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[54] **ELECTRICAL SWITCH HAVING INTEGRAL PLASTIC PARTS**
 4 Claims, 11 Drawing Figs.

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200/168, 200/153, 200/51.16

[51] Int. Cl. H01h 13/28

[50] Field of Search 200/76, 67,
 67 DC, 67.02, 68, 51.16, 51, 172A Cursory, 168 C

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ABSTRACT: There is disclosed an electrical switch including a plastic housing having a fixed electrical contact mounted therein, an integral plastic actuator including a pair of arms hingedly joined together and a handle for controlling the position of the arms, the outer ends of the arms being respectively swingably connected to the housing at spaced-apart mounting points thereon for snap movement between first and second stable conditions, and a movable electrical contact held against the fixed electrical contact when the arms are in the first stable condition and being held away from the first electrical contact when the arms are in the second stable condition.

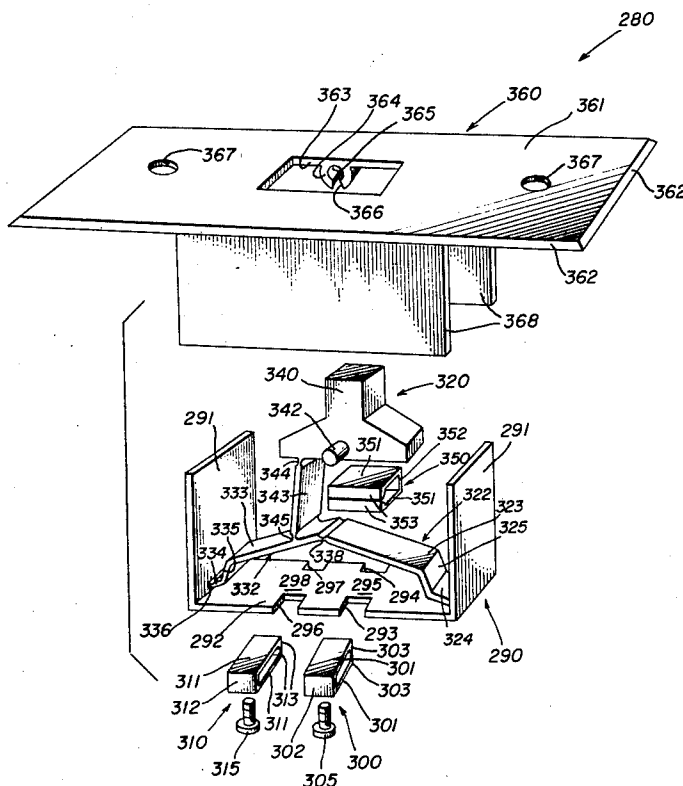


FIG. 2

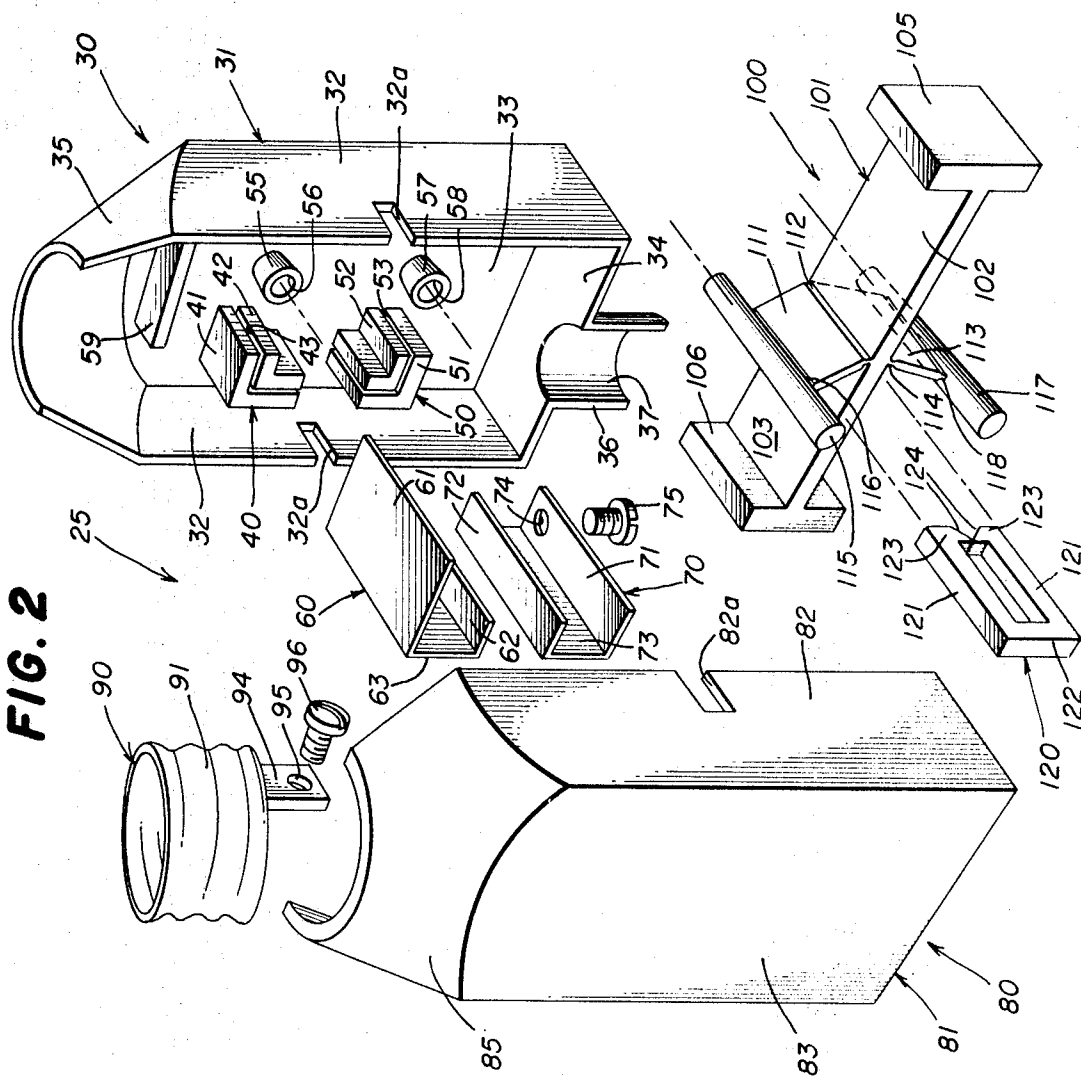
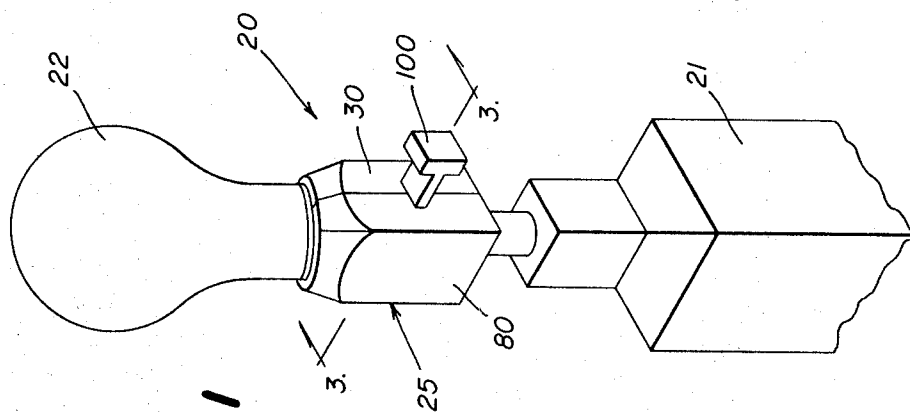


FIG. 1



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FIG. 3

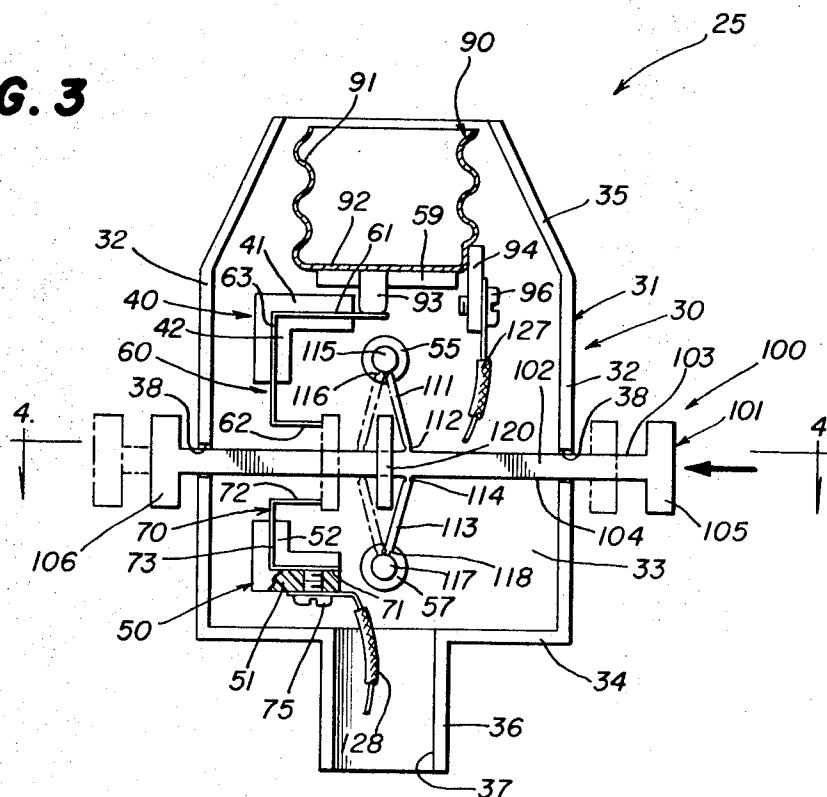


FIG. 4

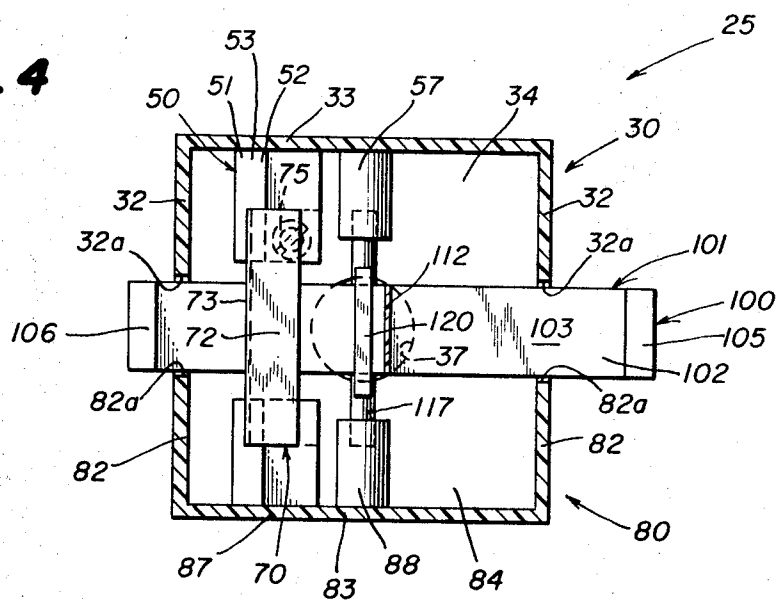


FIG. 5

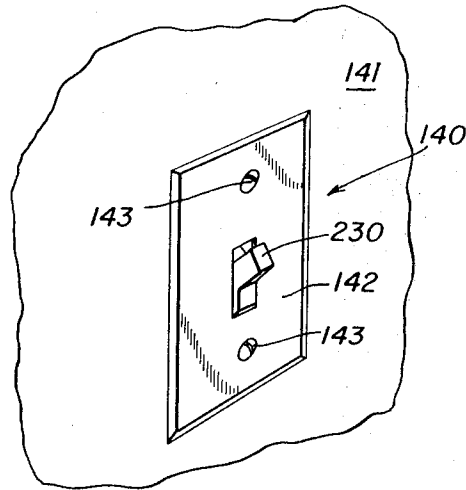


FIG. 6

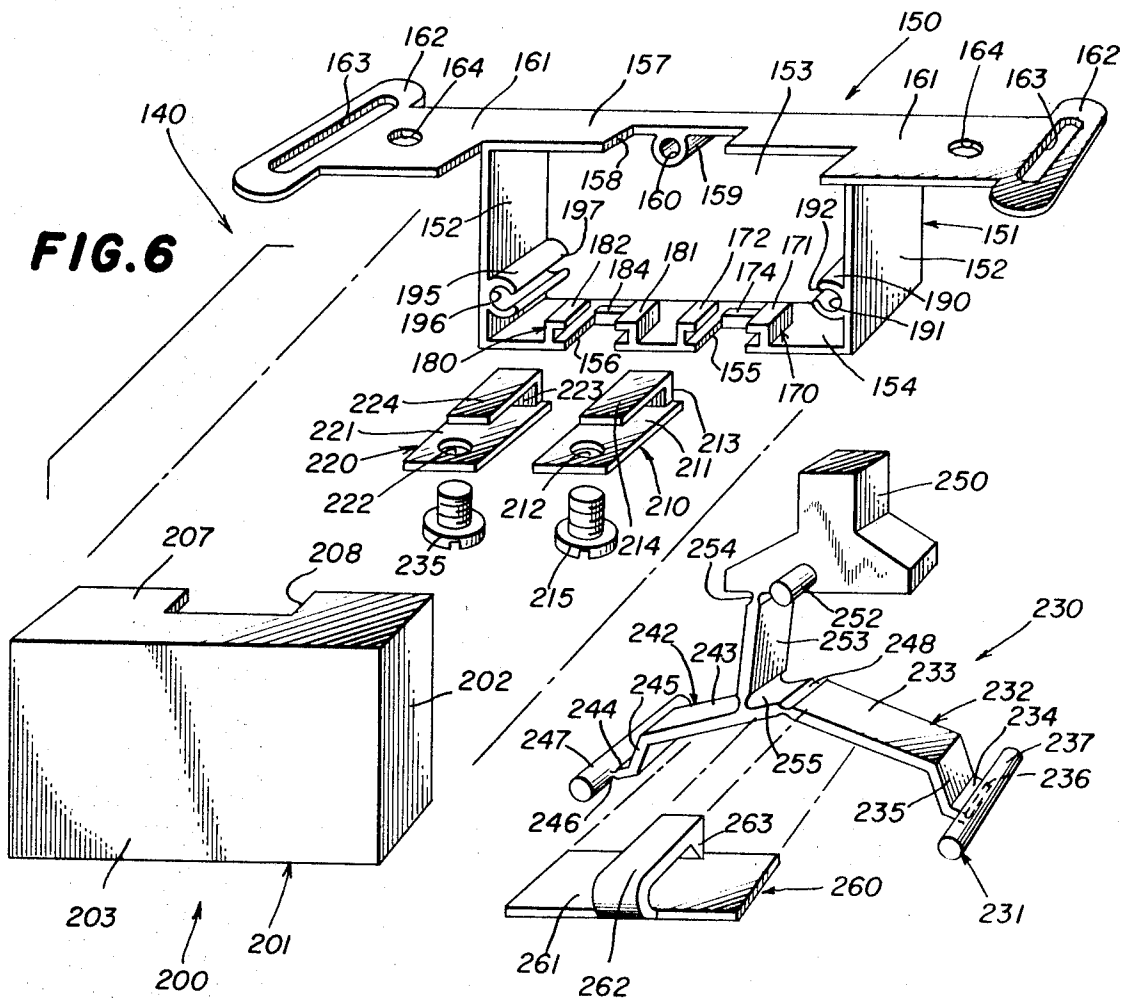


FIG. 7

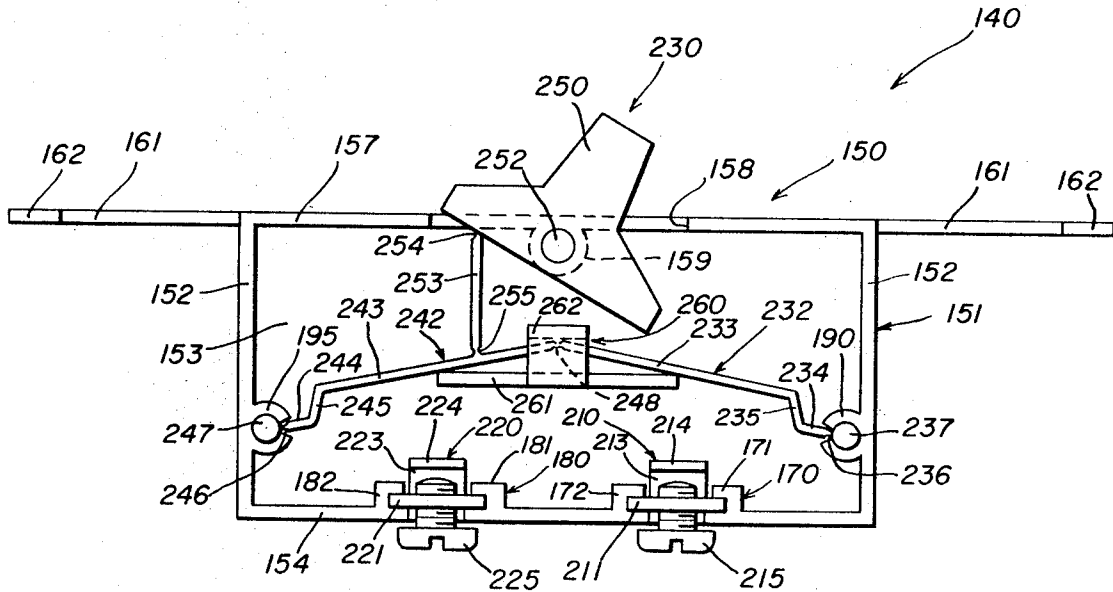
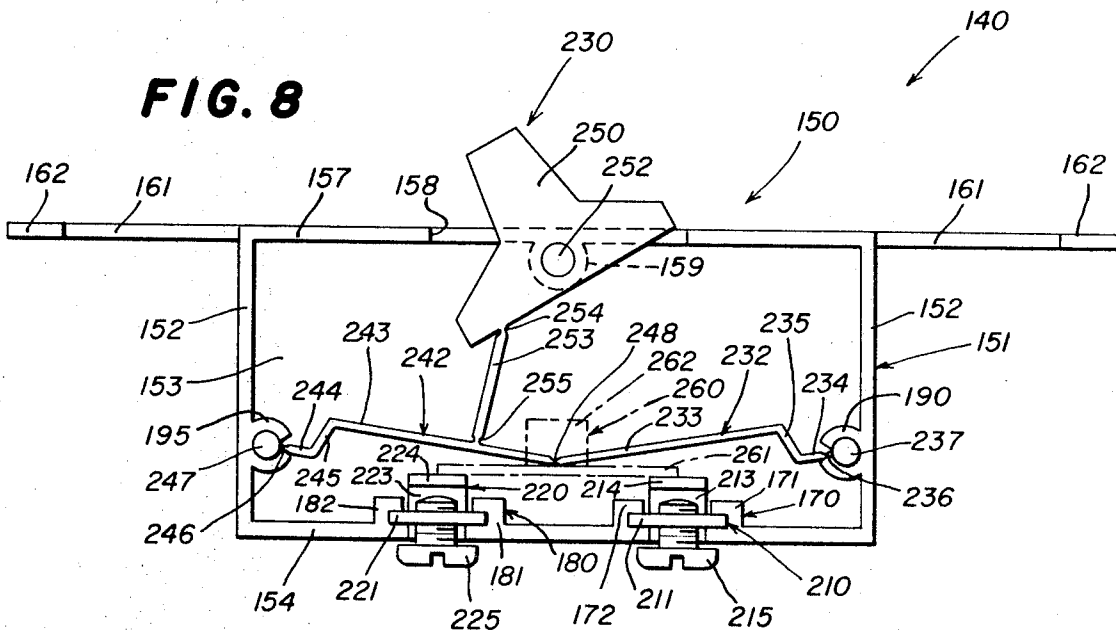
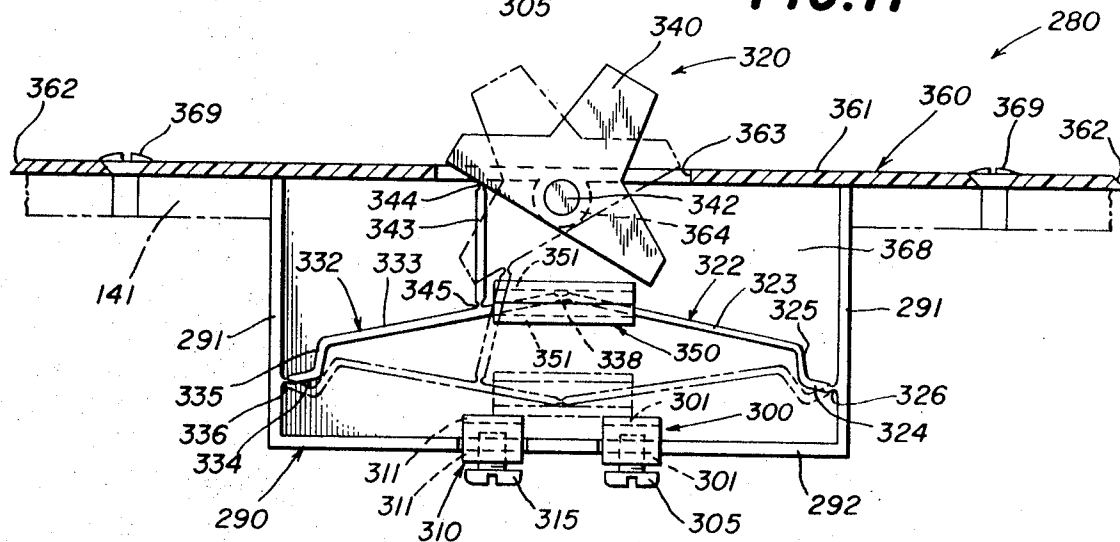
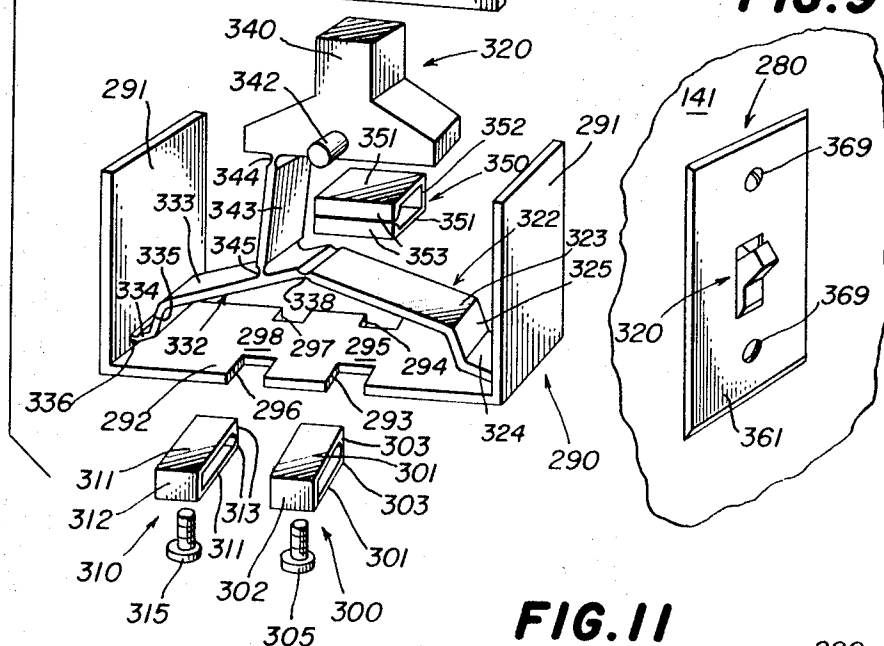
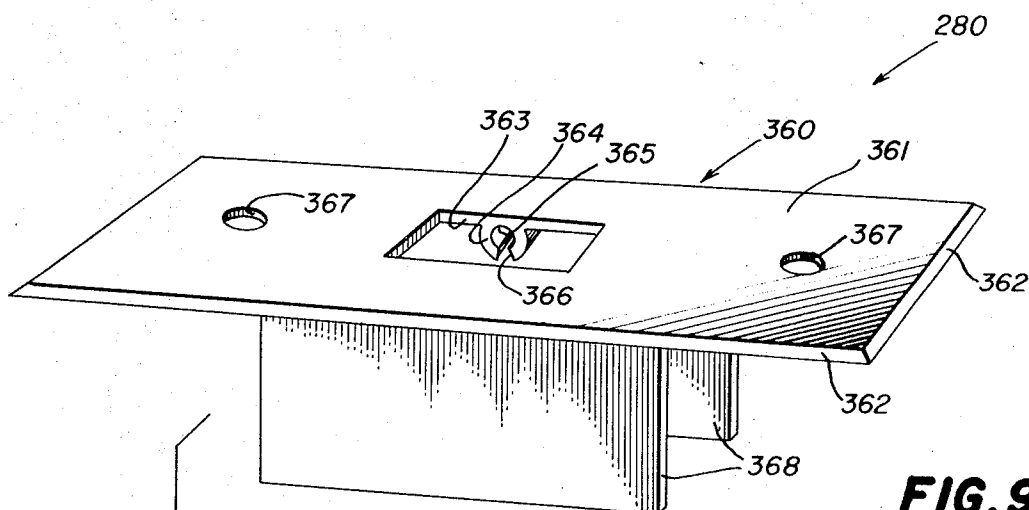


FIG. 8





ELECTRICAL SWITCH HAVING INTEGRAL PLASTIC PARTS

This invention is directed to electrical switches, and more particularly to an electrical switch including a minimum of integral plastic parts and a set of electrical contacts.

An important object of the present invention is to provide an electrical switch comprising a plastic housing including a fixed contact support integral therewith, a fixed electrical contact mounted on the fixed contact support, an integral plastic actuator including a pair of arms and at least four hinges and a handle for controlling the position of the arms, the handle including an elongated bar slidably movable with respect to the housing and having opposing mounting surfaces thereon, the movable electrical contact including a pair of legs biased toward one another and joined at one end thereof by a bight, the legs being disposed respectively adjacent to the opposing surfaces of the elongated bar and urged thereagainst, securely to retain the movable electrical contact at a selected position on the elongated bar, a first of the hinges joining one of the arms adjacent to one of the ends thereof to one of the mounting surfaces, a second of the hinges joining the other of the arms adjacent to one of the ends thereof to the other of the mounting surfaces, a third of the hinges connecting the one arm adjacent to the other end thereof to the housing at a first mounting point thereon, a fourth of the hinges connecting the other arm adjacent to the other end thereof to the housing at a second mounting point thereon spaced from the first mounting point, sliding movement of the bar flexing the hinges to swing the arms with respect to the mounting point toward and away from the fixed electrical contact, the combined effective length of the arms exceeding the distance between the mounting points to accommodate snap movement of the arms between first and second stable positions thereof, and a movable electrical contact carried by the bar and disposed adjacent to the arms and being held against the fixed electrical contact when the arms are in the first stable condition thereof and being held away from the fixed electrical contact when the arms are in the second stable condition thereof.

Another object of the present invention is to provide an electrical wall switch for mounting on a wall in an opening therein for selectively connecting a source of electric power to a load, the wall switch comprising a first integral housing section mounted in use in the associated wall opening, a first fixed electrical contact mounted on the first housing section and adapted to be coupled to the load, a second fixed electrical contact mounted on the first housing section and spaced from the first electrical contact and adapted to be coupled to the source of electric power, an integral plastic actuator including a pair of arms and a hinge and a handle operatively connected to the arms for controlling the position thereof, the hinge joining the arms together adjacent to one of the ends thereof and being integral therewith, means respectively swingably connecting the arms adjacent to the other ends thereof to the first housing section at spaced-apart mounting points thereon, a second integral plastic housing section including a decorative plastic face plate for mounting on the associated wall and including a handle support integral therewith for pivotally supporting the handle, pivotal movement of the handle flexing the hinge to swing the arms with respect to the mounting points toward and away from the fixed electrical contacts, a movable electrical contact operated by the actuator and being held against the fixed electrical contacts when the arms are in the first stable condition thereof to connect the source of electric power to load, the movable electrical contact being held away from the fixed electrical contacts when the arms are in the second stable condition thereof to disconnect the source of electric power from the load.

Further features of the invention pertain to the particular arrangement of the parts 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 drawings, in which:

FIG. 1 is a perspective view of a table lamp provided with a socket assembly incorporating the features of the present invention;

FIG. 2 is an exploded view on an enlarged scale of the socket assembly of FIG. 1;

FIG. 3 is an enlarged cross-sectional view of the socket assembly of FIG. 1 taken along the lines 3-3 thereof;

FIG. 4 is an enlarged cross-sectional view of the socket assembly of FIG. 3 taken along the lines 4-4 thereof;

FIG. 5 is a view of an electrical wall switch mounted on a wall, the wall switch representing a second embodiment of the invention;

FIG. 6 is an exploded view on an enlarged scale of the electrical wall switch of FIG. 5;

FIG. 7 is a side elevational view on an enlarged scale of one of the wall switches of FIG. 6 with one of the housing sections removed and illustrating the switch parts in the unconnected condition thereof;

FIG. 8 is a side elevational view on an enlarged scale of the parts of FIG. 7 and illustrating the switch parts in the disconnected condition thereof;

FIG. 9 is a view of an electrical wall switch mounted on a wall. The wall switch representing a third embodiment of the invention;

FIG. 10 is an exploded view on an enlarged scale of the electrical wall switch of FIG. 9; and

FIG. 11 is an enlarged view in vertical cross section of the electrical wall switch of FIG. 10.

Referring to the drawings, and particularly to FIGS. 1 to 4 thereof, there is illustrated a table lamp 20 incorporating the features of the present invention. The table lamp 20 includes a base 21 supporting a socket assembly 25 for receiving a light bulb 22. The bulb 22 may be selectively turned off and on by the operation of an actuator 100, as will presently be described.

Referring specifically to FIGS. 2 to 4, the socket assembly 25 includes a first integral housing section 30 having a body 31, the body 31 being defined by a pair of spaced-apart sidewalls 32 and a rear wall 33 integral with the sidewalls 32. Formed in each of the sidewalls 32 on the free edge thereof is a slot 32a, the slots 32a lying on a plane substantially normal to the planes of the side walls 32. There is further provided a bottom wall 34 integral with the bottom edges of the sidewalls 32 and the rear wall 33. Formed integral with the bottom wall 34 is a semicircular hollow leg 36 which defines half of a duct 37. Disposed on top of the sidewalls 32 and the rear wall 33 and integral therewith is a semicircular frustoconical neck 35.

Formed integral with the housing section 30 and on the rear wall 33 thereof is a first fixed contact support 40, the support 40 including a pair of spaced-apart L-shaped retaining flanges 41 and 42 spaced apart by a predetermined distance to define an L-shaped slot 43, the slot 43 having both horizontal and vertical extents. Disposed beneath the first contact support 40 and aligned therewith and on the other side of the plane defined by the sidewall slots 32a is a second fixed contact support 50. The contact support 50 includes a pair of L-shaped retaining flanges 51 and 52 spaced apart by a predetermined distance to define an L-shaped slot 53, the slot 53 having a vertical extent vertically aligned with the vertical extent of the slot 43 and having a horizontal extent directed generally parallel to the horizontal extent of the slot 43.

Disposed adjacent to the contact support 40 and spaced therefrom is a first trunnion 55 integral with the rear wall 33 and extending outwardly therefrom and having an annular bearing surface 56. Disposed adjacent to the contact support 50 and spaced vertically below the first trunnion 55 by a predetermined distance is a second trunnion 57 integral with the rear wall 33 and extending outwardly therefrom and having an annular bearing surface 58.

The housing section 30 finally includes a ledge 59 integral therewith and extending forwardly from the rear wall 33 and disposed slightly beneath the neck 35.

The socket assembly 25 further comprises a second integral housing section 80 which is a substantial mirror image of the

first integral housing section 30. Specifically, the housing section 80 includes a body 81, the body 81 being defined by a pair of spaced-apart sidewalls 82 (only one is shown) and a rear wall 83 integral with the sidewalls 82. Formed in each of the sidewalls 82 on the free edge thereof is a slot 82a, the slots 82a lying on a plane substantially normal to the planes of the sidewalls 82 and laterally respectively aligned with the slots 32a. Disposed on top of the sidewalls 82 and the rear wall 83 and integral therewith is a semicircular frustoconical neck 85. It is to be understood that although the drawings illustrate only certain of the parts of the second housing section 80, it in fact includes each of the parts described with reference to the housing section 30. In particular, there is a fixed contact support on the rear wall 83 of the housing section 80 laterally aligned with the contact support 43, and a fixed contact support 87 (FIG. 4) laterally aligned with the fixed contact support 50. A trunnion is provided on the rear wall 83 of the housing section 80 aligned with the trunnion 55, and there is a trunnion 88 (FIG. 4) aligned with the trunnion 57.

The socket assembly 25 further comprises a first fixed electrical contact 60 including a longer platelike leg 61, a shorter platelike leg 62 directed generally parallel to the leg 61 and spaced therefrom, and a connecting platelike web 63 connecting the legs 61 and 62. The socket assembly 25 also comprises a second fixed electrical contact 70 including a longer platelike leg 71, a shorter platelike leg 72 directed generally parallel to the leg 71 and spaced therefrom, and a connecting platelike web 73 connecting the legs 71 and 72. Formed in the leg 71 is a threaded aperture 74 which is engaged by a headed screw 75. In passing, it is noted that the platelike legs 61 and 71 are equal in horizontal extent, and the platelike legs 62 and 72 are equal in horizontal extent.

The socket assembly 25 further comprises a socket 90 including an annular sidewall 91 and a bottom wall 92. As can best be seen in FIG. 3, a first input electrical contact 93 is secured to the bottom wall 92 and extends downwardly therefrom. Secured to the sidewall 91 is a second input electrical contact 94 having a threaded aperture 95 therein engaged by a headed screw 96.

The socket assembly 25 also comprises an integral plastic actuator 100 including a handle portion 101 defined by an elongated slablike bar 102 having opposing mounting surfaces 103 and 104. Respectively disposed on the ends of the elongated bar 102 and integral therewith is a pair of buttons 105 and 106. The actuator also includes a first arm 111 swingably joined to the support surface 103 by means of a first hinge 112, and a second arm 113 swingably joined to the support surface 104 by means of a second hinge 114. There is also provided a pair of annular support shafts 115 and 117 each having a diameter in the embodiment shown, substantially equal to the diameter of the trunnion bearing surfaces 56 and 58. The arm 111 is swingably joined to the support shaft 115 longitudinally thereon by means of a hinge 116, and the arm 113 is swingably joined to the support shaft 117 longitudinally thereon by means of a hinge 118. As will be more fully appreciated hereinafter it is important to note that the sums of the effective lengths of the arms 111 and 113, including the thickness of the bar 102, is greater than the predetermined distance between the trunnions 55 and 57.

The socket assembly 25 finally comprises a movable electrical contact 120 including a bight 122 carrying a pair of legs 121 resiliently biased toward one another. Disposed on the free ends of the legs 121 and depending toward one another are two fingers 123 having beveled ends 124.

In assembling the socket assembly 25, the electrical contact 60 is forcibly urged into the L-shaped slot 43 defined by the retaining flanges 41 and 42, and specifically the leg 61 is forced into the horizontal extent of the slot 43, and the connecting web 63 is forced into the vertical extent of the slot 43. Because the thickness of the metal bent to form the contact 60 is slightly greater than the width of the slot 43, this procedure insures positive extension of the contact 60 by the support 40. Similarly the second electrical contact 70 is forcibly urged

into the L-shaped slot 53 defined by the retaining flanges 51 and 52, thereby to provide positive retention of the contact 70 by the support 50. The movable electrical contact 120 is then mounted on the actuator bar 102 on the portion thereof between the button 106 and the arms 111 and 113, but close to the latter. This is accomplished by pushing the beveled ends 124 against the bar 102 to spread apart the fingers 122 and 123, and thereby enable them to be pushed on to the bar 102. The legs 121 are then disposed respectively adjacent to the opposing surfaces 103 and 104 of the bar 102 and urged thereagainst by the resiliency in the legs 121, securely to retain the movable electrical contact 120 at a selected position on the bar 102.

One end portion of the shaft 115 is forcibly urged into the trunnion bearing surface 56, and because of the diametrical relationship therebetween in the embodiment shown, the shaft 115 is precluded from rotation with respect to the housing section 30. Similarly, the corresponding end portion of the shaft 117 is forcibly urged into the trunnion bearing surface 58 and is also precluded from rotation with respect thereto in the embodiment shown. Rendering the shafts 115 and 117 nonrotatable with respect to the housing section 30 is not necessary and if the housing sections are to be attached together, at least some rotation of the shafts 115 and 117 would be desirable. The elongated bar 102 is positioned within the slots 32a so as to be slidable with respect to the housing section 30.

As shown in FIG. 3, the socket 90 is seated on the ledge 59 and suitably secured to the housing section 30. The first input electrical contact 93 is electrically connected to the adjacent portion of the fixed electrical contact leg 61. A first wire 127 is attached to the second input electrical contact 94 with the screw 96. A second wire 128 is connected to the fixed electrical contact 70 by means of the screw 75.

The second housing section 80 is then positioned adjacent to the first housing section 30 such that the counterparts to the fixed contact supports 40 and 50 are respectively aligned with the adjacent portions of the fixed electrical contacts 60 and 70. In addition, the two trunnions integral with the housing section 80 are aligned with the adjacent portions of the actuator shafts 115 and 117, and the slots 82a are aligned with the elongated bar 102. The housing section 80 is then drawn against the housing section 30 to fix the electrical contacts 60 and 70 with respect to the housing sections 30 and 80 and to fix the shafts 115 and 117 with respect to the housing sections 30 and 80. The hollow semicircular leg 36 mates with counterpart semicircular leg on the housing section 80 to define a circular duct 37 for passage of the wires 127 and 128. If desired, the edges of the housing section 30 including the edges of the neck 35, the body 31 and the leg 36 are joined by cement or the like to the corresponding edges of the housing section 80. It should be appreciated however that in general, the retention of the fixed electrical contacts 60 and 70 by the contact supports, and the retention of the actuator 100 by the trunnions should be sufficient to hold the housing sections 30 and 80 together.

In operation, the actuator 100 is to be operated selectively to turn on and off the light bulb 22. A first terminal from a source of electric-power (not shown) is coupled to the first input electrical contact 94 of the socket 90 via the wire 127, and the second terminal of the source of electric power is coupled to the fixed electrical contact 70 via the wire 128. To turn on the light bulb 22, it is necessary electrically to connect the fixed electrical contact 70 to the fixed electrical contact 60 which in turn connects the second terminal of the electric power source to the second input electrical contact 93 of the socket 90. Of course, to turn off the light bulb 22, it is necessary to disconnect the fixed electrical contact 60 from the fixed electrical contact 70.

Referring now to FIG. 3, the method of connecting and disconnecting the contacts 60 and 70 will be described. The arms 111 and 113 of the actuator 110 have only two stable conditions because of the fact that the arm of the lengths of the arms 111 and 113, plus the thickness of the bar 102 ex-

ceeds the distance between the trunnions 55 and 57. When the arms 111 and 113 are disposed on one side of the plane defined by the trunnions 55 and 57, they are in the first stable condition thereof, and when the arms 111 and 113 are disposed on the other side of said plane they are in the second stable condition thereof.

In FIG. 3, the solid lines illustrate the arms 111 and 113 toward the right so as to be disposed in the stable condition thereof. Because the movable electrical contact 120 is fixed at a selected position on the bar 102, the contact 120 will be disengaged from the aligned ends of the fixed electrical contact legs 62 and 72, thereby electrically to disconnect the contacts 60 and 70 to cause the light bulb 22 to be off. The arms 111 and 113 are shifted into the second stable condition thereof by pushing on the bottom 105 to move the bar 102 to the left as viewed in FIG. 3, the bar 102 flexing the hinges 112, 114, 116, 118 and carrying the arms 111 and 113 past the plane defined by the trunnions 115 and 117 and into the second stable condition. As shown by the dashed lines of FIG. 3, the contact 120 is arranged on the bar 102 such that it then engages the aligned ends of the fixed electrical contact legs 62 and 72, thereby electrically to connect the contacts 60 and 70 to turn on the light bulb 22. To turn off the light bulb 22, the button 106 is pushed to move the bar 102 to the right which carries the arms 111 and 113 back to the first stable condition thereof, thereby to disengage the contact 120 from the electrical contact legs 62 and 72 to turn off the light bulb 22.

The socket assembly 25 together with the electrical switch incorporated therein has the advantage over presently available socket assemblies of being rather attractive and modern in appearance. It is simpler and substantially less expensive to manufacture various different shapes when the housing is formed of molded plastic, as opposed to the standard metal socket assembly available today.

Moreover, the socket assembly 25 has fewer parts than the presently available socket assembly, primarily due to the fact that each of the mounts are integrally molded with the associated housing section and the actuator 100 is also integral, whereby the only additional parts needed are the contacts 60, 70, and 120 and the socket 90.

Referring now to FIGS. 5 to 8, there is illustrated a wall switch 140 representing a second embodiment of the present invention. The wall switch 140 includes a decorative face plate 142 and two screws 143 for attaching the face plate to the housing of the switch 140. The switch includes an actuator 230 operable for connecting and disconnecting a source of electric power to a ceiling light, for example.

Referring specifically to FIG. 6, the wall switch 140 includes a first integral housing section 150 having a body 151, the body 151 being defined by a pair of spaced-apart sidewalls 152 and a rear wall 153 integral with the sidewalls 152. There is also provided a bottom wall 154 integral with the bottom edges of the sidewalls 152 and the rear wall 153, the bottom wall 154 on the free edge thereof having a pair of spaced-apart cutouts 155 and 156. There is also provided a top wall 157 integral with the upper edges of the sidewalls 152 and the rear wall 153, the top wall 157 having on the free edge thereof and approximately centrally thereof a cutout 158. Integral with the top wall 157 and adjacent to the slot 158 is a laterally extending trunnion 159 having an annular bearing surface 160.

Extending outwardly from the top wall 157 and integral therewith and in the plane thereof is a pair of mounting plates 161 each having on the outer end thereof a laterally extending mounting ear 162. The lateral extent of each of the mounting plates 161 is approximately double the lateral extent of the top wall 157. A laterally extending mounting slot 163 is provided in each of the ears 162, and a mounting aperture 164 is provided in each plate 161 adjacent to the associated slot 163.

Formed integral with the housing section 150 and on the bottom wall 154 thereof is a first fixed contact support 170, the support 170 including a pair of opposing C-shaped rails 171 and 172 facing one another and disposed on the sides of the cutout 155. The support 170 also includes an abutment

member 174 at the rear end of the cutout 155 and extending upwardly from the bottom wall 154. Disposed laterally of the first fixed contact support 170 is a second fixed contact support 180 including a pair of opposing C-shaped rails 181 and 182 facing one another and disposed on the sides of the cutout 156. The support 180 includes an abutment member 184 at the rear end of the cutout 156 and extending upwardly from the bottom wall 154.

Disposed on the right-hand sidewall 152 (as viewed in FIG. 6) adjacent to the bottom wall 154 is a laterally extending first trunnion 190 having an annular bearing surface 191 therein and a longitudinally extending slot 192 communicating with the bearing surface 191. Disposed on the left-hand sidewall 152 and lying in a plane that passes through the first trunnion 190 and is directed generally parallel to the bottom wall 154 is a second trunnion 195 having an annular bearing surface 196 therein and a longitudinally extending slot 197 communicating with the bearing surface 196.

The wall switch 140 further comprises a second integral housing section 200 which is a substantial mirror image of the first integral housing section 150. Specifically the housing section 200 includes a body 201, the body 201 being defined by a pair of spaced-apart sidewalls 202 (only one is shown), a rear wall 203 integral with the sidewalls 202, a bottom wall (not shown), and a top wall 207 having cutout 208 therein. It is to be understood that although the drawings illustrate only certain of the parts of the second housing section 200, it in fact includes each of the parts described with reference to the housing section 150, except for the mounting plates 161 which in the embodiment shown are both integral with the first housing section 150. In particular, there are two fixed contact supports on the bottom wall of the housing section 200 respectively laterally aligned with the fixed contact supports 170 and 180. Two trunnions are provided respectively on the sidewalls 202 of the housing section 200 and aligned with the associated trunnions 190 and 195. Lastly there is provided a trunnion adjacent to the slot 208 of the housing section 200 and integral with the top wall 207 and aligned with the trunnion 159 on the housing section 150.

The wall switch 140 further comprises a first fixed electrical contact 210 including a base 211 having thickness slightly less than the distance between the legs on the C-shaped rails 171 and 172 and also having a threaded aperture 212 therein for engaging a headed screw 215. The first fixed electrical contact 210 also includes a spacer member 213 on the base 211 and carrying a contact member 214 directed generally parallel to the base 211, the spacer and contact members 213 and 214 having widths slightly less than the distance between the inner ends of the C-shaped rails 171 and 172.

The wall switch 140 also comprises a second fixed electrical contact 220 including a base 221 having a thickness slightly less than the distance between the legs on the C-shaped rails 181 and 182 and also having a threaded aperture 222 therein for engaging a headed screw 225. The second fixed electrical contact 220 also includes a spacer member 223 on the base 221 and carrying a contact member 224 directed generally parallel to the base 221, the spacer and contact members 223 and 224 having widths slightly less than the distance between the inner ends of the C-shaped rails 181 and 182.

The wall switch 140 further comprises an integral plastic actuator 230 including a first arm 232 having a main section 233, an offset section 234 and a connecting section 235 integral therewith and with the main section 233. There is also provided an annular support shaft 237 having a diameter substantially equal to the diameter of the trunnion bearing surface 191 in the embodiment shown. The arm 232 is swingably joined to the support shaft 237 longitudinally thereon by means of a first hinge 236. The actuator 230 further includes a second arm 242 having a main section 243, an offset section 244 and a connecting section 245 integral therewith. There is also provided an annular support shaft 247 having a diameter substantially equal to the diameter of the trunnion bearing surface 196 in the embodiment shown. The arm 242 is swingably

joined to the support shaft 247 longitudinally thereon by means of a second hinge 246. The other ends of the arms 232 and 242 are swingably joined together by means of a third hinge 248. As described with respect to the embodiment of FIGS. 1 to 4, it is important to note that the sum of the effective lengths of the arms 232 and 242 is greater than the distance between the trunnions 190 and 195.

The actuator 230 further includes a handle 250 having a pair of shafts 252 (only one is shown) extending laterally outwardly therefrom in opposing directions. The diameter of each of the shafts 252 is slightly less than the diameter of the trunnion bearing surface 160. The actuator 230 finally includes a link 253 joined to the handle 250 by means of a fourth hinge 254, and joined by means of a fifth hinge 255 to the arm 242 at a point thereon near the hinge 248.

The wall switch 140 finally comprises a movable electrical contact 260 including a contact member 261 in the form of a plate, the member 261 carrying a leg 262 directed generally parallel thereto and being resiliently biased toward the member 261. There is also provided a finger 263 on the free end of the leg 262 for engaging the member 261.

In assembling the wall switch 140, the fixed electrical contact 210 is mounted in the fixed contact support 170 by sliding the base 211 into the opposing C-shaped rails 171 and 172 and up against the abutment member 174. Similarly, the second fixed electrical contact 220 is mounted in the fixed contact support 180 by sliding the base 221 into the opposing C-shaped rails 181 and 182 and up against the abutment member 184. By reason of the spacer members 213 and 223, the contact members 214 and 224 are spaced from the housing bottom wall 154 and lie in a common horizontal plane. The movable electrical contact 260 is mounted on the actuator arms 232 and 242 by moving the leg 262 away from the contact member 261, and then moving the contact 260 such that the leg 262 is disposed directly over the hinge 248. Due to the resiliency of the leg 262, it is urged against the arms 232 and 242, securely to retain the movable electrical contact 260 at the selected position thereon.

One end portion of the shaft 237 is forcibly urged into the trunnion bearing surface 191 with the hinge 236 being seated within the slot 192. Because of the diametrical relationship between the support shaft 237 and the trunnion bearing surface 191, the shaft 237 is precluded from rotation with respect to the housing section 150. Similarly, the corresponding end portion of the shaft 247 is forcibly urged into the trunnion bearing surface 196 with the hinge 246 being seated within the slot 197, the shaft 247 also being precluded from rotation with respect to the housing section 150. As was the case with the embodiment of FIGS. 1 to 4, it is not necessary that the shafts 237 and 247 be nonrotatable with respect to the housing section 150, but instead may be rotatable. The adjacent shaft 252 on the handle 250 is then rotatably journaled into the trunnion bearing surface 160 so as to be pivotal with respect to the housing section 150, with part of the handle 250 extending through the slot 158 and out of the housing section 150.

The second housing section 200 is then positioned adjacent to the first housing section 150 and between the free opposing edges of the mounting plates 161 and such that the counterparts to the fixed contact supports 170 and 180 are respectively aligned with the adjacent portions of the fixed electrical contacts 210 and 220. In addition, the two trunnions integral with the housing section 200 that correspond to the trunnions 190 and 195 are aligned with the adjacent portions of the actuator shafts 237 and 247, and the trunnion counterpart to the trunnion 159 is aligned with the adjacent shaft 252. The housing section 200 is then drawn against the housing section 150 to seat each of the fixed electrical contacts 210 and 220 between the associated opposing abutment surfaces and between the associated opposing C-shaped rails, thereby to fix the position of the contacts 210 and 220 with respect to the housing sections 150 and 200. The drawing together of the housing sections 150 and 200 also seats the shafts 237, 247 and 252 in the associated trunnions on the housing section

200. As was the case with the embodiment of FIGS. 1 to 4 the edges of the housing sections 150 and 200 may be joined together by cement or the like. If however, the diameters of shafts 237 and 247 are respectively equal to the diameters of the trunnion bearing surfaces 191 and 196 as is the case in the embodiment shown, the actuator 230 can hold the housing sections 150 and 200 together.

In operation, the actuator 230 is to be operated selectively to connect and disconnect a source of electric power (not shown) to and from a load such as a ceiling light fixture. Thus, for example, one terminal of the electric power source is to be coupled directly to one input of the ceiling light fixture, the second terminal of the electric power source is to be coupled to the contact 210 by use of the headed screw 215, and the second input of the ceiling light fixture is to be coupled to the electrical contact 220 by use of the headed screw 225. To turn on the ceiling light fixture, it is necessary electrically to connect the fixed electrical contacts 210 and 220 together which in turn connects the second terminal of the electric power source to the second input of the ceiling light fixture. To turn off the light fixture, it is necessary to disconnect the fixed electrical contacts 210 and 220.

Reference is now made to FIGS. 7 and 8 to describe the method of connecting and disconnecting the contacts 210 and 220. As was the case in the embodiment of FIGS. 1 to 4, the actuator arms 232 and 242 have only two stable conditions because of the fact that the sum of the lengths of the arms 232 and 242 exceeds the distance between the trunnions 190 and 195. When the arms 232 and 242 are disposed on one side of the plane defined by the trunnions 190 and 195, the arms are in the first stable condition, and when the arms 232 and 242 are disposed on the other side of said plane they are in the second stable condition.

In FIG. 7, the parts of the wall switch 140 are illustrated in the position wherein the contacts 210 and 220 are disconnected. As viewed in FIG. 7, the arms 232 and 242 are disposed above the plane defined by the trunnions 190 and 195 so as to be in the first stable condition thereof. The movable electrical contact 260 carried by the arms 232 and 242 at a fixed selected position thereon is disposed away from the contacts 210 and 220. The link 253 is disposed essentially vertically as viewed in FIG. 7 and the handle 250 is tilted toward one of the mounting plates 161.

To turn the ceiling light fixture on, the user grasps the handle 250 and pivots it about the pivot axis defined by the shafts 252 toward the position illustrated in FIG. 8 wherein the handle 250 is tilted toward the second mounting plate 161. Because of the location of the link 253 on the handle 250, the pivoting movement of the handle 250 tilts the link 253 somewhat and moves the arm 242 downwardly, which movement is transmitted to the arm 232 via the hinge 248. In FIG. 8, the arms 232 and 242 are in the second stable condition thereof, that is, they are below the plane defined by the trunnions 190 and 195. The arms 232 and 242 carry and urge the movable electrical contact 260 against the fixed electrical contacts 210 and 220 to connect the electric power source to the load.

To disconnect the power source from the load, the handle 250 is pivoted toward the first-mentioned mounting plate 161, which motion carries upwardly the arms 232 and 242 by way of the link 253, again to place the parts of the wall switch 140 in the condition illustrated in FIG. 7.

As was the case with the embodiment of FIGS. 1 to 4, an important advantage of the wall switch 140 having the construction just described is the reduction in the number of separate parts. In the particular embodiment described, the wall switch 140 had only eight parts, namely, the housing sections 150 and 200, the fixed electrical contacts 210 and 220, the headed screws 215 and 225, the actuator 230, and the movable electrical contact 260. This advantage may be more fully appreciated by considering that most of the presently available wall switches now consist of 18 or more parts.

Referring now to FIGS. 9 to 11, there is illustrated a wall switch 280 representing a third embodiment of the present invention. Referring specifically to FIG. 10, the wall switch 280 includes a first integral housing section 290 defined by a pair of spaced-apart end walls 291 and a base wall 292 integral therewith. Formed in the bottom wall 292 nearer to one of the end walls 291 is a pair of laterally aligned notches 293 and 294 to define a fixed contact support 295 therebetween. Formed in the base wall 292 nearer the other end wall 291 is a second pair of laterally aligned notches 296 and 297 which define a fixed contact support 298 therebetween.

The wall switch 280 also comprises a first fixed electrical contact 300 including a bight 302 and a pair of parallelly extending legs 301 thereon. Each of the legs 301 carries a finger 303 directed toward the opposing leg 301. There is also included a headed screw 305 for engaging in an aperture in one of legs 301. The wall switch 280 further comprises a second fixed electrical contact 310 including a bight 312 and a pair of parallelly extending legs 311 thereon. Each of the legs 311 carries a finger 313 directed toward the opposing leg 311. There is also included a headed screw 315 for engaging in an aperture in one of the legs 311.

The wall switch 280 further comprises an integral plastic actuator 320 including a first arm 322 having a main section 323, an offset section 324 and a connecting section 325 integral therewith and with the main section 323. The arm 322 is swingably joined by means of a first hinge 326 to one of the end walls 291 at a first mounting point thereon. The actuator 320 further includes a second arm 332 having a main section 333, an offset section 334 and a connecting section 335 integral therewith and with the main section 333. The arm 332 is swingably joined by means of a second hinge 336 to the other of the end walls 291 at a second mounting point thereon lying on a plane passing through the first mounting point and directed generally parallel to the bottom wall 292. The other ends of the arms 322 and 332 are swingably joined together by means of a third hinge 338. Again, as previously described with respect to the first two embodiments, it is important to note that the sum of the effective lengths of the arms 322 and 332 is greater than the distance between the first and second mounting points respectively on the end walls 291.

The actuator 320 further includes a handle 340 having a pair of shafts 342 (only one is shown) extending laterally outwardly therefrom in opposing directions. The actuator 320 finally includes a link 343 joined to the handle 340 by means of a fourth hinge 344, and is joined by means of a fifth hinge 345 to the arm 332 at a point thereon near the hinge 338.

The wall switch 280 further comprises a movable electrical contact 350 in the form of a sleeve and including a bight 352 and a pair of parallelly extending legs 351 thereon. Each of the legs 351 carries a finger 353 directed toward the opposing leg 351.

The wall switch 280 finally comprises a second integral housing section 360 including a decorative face plate 361 with beveled edges 362. Approximately centrally in the face plate 361 is a rectangular cutout 363. Respectively on the sides of the cutout 363 and integral with the face plate 361 are a pair of laterally aligned trunnions 364 (only one is shown). Each of the trunnions 364 has an annular bearing surface 365 therein and a longitudinally extending slot 366 communicating with the bearing surface 365. Adjacent to the ends of the face plate 361 are a pair of openings 367 for receiving the mounting screws 369. The integral housing section 360 also includes a pair of laterally spaced-apart sidewalls 368 integral with the face plate 361 and depending downwardly therefrom.

In assembling the wall switch 280, the fixed electrical contact 300 is mounted in the fixed contact support 295 by spreading the legs 301 apart and sliding them onto the bottom wall 292. In a similar fashion, the fixed electrical contact 310 is mounted on the fixed contact support 298. The movable electrical contact 350 is mounted on the actuator arms 322 and 332 by spreading apart the legs 351, and then slipping the contact 350 around the hinge 338. The handle 340 is then

passed through the slot 363 in the face plate 361 and the shafts 342 are forcibly urged through the slot 366 and into the trunnion bearing surfaces 365. If desired, the sidewalls 368 may then be joined to the adjacent portions of the sidewalls 291 and the base wall 292. The entire wall switch 280 may now be attached to a wall 141 by merely passing the screws 369 through the openings 367 and into engagement with the wall 141.

In operation, the wall switch 280 performs essentially in the same manner as the wall switch 140, whereby in the interest of brevity, no further description of the operation of the wall switch 280 is given except to not the parts in FIG. 11 are shown in solid lines to indicate the disconnected condition and in broken lines to indicate the connected condition. In the embodiment shown in FIGS. 9 to 11, the number of parts has been further reduced to seven, the face plate 361 being included as one of those parts.

While there have been described what are at present considered to be the preferred embodiments of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications fall within the true spirit and scope of the invention.

I claim:

1. An electrical wall switch for mounting on a wall in an opening therein and for selectively connecting a source of electric power to a load, said wall switch comprising a first integral housing section mounted in use in the associated wall opening, a first fixed electrical contact mounted on said first housing section and adapted to be coupled to the load, a second fixed electrical contact mounted on said first housing section and spaced from said first electrical contact and adapted to be coupled to the source of electric power, an integral plastic actuator including a pair of arms and a hinge and a handle operatively connected to said arms for controlling the position thereof, said hinge joining said arms together adjacent to the other ends thereof and being integral therewith, means respectively swingably connecting said arms adjacent to the other ends thereof to said first housing section at spaced-apart mounting points thereon, a second integral plastic housing section including a decorative plastic face plate for mounting on the associated wall and including a handle support integral therewith for pivotally supporting said handle, pivotal movement of said handle flexing said hinge to swing said arms with respect to said mounting points toward and away from said fixed electrical contacts, a movable electrical contact operated by said actuator and being held against said fixed electrical contacts when said arms are in the first stable condition thereof to connect the source of electric power the load, said movable electrical contact being held away from said fixed electrical contacts when said arms are in the second stable condition thereof to disconnect the source of electric power from the load.

2. The electrical wall switch set forth in claim 1, wherein said first housing section further includes a base wall and a pair of upstanding end walls integral therewith, and said second housing section further includes a pair of side walls integral with said face plate and disposed adjacent to said end walls and defining therewith a closed box.

3. The electrical wall switch set forth in claim 1, wherein said face plate has a slot therein receiving said handle therethrough and said handle support is a trunnion adjacent to said slot, and said handle includes a shaft rotatably journaled in said trunnion to accommodate pivotal movement of said handle for swinging said arms.

4. An electrical switch comprising a plastic housing including a fixed contact support integral therewith, a fixed electrical contact mounted on said fixed contact support, an integral plastic actuator including a pair of arms and at least four hinges and a handle for controlling the position of said arms, said handle including an elongated bar slidably movable with respect to said housing and having opposing mounting surfaces thereon, said movable electrical contact including a pair

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of legs biased toward one another and joined at one end thereof by a bight, said legs being disposed respectively adjacent to the opposing surfaces of said elongated bar an urged thereagainst, securely to retain said movable electrical contact in a selective position on said elongated bar, a first of said hinges joining one of said arms adjacent to one of the ends thereof to one of said mounting surfaces, a second of said hinges joining the other of said arms adjacent to one of the ends thereof to the other of said mounting surfaces, a third of said hinges connecting said one arm adjacent to the other end thereof to said housing at a first mounting point thereon, a fourth of said hinges connecting said other arm adjacent to the other end thereof to said housing at a second mounting point

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thereon spaced from said first mounting point, sliding movement of said bar flexing said hinges to swing said arms with respect to said mounting points toward and away from said fixed electrical contact, the combined effective lengths of said arms exceeding the distance between said mounting points to accommodate snap movement of said arms between first and second stable positions thereof, and a movable electrical contact carried by said bar and disposed adjacent to said arms and being held against said fixed electrical contact when said arms are in the first stable condition thereof and being held away from said fixed electrical contact when said arms are in the second stable condition thereof.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,582,584 Dated June 1, 1971

Inventor(~~S~~) Aaron R. Best

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 10, claim 1, line 38, "the other" should be
-- one of the --.

Column 11, claim 4, line 3, "an" should be -- and --.

Signed and sealed this 28th day of September 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents