

July 1, 1947.

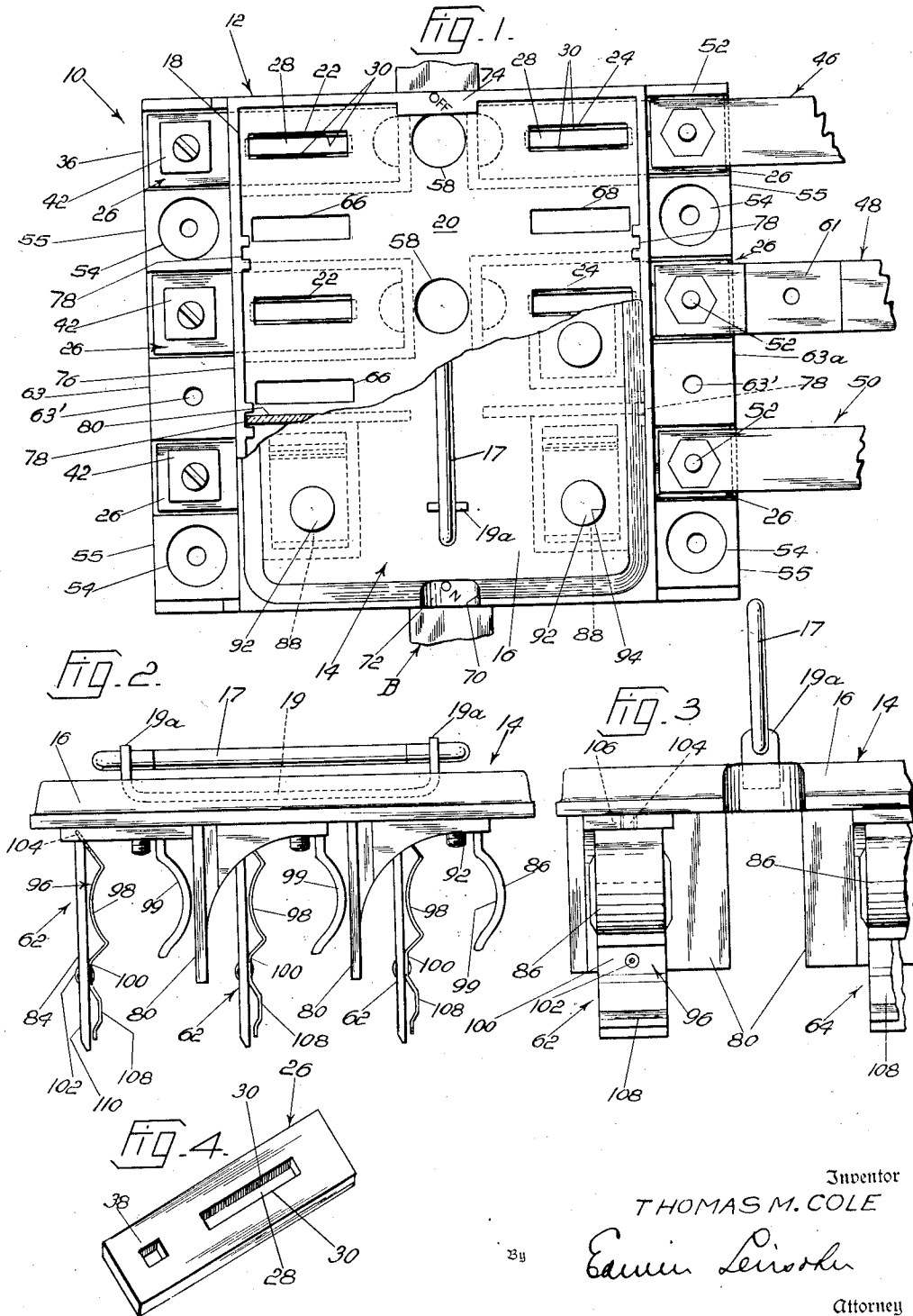
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COMBINED FUSE AND ELECTRIC SWITCH

Filed Dec. 18, 1943

2 Sheets-Sheet 1



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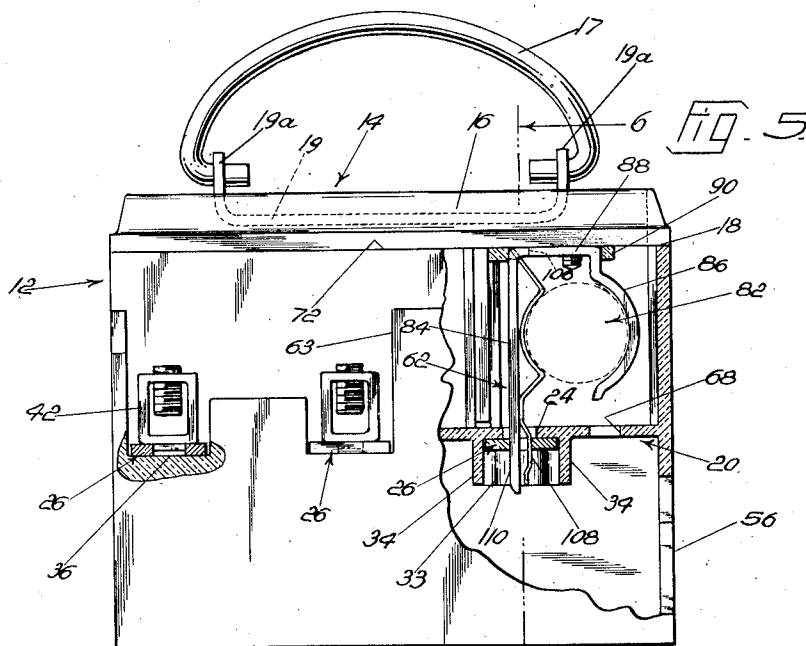
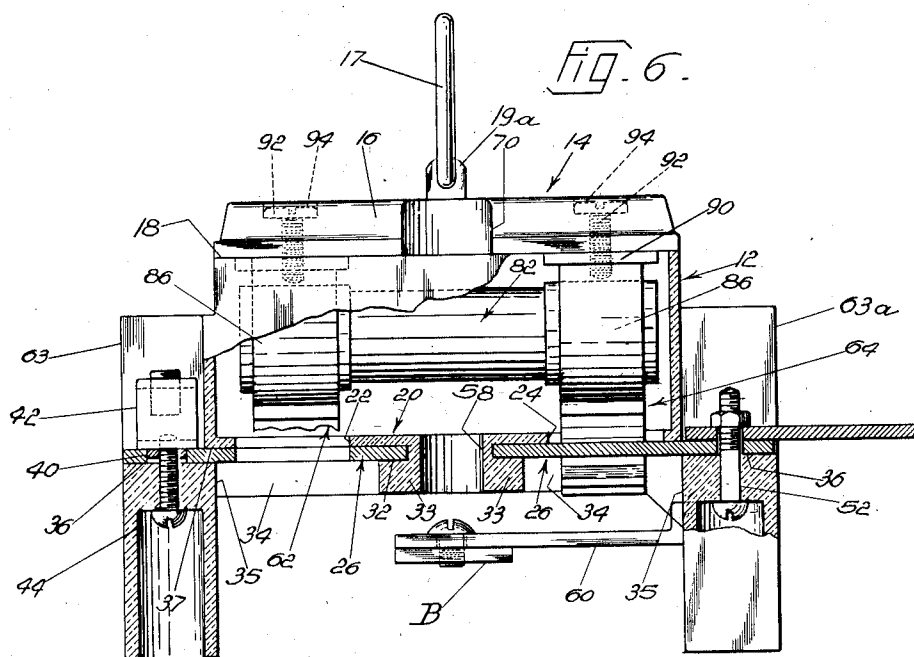
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COMBINED FUSE AND ELECTRIC SWITCH

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2 Sheets-Sheet 2



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2,423,227

COMBINED FUSE AND ELECTRIC SWITCH

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Application December 18, 1943, Serial No. 514,811

7 Claims. (Cl. 200—114)

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This invention relates to electric switches.

One object of the invention is to provide a combined movable contact member and fuse clip unit which is of improved construction, and which is well adapted to be used in a switch of the type known as a pull-out switch.

Another object of the invention is generally to provide a pull-out switch of improved construction and operation.

The above objects of the invention will be more fully understood from the following description considered in connection with the accompanying illustrative drawings, and other objects, features and advantages of the invention will become apparent as the description proceeds.

In the drawings:

Figure 1 is a front view of a pull-out switch embodying the present invention, parts being broken away for the purpose of illustration;

Figure 2 is a side view, in elevation, of the pull-out unit of the switch illustrated in Figure 1, said pull-out unit being removed from the switch receptacle;

Figure 3 is an end view of the pull-out unit;

Figure 4 is a perspective view of one of the stationary contact members;

Figure 5 is a side view of the switch as viewed looking from the left of Figure 1; and

Figure 6 is a view partly in elevation and partly in section on the line 6—6 of Figure 5.

Referring now to the drawings in detail, the pull-out switch 10 comprises a receptacle 12 and removable frame 14 mounted thereon. Receptacle 12 and frame 14 are each formed as a single integral unit from any suitable insulation material; more particularly, said receptacle 12 and frame 14 are each molded in one piece from a suitable plastic, for example, "Bakelite." Receptacle 12 has an open front end which is closed by the plate 16 of frame 14 which is removably seated on the front peripheral edge 18 of the receptacle and constitutes a cover therefor. Said frame 14 is provided with a handle 17 secured at its ends to a strap 19 which is positioned at the inner side of plate 16 and has ears 19a which project outwardly through openings in said plate, the ends of said handle being pivotally engaged in said ears 19a, respectively.

Receptacle 12 has a wall 20 offset inwardly from the front peripheral edge 18. Wall 20 is provided with a plurality of pairs of spaced openings 22, 24, the openings of each pair being in alignment longitudinally and the pairs of openings being in alignment laterally of each other, in laterally spaced relation, as illustrated in Figure 1. As the

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illustrated switch is a three-pole switch, it is provided with three pairs of openings 22, 24. A stationary contact member 26 is positioned rearwardly of wall 20 and is provided with an opening 28 which registers with the companion opening 22 or 24. As illustrated in Figure 1, the opposite edges 30 of opening 28 of stationary contact member 26 are disposed inwardly of the adjacent edges, respectively, of the companion opening 22 or 24. Said contact members 26 are supported adjacent to and in abutting surface relation with the rear side of wall 20, one end of each of said stationary contact members being received in a recess 32 formed in an integral projection 33 provided on wall 20, and the other end of the stationary contact member being supported on outer surface portions 36 of receptacle 12. Projection 33 extends between ends of companion projections 34 which terminate at their opposite ends at the adjacent side wall portions 35 of the receptacle. Slots 37 (Figure 6) are provided in wall portions 35 in alignment with recesses 32, respectively, said stationary contact members 26 being inserted through said openings 37, respectively, for mounting them in position. Each contact member is provided with a non-circular hole 38 in which non-circular projections 40 of the companion terminal members 42 fit removably, each of said terminal members being secured to the stationary contact member by a screw 44. It will be understood that conductors (not shown) leading to the load are connected to terminal members 42. The stationary contact members 26 at the supply side of the switch are connected to the branch bus bars 46, 48 and 50 by bolts 52 which project through said openings 38 of the stationary contact members 26. Openings 54 are provided in the opposite outer side portions 55 of receptacle 12 to receive screws (not shown) for securing said receptacle to a panel board or to the pan of a panel box. Receptacle 12 is open at its opposite ends as indicated at 56, rearwardly of wall 20 to provide room for a bus bar, indicated at B in Figures 1 and 6, said bus bar being straddled by receptacle 12 when the latter is secured in position. Wall 20 is provided with a plurality of openings 58 through which access may be had from the front of said receptacle, when frame 14 is removed, for connecting a branch conductor bar 60 to said bus bar or for securing the receptacle in position by means of screws projected through one or more of said openings 58 for engagement with threaded openings in the bus bar B, this means of securement of said receptacle being additional to or in lieu of the se-

curement by screws passing through the openings 54 in said receptacle. Conductor bar 60 is connected at its outer end to the inner end of bus bar 48 between the latter and the outer end of companion stationary contact member 26 and is secured in that position by the companion bolt 52. Ordinarily two of the pull out switches of identical construction, are used together in a three-phase system and in that case branch bus bar 46 is connected also to a stationary contact member 26 of the second switch, branch bus bar 50 is connected also to a supply bus bar which like the bus bar B is straddled by said second switch and which is connected to a companion stationary contact member 26 by a branch conductor which like the conductor 60 is connected to said last mentioned companion stationary contact member, and branch bus bar 48 is also connected to a companion stationary contact member 26 of the second switch and to a third bus bar which runs in the space between the two switches. In order to permit the connection of branch bus bar 48 to said third bus bar, said branch bus bar is provided with a rearwardly offset portion 61 (Figure 1). When the two switches are thus connected for a three phase system, they are positioned so that the outer side wall portions 63a of the two switches confront each other in spaced relation in the assembly and the outer side wall portions 63 at which the terminal members 42 are located are at the remote ends of the assembly. Portions 63 and 63a are of the same construction and extend forwardly beyond the outer side wall portions 55. Said portions 63 and 63a are each provided with an opening 63' to receive a screw for attaching a cover plate (not shown) which customarily is placed over the electrical conductors.

The openings 22, 24, in wall 20 of receptacle 12 provide passages for the pairs of contact members 62, 64, respectively, which are carried by frame 14. The contact members 62, 64 of each pair are in alignment with each other and are positioned to engage the companion stationary contact members 26 which are in registry with the companion pair of openings 22, 24, when said movable contact members are projected through the passages provided by the companion pairs of openings 22, 24. It will be understood that when the plate 16 of frame 14 is seated on the peripheral edge 18 of receptacle 12, the movable contact members 62, 64 are in engagement with the companion stationary contact members 26, respectively. Wall 20 of receptacle 12 is provided with a plurality of pairs of spaced openings 66, 68 disposed laterally of the pairs of openings 22, 24 to receive the free ends of the contact members 64, 62, respectively, following the disengagement of said movable contact members from their companion stationary contact members which is accomplished by removing frame 14 from receptacle 12, said frame being replaced on said receptacle in a position displaced 180° from the position of said frame when the switch is closed. The plate or cover 16 of frame 14 is provided with a cut-out or notch 70 which exposes a portion 72 of edge 18 when said frame is positioned so that the switch is closed and which exposes a portion 74 of edge 18 when said frame is in the switch-open position. As shown in Figure 1, portions 72 and 74 of edge 18 are marked with the legends "on" and "off," respectively, to indicate the corresponding conditions of the switch. Accordingly, it will be understood that in order to open the switch, frame 14 is pulled out of the receptacle and may

either be left out of the receptacle or replaced therein without closing the switch and that for the latter purpose said frame is turned through an angle of 180°, that is to a position in which the cut-out 70 registers with the edge portion 74 of the receptacle. It will be understood that when the frame is in said last mentioned position, it may be seated on edge 18 of the receptacle, since there is a pair of openings 66, 68 for each pair of movable contact members 64, 62 which project through said openings, respectively, in the open condition of the switch. The opposite side walls 76 of receptacle 12 are provided with vertical grooves 78 on their inner surfaces to receive the aligned barrier and guide plates 80 constituting integral parts of frame 14. Grooves 78 and the companion members 80 which are slidable in said grooves thus provide means for guiding the movable contact members 62 either into engagement with the companion stationary contact members 26 or for positioning the free ends of the movable contact members in the companion openings 66, 68 of wall 20 in the closed and open conditions, respectively, of the switch.

The movable contact members 62 and 64 are all of the same construction. Accordingly, for convenience in the further description of the movable contact members and of the manner in which they are attached to the frame 14, it will be sufficient to describe one of the movable contact members 62 and it will be understood that the description thereof applies as well to each of the movable contact members 64. Each movable contact member constitutes a combined movable contact member and a fuse clip for engaging the end of a fuse indicated at 82 in Figures 5 and 6. The movable contact member comprises laterally spaced parts 84 and 86 integral with an end connecting portion 88. The end connecting portion 88 is positioned within a recess defined by a peripheral continuous projection 90 on the inner surface of plate or cover 16 of frame 14, said end connecting part 88 being secured in said recess by a screw 92. The heads of screws 92 are positioned in companion recesses 94 in the outer surface of cover plate 16, said recesses being filled with wax or other insulating material (not shown) for covering the heads of said screws at the front of the switch. As the recesses defined by rims 90 are non-circular, and as the end connecting parts 88 of the movable contact members mounted in said recesses are also non-circular and fit in said recesses, respectively, displacement of the movable contact members in a plane parallel to wall 20 of receptacle 12 is thereby prevented and accordingly it is sufficient to use a single screw 92 for holding the companion movable contact member in proper position and in secure relation on frame 14.

A spring metal strip 96 is secured to the part 84 of each movable contact member in confronting relation to the part 85 thereof. Said spring metal strip has a concave portion 98 which confronts the part 86 of the companion movable contact member, and said part 86 is curved as shown so that it has a concave surface 99 which is opposed to the companion concave surface 98 of strip 96. Accordingly, it will be understood that part 86 of the movable contact member and portion 98 of the companion strip 96 provide means for holding the end of a fuse and that said end of the fuse is resiliently engaged by part 98 of the spring metal strip and is thus resiliently and removably held by the movable contact member. It will be understood of course that the opposite

ends of a fuse are mounted in a pair of movable contact members 62, 64 as illustrated in Figure 6. The spring metal strip 96 has a portion 100 which is secured to part 84 of the movable contact member in any suitable way as by a rivet 102. Also, one end of strip 96 is provided with a tang 104 of reduced width which is received within an opening 106 provided in the end connecting portion 88 of the movable contact member to prevent turning of said spring strip about the axis of the rivet. A portion 108 of contact strip 96 is spaced from an adjacent opposed end portion 110 of part 84 of the movable contact member and is resiliently movable toward said opposed portion 110 so that when the movable contact member is moved into engagement with its companion stationary contact member 26 in the opening 28 thereof, resilient portion 108 engages and makes contact with one edge 30 at said opening while said opposed portion 110 of part 84 of the movable contact member engages and makes electrical contact with the opposite edge 30 of the opening 28 of the companion stationary contact member 26. Further, it will be understood that when the movable contact member is thus engaged with its companion stationary contact member, the comparatively stiff and rigid portion 110 of the movable contact member is held resiliently by the portion 108 of spring strip 96 in engagement with a stationary contact member. It will be noted that part 84 not only projects beyond the free end of the companion part 86, but also projects somewhat beyond the free end of the resilient portion 108 of spring strip 96, and it will be noted further that said part 84 is thicker and of course is stiffer than said resiliently flexible portion 108. Accordingly, it will be understood that when the movable contact members are disengaged from their companion stationary contact members, the electrical contact between said companion stationary and movable contact members is not broken until the free end of portion 110 disengages the adjacent edge 30 of the companion stationary contact member, so that an arc which might be drawn upon the separation of said companion stationary and movable contact members will be drawn between the stationary contact member and portion 110 of the movable contact member and not between the stationary contact member and the comparatively thin and resilient portion 108. Thus, impairment of the resilient strip 96 is prevented. It will be understood that strip 96 can move relative to part 84 of the companion movable contact member longitudinally of said part 84 in opposite directions from the point of securement 100, and it will be noted further that the concave portion 98 of the strip is spaced laterally of the adjacent part 84 of the companion movable contact member for movement toward the latter as may be necessary when the end of the fuse is inserted between said concave portion 98 and the companion concave surface 99 of part 86. It will be understood that part 86 is substantially rigid so that it is not displaced when the end of a fuse is inserted between said part and the companion portion 98 of the spring strip, the required tolerance being provided by said resiliently movable spring portion 98.

While I have shown and described the preferred embodiment of my invention, it will be understood that the latter may be embodied otherwise than as herein illustrated or described, and that in the illustrated embodiment certain changes in the details of construction and in the arrangement of parts may be made within the

scope of the invention as defined by the patent claims.

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

1. In an electric switch having a pair of spaced stationary contact members, a movably mounted supporting member and a pair of spaced contact members mounted on said supporting member and movable therewith into and out of engagement with said stationary contact members, respectively, each of said movable contact members comprising laterally spaced parts forming a fuse-holding clip, said fuse-holding clips of the two movable contact members being in alignment for engaging the opposite ends of a fuse, and a resilient member carried by one of said laterally spaced parts of each of said contact members and having a portion for resiliently engaging the adjacent end of the fuse and a portion for resiliently engaging the companion stationary contact member, said resilient member comprising a strip having a part thereof between said resiliently engaging portions fixed to said one of the laterally spaced parts, said resiliently engaging portions being movable with respect to each other and said one of the laterally spaced parts.

2. In an electric switch having a pair of spaced stationary contact members, a movably mounted supporting member and a pair of spaced contact members mounted on said supporting member and movable therewith into and out of engagement with said stationary contact members, respectively, each of said movable contact members comprising laterally spaced parts, a spring-metal strip fixed at a point between its ends to one of said laterally spaced parts of each of said contact members, said spring strip having a resilient concave part at one side of said point and said other part of each of said contact members having a concave part confronting said concave part of the companion strip and forming a fuse clip therewith, each of said spring strips also having a portion at the other side of said point for resiliently engaging the stationary contact member to provide a resilient engagement between the companion stationary and movable contact members.

3. In an electric switch having a stationary contact member, a movably mounted supporting member comprising a plate formed of insulation material and provided with a recess, and a contact member carried by said supporting member and movable therewith into and out of engagement with said stationary contact member, said movable contact member having laterally spaced parts and an integral end connecting portion between said parts, said end connecting portion being disposed in said recess of said plate and secured to said supporting member, said spaced parts projecting from said plate, one of said spaced parts having a spring metal strip secured thereto in confronting relation to the other of said spaced parts, said spring metal strip and said other spaced part having opposed concave surfaces forming a resilient fuse-holding clip.

4. In an electric switch having a stationary contact member, a movably mounted supporting member comprising a plate formed of insulation material and provided with a recess, and a contact member carried by said supporting member and movable therewith into and out of engagement with said stationary contact member, said movable contact member having laterally spaced

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parts and an integral end connecting portion between said parts, said end connecting portion being disposed in said recess of said plate and secured to said supporting member, said spaced parts projecting from said plate, one of said spaced parts having a spring metal strip secured thereto in confronting relation to the other of said spaced parts, said spring metal strip and said other spaced part having opposed concave surfaces forming a resilient fuse-holding clip, said one of said spaced parts and the spring metal strip projecting beyond the free end of said other spaced part for resiliently engaging said stationary contact member.

5. In an electric switch having a stationary contact member, a movably mounted supporting member comprising a plate formed of insulation material and provided with a recess, and a contact member carried by said supporting member and movable therewith into and out of engagement with said stationary contact member, said movable contact member having laterally spaced parts and an integral end connecting portion between said parts, said end connecting portion being disposed in said recess of said plate and secured to said supporting member, said spaced parts projecting from said plate, one of said spaced parts having a spring metal strip secured thereto in confronting relation to the other of said spaced parts, said spring metal strip and said other spaced part having opposed concave surfaces forming a resilient fuse-holding clip, said one of said spaced parts and the spring metal strip projecting beyond the free end of said other spaced part for resiliently engaging said stationary contact member, said one of the spaced parts projecting outwardly beyond the adjacent outer end of said spring metal strip whereby said one of the spaced parts disengages the companion stationary contact member after the latter is disengaged by said spring strip in opening the switch.

6. In an electric switch having a stationary contact member provided with an opening, a companion movable contact member mounted for movement to a position in which it engages said stationary contact member in said opening, said movable contact member comprising laterally spaced parts, a spring metal strip secured to one of said spaced parts and confronting the other of said spaced parts, said strip being attached at a point between its opposite ends to said one of

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said spaced parts and having laterally offset resilient portions at opposite sides, respectively, of said point of attachment, one of said offset resilient portions and said other spaced parts providing a resilient fuse clip, and the other of said resilient portions being resiliently engageable with said stationary contact member in said opening for holding a portion of said one of said spaced parts resiliently in engagement with said stationary contact member.

7. In an electric switch having a stationary contact member provided with an opening, a companion movable contact member mounted for movement to a position in which it engages said stationary contact member in said opening, said movable contact member comprising laterally spaced parts, a spring metal strip secured to one of said spaced parts and confronting the other of said spaced parts, said strip being attached at a point between its opposite ends to said one of said spaced parts and having laterally offset resilient portions at opposite sides, respectively, of said point of attachment, one of said offset resilient portions and said other spaced parts providing a resilient fuse clip, and the other of said resilient portions being resiliently engageable with said stationary contact member in said opening for holding a portion of said one of said spaced parts resiliently in engagement with said stationary contact member, said contact engaging portion of said one of the parts projecting outwardly beyond said other resilient portion whereby said contact engaging portion disengages the stationary contact member after the latter is disengaged by said other resilient portion in opening the switch.

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