

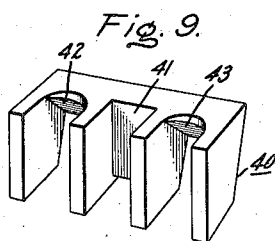
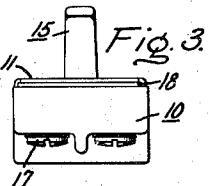
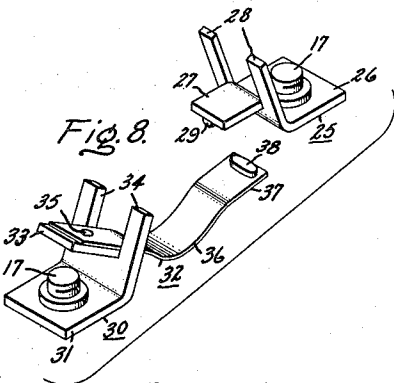
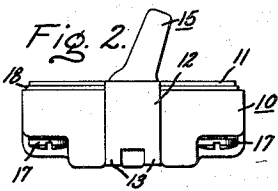
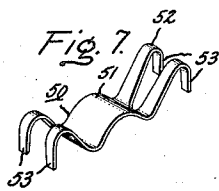
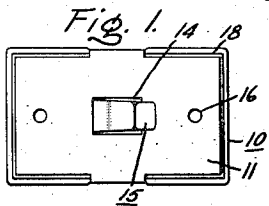
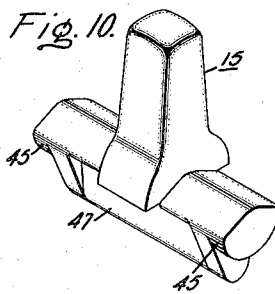
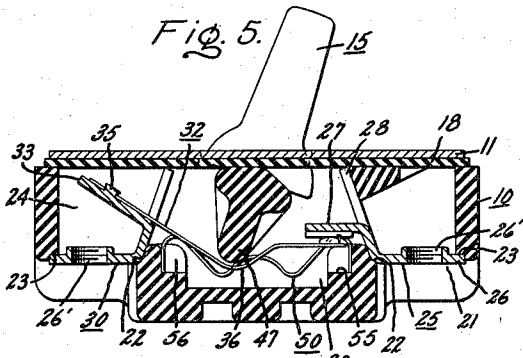
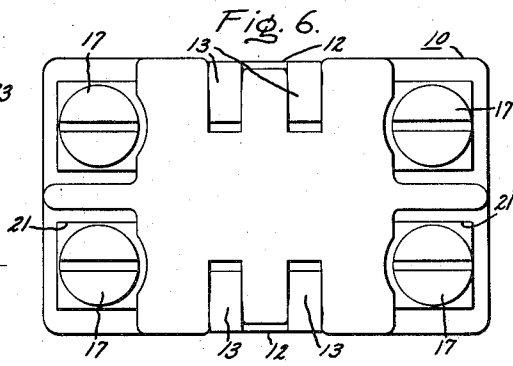
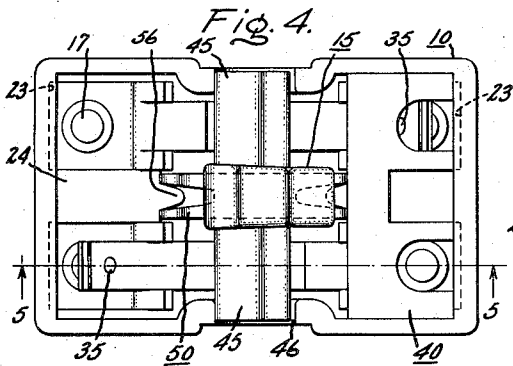
Aug. 19, 1958

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2,848,574

SLOW MAKE AND BREAK SWITCH

Filed Aug. 30, 1954



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2,848,574

SLOW MAKE AND BREAK SWITCH

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Application August 30, 1954, Serial No. 452,926

6 Claims. (Cl. 200-68)

This invention relates to electric switches and in particular to a slow make and slow break switch for use on appliances such as room air conditioners to control the speed of the blowers. This switch is designed to replace prior art switches having a more complicated and more expensive operating mechanism. The ease with which this switch may be assembled was of primary importance in reducing its cost over previous models to gain its acceptance by the industry. Also, the usual method of mounting the terminals in the switch housing by means of screw fasteners or the like has been replaced with the cover member for rigidly securing the switching elements in the housing. The novel detent spring for moving the trigger member of the switch to either of its extreme positions is also of importance in the successful operation of this switch.

Accordingly, the principal object of this invention is the provision of an improved switch mechanism which is compact and simple in design to carry high currents relative to its size.

A further object of this invention is to provide a simple arrangement for supporting the terminals of the contacts in the switch housing.

A further object of this invention is to provide a novel detent spring for the trigger member which will have a long dependable life and which will serve to hold the trigger member in either of its two extreme positions.

Our invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing:

Figure 1 is a top plan view of a switch embodying the invention.

Figure 2 is a front elevational view of the switch of Figure 1.

Figure 3 is an end elevational view of the switch of Figure 1.

Figure 4 is an enlarged plan view of the switch embodying the invention with the cover plate and the left-hand hold-down block removed.

Figure 5 is a cross-sectional elevational view taken generally on the lines 5-5 of Figure 4.

Figure 6 is a bottom plan view of the switch housing of Figure 4.

Figure 7 is a perspective view of a detent spring for cooperation with the trigger member.

Figure 8 is a perspective view showing a movable and a fixed contact member of a switch embodying the invention.

Figure 9 is a perspective view of one of the hold-down blocks for securing the contacts in place.

Figure 10 is a perspective view of the trigger member.

Referring in detail to the drawing in which like elements are represented by like reference numerals, 10 represents a recessed body member in Figures 1-3 of molded phenolic or other suitable insulating material. The body

member 10 is closed by a steel cover plate 11 which is fastened thereon by a pair of side arms 12 which extend around the body member so that the pair of tongues 13 on each side arm 12 are gripped to the body member to provide a positive clamping action between the members so that there is in effect a hollow switch housing for enclosing the switch parts.

There is a rectangular hole 14 in the center of the cover 11 for receiving the manually operated trigger member 15 which is also of insulating material. Threaded apertures 16 are formed in the cover member so that the switch may be mounted on a supporting structure by screw fasteners (not shown). Terminal screws 17 are joined with each of the movable and fixed contacts of the switch and are visible from the bottom of the switch housing. As seen in Figure 5, the cover plate 11 is insulated from the internal switch mechanism by the insulating plate 18 which is of similar dimensions as plate 11.

The recessed body member 10 has a central depression 20 extending transversely of the housing which separates the shallow recesses 24 at the ends of the housing. Square shaped terminal openings 21 are formed through the bottom wall of the housing at each corner thereof for a reason which will be explained later. The edges of the terminal openings 21 which border on the central depression 20 are each provided with a narrow ledge 22 to serve as a fulcrum for the contact members. The opposite edge of each of the terminal openings 21 is formed by the end walls of the body 10 on the bottom of which are located the terminal-receiving notches 23.

As is best shown in Figures 5 and 8, the fixed contact 25 comprises a square terminal portion 26, an overhanging contact portion 27 and a pair of upwardly inclined strut members 28. The terminal portion 26 is provided with a threaded aperture 26' for receiving a terminal screw 17. The contact portion 27 is lanced out of an upwardly extending portion of the contact to form the resulting strut members 28. A slug of silver 29 is welded to the underneath side of the portion 27.

Also as best seen in Figures 5 and 8, the movable contact member 30 is formed with a square terminal portion 31 and a resilient contact blade 32. There is an upwardly extending portion from the terminal 31 which is lanced out to form the tongue 33 that is bent to partially overlap the terminal 31. By means of this lanced construction strut members 34 are formed in a manner similar to strut members 28 of the fixed contact 25. The resilient contact blade 32 is riveted or otherwise fixed as at 35 to the tongue 33. The central portion of member 32 is provided with a bend 36 which is concave upwardly. The free end 37 of member 32 is bent downwardly and outwardly to be substantially horizontal in the switch housing. A slug of silver 38 is also welded to the upper surface of end 37.

Turning now to a consideration of the arrangement of the contacts in the housing of Figures 4 and 5, it will be seen that there are two pairs of contacts 25 and 30 mounted in the base or body 10 with the like contacts being arranged in opposite corners of the housing. Since the two sets of contacts are identical only one set will be discussed in detail for the sake of brevity, and only one set is illustrated in Figure 5. The movable contact 30 is mounted in the body by placing the terminal 31 in the opposite terminal-receiving opening 21 so that one edge of the terminal underlies the end wall of the housing to be in the notch 23 while the opposite edge of the terminal is seated on the ledge 22. Similarly, the fixed contact 25 is assembled in the housing by inserting the terminal 26 in the opening 21 with one edge of the terminal 26 under the end wall of the housing and in the notch 23 while the opposite edge of the terminal 26 is seated on

the narrow ledge 22. The resilient contact blade 32 then extends across the central depression 20 with the free end 37 underlying the contact portion 27 of the fixed contact 25. Looking at Figure 5, it should be appreciated that the strut members 28 and 34 of contacts 25 and 30 respectively are held down by the insulating cover member 18 so that the contacts are fulcrumed on the ledges 22 and held in place by the notches 23 in the end walls of the switch housing.

In order to furnish a more positive holding action for the contacts in the housing, we have provided hold-down blocks 40 for preventing the contacts from shifting out of position under conditions of rough handling that might cause the contacts to drop out of the housing through the openings 21. These blocks are best shown in Figure 9 and they are dimensioned to fill up most of the space in the housing between the struts 28 and 34 respectively and the adjacent end walls of the housing while extending from one side wall to the other within the housing. The central portion of the blocks 40 is cut out as at 41 in order to accommodate the mounting screw (not shown) that is used to fasten the switch to a supporting surface by engaging in the threaded aperture 16 in the cover plate 11. Similar cut-outs 42 and 43 are provided at either side of cut-out 41 to accommodate the shank of the terminal screws 17 as well as the upwardly extending tongue 33 of the movable contact 30.

As mentioned before, a pivoted trigger 15 is provided in the switch housing for actuating the movable switch blades 32. Trunnions 45 are formed on the sides of the trigger to lie within open bearings 46 formed in the opposite side walls of the body 10. The cover plates 11 and 13 overlie the trunnions 45 in the bearings 46 so that the trigger is confined to rotational movement in the bearings. Between the trunnions 45, and at the lower end thereof, the trigger is provided with a rounded projection 47 that is adapted to bear on the upper surface of the contact blades 32 of the movable contacts 30. In the position of the trigger 15 in Figure 5, the projection 47 is engaged within the concave portion 36 of the blade 32. In this position the free end 37 of blade 32 is in engagement with the fixed contact portion 27 in order to complete the circuit. Thus, if the trigger 15 were pivoted to the left, the projection 47 would depress the blade 32 to open the circuit at that point. Since the second set of contacts is oppositely arranged from the first set mentioned above, it should be appreciated that when the trigger is moved the action of the one set of contacts will be opposite from the action of the remaining set so that this switch is in effect a single-pole double-throw switch.

A detent spring 50, as is best shown in Figures 4, 5 and 7, is located centrally within the depression 20 of the housing to underlie the rounded projection 47 of the trigger 15. The function of this spring is to normally hold the trigger 15 in either of its two extreme positions so that more than a casual force is needed to move the trigger 15 to its opposite position. This spring is made from a thin strip of resilient material such as beryllium copper and it has an arched central portion 51 as well as arched end portions 52 which are bifurcated to form a pair of downwardly extending legs 53 at both ends of the spring. Longitudinally spaced shelves 55 are formed adjacent the central depression 20 for supporting the spring 50 above the bottom wall of depression 20. Opposed abutments 56 are formed on the shelves 55 to be straddled by the bifurcated ends 52 of the spring 50 so that the spring is held in the housing by pressure against the opposite walls of the depression 20 as well as by the cooperation of the abutments 56 with the bifurcations 52. The bifurcated ends 52 of the spring are of gradually diminishing cross-sectional area from the arched central portion to the ends of the spring. Thus, the spring is of substantially uniform strength. The spring is supported at both ends and the

load is applied over the arched central portion. Both the width and thickness of the spring material are uniform so that the cross-sectional area is a maximum at the arched central portion that is designated as the area of loading. Hence, the outline of this spring in plan view is equivalent to two triangles in opposed relation with their apexes at the area where the load is supported by the spring. See Figure 4. Accordingly, the movement of the trigger 15 is resisted by the spring pressure of the detent spring 50 which must be overcome by depressing the arched portion 51 of the spring until the rounded projection 47 of the trigger is capable of riding over the arch 51 to operate the switch and make or break contact between the movable contacts 30 and the fixed contacts 25.

Consequently, having described our invention of a new and improved slow make and break electric switch, it will be readily apparent to those skilled in this art that we have devised a switch which is simple in design, reliable in operation and easy to assemble as well as readily adaptable to mass production methods of manufacture. While we have shown hold-down blocks for use with the movable and fixed contacts, it should be appreciated that under many conditions they may be eliminated as the cover plate may be relied upon to satisfactorily hold the contacts in the housing. Under conditions of severe handling and usage, it is preferable, however, to take advantage of the hold-down blocks so that the terminals are as reliable in operation as those which are permanently fixed to the switch housing by means of rivets or the like. Also, this switch can very easily be made into a three-way switch by merely placing a jumper strip across two adjacent terminals of the switch. Also, one of the sets of contacts may be reversed so that the movable contacts will open and close simultaneously to form a double-pole single-throw switch.

A possible modification of the detent spring would be to form the top of the arched central portion with a concavity so that the switch is changed to a three position switch with a variety of circuit combinations. As an example, the extreme end positions of the trigger could be the "on" positions for two different circuits while the middle position would serve as the "off" position. This change in the design of the spring, and consequently the action of the switch, could be made without altering the design of the other parts of the switch.

Modifications of this invention will occur to those skilled in this art and it is to be understood therefore that this invention is not limited to the particular embodiment disclosed but that it is intended to cover all modifications which are within the true spirit and scope of this invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric switch comprising a recessed body member with a cover member for forming a hollow housing, the housing containing at least one fixed contact that is normally biased into engagement with a movable contact, each contact having a terminal end to which a lead wire may be connected, openings formed through the back wall of said housing to accommodate the terminals of said contacts, the said terminals lying within the openings and being supported on a side ledge of their respective opening, upwardly inclined strut members formed on each contact to be in engagement with the underside of said cover so that each terminal is held seated on said ledges by the downward force supplied by the cover while the opposite edge of each of the terminals is held against an overlying stop member of the housing, and a trigger pivotally supported in said housing for holding the movable contact away from the fixed contact.

2. An electric switch as recited in claim 1 wherein there are a pair of fixed contacts and a pair of movable contacts normally biased into engagement therewith, and a

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pair of hold-down blocks seated over an adjacent pair of the terminals of said contacts while also being in engagement with the underside of the cover to assist in fixedly securing the terminals in the housing.

3. An electric switch comprising a hollow housing formed of a recessed body member and a cover with a pair of fixed contacts that are normally biased into engagement with a pair of movable contacts, openings formed through the back wall of said housing to accommodate the terminals of said contacts, each of the said terminals lying within an opening and being fulcrumed on a side ledge of their respective openings, while the opposite edge of each of the terminals underlies a ledge of said openings, a hold-down block seated over the terminals and being forced down by the cover to support the terminals in the openings, and a trigger pivotally supported in said base member for holding the movable contact away from the fixed contact.

4. An electric switch comprising a hollow housing having a fixed contact in cooperation with a movable contact, each contact having a terminal end fixed in the housing to which a lead wire may be connected, and a cover member for closing the said housing, a trigger pivotally mounted in the housing for moving the movable contact into and out of engagement with the fixed contact, and a detent spring located in the path of movement of said trigger to hold the trigger in one of several predetermined positions, the spring having an arched central portion as well as arched end portions, said arched end portions being bifurcated along their entire length and having substantially vertical legs for holding the central portion away from the supporting surface, the said legs of the spring being braced between opposed walls in the housing with the legs at each end straddling an abutment formed as part of said walls so that the spring is supported against sidewise sliding movement in the housing.

5. An electric switch comprising a hollow housing, a

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fixed contact and a movable contact blade located in the housing, a manually operated trigger pivotally mounted within the housing and engageable with the contact blade to move it away from the fixed contact, the trigger having a handle portion that extends outwardly through a top opening in the housing, and a pair of opposed walls in the housing, a detent spring braced between these opposed walls and held in the path of movement of the trigger to hold the trigger in one of several predetermined positions, the spring having an arched central portion and arched end portions which are turned down vertically at the ends to form supporting legs, the spring being compressed slightly between the opposed walls to hold the spring in place, the said arched end portions being of gradually diminishing cross-sectional area from points adjacent the sides of the arched central portion to the nearest end of the spring.

6. An electric switch as recited in claim 5 wherein the said arched end portions are bifurcated to form a pair of vertical legs at both ends of the spring.

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