

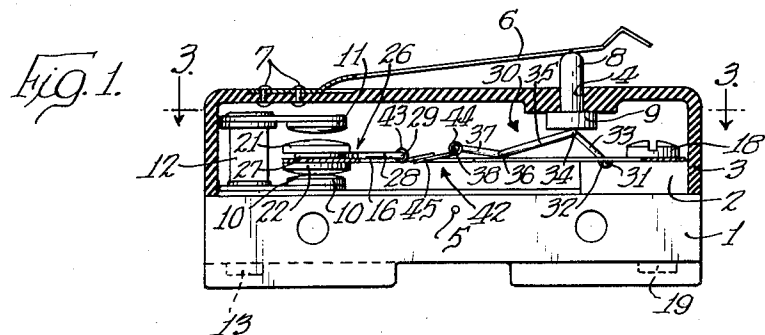
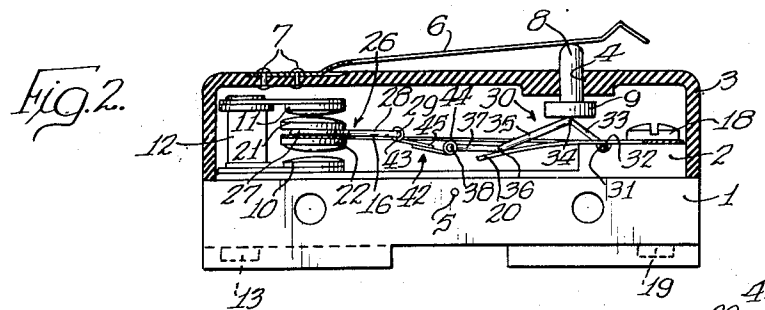
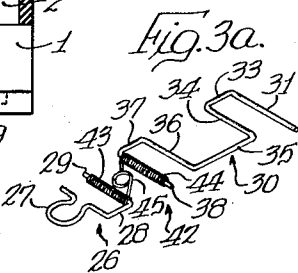
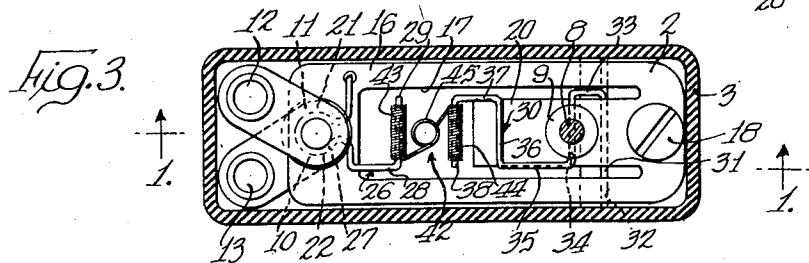
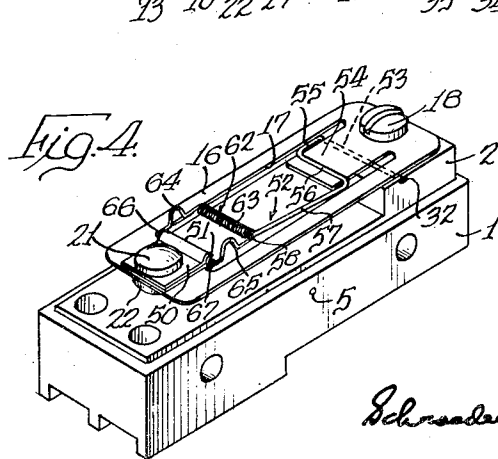
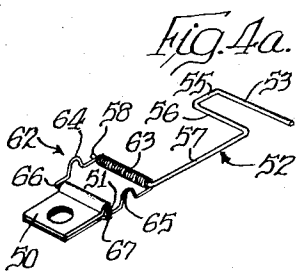
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SNAP SWITCH

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2,774,837

SNAP SWITCH

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6 Claims. (Cl. 200—67)

This invention relates to an electrical switch, and, more particularly, to an electrical switch of the snap-action type.

A general object of this invention is to provide a new and improved snap switch.

Another object of this invention is to provide a new and improved snap switch which is compact and sensitive, and in which the parts are simple and economical to manufacture and easy to assemble.

A further object of this invention is to provide a new and improved snap switch of the character described in which the actuating parts are constructed mainly of wire.

Other objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevational view of one embodiment of the invention with the front of the cover broken away on line 1—1 of Fig. 3 so as to show the parts in their normal position;

Fig. 2 is a front elevational view similar to Fig. 1 but showing the positions of the parts when the plunger is depressed;

Fig. 3 is a horizontal sectional view taken along line 3—3 of Fig. 1;

Fig. 3a is a perspective view of the switch blade operating means of the embodiment shown in Figs. 1, 2 and 3;

Fig. 4 is a perspective view of another embodiment of the invention with the cover removed; and

Fig. 4a is a perspective view of the switch operating means of the embodiment shown in Fig. 4.

While the invention is herein described with reference to two embodiments, it is not intended to limit the invention to the specific forms and arrangements shown, it being contemplated that various changes may be made by those skilled in the art without departing from the spirit and scope of the invention as pointed out in the appended claims.

Referring now to Figs. 1, 2, 3 and 3a for a detailed description of one embodiment of the invention, there is shown a base member 1 made of a dielectric material and having a raised or blade supporting portion 2 at one end, and a cover member 3 made of a dielectric material and having a vertically extending bore 4 formed near one end thereof. The cover member 3 is adapted to be fitted on the base member 1 and secured thereto by pins extending through aligned holes in the cover member 3 and the base member 1, as indicated at 5. A flat spring member 6 is secured at one end to the cover member 3 by rivets 7, the other end being adapted to be pressed downwardly against the upper end of a plunger 8 made of a dielectric material which is slidably mounted in the bore 4, the plunger 8 having a lower enlarged portion 9 disposed inside the cover member 3 and adapted to engage switch actuating means to be later described.

As illustrated, the switch is of the single pole double throw type and has lower and upper fixed contacts and intermediate movable contacts carried on a switch blade.

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and an upper contact 11 is supported vertically above the lower contact 10 on a conducting post 12. The contact 10 is connected to an external terminal 13 disposed on the bottom surface of the base member 3, the contact 11 being similarly connected through the post 12 to an external terminal (not shown) on the bottom surface of the base member 3.

An elongated resilient switch blade member 16 having a relatively large opening 17 formed therein is secured at one end to the raised portion 2 of the base member 3 by a bolt 18 which is connected to an external terminal 19 disposed on the bottom surface of the base member 3. A shorter resilient blade member 20 secured at one end to the raised portion 2 of the base member 3 extends substantially into the opening 17 and, as shown, is formed integral with the switch blade member 16. An upper contact 21 and a lower contact 22 are carried on the free or non-secured end of the switch blade member 16 so as to be disposed between the contacts 10 and 11, with the lower contacts 10 and 22 being normally closed and the upper contacts 11 and 21 being normally open.

The means for operating the switch blade, as best shown in Figs. 3 and 3a, comprises a first stiff wire member 26 which has a loop end portion 27 secured on the switch blade member 16 underneath the contact 21, an intermediate longitudinal portion 28 extending into the opening 17 in the switch blade member 16, and an end portion extending transversely in the opening 17 to form a fixed pivot pin 29. A second stiff wire member 30 has a first transverse end portion 31 pivotably mounted in a transverse groove 32 formed in the upper surface of the raised portion 2 of the base member 1 and underlying the blade member 20, a first longitudinal portion 33 inclined upwardly, a second transverse portion 34 disposed above the blade member 20 and in engagement with the enlarged portion 9 of the plunger 8, a second longitudinal portion 35 inclined downwardly toward the blade member 20, a third transverse portion 36 overlying the blade member 20, a third longitudinal portion 37 extending slightly upwardly, and a fourth transverse end portion disposed above the opening 17 to form a pivot pin 38 positioned slightly above and parallel to the pivot pin 29.

Cooperating with the members 26 and 30 to form a toggle like operating means for the switch blade 16 is a wire spring member 42 which has two parallel transversely extending end portions wound in tight helices to form bearing portions 43 and 44 adapted to be pivotably carried, respectively, upon the pivot pins 29 and 38 and an intermediate resilient means, as a single compressible loop or coil 45, disposed therebetween. The pivot 38 is normally above a plane extending between pivots 29 and 31 and, as shown in Fig. 2, pivot 38 is moved below such a plane to obtain a snap-action by means of the operating parts forming a toggle mechanism.

As to the operation of this snap switch, when the lever 6 is pressed downwardly, the plunger 8 acting against the plunger engaging portion 34 of the wire member 30 pivots the wire member 30 downwardly about the axis defined by the groove 32. As the pivot pin 38 is swung downwardly, the distance between the two bearing portions 43 and 44 is decreased, thus compressing the spring loop 45 until the pivot pin 38 reaches a position horizontally below the pivot pin 29 whereupon the biased spring loop 45 shifts the switch blade member 16 upwardly with a snap-action to close the normally open upper contacts 11 and 21 and to open the normally closed lower contacts 10 and 22. Simultaneously, as the spring loop 45 is compressed by the downward movement of the wire member 30, the shorter blade member 20 is biased downwardly by the transverse portion 36 of the wire member 30, as shown in Fig. 2. Therefore, when the plunger actuating lever 6 is released, the bias of the blade member 20 is

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sufficient to compress the single loop 45 and pivot the spring member 30 upwardly to its initial position, the switch blade member 16 being moved downwardly by the compressed spring loop 45 with a snap-action to close the normally closed lower contacts 10 and 22 and to open the normally open upper contacts 11 and 21.

The embodiment of the invention shown in Figs. 4 and 4a differs from the embodiment described in the form and design of the operating members, the parts 20, 26, 30 and 42 of the first embodiment. The other elements, being identical to the corresponding elements in the first described embodiment, are similarly numbered and will not be further discussed.

In Figs. 4 and 4a there is shown a hinge member 50 fixed to the switch blade member 16 underneath the contact 21 and having a bearing socket portion 51 disposed transversely in the opening 17. A stiff wire member 52 has a transverse end portion 53 pivotally mounted in the groove 32 underlying a blade member 54 (which, for reasons which will become obvious, may be substantially shorter than the blade member 20 of the first described embodiment), a first longitudinal portion 55, an intermediate transverse portion 56 overlying the second blade member 54 and in engagement with the enlarged portion 9 of the plunger 8, a second longitudinal portion 57 inclined upwardly, and a transverse end portion forming a pivot pin 58 spaced above and parallel to the bearing socket portion 51.

A spring wire member 62 has a transverse portion wound in a tight helix to form a bearing member 63 adapted to be pivotally carried on the pivot pin 58, two longitudinal side portions formed with open loops 64 and 65, and transverse pivot pins 66 and 67 extending inwardly, respectively, from loop portions 64 and 65 and adapted to be pivotally received in the bearing socket portion 51 of the hinge member 50.

The operation of this embodiment is substantially identical to the operation of the first described embodiment with the open loop portions 64 and 65 being compressed as the stiff wire member is pivoted downwardly and the intermediate transverse portion 56 of the stiff wire member 52 acting as both the plunger engaging means and the blade member biasing means, which construction allows the blade member 54 to be shorter than in the first described embodiment.

I have shown one embodiment wherein the two ends of the wire spring member 42 form bearings for pivot pins on the stiff wire members 26 and 30 and one embodiment wherein one end of the spring wire member 62 forms a bearing for a pivot pin on the stiff wire member 52 and the other end forms a pivot pin for the bearing on the hinge member 50. It is readily apparent that any combination of such connections is included in the scope of the invention, as well as any form of the intermediate resilient portion of the wire spring member.

I claim:

1. A snap switch comprising, in combination; a base member having a raised portion at one end, a contact supporting switch blade of resilient material secured at one end to said raised portion of the base and carrying upper and lower contacts on its other end, said blade having an opening therethrough extending substantially throughout its length, a shorter blade member extending from the raised portion of the base and into said opening, cooperating upper and lower contacts supported in spaced relation on the other end of the base with the lower contact normally engaged by the lower contact on the switch blade, and means for opening the normally closed contacts and closing the normally open contacts with a snap action comprising, a first stiff wire member secured to the free end of the blade and having a portion extending longitudinally of the blade into the opening and an end portion extending transversely of the opening to form a first pivot pin, a second stiff wire member having a first transverse portion pivotally mounted in a horizontal

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groove formed in said raised portion of said base and secured therein by said shorter blade member, a first longitudinal portion inclined upwardly along one side of the switch blade, a second transverse plunger engaging portion above said shorter blade member, a second longitudinal portion inclined downwardly along the other side of the switch blade, a third transverse portion overlying said shorter blade portion, a third longitudinal portion extending along the side of the switch blade, and an end portion extending transversely above the opening in the switch blade and spaced above and parallel to said first pivot pin to form a second pivot pin, a wire spring member having two parallel transversely extending end portions formed in bearing helices and adapted to be carried on said first and second pivot pins and a spring loop formed intermediate said two helices, a cover adapted to be secured on said base and having a bore extending downwardly therethrough above said plunger engaging portion of said second wire member, and a plunger slidably mounted in said bore and having its lower end bearing against said plunger engaging portion of said second wire member.

2. A snap switch comprising, in combination; a base having a switch blade supporting portion at one end with a transverse groove formed in the upper surface thereof, a cover adapted to be secured to said base and having a vertical bore extending through the top thereof, a plunger slidable in said bore, upper and lower spaced contacts disposed at the other end of the base and having terminal connections on the outside of the base, a switch blade member of a resilient material having one end secured to the switch blade supporting portion of the base and its free end disposed between said upper and lower contacts and normally engaging said lower contact, said switch blade member having a relatively large central opening formed therein, a shorter blade member of a resilient material having one end secured to the switch blade supporting portion of the base and the other end extending into said central opening, and means for operating said switch blade with a snap-action when said plunger is depressed comprising; a first stiff wire member secured at one end to the free end of said switch blade member and having its other end extending transversely in the central opening to form a pivot pin, a second stiff wire member having a plurality of transversely extending portions, one of said portions being disposed in the transverse groove in the switch blade supporting portion of the base and underlying the shorter blade member so as to form a pivot for said second wire member, another of said portions being spaced above the shorter blade member and adapted to be contacted by said plunger to pivot the second wire member downwardly, another of said portions overlying the shorter blade member and adapted to bias said member downwardly when the second wire member is pivoted downwardly, and another portion disposed in the central opening to form a pivot pin parallel to and above the pivot pin of said first wire member, and a wire spring member having parallel end portions wound in helices and adapted to be carried on said two parallel pivot pins and a resilient portion disposed intermediate the parallel end portions.

3. A snap switch comprising, in combination; a base member having a contact supported at one end thereof, a cover member for the base member carrying a depressible plunger, a resilient switch blade member having one end secured to the other end of the base member and having its free end normally spaced from said contact, a shorter resilient blade member having one end secured to said other end of the base member, means secured to the free end of the switch blade member forming one part of a first transversely extending pivot joint, stiff wire means having a first transverse end portion pivotally mounted adjacent said other end of the base member, a second transverse end portion forming one part of a second pivot joint parallel to and above said

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first pivot joint, and intermediate portions engaging said plunger and said shorter blade member, and a wire spring member having transverse parallel end portions connected to said first and second pivot joints and an intermediate resilient means operable to snap the free end of said switch blade against said contact when said plunger is depressed.

4. A snap switch comprising, in combination; a base having a raised portion at one end, a cover adapted to be secured to said base and having a vertical bore extending through the top thereof, a plunger depressible in said bore, upper and lower spaced contacts disposed at the non-raised end of the base, a switch blade member of a resilient material having one end secured to the raised portion of the base and its free end disposed between said upper and lower contacts and normally in engagement with the lower contact, a shorter blade member of a resilient material having one end secured to the raised portion of the base, and means for switching said switch blade member from the lower contact to the upper contact with a snap-action when said plunger is depressed comprising; a hinge member fixed to the free end of the switch blade member and having a transverse bearing socket portion, a stiff wire member having a first transverse end portion pivotably mounted adjacent the secured end of the switch blade member, a second transverse end portion forming a pivot pin normally disposed parallel to and above said bearing socket portion, and an intermediate transverse portion adapted to be engaged from the top by the plunger to pivot said stiff wire member downwardly and overlying the shorter blade member to bias said member downwardly, and a resilient wire member adapted to be connected between said bearing socket portion and said pivot pin.

5. A snap switch comprising, in combination; a base member having upper and lower contacts supported at one end thereof, a cover member for the base member

carrying a depressible plunger, a resilient switch blade member having one end secured to the other end of the base member and the free end carrying upper and lower contacts disposed between the contacts on the base member, said upper contacts being normally open, a shorter resilient blade member having one end secured to said other end of the base, a first stiff wire member secured to the contact carrying end of the switch blade member and having a transversely extending end portion forming a first pivot pin, a second stiff wire member having a first transverse end means pivotably mounted adjacent said other end of the base member, a second transverse end means forming a second pivot pin normally spaced parallel to and above said first pivot pin, and intermediate transverse plunger engaging and shorter blade member biasing means, and a wire spring member having transverse parallel bearing portions for said first and second pivot pins and an intermediate resilient portion.

6. A snap switch comprising, in combination; a base having at least one contact supported thereon, a resilient switch blade member having one end secured to the base and a free end normally spaced from said contact, a first wire secured to the free end of the switch blade member forming one part of a first pivot joint, a second wire having portions forming parts of a second fixed pivot joint adjacent the secured end of the switch blade member and a third pivot joint normally parallel to said first pivot joint and above a plane between said first and second pivot joints, resilient wire means mounted between said first and third pivot joints, actuating means for pivoting said second wire member downwardly whereupon said switch blade member is moved with a snap action into engagement with said contact, and means for returning the switch blade member to its normal position.

No references cited.