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3,118,029 1/1964 Yamamoto..... 200/67D(UX)
3,234,343 2/1966 McCloskey..... 200/67D(UX)
3,412,225 11/1968 Rogers et al..... 200/168

FOREIGN PATENTS

1,079,983 8/1967 Great Britain.....200/67D2(UX)
1,402,906 5/1965 France 200/172A(UX)

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[54] **SNAP SWITCH WITH UNITARY INSULATING ENCLOSURE**
5 Claims, 5 Drawing Figs.

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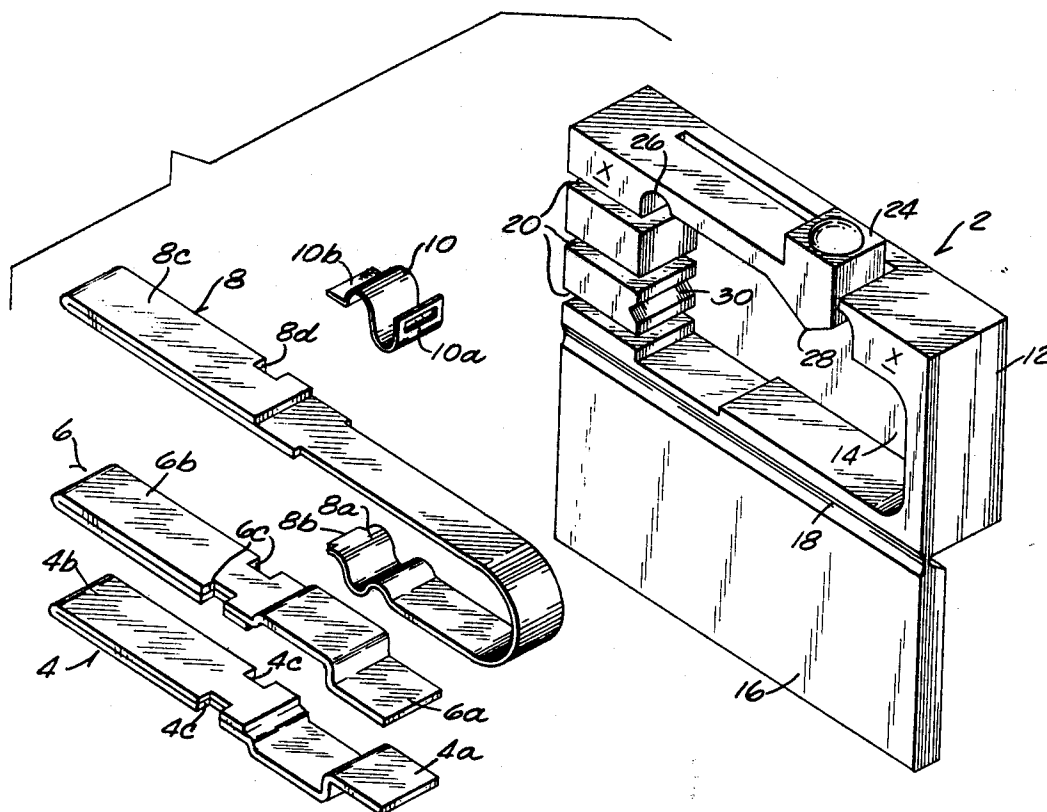
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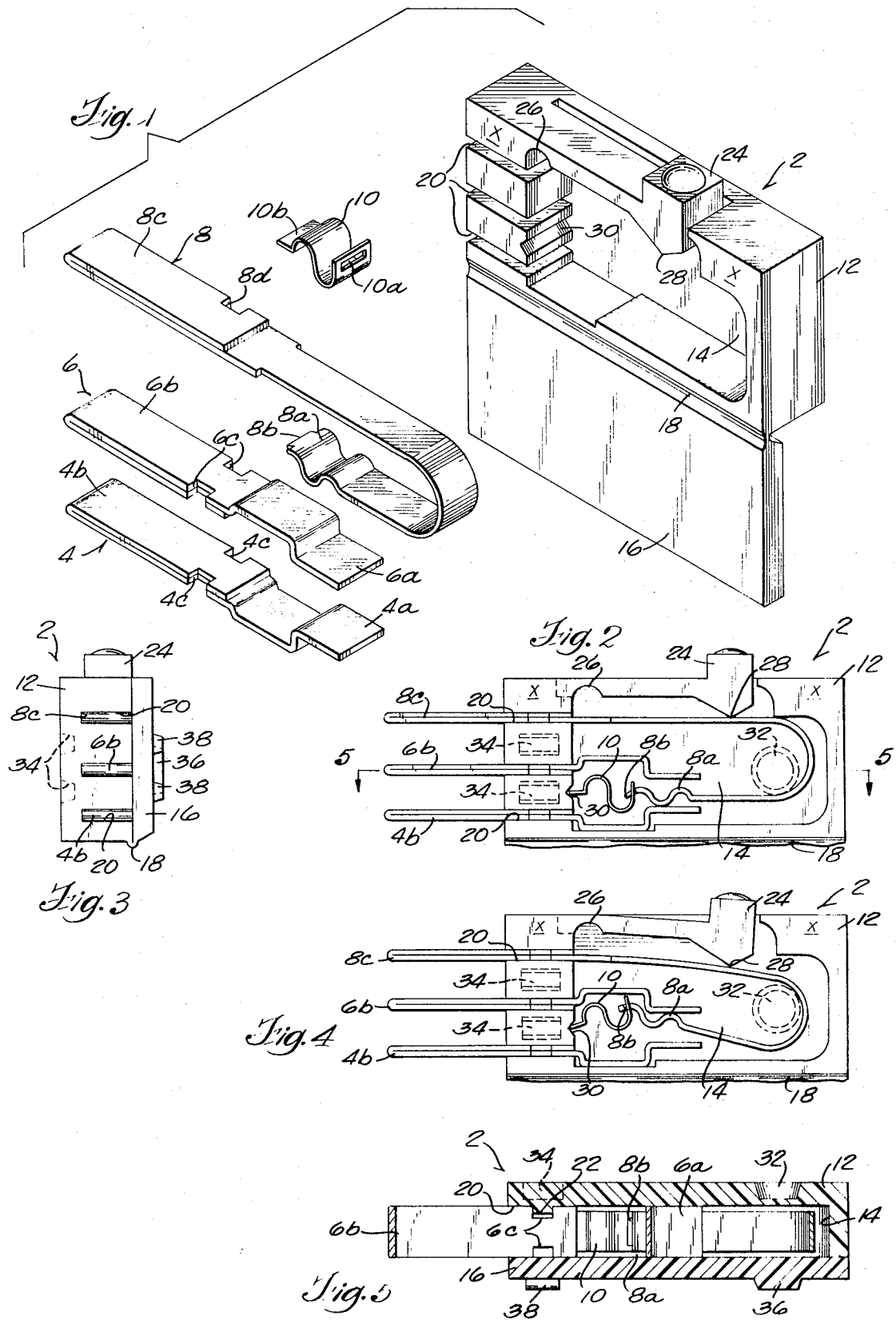
[56] References Cited

UNITED STATES PATENTS

3,099,723 7/1963 Roeser 200/67D(UX)

ABSTRACT: A molded switch base has cover and actuator portions integrally hinged thereto. Slots in a base portion sidewall position a pair of stationary contacts and a contactor within the base as well as the terminal portions thereof exteriorly of the base. The cover is closed upon and secured to the base to complete the assembly. The contactor has no high-resistance current-carrying joint and is urged to a stable position by an overcenter spring assembled between a sidewall and the free end of the contactor. The latter is driven to an unstable circuit making position by deflecting the actuator inwardly.





SNAP SWITCH WITH UNITARY INSULATING ENCLOSURE

BACKGROUND OF THE INVENTION

This invention relates to electric snap switches, and particularly to those switches referred to as precision snap switches wherein the contacts are operated in response to a very small amount of actuator travel.

Prior art switches of the precision snap variety generally have a contact system in which several individual parts are assembled together under compressive forces. In most instances these parts are relatively small and hard to assemble.

The cost of producing low travel snap switches may be reduced considerably by providing a design which utilizes fewer and more readily assembled parts. An additional desirable feature in the design of such switches is the elimination of high-resistance current-carrying hinge joints in the contact systems thereof.

SUMMARY OF THE INVENTION

It is therefore a primary object of the invention to provide an electrical snap switch which has only a few individual parts.

It is another object of the invention to provide an electrical snap switch which has few individual parts and wherein one of the parts is a unitary insulating enclosing case.

It is a further object of this invention to provide an electrical snap switch having an improved contact structure.

These and other objects and advantages of the invention will become more apparent in the following specification and claims when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded isometric view of the various components of the precision snap switch of this invention.

FIG. 2 is a view of the switch in its assembled condition with the cover portions broken away;

FIG. 3 is a left-end elevational view of the switch of FIG. 2;

FIG. 4 is a view like FIG. 2 but showing the switch contacts in an actuated condition; and

FIG. 5 is a longitudinal sectional view of the switch taken along the line 5-5 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawings and particularly FIG. 1, the components of the switch of this invention are shown in exploded view form. These components comprise a molded enclosing case indicated by the general reference character 2, a pair of identical stationary contact members 4 and 6, a contactor 8 and a serpentine-type overcenter spring 10.

Insulating enclosing case 2 comprises a switch base portion 12 in which is formed a switch cavity 14 open to the front side of the case. A cover portion 16 is integrally joined to the case 2 along the lower front edge thereof by a thin web 18 of molded material which serves as a hinge for the cover portion 16. The left-hand end wall of base portion 12 is provided with three vertically spaced horizontal slots 20 which communicate between the cavity 14 and exterior of the case. Slots 20 are also open to the front side of base portion 12 and contain rectangular projections 22 in their rear walls (see FIG. 5).

An actuator 24 forms a major portion of the upper wall of base portion 12. Actuator 24 is an integral portion of the enclosing case 2 and is joined to the left-hand sidewall by a thin web of material 26 which serves as a hinge for the actuator. The free end of actuator 24 is formed in an upstanding rectangular boss capped with a shallow dome. The underside of actuator 24, at the free end thereof, is formed by a pair of convergent, downwardly extending angular planes to form an apex 28 which extends parallel to the axis of hinge 26. Apex 28 serves as a bearing point upon the contactor 8 in assembled condition of the switch and may preferably be slightly rounded to minimize wear.

A V-shaped groove 30 is formed on the inner surface of the left-hand end wall between the lower pair of slots 20. The groove 30 extends along a plane parallel to the apex 28.

As may be noted in FIG. 1, stationary contacts 4 and 6 are identical members except that the upper contact 6 is inverted for use in the switch. The contacts 4 and 6 are formed from elongated, or ribbon stock, of copper or other good electrical conducting material. As viewed in the drawings, the members 4 and 6 have planar contact portions 4a and 6a, respectively, formed at the right-hand ends thereof and double thickness terminal portions 4b and 6b formed at the left-hand ends by folding the material back upon itself to increase the rigidity thereof. The terminal portion and contact portion of each member is connected by a shallow, substantially U-shaped offset portion. Each member 4 and 6 is provided with a pair of opposed, lateral notches 4c and 6c, respectively, one each of which cooperates with the projection 22 in the respective slot 20 to prevent longitudinal shifting of the member with respect to the case upon assembly.

Contact 8 is also formed from copper ribbon stock or the like. The right-hand end of contactor 8 is formed in a reverse loop so that the free end 8a thereof extends toward the left. Free end 8a is formed into a serpentine shape which serves as a movable contact member and terminates in an outwardly extending tab 8b. The left-hand end of contactor 8 is bent over upon itself to provide a double thickness terminal portion 8c similar to the terminal portions 4b and 6b. Contactor 8 is provided with a single lateral notch 8d formed in the double thickness terminal portion 8c. Notch 8d cooperates in assembly with the projection 22 in the respective slot 20 of enclosing case 2.

As seen in FIG. 2, when the contacts and contactor are assembled within the switch base, the free end 8a of contactor 8 is positioned between the upper and lower stationary contact portions 6a and 4a, respectively. Slots 20 in base portion 12 are dimensioned to snugly receive the double thickness portion of the contacts 4 and 6 and contactor 8 to firmly position these members in the base.

Overcenter spring 10 is assembled between free end 8a of contactor 8 and the groove 30 in the left-hand end wall of base portion 12. Spring 10 has a slot 10a provided at one end thereof into which tab 8b of contactor 8 loosely projects to maintain the spring positioned upon the contactor. The other end of spring 10 has a knife blade bearing portion 10b extending outwardly in the plane of the compressive axis of the spring. Bearing portion 10b rests in the groove 30 to position that end of the spring 10 with respect to the base.

As shown in FIG. 2, spring 10 normally biases free end 8a of contactor 8 into circuit-making engagement with the lower stationary contact 4a. This is the stable position of the switch. It may further be seen therein that the apex, or bearing 28 of actuator 24 abuts the upper surface of the right-hand end of contactor 8.

Depression of actuator 24 a small amount as shown in FIG. 3 drives the right-hand end of contactor 8 downward. The latter movement causes the lower leg thereof to pivot clockwise upon the stationary contact 4a, thereby raising the free end 8a of contactor 8 overcenter of the compressive axis of spring 10. The latter then drives the free end 8a upwardly with a snap action into circuit-making engagement with upper stationary contact 6a.

Actuator 24 restores to its original position upon removal of the depressive force applied thereto. Contactor 8 follows the return movement of actuator 24 and in so doing, pivots the free end 8a thereof back across the compressive axis of spring 10 whereby the latter drives free end 8a into contact with lower stationary contact 4a. In addition to the pivoting or rocking motion imparted to the end 8a of contactor 8 upon the stationary contacts 4a and 6a, the depression of contactor 8 also causes the free end 8a to slide along the respective stationary contact a small distance, thereby affecting a wiping contact action to the contact structure.

To complete the assembly of the switch, the cover portion 16 is folded over about the hinge portion 18 to close off the open side of base portion 12. The cover portion 16 is permanently secured to the base portion by gluing or sonic welding the two portions together at the portions marked X in the upper corners of the base portion.

The insulating enclosing case 2 may further be provided with external recesses and bosses to facilitate ganging a plurality of switches within a frame structure. The external surface of the rear wall of base portion 12 is provided with a circular depression 32 located near the right-hand end as viewed in the drawings, while the left-hand end thereof is provided with a pair of vertically spaced rectangular recesses 34. The external surface of cover portion 16 is provided with a circular projection 36 aligned with depression 32 and a pair of rectangular projections 38 aligned with the recesses 34. Thus two switches of the disclosed type may be placed side-by-side wherein the projections 36 and 38 of one switch project into the recesses 32 and 34, respectively, of the other switch to rigidly position the two switch cases together. A frame, suitable formed to surround the opposite ends of the multiswitch assembly, may also be provided with corresponding projections and recesses to position the switches within the frame.

Thus there is disclosed herein a switch which has but four distinct parts which are readily manufactured and easily assembled. A contact system is incorporated therein which provides good contact action and has no high-resistance hinge joints. A unitary molded enclosing case incorporates an actuator, hinged cover and various mounting features without the use of extra hardware.

While but one preferred embodiment has been disclosed herein, it is to be understood that this invention is susceptible of various modifications without departing from the spirit thereof as defined in the appended claims.

I claim:

1. An electric snap switch comprising, in combination:
 - a hollow insulating enclosure;
 - a pair of electrically conductive members extending through a first sidewall of said enclosure in spaced-apart relation, said electrically conductive members having terminal portions extending exteriorly of said enclosure and having contact portions extending within said cavity presenting a pair of opposed spaced contact faces;
 - a contactor member extending through said first sidewall and having a terminal portion extending exteriorly of the enclosure, said contactor further having a portion extending with said cavity toward an opposite sidewall, said portion including a segment formed in a reverse loop proximate said opposite sidewall, the reverse portion thereof extending back toward said first sidewall wherein the free end is disposed substantially between said contact faces, said free end being formed with contact surfaces on opposite sides thereof for circuit-making engagement alternately with said pair of contact faces;
 - overcenter spring means connected between said first

sidewall and said free end of said contactor normally biasing the latter into engagement with one of said contact faces; and

actuator means formed in another sidewall adjacent said first sidewall of said enclosure, said actuator means bearing upon said contactor at a point between said first sidewall and said reverse loop portion and being depressible inwardly of said enclosure; wherein depression of said actuator means deflects said reverse loop portion of said contactor causing said free end thereof to pivot upon said one of said contact faces, thereby moving the free end of said contactor across the compressive axis of said overcenter spring to cause the latter to drive the free end of said contactor against the other of said stationary contact faces.

2. The combination according to claim 1 wherein said actuator means is a lever formed from and comprising a major portion of said another sidewall, said lever being joined at one end to said first sidewall by an integrally molded hinge portion, the other end of said lever being deflectable inwardly of said enclosure about said hinge portion.

3. The combination according to claim 2 wherein said hollow insulating enclosure is a unitary molding having two mating portions joined by an integrally molded thin web hinge portion, said mating portions being folded over about said hinge portion and secured together to form said hollow insulating enclosure.

4. The combination according to claim 2 wherein said insulating enclosure has a plurality of recesses formed in one exterior surface and a plurality of axially aligned bosses on an opposite exterior surface, whereby a plurality of said switches may be rigidly clamped together in side-by-side relationship with the bosses of one switch enclosure fitting into the corresponding recesses of an adjacent switch enclosure to prevent lateral movement therebetween.

5. A unitary insulating enclosure for an electric switch comprising, in combination:

- a base portion;
- a central cavity in said base portion open to one side thereof;
- a plurality of slots in at least one sidewall of said base portion, said slots communicating between said cavity and the exterior of said base portion and being open to said one side of said base portion for receiving and positioning electrically conductive members of said switch;
- a lever actuator portion formed from another sidewall of said base portion, said lever actuator portion being joined to said base portion by an integrally molded hinge portion at one end wherein the other end of said lever actuator portion is deflectable inwardly of said enclosure; and
- a cover portion joined to said base portion along an edge adjacent said one side by an integrally molded hinge portion, and wherein said cover portion is folded over about said hinge portion to overlie said one side and is secured thereto to close off said cavity.