Aug. 1, 1950 W. J. ETTINGER 2,517,392

ELECTRIC SWITCH

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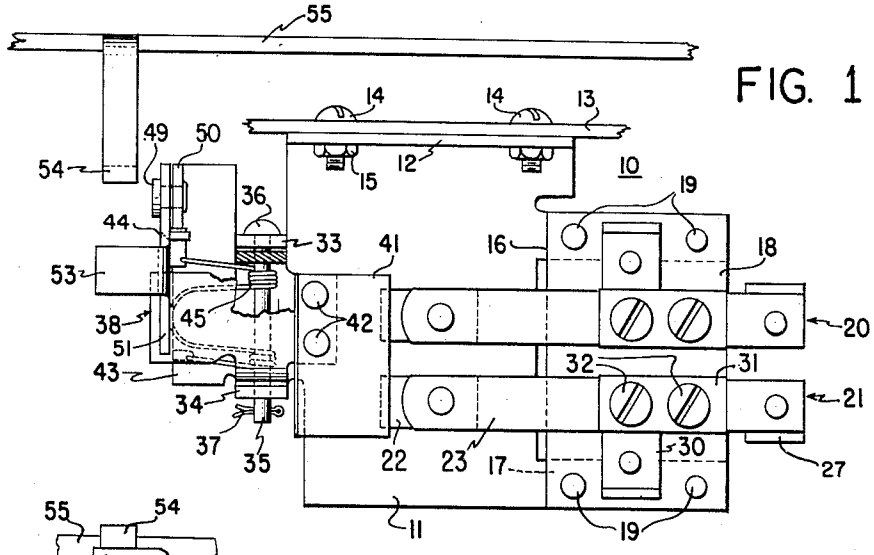


FIG. 1

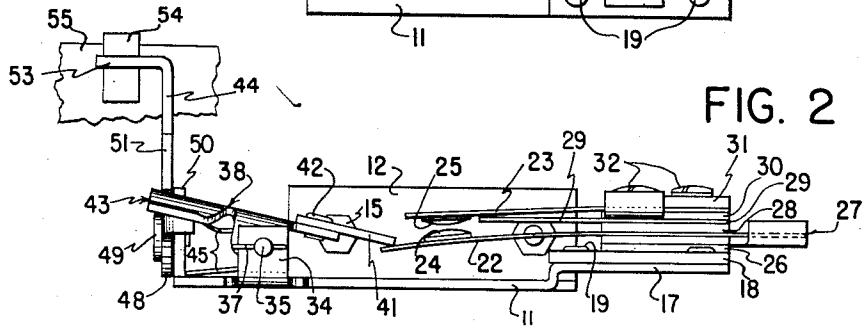


FIG. 2

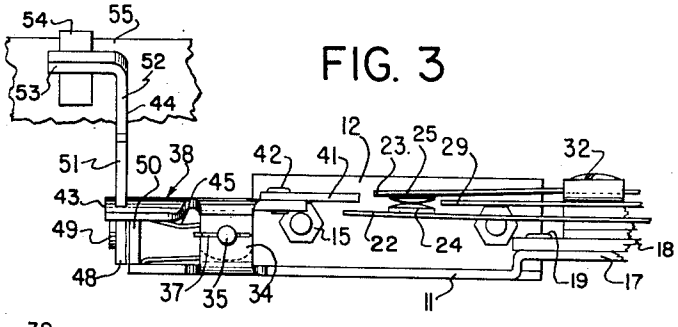


FIG. 3

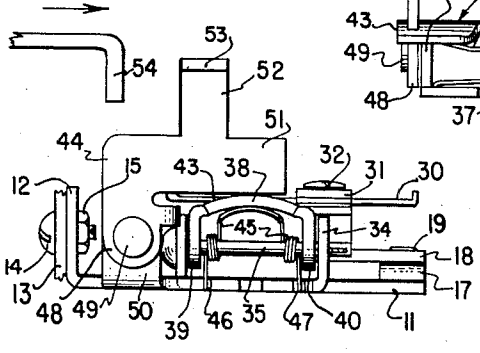


FIG. 4

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ELECTRIC SWITCH

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1 Claim. (Cl. 200—153)

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The present invention relates to electric switches, and more particularly to improved contact structure therein.

In an electric switch mounted on a home appliance or the like that is subject to vibration, there is a tendency for the contacts to chatter in the closed position thereof resulting in arcing therebetween and the consequent damage thereto, as well as improper operation of the appliance.

Accordingly, it is a general object of the present invention to provide an electric switch incorporating improved contact structure that is not subject to chatter in the closed position even though considerable vibration is transmitted to the switch through its mounting.

Another object of the invention is to provide in an electric switch of the character noted, improved contact structure in which floating contact or engagement is maintained between the contact members.

Further features of the invention pertain to the particular arrangement of the elements of the electric switch, whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawing, in which Figure 1 is a fragmentary side view of an electric switch and its associated mounting embodying the present invention; Fig. 2 is a bottom view of the switch, as shown in Fig. 1, illustrating the open circuit position thereof; Fig. 3 is a fragmentary bottom view of the switch, similar to Fig. 2, illustrating the closed circuit position thereof; and Fig. 4 is a fragmentary end view of the switch, as shown in Fig. 1.

Referring now to the drawing, the electric switch 10 there illustrated and embodying the features of the present invention, comprises a base 11 provided with an upwardly directed flange 12 that is carried by an associated support 13, the flange 12 being secured directly to the support 13 by two screws 14 provided with cooperating nuts 15. The base 11 may be formed of sheet steel, or the like, and the right-hand side thereof is provided with upper and lower substantially parallel spaced apart outwardly extending arms 16 and 17 that are forwardly offset to provide supporting surfaces for a platform 18 made of a suitable sheet of insulating material. The platform 18 is disposed slightly forwardly with respect to the base 11 and is rigidly secured in

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place upon the arms 16 and 17 by four rivets 19. The platform 18 carries upper and lower substantially identical contact structures 20 and 21, each including a pair of resilient contact springs formed of a suitable copper alloy.

Specifically, the contact structure 21 comprises rear and front elongated resilient flexible contact springs 22 and 23 arranged in superimposed spaced-apart relation and carried by the platform 18. More particularly, the contact springs 22 and 23 are provided with fixed ends rigidly secured to the platform 18 and free ends carrying cooperating contact members 24 and 25 respectively. Specifically, a suitable strip of insulating material 26 is arranged on top of the platform 18; a suitable metallic contact terminal 27 is arranged on top of the insulating strip 26; the contact spring 22 is arranged on top of the contact terminal 27; a suitable strip of insulating material 28 is arranged on top of the contact spring 22; a suitable stop or limit spring 29 is arranged on top of the insulating strip 28; a suitable metallic terminal 30 is arranged on top of the stop spring 29; the contact spring 23 is arranged on top of the contact terminal 30; and a suitable strip of insulating material 31 is arranged on top of the contact spring 23. Finally the elements mentioned are retained in stacked relation by two screws 32 extending through aligned openings formed therein and carrying nuts, not shown, disposed below the platform 18. The contact terminal 27 is arranged in good electric contact with the contact spring 22 and extends outwardly in order that it may be connected to one terminal of an associated circuit, not shown; and likewise, the contact terminal 30 is arranged in good electric contact with the contact spring 23 and extends downwardly in order that it may be connected to another terminal of an associated circuit, not shown. Accordingly, the contact springs 22 and 23 are mutually electrically insulated from each other and from the base 11; and the stop spring 29 is interposed with respect to the contact springs 22 and 23 and arranged in stacked relation therewith.

The left-hand side of the base 11 is provided with upper and lower substantially parallel spaced-apart forwardly extending arms 33 and 34 having aligned openings therein through which a pivot pin 35 extends, the upper end of the pivot pin 35 being provided with an enlarged head 36 and the lower end of the pivot pin 35 having an opening therein through which a key 37 is arranged. A bracket 38 provided with upper and lower inwardly extending arms 39 and 40

is pivotally mounted on the pivot pin 35, the pivot pin 35 extending through aligned openings provided in the arms 39 and 40. The inner end of the bracket 38 carries an insulating operating member 41 secured thereto by two rivets 42; which insulating operating member 41 cooperates with the rear contact spring 22 of the contact structure 21 and also with the corresponding rear contact spring of the contact structure 20. The outer end of the bracket 38 is provided with a curved operating arm 43 that, in turn, cooperates with a pivotally mounted lever 44. Also a resilient steel spring 45 is arranged to surround the pivot pin 35 and to act between the base 11 and the operating arm 43 of the bracket 38. Specifically, the midsection of the spring 45 engages the rear surface of the operating arm 43, while the opposite ends of the spring 45 are arranged in two notches 46 and 47 formed in the base 11; whereby the bracket 38 is normally biased in the clockwise direction about the pivot pin 35, as illustrated in Figs. 1 and 2. Specifically, the bracket 38 is biased by the spring 45 in order to move the insulating operating member 41 toward the base 11; whereby the insulating operating member 41 engages the rear contact spring 22 moving it toward the base 11 away from the front contact spring 23 in order to move the contact members 24 and 25 into open circuit position.

More particularly, the lever 44 is substantially L-shaped being provided with a rearwardly extending arm 48 that is pivotally mounted by a pin 49 upon a forwardly projecting arm 50 carried by the base 11. Also the lever 44 is provided with a downwardly extending arm 51 that directly engages the operating arm 43 of the bracket 38, as well as a forwardly projecting arm 52 carrying an outwardly extending tab 53 that, in turn, is adapted to cooperate with a downwardly projecting tab 54 carried by a cooperating movable support 55. Specifically, when the support 55 is moved downwardly toward the support 13, the tab 54 carried thereby engages the tab 53 carried by the lever 44; whereby the lever 44 is pivoted in the clockwise direction as viewed in Fig. 4 about the pivot pin 49 causing the arm 51 on the lever 44 to engage the operating arm 43 of the bracket 38 in order to pivot the bracket 38 in the counter-clockwise direction, as viewed in Fig. 2, against the bias of the spring 45; whereupon the insulating operating member 41 disengages the rear contact spring 22 permitting the contact members 24 and 25 to be moved into closed circuit position, as illustrated in Fig. 3.

When the bracket 38 occupies its normal position, illustrated in Fig. 2, the contact springs 22 and 23 are moved to disengage the contact members 24 and 25; and when the bracket 38 occupies its operated position, illustrated in Fig. 3, the contact springs 22 and 23 are moved to engage the contact members 24 and 25. Specifically, the contact springs 22 and 23 are biased by their inherent resiliency toward each other in order to engage the contact members 24 and 25; and when the bracket 38 occupies its operated position, the contact springs 22 and 23 move the contact members 24 and 25 into engagement with each other. Also at this time, the front contact spring 23 completely disengages the associated stop spring 29, and the insulating operating member 41 completely disengages the outer end of the rear contact spring 22 so that the contact springs 22 and 23 may be moved through limited distances toward and away from the base 11 with each other while maintaining floating contact between the contact members 24 and 25.

Subsequently, when the lever 44 is controlled to release the bracket 38 the spring 45 moves the bracket 38 from its operated position, shown in Fig. 3, to its normal position, shown in Fig. 2. Specifically, when movement of the bracket 38 from its operated position to its normal position is initiated, the insulating operating member 41 first engages the outer end of the rear contact spring 22 moving it toward the base 11. The front contact spring 23 follows the initial movement of the rear contact spring 22 toward the base 11 since the contact springs 22 and 23 are biased toward each other due to their inherent resiliency. However, after a predetermined limited movement of the front contact spring 23 with the rear contact spring 22 toward the base 11, the outer end of the stop spring 29 engages the associated front spring 23 arresting further movement thereof. Accordingly, continued movement of the rear spring 22 toward the base 11 after movement of the front spring 23 has been arrested is effective to move the contact members 24 and 25 into disengagement.

Thereafter, when the lever 44 is controlled to operate the bracket 38, the bracket is moved against the bias of the spring 45 from its normal position, shown in Fig. 2, to its operated position, shown in Fig. 3. Specifically, when the movement of the bracket 38 from its normal position to its operated position is initiated the insulating operating member 41 first begins to release the outer end of the rear contact spring 22 permitting it to move due to its inherent resiliency away from the base 11. The rear contact spring 22 then moves the contact member 24 into engagement with the contact member 25, thereby riding the contact spring 23 out of engagement with the associated stop spring 29; whereby the contact springs 22 and 23 maintain floating engagement between the contact members 24 and 25.

In the switch 10 the identical contact structures 20 and 21 are especially adapted to control the opening and closing of the two outside lines in an Edison three-wire power system employed in electric home appliances or the like. The contact structures 20 and 21 in the switch 10 are very advantageous in view of the fact that floating contact is maintained between the pairs of contact members carried by the pairs of contact springs because of the balanced forces in the pairs of contact springs in closed positions thereby eliminating chatter between the contact members at this time even though the support 13 for the switch 10 is subject to considerable vibration. This floating engagement between the contact members in the contact structures 20 and 21 preventing chatter therebetween eliminates arcing therebetween and the consequent damage thereto. Also the arrangement of the bracket 38 cooperating with the contact structures 20 and 21 is very advantageous as it positively moves the contact members to their open circuit positions when it is disengaged by the lever 44, the lever 44 being controlled in accordance with the position of the support 55 with respect to the support 13 as explained above.

In view of the foregoing, it is apparent that there has been provided in an electric switch improved contact and operating structure of simple and economical construction and arrangement.

While there has been described what is at present considered to be the preferred embodiment of

the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claim all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

A switch comprising a longitudinally extending base, two elongated resilient flexible contact springs carried by said base and extending longitudinally thereof, said contact springs being provided with fixed ends rigidly secured to said base and free ends carrying cooperating contacts, said contact springs being arranged in spaced-apart relation and mutually insulated from each other and from said base, said contact springs being biased by their resiliency toward each other in order to engage said contacts, an operating member pivotally mounted intermediate its ends upon a first pin carried by said base and extending transversely thereof for movement between a normal position and an operated position and insulated from said contact springs, one end of said operating member cooperating with one of said contact springs and completely disengaging said one contact spring when said operating member occupies its operated position and engaging said one contact spring when said operating member occupies its normal position, a spring biasing said operating member from its operated position into its normal position, an element pivotally mounted upon a second pin carried by said base and extending longitudinally thereof for independent movement and having an operated position engaging the other end of said operating member in order to restrain said operating member in its operated position against the bias of said spring, said contact springs being free to move in either

direction through limited distances with each other when said operating member occupies its operated position in order to maintain floating engagement between said contacts, thereby to absorb any vibratory movement transmitted to said contact springs through said base, said element being movable from its operated position to release said other end of said operating member so that said operating member is moved by said spring from its operated position to its normal position, said one contact spring being moved in a predetermined direction by engagement of said one end of said operating member when said operating member is moved from its operated position to its normal position, said other contact spring being moved initially in said predetermined direction by its resiliency with said one contact spring, and a stop carried by said base and arranged to arrest further movement of said other contact spring in said predetermined direction beyond said limited distance, said contacts being disengaged by continued movement of said one contact spring in said predetermined direction after further movement of said other contact spring is arrested.

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