June 4, 1940. W. SCHMID 2,203,309

ELECTRICAL SWITCHING DEVICE

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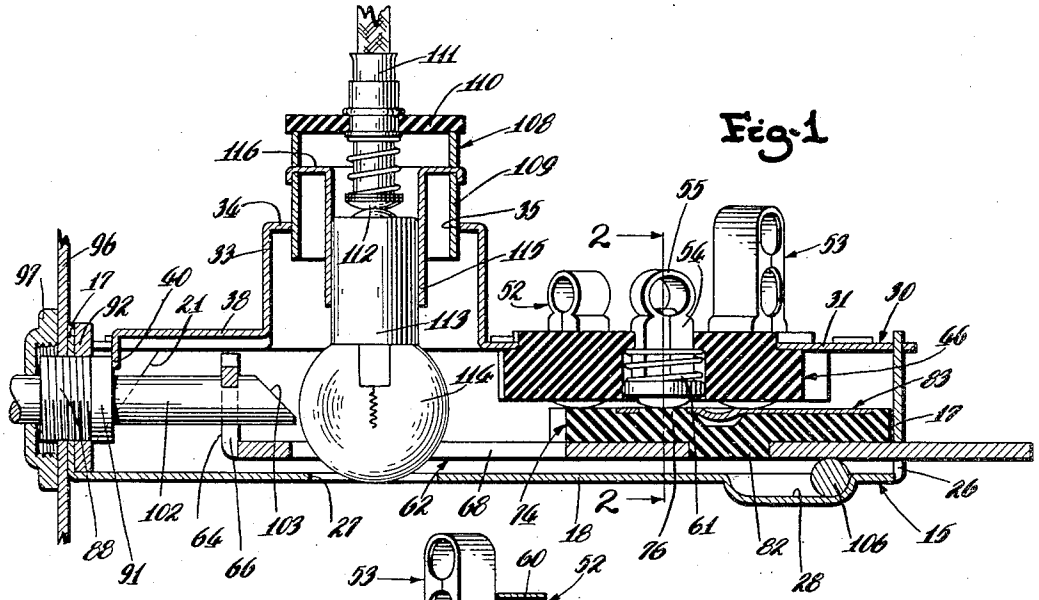


Fig. 1

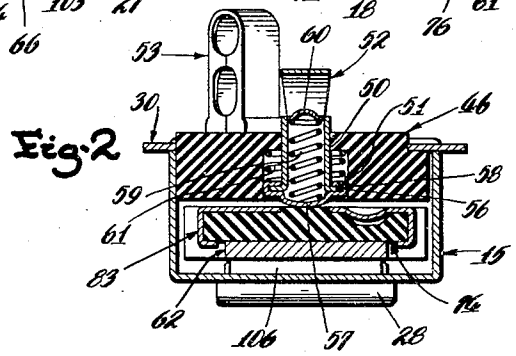


Fig. 2

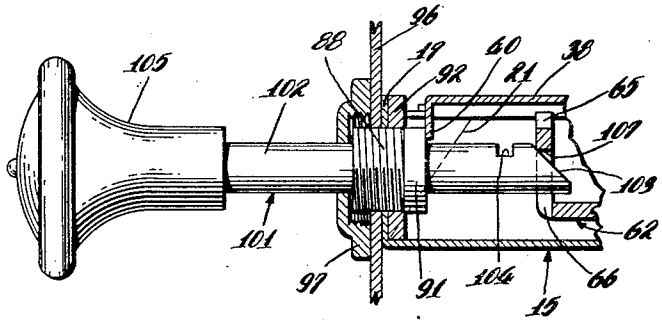


Fig. 3

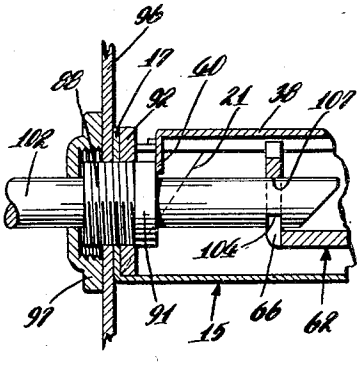


Fig. 4

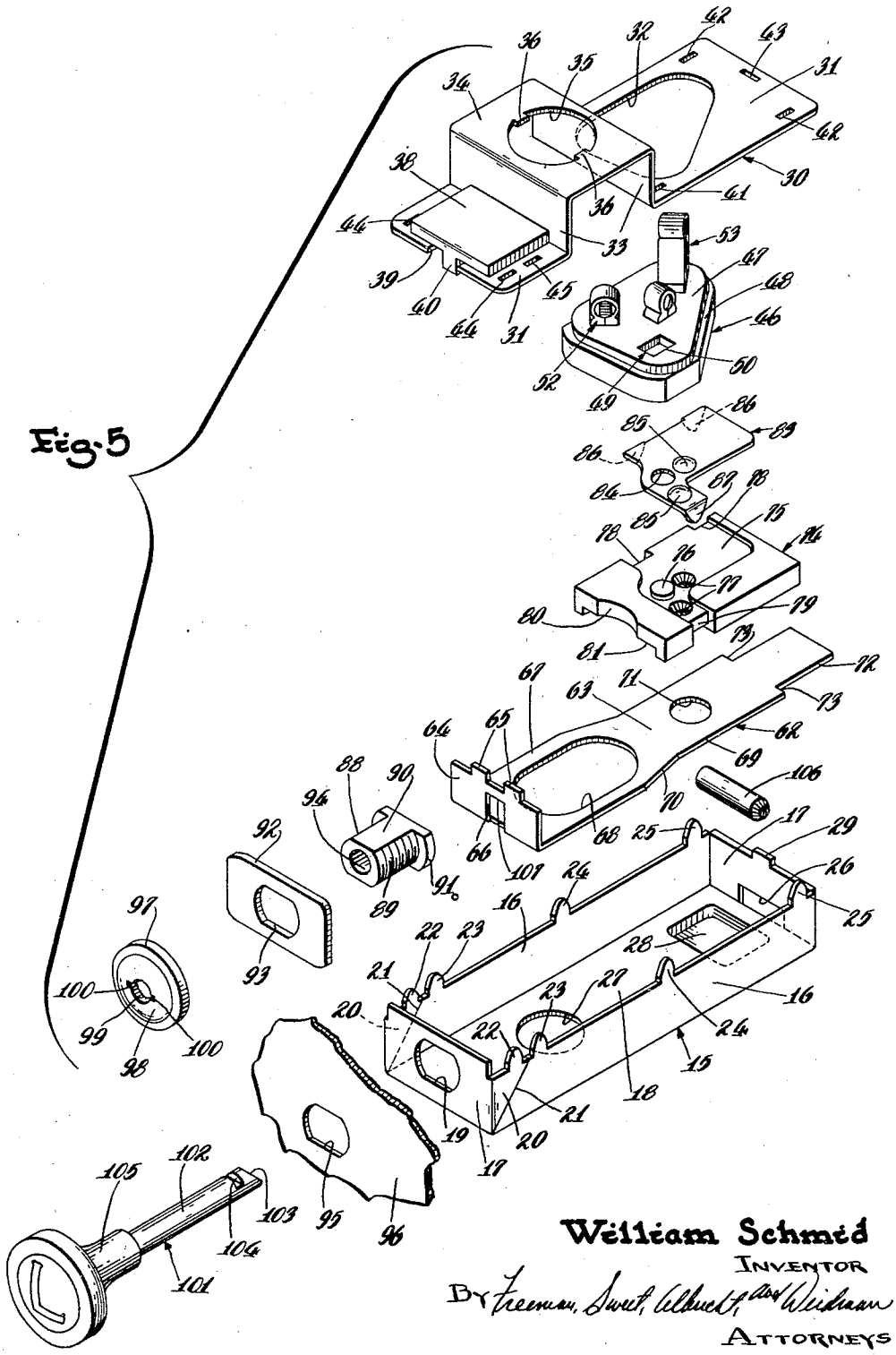
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ELECTRICAL SWITCHING DEVICE

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Fig. 5



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Fig. 6

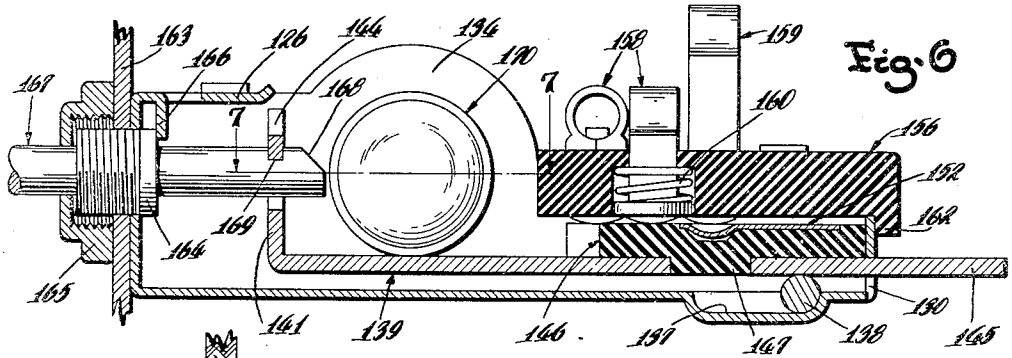


Fig. 7

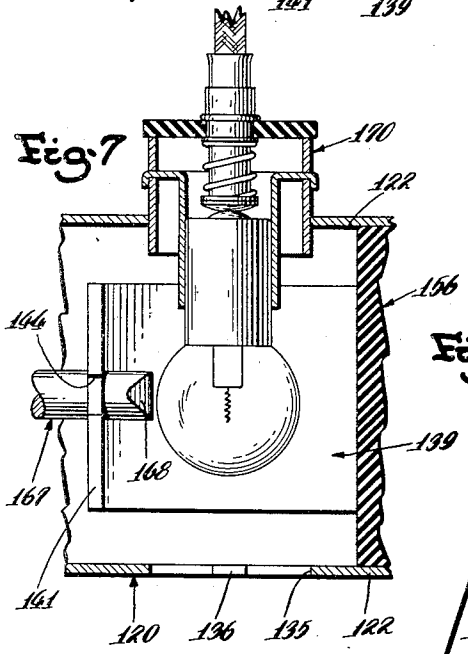
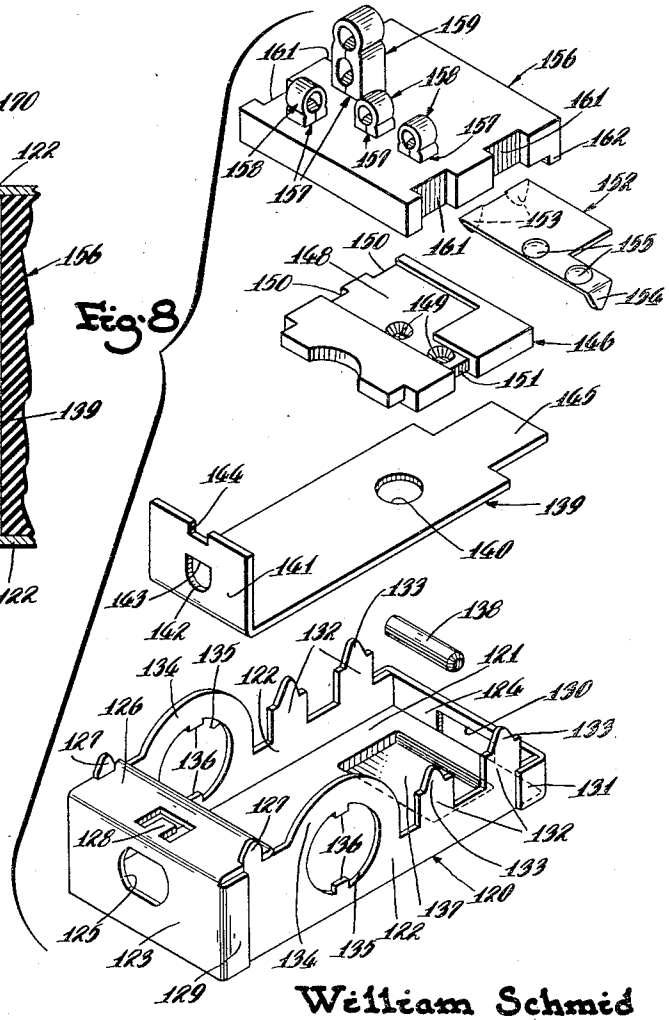


Fig. 8



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ELECTRICAL SWITCHING DEVICE

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Fig. 9

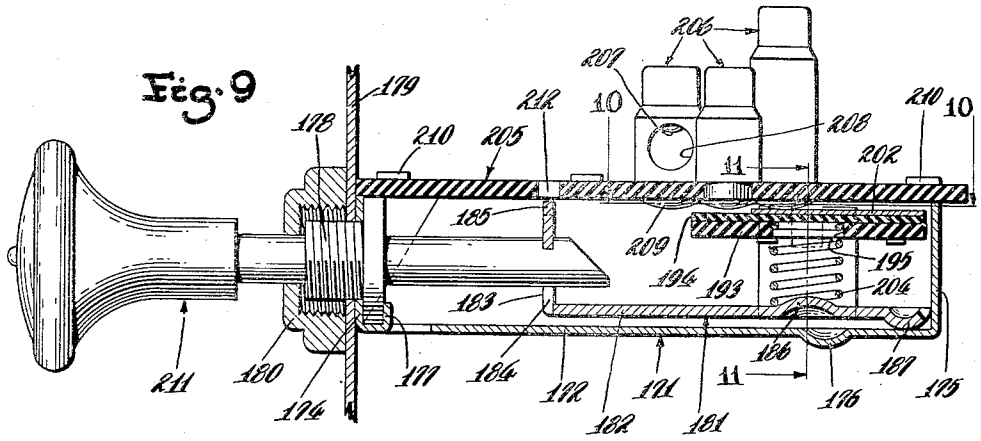


Fig. 10

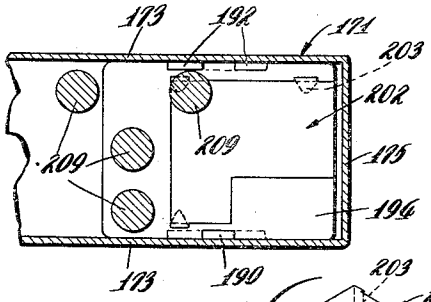


Fig. 11

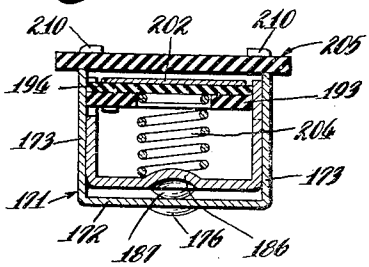
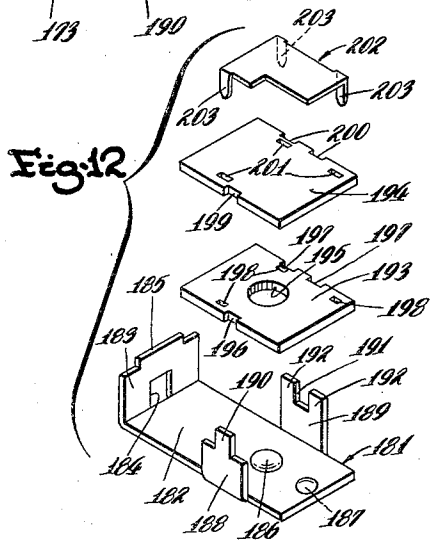


Fig. 12



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Patented June 4, 1940

2,203,309

UNITED STATES PATENT OFFICE

2,203,309

ELECTRICAL SWITCHING DEVICE

William Schmid, Bronson, Mich., assignor, by mesne assignments, to Kingston Products Corporation, a corporation of Indiana

Application November 2, 1936, Serial No. 108,714

6 Claims. (Cl. 200—16)

This invention relates to electrical switching devices, more particularly to the type of switching devices suitable for use with automotive vehicles, and the principal object of this invention is to provide new and improved devices of this type.

In the drawings accompanying the specification and forming a part of this application, I have shown, for purposes of illustration, several forms which my invention may assume, and in these drawings:

Figure 1 is a central longitudinal sectional view through an embodiment of the invention, parts being shown in elevation, and other parts being broken away to better accommodate the view to the sheet,

Figure 2 is a transverse sectional view corresponding substantially to the line 2—2 of Figure 1,

Figure 3 is a fragmentary sectional view, with parts shown in elevation, disclosing a method of assembling the actuator means with the operating means,

Figure 4 is a fragmentary sectional view similar to Figure 3 showing a method of disassembling the actuator means from the operating means,

Figure 5 is a perspective view of some of the parts of the embodiment shown in Figures 1 through 4,

Figure 6 is a central longitudinal sectional view through a different embodiment of the invention, parts being shown in elevation, and parts being broken away,

Figure 7 is a fragmentary horizontal sectional view corresponding substantially to the line 7—7 of Figure 6,

Figure 8 is a perspective view of some of the parts of the embodiment shown in Figures 6 and 7,

Figure 9 is a central longitudinal sectional view of still another embodiment of the invention, parts being shown in elevation,

Figure 10 is a horizontal sectional view corresponding substantially to the line 10—10 of Figure 9,

Figure 11 is a transverse sectional view corresponding substantially to the line 11—11 of Figure 9, and

Figure 12 is perspective view of some of the parts comprising the embodiment shown in Figures 9 through 11.

Referring first to Figures 1 through 5, the embodiment of the invention therein shown comprises a box-like housing means 15, preferably formed of sheet metal, and having integral side walls 16, end walls 17, and a bottom wall 18. As best shown in Figure 5, one end wall 17 is provided with an aperture 19 having arcuate and rectilinear margins, and this end wall is provided with portions 20 bent to lie in planes including the side walls 16, each of the bent portions 20 having an angular defining margin 21 which abuts a complementary margin formed on the side walls 16, so that in effect, the bent portions 20 form continuations of the side walls 16. Each of the bent portions 20 is provided with an extending ear 22, and the adjacent part of the margin of each of the side walls 16 is provided with an extending ear 23. The side walls 16 are also provided with ears 24 formed intermediate their length, and ears 25 are formed on the side walls adjacent the other end 17 of the housing 15. This other end 17 of the housing 15 is provided with an elongated generally rectangular aperture 26, and the bottom wall 18 of the housing 15 is provided with an aperture 27, and an outwardly depressed well portion 28. The end wall 17 in which the aperture 26 is formed is provided with an extending ear 29.

The housing 15 is adapted to be closed by a closure plate 30, having a plane portion 31 provided with a generally triangularly shaped aperture 32. Intermediate the longitudinal extremities of the plane portion 31, the closure plate 30 is provided with integral angularly outwardly extending walls 33, and a wall 34 connecting the walls 33, and disposed substantially parallel to the plane portion 31. The wall 34 is provided with an aperture 35 having inwardly directed projections 36 formed on its margin. The plane portion 31, adjacent the offset formed by the walls 33, is provided with an outwardly pressed chamber 38, and the defining margin of the plane portion 31 adjacent the chamber 38 is recessed as shown at 39. A margin of the chamber 38 is provided with a downwardly extending ear 40 projecting between the margins of the recess 39. The plane portion 31 of the closure plate 30 is provided with recesses 41 and 42 for accommodating the ears 24 and 25 formed on the side walls of the housing means 15, and a recess 43 is provided for accommodating the projection 29 formed on the end wall 17. The plane portion 31, adjacent the chamber 38, is provided with recesses 44 and 45 adapted to accommodate the ears 22 and 23 formed on the bent portions 20 and side walls 16 respectively of the housing means 15. When assembled with the housing means 15, the inner surface of the closure plate 30 rests on the terminal margins of the side walls 16 and end walls 17, and the extremities of the ears 22, 23, 24, and

25 are bent to overlie the outer surface of the closure means 30.

A contact carrying member or support 46, preferably formed of insulation as shown, is formed to correspond substantially to the shape of the generally triangular aperture 32 in the closure plate 30, the support 46 being provided with a reduced boss 47 of a size to pass through the aperture 32, the boss 47 forming a shoulder 48 which bears against the inside surface of the closure plate 30. The support 46 is provided with a plurality of apertures 49, each aperture comprising a generally rectangular portion 50 leading to the exterior surface of the support 46, and a circular well 51 leading to the interior surface of the support 46, and countersinking the rectangular portion 50. Disposed in each of the apertures 49 is a contact means, and as shown, four contact means are provided, three, numbered 52, are adapted for receiving a single conductor terminal, and the fourth, numbered 53, being adapted to receive two conductor terminals. The contact means 52 and 53 are fully described in a copending application, Serial Number 51,069, filed November 22, 1935, and only a brief description of these contact means is believed to be necessary. Each of the contact means 52 comprises a sheet metal body portion 54, including an integral loop portion 55, the body portion 54 being tubular and preferably formed by bent together U-shaped parts. The extremity of the body portion 54 opposite the loop portion 55 is provided with angularly outwardly bent flanges 56, and a sheet metal contact is provided to close the open end of the body portion 54, the contact having a generally annular dome-shaped portion 57, the latter portion having a flange at its periphery, which flange is adapted to be spun over the flanges 56 of the body portion 54, as shown at 58. A helical spring 59 and detent means 60 are disposed within the tubular body portion 54 before the sheet metal contact is secured to the body portion, the spring 59 being interposed between the detent member 60 and the inner surface of the dome-shaped portion 57, to urge the detent member against a shoulder formed on a body portion 54 adjacent the loop portion 55, so that a portion of the detent member 60 is yieldably held in the recess provided by the loop portion 55. A helical spring 61 is disposed about the tubular body portion 54, the spring 61 being interposed between the bottom of the well 51 and the spun-over extremity 58 of the sheet metal contact. It will be appreciated that the body portion 54 has a transverse section closely fitting the outline of the rectangular portion 50 of the aperture 49, so that the contact means is held against rotation. The contact means 53 is similar to the contact means 52, with the exception that the body portion is elongated to provide two recesses for accommodating conductor terminals, and two detent means are provided to cooperate with the two recesses.

Operating means 62 are arranged within the housing means 15, and are adapted to be moved relative thereto, the operating means 62 being preferably formed of sheet metal and comprising a generally plane surface 63, at one end having an integral upwardly bent portion 64. The terminal margin of the portion 64 is provided with spaced projections 65, and extending upwardly from the plane surface 63 to a point short of the terminal margin of the bent portion 64 is a centrally located rectangular aperture 66. The plane surface 63 is formed with a portion 67 provided with an elongated aperture 68, for a purpose hereinafter apparent. A reduced portion 69 forms a continuation of the portion 67, and leads to this portion by means of angular defining walls 70, the reduced portion 69 being provided with an aperture 71. Extending from the reduced portion 69 is a further reduced portion 72, forming shoulders 73 with the first reduced portion. The operating means may, if desired, be made of a width so that the longitudinal margins thereof slidably engage the inner surfaces of the side walls 16 of the housing means 15. Also, the operating means, if made of a lesser width, may be provided with projections slidably engaging the inner surfaces of the side walls 16.

Carried by the operating means 62 is a carrier block 74, preferably formed of insulating material as shown, and of a generally oblong shape, the top surface being recessed as shown at 75 to provide an irregularly shaped recess, best illustrated in Figure 5, the recessed portion 75 being provided with an upstanding circular lug 76, and inwardly tapering recesses 77. One side margin of the carrier block 74 is provided with recesses 78, and the other side margin is provided with a recess 79, and an end margin is provided with an arcuate recess 80. The lower surface of the carrier block 74 is recessed as shown at 81, the recessed surface being provided with an extending lug 82 of a size to closely fit the aperture 71 formed in the operating means 62. The recessed under-surface 81 of the carrier block 74 closely conforms to the configuration of the adjacent part of the operating means 62, so that the carrier block 74 may be assembled with the operating means 62 in straddled relation. The carrier block 74 is preferably made of a width slightly less than the distance between the inner surfaces of the side walls 16, so that movement of the operating member is guided by sliding engagement between the transverse margins of the carrier block and the inner surfaces of the walls 16.

Bridge means 83 are assembled with the carrier block 74, and comprise a generally plane circuit continuing plate having a configuration similar to the recess 75 formed in the upper surface of the carrier block 74. The bridge means 83 is provided with an aperture 84 closely fitting the projection 76 of the carrier block 74, and also has inwardly depressed arcuate recesses 85 forming protuberances fitting within the inwardly tapering recesses 77 formed on the carrier block 74. One terminal margin of the bridge means 83 is provided with angularly downwardly extending ears 86 fitting in the recesses 78, and the other terminal margin is provided with an offset portion having an ear 87 fitting in the recess 79 of the carrier block 74.

A bushing member 88 is interposed through the aperture 19 in the end wall 17, the bushing 88 being exteriorly threaded as shown at 89, and having flatted surfaces 90 cooperable with the rectangular margins of the aperture 19 so that the bushing is held against rotation. The bushing 88 is provided with a shoulder 91 at one extremity, and a plate 92, having an aperture 93 similar to the aperture 19, is interposed between the inner surface of the end wall 17 and the shoulder 91 to form a means for reenforcing the end wall 17. The bushing 88 is provided with a bore 94, and as best shown in Figure 1, the extremity of the bushing 88 opposite the shoulder 91 extends away from the end wall 17 and passes through an aperture 95 formed in a mounting 96,

the aperture 95 being similar to the apertures 19 and 93. A nut 97, having a closed end 98, is provided with screw-threads engageable with the screw-threads 89 of the bushing 88, the nut 97 being drawn up against the mounting 96 to hold the switching device to the mounting 96. The closed end of the nut 97 is apertured as shown at 99, the aperture being provided with marginal recesses 100, adapted to receive a spanner wrench for properly drawing up the nut 97. As best shown in Figure 1, the bushing 88 is held against displacement from the switching device by the downwardly extending ear 40 formed on the closure plate 30.

Actuator or handle means 101 are provided for effecting movement of the operating means 62, the actuator means 101 comprising a rod 102, adapted to work through the aperture 99 and the bore 94 in the nut 97 and the bushing 88 respectively, the rod 102 being provided with a beveled extremity 103, and spaced inwardly from the beveled extremity 103 is a slot 104 formed transversely of the rod 102. The other extremity of the rod 102 is provided with a button 105, preferably formed of insulating material, and bearing suitable indicia indicating means controlled by the switching device.

The parts of the switching device, not including the actuator or handle means 101, may be assembled in any desirable manner, and when assembled, assume the relation shown in Figures 1 and 2. It will be noted that the under-surface of the operating means 62 is adapted to ride on a support, here shown to be an elongated roller 106 disposed in the well 28, the roller 106 being rotatively movable in the well 28 in a direction parallel to the direction of movement of the operating means 62. The roller 106 not only provides an anti-friction bearing support for the operating means 62, but further provides a fulcrum. The springs 61 encircling the contact means 52 and 53 normally urge the shoulder 48 of the support member 46 against the inner surface of the closure means 30, and also urge the sheet metal contact portion of the contact means 52 and 53 against the bridge means 83 or the adjacent surface of the carrier block 74, the bridge means 83, as best shown in Figure 1, having its outer surface generally flush with the adjacent surface of the carrier block 74. The force against the bridge means 83 and carrier block 74 is transmitted to the operating means 62, to normally cause the operating means 62 to swing in a counter-clockwise position as viewed in Figure 1, this force urging the bent portion 64 of the operating means 62 downwardly. The combined support and fulcrum for the operating means 62, instead of the well 28 and roller 106, may take the form of a plurality of grooves formed in the bottom wall 18 of the housing means 15, each groove being provided with a ball adapted to support the operating means 62. Additionally, the well 28 and roller 106 may be supplanted by a transversely extending, inwardly directed, projection pressed from the bottom wall 18.

To assemble the actuator or handle means 101 with the operating means 62, the rod 102 is inserted through the aperture 99 and bore 94 of the nut 97 and bushing 88 respectively, until the beveled portion 103 strikes the upper rectilinear margin 107 of the recess 66. The operating means 62 will be urged to the extreme right hand position shown in Figure 1, and additional inserting force on the actuator means 101 causes the beveled surface 103 to cam the adjacent end of the operating means 62 in an upward direction, this upward movement being permitted by reason of the fact that the closure means 30 is provided with the upwardly extending chamber 38, and the force is exerted until the beveled surface 103 clears the rectilinear margin 107 of the recess 66, whereupon relative movement of the rod 102 with respect to the bent portion 64 of the operating means 62 causes the slot 104 to align with the margin 107 of the recess 66, and the urging force of the springs 61 surrounding the contact means 52 and 53 causes the margin 107 of the recess 66 to snap into the slot 104, and yieldably hold the actuator means 101 and the operating means 62 in assembled relation.

To disassemble the actuator means 101 from the operating means 62, it is only necessary to turn the rod 102 through at least a quarter of a revolution, causing the unslotted portion of the rod 102 to engage the margin 107 of the recess 66, and the rod 102 may then be removed from the recess 66. It will be obvious that the chamber 38 formed in the closure means 30 provides space so that the actuator means 101 and the operating means 62 may be assembled or disassembled in any of the positions of the operating means 62; however, this chamber 38 may be so constructed and arranged to provide for assembly and disassembly of the actuator means 101 and the operating means 62 in any predetermined position. From the foregoing, it will be apparent that the actuator means 101 may be assembled or disassembled with respect to the operating means 62 from one side of the mounting 96.

A lamp construction 108 is adapted to be assembled with the switching device, and as shown in Figure 1, the lamp construction 108 comprises a socket 109 adapted to be disposed within the aperture 35 in the closure plate 30, and having suitable slot means interengageable with the projections 36, so as to hold the socket 109 to the closure plate 30. The socket 109 is provided with an insulating contact carrier 110, carrying a slidable contact 111, the latter having a contact head 112 adapted to engage a contact formed on the base 113 of an electric lamp 114. The base 113 of the lamp 114 is received within a socket 115, smaller in diameter than the socket 109, the socket 115 having radially extending portions 116 secured to the socket 109. It will be appreciated that the lamp construction 108 is removably assembled with the switching device, and when assembled, light from the electric lamp 114 illuminates the interior of the switching device, and some light passes through the aperture 27 formed in the bottom wall 18 of the housing means 15. As shown in Figure 1, the electric lamp 114 is disposed in the space provided by the recess 68 of the operating means 62, the recess being elongated so that the lamp 114 will not interfere with movement of the operating means. The arcuate recess 80 in the carrier block 74 also provides clearance for proper movement of the operating means 62.

Referring to Figures 6 through 8, the switching device therein disclosed comprises a housing means 120, having a bottom wall 121, side walls 122, and end walls 123 and 124. As best shown in Figure 8, the housing means 120 is preferably formed of a single sheet of sheet metal, the side and end walls being bent upwardly from the bottom wall, the end wall 123 being provided with an aperture 125, similar to the aperture 19 hereinbefore described. The end wall 123 also

has an angular portion 126, bent to span a portion of the upper margins of the side walls 122, the portion 126 being provided with notches adapted to receive fingers 127, and the fingers are bent to overlie the outer surface of the portion 126 to hold the portion in position. The end wall 123 is formed with angular portions 129 which are bent to overlie the adjacent surfaces of the side walls 122. The construction described materially strengthens the adjacent part of the housing means 120. The bent portion 126 is provided with a finger 128 for a purpose that will be hereinafter apparent.

The rear end of the housing means 120, that is the right hand portion as shown in Figures 6 and 8, is reduced in height, the end wall 124 being provided with a rectangular aperture 130, and also having extending portions 131 bent to overlie the adjacent surfaces of the side walls 122. The side walls 122 are provided with extending fingers 132 having tapered extremities 133. The side walls 122 are each provided with an arcuate extension 134, each extension having a circular aperture 135 provided with inwardly directed projections 136 formed on its margins. The bottom wall 121 is provided with a depressed well portion 137 for a purpose similar to that hereinbefore described. As before, a support, such as an elongated roller 138, is adapted to be contained within the well portion 137.

An operating means 139 is provided for effecting operation of the switching device in much the same manner as that previously described, the operating means comprising a generally plane plate-like member, having an aperture 140 formed therein, and having one extremity bent upwardly as shown at 141. The upwardly bent extremity is provided with a recess 142, the lower margin of which is arcuate, and the upper margin is rectilinear as shown at 143. The terminal margin of the bent portion 141 is provided with a notch 144. The extremity of the operating means 139 opposite the bent portion 141 is reduced as shown at 145, to provide for passage of this extremity through the rectangular aperture 130 formed in the end wall 124 of the housing means 120.

A carrier block 146 is assembled with the operating means 139, the carrier block 146 having a projection 147 formed in its lower surface, and fitting within the aperture 140 provided in the operating means 139. The upper surface of the carrier block 146 is provided with a recessed portion 148, having an irregular shape as best shown in Figure 8, the recess 148 being provided with inwardly tapering recesses 149. One margin of the carrier block 146 is provided with notches 150, and the opposite margin is provided with a notch 151.

Bridge means 152 are provided for assembly with the carrier block 146, and as best shown in Figure 8, the bridge means 152 preferably comprises a plate of current conducting material of a shape corresponding generally to the shape of the recessed portion 148 provided in the carrier block 146, and of a thickness to be disposed in the recess 148 so that the outer surface of the bridge means 152 is substantially flush with the outer surface of the carrier block 146. The bridge means 152 is provided with angular downwardly projecting fingers 153 and 154, the fingers 153 being receivable within the notches 150 of the carrier block 146, and the finger 154 being receivable within the notch 151. Arcuate inwardly depressed recesses 155 are formed in the bridge means 152, so as to be disposed within the inwardly tapering recesses 149 of the carrier block 146 when the bridge means 152 is assembled with the carrier block 146.

A contact support 156, preferably formed of insulating material as shown, is formed with a plurality of apertures 157, similar to the apertures 49 hereinbefore described, the apertures 157 being adapted to receive contact means 158 and 159, similar to the contact means 52 and 53. As before, a resilient means, such as a helical spring 160, is adapted to encircle the body portion of each of the contact means 158 and 159, and be disposed in the well portion of a respective aperture 157, so as to urge the respective contact means downwardly, referring to Figures 6 and 8. The support 156 is provided with notches 161 in opposite margins, and its rear portion is provided with a downwardly projecting lip 162.

To assemble the structure thus far described, the operating means 139 is placed in the housing means 120, with its reduced extremity 145 disposed through the aperture 130 in the end wall 124, and the lower surface of the operating means 139 is positioned to ride on the support or elongated roller 138. The carrier block 146, carrying the bridge means 152, is assembled with the operating means 139 by seating the projection 147 in the aperture 140. The contact support 156 is then placed in position on the housing means 120, the fingers 132 being disposed in the notches 161, and the lower surface of the support 156 resting on the upper margins of the side walls 122. The extremities 133 of the fingers 132 are then bent to overlie the upper surface of the support 156, and as best shown in Figure 6, the downwardly projecting lip 162 overhangs a portion of the end wall 124. In the assembly thus far described, the spring 160 encircling the body portion of each of the contact means 158 and 159 urges the contact means into engagement with either of the upper surfaces of the carrier block 146 or with the upper surface of the bridge means 152, and this urging force is transmitted through the carrier block to the operating member 139, to cause this operating member to swing about the support or roller 138 in a counterclockwise direction, referring to Figure 6.

As before, the switching device is secured to an apertured mounting 163 by means of a bushing 164 and a nut 165, these parts being respectively similar to the mounting 96, bushing 88, and nut 97, hereinbefore described. The finger 128, formed in the bent portion 126 of the end wall 123, is bent inwardly as shown at 166 to engage the shoulder on the bushing 164 so as to hold the bushing assembled with the housing means 120. In this embodiment it will be appreciated that the carrier block 146 is of a width substantially equal to the spacing of the side walls 122, so that movement of the carrier block 146 and the operating means 139 is guided by sliding engagement between the margins of the carrier block 146 and the inner surface of the side walls 122.

Actuator or handle means 167, similar to the actuator means 101 hereinbefore described, are detachably connected to the operating means 139 in a manner similar to that described in the embodiment shown in Figures 1 through 5. The actuator means 167 is provided with a beveled extremity 168 and a transverse slot 169, and is cooperable with the recess 142 and its rectilinear margin 143 substantially as before. Referring to Figure 6, it will be noted that connection and

disconnection of the actuating means 167 with the operating means 139 may be effected only in the position shown in Figure 6, that is the rearward position of the operating means 139, the connection or disconnection of the parts in any other position being prevented by the bent portion 126 of the end wall 123. The rearward position, in this particular instance, is the position wherein the contact means 158 and 159 are not bridged by the bridge means 152, or in other words, the rearward position is the "off" position of the switching device.

An electric lamp construction 170, similar to the electric lamp construction 108, may be assembled with either side wall 122 by inserting the socket of the lamp construction 170 in the proper aperture 135, and engaging the slots formed in the socket with the projections 136 formed in the aperture 135.

Referring to the embodiment of the invention disclosed in Figures 9 through 12, a box-like sheet metal housing means 171 is provided for receiving the switching mechanism, the housing means 171 comprising a bottom wall 172, side walls 173, and end walls 174 and 175. The bottom wall 172 is provided with a recess 176, adjacent the end wall 175, this bottom wall also being provided with a struck-up ear 177 adjacent the end wall 174, the ear 177 functioning to hold a bushing 178 assembled with the end wall 174 of the housing means 171. The bushing 178, similar to the bushing 88, passes through an apertured mounting 179, and is held in position by a nut 180, the mounting 179 and nut 180 being similar to parts hereinbefore described.

Disposed within the housing 171 is an operating means 181, having a generally plane portion 182 and an angularly bent extremity 183, the extremity 183 being provided with a recess 184 similar to the recess 66 hereinbefore described. The terminal margin of the extremity 183 is notched to provide a projection 185. The plane portion 182 of the operating means 181 is provided with an upwardly pressed proturberance 186, and adjacent the extremity of the operating means 181 there is provided a downwardly projecting protuberance 187, the protuberance 187 being adapted to cooperate with the recess 176. The side margins of the plane portion 182 are provided with upwardly extending supports 188 and 189, the support 188 being notched to provide a centrally disposed finger 190, whereas the support 189 is provided with a centrally disposed notch 191, which forms fingers 192.

A carrier block is adapted to be supported by the supports 188 and 189, the carrier block in this instance comprising two generally rectangular insulating plates 193 and 194. The insulating plate 193 is provided with a generally centrally disposed aperture 195. One margin of the plate 193 is provided with a slot 196, and the opposite margin is provided with slots 197, the slots 196 and 197 fitting respectively the fingers 190 and 192 of the supports 188 and 189. The plate 193 is also provided with apertures 198, spaced as best shown in Figure 12. The plate 194 is provided with notches 199 and 200, these notches being similar to and for the same purpose as the notches 196 and 197 formed in the plate 193. Also, the plate 194 is provided with apertures 201 coinciding with the apertures 198 of the plate 193.

Bridge means 202, of generally L-formation as shown in Figure 12, preferably comprise a plate of current conducting material, having angular downwardly projecting fingers 203 adapted to pass through the apertures 201 and 198 formed respectively in the plates 194 and 193, and the extremities of the fingers 203 may be bent to overlie the under-surface of the plate 193, and thereby hold the plates 193 and 194 and the bridge means 202 assembled. Yieldable means, such as a helical spring 204, is provided for interposition between the under-surface of the plate 194 and the upper surface of the operating means 181, one extremity of the spring 204 being disposed within the aperture 195 formed in the plate 193, and the other extremity surrounding the protuberance 186.

A contact support 205, preferably formed of insulating material, carries contacts 206 of a type similar to that described in a copending application, serial number 25,116, filed June 5, 1935, now Patent No. 2,144,484, patented January 17, 1939. The contact means 206 are each provided with spring pressed detents 207 for yieldably holding a conductor terminal in apertures 208 formed in the body portion of the contact means 206. An extremity of each contact means 206 is reduced to form a shoulder abutting the upper surface of the support 205, and the end of this extremity projects through a suitable aperture in the support, and is headed over the under-surface, as shown at 209, to form contacts engageable with the bridge means 202. The support 205 rests on the margins defining the open end of the housing means 171, and fingers 210 may be provided on the housing means 171, and may be clinchable over the outer surface of the support 205, to hold the support assembled with the housing means.

Actuator means or handle means 211, similar to the means 101 hereinbefore described, may be assembled and disassembled with the operating means 181 in a manner similar to that shown and described in the embodiment disclosed in Figures 1 through 5. It will be appreciated that the spring 204 urges the bridge means 202 against the contacts 209 of the contact means 206, and also urges the operating means 181 to swing in a counter-clockwise direction (Figure 9) about the protuberance 187. The support 205 is provided with a slot 212 of a size adapted to clear the projection 185 formed on the angular extremity 183 of the operating means 181, and when the operating means 181 is in the position shown in Figure 9, the actuator means 211 may be assembled or disassembled with respect to the operating means 181. It will be obvious that the slot 212 may be widened, to permit assembly or disassembly in other positions of the actuating means 101, or a series of slots may be provided to permit such assembly or disassembly.

The protuberance 187, in addition to serving as a fulcrum for the operating means 181, is engageable, in a predetermined position of the switch, with the recess 176 formed in a bottom wall 172 of the housing means 171, to provide a greater yieldable opposition to movement of the operating means 181. In the preferable construction, the protuberance 187 engages the recess 176 in an intermediate position of the switching device. Of course, it will be appreciated, that the type of support and fulcrum hereinbefore described may be used in this embodiment, if desired. As best shown in Figures 10 and 11, the supports 188 and 189, of the operating means 181, are spaced apart so that their outer surfaces engage the inner surface of the side walls 173 of the housing means 171, the plates 193 and 194 also

being of a width to engage these inner surfaces. It will be appreciated that the construction may be so formed that either the supports 188 and 189 or the plates 193 and 194 engage the inner surfaces of the side walls 173 to guide movement of the operating means 181.

It will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention, and it also will be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the hereindisclosed embodiments are illustrative only, and that my invention is not limited thereto.

I claim:

1. Electrical switching mechanism, comprising: a support member; a bridge member; movable operating means, carrying said bridge member for movement relative to said support member; contact means carried by said support member for movement relative to said support member in a direction transverse to the movement of said bridge member, said contact means having a portion for engagement with said bridge member; bearing means, for supporting said operating means, constructed and arranged to provide for said relative movement of said operating means, and also providing a fulcrum for rocking of said operating means; handle means, for effecting movement of said operating means, said handle means having a detachable connection with said operating means, said connection being released by movement of said operating means to a predetermined position about said furcrum; and resilient means, constructed and arranged to urge the portion of said contact means against said bridge member so as to yieldably hold said operating means in a position opposite to said predetermined position, and thereby yieldably hold said handle means connected to said operating means.

2. Electrical switching mechanism arranged substantially within a housing, comprising: movable operating means, for moving the switching means to various positions, having a portion formed with an aperture; an actuator means, for effecting movement of said operating means coextensive with said actuator means, comprising a cylindrical end portion, having an extremity defined by a plane surface oblique to the axis of said end portion, forming a pointed tip portion, said end portion having also a transverse notch spaced inwardly from said oblique surface and diametrically opposite said tip portion; resilient means carried by and movable transverse to a wall of said housing, yieldably urging said end portion and said aperture out of axial alignment; said actuator means being connected to said operating means by inserting said tip portion into said aperture and causing movement of said end portion through said aperture, said oblique surface engaging the margin of said aperture and camming said aperture and said end portion into axial alignment, and further moving said end portion through said aperture until the marginal surface of said aperture snaps into said notch and is held in latching relation by said resilient means, said actuator means being disconnected from said operating means by relatively rotating said actuator means and said operating means, so that the cylindrical surface adjacent said notch engages the marginal surface of said aperture and cams said aperture and said end portion into axial alignment against the urging force of said resilient means, and causing axial movement of said end portion out of said aperture, to bodily separate said actuator means and said operating means.

3. Electrical switching mechanism arranged substantially within a housing, comprising: contact means; reciprocable means, movable relative to said contact means, and comprising bridge means cooperable with said contact means, and a relatively planar surface; and bearing means carried by a planar wall of said housing, comprising a surface contacting said planar surface and transversely disposed with respect to the movement of said reciprocable means and engaging said planar surface at a place whereby to maintain said reciprocable means in a tilted position with respect to the planar wall of said housing.

4. Electrical switching mechanism arranged substantially within a housing, comprising: contact means; reciprocable means, movable relative to said contact means, and comprising bridge means cooperable with said contact means, and a relatively planar surface; and a roller bearing carried by a planar wall of said housing engaging said planar surface, and providing an anti-friction support for said reciprocable means, the axis of said roller bearing being disposed transversely of the movement of said reciprocable means whereby to maintain said reciprocable means in a tilted position.

5. Electrical switching mechanism, comprising: contact means; reciprocable means, movable relative to said contact means, and comprising bridge means cooperable with said contact means, and a relatively planar surface; casing means, generally housing said contact means and said reciprocable means, and being formed with a well portion; and bearing means, disposed in said well portion, and engaging said planar surface and providing an anti-friction support for said reciprocable means, said bearing means being bodily movable in said well portion generally parallel to the movement of said reciprocable means and providing means whereby to maintain said reciprocable means in a tilted position with respect to the wall of said casing means having the well therein.

6. Electrical switching mechanism, comprising: housing means, having a wall formed with a recess; contact means, carried by said housing means; means reciprocable within said casing, comprising bridge means movable into and out of engagement with said contact means; actuator means, connected to said reciprocable means for effecting movement of said reciprocable means, and holding one end of said reciprocable means in spaced relation from said casing wall; said reciprocable means having an abutment adjacent its other end slidably engaging said casing wall and holding said other end in spaced relation from said casing wall; the recess formed in said casing wall lying in the path of movement of said abutment, and said abutment yieldably seating in said recess in a predetermined position of said reciprocable means, thereby providing means to indicate when said predetermined position is reached.

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