Sept. 20, 1938. W. H. LANTZ, JR 2,130,589

SPRING ACTION ROTARY SWITCH

Filed July 19, 1937

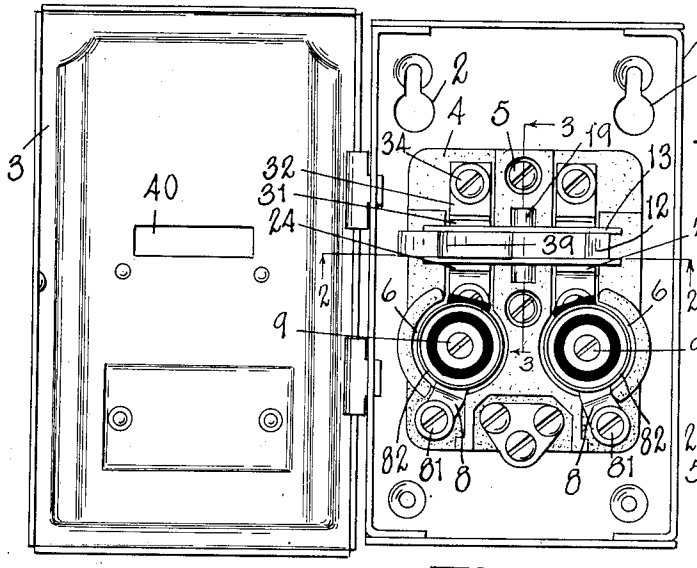


Fig. 1.

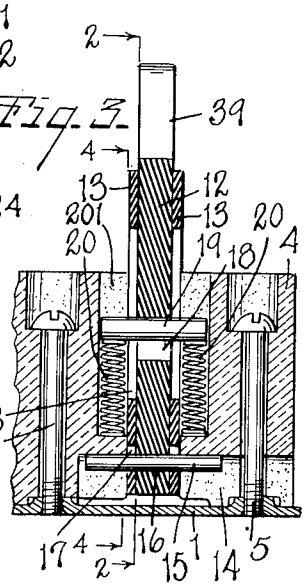


Fig. 3.

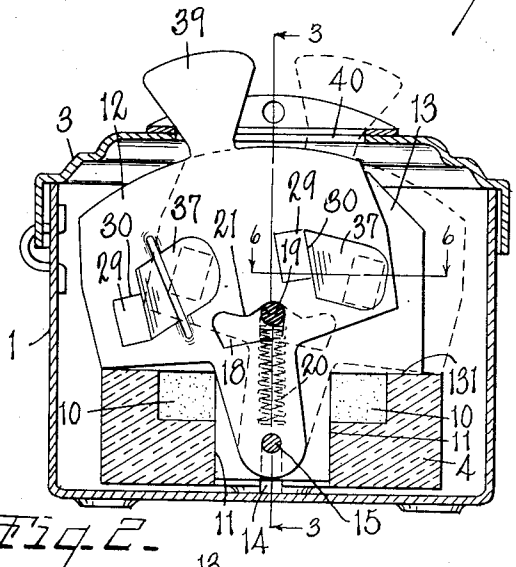


Fig. 2.

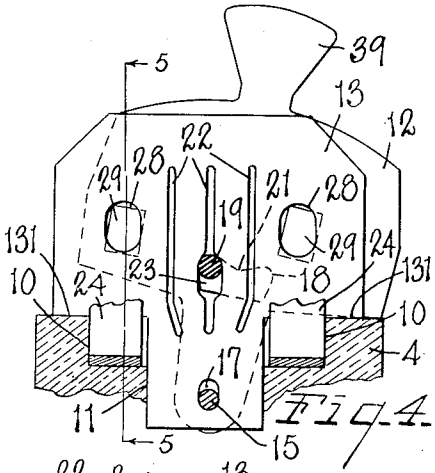


Fig. 4.

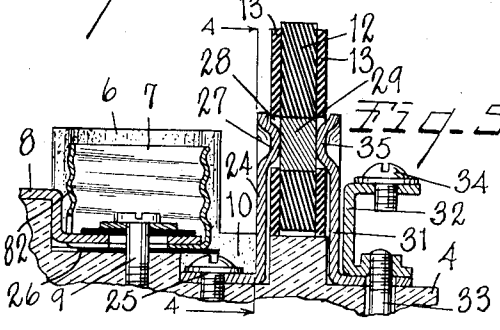


Fig. 5.

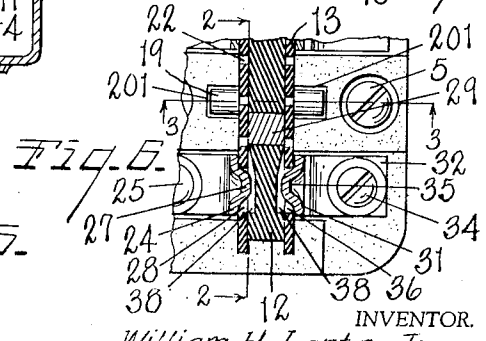


Fig. 6.

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SPRING ACTION ROTARY SWITCH

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Application July 19, 1937, Serial No. 154,357

24 Claims. (Cl. 200—151)

This invention relates to improvements in spring action rotary switches.

The main objects of my invention are:

First, to provide a spring action rotary switch mechanism suitable for use in fuse boxes and other applications.

Second, to provide a device of the type described characterized by a movable switch member having a floating bridging or conducting member mounted therein which is entirely self-aligning with opposed coacting stationary contact clips.

Third, to provide a device of the type described having novel and highly efficient arc snuffing provisions.

Fourth, to provide a switch of the type described having provisions whereby the possibility of a flash-over between opposite polarities is eliminated.

Fifth, to provide a device embodying a movable switch member carrying a plurality of bridging members and having provision whereby perfect alignment of the bridging members with coacting contact clips is afforded in one position of the switch member and whereby separate completely enclosed arc snuffing chambers are formed in another position of the switch member.

Sixth, to provide a switch of the type described having great flexibility in the matter of alignment of a movable bridging or conducting member with opposed coacting contact clips.

Seventh, to provide a device of the type described having opposed ball type pressure contact clips of novel and improved form to assure perfect contact with a coacting bridging member.

Further objects relating to details and economies of this invention will definitely appear from the description to follow. The invention is defined in the claims.

A structure embodying the features of my invention is illustrated in the accompanying drawing, wherein:

Fig. 1 is a plan view illustrating my invention as embodied in a fuse box, the cover of which is shown in open position.

Fig. 2 is an enlarged view in transverse vertical section on line 2—2 of Figs. 1, 3, and 6.

Fig. 3 is a fragmentary view in vertical section on line 3—3 of Figs. 1, 2, and 6.

Fig. 4 is a fragmentary view illustrating more clearly the relation of the pivoted switch member and coacting insulating shields, being in section on line 4—4 of Figs. 3 and 5.

Fig. 5 is a fragmentary sectional view on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary view illustrating a detail of my assembly, being in section on line 6—6 of Fig. 2.

This invention relates to a switch mechanism which in the illustrated embodiment is shown as being incorporated in a fuse box. However, it will be apparent from the description to follow that my invention is not to be unduly limited in its application and is adapted to practically all uses wherein it is desired to throw a movable bridging member from operative or "on" position relative to a pair of stationary coacting contacts to "off" position and vice versa.

In hitherto known devices of the type described, there has been considerable objection due to improper alignment of the contacts for engagement with the shunt member, or due to excessive arcing which tends to pit or otherwise cause the contacts to become deteriorated, both of the above factors preventing satisfactory electrical engagement of the members. My construction overcomes the aforenoted objections, first, by securing a universally satisfactory engagement between the stationary contacts and movable bridging member regardless of slight variations in the positioning or alignment of the former, this purpose being accomplished by providing a bridging member which is floatingly carried by a movable member as well as by the provision of fixed spring contact points of an improved type.

At the same time objectionable arcing is prevented through the provision of separate arc snuffing chambers adjacent the bridging members, the said chambers being completely enclosed, in combination with the provision of a toggle acting mechanism to shift the carrying member, with the result that the arc is minimized and is so directed as to make it impossible for the bridging member engaging portion of the fixed contacts to become fouled.

Referring to the drawing, the reference numeral 1 indicates a metal fuse box having provision for suspending the same from a wall or other support in the form of slotted openings 2 and being provided with a pivoted cover 3.

The box has mounted therein a molded block 4 of suitable non-conducting material, the block being secured to box 1 by a pair of screws 5 extending therethrough and threadedly engaging the bottom of the box. The block is conformed to provide a pair of wells 6 having conventional sockets 7 therein for receiving threaded plug fuses of a well known type. The fuses are each provided with terminals 8 and binding posts

31 electrically connected to the socket 32 of the fuse and adapted to be connected with the line through the switch mechanism to be hereinafter described.

Block 4 is recessed adjacent the fuse-receiving wells 6 as indicated at 10 and has a further well 11 extending completely through block 4 and receiving the pivoted switch member or rocker 12 of Bakelite or other suitable insulating material. A pair of shields 13 of fiber or other insulating material are placed in well 11 on either side of the switch member 12, the said shields having shoulders 131 resting on the block. As indicated in Fig. 3, block 4 has a laterally extending bottom cavity 14 communicating with well 11 for the reception of a steel pivot pin 15, which pin passes through an opening 16 in switch member 12 and through elongated apertures 17 in fiber shields 13. Reference to Figs. 2 and 4 discloses that the lowermost portions of said shields correspond substantially in width to the width of well 11 so that the pin 15, in cooperation with the movable switch member 12 and the contact clips to be hereinafter described, is sufficient to maintain the said shields in proper vertical position. The elongated slots 17 permit slight shifting of the shields if necessary, to facilitate proper alignment of the same.

Switch member 12 has an opening 18 therein adapted to receive a transverse fiber rod or thrust pin 19 which is resiliently urged upwardly by coil springs 20 in vertical grooves or recesses 201 in the block positioned on either side of and above well 11. Accordingly, pin 19 exerts an upward thrust on the switch member, and since the width of the opening 16 is restricted at a medial point 21 thereof, the result is that the switch member, when manually shifted, is urged to either the "on" or "off" position thereof by a rapid snap action which considerably minimizes arcing. Shields 13 carry vertically extending ventilating openings 22, one of which openings has an enlarged portion 23 accommodating the thrust pin 19.

Block 4 carries a pair of strips of copper conformed to provide angled or L-shaped spring contact clips 24, the said clips being secured to the block by screws 25. The screws 25 are connected electrically with central terminals 9 of the fuses in a manner not illustrated, but readily apparent to those skilled in the art, and are spaced from the fuse sockets 82 by insulating elements 26. At their uppermost ends, contact clips 24 are extruded centrally at 27 to form substantially rounded or ball type pressure contact points extending through apertures 28 formed in the adjacent fiber shield 13 and into electrical contact with copper bridging members 29 carried by pivoted switch member 12. Bridging or conducting members 29 are mounted in the seats or openings 39 in switch member 12 for floating movement transverse or normal to the switch member 12 and the direction of movement thereof.

On the opposite side of the switch member, I provide a pair of similar L-shaped spring contact clips 31 secured to block 4 and to conducting elements 32 by vertically extending screws 33. The said conducting elements 32 carry binding posts 34 adapted to be connected to the line. Clips 31 terminate in extruded areas providing rounded contact points 35 similar to the points 27 above described. If desired, a plurality of ball type pressure contact points or areas 27, 35 may be provided in each of the clips 24, 31.

The said points 35 extend through openings 36 formed in one of the fiber shields 13 and into contact with the bridging member 29 in the manner previously described with reference to contacts 27. Both the contact clips 24 and the contact clips 31 are made of spring material and are so formed and extruded as to exert a spring action on bridging member 29 when operatively mounted on block 4, with the result that an effective point contact is secured and the floatingly mounted bridging member 29 is entirely self-aligning relative to the contact points 27, 35 when the shunt is brought into circuit making position relative thereto. I desire to stress the fact that the contact area of my clips is concentrated in a very small space by the provisions described and does not materially affect the overall width of the contact clip. Reference to Figs. 4 and 6 makes it clear that the clips 24, 31 are, however, of sufficient width to entirely cover openings 28, 36 formed in shields 13 when the switch is in "off" position. This provision cooperates with further arc snuffing provisions to be hereinafter described.

Referring to Figs. 2 and 6, I provide recesses 37 in switch member or rotor 12 adjacent the bridging members 29, the said recesses varying in depth from a minimum immediately adjoining the bridging member to a maximum adjoining the contacts in "off" positions of the switch. This relation is clearly illustrated in Fig. 6. At this position in the switch operation, contact clips 24, 31 have sprung inwardly to completely cover openings 28, 36, respectively, the recesses, shields, and clips thus providing completely enclosed arc snuffing chambers designated by the reference numeral 38, the chambers 38 on the side of clips 24 being mutually entirely separate and unconnected as are the chambers on the side of clips 31, so that short circulating or flash-over is impossible.

Obviously, ventilating openings 22 allow the arc-formed gases to escape and be blown out.

Switch member 12 is provided with an actuating handle or knob 39 extending, when cover 3 is closed, through an elongated operating slot 40 in the cover, the slot being so positioned that when the switch is in "on" position, it is impossible for the cover to be opened. This relation of the handle 39 to the closed cover and slot therein is illustrated in dotted lines in Fig. 2.

In operation of my switch, a definite wiping action between the contact clip and the movable shunt is obtained when the switch member 12 is thrown to "on" and "off" positions. The first engagement where any possible arcing may occur is made when copper bridging member 29 first engages the rounded surfaces of the extruded areas or points 27, 35. The arc assumes a downward path at this point and in the case of any possible burning such burning would occur on the rounded surface of the extruded area below the point of contact with the bridging member. When the switch is thrown to the full "on" position, a wiping action is obtained tending to clean the top or bridging member contacting surface of the rounded surface, thus eliminating any possibility of burned surfaces at the point of final engagement. When moved to "off" position, the arc is immediately snuffed in the chambers 38. A novel feature of my invention resides in the fact that I employ the metal in the clip itself surrounding the contact area as a contributing element in the arc snuffing operation, the said metal completely covering the shield openings 28, 36 through which the extruded areas 27, 35 pass.

A particular advantage of my switch is the fact that a misalignment of clips **24, 31** has no particularly bad effect on the efficiency of the switch, the spring character of these clips together with the extruded sections and the floating nature of bridging member **29** making a good electrical and mechanical contact possible even though the clips are not in absolutely square relationship. Fiber shields **13** provide the only means by which the bridging member is restrained from outward movement and these shields are of a relatively loose fit, thereby allowing a more or less unlimited and universal adjustment of the movable bridging member. This makes possible a highly flexible and self-aligning operation.

Furthermore, from a practical manufacturing standpoint, extruded contact clips as herein disclosed lend themselves to quantity production because of the relatively few operations necessary to be performed thereon. There is no need to cut away metal, nor are any assembling steps required in manufacturing the clips.

Although my invention has been described in connection with a switch mechanism for a plug type fuse, it is to be understood that the novel and inventive features above described are capable of many other applications which will suggest themselves to those skilled in the art. Similarly, the number of poles involved is not restrictive of my invention and I desire the same to be construed to cover an installation involving any number of poles. Likewise, although I have particularly designated the contact areas on the spring contact clips to be substantially in the form of a point, and they preferably take this form, I consider the invention to be broader than this and to reside in the formation of contact areas by extruding the same from the surface of contact clips in whatever shape is found desirable.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a single-throw double-pole electric switch pairs of opposed stationary spring contacts having mutually facing contact points extruded therein, a pivoted switch member of insulating material having conducting members floatingly mounted therein and adapted to simultaneously engage said contact points when the switch member is thrown in one direction, shield plates mounted on either side of said switch member and having openings receiving said contact points, said switch member having recesses on either side thereof adjoining said conducting members and cooperating with said shields to form arc snuffing chambers adjacent said conducting members, said spring contacts covering said openings externally whereby to completely enclose said chambers, and means for causing said switch member to move in either direction with a snap movement.

2. In an electric switch, opposed stationary spring contacts having mutually facing contact points extruded therein, a pivoted switch member of insulating material having a conducting member floatingly mounted therein and adapted to engage said contact points when the switch member is thrown in one direction, and shield plates mounted on either side of said switch member and having openings receiving said contact points, said switch member having recesses on either side thereof adjoining said conducting member and cooperating with said shields to form arc snuffing chambers adjacent said conducting member, said spring contacts covering said openings externally whereby to completely enclose said chambers.

3. In an electric switch, opposed stationary spring contact points, a pivoted switch member of insulating material having a conducting member mounted therein for floating self-aligning movement transversely thereof and adapted to engage said contact points when the switch member is thrown in one direction, and shield plates mounted on either side of said switch member, said switch member cooperating with said shields to form arc snuffing chambers adjacent said conducting member.

4. In a single-throw double-pole electric switch, pairs of opposed stationary spring contacts having mutually facing contact points extruded therein, a pivoted switch member of insulating material having conducting members floatingly mounted therein and adapted to simultaneously engage said contact points when the switch member is thrown in one direction, shield plates mounted on either side of said switch member and having openings receiving said contact points, said switch member having recesses on either side thereof adjoining said conducting members and cooperating with said shields to form closed arc snuffing chambers adjacent said conducting members, and means for causing said switch member to move in either direction with a snap movement.

5. In a single-throw double-pole electric switch, pairs of opposed stationary spring contacts having mutually facing contact points extruded therein, a pivoted switch member of insulating material having conducting members floatingly mounted therein and adapted to simultaneously engage said contact points when the switch member is thrown in one direction, and shield plates mounted on either side of said switch member and having openings receiving said contact points, said switch member having recesses on either side thereof adjoining said conducting members and cooperating with said shields to form closed arc snuffing chambers adjacent said conducting members.

6. In an electric switch, opposed stationary contacts having mutually facing contact points, a pivoted switch member of insulating material carrying a conducting member adapted to engage said contact points when the switch member is thrown in one direction, and shield plates mounted on either side of said switch member, said switch member having recesses on either side thereof adjoining said conducting member and cooperating with said shields to form closed arc snuffing chambers adjacent said conducting member.

7. In an electric switch of the type described, a pivoted insulating switch member having openings therein, bridging members mounted in said openings for floating movement transversely of the switch member, said bridging members being of substantially the same thickness as said switch member, and insulating shields mounted at either side of said switch member, said shields having restricted apertures therein receiving contact points for engagement of said points with said shunts, said shunts being shiftable laterally in said openings for proper engagement with said contact points, said switch member having recesses adjacent said shunts cooperating with said shields to provide a plurality of separate arc snuffing cavities on either side of said switch member.

8. In an electric switch of the type described, a

movable insulating switch member having a clearance opening therein, a bridging member floatingly mounted in said opening, and insulating shields mounted at either side of said switch member, said bridging member being shiftable laterally in said opening for proper engagement with said contact points, said switch member having a recess adjacent said bridging member cooperating with one of said shields to provide an arc snuffing cavity adjoining said bridging member.

9. In a switch of the type described having a pivoted switch member, bridging members mounted therein for floating movement transversely thereof, and shields on either side of said member, pairs of opposed contact clips coacting with said bridging members on opposite sides thereof, said clips having an area extruded therefrom in substantially the form of a point whereby perfect contact of said clips with said floating bridging members is assured, said shields having openings therein receiving said engaging area and otherwise covered by said clips.

10. In a switch of the type described having a pivoted switch member, bridging members mounted therein for floating movement transversely thereof and shields on either side of said member, pairs of opposed contact clips coacting with said bridging members on opposite sides thereof, said clips having an area extruded therefrom in substantially the form of a point for engaging said bridging members whereby perfect contact of said clips with said floating bridging members is assured, said shields having openings therein receiving said engaging area.

11. In a switch of the type described having a pivoted switch member, bridging members mounted therein for floating movement transversely thereof and shields on either side of said member, pairs of opposed contact clips coacting with said bridging members on opposite sides thereof, said clips having an area for engaging said bridging members, said shields having openings therein receiving said engaging area and otherwise covered by said clips.

12. In a switch of the type described having a pivoted switch member carrying a bridging member, said bridging member being mounted for floating movement transversely of the movement of the switch member, shields on either side of said switch member, and opposed contact clips coacting with said bridging member on opposite sides thereof, said clips having an area extruded therefrom in substantially the form of a point for engaging said bridging member whereby perfect contact of said clips with said floating bridging member is assured, said shields having openings therein receiving said engaging area and otherwise covered by said clips.

13. In a switch of the type described having a pivoted switch member carrying a bridging member, shields on either side of said member, and opposed contact clips coacting with said bridging member on opposite sides thereof, said clips having an area engaging said bridging member, said shields having openings therein receiving said area, the clips being of a size to completely cover said openings.

14. In a switch of the type described having a pivoted switch member carrying a bridging member, shields on either side of said member, and opposed contact clips coacting with said bridging member on opposite sides thereof, said clips having an area extruded therefrom in substantially the form of a point whereby perfect contact of said clips with said bridging member is assured, said shields having openings therein receiving said area, the clips being of a size to completely cover said openings.

15. In a switch of the type described, a pivoted insulating switch member, conducting members carried thereby, an insulating shield at either side of said switch member, and opposed contact clips coacting with said conducting members in one position of the switch member, said shields having apertures receiving a portion of said clips for engagement with the conducting members, the apertures being of a size to be substantially covered by another portion of the clips, said switch member having recesses therein adjacent said conducting members and coacting with said shields and clips to provide spaced enclosed arc snuffing chambers in another position of said switch member.

16. In a switch of the type described, a movable insulating switch member, conducting members carried thereby, an insulating shield at either side of said switch member, and opposed contact clips coacting with said conducting members in one position of the switch member, said switch member having recesses therein adjacent said conducting members and coacting with said shields to provide spaced enclosed arc snuffing chambers in another position of said switch member.

17. In a switch of the type described, a movable insulating switch member, a conducting member carried thereby, an insulating shield at one side thereof, and a contact clip coacting with said conducting member in one position of the switch member, said shield having an aperture receiving a portion of said clip for engagement with the conducting member, the aperture being of a size to be substantially covered by another portion of the clip, said switch member having a recess therein adjacent said conducting member and coacting with said shield and clip to provide an enclosed arc snuffing chamber in another position of said switch member.

18. In a switch of the type described, a movable insulating switch member, a conducting member carried thereby, an insulating shield at one side thereof, and a contact clip coacting with said conducting member in one position of the switch member, said switch member having a recess therein adjacent said conducting member and coacting with said shield to provide an enclosed arc snuffing chamber in another position of said switch member.

19. In a switch of the type described, a block having a well extending therethrough and a cavity on one side of the block communicating with the well, a pivoted switch member having a portion extending into said well and provided with a bearing opening, a bearing pin disposed in said cavity and passing through said opening to pivotally mount said member on said block, said member having a laterally extending elongated opening therein restricted medially in width to provide cam surfaces, shields at either side of said switch member anchored to said block, said shields having apertures therein in alignment with said elongated opening in said switch member, and means cooperative with said elongated opening to cause said switch member to move with a snap action, comprising a thrust pin passing through said elongated opening and said shield openings and laterally restrained by the latter, and springs disposed between said block and said thrust pin and adapted to resiliently

thrust said pin against said cam surfaces and to urge said switch member to one side or the other with a snap action, said block having recesses at either side of said shields in which said springs are disposed.

20. In a switch of the type described, a block, a switch member, means to pivotally mount said member on said block, said member having a laterally extending elongated opening therein restricted medially in width to provide cam surfaces, shields at either side of said switch member anchored to said block, said shields having apertures therein in alignment with said elongated opening in said switch member, and means cooperative with said elongated opening to cause said switch member to move with a snap action, comprising a thrust pin passing through said elongated opening and said shield openings and laterally restrained by the latter, and springs disposed between said block and said pin and adapted to resiliently thrust said pin against said cam surfaces and to urge said switch member to one side or the other with a snap action.

21. In a switch of the type described, a block, a switch member, means to pivotally mount said member on said block, said member having a laterally extending elongated opening therein restricted medially in width to provide cam surfaces, shields at either side of said switch member anchored to said block, said shields having apertures therein in alignment with said elongated opening in said switch member, and means cooperative with said elongated opening to cause said switch member to move with a snap action, comprising a pin passing through said elongated opening and said shield openings and laterally restrained by the latter, and spring means acting on said pin and adapted to resiliently thrust said pin against said cam surfaces and to urge said switch member to one side or the other with a snap action.

22. In a switch of the type described, a block, a switch member, means to pivotally mount said member on said block, said member having a laterally extending elongated opening therein restricted medially in width to provide cam surfaces, and means cooperative with said elongated opening to cause said switch member to move with a snap action, comprising a pin passing through said elongated opening, and spring means acting on said pin and adapted to resiliently thrust said pin against said cam surfaces and to urge said switch member to one side or the other with a snap action.

23. In a switch of the type described, a base, a switch member pivotally mounted on said base and having clearance openings therein, pairs of contact members mounted on said base on opposite sides of said switch member, and bridging members mounted in said openings for free floating movement transversely of the path of movement of the switch member, said switch member being movable to bring said bridging members into and out of engagement with the contacts of said pairs and being entirely self-aligning when engaged thereby.

24. In a switch of the type described, a base, a switch member movably mounted relative to said base and having a clearance opening therein, contact members mounted on said base on opposite sides of said switch member, and a bridging member mounted in said opening for free floating movement transversely of the path of movement of the switch member, said switch member being movable to bring said bridging member into and out of engagement with the contacts and being entirely self-aligning when engaged thereby.

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