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ELECTRIC SWITCH

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FIG. 2.

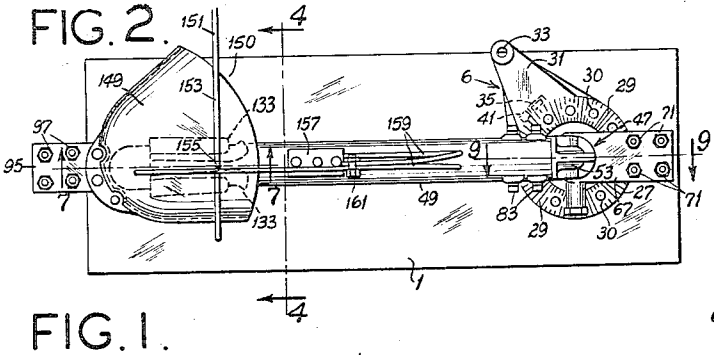


FIG. 17.

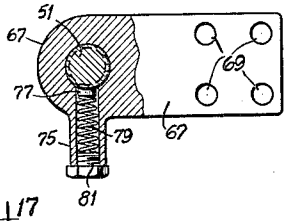


FIG. 1.

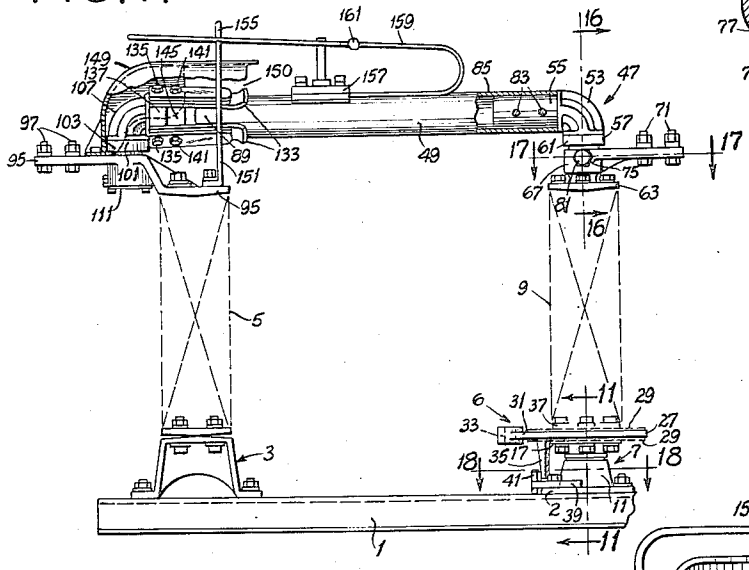


FIG. 4.

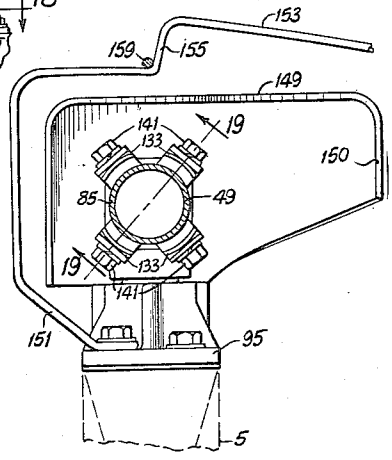
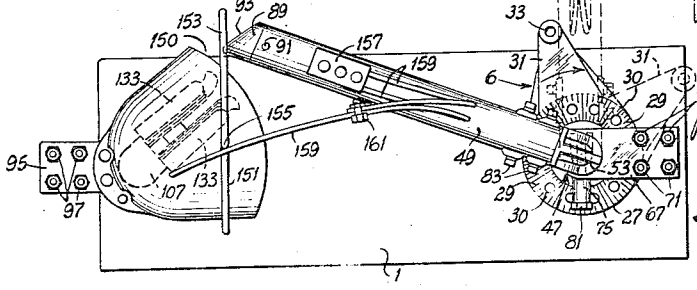


FIG. 3



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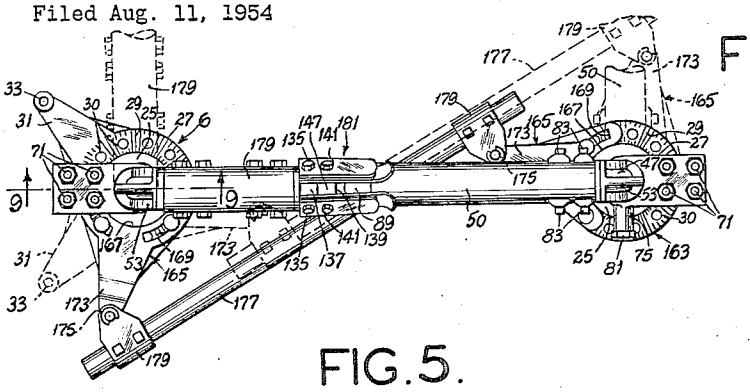


FIG. 6.

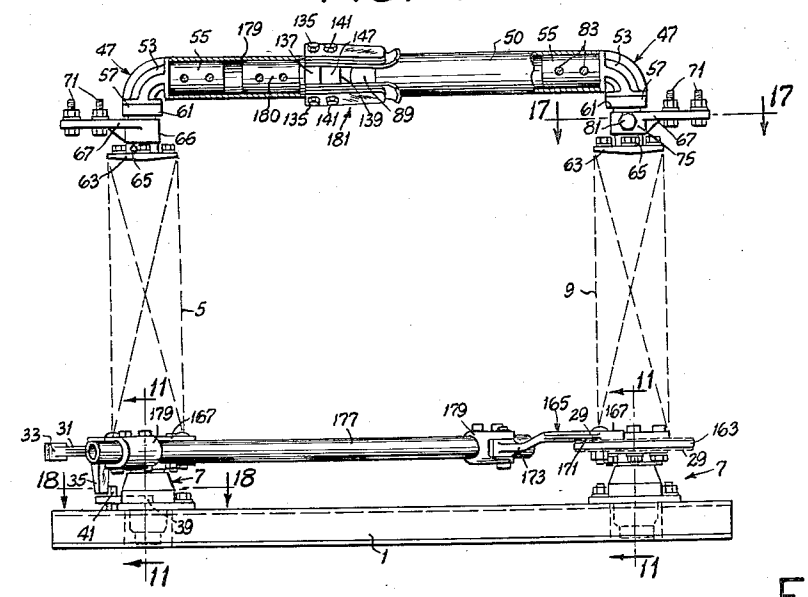


FIG. 5.

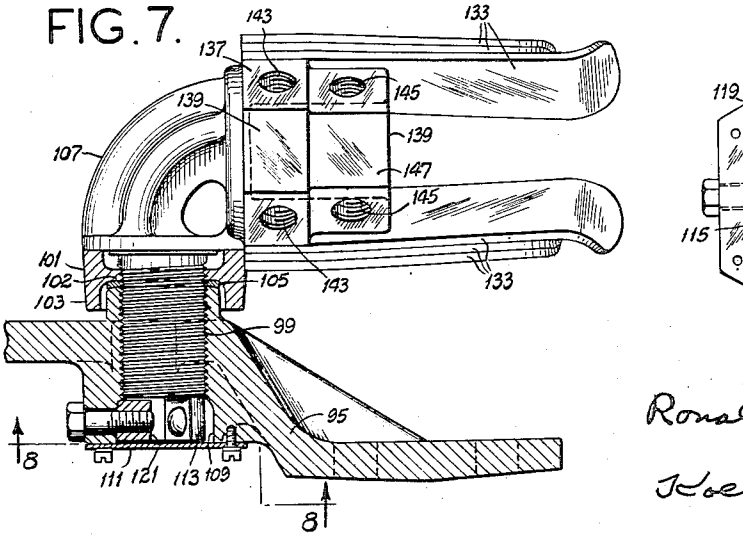


FIG. 7.

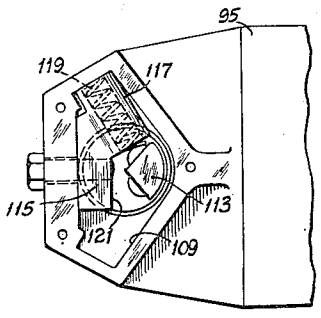


FIG. 8.

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FIG. 9.

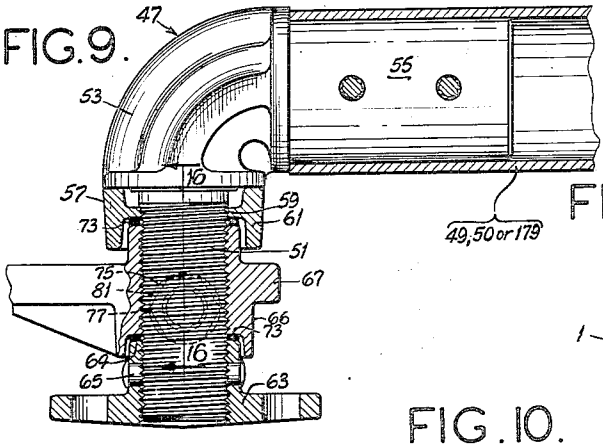


FIG. 11.

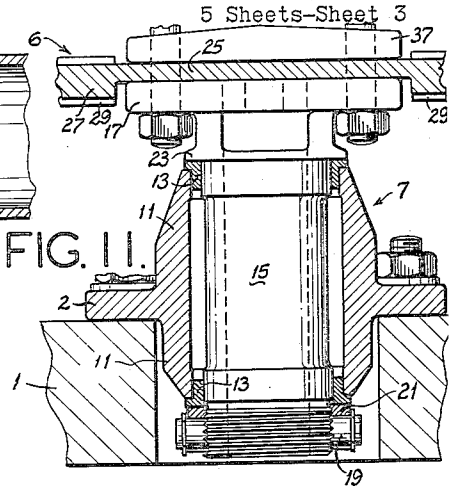


FIG. 10.

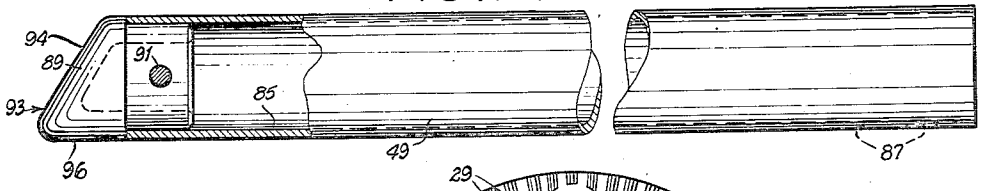


FIG. 12.

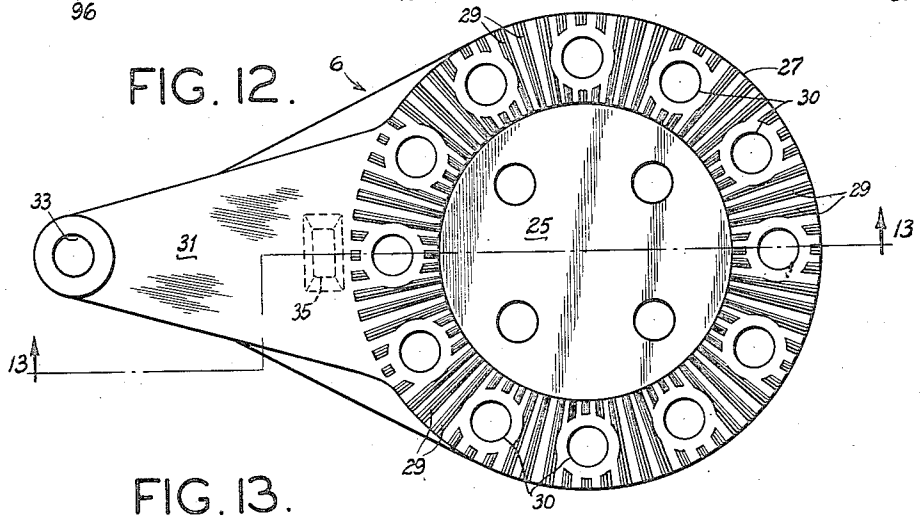
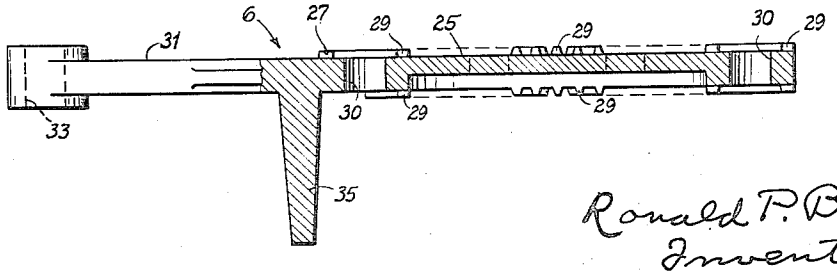


FIG. 13.



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FIG. 14.

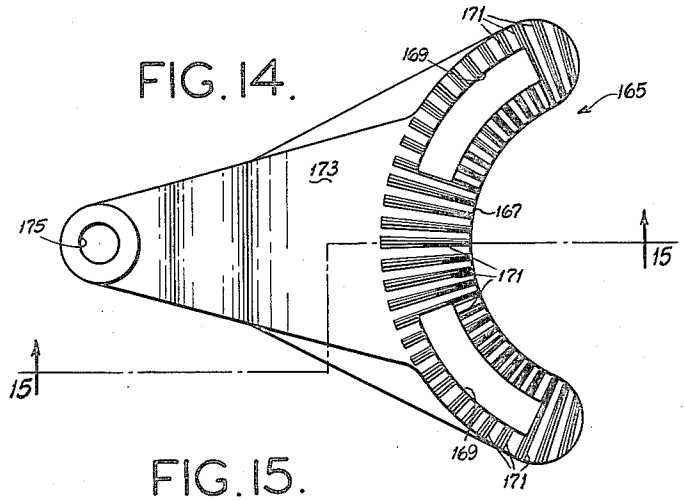


FIG. 15.

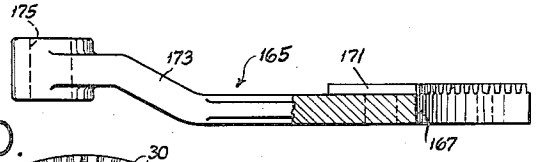


FIG. 20.

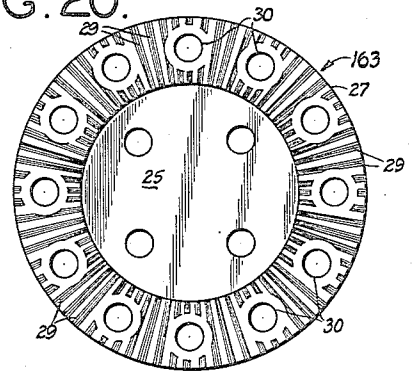


FIG. 16

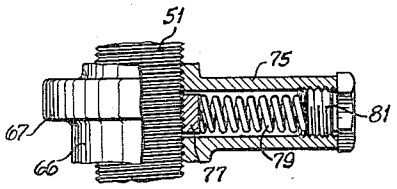


FIG. 18.

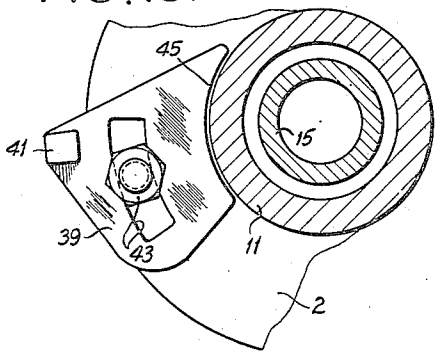
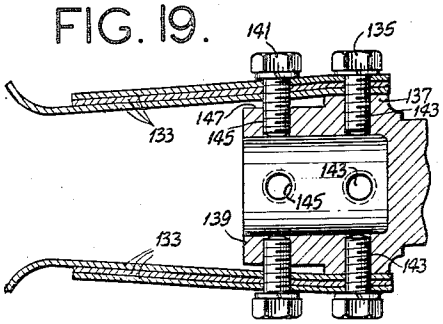


FIG. 19.



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FIG. 21.

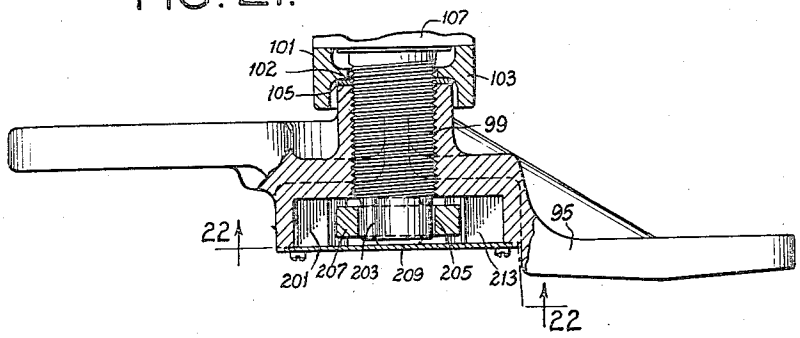


FIG. 22.

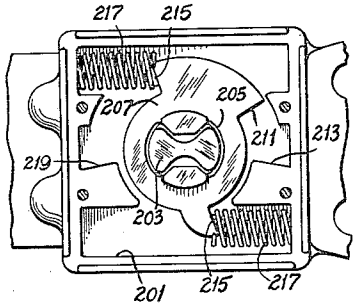
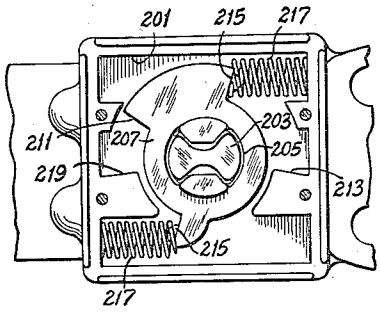


FIG. 23.



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United States Patent Office 2,825,774 Patented Mar. 4, 1958

2,825,774

ELECTRIC SWITCH

Ronald P. Bridges, Centralia, Mo., assignor to A. B. Chance Company, Centralia, Mo., a corporation of Missouri

Application August 11, 1954, Serial No. 449,053

12 Claims. (Cl. 200—48)

This invention relates to electric switches of the swinging arm and rotary contact type, being an improvement in a class of switches such as shown in U. S. Patent 2,306,117.

Among the several objects of the invention may be noted the provision of a swinging arm and rotary contact switch adapted by reason of its inter-changeability of parts to be assembled as a normally horizontal side-break switch or as a center-break switch, either one of which is adapted to break in either of two directions, depending upon the mode of assembly; the provision of a switch of the class described, wherein the rotary contact is biased to normal open position to ensure a wide gap when the switch is open, but which when closed firmly entraps the switch arm and is arranged to prevent opening movements due to magnetic or analogously operative forces; the provision of a switch of the class described, having means ensuring noncorroding rotary bearing contacts of low electrical resistance; and the provision of a switch of the class described which is economical to manufacture and convenient to assemble and align. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of which will be indicated in the following claims.

In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated,

Fig. 1 is a front elevation of a side-break form of switch embodying my invention, shown in closed position;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a view similar to Fig. 2, showing in solid lines a partially open arm position, and in dotted lines a completely open position;

Fig. 4 is an enlarged cross section taken on line 4—4 of Fig. 2;

Fig. 5 is a side elevation of a center-break form of switch embodying the invention, parts being shown in section;

Fig. 6 is a plan view of Fig. 5, the solid lines showing a closed position and the fragmentary dotted lines an open position;

Fig. 7 is an enlarged vertical section taken on line 7—7 of Fig. 2, some parts being omitted and others shown in elevation;

Fig. 8 is a bottom view of Fig. 7, certain bottom cover parts being removed;

Fig. 9 is an enlarged fragmentary vertical section taken on line 9—9 of Figs. 2 and 6, parts being omitted to show only such as exist on both switch forms;

Fig. 10 is an enlarged detail view of a switch arm, parts being shown in section;

Fig. 11 is an enlarged vertical and fragmentary cross section taken on line 11—11 of Figs. 1 and 5;

Fig. 12 is an enlarged detail plan of a control-lever plate;

Fig. 13 is a vertical section taken on line 13—13 of Fig. 12, parts being shown in elevation;

Fig. 14 is a plan view of an adjustable link arm;

Fig. 15 is a vertical section taken on line 15—15 of Fig. 14, parts being shown in elevation;

Fig. 16 is a vertical section taken on line 16—16 of Fig. 1, parts being shown in elevation;

Fig. 17 is a horizontal section taken on line 17—17 of Figs. 1 and 5, parts being shown in elevation;

Fig. 18 is a horizontal section taken on line 18—18 of Figs. 1 and 5 and showing an adjustable-sector stop piece;

Fig. 19 is a cross section taken on line 19—19 of Fig. 4;

Fig. 20 is a plan view on a reduced scale of a plate like that shown in Fig. 12 but omitting the control lever thereon;

Fig. 21 is a sectional view similar to the lower portions of Fig. 7 but showing a modification;

Fig. 22 is a horizontal section taken on line 22—22 of Fig. 21; and,

Fig. 23 is a view similar to Fig. 22, showing a reversed arrangement of certain parts from the positions shown in Fig. 22.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Figs. 1–4, which show the side-break form of the invention, there is diagrammatically shown at numeral 1 a supporting bracket for the switch parts to be described. At 3 is shown a stationary mount for a stationary insulator stack 5. At 7 is shown a rotary mount for an insulator stack 9. The insulator stacks 5 and 9 are indicated diagrammatically by dotted lines, inasmuch as any one of a number of one-piece insulators or stacked insulator assemblies may be supported on 3 and 7.

The rotary mount 7 is constituted by a bearing sleeve 11 (Fig. 11) attached to the support 1 by flange 2, on which are shouldered bearing bushings 13 for a vertical rotary journal 15. The upper end of this journal 15 is constituted by a supporting pad 17. It is threaded at its lower end to receive a castellated nut 21 locked by a cross pin 19. This is for the purpose of appropriately distancing the upper surface of the nut from a shoulder 23 below the pad so as to obtain an accurately aligned, but free-running fit of the journal 15 in the bushings 13.

Bolted to the pad 17 is a central circular web 25 of a toothed ring 27, which appears in greater detail in Figs. 12 and 13. It has radial teeth shown at 29, and it also has openings 30 for the center-break form of the invention later to be described. Extending from the ring 27 is a lever arm 31, having an end bearing 33 and a downwardly projecting stop arm 35. Numeral 6 is applied to the entire member as shown in Figs. 12 and 13 and identified as a control-lever plate. Also bolted to the journal 15, above the web 25, is a bottom support 37 for the insulator stack 9.

As shown in Fig. 18, there is attached to the flange 2 an adjustable sector stop piece 39 having a vertical stop 41 adapted to be engaged by a stop 35 on arm 31. The sector piece is angularly adjustable by a bolt-and-slot combination 43. An inner circular edge 45 of the sector 39 engages the bearing sleeve 11, so as circularly to guide the sector during angular adjustments.

At the top of the insulator stack 9 is a supporting assembly 47 for a tubular switch conductor arm or blade 49. This assembly 47 is also used on the second form of the switch, to be described, and (Fig. 9) comprises a threaded conductive (such as bronze) journal 51 at the

upper end of which is a 90° neck or elbow 53 connecting the journal with a gudgeon 55. Threaded on the journal 51 and screwed tightly up against the neck 53 is a shoulder piece 57, formed with an inwardly directed shoulder 59 and a weather-guard skirt 61. At the lower end of the journal 51 is threaded a support 63 for attachment to the appropriate insulator stack (in this case 9). This support provides an inner shoulder 64. After having been threaded the proper distance on 51, the support 63 is pinned, as indicated at 65.

At numeral 67 is shown a conductive (such as bronze) line terminal bracket having openings 69 for receiving the usual wire connectors 71. Since the line terminal 67 is to be nonrotary, or at most to have limited compensating movement adapting its position to whatever is attached at 71, it will be understood that relatively rotary motion will be required between it and the threaded journal 51, and that between these parts there will be an electrical contact. Bracket 67 carries a skirt 66. The purpose of threading the journal 51 is to increase the surface contact over that of a cylindrical journal and therefore to reduce the electrical contact resistance. These threads are silver-plated for further reducing the contact resistance. In order to accommodate the resulting slight axial motion between parts 51 and 67 resulting from relative turning, resilient washers 73 are employed between 67 and 57 on one hand, and 57 and 63 on the other hand. These washers may be composed of felt, impregnated with a waterproof lubricant. These washers are respectively lapped by skirts 61 and 66. The washers are also slightly compressed in the properly attached position of support 63.

In order to improve the electrical contact pressure between members 51 and 67, there is provided the arrangement shown in Figs. 16 and 17, which consists of a socket 75 for the reception of a fiber disc 77, pressed by a spring 79 reacting against a screw closure 81. This disc 77, which with respect to the material of the journal 51 is relatively soft, engages the threaded surface of journal 51 without damage thereto and tends to maintain the respective male and female threads in snug wedging contact by producing a force directed transversely to the common axes of the threads.

In view of the above, it will be seen that when the insulator stack 9 (Figs. 1–3) is rotated on 7 by means of the lever 31, there will be relative motion between the threads on 51 and 67, which occurs at all times under reliable helical contact conditions. Moreover, the helical contact area between these parts 51 and 67 (between washers 73) is thoroughly weather-protected by the sealing qualities of the lubricant-impregnated washers and the shingling action of skirts 61 and 66.

The purpose of rotating the insulator stack 9, including the neck 53, is to swing the tubular switch arm 49 in a horizontal plane from the position shown in Fig. 2 through the solid-line position shown in Fig. 3 to the 90° dotted-line position, the arm being attached to the neck 53 by means of bolts 83. Details of the switch arm are shown in Fig. 10, its tubular form being indicated at 85. Holes 87 are in it for receiving the fastening bolts 83. At the outer end, the arm is provided with an inserted nose piece 89, held by pin 91, the nose being beveled, as shown at 93. The nose obviously may be located in either of two positions 180° apart. It is so located that its sloping bevel portion 94 is in leading position upon switch-opening movement, and its straight portion 96 is in leading position upon switch-closing movement.

Referring now to the nonrotary insulator stack 5 (Figs. 1 and 2), it carries at its upper end a stationary conductive (such as bronze) bracket 95, carrying line wire connectors 97 (see also Figs. 7 and 8). Threaded through this bracket is a second threaded conductive (such as bronze) journal 99. The threads are silver-plated. To the upper end of the journal is threaded a hollow piece 101, including an inner shoulder 102 and skirt 103 within which is a lubricant-impregnated felt protective washer 105. Parts 101, 102 and 103 are analogous to parts 57, 59 and 61, already described, and have analogous purposes, but the former are located on a neck or elbow 107, attached to the upper end of the journal 99.

Around the lower end of the journal 99 the bracket 95 is formed with a pocket or container 109 which is normally enclosed by a screw-attached sealing cover 111. In this pocket the threaded journal 99 carries an eccentric lug 113. Bolted to one side of the pocket 109 is a spring container 115 on which is a socket 117 carrying a compression spring 119, pressing upon the lug 113 in a direction such that the journal 99 is biased anticlockwise when viewed from the top as in Fig. 2. If it is desired to bias the journal clockwise, the container 115 may be loosened and turned over in position within the pocket 109, thus pressing the lug 113 from the opposite direction. In such event, the journal 99 will be biased clockwise, as viewed from the top in Fig. 2. A stop portion 121 on the spring container 115 limits the movement of the lug 113 under conditions of either of said biases. One limiting position for anticlockwise bias is shown in Fig. 3, which is about 45° from an initial position as determined by engagement of the lug 113 with the stop 121 on the spring container 115. It will be noted that the pocket 109 is of symmetrical form (Fig. 8) to accommodate the spring container 115 in either of its two possible positions. It will be apparent that the thrust of spring 119 crosswise of the axis of journal 99 improves the electrical contact between its threads and those of member 95. Thus in this case a cross thrust assembly such as shown in Fig. 16 is not necessary, although it could be additionally used, if desired.

In Figs. 21–23 is shown a modification of the lower end structure of the journal 99 and pocket 109. Like numerals designate like parts to those shown in Fig. 8, and it is to be understood that either the construction shown in Figs. 7, 8 or that shown in Figs. 21–23 may be used. Figs. 21–23 show switch-closed positions.

Referring to Figs. 21–23, the pocket 201 beneath the bracket 95 is of rectangular form. The lower end of the journal 99 is formed with a wing-shaped lug 203, which engages with a wing-shaped opening 205 of a plate 207 located in the pocket 201 and held in place by a sealing cover 209. The plate 207 is formed with a stop surface 211 which in switch-open position engages a limiting stop surface 213. The plate 207 is also provided with eccentric projections 215 which engage compression springs 217 located in the pocket 201, so as by reaction to exert a turning moment on the plate and on the journal 99. The turning moment is in the switch-opening direction. If it is desired to reverse the switch-opening direction, the plate 207 may be turned over in the pocket 201, as shown in Fig. 23. The springs 217 are also relocated, as indicated in Fig. 23, so that the bias of their returning moment is the reverse of that shown in Fig. 22. This causes the stop surface 211 to engage a stop 219 in the pocket 201 when the switch is open.

Operation of the alternative form shown in Figs. 21–23 will be obvious from the description given in connection with the construction shown in Figs. 7 and 8, and it is to be understood that the reversible spring-biasing stop features of the latter Figs. 21–23 are alternative to those of the former Figs. 7, 8.

The purpose of the journals 99, 107 (Fig. 7) is to support a spring clip socket assembly 133 which is anchored by one set of bolts 135 to base 137 of a lug 139. The bolts 135 are threaded into openings 143 in the base 137. Bolts 141 pass through openings in the spring clip socket assembly 133 and are threaded into openings 145 in a reduced section 147 of lug 139. These bolts serve adjustably to tension the clips in a radial direction. It will be noted that the assembly 133 swings over the vertical center line of the insulator stack 5.

As shown in Fig. 1, an optional weather protective hood 149 is employed over the swinging assembly 99, 107, 133. This hood includes an entry 150 for the swinging end 89 of the switch arm 49. There is also provided a stationary arcing horn 151, attached to the bracket 95. This loops over the hood 149 (Fig. 4) and is provided with a sloping portion 153 and a step 155. Anchored to the arm 49 at 157 is a pair of spring arcing horn wires 159, joined at a clamp 161. One of these wires 159 extends to lie behind the step 155 when the switch is closed (Figs. 1, 2 and 4). When the switch is opened, the extending wire 159 wipes from behind the step 155, to maintain contact as the arm 49 moves from the clip assembly 133 (Fig. 3; solid lines). Upon further movement, the extending wire 159 snaps from behind the step 155, at first drawing and then breaking the arc as the arm swings from the solid-line position shown in Fig. 3 to the dotted-line position.

Operation of the first form of the invention is as follows:

Motion is applied to the switch by attaching a suitable operating link to the bearing 33 of the arm 31. Thus the switch may be independently operated or gang-operated with similar switches from a suitable switch-operated linkage (not shown). Upon moving the lever 31 clockwise from the Fig. 1 position, the arm 49 moves through the solid-line position of Fig. 3 to the dotted-line position. In doing so, its end adjacent 89 swings out from the socket formed by the spring clip assembly 133 in which it was telescopically and spring held. The bevel portion 93 of nose 89 is forward, relative to the opening movement, thus providing for rapid clearance between the arm and the clips. Outward movement of the arm moves the clips to the dotted-line position shown in Fig. 3, wherein they are held by action of the spring 119. The concomitant separating action of the arcing horns 159 and 151 has been described.

To reclose the switch, the lever 31 is moved anticlockwise, whereupon the arm 49 moves from the dotted-line position shown in Fig. 3 through the solid-line position, after which its end adjacent 89 moves into the clip assembly 133 until the Fig. 2 coaxial telescoped position is reached. Concomitantly, the end of the springing arcing horn 159 rides up the ramp 153 of horn 151 until it settles behind the step 155, which prepares the horns for later reopening action. Any forces involved in the closing movement, tending to cant the screw journals in 99 (Fig. 7) and 51 (Fig. 9), only enhance the contact pressures of the helical threads of these journals. The bevel 94 at the end of arm 49 allows easy entry into the socket-type contact clip assembly 133. The straight portion 96 aids in preventing the arm from passing the center-line position, due to flat engagement of the portion 96 with the contact assembly 133. Any resulting wedging action in the threads further improves the contact pressure. Hence the contact resistance against current flow through the rotary journals is minimized, particularly so in view of the silver-plating on the threads and their large areas of helicoidal engagement. The slight axial motions of the journals 51 and 99 upon rotation do not interfere with the proper engagement between the switch arm end and the clip assembly 133. The closed position of the switch (Fig. 2) is determined primarily by engagement between the depending stop arm 35 on lever 31 and the upstanding stop 41 on the properly adjusted sector piece 39. Since, when the switch is closed, the center lines of the arm 49, clip assembly 133 and screw journals 99 are all coplanar, the axial force of the field surrounding the arm 49 has no effective moment arm around the center lines of the journals 51 and 99 which might cause opening movements. In fact, any such magnetic reaction only improves electrical contact between the male and female threads associated with the journals 51 and 99. This is because any canting movements of the journals around axes perpendicular to their center lines tend to wedge the threads tighter, thus increasing contact pressure and lowering contact resistance when most needed.

It will be understood that the bracket 67 is nonrotary by reason of attachment to suitable line terminal parts (not shown). Bracket 95 is stationary because of its attachment to the stationary insulator stack 5.

If it is desired to have the switch open to the other side (opposite to the opening shown in Fig. 3), it is necessary only appropriately to change the position of the spring container 115 and stop 121 (Figs. 7 and 8) and to limit the motion of the stop 35 by stop 41 upon clockwise instead of anticlockwise movement of the lever 31. In this event the position of the nose 89 on the end of the arm 49 should be turned over 180°. Also, the position of the weather hood 149 and the arcing horn 151 should be reversed relative to the Fig. 4 position.

The alternative center-break form of the invention is shown in Figs. 5 and 6 and others to be mentioned. Like numerals designate like parts. Those parts which are different are given new numbers. In this case a rotary mount 7, such as shown in Fig. 11, is again used as a rotary support for each insulator stack 5 and 9 on the base 1. Hoewver, the mount 7 for stack 9 does not carry the sector stop plate 39 of Fig. 18. Moreover, instead of the supporting pad 17 carrying a control-lever plate 6 such as shown in Fig. 12, it carries a ring member 163, such as shown in Fig. 20. This member 163 is similar to 6 but does not carry a lever such as 31. However, an adjustable link arm 165 is provided on this ring member 163. Such a link arm is shown in Figs. 14 and 15. This link arm 165 has a sector portion 167 with sector slots 169 and radial teeth 171. It also has an arm 173 at the end of which is an end bearing 175. Thus the teeth of the link arm 165 may be interdigitated with the teeth 29 of the ring member 163, being adjusted in any desired angular position and held by bolts passing through the sector slots 169.

The rotary mount 7 for the insulator stack 5 is provided with a sector stop 39 such as shown in Fig. 18 to provide a stop 41. This is engaged by stop arm 35 on control-lever plate member 6, such as shown in Fig. 12. This plate 6 is carried between the rotary support 7 and the insulator stack 5. In addition, an adjustable link arm 165 (Figs. 14 and 15) is adjustably attached to the control-lever member 6. A cross link 177 is bolted in sleeves 179, which in turn are pinned to the link arms 165. The link arms 165 are appropriately angularly adjusted, so as properly to phase the desired relative angular positions of the insulator stacks 5 and 9. Supporting assembly arrangements 47 are used at the tops of the stacks 5 and 9, both of which are of the construction shown in Fig. 9, thus providing for rotation relative to the line wire terminal brackets 67 which carry the wire connectors 71. Attached to the assembly 47 on stack 9 is a switch arm 50, which is like switch arm 49 except that it is shorter. Attached to the gudgeon 55 of assembly 47 on stack 5 is a sleeve 179. At the outer end of the sleeve is a clip assembly 181, which is like that shown in Fig. 7 except that it is attached to a gudgeon 180. This gudgeon 180 is pinned to sleeve 179. This arrangement is responsible for the center-break characteristics of the alternative form of the invention.

Operation of the alternative form is as follows, referring to Figs. 5 and 6, wherein the switch is shown in closed position with the stop arm 35 against stop 41:

By attaching an operating linkage to the end bearing 33 of the lever 31, the insulator stack 5 may be turned anticlockwise (Fig. 6) through 90°. This, through action of the cross link 177, turns the stack 9 also through approximately 90°, thus opening the circuit. This oppositely angles each of the members 179 and 50 through approximately 90° each, so that they become more or less parallel. The operation withdraws the end of arm 50 from its telescopic position in the

clip assembly 181. In this form of the invention, the showing of a weather hood and arcing horns has been omitted.

It will be understood that if it is desired to reverse the opening angles of this form of switch, the arms 173 may be reset on the toothed rings 27, so as to reverse the angular position of the cross-connecting link 177 between the stack assemblies. Suitable repositioning of the stop 41 relative to stop arm 35 will also be required, as also 180° rotation of the nose 89 of the arm 50. Further elaboration in this respect will be unnecessary and it will be clear to those skilled in the art.

From the above it will be clear that the invention provides for two forms of switches, i. e., side-break and center-break types, which may be assembled conveniently from parts, most of which are interchangeable. Each switch can be assembled and adjusted to operate in either of two directions for opening and closing. Each switch has silvered thread-type journals providing for rotation with respect to parts which are to be connected to the line wires, so that electrical contact resistance is decreased. All of the rotary contact parts are thoroughly protected against weathering and corrosion. Each switch is proof against being spontaneously opened by any magnetic field or similar forces when closed. The combined angling and telescopic rubbing movements of the end of the switch contact arm into and from the contact socket maintain clean metal-to-metal contacts. The angled positions of the spring clips forming the socket allow convenient entry of the arm end into the socket.

It is to be understood, as to the phraseology used in this specification, that the following meanings are intended: Each of the conductive members 67 and 95 is a line terminal in the sense that it terminates the circuit up to journals 51 and 99, respectively. Generically, each swinging switch arm assembly and swinging clip assembly may be referred to as a swinging contact.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. An electrical switch comprising a swinging conductor, a conductive bearing for said conductor comprising a conductive member having a threaded opening therethrough, a threaded relatively rotary journal extending from said conductor and threaded through said opening, spaced shoulders on said journal, spaced end surfaces on said member adjacent said shoulders, and resilient packing means between the respective end surfaces and shoulders.

2. A switch made according to claim 1, wherein the swing of the conductor is horizontal and the coextensive axes of said opening and journal are vertical, whereby one of said shoulders is above one packing means and an uppermost end surface, a skirt depending from said shoulder around the packing means and said end surface, the lowermost one of said end surfaces being above the other packing means and the lowermost shoulder, said last-named end surface having a depending skirt surrounding the lowermost packing means and the lowermost shoulder.

3. An electric switch comprising a swinging switch arm, a swinging contact clip assembly adapted to be engaged by and to swing with the switch arm, a threaded journal, a bracket having a threaded opening in which the journal is threaded to establish an axis of swing, said clip assembly being attached at one end of the journal, said bracket having a pocket adjacent the other end of the journal, an eccentric lug means extending from said journal and located in the pocket, spring means in the pocket acting upon said lug means to bias said clip assembly to a disengaged position, and stop means engageable by said lug means adapted to predetermine said disengaged position.

4. An electric switch comprising a swinging switch arm, a swinging contact clip assembly adapted to be engaged by and to swing with the switch arm, a threaded journal, a bracket having a threaded opening in which the journal is threaded to establish an axis of swing, said clip assembly being attached at one end of the journal, said bracket having a pocket adjacent the other end of the journal, a stop plate having a driving connection with said journal and located in the pocket, spring means in the pocket acting upon said stop plate to bias said clip assembly to a disengaged position, stop means in the pocket engageable by said stop plate to predetermine said disengaged position, said stop plate and spring means being adapted to be reversibly positioned in the pocket.

5. An electric switch comprising a switch arm, a contact clip assembly adapted for swinging movement and engagement with said switch arm, a threaded journal, a bracket having a threaded opening in which the journal is threaded to establish an axis of swing, said clip assembly being attached at one end of the journal, said bracket having a container adjacent the other end of the journal, an eccentric lug means extending from said journal and located in the container, reversible spring means in said container adapted in each of two different positions to bias the lug means for rotation of the journal to one or another of two different limiting positions, and a stop on said reversible spring means adapted in each position of said spring means in the container to determine one of said limiting positions.

6. An electrical switch comprising a pair of conducting elbows each having an axial journal, one of the elbows having an axial-socket contact member extending at right angles to its journal and the other elbow having an axial-arm switch contact arm member extending at right angles to its journal and having a free end, means supporting said journals for rotation with their axes parallel and with the axes of said socket and arm contact members swingable substantially in a common plane perpendicular to said journal axes from positions in which the axes of the socket and arm contact members are coextensive and the socket and free end of the contact arm are telescopically engaged to positions in which the axes of the socket and arm contact members are angled and the socket and arm contact members are disengaged, reversible stop means adapted to determine said positions of engagement, stationary elements line terminal means having bearing means for said journals, insulators supporting said elbows and line terminal elements, one of said insulators being attached to and rotary with the elbow carrying the switch contact arm member and the other insulator being stationary, and reversible spring means adapted to bias said socket contact member toward its disengaged position.

7. In an electrical switch, a rotatable switch contact means comprising a journal having male threads thereon, a line terminal having female threads engaged by said male threads, the axes of the male and female threads being coextensive, said line terminal having a pocket extending from said female threads, a compression coil spring in said pocket extending transversely with respect to said axes, and a pressure member in said pocket engaging said male threads and adapted to apply thrust from said spring to said journal transversely of said axes.

8. In an electrical switch, a rotatable switch contact means made according to claim 7, wherein said pressure member is formed of material which with respect to the material of the journal is relativley soft, whereby damage to said male threads is prevented.

9. In an electrical switch, a rotatable switch contact means made according to claim 7, including resilient seal-

ing means at the point where said male threads emerge from said female threads.

10. In an electrical switch, a rotatable switch contact means made according to claim 9, including a skirt extending from said journal and surrounding said sealing means and extending in water-deflecting position over a portion of said line terminal.

11. An electric switch comprising a swinging arm, a swinging contact clip assembly adapted to be engaged by and to swing with the switch arm, a journal, a bracket having a bearing in which the journal is borne in reference to an axis of swing, said clip assembly being attached to the jornal, lug means extending from said journal, spring means acting upon said lug means to bias said clip assembly to a disengaged position, and stop means engageable by said lug means adapted to predetermine said disengaged position.

12. An electric switch comprising a swinging switch arm, a swinging contact clip assembly adapted to be engaged by and to swing with the switch arm, a journal, a bracket having a bearing in which the journal is rotatable in reference to an axis of swing, said clip assembly being attached to the journal, a stop member having a reversible driving connection with said journal, spring means acting upon said stop member to bias said clip assembly to a disengaged position, and stop means engageable by said stop member to predetermine said disengaged position.

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U. S. DEPARTMENT OF COMMERCE

PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,825,774 March 4, 1958

Ronald P. Bridges

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 23, for "Hoewver" read -- However --; column 8, line 50, for "stationary elements line terminal means" read -- stationary line terminal elements --; column 9, line 13, for "jornal" read -- journal --.

Signed and sealed this 22nd day of April 1958.

(SEAL)

Attest:

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Commissioner of Patents