Dec. 17, 1940. L. W. COLE ET AL 2,224,848

ELECTRIC SWITCH

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Fig. 1.

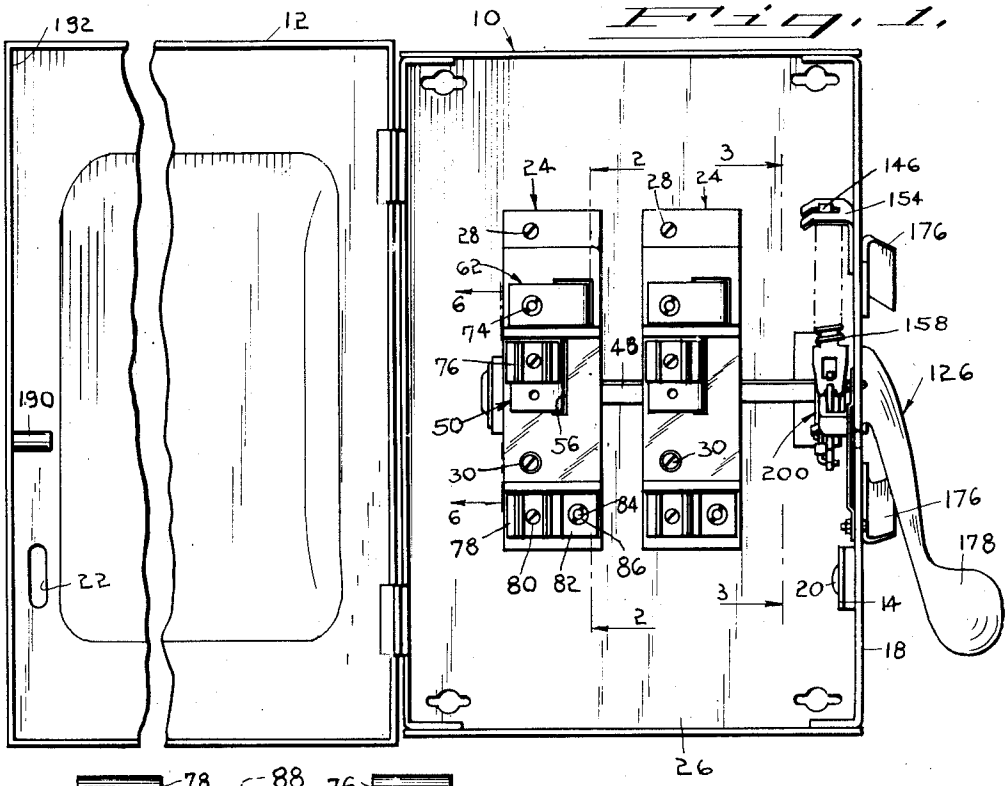


Fig. 2.

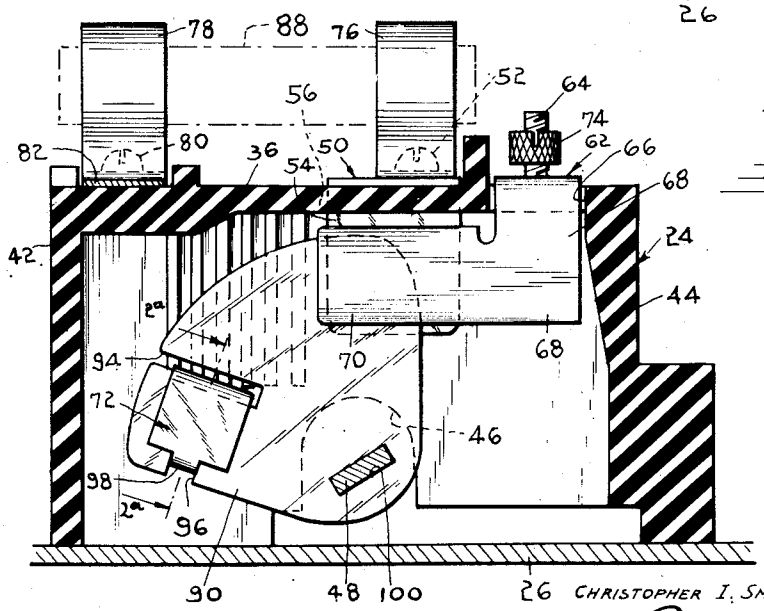
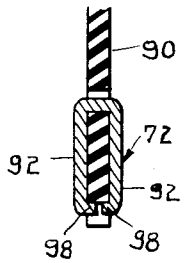


Fig. 2A.



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ELECTRIC SWITCH

Filed Sept. 29, 1937 4 Sheets-Sheet 2

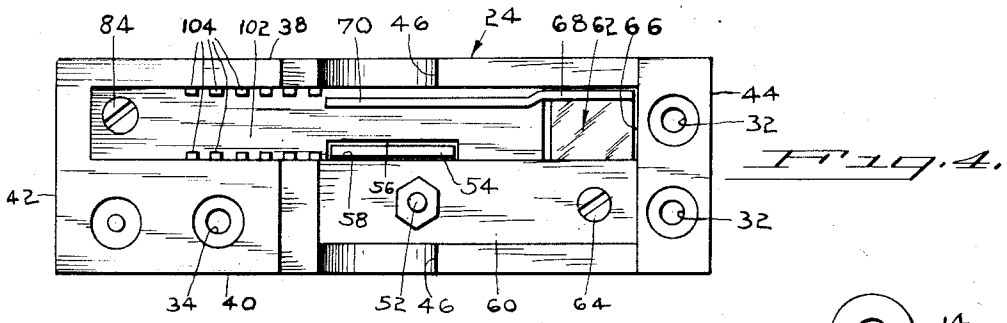


Fig. 4.

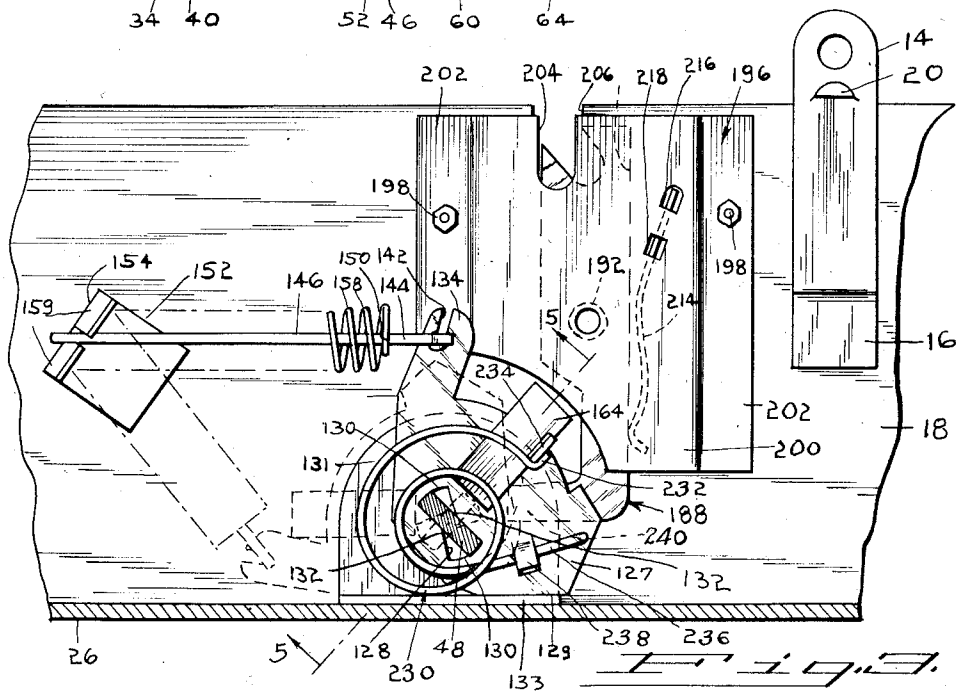


Fig. 3.

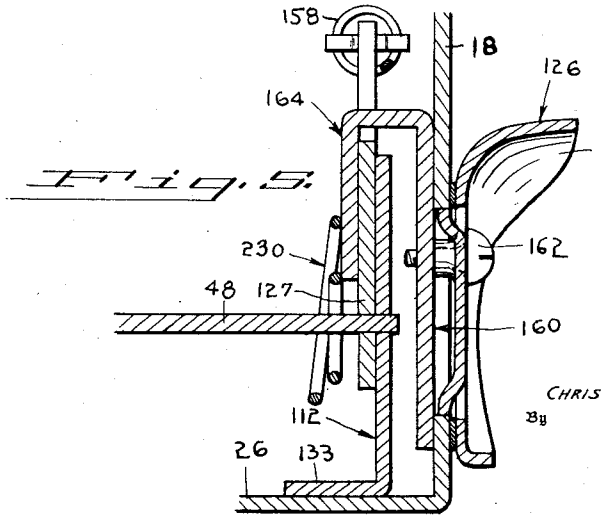


Fig. 5.

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ELECTRIC SWITCH

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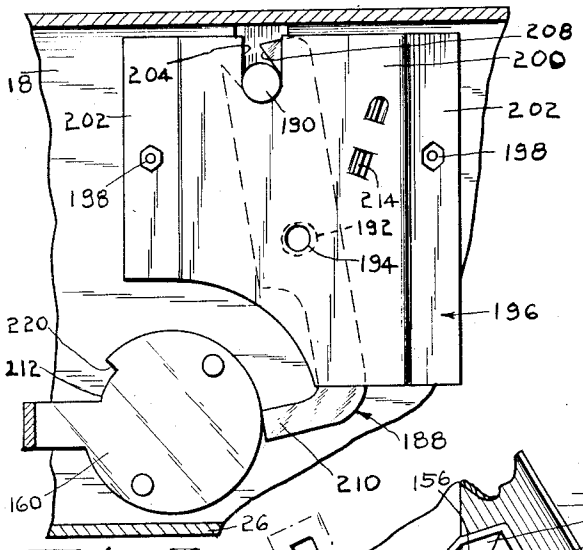


Fig. 7.

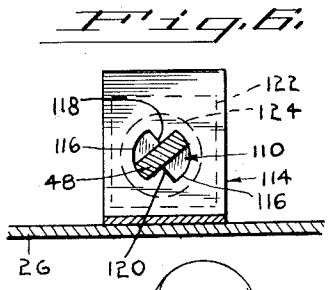


Fig. 6.

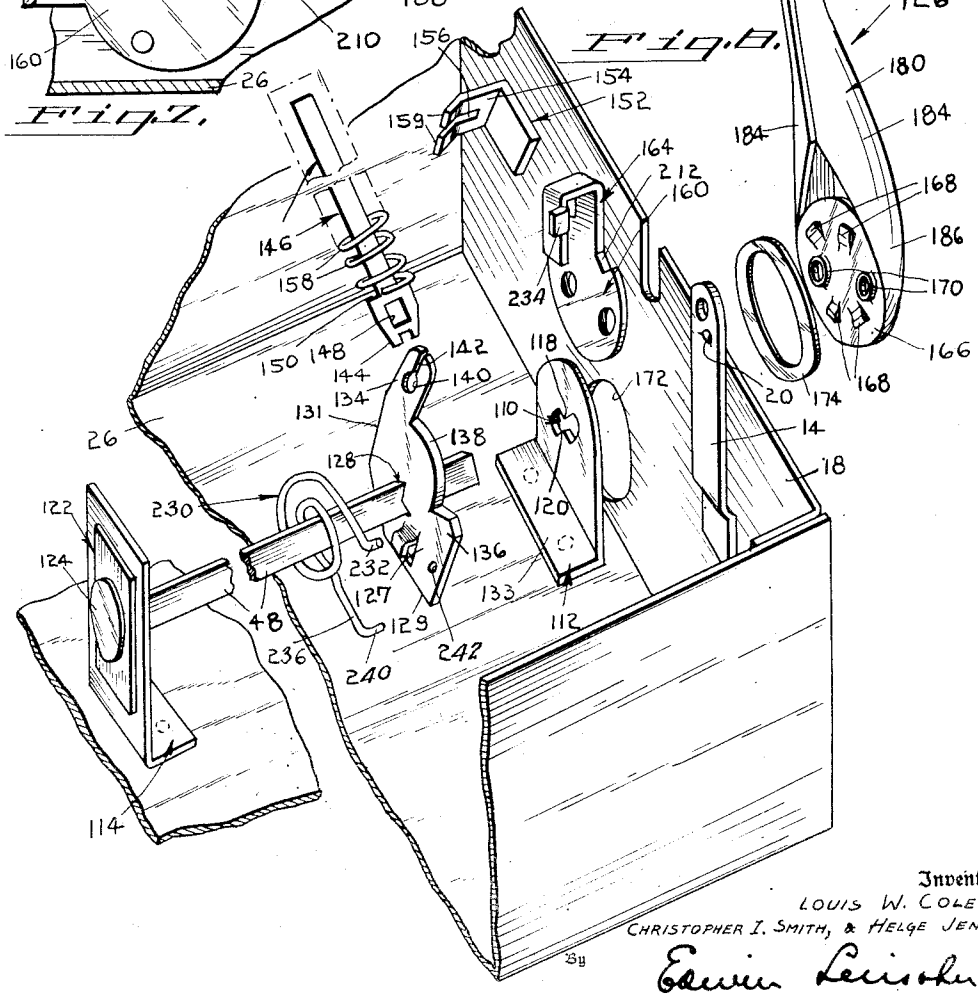


Fig. 8.

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ELECTRIC SWITCH

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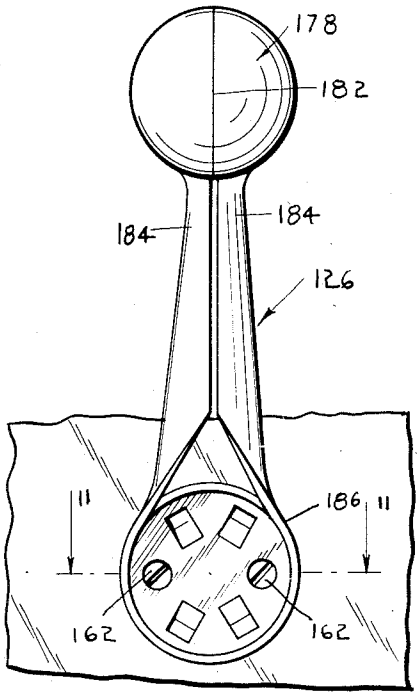


Fig. 9.

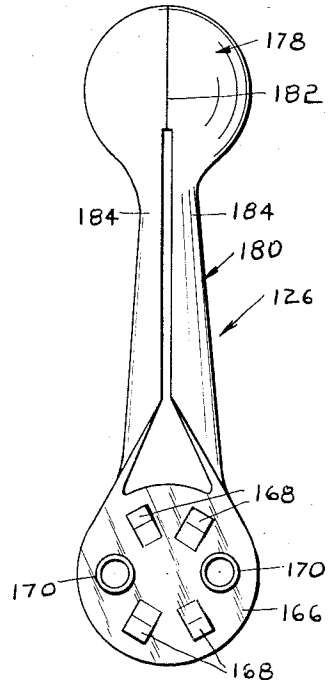


Fig. 10.

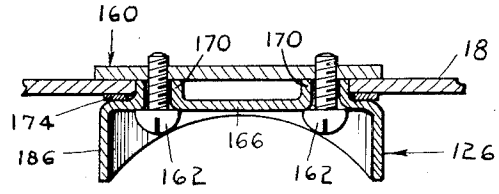


Fig. 11.

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Patented Dec. 17, 1940 2,224,848

UNITED STATES PATENT OFFICE

2,224,848

ELECTRIC SWITCH

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Application September 29, 1937, Serial No. 166,314

20 Claims. (Cl. 200—50)

The present invention relates to switches and more particularly to quick make and break switches arranged within a casing and operable by means of a handle mounted on the casing externally thereof.

The primary objects of the invention are to provide a compact safety switch which is simple in construction and reliable in operation and in which the arc which is formed when the circuit is interrupted is completely covered so that it is practically impossible for the operator to make contact therewith even when the casing cover is in open position.

It is also an object of the invention to provide a switch in which the fuses are readily accessible and which can be inserted, removed and replaced substantially without danger.

Another object of the invention is to provide a switch of the character described with flexible stationary contact members and self-aligning movable contacts engageable between said stationary members.

The invention also has for an object the provision of an operating handle of improved construction and more specifically a handle which is easy to grasp and operate, which is of light weight yet rugged in construction, which can be made of a single piece of sheet metal by simple stamping and die forming operations whereby said handle can be economically manufactured; also to provide a handle which eliminates the necessity for intermediate spacing washers when fastened in operative engagement with the mechanism on the interior of the casing, and to provide a handle which is operable through a circular hole in a wall of the switch casing.

A further object of the invention is the provision of an improved quick make and break mechanism which has a minimum number of simple parts and in which the rate of movement of the movable switch contact member is independent of the rate of movement of the handle after the initial movement thereof. Further objects in this connection are to provide a quick make and break mechanism which may be easily assembled and disassembled without the use of special tools, to make such mechanism from parts stamped from sheet metal and economical to fabricate and assemble, and to provide a quick make and break mechanism which makes unnecessary the use of small pins, rivets, eyelets or the like.

Another object of the invention is to provide an improved lock between the switch operating mechanism and the casing cover whereby the cover cannot be opened unless the switch is in circuit interrupting position and whereby the switch cannot be operated to circuit closing position unless the casing cover is closed.

A yet further object of the invention is generally to improve the construction, operation, and safety of electric switches.

The above objects of the invention and other objects ancillary thereto will be fully understood from the following description considered with reference to the accompanying drawings illustrating a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a view in elevation of the switch showing the casing cover in open position;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 2*a* is a detail sectional view on the line 2*a*—2*a* of Fig. 2;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a bottom view of a switch block made in accordance with the present invention;

Fig. 5 is a sectional view on the line 5—5 of Fig. 3;

Fig. 6 is a sectional view on the line 6—6 of Fig. 1;

Fig. 7 is a fragmentary elevational view, partly in section, illustrating the interlock;

Fig. 8 is an exploded perspective view of the switch operating mechanism and part of the casing;

Fig. 9 is a view in elevation of part of the casing wall and of the switch operating handle mounted in position therein;

Fig. 10 is a rear view in elevation of the switch operating handle detached from the casing;

Fig. 11 is a sectional view on the line 11—11 of Fig. 9.

Referring now more particularly to the drawings, it will be observed that the switch is housed within a metal casing 10 provided with a pivoted cover 12 and a spring latch 14 welded at its lower offset end portion 16 to the inner surface of casing wall 18 and provided with a catch 20 adjacent its upper end which is releasably engageable with cover 12 at an edge 22 of an opening through said cover.

Switch blocks 24, which carry the stationary contact members, the fuses, and the switch terminals are mounted within casing 10 in parallel relation and are removably secured to a wall 26 of said casing in any suitable manner as by screws 28 and 30 which extend through openings 32 and 34 respectively in said blocks and are threaded into openings in said casing wall

26. As blocks 24 may be identical in construction a description of one of said blocks will be sufficient.

Referring now to Figs. 1, 2 and 4, block 24, which may be made of any suitable insulation material such as porcelain, is hollow and has a closed top wall 36, side walls 38 and 40, and end walls 42 and 44, a portion of side wall 40 and end wall 44 being thickened for the provision of openings 34 and 32 respectively. The bottom of the block is open and the side walls of the block are provided with aligned recesses 46 through which the switch operating rod 48 extends.

A stationary contact member 50 is secured to the top 36 of block 24 by means of a bolt 52 and has a reflexed portion 54 which projects through a slot 56 in said top wall into the interior of the block, being spaced somewhat from the adjacent side 58 of the thickened top portion 60 of the block. A companion stationary contact member 62 is fastened to top 36 adjacent side wall 40 by means of a screw 64 and extends across and completely covers an opening 66 in the top of the block disposed between thickened portion 60 and the inner surface of side wall 38. Said stationary contact member 62 has a reflexed portion 68 a part of which lies closely adjacent the inner surface of side wall 38 and part 70 of which is spaced from said side wall and is disposed in confronting relation to portion 54 of stationary switch contact member 50. As thus arranged said stationary switch contact members have flexible portions 54 and 70 which, as will hereinafter appear, are engaged by the movable switch contact member 72 for completing the circuit.

It will be observed that screw 64 which secures switch contact member 62 in position constitutes one terminal of the switch and for that purpose is provided with a nut 74 threaded thereon for releasably securing the terminal end of the conductor or a connector terminal (not shown) of any suitable construction. It will also be observed that bolt 52 which secures stationary contact member 50 in position also serves to secure fuse clip 76 in fixed electrical and mechanical connection with said stationary contact member on the top 36 of block 24. The other fuse clip 78 is secured by a screw 80 in fixed electrical and mechanical connection with a terminal contact member 82 fastened to the top of the block by a screw 84 which is provided with a nut 86 similar to nut 74 for attaching the other conductor terminal end or the other terminal connector. It will be understood that a fuse 88 of the cartridge type is removably engaged in fuse clips 76 and 78.

The movable switch contact member 72 is mounted on a sector shaped insulation disk 90, which may be composed of any suitable insulation material such as fibre board. Said contact member, as clearly shown in Figs. 2 and 2a is U-shaped and is rigidly fastened to insulation member 90 preferably in the manner illustrated from which it appears that opposite sides 92 of said switch contact member are in engagement with opposite sides of said insulation member. Insulation member 90 is provided with a slot 94 in which member 72 is inserted and a slot 96 in which tongues 98 projecting from sides 92 of switch member 72 are bent for rigidly securing said switch member to insulation member 90. Said insulation member is provided with a slot 100 through which operating rod 48 projects preferably in rather loose fitting relation therewith whereby said insulation member and said movable switch contact member 72 carried thereby may be moved into and out of engagement with stationary switch contact members 50 and 52. It will be observed that by the construction just described there is provided an important feature of the present invention, namely, the flexible stationary contact member in combination with a movable contact which is self-aligning therebetween, and for the latter purpose it is preferred that the opening 100 in the insulation member 90 be dimensioned so as to permit said member to slide on rod 48 in frictional engagement therewith.

As illustrated in Fig. 2 insulation member 90 is dimensioned so that it is disposed between said stationary switch contact members forming a barrier to the arc which may be drawn when the movable switch contact member is moved to circuit interrupting position. Movement of insulation member 90 takes place within passage 102 formed in said block in alignment with the spaced stationary contact portions 54 and 70. A plurality of spaced ribs 104 are disposed in confronting relation on the inner surface of the walls of said passage 102 for interrupting the continuity of said walls and thereby preventing the formation of continuous coatings of conducting material which might otherwise be deposited on said walls after repeated operations of the switch. Said ribs are preferably formed of the material of said block in integral relation with the walls of passage 102 when the block is molded into shape.

Rod 48 on which the movable switch members are mounted for pivotal movement in relation to the stationary contact members is pivotally mounted at its ends in bearing openings 110 formed in bearing members 112 and 114 secured preferably by welding to casing wall 26. As clearly shown in Figs. 6 and 8, openings 110 are defined by opposed arcuate edges 116 and by opposed pointed edges 118 and 120, said last mentioned pointed edges serving as knife-edge bearings for rod 48. A cap 122 is welded to bearing member 114 and is provided with a recessed portion 124 in alignment with opening 110 in said bearing member for receiving an end portion of rod 48 for limiting the longitudinal movement of said rod in one direction.

Rod 48 is actuated by a handle 126 through a quick make and break mechanism which will now be described. Said mechanism comprises a lever 127 mounted on rod 48. Said lever is constituted as here shown by a metal plate having an opening 128 through which rod 48 projects. As clearly shown in Fig. 3 opening 128 is defined by opposed arcuate edges 130 and by opposed pointed edge 132. Said last mentioned edges provided knife edge bearings between said lever and rod 48 and said opening; flaring from said knife edges toward said arcuate edges thereby provide for limited relative movement between said lever and said rod to aid in producing a quick opening of the switch. Lever plate 127 has spaced projections 134 and 136 and an intermediate arcuate edge portion 138. Projection 134 is provided with an opening 140 which communicates with an open-end slot 142. Said projection is engaged by the forked end 144 of a rod 146. Said forked end of the rod is provided with an opening 148 and with shoulders 150. Said end of rod 146 is connected to projection 134 by engaging said end with opening 140 through slot 142, the spaced portions of projection 134 at opposite sides of said slot being received within opening 148 in said rod, and movable therein, whereby said rod and lever are pivotally connected.

The other end portion of rod 146 is slidably engageable with a bracket 152 secured preferably by welding to casing wall 18. For this purpose bracket 152 is provided with an abutment portion 154 having an open-end slot 156 therein through which said end portion of rod 146 projects for sliding movement. A compression spring 158 surrounds rod 146 and has a bearing at one end thereof on shoulders 150 of said rod and bears at its other end on abutment 154. The bifurcated ends 159 of said abutment are reflexed somewhat to prevent unintentional disengagement of rod 146 and spring 158 from bracket 152. By the arrangement thus provided lever 127 is effective to rock operating rod 48 with a snap action in both directions after movement of said lever is initiated by handle 126 in the manner which will hereinafter appear. Movement of rod 48 in either direction is limited by the engagement of edges 129 and 131 with the foot 133 of bearing member 112 and also by the pointed edges of openings 110. Said foot 133 being welded to casing wall 26 is a part of the casing, but as said edges 129 and 131 of lever 127 hit with considerable force it is desirable to provide for their engagement with foot 133 instead of directly with wall 26, thus preventing loosening of the connection of said bearing member with said wall.

For initiating movement of lever 127, handle 126 is operatively connected to said lever by a connecting plate 160 which is rigidly secured to said handle by screws 162. Connecting plate 160 has a lost motion connection with lever 127, and for that purpose said connecting plate is provided with an integral U-shaped extension 164 which as clearly shown in Figs. 3 and 5 straddles lever plate 127 at the intermediate portion 138 thereof between plate projections 134 and 136 in position to engage either of said projections and thereby to move the lever in either direction first in opposition to the action of the spring projected rod 146 which is subsequently operative, as previously described, to move said lever by snap action in the direction of its initial movement by handle 126 and connecting plate 160.

An important feature of the present invention resides in the construction of handle 126 and its pivotal mounting in casing wall 18. First, with respect to the mounting of said handle, it will be observed that the latter is provided with a hub portion 166 which has a plurality of struck-out portions 168 the free edges of which lie substantially in the arc of a circle concentric with the center of said hub portion. Said hub portion is also provided with a pair of outwardly pressed circular projections 170 defining openings through which fastening screws 162 project for connecting handle 126 to connecting plate 160. Said projections 170 are positioned in tangential relation to and on the inside of the circle in which the outer edges of tongues 168 lie. Said circle is substantially of the same size as circular opening 172 provided in casing wall 18 whereby the outer edges of tongues 168 and circular projections 170 have a bearing in the edge of said opening. By reason of this construction it is unnecessary to provide a spacing washer between handle hub 166 and connecting plate 160. A washer 174 is interposed between the outer surface of casing wall 18 and the adjacent surface of handle hub 166 whereby to frictionally retain handle 126 in any position through its range of movement regardless of the lost motion connection between plate 160 and lever 127. Stop members 176 are secured to the outer surface of casing wall 18, preferably by welding, for limiting the movement of handle 126 in either direction.

The novel construction of handle 126 will now be further described. As here shown said handle is provided with a spherical hand grip 178 and with a shank 180, integral with each other and with hub 166. For this purpose handle 126 is formed from a single sheet of suitable metal such as sheet steel by suitable die stamping and bending operations. More particularly, after the sheet metal blank from which the handle is made is cut to the necessary shape, said blank is bent into the form shown for providing the handle and is welded at a median line 182 in the spherical portion 178. Shank 180 of the handle is constituted by two longitudinal extending transversely curved portions 184 which merge at their ends into spherical portion 178 and into a partial circular flange 186 formed on hub 166. The handle thus formed is rugged in construction, being reinforced by the spherical hand grip and by the transversely curved shank portions and by the flanged hub.

In a switch of the present type it is usually desirable to provide an interlock between the casing cover and the switch operating mechanism, whereby to prevent opening of the casing before the switch is moved to circuit interrupting position and to prevent movement of the switch to circuit closing position unless the switch cover is closed. For this purpose the interlock which will now be described is preferred. As here shown, more particularly in Figs. 3 and 7, a pivoted lever 188 is arranged for engagement with connecting disk 160 and with a pin 190 fixed to casing cover 12 and projecting inwardly from the side edge 192 of said cover (Fig. 1). Lever 188 is provided intermediate its ends with bearing opening 192 by which said lever is journalled on a bearing 194 constituted by an inwardly pressed projection formed in a plate 196. Said plate is removably secured to the inner surface of casing wall 18 by screws 198. The intermediate portion 200 of plate 196 is pressed outwardly from side plate portions 202 to provide room for lever 188, the inner surface of plate portion 200 and the adjacent surface of casing wall 18 forming a guide for the pivotal movement of said lever. The upper edge portion of plate 196 is provided with a cut-out 204 which registers with a similar cut-out 206 formed in casing wall 18 for receiving cover pin 190 when the cover is in closed position. One end of lever 188 is provided with an angularly disposed slot 208 in which pin 190 is received, said slotted portion of the lever constituting a latch to retain said pin against outward movement in certain positions of said lever. The other end of lever 188 is provided with a finger 210 which engages connecting plate 160 and is normally in engagement with the circumferential edge of said plate and when so engaged prevents release of pin 190 from the hook portion of the lever and thereby prevents opening of the cover.

Connecting plate 160 is provided with a recess 212 in a circumferential edge portion thereof disposed so that when said connecting plate has been moved to open the switch, finger 210 can enter said recess to permit pivotal movement of lever 188 for releasing pin 190. Such movement of the lever is effected by a spring 214 secured at one end thereof between spaced inwardly pressed portions 216 and 218 of plate 196 and bearing at its other end on an edge of said lever.

Movement of connecting disk 160 for closing the switch is prevented unless the cover is closed by reason of the engagement of finger 210 in recess 212 of connecting plate 160 and more particularly by reason of the engagement of said finger with shoulder 220 at one end of said recess of the connecting plate, as shown in Fig. 3. It will be understood that as long as the casing cover is open, finger 210 is in engagement with said shoulder and thereby prevents movement of connecting plate 160, thus preventing movement of said plate for closing the switch, but when cover 12 is closed pin 190 engages in the slot 208 of lever 188 and thereby moves said lever to withdraw finger 210 from recess 212 and from engagement with shoulder 220, thereby releasing plate 160 from said lever for operation of the latter by handle 126 to effect the closing of the switch.

In the construction described above it will be apparent that the switch parts, including the switch block or blocks, the quick make and break mechanism, and the operating handle may be readily assembled in the casing and also readily disassembled, and that a minimum of fastening elements are utilized. It will be noted that rod 48 having the insulation disks 90 and lever plate 127 assembled thereon may be readily inserted in bearings 112 and 114, by inserting one end portion of said rod through opening 110 in bearing 112 and then moving said rod in a reverse direction to engage the opposite end thereof with the opening in bearing 114. Movement of rod 48 through opening 110 is permitted because of the presence of circular opening 172 in casing wall 18 which is in alignment with the opening in bearing 112. After rod 48 is positioned in its bearings, rod 146 with spring 158 assembled thereon is engaged at its forked end 144 with projection 134 and at its other end with abutment 154 of bracket 152. When rod 146 and lever 127 are thus connected, said lever plate lies adjacent to the upstanding portion of bearing 112. After said rod and lever are connected, plate 160 is positioned in operative engagement to said lever and is connected to handle 126 by screws 162. It will be observed that lever plate 127 is held in position adjacent bearing 112 by the free side of U-shaped projection 164 of plate 160. It will be observed also that longitudinal movement of rod 48 in bearing 112 is prevented by connecting plate 160 which is spaced but a small distance from bearing 112. After the operating mechanism is assembled switch blocks 24 are mounted in position and secured to casing wall 26, the insulation disks 90 with the movable contact members carried thereby being disposed within passages 102 for engagement with and disengagement from companion stationary contact members 54 and 70. By reason of the flexibility of said stationary contact members and the mounting of the insulation disks on rod 48 for movement longitudinally thereof, said movable contact members are substantially self-aligning for assembly purposes as well as for engagement with the stationary contacts in the operation of the switch.

Reverting to the switch mechanism, a feature of substantial importance resides in the provision of means for preventing the switch from being retained in closed position which might otherwise occur, notwithstanding the operation of the handle to switch opening position, by reason of the friction between the relatively movable parts and the necessity for spring projected rod 146 to overcome its dead center with lever 127. For this purpose there is provided a coil spring 230 disposed about switch operating rod 48 and bearing at one end 232 against an out-turned ear portion 234 of connecting plate 160 and at its other end portion 236 against a struck-out portion 238 on plate 127, said last mentioned end portion being provided with a reflexed part 240 projected into an opening 242 in said last mentioned plate. It will be observed that the action of spring 230 is to assist spring 158 in moving plate 127 to circuit opening position and that said spring by opposing the movement of connecting plate 164, which is connected to handle 126, is effective to return the handle to circuit closing position unless the dead center between spring projected rod 146 and lever 127 is broken by the movement of said lever to circuit interrupting position, in which case handle 126 is also moved to circuit interrupting position. In other words, should handle 126 be moved in a direction to open the switch but without actually effecting such opening, upon release of handle 126 spring 230 will operate to return said handle to circuit closing position which will serve to indicate that the switch has not been opened. It will be observed also that spring 230, by opposing the movement of lever 127 to circuit closing position, cushions the movement of said lever beyond its dead center with spring projected rod 146 and thereby serves to decrease the impact and consequent noise which might otherwise occur when said lever strikes the foot 133 of bearing member 12.

While we have shown and described the preferred embodiment of the invention it will be understood that the invention may be embodied otherwise than as here shown, and that in the construction specifically illustrated or described herein, certain changes may be made within the spirit of the invention and will occur to those skilled in the art particularly in view of the present disclosure. Therefore, we do not wish to be limited precisely to the construction herein shown or described or to any part thereof or to all of the features of the invention in combination unless required by the appended claims considered with reference to the prior art.

What we claim and desire to secure by Letters Patent is:

1. In an electric switch, a casing, bearing members secured in said casing and upstanding from a wall thereof, a rod mounted in said bearing members for pivotal movement about its longitudinal axis, an insulating block secured in said casing and provided with stationary contact members, a movable switch contact member operable by said rod and engageable with and disengageable from said stationary contact members, and means including a handle accessible externally of said casing for actuating said rod, said last mentioned means including also a member mounted on said rod for turning the latter, said member having a limited turning movement in relation to said rod and having parts engageable with said casing at the end of the turning movement of said member in opening and closing the switch

2. In an electric switch, a casing, bearing members secured in said casing and upstanding from a wall thereof, a rod mounted in said bearing members for pivotal movement about its longitudinal axis, an insulating block secured in said casing and provided with stationary contact members, a movable switch contact member operable by said rod and engageable with and disengageable from said stationary contact members, one of said bearing members having a foot

portion secured to said casing wall and means including a handle accessible externally of said casing for actuating said rod, said last mentioned means including also a member mounted on said rod for turning the latter, said member having a limited movement in relation to said rod and having parts engageable with said foot portion at the end of the turning movement of said member in opening and closing the switch.

3. In an electric switch, a casing, stationary contact members in said casing, a rod mounted in said casing for pivotal movement in different directions about its longitudinal axis, a movable switch member mounted on said rod and provided with a contact member engageable with and disengageable from said stationary contact members upon movement of said rod in said different directions, respectively, a handle mounted in said casing and operably externally thereof, a lost motion connection between said handle and said rod comprising a plate mounted on said rod and operable to impart pivotal movement thereto, said plate having spaced peripheral projections, and a connecting member fixed to said handle and operable thereby to selectively engage said projections for initiating the movement of said rod in a predetermined direction, and spring actuated means operatively connected to said plate for completing the movement of said rod in the same direction, said plate having parts engageable with said casing for limiting the movement of said spring actuated means in said direction.

4. In an electric switch, a casing, stationary contact members in said casing, a rod mounted in said casing for pivotal movement in different directions about its longitudinal axis, a movable switch member mounted on said rod and provided with a contact member engageable with and disengageable from said stationary contact members upon movement of said rod in different directions, respectively, said casing having a wall provided with an opening, a handle operable externally of the casing rotatably mounted in said opening, said handle having an integral part in rotary engagement with the edge of said wall of the casing at said opening therein, said edge of the wall constituting a bearing for said handle, a member associated with said rod for pivotally moving the same, and means releasably engageable directly with said last mentioned member and removably connected directly to said handle and operable thereby for actuating said last mentioned member, said last mentioned means also serving to retain said integral part of the handle in said opening.

5. In an electric switch, a casing, bearing members secured in said casing and upstanding from a wall thereof, a rod mounted in said bearing members for pivotal movement about its longitudinal axis, said bearing members having surface portions which engage said rod to limit the pivotal movement thereof, an insulating block secured in said casing and provided with stationary contact members, a movable switch contact member operable by said rod and engageable with and disengageable from said stationary contact members, said casing having a wall provided with an opening substantially in alignment with said rod, and means for actuating said rod including a handle mounted for rotation in said opening, a member mounted on said rod for pivotally moving the same, said member having a limited turning movement in relation to said rod and having parts engageable with said casing at the end of the turning movement of said member in opening and closing the switch, and means removably connected to said handle and operable thereby for actuating said member.

6. In an electric switch, a casing, bearing members secured in said casing and upstanding from a wall thereof, a rod mounted in said bearing members for pivotal movement about its longitudinal axis, an insulating block secured in said casing and provided with stationary contact members, a movable switch contact member operable by said rod and engageable with and disengageable from said stationary contact members, at least one of said bearing members having means to limit the pivotal movement of said rod, and means operable externally of said casing for actuating said rod, said last mentioned means including a member mounted on said rod, having a limited turning movement in relation thereto, and having a part engageable with said casing for limiting movement thereof in one direction.

7. In an electric switch, a casing, a bearing member secured in said casing and upstanding from a wall thereof, a rod mounted in said bearing member for pivotal movement about its longitudinal axis, said bearing member having an opening in which said rod is received, said opening being defined by intermediate spaced confronting edges which engage opposite sides of said rod and by pairs of spaced confronting edges extending in diverging relation from said intermediate edge, said pairs of diverging edges being located at opposite sides, respectively, of said intermediate edges and engageable with said rod for limiting the pivotal movement thereof.

8. In an electric switch, a casing, bearing members secured in said casing and upstanding from a wall thereof, a rod mounted in said bearing members for pivotal movement about its longitudinal axis, said bearing members having openings in which portions of said rod are received and which limit the turning of said rod therein, each of said openings being defined by intermediate spaced confronting edges which engage opposite sides of said rod and by pairs of spaced confronting edges extending in diverging relation from said intermediate edge, said pairs of diverging edges being located at opposite sides, respectively, of said intermediate edges and engageable with said rod for limiting the pivotal movement thereof.

9. In an electric switch, a casing, bearing members secured in said casing and upstanding from a wall thereof, a rod mounted in said bearing members for pivotal movement about its longitudinal axis, an insulating block secured to said casing wall independently of said bearing members and provided with stationary contact members, a movable switch member positioned substantially entirely within said block and operable by said rod and having a contact member engageable with and disengageable from said stationary contact members, said block having a substantially closed wall on which said stationary members are mounted and provided with openings through which said stationary contact members extend for engagement by said movable contact member, said stationary contact members substantially closing said openings, said movable contact member being movable by said rod from a point adjacent said closed wall of said block, in engagement with said stationary contacts, to disengaged position at a point spaced a substantial distance from said stationary contacts in a direction away from said wall of said insulation block and means for operating said rod.

10. In an electric switch, a casing, a rod pivotally mounted in said casing, a movable switch member carried by said rod and provided with a contact member, a hollow one-piece insulating block secured removably to a wall of said casing over said rod separately from the latter, said block having a substantially closed wall overlying said rod and said contact member, openings in said wall, and stationary contact members mounted on said wall externally thereof and extending through said openings into said block for engagement by said movable contact, said openings being substantially closed by said stationary contact members, whereby an arc which may be formed when the electric circuit is interrupted is confined within said block, said movable contact member being movable by said rod from a point adjacent said closed wall of said block, in engagement with said stationary contacts, to disengaged position at a point spaced a substantial distance from said stationary contacts in a direction away from said wall of said insulation block.

11. In an electric switch, a casing, bearing members upstanding from a wall of said casing, a rod pivotally mounted in said bearing members, a movable switch member carried by said rod and provided with a contact member, a hollow one-piece insulating block secured to said casing wall in position over said rod separately from the latter, said block having a substantially closed wall overlying said rod and said contact member, openings in said wall, and stationary contact members mounted on said wall externally thereof and extending through said openings into said block for engagement by said movable contact, said openings being substantially closed by said stationary contact members, whereby an arc which may be formed when the electric circuit is interrupted is confined within said block, said movable contact member being movable by said rod from a point adjacent said closed wall of said block, in engagement with said stationary contacts, to disengaged position at a point spaced a substantial distance from said stationary contacts in a direction away from said wall of said insulation block the portions of said stationary contact members which are engageable by said movable contact member being spaced from the adjacent wall portions of the block to permit flexing of said portions.

12. In an electric switch, a casing having a wall provided with circular openings, stationary and movable contact members in said casing, and means operable externally of the casing through said opening for actuating said movable contact member, said means comprising a handle positioned externally of the casing and mounted for rotation in said opening, said handle having an integral part provided with a plurality of circumferentially spaced struck out portions rotatably engageable with the edge of the wall at said opening, and means for retaining said handle part in said opening for turning movement therein.

13. In an electric switch, an operating handle composed of sheet metal and having a substantially spherical hand-grip portion comprising two substantially semi-spherical parts having their edges disposed in abutting relation and welded together, a shank portion integral with said hand-grip portions, and a hub integral with said shank portion.

14. In an electric switch, an operating handle composed of sheet metal and having a substantially spherical hand-grip portion comprising two substantially semi-spherical parts having their edges disposed in abutting relation and welded together a shank portion integral with said hand-grip portion, said shank comprising opposed portions merging at one end of the shank into said spherical portions, and a hub at the other end of said shank integral therewith, said hub having struck out portions for rotatably mounting said hub in a bearing.

15. In an electric switch, stationary and movable contact members, a quick make and break mechanism for moving said movable contact member into and out of engagement with said stationary contact member, said mechanism including pivoted levers and a handle having a lost-motion connection with one of said levers for initiating the movement thereof to effect disengagement of said contact members, a spring for actuating said levers under the control of said handle, and means for returning said handle to circuit closing position unless the movement of said levers to disengage said contact members is completed.

16. In an electric switch, stationary and movable contact members, a quick make and break mechanism for moving said movable contact member into and out of engagement with said stationary contact member, said mechanism including pivoted levers and a handle having a lost-motion connection with one of said levers for initiating the movement thereof to effect disengagement of said contact members, said mechanism including also a spring for moving said levers to engage and disengage said contact members, and means associated with said mechanism comprising a spring operative after a predetermined movement of said levers to assist said spring to complete the movement of said levers to disengage said contact members.

17. In an electric switch, stationary and movable contact members, a quick make and break mechanism for moving said movable contact member into and out of engagement with said stationary contact member, said mechanism including spring actuated toggle levers, a movable member having a lost motion connection with one of said toggle levers for moving the latter beyond dead center to open the switch, a handle for actuating said movable member, and spring means operatively connected to said movable member to return the handle, upon release thereof, to circuit closing position unless said movable member has projected said toggle levers beyond the dead center thereof to open the switch.

18. In an electric switch, stationary and movable contact members, a quick make and break mechanism for moving said movable contact member into and out of engagement with said stationary contact member, said mechanism including spring actuated toggle levers, a movable member having a lost motion connection with one of said toggle levers for moving the latter beyond dead center to open the switch, a handle for actuating said movable member, and spring means operatively connected to said movable member to return the handle, upon release thereof, to circuit closing position unless said movable member has projected said toggle levers beyond the dead center thereof to open the switch, said spring means being operable upon said toggle levers to assist in the projection thereof beyond dead center to switch-opening position.

19. In an electric switch, stationary and movable contact members, a quick make and break mechanism for moving said movable contact

member into and out of engagement with said stationary contact member, said mechanism including spring actuated toggle levers, a movable member maving a lost motion connection with one of said toggle levers for moving the latter beyond dead center to open the switch, a handle for actuating said movable member, and spring means connected to one of said toggle levers and engageable by said movable member to return the handle, upon release thereof, to circuit closing position unless said movable member has projected said toggle levers beyond the dead center thereof to open the switch.

20. In an electric switch, stationary and movable contact members, a quick make and break mechanism for moving said movable contact member into and out of engagement with said stationary contact member, said mechanism including spring actuated toggle levers, a movable member having a lost motion connection with one of said toggle levers for moving the latter beyond dead center to open the switch, a handle for actuating said movable member, spring means connected to one of said toggle levers and engageable by said movable member to return the handle, upon release thereof, to circuit closing position unless said movable member has projected said toggle levers beyond the dead center thereof to open the switch, said spring means being stressed during the movement of said handle from circuit closing position toward circuit opening position whereby it is effective to assist the projection of said toggle levers from dead center to circuit opening position.

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