June 13, 1950 E. P. BUGGE 2,511,526

SNAP SWITCH

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Fig. 1

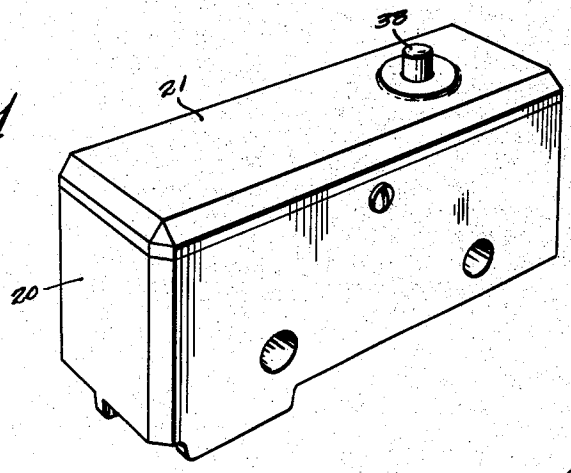


Fig. 2

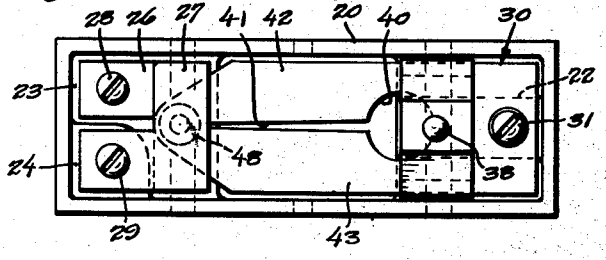


Fig. 3

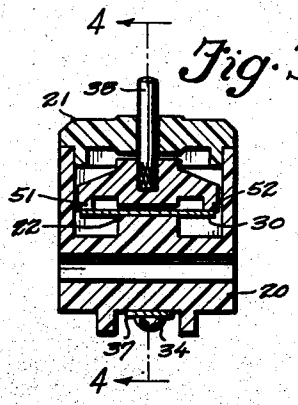


Fig. 4

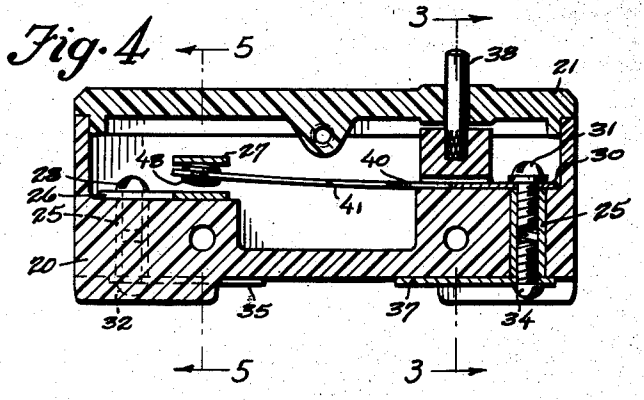
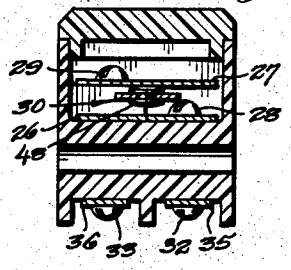


Fig. 5



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SNAP SWITCH

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Fig. 7

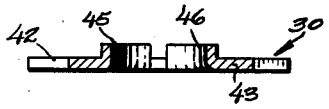


Fig. 6

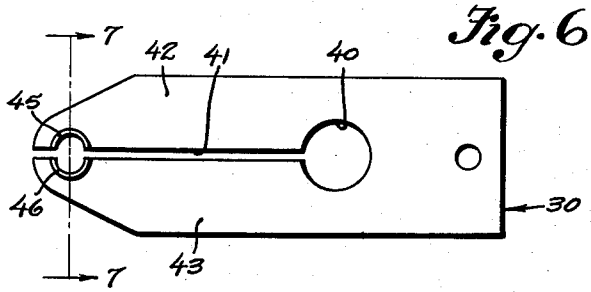


Fig. 9

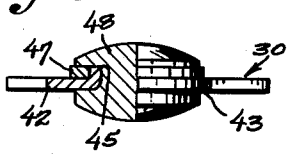


Fig. 8

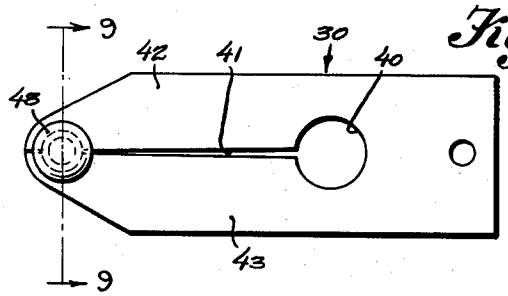


Fig. 10

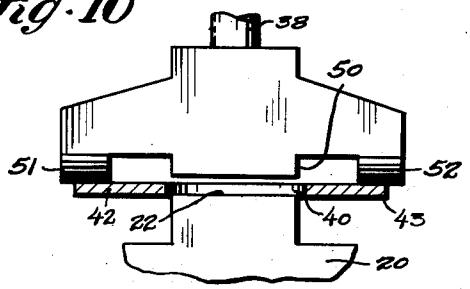


Fig. 11

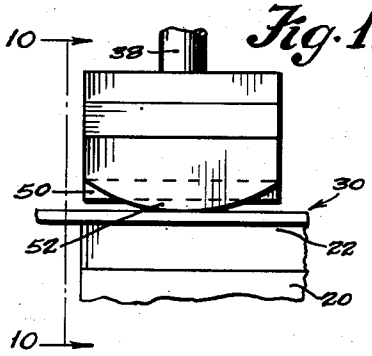
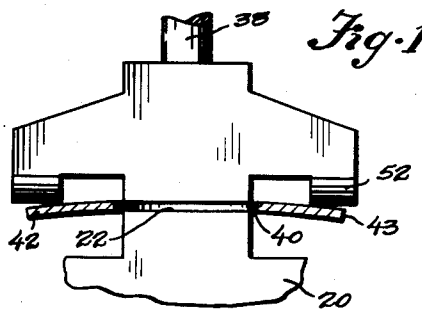


Fig. 12



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UNITED STATES PATENT OFFICE

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SNAP SWITCH

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Application July 1, 1946, Serial No. 680,606

6 Claims. (Cl. 267—1)

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This invention relates to that type of snap-switch which is made extremely sensitive, not only in point of the exerted pressure necessary to operate the switch but also, and which is perhaps the more important, in respect of the travel necessary to effectuate activation, and one which gives to the switch blade a fast make-and-break action.

Switches of this character customarily resort to the use of a switch blade of resilient material and which is stressed in such a manner as to set up a deformation, creating one area or section of high sensitivity within the length of the blade which, upon being subjected to a modicum of movement, will give to another area or section of the blade a rapid and material displacement. There have been heretofore devised any number of switches which profess to one or another advantage over the previous state of the art, but these switch developments have been most generally characterized in that reliance for distortion is placed upon the manner in which the switch blade is secured or held within the switch case. It is a particular object of the present invention to provide a blade-producing technique by which the blade, separate and apart from its mounting within the case, inherently possesses a strong internal stress, the advantage thereof lying in the fact that the switch assembly is made a more precise instrument in the accomplishment of the end for which it is intended.

The invention has the further object of providing an improved plunger mechanism by which to cause a free end of the internally stressed blade to move back and forth between two spaced contacts.

It is a yet further and more general object to otherwise perfect switches of the character to which the present invention pertains, and with these objects in view, the invention consists in the novel construction and in the adaptation and combination of parts of a snap switch and in the method of producing the blade therefor, hereinafter described and claimed.

In the drawings:

Figure 1 is a perspective view of my improved switch.

Fig. 2 is a top plan view thereof with the cover removed.

Fig. 3 is a transverse vertical section on line 3—3 of Fig. 4.

Fig. 4 is a longitudinal vertical section on line 4—4 of Fig. 3.

Fig. 5 is a transverse vertical section on line 5—5 of Fig. 4.

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Fig. 6 is a top plan view of the switch blade shown in process of manufacture and prior to having an internal stress set up therein, the scale being enlarged from that employed in the preceding views.

Fig. 7 is a transverse vertical section taken to an enlarged scale on line 7—7 of Fig. 6.

Fig. 8 is a top plan view showing the blade after having been put in said condition of internal stress, the scale here used corresponding to that of Fig. 6.

Fig. 9 is a view partly in end elevation and partly in transverse vertical section and employing the same scale as Fig. 7, the section being on line 9—9 of Fig. 8.

Fig. 10 is a fragmentary transverse vertical sectional view using a scale corresponding to that of Figs. 7 and 9 and illustrating the association as between the switch blade, the platform from which said blade is carried, and an operating plunger for the blade, the plunger being shown in its normal inoperative position.

Fig. 11 is a side elevational view of the structure shown in Fig. 10; and

Fig. 12 is a view similar to Fig. 10 excepting that the plunger is here shown in its depressed position.

Proceeding to describe the invention, and first having reference only to the general assembly of parts, to the exclusion of any express description of the peculiarizing features which give to my assembly its advantages over prior snap-type switches, there is provided the usual insulated case comprised of a base and its cover, denoted by the numerals 20 and 21, respectively, and having within the base and located at one end thereof a platform 22 and, in the other end, two stepped platforms 23 and 24, one disposed at one side and the other at the other side of the chamber's longitudinal median line. The lower platform 23 desirably occupies a plane below, and the platform 24 desirably lies above, the plane of the platform 22. Such platform 22, in point of width, is appreciably less than the width of the chamber.

The base is vertically bored from the underside to give access to each of these three platforms, and there is fixedly received in each of these bores an internally threaded and conductive sleeve, as 25. Stationary contacts 26 and 27, each composed of a flat L-shaped plate, are secured by one wing of each upon the platforms 23 and 24 and such that the other wings project forwardly beyond the platforms and into overlying spaced relation, one to the other. The means for securing

said contacts 26 and 27 comprises screws 28 and 29 each working in a respective sleeve 25. On the other platform 22 there is secured by one of its ends a spring blade 30, and the free end of this blade extends into the space between the forwardly projected wings of the contacts 26 and 27. A securing screw 31 engages the blade toward the rear end of the platform 22 and threads into the sleeve related to this platform. Each of these sleeves has threaded into its lower end a respective screw, as 32, 33 and 34, and caught by the heads of these screws are bus bars 35, 36 and 37, respectively. In the cover of the case and placed to lie at a point central to the width and such as will locate the same above the frontal portion of the platform there is provided a vertical bore which accommodates a push button 38.

Now more expressly referring to said spring blade, the form and working thereof can be best understood by describing the manner in which it is produced. Using thin spring steel or other suitable resilient material of a conductive nature, the same is stamped to the form illustrated in Fig. 6, and which is to say into a generally rectangular form slotted longitudinally from one end for a major part of the length and having at the inner end of the slot a circular hole 40. The slot, denoted 41, provides two fork arms 42 and 43, and at each side of the slot adjacent the open end the two fork arms present re-entrant half circles, each marginally described by a raised collar, as 45 and 46. After this forming operation, the fork arms of the blade are brought together at the ends, and there is thus produced, by the complement of the one to the other of the two half-circle openings, a full-circle hole bordered by a continuous upstanding flange. As a retaining collar, I slip a ring 47 over this flange, and then lock the assembly to set the fork arms in this distorted relationship by applying a rivet 48 (Figs. 8 and 9). The rivet is of a conductive nature and presents button-like contacts above and below the blade. It will be understood that the blade, in consequence of drawing the free ends of the fork arms together, has been caused to take on an upwardly curved shape and, at the same time, has developed a strong internal stress which, perforce, is thereafter inherent to the blade. The blade is now applied to the case, and its placement upon the platform is such that the lip of the platform and the center of the hole 40 approximately coincide. Also, the width of the platform and the diameter of the hole generally correspond.

The actuator which I employ to accomplish the snap movement of the free end of the blade is comprised of a plunger head made rigid with the lower end of the push button 38; and presented by this actuator is a center dependency 50 and outlying dependencies 51 and 52 laterally removed beyond each side thereof. The center dependency has a flat underside substantially paralleling the face of the platform and is given a width approximating the width of the latter. The said dependencies 51 and 52 are placed to occupy positions above the extreme side edges of the blade and, considered in side elevation, have convex lower surfaces which project somewhat below the bottom surface of the center dependency 50.

The action of the plunger head is such that, by its depressive force, it produces a slight "double-bending" movement, causing a snap action which instantly throws the entire blade into the reverse of its normal upward curve, and contact is then made between the button-head of the rivet 48 and the terminal 26. The plunger head, in attaining this snap action, will have produced two equal and concentrated forces as the two lateral dependencies 51 and 52, by engagement of the crests of the arched undersurfaces, simultaneously press upon the side edges of the spring blade. Also of importance in this depression movement of the plunger head is the fact of the same being given only a limited travel in its blade-bending depression movement, the travel being interrupted as the center dependency 50 bears upon the blade with the latter in turn resting firmly upon the platform 22. The significance is that damage to the blade is precluded, and which is to say that the plunger head cannot move beyond the travel necessary for the activation of the blade.

From the above detailed description of the invention, it is believed that the construction and operation thereof will at once be apparent. No limitations are to be implied therefrom, it being my intention that all forms of construction and variations in detail coming within the scope of the hereto annexed claims are to be considered as comprehended by the invention.

What I claim, is:

1. A blade for a snap-switch, comprising a spring leaf element arranged and adapted to be firmly anchored at one end and having the other end formed with an open end slot running lengthwise of the leaf, formed at the inner end of the slot with a circular opening larger than the width of the slot, and having the free ends of the fork arms which are described at opposite sides of said slot drawn together to put the leaf under a condition of internal stress, and locking means made a unitary immovable part of the spring blade and holding said leaf in its said condition of internal stress, said locking means being applied at the inner edge limits of the fork arms and engaging only a minor part of the width of the fork arms to leave the side edges of the latter entirely unfettered for free flexure.

2. The blade for a snap-switch comprising a spring leaf element slotted longitudinally from one end, formed at the inner end of the slot with an opening larger than the width of the slot, and providing, at opposite sides of the slot adjacent the open end of the latter, registering semi-circular openings bordered along the margin of the arcs by upstanding flanges, the free ends of the fork arms which are described at opposite sides of said slot being drawn together to put the leaf under a condition of internal stress, and a ring applied over said flanges of the contracted fork arms to act in the nature of a collar and hold said leaf in its said condition of internal stress.

3. The blade for a snap-switch comprising a spring leaf element slotted longitudinally from one end, formed at the inner end of the slot with an opening larger than the width of the slot, and providing, at opposite sides of the slot adjacent the open end of the latter, registering semi-circular openings bordered along the margin of the arcs by upstanding flanges, the free ends of the fork arms which are described at opposite sides of said slot being drawn together to put the leaf under a condition of internal stress, a ring applied over said flanges of the contracted fork arms to act in the nature of a collar for holding said leaf in its said condition of internal stress, and a pin inserted through the annular hole

formed by said registering semi-circular openings and having its ends headed to operate as a rivet for locking said ring in place.

4. A snap-switch comprising, in combination: a chambered case providing a plane-faced mounting platform of less width than the width of the chamber, a resilient blade seating by one of its ends upon and secured to the platform, said blade being adapted to be flexed to cause a snap action of the free end, and a plunger head overlying the seated blade at the frontal end of the platform and movable perpendicular to the face of the platform for flexing said blade, said plunger head providing a center dependency the undersurface of which is flat and parallels the face of the platform and having outlying dependencies at each side of said center dependency which are removed laterally beyond the side edges of the platform and overlie and span the side edges of the blade, said outlying dependencies projecting slightly below the lower limit of the center dependency.

5. The blade for a snap-switch comprising a spring leaf element slotted longitudinally from one end and providing upstanding flanges at opposite sides of and bordering the slot adjacent the open end of the latter, the free ends of the fork arms which are described at opposite sides of said slot being drawn together to put the leaf under a condition of internal stress, and means finding hooking engagement over said flanges to restrain the free ends of said fork arms from

spreading and thus holding the leaf in its said condition of internal stress.

6. The blade for a snap-switch comprising a spring leaf element slotted longitudinally from one end, formed at the inner end of the slot with an opening larger than the width of the slot, and providing upstanding flanges at opposite sides of and bordering the slot adjacent the open end of the latter, the free ends of the fork arms which are described at opposite sides of said slot being drawn together to put the leaf under a condition of internal stress, and means finding hooking engagement over said flanges to restrain the free ends of said fork arms from spreading and thus holding the leaf in its said condition of internal stress.

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