

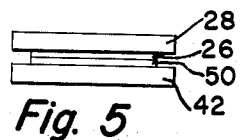
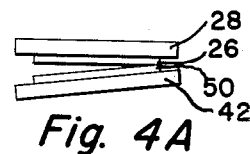
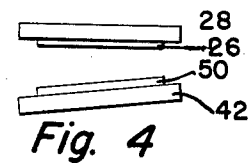
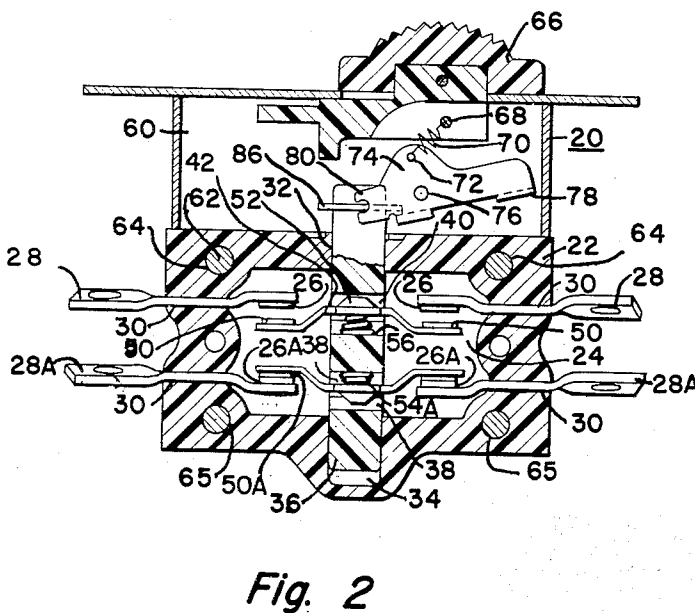
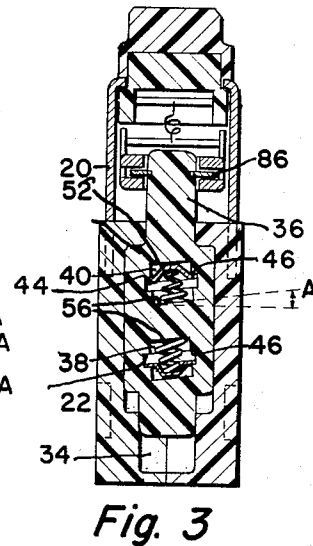
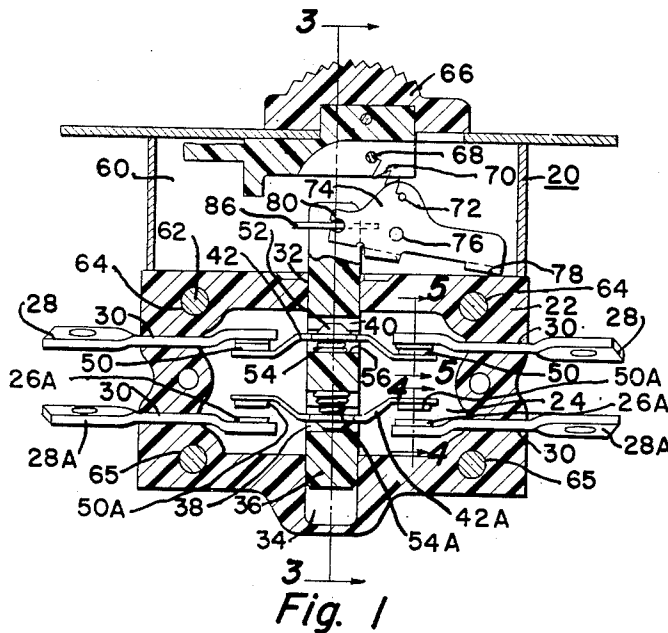
Aug. 7, 1956

R. C. A. WEIDE
ELECTRICAL SWITCH

2,758,169

Filed March 15, 1954

3 Sheets-Sheet 1



INVENTOR.
Rudolph C. A. Weide
BY
John T. Mann
His Attorney

Aug. 7, 1956

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3 Sheets-Sheet 2

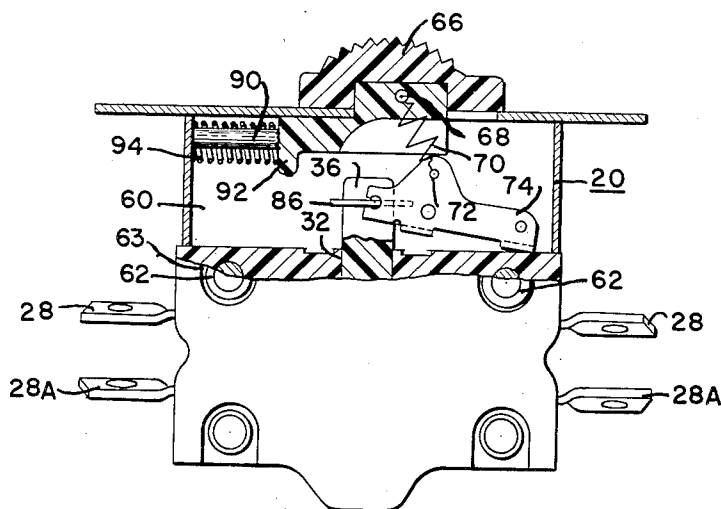


Fig. 6

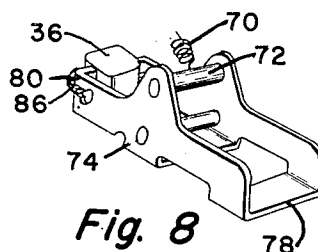


Fig. 8

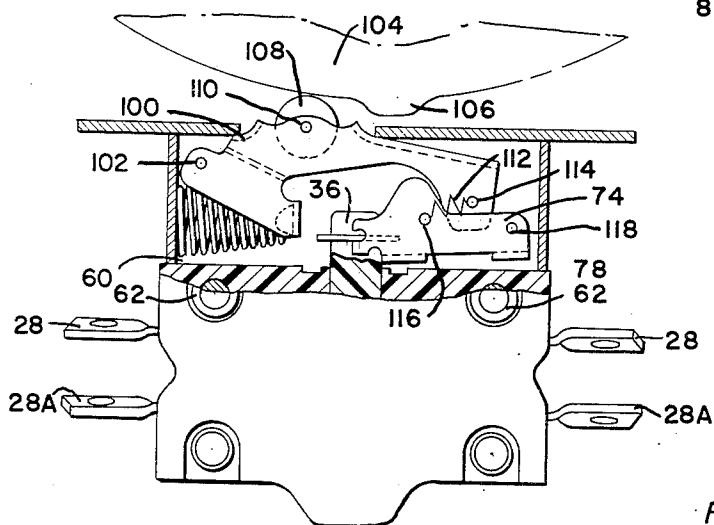


Fig. 7

INVENTOR.
Rudolph C. A. Weide
BY
John J. Main
His Attorney

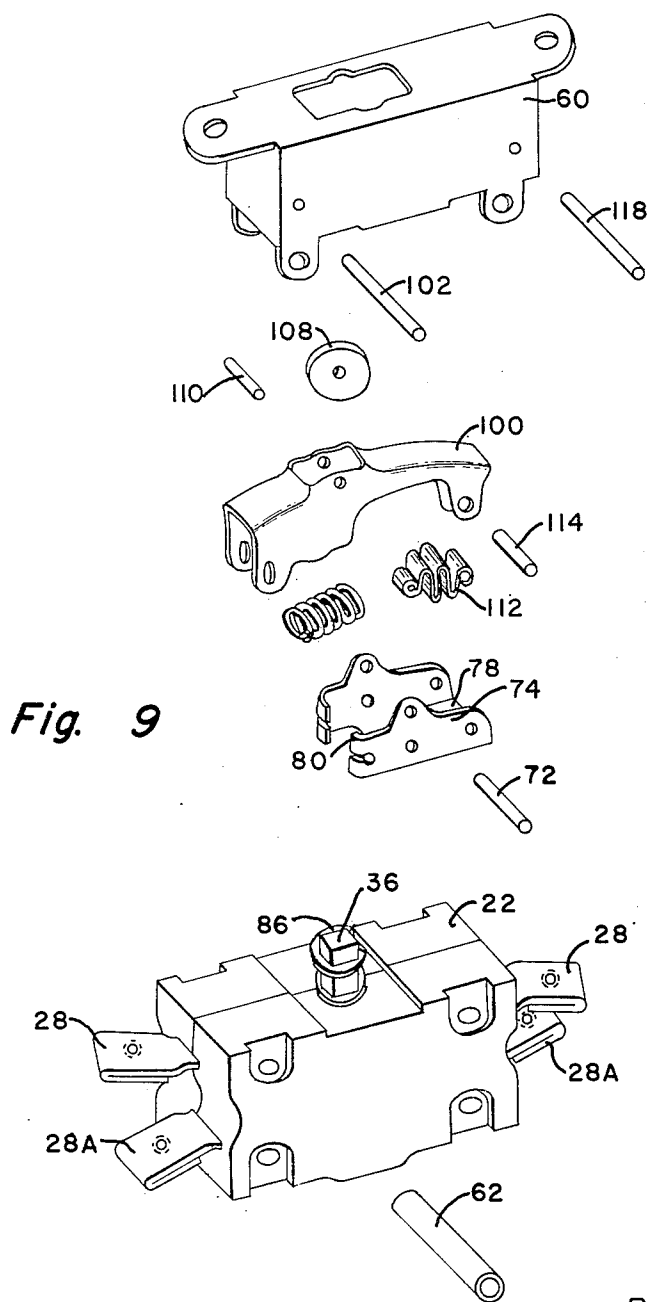
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3 Sheets-Sheet 3



INVENTOR.
Rudolph C. A. Weide
BY *Rudolph C. Weide*
His Attorney

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2,758,169

ELECTRICAL SWITCH

Rudolph C. A. Weide, La Grange, Ill., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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9 Claims. (Cl. 200—67)

This invention relates to electric switches and more particularly to switches wherein movable switch contacts are moved by a reciprocating plunger.

It is an object of the present invention to provide a switch wherein a rocking action occurs when movable contacts, carried by a reciprocating plunger, are moved into abutting relation with fixed contacts.

It is another object of the present invention to provide an electric switch wherein a plunger, that is adapted to reciprocate, moves a contact carrying member relative to fixed contacts so that a rocking action between the contacts is accomplished when the contacts are brought into abutting relation.

Another object of the present invention is to actuate a reciprocal member of an electric switch by a snap acting toggle mechanism so that the member will be moved and bring contacts of the switch into abutting relation with a rapid closing and opening action that is accompanied by a rocking action of the contacts as the contacts are brought into a closed position.

A more specific object of the present invention is to provide a switch that includes a housing that carries spaced contacts and a reciprocal plunger whereon movable contacts are carried so that a rocking action will occur between the movable contacts and the stationary contacts as they are brought into circuit closing position, said movable member being actuated by a snap action toggle mechanism that is positioned remote from the first housing so that the toggle mechanism may actuate an external portion of the plunger.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Figure 1 is a cross sectional view of an electric switch according to the present invention.

Figure 2 is a view of the switch shown in Figure 1 with the parts in a second position.

Figure 3 is a sectional view of the switch along lines 3—3 in Figure 1.

Figure 4 diagrammatically shows the angularity of the contacts when separated.

Figure 4A diagrammatically shows the contacts in Figure 4 before a rocking action therebetween occurs.

Figure 5 diagrammatically shows the contacts in Figure 4A in engagement.

Figure 6 is one modification of the device shown in Figure 1.

Figure 7 is a view partly in section of another modification of the switch shown in Figure 1.

Figure 8 in perspective shows the toggle mechanism for actuating a switch plunger.

Figure 9 is an exploded perspective view of the switch parts in Figure 7.

In the drawings and in Figures 1 and 2 the switch 20

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has a housing 22 that defines an internal cavity 24 wherein a plurality of pairs of fixed contacts 26 are maintained in spaced relation. The terminal portions 28, which carry the contacts 26, are maintained in position in suitably formed apertures 30 in wall portions of the housing 22. The housing 22 also has an aperture or bore 32, leading to the cavity 24 that is aligned with a recess 34 located in the wall of the housing remote from the bore 32 so a plunger 36 may be guided in a reciprocal movement in the housing cavity 24.

Plunger 36, has two spaced apertures 38 and 40 formed as clearly shown in Figure 3. These openings 38 and 40 are generally of cross-shape and are located transversely in the material of the body of the plunger at an angle relative to the axis and direction of reciprocal movement of plunger 36.

The openings 38 and 40 in plunger 36 are of sufficient dimension to permit contact carrying bridging members 42 to be loosely received therein with the mid-portions thereof located between two oppositely disposed arm portions 44 and 46 of the cross-shaped openings 38 and 40, whereby the movement of members 42 in openings 38 and 40 is limited by the ledge portions which define the two parallel walls of arm portions 44 and 46. Thus the shape and location of apertures 38 and 40 in plunger 36 will cause contacts 50 which are suitably located in opposite ends of the bridging member 42 to rock when contacts 50 abut with contacts 26 in a manner that will become hereinafter apparent.

Bridging member 42, preferably has a cone-shaped depression 52 formed in its mid portion wherein one end of a spring 54 is received. The other end of the spring 54 rests against a wall of one of the arm portions 56 of the cross-shaped openings 38 and 40 that is perpendicularly disposed to arm portions 44 and 46 of the cross-shaped aperture 40 so bridging member 42 is constantly urged into engagement with the ledge portions of arm portions 44 and 46, as clearly seen in Figure 3.

As contacts 50 are moved successively, in from the position in Figure 4 successively through the position shown in 4A and to that shown in Figure 5, the movement of the contacts 50 from an open to an abutting relation with contacts 26 will be accomplished. When the contacts are open, bridging member 42 will be forced against certain ledge portions of arm portions 44 and 46, by spring 54 and contacts 50 will be at an angle A to the fixed contacts 26. When plunger 36 moves the bridging members 42 to the intermediate position as in Figure 4A, contact 50 will begin to touch contact 26 and member 42 will remain in contact with the ledge portions as heretofore described. When, however, the position as in Figure 5 is accomplished and the contacts 26 and 50 are in tight abutting relation with each other, bridging member 42 will be out of contact with ledge portions 44 and 46 of apertures 40. To accomplish this movement the contact 50 changes its angularity relative to contact 26 by rocking across the surface of contact 26. This results in a tight electrical connection between contacts 26 and 50 and reduces arcing therebetween so as to enable the switch to carry a higher current load.

Further it is apparent that the above rocking action occurs in reverse when the contacts 26 and 50 are separated from each other and any inductive electrical arcing that takes place is located along the area shown in Figure 4A where the contacts mutually abut. Thus the remainder of the contacts remain clean to impart a longer life and service thereto.

The second housing 60, which contains the actuating mechanism for plunger 36, is preferably riveted to housing 22 by rivets 62 that pass through suitably located ears 63 on housing 60 and through apertures 64 in housing

22. In connection with the above switch it is to be here noted that the section shown in Figures 2 and 3 represents a portion of the housing and if a suitably similar shaped second portion, not shown, is provided, it may be secured to form the complete housing when the parts are riveted to each other through suitably located aperture 65 as located in housing part 22.

The housing 60 supports a transversely slidable actuating button 66 that has a pin 68 suitably located thereon to locate one end of a toggle spring 70. The other end of toggle spring 70 is secured to a pivot pin 72 carried by a toggle link 74 pivoted on a pin 76 that is suitably journaled on housing 60. Toggle link 74, shown in perspective in Figure 8, has a stop portion 78 integrally formed thereon that engages the housing 22 when the link 74 is in the position shown in Figure 1. The link 74 has a bifurcated end 80 remote from the end whereon stop portion 78 is located. This bifurcated end 80 embraces a C-shaped member 86, so the snap acting rotary motion of the toggle link 74, as started by the toggle action of spring 70, may be translated into lineal motion of plunger 36, when the pivot 72 passes through the line of centers between pivots 68 and 76 from the position in Figure 1 to the position shown in Figure 2.

In Figure 6 a projection 90 is formed on a portion 92 of the sliding button 66. This projection is used to position a spring 94, that has one end engaging housing 60 and the other end engaging the projection 92, so the sliding button 66 is constantly urged to the right as in Figure 6. From this arrangement of parts, the contacts 50 and 26 will be urged into an open or closed circuit position as desired.

In Figure 7 a lever 100, pivoted on a pivot pin 102 journaled on a housing 60, is used to actuate the toggle link 74 in a manner similar to that heretofore described. In this embodiment a suitable cam roller 104 has projections 106 thereon which engage a roller 108, journaled on the lever 100 by pin 110, so the projection 106 will force roller 108 toward the housing and impart a clockwise motion to lever 100 about pivot 102. This motion will be transmitted through a toggle spring 112, which has one end pivoted on lever 100 at pivot 114 and the other end pivoted on the toggle link 74 at pivot 116. Toggle link 74 will impart a reciprocating movement to plunger member 36 through the bifurcated arms of the toggle when the toggle pivot 114 passes over the line of centers between pivot 116 and pivot 118.

From the above arrangement of parts it is apparent the contacts 50 and 26 in any of the embodiments shown may be positioned so they are in circuit making or breaking relation with each other when the plunger 36 is in either extreme position. Thus if the lower sets of terminal members designated with the suffix "a" for purposes of illustration only, as 28a in Figure 1 and the bridging member 42a and spring 54a, are positioned as are the upper contacts shown in the drawing, the circuit between the contacts would be made when the plunger is in the upper position, and broken when the plunger is in the lower position. Conversely if the upper set of contacts 26 and 50 in Figure 1 are used, the circuit will be reversed from that if the low set of contacts 26A and 50A are used for each position of the plunger 36. This arrangement will provide an interlock switch whereby any arrangement of contacts and circuits may be made while others are broken or circuits may be made and broken simultaneously depending upon the arrangement of the bridging member 42 on the plunger and the location of terminal members 28 in housing 22. Further it is apparent that if, because of the arrangement of parts, the C-shaped member 86 may be rotated 180° relative to plunger 36, and the entire housing 60 and its actuating mechanism contained therein may be reversed relative to housing 22 so that the actuating button 66 when moved in a direction which would normally place the parts of the switch in an ON position will place the parts in an

OFF position, so as to provide a completely reversible switch.

It is a further object to provide a switch, adapted for use with highly inductive circuits, that has a basic contact carrying housing that accommodates fixed reversible contacts that have their terminal end portions staggered for ease of assembly with terminal lead when said switches are placed in a banked arrangement, so a multiplicity of circuits easily connected thereto can be simultaneously opened or closed when a circuit between said stationary contacts is made through a plurality of reversible movable contacts that are carried on a reciprocal plunger that is slidably mounted in the housing with an end protruding therefrom that may be spring biased for individual manual operation or when the switch housings are placed in banked arrangement may be concomitantly operated in accordance with an arrangement of cams on a shaft or in either of the above arrangements may have an auxiliary reversible housing carrying a snap acting toggle mechanism that is connected to the end of the plunger so the plunger may be actuated either manually or by means of cams on shafts so the operation of the switch will be either manual or automatic as desired.

Another object of the present invention is to provide a switch or electrical interlock that has a basic housing structure made up of standardized parts so that the stationary contacts held in staggered grooves in the housing may be reversed and selectively make or break a circuit with reversible movable contacts held by springs on a reciprocal plunger which may be manually or automatically operated for moving said contacts into engagement with said fixed contacts and whereon an auxiliary housing may be mounted that may be reversed relative to said basic housing wherein a snap action mechanism is included for a rapid opening and closing of said contacts.

In Figure 9 it is readily apparent that if a spring, not shown, is positioned between housing 22 and the C shaped retainer 86, the switch may be used without the second housing 60 so the plunger 36 may be manually depressed by hand or may be depressed by a cam on a rotatable shaft, not shown. This Figure 9 also clearly shows the two part housing 22 wherein the apertures 30 may be staggered for permitting the terminal portions 28 to be located in a staggered manner relative to housing 22. This arrangement will permit a plurality of switches of any of the modifications heretofore disclosed to be easily connected to terminal ends of wires by a screwdriver or wrench when the switches are mounted in a bank or side by side arrangement. These switches when mounted in a banked arrangement may be actuated manually or concomitantly operated in accordance, with the arrangement of cams on a rotating shaft, not shown, so that a plurality of circuits may be simultaneously closed, or broken as desired without excess arcing as caused by high inductive circuits as the contacts rock or wipe relative to each other during opening and closing.

Manifestly the materials used in the construction of the switch housings 60 and 22 and plunger 36 and actuating button 66 may be of metal or a suitable insulating material well known to those skilled in the switch art. In the particular embodiment shown housing 22, and button 66 and plunger 36 are of a suitable insulating material while all the other parts are of metal. It is apparent any combination of materials might be used providing the contacts through which the electrical circuits are made are properly insulated from each other so as to avoid electrical shorts within the switch.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed as is follows:

1. In an electric switch, the combination comprising; a housing carrying spaced contacts, a plunger member having at least one aperture therein movably carried by

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said housing, a bridging member carried in the aperture of said movable member adapted to be moved thereby into abutting relation with said spaced contacts, and a second means including a spring disposed between the bridging member and a wall of said aperture for normally urging said member into contact with another wall of said aperture for causing a rocking movement between said contacts and bridging member when said movable member is moved by said first means so that the bridging member contacts said first mentioned wall of said aperture.

2. In an electric switch, the combination comprising; a housing carrying at least one pair of spaced contacts, a plunger member having at least one aperture therein reciprocally movable and carried by said housing, a bridging member resiliently carried in the aperture of said movable member having contacts adapted to abut with said spaced contacts, means operatively associated with said movable member for moving the contacts on said bridging member into and out of contact with said spaced contacts, and a second means including a spring disposed between the bridging member and a wall of said aperture for normally urging said member into contact with another wall of said aperture for causing a rocking movement between said spaced contacts when said movable member is moved by said first means so that the bridging member contacts said first mentioned wall of said aperture.

3. In an electric switch, the combination comprising; a housing having an aperture at one end and at least one pair of spaced contacts in a cavity within said housing, a plunger within said housing cavity having a portion thereof extending through said aperture and a transverse aperture therein within said cavity, a bridging member carried in the transverse aperture of said movable plunger adapted to abut said spaced contacts and close a circuit therebetween, means including a spring disposed between the bridging member and a wall of said aperture for normally urging said member into contact with another wall of said aperture for causing a rocking movement of said member when said member abuts said contacts, and means associated with said plunger and housing for moving said plunger relative to said housing cavity.

4. In an electric switch, the combination comprising; a housing having an aperture in one end and spaced contact members in a cavity within said housing, a plunger having an aperture therein and adapted to axially move within said housing cavity and having a portion thereof extending through said aperture, a bridging member resiliently carried by said plunger, said plunger being adapted to move said bridging member into abutting relation with said spaced contacts, means associated with said plunger for causing a rocking movement of said bridging member when said member abuts said contacts, said means including; the aperture in said plunger for receiving said bridging member, said aperture being disposed transversely at an angle to the axis of movement of said plunger and dimensioned to permit said member to have a limited movement along said axis relative to said plunger, and a spring within said aperture in contact with said plunger and bridging member for normally resiliently maintaining said bridging member against one of the walls of said aperture and adapted to permit said bridging member to rock relative to said contacts and the walls of said aperture when said member is brought into abutting relation with said spaced contacts, and means associated with said plunger and housing for causing a movement of said plunger in said housing, said means including; a second housing carried by said first housing, a toggle means carried by said second housing and embracing a portion of the plunger extending through said first housing, and means associated with said second housing for actuating said toggle mechanism.

5. In an electric switch, the combination comprising; a housing having an aperture in one end and at least one

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pair of spaced contact members in a cavity within said housing, a plunger having an aperture therein adapted to axially move within said housing and having a portion thereof extending through the aperture in said housing, a bridging member carried in the aperture in said plunger and adapted to move into abutting relation with said spaced contacts, means associated with said plunger for causing a rocking movement of said bridging member when said member abuts said contacts, said means including; wall portions of the aperture in said plunger for receiving said bridging member, said aperture being disposed transversely at an angle to the axis of movement of said plunger and dimensioned to permit said member to have a limited movement along said axis relative to said plunger, a spring within said aperture for normally resiliently maintaining said bridging member in said aperture in contact with the wall portions of said aperture of the plunger, said spring being adapted to permit portions of said bridging member to rock relative to said contact and plunger when engaging said spaced contacts, and means embracing a portion of the plunger and carried by said housing for causing a movement of the plunger within said housing cavity.

6. In an electric switch the combination comprising; a housing having an aperture in one end and at least one pair of spaced contact members in the cavity within said housing, a plunger having an aperture therein and adapted to axially move within said housing cavity and having a portion thereof extending into said housing aperture, a bridging member carried in the aperture of said plunger and adapted to move into abutting relation with said spaced contacts, means associated with the aperture in said plunger for causing a rocking movement of said bridging member when said member abuts said contacts, and means associated with said plunger and said housing for causing movement of said plunger in said housing cavity, said second mentioned means including; a second housing carried by said first housing having a snap acting toggle means operatively connected with said plunger by embracing a portion thereof, and means associated with said second housing for actuating said toggle means.

7. In an electric switch the combination comprising; a housing carrying spaced contacts, a plunger member having an aperture therein and movably carried by said housing, a bridging member resiliently carried in the aperture of said movable member and adapted to contact said contacts, means operatively associated with said movable member for moving said bridging member relative to said contacts, said means including; a second housing carried by said first housing having a snap acting toggle mechanism operatively connected with said plunger by embracing a portion thereof, and a second means associated with said second housing for actuating said toggle mechanism, said second means including; a member slidable on a portion of said second housing in a direction transverse to the direction of movement of said movable member and connected for actuating said toggle mechanism, and a third means associated with said movable member for causing a rocking movement between said contacts and said bridging member when said movable member is moved by said first means.

8. In an electric switch, the combination comprising; a housing carrying stationary contacts, a member movable having an aperture within said housing, a bridging member resiliently carried in the aperture of said movable member adapted to contact said stationary contacts, means operatively associated with said movable member for moving said bridging member relative to said stationary contacts said means including; a second housing carried by said first housing, a toggle means pivotally carried by said second housing operatively connected with said plunger by embracing a portion thereof, and a second means associated with said second housing for actuating said toggle mechanism, said second means including; a member slidable on a portion of said second housing in

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a direction transverse to the direction of movement of said movable member connected for actuating said toggle mechanism, and a spring means associated with said second housing and said slidable member for constantly urging said member in one direction and a third means associated with said movable member for causing a rocking movement between said contacts and said bridging member when said movable member is moved by said first means.

9. In an electric switch, the combination comprising; 10
a housing carrying stationary contacts, a member movably having an aperture therein and carried by said housing, a bridging member resiliently carried in the aperture of said movable member and adapted to contact said stationary contact, means operatively associated with 15
said movable member for moving said bridging member relative to said contacts said means including; a second housing carried by said first housing, a snap acting toggle means pivotally carried by said second housing operatively connected with said plunger by embracing a portion 20
thereof, and second means associated with said second housing for actuating said toggle mechanism, said second

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means including; an actuating member pivotally carried by said second housing, and operatively associated with said toggle mechanism, a spring between said member and housing for urging said member in one direction, 5
and means for moving said member against the force of said spring whereby said toggle mechanism is moved and a third means associated with said movable member for causing a rocking movement between said contacts and said bridging member when said movable member is moved by said first means.

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