

March 15, 1966

G. M. FARRELL

3,240,893

SNAP ACTION ELECTRIC STACK SWITCH WITH ADJUSTABLE
DAMPER CONNECTED TO ITS LEAF SPRINGS
Filed June 18, 1963

FIG. 4

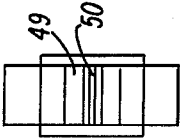


FIG. 2

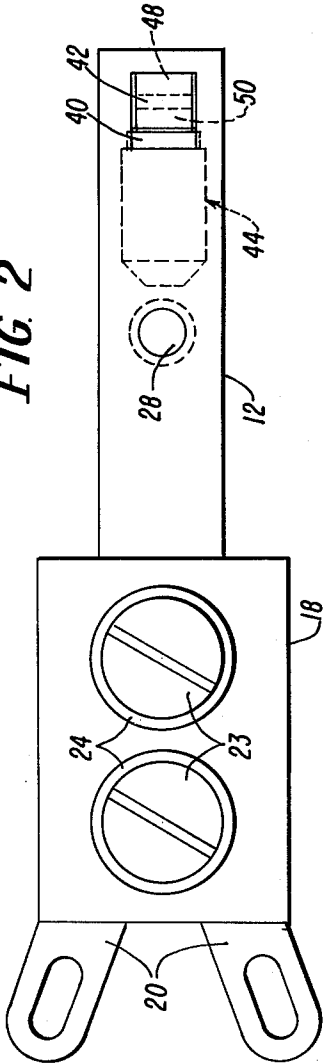


FIG. 3

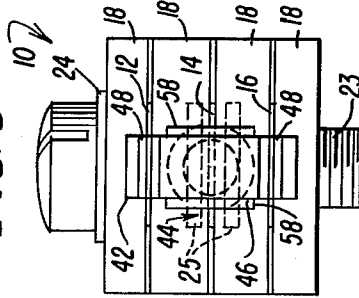


FIG. 1

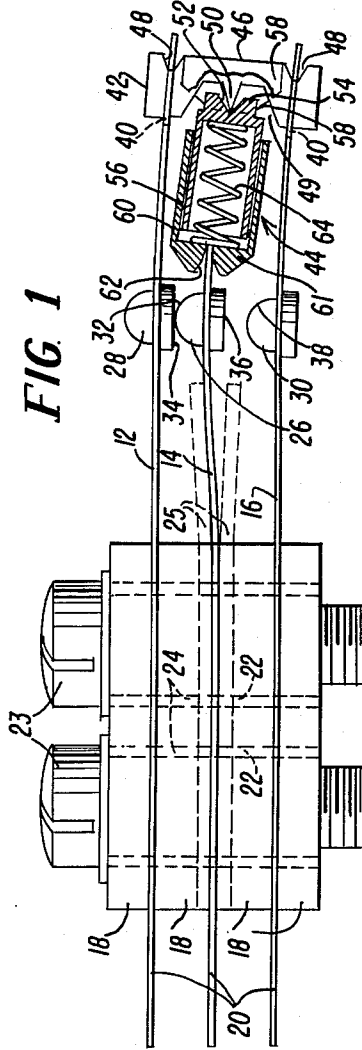
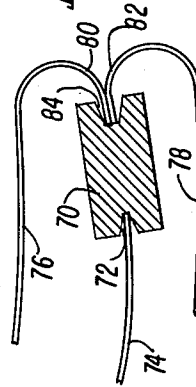


FIG. 5



INVENTOR.
Guy M. Farrell

BY

Corn, Mc Dougall & Hersh.
Attys.

3,240,893

SNAP ACTION ELECTRIC STACK SWITCH WITH ADJUSTABLE DAMPER CONNECTED TO ITS LEAF SPRINGS

Guy M. Farrell, Elmhurst, Ill., assignor to F & F Enterprises, Inc., Chicago, Ill., a corporation of Illinois
Filed June 18, 1963, Ser. No. 288,683
9 Claims. (Cl. 200-67)

This invention relates in general to snap action switches and more particularly to a versatile and economical snap action switch having improved contact wipe and reduced contact bounce.

Basically the present invention is intended economically to solve a number of problems relating to snap action switches. These problems include the provision of contact wipe, the elimination of contact bounce, the avoidance of an electrical by-pass path being completed through the snap action actuator member and the provision of simple and economical means for adjusting the switch blades.

It is, therefore, a primary object of the present invention to provide a snap action switch of improved design.

It is still another object of the present invention to provide a more economical and versatile snap action switch.

Other objects and features of this invention will become apparent on examination of the following specification, claims and drawing, wherein:

FIG. 1 is a side elevational view of the switch assembly illustrating the snap acting assembly in cross-section and the actuator partially broken away;

FIG. 2 is a top plan view of the switch assembly;

FIG. 3 is a front end view of the switch assembly;

FIG. 4 is a plan view of the actuator; and

FIG. 5 diagrammatically illustrates a modification of the invention.

In the drawings, a snap action switch assembly is illustrated by the reference character 10. The switch assembly comprises three cantilever type parallel spring blades 12, 14 and 16 mounted adjacent one end at spaced apart positions in a conventional spring pile-up comprising the insulators 18. The blades 12, 14 and 16 each have a terminal portion 20 by means of which external electrical connection may be established to the spring blades. The insulators and blades are provided with aligned apertures 22 in which screws 23 insulated from the blades by means of insulators 24 may be inserted to fix the pile-up in a desired position. If desired, of course, the entire pile may comprise an integrally molded unit which is formed for also enclosing the assembly 10.

The center blade 14 may also be provided with a pair of damper blades 25 illustrated by the dotted lines in FIG. 1. The damper blades 25 are cantilever blades mounted in the spring pile-up on opposite sides of the center blade 14 but are shorter than the center blade. The blades 25 project from the spring pile-up substantially parallel to the blade 14 and are formed to exert a desired damping effect upon the movement of the center blade. This controls the force with which the contact 26 carried by the center blade engages either the contact 28 on the blade 12 or the contact 30 carried by blade 16. The damper blades 25 have the further function of controlling the differential dimension, i.e. to widen or to narrow the distance between the "up" actuated snap-over point and the "down" actuated snap-over point.

The blades 12 and 16 extend beyond the end of blade 14 with the respective contacts 28 and 30 located between the ends and in alignment with contact 26 carried near the free end of blade 14. The contact 26 has a curved or circularly shaped upper surface 32 adapted to engage

with a flat face 34 on contact 28 for providing improved wipe in response to the movement of blade 14. The contact 26 also has a flat face 36 for engaging a curved surface 38 on the contact 30 to provide the type of pressure and movement which wipe away dust and penetrate an oxide layer that tends to form on the contacts.

As mentioned, the free ends of blades 12 and 16 extend beyond the end of spring 14. An aperture 40 is provided adjacent the free end of blades 12 and 16.

A generally rectangular actuator member 42 of insulating material is inserted through the apertures 40 in the blades 12 and 16. A snap acting assembly 44 connects the actuator 42 to the free end of blade 14.

The actuator 42 has a back wall 46 with notches 48 therein adjacent opposite ends for engaging the edges of respective apertures 40. Its front wall is provided with a recess 49 from which a hinge element 50 projects along the central horizontal axis of the actuator. The hinge element 50 is a triangularly shaped projection whose apex engages a similarly shaped recess 52 in the hub 54 of a telescoping element 56 in the snap acting assembly 44. This arrangement permits the telescoping element 56 to pivot in either a clockwise or counterclockwise direction about projection 50 in response to the downward or upward movement of the actuator 42. The actuator 42 is also provided with vertical side wings or flanges 58 to prevent lateral displacement of the element 56.

The snap acting assembly 44 comprises in addition to the element 56 another telescoping element 60 adapted to engage over element 56. The element 60 has a hub 61 and the hub 61 is provided with a notch or recess 62 in which the free end of blade 14 seats. A helical spring 64 biases elements 56 and 58 apart and maintains the free end of blade 14 under a desired degree of pressure so that when the element 56 pivots about hinge 50, the blade 14 is pivoted in the opposite direction about its support. The blade 14 passes the snap-over point under the influence of spring 64 which serves to hold the contact 26 in positive engagement with either contact 28 or 30 depending on which was the original position in which the actuator 42 was placed.

Thus if the contact 26 is engaged with contact 28 and it is desired to alter its position so that it engages with contact 30, the actuator 42 is moved either manually or through some suitable mechanism such as a relay armature in an upward direction. This causes the snap acting assembly 44 to pivot about hinge 50 in a counterclockwise direction to pivot blade 14 in a clockwise direction. This swings contact 26 from contact 28 and when the snap-over point is passed, the blade 14 carries the contact 26 into positive engagement with contact 30. It will be noted that the actuator 42 is also biased against the edge of apertures 40 by the spring 64 and that its movement causes the blades 12 and 16 to bow about the juncture of notch 48 and the edge of apertures 40. This bowing causes blade 16 to be placed under tension as the blade 14 moves towards it so that a more positive engagement between contacts 28 and 30 occurs. To re-engage contact 26 with contact 28 the actuator is simply moved in the opposite direction from that described to provide engagement between contacts 26 and 28 in a manner similar to that described for contacts 26 and 30.

It will be appreciated, of course, that the actuator 42 may be located in any one of a number of positions with respect to the center and end blades for the purpose of providing desired actuation points.

The rate or force with which the contacts engage is important in controlling contact bounce. For this purpose, the damper blades 25 are adjusted or formed as

3

desired to restrain the rate of movement of the blade 14. The damper blades 25 may be adjusted over a small increment to provide a large change in the movement of the blade 14. With reduced contact bounce a reduction occurs in the slight opening and closing of the contacts following the initial closure. This contributes to prolonging the total contact life and reduces the possibility of malfunction in the circuits associated with the contacts.

It will be appreciated that the blade 14 may be made to assume a neutral position without normally engaging either contact 28 or 30, if desired, by either appropriately forming the blades or by adjustment of the damper blades 25.

In the arrangement shown in FIG. 5, the telescoping members are replaced by a solid member 70 of an electrically insulating material. The member 70 is provided with a recess or notch 72 therein for engaging the free end of the center blade 74 to permit relative pivoting therebetween. The center blade 74 is otherwise similar to blade 14; however, the upper and lower blades 76 and 78 instead of being straight as blades 12 and 16 are each extended and formed over to provide springlike extensions 80 and 82. These extensions engage a central recess 84 at the other end of the member 70 thereby to hold it biased against the spring 74 while permitting relative pivoting between the extensions 80 and 82 and the member 70. Thus if either spring 76 or 78 is now moved, the member 70 swings in the opposite direction about the extensions 80 and 82 to pivot the center blade 74 away from the contact with which it is engaged and into engagement with the contact carried by the other blade.

The foregoing is a description of an improved type of snap acting switch whose inventive principles are believed to be more fully defined in the appended claims.

I claim:

1. A snap action switch comprising a pair of spaced apart cantilever springs, an insulating support for mounting one end of each of said springs, an intermediate cantilever spring having one end mounted in said support and being located between said pair of springs, a first contact carried by said intermediate spring and additional contacts carried by each of said pair of springs with said first contact alternately engaging one of said additional contacts, an actuator member formed of insulating material and connected to the opposite ends of said pair of springs, a pressure member having one end pivotally connected to the opposite end of said intermediate spring, and means pivotally connecting the other end of said pressure member to said actuator member.

2. The switch claimed in claim 1 in which said pressure member comprises a coiled spring.

3. In the switch claimed in claim 2, wherein said pressure member comprises a pair of engaged telescoping elements for encircling said coiled spring.

4. In the switch claimed in claim 3, a hinge on said actuator member engaging one of said telescoping members.

4

5. In the switch claimed in claim 1, a pair of flanges on said actuator member for preventing the lateral displacement of said pressure member.

6. A snap action switch comprising a pair of spaced apart cantilever springs, an insulating support for mounting one end of each of said springs, an intermediate cantilever spring having one end mounted in said support and being located between said pair of springs, a damper means associated with said intermediate springs for controlling the rate at which the other end of said intermediate spring can move relative to said pair of springs, a first contact carried by said intermediate spring and additional contacts carried by each of said pair of springs with said first contact alternately engaging one of said additional contacts, an actuator member formed of insulating material and connected to the opposite ends of said pair of springs, a pressure member having one end pivotally connected to the opposite end of said intermediate springs, and means pivotally connecting the other end of said pressure member to said actuator member.

7. The switch claimed in claim 6 in which said damper means comprises a pair of cantilever blades having one end mounted in said support on opposite sides of said intermediate spring.

8. A switch in accordance with claim 1 wherein the means connecting the other end of said pressure member to said actuator member comprises a hinge formed integrally with said actuator member.

9. A snap action switch comprising a pair of spaced apart cantilever springs, an insulating support for mounting one end of each of said springs, an intermediate cantilever spring having one end mounted in said support and being located between said pair of springs, a first contact carried by said intermediate spring and additional contacts carried by each of said pair of springs with said first contact alternately engaging one of said additional contacts, each of said pair of springs including extensions comprising return portions, said return portions being joined together with the combined return portions forming an actuator member for the switch, a pressure member having one end pivotally connected to the opposite end of said intermediate spring, the other end of said pressure member being engaged with the joined ends of said return portions to thereby provide a second pivotal connection between said joined ends and said pressure member.

References Cited by the Examiner

UNITED STATES PATENTS

2,290,725	7/1942	Bartels et al.	200—166
2,378,784	6/1945	Obszarny	200—1 X
2,818,481	12/1957	Nicolaus	200—166
3,001,042	9/1961	Cherry	200—67

KATHLEEN H. CLAFFY, *Primary Examiner*.

ROBERT K. SCHAEFER, *Examiner*.