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2,328,154

ELECTRIC SWITCH

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2 Sheets-Sheet 1

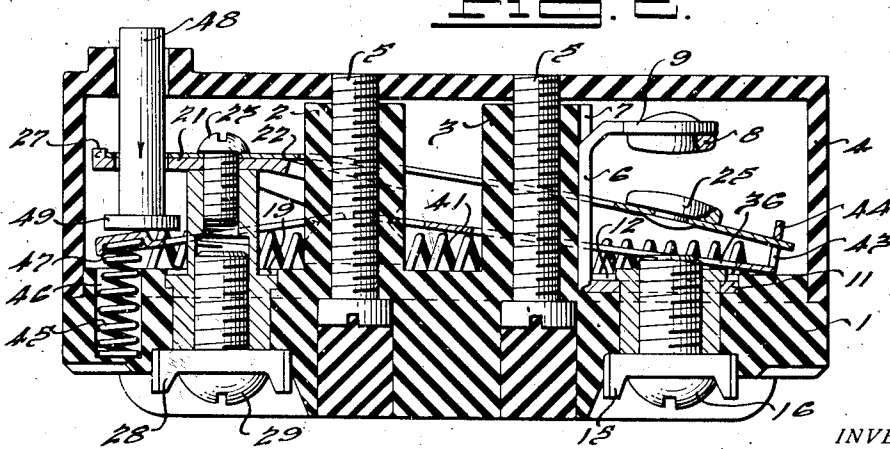
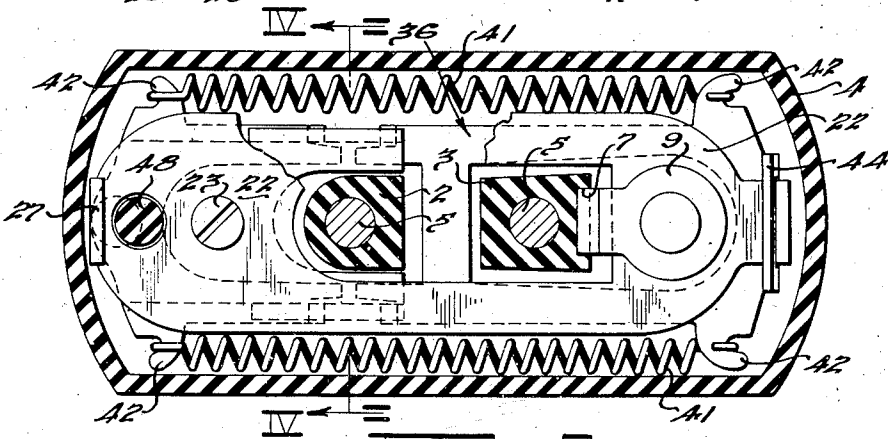
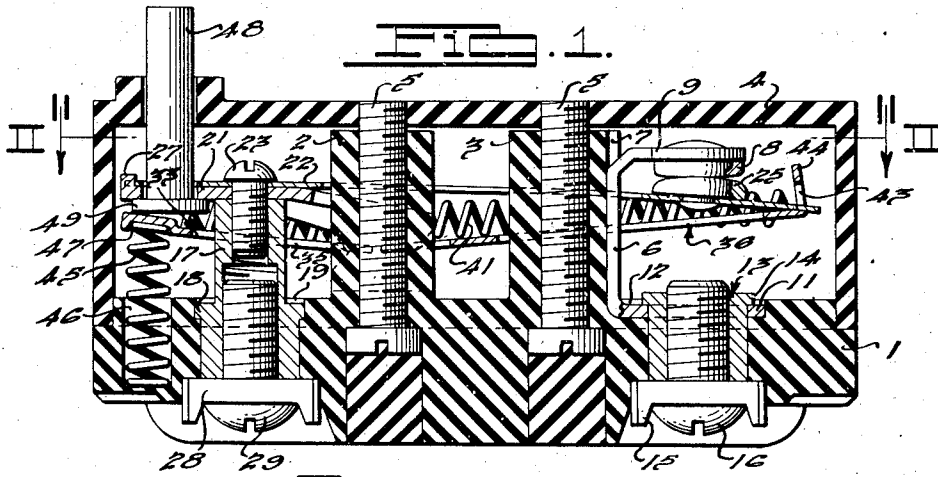


FIG. 3.

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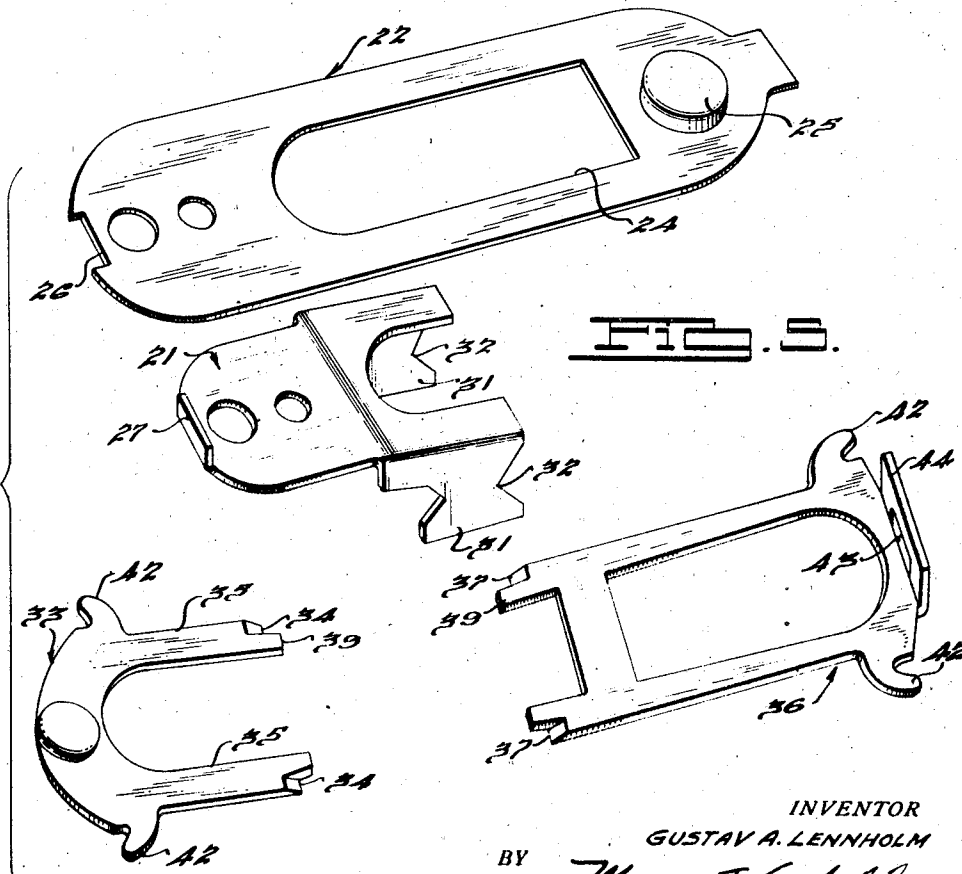
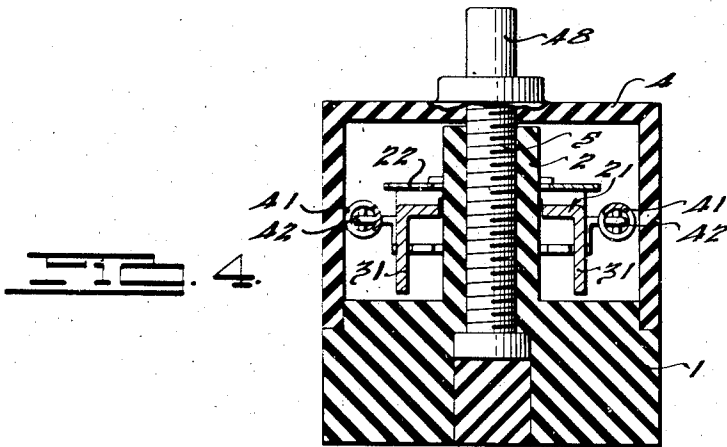
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2 Sheets-Sheet 2



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ELECTRIC SWITCH

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8 Claims. (Cl. 200—67)

This invention relates to apparatus for making and breaking electric circuits and more particularly to electric switches having a snap action.

An object of this invention is the provision of a snap switch having improved construction and operation.

Other objects and features of this invention will be readily apparent to those skilled in the art from the specification and appended drawings illustrating certain preferred embodiments in which:

Figure 1 is an elevational sectional view of the switch according to the present invention.

Figure 2 is a sectional view taken on the line II—II of Figure 1.

Figure 3 is a view similar to Figure 1 but showing the parts in the "off" position.

Figure 4 is a sectional view taken on the line IV—IV of Figure 2.

Figure 5 is a perspective exploded view showing certain of the main operating parts.

The switch, according to the present invention, embodies a base 1 carrying upstanding wall portions 2 and 3 thereupon, and with a cover 4 sealably secured thereto by studs 5 passing through said wall portions 2 and 3 and threaded into said cover 4. The studs 5 are sealed in position by filling in with wax the base recesses in which the head portions of said studs are disposed. A U-shaped supporting member 6 is mounted upon the back of base 1 adjacent the wall portion 3. The wall 3 is cut away as at 7 providing a slot into which the bight of said U-shaped member 6 is received, said slot 7 serving to guide the member 6 into position and to prevent lateral movement of said member while in position. A contact element 8 is secured to leg 9 of the member 6 and acts as the stationary contact of the switch. The second leg 11 of said U-shaped member 6 is disposed adjacent the base 1 within a slot 12 cut therein, said slot 12 thus similarly to slot 7 serving to guide the member 6 into position and prevent lateral movement of said member while in position. Said member 6 is held rigidly in place within its guide slots 7 and 12 by a threaded metallic insert 13 extending through openings in leg 11 and the base 1 to the exterior, the inner extremity of said insert is provided with an extended rim portion 14 which lies in abutting relation with the back of leg 11 of member 6. A terminal member 15 is secured to the exterior extremity of said insert 13 by a stud 16. Said terminal member is receivable within a recess cut into base 1 to pre-

vent lateral movement of said terminal member 15. The rotation of stud 16 into the threaded insert 13 forces the terminal member 15 against the base and carries the insert 13 downwardly to bring the rim portion 14 of said insert down tightly upon the back of leg 11. Thus rotation of the stud 16 into the insert 13 serves to securely hold both the supporting member 6 and the terminal member 15 to the base. Said stud 16 also serves to secure a lead in wire to the switch, said wire to be clamped between the head of said stud and the terminal member 15.

Mounted at the opposite end of base 1 is an elongated threaded metallic insert 17, having an extended rim-like portion 18 generally centrally thereof, which portion is received within a recess 19 provided by base 1 and lies in abutting relation with the back of said base. Carried upon the inner extremity of said insert is a bearing or supporting member 21 of a generally H-shape and a contact arm 22 formed of a thin leaf spring. A stud 23 is passed through openings in contact member 22 and in said bearing arm 21 and is threaded into the insert 17 to thereby secure said members to said insert. The contact arm 22 is provided with an elongated opening 24 generally centrally thereof and of a sufficient size that the upstanding wall portions 2 and 3 may extend therethrough and not interfere with movements of said contact arm. A contact element 25 is mounted upon the free end of said contact arm 22 and cooperates with the stationary contact 8 to make and break a circuit there-through. The opposite extremity of said contact arm 22 is cut away as at 26 to receive the bent up portion 27 of the bearing member 21 whereby said contact arm is properly positioned and lateral movement prevented. A terminal member 28 similar to terminal member 15 is secured to the outer extremity of insert 17 by a stud 29 and is receivable within a recess in base 1 to prevent lateral movement thereof. Rotation of said stud 29 into the threaded insert 17 moves the terminal member 28 into abutting relation with the base 1 and moves said insert downwardly to bring the rim 18 down tightly against the base 1 within the recess 19 to thus positively position said insert 17 and said terminal member 28. The stud 29 and terminal member 28 also cooperate to secure a cable terminal end to said switch.

The bearing member 21 is provided with a pair of legs 31 with each of said legs carrying a pair of V-shaped bearing seats 32, disposed on oppo-

site edges of said legs 31. The apexes of the V's of said seats as shown are all disposed in the same horizontal plane but it is not necessary to the invention that they all be disposed in the same plane. A generally U-shaped lever member 33 carrying knife edges 34 at the extremities of its leg members 35 cooperates with the left V seats 32 as viewed in Figures 1-3. A second lever member 36 having knife edges 37 disposed at the extremities of its leg members fits within the V seats disposed upon the right hand edges of said legs. Extensions 39 are provided upon each of the levers 34 and 36, disposed adjacent the knife edges thereon to properly position the knife edges within their cooperating V seats and to prevent lateral movement of said knife edges out of said V seats.

The levers 34 and 36 are joined together for mutual action by means of springs 41 connected to hook-like projections 42 carried by said levers at their outer extremities. The free end of the contact arm 22 extends through an opening 43 provided by a flange 44 disposed at the outer extremity of lever 36, thus furnishing a lost motion connection between said arm 22 and said lever 36. A compression spring 45 is disposed between the interior face of the base 1 and the free or outer extremity of the lever 34, the spring seats for said spring 45 being a recess 46 within the base 1 and a recess 47 formed in the lever 34.

The lever 34 is actuated by an operating pin 48 extending through aligned openings in the bearing member 21, the contact arm 22 and the cover 4 to the exterior and having an annular headed portion 49 at its inner extremity in abutting relation with said lever 34. The headed portion 49 is of a greater diameter than the openings through which the stem of the pin 48 extends thus preventing the removal of said pin from the switch.

The force of the above said compression spring 45 is sufficiently strong to continuously bias the lever 34 into its uppermost position. The biasing of lever 34 upwardly positions the line of force of lever springs 41 above the pivot points of both the levers 34 and 36 and the force of said lever springs 41 causes the lever 36 to also be biased into its uppermost position. The resiliency of contact arm 22 tends to move it to its upper position and the contact element 23 carried thereon is brought into closed circuit position with stationary contact 8, thus providing a switch in which the contacts are normally biased closed.

The switch is operated through the actuation of the operating pin 48. Through the abutting engagement of the headed portion 49 with the lever 34, movement of the pin 48 downwardly will cause said lever 34 to rotate in a counter-clockwise direction against the force of spring 45. The rotation of lever 34 will carry the lever springs 41 downwardly and when the line of force of said springs 41 passes the pivot points of the lever 36, said lever 36 will be moved downwardly with a snap motion under the action of said spring force. Through the lost motion connection between the link 36 and the contact arm, the snap movement of the lever 36 will cause the flange 44 of lever 36 to strike the contact arm with a hammer blow, insuring a quick disengagement of the contacts to thus prevent arcing. Upon the release of the operating pin 48, the spring 45 is again permitted to act and it forces lever 34 upwardly, carrying the line of force of the toggle springs 41 past the pivots of the levers 34 and 36 to snap said levers

upwardly and to snap with them the contact arm 22 to thus engage the contacts 8 and 25 in a quick make.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. In an electric switch, a stationary contact, a thin leaf spring with a contact supported thereon and movable thereby to move to engaged and disengaged position with said stationary contact, a support for said leaf spring, conducting means securing said support in position, terminal means disposed upon an extremity of said conducting means, a bearing member, a plurality of bearing seats disposed thereupon, a lever member associated with said bearing seats and having a lost motion connection with said leaf spring, spring means operatively connected to said lever member, and means operable to move said spring means through dead center position including a second spring means continually exerting its bias to tend to move said movable contact toward engaged position.

2. In an electric switch, a stationary contact, a thin leaf spring supported at one end and having a contact disposed upon its free end movable to engage and disengage with said stationary contact, a bearing member, leg portions integral therewith, a plurality of V-shaped bearing seats thereon, a lever member, a plurality of knife edges carried by said lever member and received by said V-shaped bearing seats, said lever member having a bent portion with an opening there-through through which the free end of said leaf spring extends to thereby provide a lost motion connection between said leaf spring and said lever member, spring means operatively connected to said lever member, means operable to move said spring means through dead center position to move said lever member with a snap action and a second spring means biasing the above said movable contact toward engaged position.

3. In an electric switch, a stationary contact, a movable contact, a thin leaf spring movable to move said movable contact to engaged and disengaged position, a bearing member, leg portions thereon, a plurality of V-shaped bearing seats provided by said leg portions, a lever member having a lost motion connection with the leaf spring and carrying a plurality of knife edge portions at one extremity for cooperation with said V-shaped bearing seats, fingerlike means carried by said lever member to retain said knife edges within the V seats, spring means operatively connected to said lever member, a second spring means operable to position the line of force of said first spring means above said V-shaped bearing seats, and operating means operable to move said line of force of said first spring means below said V-shaped bearing seats to move said lever with a snap action.

4. In an electric switch, a stationary contact, a movable contact, a thin leaf spring actuable to move said movable contact to engaged and disengaged positions, a supporting member, lever members oppositely disposed thereagainst, a bent portion upon the first of said levers having an opening through which the leaf spring extends, spring means interconnecting the lever members,

means operable to actuate the second lever member, a spring seat upon said second lever member, a second spring means receivable within said spring seat and exerting its bias to move said second lever member into its uppermost position.

5. In an electric switch, a stationary contact, a thin leaf spring supported at one end, a contact disposed upon the free end of said leaf spring and movable thereby into engaged and disengaged position, a supporting member, leg portions thereon, oppositely disposed V-shaped bearing seats upon each of said leg portions, a plurality of lever members, knife edges carried by said lever members and receivable by said V-shaped bearing seats, means carried by said lever member for retaining said knife edges closely adjacent their respective V seats, one of said lever members having means thereon whereby a lost motion connection is had with said leaf spring, spring means connecting said lever members, operating means to actuate said spring means to cause said movable contact to move with a snap action to disengaged position and a second spring means operable to normally bias the movable contact into engaged position.

6. In an electric switch, a stationary contact, a thin leaf spring supported at one end and having the other end free to move, a contact disposed upon said free end and movable therewith to be engaged and disengaged with said stationary contact, a lever member having a lost motion connection with said leaf spring, knife edges provided upon said lever member, a second lever member oppositely directed to said first lever member, knife edges thereupon, a supporting member, a plurality of V-shaped bearing seats disposed thereupon and receiving the knife edges of said lever members, spring means exerting its bias upon said second lever member to position the line of force of said first spring means above dead center position, and means operable to move said second lever member downwardly against the bias of the said second spring means to carry the line of force of the first spring means below dead center position.

7. An electric switch comprising an enclosure, a cover sealably secured thereto, a stationary contact, a supporting member therefore, a conducting member securing said supporting member within the enclosure, terminal means carried upon the extremity of said conducting member and disposed at the exterior of said enclosure,

a movable contact, a resilient contact arm supporting said movable contact and movable to move said contact into engaged and disengaged position, a second supporting member, a conducting member, means securing both said resilient contact arm and said second supporting member to said conducting member, terminal means carried upon the extremity of said conducting member and disposed at the exterior of said enclosure, a lever member pivotally supported by said second supporting member and having a lost motion connection with said resilient contact arm, a second lever member, spring means interconnecting said lever members, means operable to actuate said spring means to move said movable contact to disengaged position with a snap action and means normally biasing said movable contact into engaged position.

8. An electric switch comprising an enclosure, a cover sealably secured thereto, a stationary contact, a supporting member therefore, guide slots provided by said enclosure to position said supporting member, a conducting means securing said supporting member within the enclosure, terminal means carried by said conducting means at the exterior of said enclosure, a thin leaf spring, a contact movable thereby to engage and disengaged positions, a bearing member, a second supporting member to which both said thin leaf spring and said bearing member are secured, terminal means carried by said second supporting member at the exterior thereof, leg portions provided upon said bearing member, pairs of V shape bearing seats oppositely disposed on each of said leg portions, a lever member having lost motion connection with said thin leaf spring, knife edges upon said lever member, a second lever member having knife edges thereupon, the knife edges of said lever members being receivable by said V-shape bearing seats, means carried by said lever members disposed adjacent each V-seat to prevent lateral movement of said lever members, means operable to actuate said lever members with a snap action and a second spring means normally exerting its bias upon said second lever member to move it to its uppermost position to normally maintain the line of force of said first spring means above dead center position.

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