

United States Patent

Brevick

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[54] SLIDE SWITCH WITH SNAP ACTION

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[73] Assignee: UID Electronics Corp., Hollywood, Fla.

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[52] U.S. Cl. 200/77, 200/16

[51] Int. Cl. H01h 15/18

[58] Field of Search 200/76, 78, 77, 16 R, 68

[56] References Cited

UNITED STATES PATENTS

3,339,032 8/1967 Hulst.....200/16 R

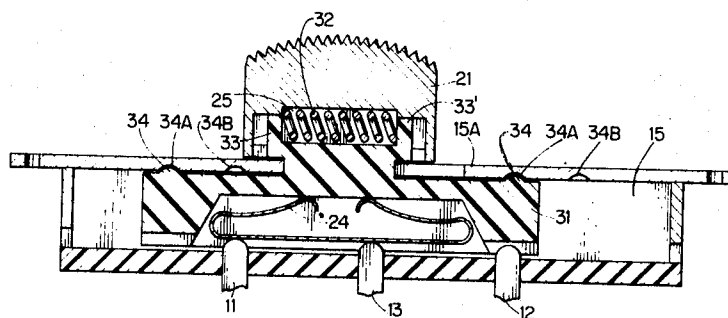
2,762,880	9/1956	Hathorn et al.....	200/77
1,600,127	9/1926	Nero.....	200/76
3,485,966	12/1969	Bailey et al.....	200/16 R
3,072,757	1/1963	Gluck.....	200/16 R
3,333,074	7/1967	Hulst.....	200/68

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[57] ABSTRACT

A snap action sliding contact switch interconnects at least two stationary contacts. Actuation temporarily stores energy in a spring generally parallel to the path of sliding movement that is then released against the movable contact support to provide snap action.

8 Claims, 9 Drawing Figures



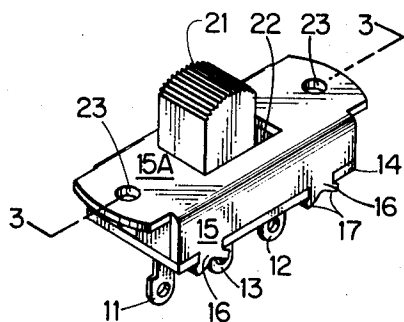


Fig. 1.

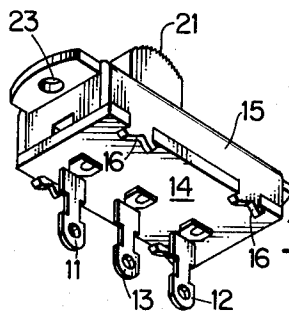


Fig. 2.

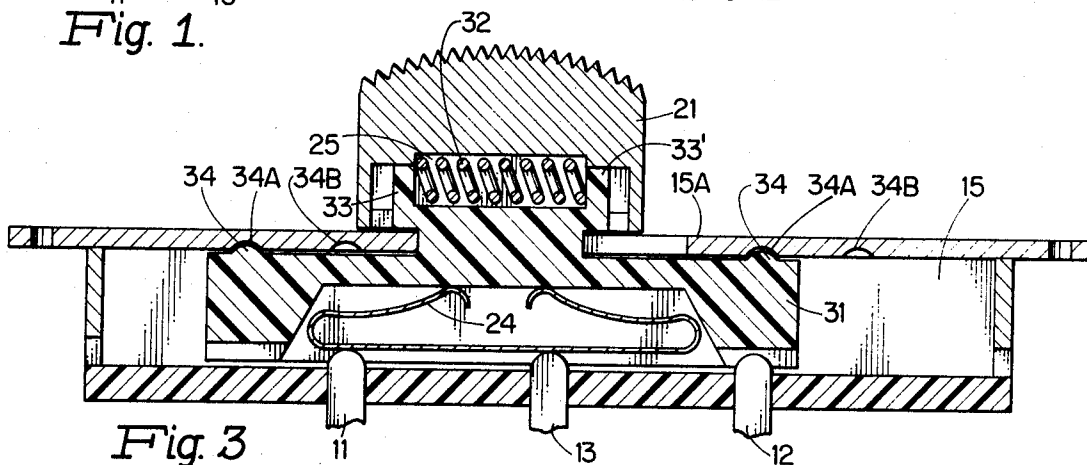


Fig. 3

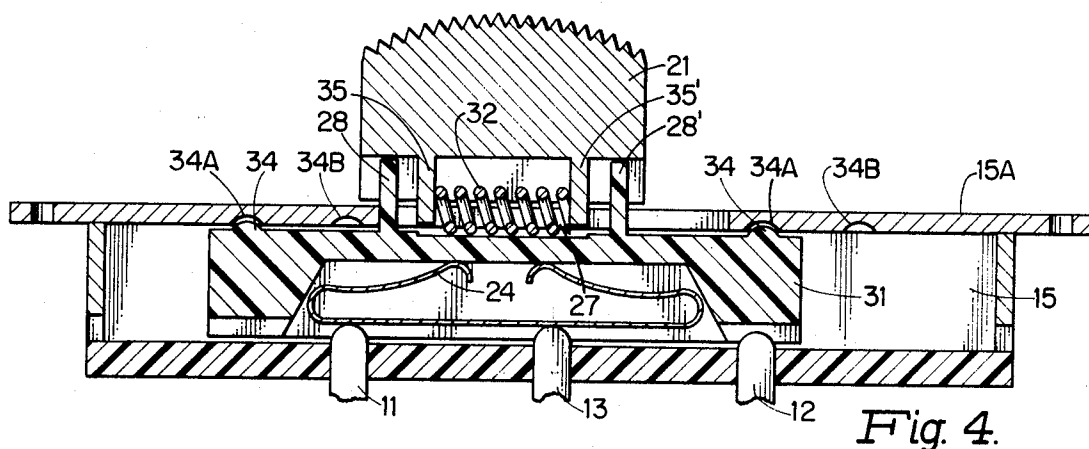


Fig. 4.

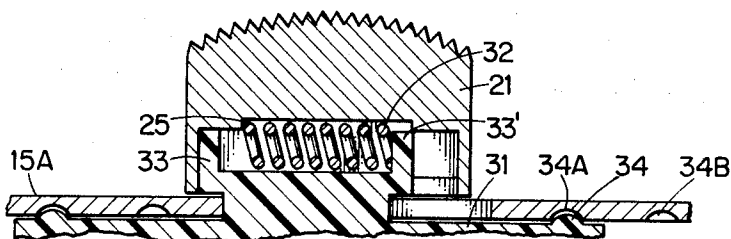


Fig. 5.

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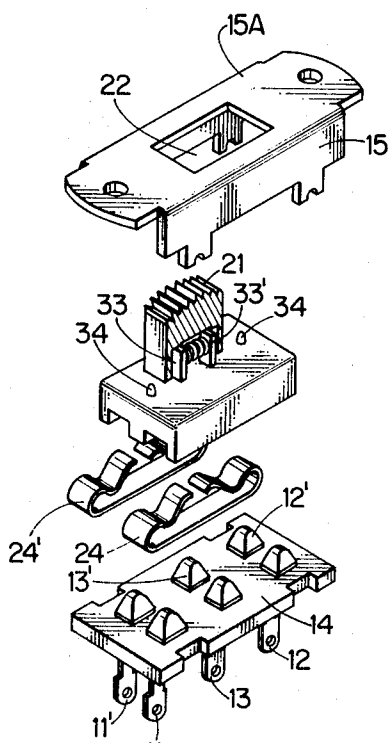


Fig. 6.

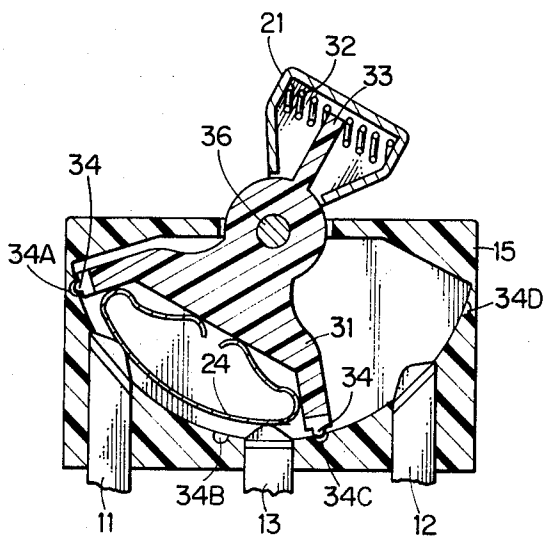


Fig. 9.

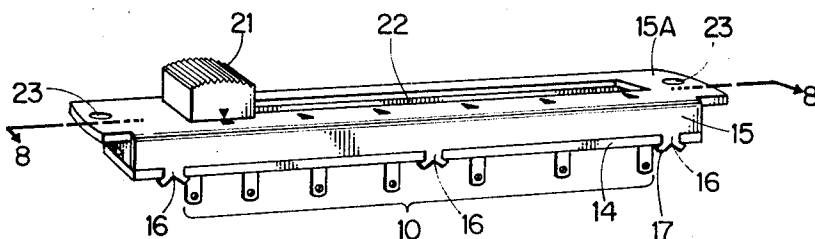


Fig. 7.

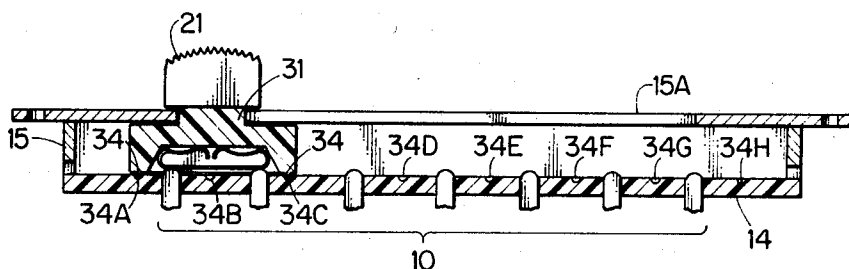


Fig. 8.

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SLIDE SWITCH WITH SNAP ACTION

BACKGROUND OF THE INVENTION

The present invention relates in general to electrical switches and in particular is concerned with an improved snap action switch mechanism.

Various types of electromechanical switches which feature snap action operation presently exist. With such switches rapid snap action from one contact position to the next is desirable so that the inter-contact time interval is minimized. Some of the snap action switches have been expensive to make while others have not provided a sufficiently sensitive and rapid snap action.

It is an important object of the present invention to provide an improved electromechanical switch device.

A further object of the present invention is to provide a sliding contact switch which is characterized by improved snap action.

Another object of the present invention is to provide a sliding contact switch including biasing means for causing rapid changeover from one interconnection to another.

SUMMARY OF THE INVENTION

According to the invention, a switch mechanism preferably of the slide-switch type, is provided with means for causing improved snap action of the switch mechanism. A contact carrier includes a sliding contact which is adapted to communicate with at least two separate stationary contacts. In one embodiment of the invention, an actuator means includes means for coupling a moving force to the contact carrier including spring means. In another embodiment of the invention, the spring means is included with the contact carrier.

Numerous other features, objects and advantages of the invention will become apparent from the following specification when read in conjunction with accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 and 2 show respective top and bottom perspective views of a snap action switch according to the invention;

FIGS. 3 and 4 are longitudinal sectional views through the structure of FIGS. 1 and 2 corresponding essentially to section 3—3 of FIG. 1, for two separate embodiments;

FIG. 5 is a longitudinal sectional view of a portion of the switch mechanism of FIG. 3 showing the compression of the spring that occurs just prior to the snap action position change;

FIG. 6 is an exploded view of a double pole switch according to the invention with the actuator housing in cross-section;

FIG. 7 is a perspective view of a multiposition switch arrangement;

FIG. 8 is a partial longitudinal sectional view through the structure of FIG. 7 corresponding essentially to section 8—8; and

FIG. 9 is a cross-sectional view through a toggle switch arranged according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With reference now to the drawings and more particularly to FIGS. 1 and 2, there are shown respective top and bottom perspective views of an assembled snap action single pole switch. Two end fixed contacts 11 and 12 are separated by a center fixed contact 13, each of the contacts being formed with lugs for connection to external circuits (not shown). A rectangular bottom plate 14 made of insulated material, such as cardboard or plastic, supports and insulatedly separates the fixed contacts 11—13, along a path followed by the internal sliding contact. A metal housing 15 is formed with tabs 16, which fits snugly in grooves in the bottom of plate 14. The tabs 16 are firmly seated in the grooves by bending the tabs 16 inward and urging the ears 17 on each tab apart.

The housing 15 includes a top cover plate 15A having a rectangular opening 22 formed therein. Actuator housing 21 is shown located within opening 22. Cover plate 15A also includes a pair of holes 23 for accommodating screws or other suitable devices to fasten the switch to an associated chassis or panel.

FIGS. 3 and 4 show partial longitudinal sectional views of embodiments of the switch shown in FIGS. 1 and 2. FIG. 5 shows a partial view similar to that shown in FIG. 3 with a force being imparted to actuator housing 21. The same reference symbols identify corresponding elements throughout the different figures of the drawings.

The structure of FIG. 3 generally includes a switch housing 15, contact carrier 31, and actuator housing 21. Contact carrier 31 is usually fabricated of a plastic material and has a recess in its bottom surface which is adapted to accommodate sliding contact 24. Contact carrier 31 also includes locating means in the form of dimples 34, which are adapted to communicate with either mating recess pairs 34A or 34B in the underside surface of plates 15A of housing 15. Sliding contact 24 is so shaped and positioned within carrier 31 to provide a forced meeting between sliding contact 24 and either contacts 11, 13 or contacts 12, 13. The contact carrier 31 is further provided with mating protrusions 33, 33' which extend above housing 15 into contact with actuator housing 21.

For the embodiment of FIG. 3, actuator housing 21 includes biasing means 32 which is shown as a horizontally contained compressible spring. The spring 32 is slidably located within a recess 25, in actuator housing 21. The inner forcing surfaces of protrusions 33, 33' of contact carrier 31 are adapted to communicate with both ends of spring 32. In the position shown, the contacts 11 and 13 are interconnected by slide contact 24. When the actuator housing 21 is initially pushed toward the right, the contact carrier 31 is not immediately moved. At that time, movement is prevented by dimples 34 which are mated with recesses 34A. The spring 32 however, is compressed by the inner surface of right protrusions 33' thereby imparting a force toward the right to the contact carrier 31. When the spring 32 has been sufficiently compressed as more clearly shown in FIG. 5 the outer surface of left protrusion 33 contacts the internal wall of actuator housing 21. This added contact force is sufficient to overcome static friction and start contact carrier 31 moving to the right. At that time the frictional force decreases because the coefficient of sliding friction is less than that of static friction. Spring 32 then releases its stored energy in expanding to snap contact carrier to its rest position at the right, where dimples 34 are mated with recesses 34B in plate 15A.

Another embodiment is shown in FIG. 4. The contact carrier 31 includes a slide contact 24, which communicates with contacts 11—13 in a manner similar to that shown in FIG. 3. Biasing means or spring 32, however, is now physically housed within contact carrier 31 instead of within actuator housing 21. The operation of the embodiment of FIG. 4 is functionally analogous to that of FIG. 3.

The contacts 11 and 13 are interconnected by slide contact 24 which is secured in carrier 31. Contact carrier 31 also includes a locating means in the form of dimples 34 which are adapted to communicate with either mating recess pairs 34A or 34B in the underside of plate 15A. The top central section of carrier 31 has a recess 27 therein and includes limiting protrusions 28, 28' which reach into housing 21. The spring 32 is horizontally contained within recess 27 in a partially compressed position. The housing 21 includes protruding members 35, 35' which have inner facing surfaces that mate with the ends of spring 32.

When actuator housing 21 is pushed toward the right by an operator of the switch, the contact carrier is not immediately moved. At that time movement is prevented by dimples 34 which are mated with recesses 34A. The spring 32, however, is compressed by the inner surface of left member 35, thereby imparting a moving force to contact carrier 31. When the spring 32 has been sufficiently compressed, the outer surface

of member 35' contacts protrusion 28'. Snap action then occurs in the manner described above.

In FIG. 6 there is shown an exploded view of a double pole switch similar to that shown in FIGS. 1 and 2 with housing 21 in cross-section. The contacts 11, 12, 13, and 11', 12', 13', are shown already assembled in the insulated supporting plate 14. The sliding contacts 24 and 24' are above contacts 11-13, and 11'-13', respectively. The sliding contacts are contained within contact carrier 31 having locating dimples 34 and mating protrusions 33, 33'. Housing 15 with cover plate 15A fits over contact carrier 31 and supports plate 14 in the same manner described above. Actuator housing 21 rides within recess 22. Spring 32 in housing 21 abuts protrusions 33, 33' extending from contact carrier 31 as more clearly shown in FIG. 3.

For certain applications, it is desirable to use a multi-position sliding contact switch, such as is illustrated in FIG. 7. For example, the arrangement shown therein could be used in substitution for a plurality of single switches, especially when the positions to be selected are mutually exclusive.

FIG. 7 shows a single pole multi-position switch arrangement and includes a switch housing 15 having a cover plate 15A with a rectangular opening 22 formed therein. Seven contacts 10 in the embodiment shown form a six-position switch.

FIG. 8 shows a longitudinal sectional view of the switch along section 8-8 of FIG. 7. Contact carrier 31 is enclosed within housing 15 between the bottom surfaces of plates 15A and the top surface of plate 14. The contact carrier 31 has sliding contact 24 housed therein and also includes dimple 34 which act as locating means. The slide contact 24 is adapted to contact between adjacent sets of contacts 10, two at a time. The top surface of terminal board 14 has recessed 34A to 34H disposed therein which mate with dimples 34 in carrier 31. As the actuator housing 21 which may contain the biasing means is moved towards the right, contact carrier 31 is adapted to snap through successive positions defined by the mating dimples 34 and recesses 34A-34H.

In FIG. 9 there is shown a further embodiment of the switch mechanism of the invention, for use with a toggle switch configuration. The contact carrier 31 rotates about pin 36 within housing 15. Carrier 31 includes at its bottom section, sliding contact 24 recessed therein and dimples 34 protruding therefrom which are adapted to communicate with mating recesses 34A, 34B, 34C and 34D, located within the internal walls of housing 15, as shown. Contacts 11, 12 and 13 are also initially secured in housing 15 and insulatedly separated. The actuator housing 21 includes biasing spring 32, which communicates with member 37 which protrudes from contact carrier 31. Member 37 protrudes inside spring 32 and is located midway along the length thereof. Spring 32 may actually include two separate spring sections. The operation of the switch mechanism is similar to that shown in FIG. 3. The spring 32 is compressed by member 37 until it can be compressed no further. The contact carrier 31 is then adapted to switch positions when sufficient force has been imparted to actuator button 21.

The foregoing illustrated embodiments of the invention are

representative of the concepts of invention. However, it is evident that those skilled in the art may now make numerous uses and modifications of and departures from the specific embodiments described herein without departing from the inventive concepts. Consequently, the invention is to be construed as embracing each and every novel feature and novel combination of features present in or possessed by the apparatus and techniques herein disclosed and limited solely by the spirit and scope of the appended claims.

What is claimed is:

1. A snap action switch comprising, a plurality of spaced contacts defining a path, a sliding contact, contact carrying means for accommodating said sliding contact, actuating means, means for supporting said actuating means and the assembly comprising said contact carrying means and said sliding contact in relatively movable relationship to said plurality of spaced contacts in a direction generally parallel to said path to selectively interconnect at least two adjacent ones of said plurality of spaced contacts, said actuating means and said contact carrying means being formed with an opposed pair of recesses, and spring means within and joining said opposed recesses for storing energy in response to relative movement between said actuating means and said path, said actuating means also including means for directly transmitting a force from said actuating means to said contact carrying means for moving said sliding contact whereby upon movement of said contact carrying means relative to said path the energy stored in said spring means is released to aid the latter movement and provide snap action.
2. A snap action switch in accordance with claim 1 wherein said spring means is aligned for movement generally parallel to said path.
3. A snap action switch in accordance with claim 3 wherein said spring means comprises a coil spring with its axis generally parallel to said path.
4. A snap action switch in accordance with claim 1 wherein one of said contact carrying means and said actuating means includes a pair of protrusions embracing said spring means.
5. A snap action switch in accordance with claim 1 wherein said contact carrying means includes a pair of protrusions embracing said spring means.
6. A snap action switch in accordance with claim 1 wherein said actuating means includes a pair of protrusions embracing said spring means.
7. A snap action switch in accordance with claim 1 and comprising detent means including a plurality of spaced dimples protruding from said contact carrier.
8. A snap action switch in accordance with claim 1 wherein said contact carrying means includes first and second protrusions mating with respective first and second ends of said spring means.

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