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ELECTRIC SWITCH WITH TERMINAL PLATE
AND WIRE GRIP THEREFOR
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2,946,036

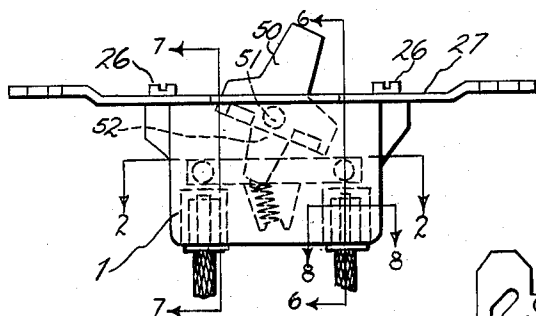


Fig. 1

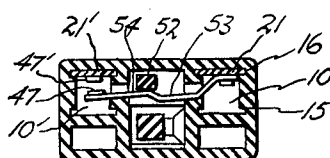


Fig. 2

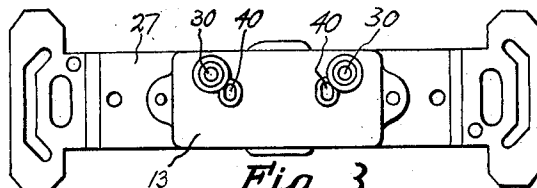


Fig. 3

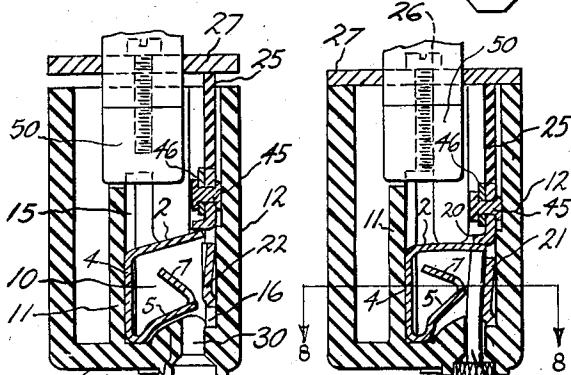


Fig. 5

Fig. 6

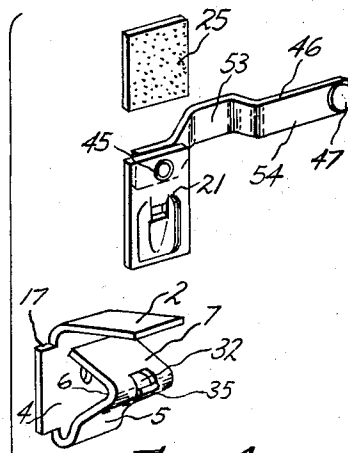


Fig. 4

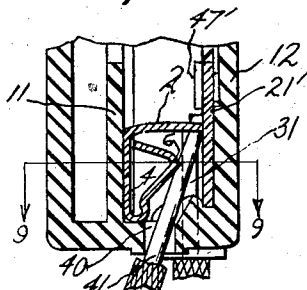


Fig. 7

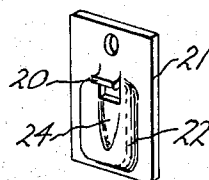


Fig. 10

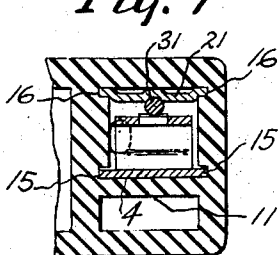


Fig. 8

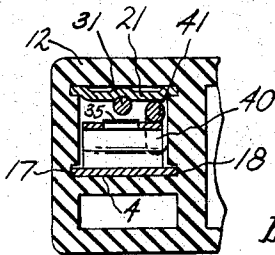


Fig. 9

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ELECTRIC SWITCH WITH TERMINAL PLATE AND WIRE GRIP THEREFOR

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This invention relates to terminal plates and wire grips particularly intended for use in connection with electric switches. It has for an object to provide a gripping engagement with the wire which avoids any necessity for the use of terminal screws, and it also provides a terminal plate particularly adapted for cooperation with the grip and which may carry selectively either a rivet for securing a switch arm or a terminal button. A particular object of the grip construction is to provide for the entire gripping action to be produced by a spring arm which is rigidly anchored in the insulating casing.

A further object of the invention is to provide a construction by which the wire may be readily released from the grip when desired.

For a more complete understanding of this invention reference may be had to the accompanying drawing in which—

Figure 1 is a side elevation of a switch embodying the invention;

Figure 2 is a detail sectional view on the line 2—2 of Figure 1;

Figure 3 is a bottom elevation of the switch;

Figure 4 is an exploded perspective view showing the terminal grip and plate, the plate being shown as having riveted thereto a switch arm;

Figure 5 is a section on a larger scale on line 6—6 of Figure 1 but showing the switch as first assembled and with the grip unclamped;

Figure 6 is a view similar to Figure 5 but showing the grip secured rigidly in position and with a terminal wire in gripped position;

Figure 7 is a sectional view on the line 7—7 of Figure 1, on a larger scale, showing the wire released from gripping engagement by the use of a second wire or tool;

Figure 8 is a sectional view on line 8—8 of Figures 1 and 6;

Figure 9 is a sectional view on line 9—9 of Figure 7; and

Figure 10 is an enlarged perspective view of one of the terminal plates.

Referring to the drawings, 1 indicates a casing which houses the switch mechanism, the terminal plates and the necessary grips for the terminal wires. The walls, bottom and inner partitions of the casing 1 may conveniently be a single piece of molded insulating material, the top member being preferably but not necessarily a metal plate.

Referring to Figure 4, each terminal wire grip comprises a strip of spring metal having a pair of angularly related legs 2 and 4. From the leg 4 there extends a reversely curved portion 5, constituting a spring arm which extends diagonally toward the free end of the leg 2 and then is bent backward as at 6 to form an end portion 7 extending toward the leg 4. The legs 2 and 4 are initially formed with an angle between them greater than 90° e.g., 100° more or less, as shown best in Figure 5. The casing 1 contains two similar rectangular chambers 10 and 10' for the grips, formed by walls and partitions

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of the casing 1. Two opposed walls of the chamber 10 are a partition 11 and a casing wall 12. The walls of the chamber are integral with the bottom 13 of the casing which forms the base of the chamber. The walls 11 and 12 are provided with oppositely disposed guideways 15 and 16. The guideway 15 receives lateral extensions 17 and 18 of the leg 4 of the grip. When the switch is being assembled, the grip is inserted into the chamber 10 through the open top thereof and is pushed into position as hereinafter described, the lateral extensions 17 and 18 sliding in the guideway 15 and the leg 4 of the grip bearing against the partition wall 11. The leg 2 extends toward the guideway 16 and is engaged at the end of its upper face by a central tab 20 struck up from a terminal plate 21 which is slidable in the guideway 16. The plate 21 has an embossment 22 below the tab 20 with a central groove 24 therein to receive a terminal wire as will later appear.

The embossment 22 is of sufficient height to keep the portion indented to form the groove 24 from projecting beyond the plane of the rear face of the terminal plate 21. The plane portions of the rear face of the plate thus bear directly against the wall 12.

Above the terminal plate 21, mounted to slide in the guideway 16, is a flat piece of insulation 25. This insulation 25 extends above the level of the top of the chamber when the terminal grip is in normal unstressed condition as indicated in Figure 5. When pressed downward to the position shown in Figure 6, it pushes the terminal plate 21 to its seated position at the bottom of the guideway 16. The location of the tab 20 is such that when the plate 21 moves down to its seated position, the tab flexes the leg 2 to an approximately horizontal position, thus anchoring the leg 2 rigidly in position and causing the leg 4 to press strongly against the partition wall 11. If the length of the leg 2 is exactly equal to the distance between the partition wall 11 and the front face of the terminal plate 21, there will be a slight clearance between the end of the leg 2 and the face of the plate 21 when the parts are assembled unstressed as in Figure 5. In such case, the grip can be dropped into the chamber through the open top thereof, together with a terminal plate 21, and screws 26 which extend through a metal top plate 27 into the casing walls may be employed to press the piece 25 and plate 21 down to the seated position, and the leg 2 will then be rigidly anchored. However, on account of slight unavoidable variations in the inner dimensions of the molded casing 1, the grip may be made so that the leg 2 is long enough to touch the front face of the terminal plate 21 when the parts are in the loosely assembled position shown in Figure 5. Considerable force must then be applied by suitable tools (not shown) to force the piece 25 and plate 21 down to the seated position since the leg 2, being slightly longer than the distance between the partition 11 and the plate 21 will necessarily bow slightly as indicated in Figure 6. This keeps the legs 2 and 4 immovable under rigid tension so that operational flexing of the grip is confined to the extension 5.

The bottom 13 is provided with a perforation 30 through which the bared end 31 of the conductor wire may be thrust. The grip is made with a hole 32 at the bend 6, a short lip 35 being formed at the lower edge of the hole. The outer edge of this lip is nearer to the terminal plate 21 than the diameter of the wire to be inserted. On insertion of such a wire, the extension 5 and the end portion 7 of the grip are forced toward the left (Figure 6) by the wire and when thus distorted press the wire against the face of the terminal plate within the groove 24, thus providing a firm electric contact therewith. Any attempt to withdraw the wire is resisted by the edge of the lip 35 gripping the wire, which edge may be slightly rounded so as not to cut too deeply into the

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wire if force is used in an attempt to withdraw the wire without first releasing it as hereinafter described. In order to avoid injury to the grip itself resulting from attempts to withdraw the wire 31 by excessive force, the bottom 13 is provided with a raised bolster 36 under the extension 5 to be engaged by the extension 5 if the wire 31 is pulled with sufficient force. The bolster 36 then acts as a stop to support the extension 5 before the grip is distorted sufficiently to be injured.

For each grip chamber, the bottom 13 is also provided with a second perforation 40 which is shown in Figures 3 and 9 as oval in cross section and through which a wire or tool 41 may be thrust to engage the spring arm at a point on the bend 6 offset from the hole 32, this acting to wedge the spring arm 5 away from the wire 31 so as to release the wire therefrom. It will be noted that the leg 2 of the grip may act as a stop when a wire 31 or a tool 41 is inserted into the chamber to prevent the wire or tool from being thrust too far into the casing. When a wire or tool 41 is inserted to release the terminal wire 31, the spring arm 5 is flexed so that the extremity of the end portion 7 approaches the leg 4. If the tool 41 is inserted at a skew angle, the arm 5 is additionally flexed, but the end portion 7 is made long enough to engage the arm 4 as a stop before the arm 5 can be flexed sufficiently to damage the grip.

As shown in Figure 4 the terminal plate 21 has riveted thereto as at 45 a switch arm 46 carrying a terminal button 47 at its other end. This switch arm 46 extends into the chamber 10' and is arranged so that its button 47 normally presses against a button 47' on a terminal plate 21' mounted in the chamber 10'.

To open the switch, the arm 46 is sprung to separate the buttons 47 and 47' by any suitable means such as a cam 52 carried by a toggle lever 50 which is fulcrumed at 51. The cam 52 moves from a portion 53 to a portion 54 of the arm 46, these portions being mutually offset as indicated in Figures 2 and 4.

The terminal plates 21 and 21' are each symmetrical with respect to the central wire-engaging portion, i.e., the groove 24. They are therefore interchangeable and can be used in switches containing more than two terminals.

From the foregoing description of an embodiment of this invention, it should be evident to those skilled in the art that various changes and modifications may be made therein without departing from its spirit or scope.

I claim:

1. An electric switch comprising an insulating casing having a chamber, opposed walls and a base, a wire grip comprising a pair of angularly related legs one of which is rigidly pressed against one of said walls, the other leg extending toward the opposite wall and being rigidly anchored in position, and a spring portion extending diagonally from said one leg toward the other leg and opposite wall and having an end portion bent back toward said one leg, and a terminal plate slidable against said

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opposite wall and having a projecting tab pressing down the end of said other leg and springing said other leg to a bowed shape, said casing having a hole through said bottom for insertion therethrough of a terminal wire between said spring portion and terminal plate to be gripped therebetween and means pressing said terminal plate downwardly to distort said other leg from its unstressed shape and to clamp said grip and plate in seated position against the base of said chamber.

2. In combination, a casing having a chamber provided with walls and vertical guideways at opposite walls thereof, a wire grip comprising a spring member having a pair of angularly related legs, one of said legs being in one of said guideways and against one of said walls, the other of said legs extending across said chamber toward the other of said walls, said first mentioned leg having an extension projecting diagonally toward the free end of the other leg, said extension having an end portion bent back toward said first mentioned leg, said chamber having a base provided with a hole therethrough adjacent to said other guideway through which a wire may be extended into gripping contact with said extension adjacent to the bend thereof, said base having a raised bolster adjacent to said extension to limit downward flexing thereof, a terminal plate slidably engaged in said other guideway, said plate having a projecting element overlying and engaging the end of said other leg, an insulating member slidable in said other guideway and engaging with said plate, and means pressing said insulator and plate along said other guideway to seat said plate on said base, said overlying portion forcing the legs of said grip into a rigidly fixed position, the bend of said extension being normally closer to said plate than the diameter of the wire for engagement therewith.

3. The combination as in claim 2, the bent-back end portion of said extension being constructed to approach said one leg when said extension is flexed by a tool and to engage said one leg as a stop before said extension can be excessively flexed by said tool.

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