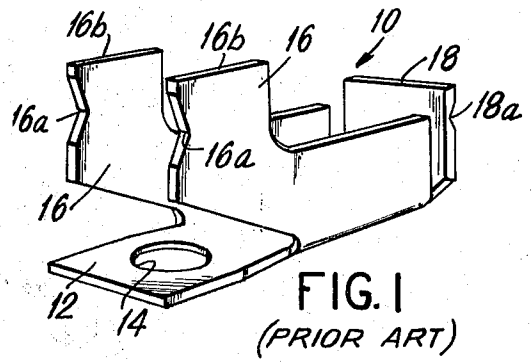



FIG. 1
(PRIOR ART)

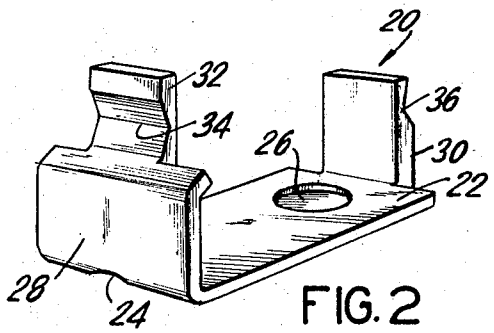



FIG. 2

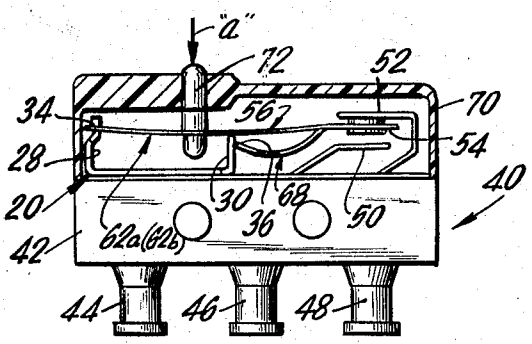



FIG. 3

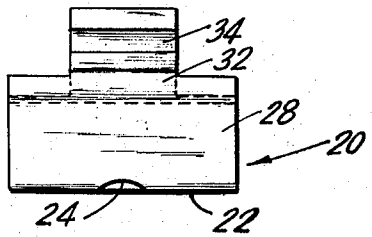



FIG. 6

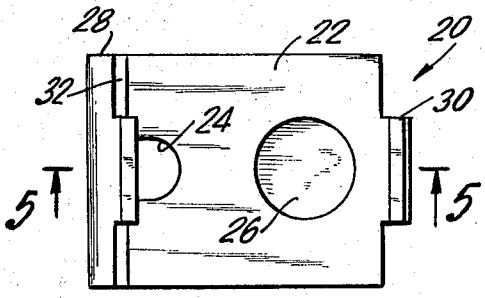



FIG. 4

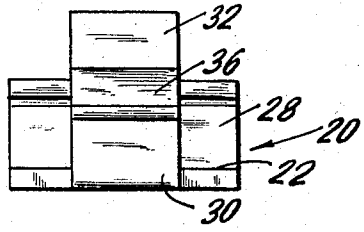



FIG. 7

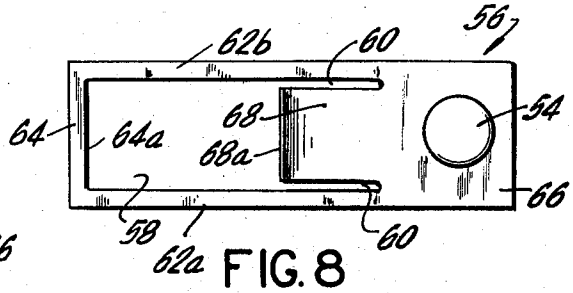



FIG. 8

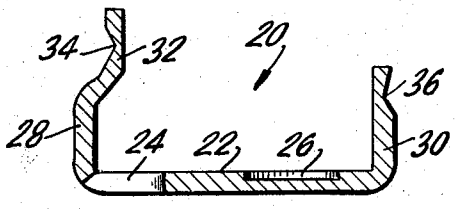



FIG. 5

INVENTORS.
ALFRED L. EHRENFELS
PAUL C. KAHLS

BY

Nolte & Nolte
ATTORNEYS

United States Patent Office 3,476,898 Patented Nov. 4, 1969



3,476,898

# PIVOT FOR SNAP-ACTING SWITCH

Alfred L. Ehrenfels, Cheshire, and Paul C. Kahl, Westfield, Conn., assignors to Maxson Electronics Corp., New York, N.Y., a corporation of New York

Filed Aug. 18, 1967, Ser. No. 661,622
Int. Cl. H01h 21/40
U.S. Cl. 200—67 3 Claims

## ABSTRACT OF THE DISCLOSURE

A U-shaped member provides colinear support for the compression and tension portions of a snap-acting spring used in a miniature switch. The spring is mounted in cantilevered-fashion on a U-shaped support member and is arranged to be externally actuated so that the free end moves between two stationary contacts. A stop means for the externally operated actuator is provided in the bight portion of the support member. The spring has a cutout opening with a struck-out compression member.

This invention relates generally to snap-acting switches and more particularly to novel support means for the thin leaf spring utilized as the actuating member for the movable contact in a subminiature switch.

The present invention is directed to improvements in the structure of snap-acting switches of miniature size. These switches use a leaf spring actuator for moving a contact between fixed terminals. The movable contact is controlled according to the overcenter or toggle principle that is well known in the art.

An example of the type switch that would utilize the present invention is described and shown in U.S. Patent No. 3,144,529, issued on Aug. 11, 1964, to J. J. Zemke et al. The switch is comprised of a body portion having terminals comolded therewith. A button extends through the cover of the switch and is actuated by a pivotally mounted lever. Internally the button engages a cantilevered snap-acting spring that is mounted on a pivot member secured to the body of the switch. As shown in the drawing of the aforementioned patent, the pivot member is comprised of two longitudinally extending, substantially parallel legs that support the tension legs of the spring at the ends thereof and a transversely positioned leg at the opposite end of the pivot that supports the compression leg of the spring. It will be noted that the ends of the upstanding, parallel legs are spaced apart and, in combination with the transverse leg, provide a triangular support for the snap-acting spring.

The present invention is particularly characterized by an improved pivot member that supports the snap-acting spring. In contrast to the structure shown in the patent mentioned above, the present invention provides two spacedly opposed legs that pivotally support the compression and tension members of the spring in a colinear manner. Essentially, the pivot is a U-shaped member having oppositely facing notches in the oppositely facing ends of the legs thereof.

An overtravel stop for the pushbutton is provided by the central portion of the pivot that connects the two legs. In the aforementioned patent the comparably functioning overtravel stop was the parallel side walls that supported the tension member on the snap-acting spring. A comparison of the structure of this invention and the issued patent will reveal that the present invention is far simpler to fabricate and in addition provides colinear support for the tension and compression members of the spring whereas in the prior art the support was at three, triangulated points.

Accordingly, it is an object of this invention to provide an improved pivot member for a snap action switch.



Another object of this invention is to provide a substantially U-shaped pivot member that supports the snap acting spring in a colinear manner.

A further object of this invention is to provide a pivot member that more rigidly and accurately supports the snap-acting spring member.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and will, in part, become obvious from the following more detailed description of the invention, taken in conjunction with the accompanying drawing, which forms an integral part thereof.

In the various figures of the drawing like reference characters designate like parts.

In the drawing:

FIG. 1 is a perspective view of a prior art pivot bracket;

FIG. 2 is a perspective view of the pivot bracket constructed in accordance with the teachings of the present invention;

FIG. 3 is a side elevational view of the present invention partly broken away and partly in section, illustrating the pivot bracket together and the switch with which it is used;

FIG. 4 is a plan view of the new pivot bracket;

FIG. 5 is a longitudinal sectional view of a pivot member alone and taken along line 5—5 of FIG. 4;

FIG. 6 is an end elevational view of the pivot member comprising the present invention;

FIG. 7 is another end elevational view of the pivot bracket the view being taken opposite to that shown in FIG. 6; and

FIG. 8 is a plan view of the snap acting leaf spring used with this invention.

Referring now to FIG. 1 of the drawing, the prior art pivot **10** as exemplified by U.S. Patent No. 3,144,529 is comprised of a base portion **12** that is secured to one of the switch terminals by means of a mounting hole **14**. The pivot is provided with elongated side walls **16** that are spaced from each other in a plane parallel to the longitudinal axis of the leaf spring. A third, transversely located leg **18** is provided at the end of the pivot opposite to mounting hole **14**. As may be seen in the aforementioned U.S. patent, the leaf spring is provided with a three point mounting by means of notches in each of the legs **16** and an oppositely facing notch in leg **18**. Support for the tensioning portions of the snap acting spring is provided by means of the notches **16***a* in legs **16** and the compression portion of the spring is mounted in the notch **18***a* in leg **18**.

The dissimilarity between the present invention and the prior art will be most readily apparent by a comparison of FIG. 1 and FIG. 2. The present invention generally designated as reference character **20** in FIG. 2 is comprised of a base portion **22** that extends in a plane substantially parallel to the plane of the snap-acting switch. The base is provided with an aperture **24** whereby it is secured to one of the terminals of the switch. Where appropriate, other means such as welding may be used to secure the pivot member to the terminal. A circular recess **26** formed in the base portion during fabrication is used as an overtravel stop for the pushbutton. Legs **28** and **30** extend upwardly from opposite ends of the base member. Leg **28** is provided with an inwardly offset portion **32** and transverse notches **34** and **36** are formed respectively in leg portions **30** and **32**. In the embodiment illustrated the pivot member is blanked and formed from a 0.016 thick sheet of brass.

FIG. 3 illustrates the relationship of the pivot **20** with respect to the remainder of the switch elements. Switch

member **40** is comprised of a plastic body member **42** having terminals **44**, **46** and **48** comolded therewith. Fixed contacts **50** and **52** are secured to terminals **46** and **48**, respectively, in any suitable manner. It will be seen that contacts **50**, **52** are spaced from each other and that the movable contact **54** of spring member **56** is positioned therebetween.

As may be seen in FIG. 8, spring member **56** is substantially rectangular in area and is provided with an enlarged rectangular opening **58** from which extends two transversely spaced, elongated slots **60**. The tension legs **62***a* and **62***b* are defined by opening **58**, there being a reatively narrow transverse web **64** joining one end of the tension legs. A much wider transverse web **66** joins the other end of the tension legs and also provides a support member for contact **54**. The compression member **68** is integral with web **66** and extends parallel to the tension legs between slots **60** in a direction towards narrow web **64**.

In the embodiment illustrated, transverse edge **64***a* of web **64** is disposed in transverse notch **34** of pivot leg **32**. In a like manner, the free transverse edge **68***a* of compression member **68** is positioned in notch **36** of pivot leg **30**.

Referring once again to FIG. 3, it will be seen that the pivot member, the spring and the contacts are completely enclosed by a cover member **70** that is secured to the switch body **42**. A button **72** extends through an opening in the top surface of the cover. The internal end of the button, which has been lengthened to cooperate with depression **26**, bears against the two tension legs of the leaf spring in the area intermediate the two notched support legs **30** and **32** of the pivot member.

Any suitable actuating means, such as a pivoted or resilient lever, a roller or the like may be used to depress the contact button by applying a force in the direction of arrow *a* as shown in FIG. 3. The selection of the actuating means is made in accordance with the ultimate application of the switch.

In the prior art device the laterally extending tabs at the bottom, internal end of the contact button were arranged to coact with the top edges **16***b* of legs **16** in order to provide an overtravel stop. In the present invention upstanding side legs have been eliminated. However, in order to provide an overtravel stop, depression **26** is provided in base member **22**. During stamping and forming of the pivot **20**, means are included in the machine tool for making impression **26**.

It will be appreciated from the drawing and the foregoing description that a more easily fabricated pivot member is provided for a snap acting switch. Instead of the three point support found in the prior art structure, the snap-acting spring of this invention is mounted on transverse pivot points at the two ends of the pivot bracket. The spring is still freely pivotable and yet is accurately located by means of the two elongated pivot means.



While the leaf spring is not a part per se of this invention, it is essential that the pivot member be accurately fabricated in order to permit the spring to function with its usual and well known characteristics.

There has been disclosed heretofore the best embodiment of the invention presently contemplated. It is to be understood, however, that various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

**1.** A switch comprising a housing, a snap-acting spring havbing a contact, said spring being provided with an opening therethrough, a pair of spaced fixed contacts, a U-shaped bracket support means for said spring, the spaced legs of said bracket constituting a first member having a first notch in the outer surface thereof supporting the tension component of said spring in said first notch and a second member having a second notch in the outer surface thereof supporting the compression component of said spring in said second notch, the bight portion of said U-shaped bracket support means interconnecting said first and second members and being provided with a stop means, and actuating means projecting through said housing and the opening in said spring while engaging a portion of the latter and extending below the plane of said spring a distance to ensure abutment of said stop means thereby limiting the travel of said actuating means in one direction when said contact engages a selected fixed contact.

**2.** A switch as claimed in claim **1** wherein said spring has a substantially rectangular opening therein, said compression component of said spring being a struck-out element projecting into said opening, and the tension component of said spring being the transverse web of said spring at the opposite side of said opening from said struck-out element.

**3.** A switch as claimed in claim **1** wherein said stop means is a recess in said bight portion and is integral with the latter.

**References Cited**

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,594,216 | 4/1952 | Roeser. |
| 2,659,238 | 11/1953 | Martin. |
| 2,743,331 | 4/1956 | Lauder et al. |
| 2,985,738 | 5/1961 | Baak. |

FOREIGN PATENTS

| | | |
|---|---|---|
| 1,185,042 | 2/1959 | France. |

ROBERT S. MACON, Primary Examiner

D. SMITH, JR., Assistant Examiner