March 19, 1957 R. P. BRIDGES 2,786,121

ROTARY SWITCH CONTACT ASSEMBLY

Filed May 31, 1955

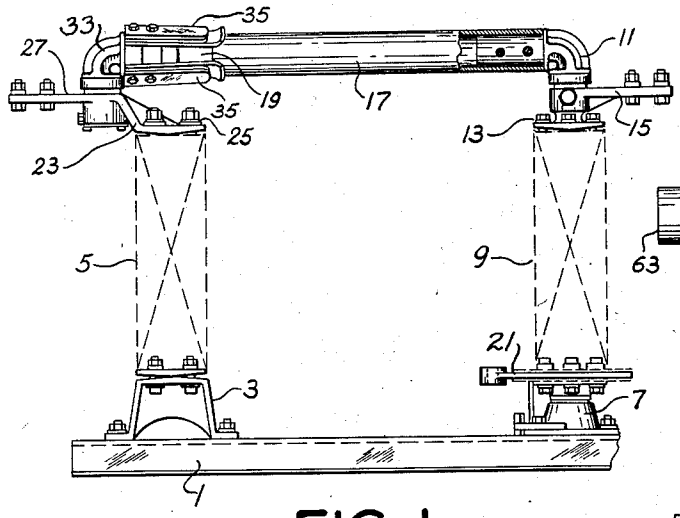


FIG. 1.

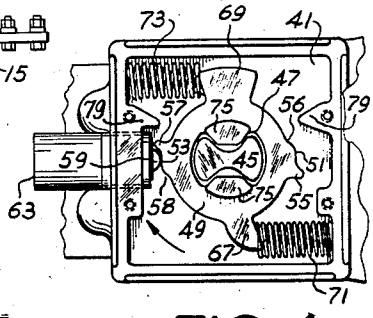


FIG. 4.

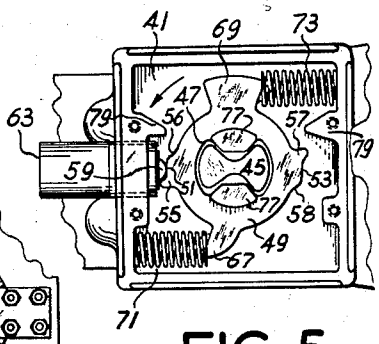


FIG. 5.

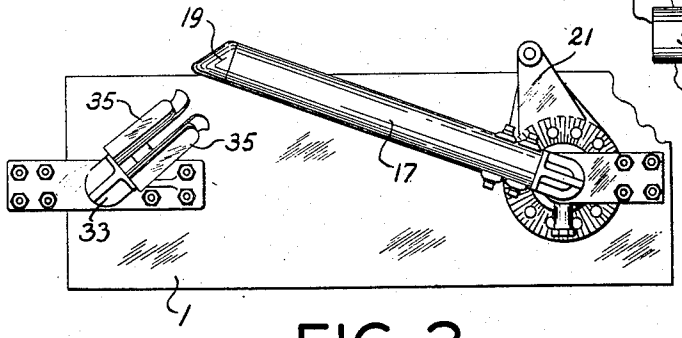


FIG. 2.

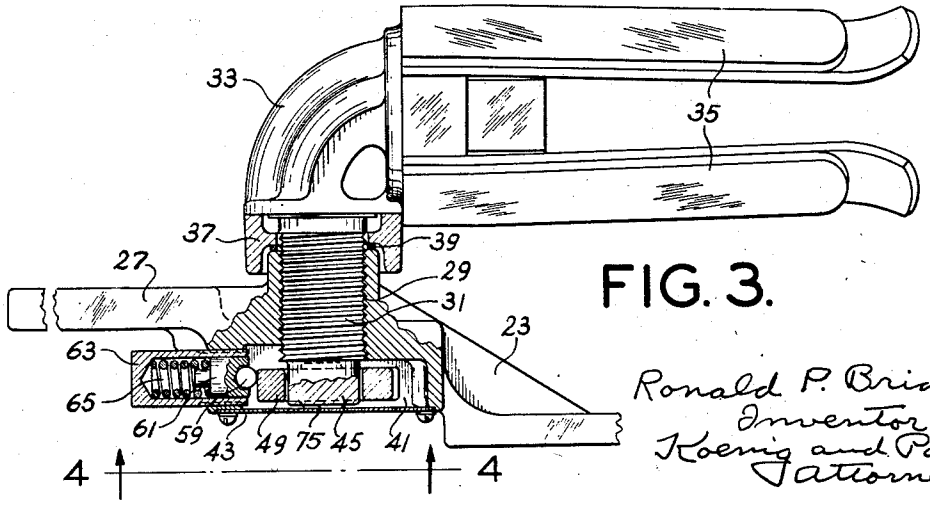


FIG. 3.

Ronald P. Bridges,
Inventor,
Koenig and Pope,
Attorneys.

United States Patent Office 2,786,121 Patented Mar. 19, 1957

2,786,121

ROTARY SWITCH CONTACT ASSEMBLY

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

Application May 31, 1955, Serial No. 511,884

9 Claims. (Cl. 200—170)

This invention relates to rotary switch contact assemblies, and more particularly to those of the threaded shank type.

Among the several objects of the invention may be noted the provision of an improvement upon the general class of rotary switch contacts shown in my copending application Serial No. 449,053, filed August 11, 1954, for Electric Switch, wherein is shown a threaded current-carrying bearing for a rotary switch arm; the provision of a rotary switch contact of the class described wherein bearing contact pressure is increased with concomitant decrease in contact resistance only when the switch arm is in closed position and current is flowing; the provision of an improved rotary switch contact of the class described in which said contact pressure is decreased as the switch arm moves to open position, thereby facilitating switch-opening and -closing operations when low contact resistance is not required; the provision of a rotary contact of the class described allowing for interchangeable reverse swinging operations of the switch arm; and the provision of a rotary contact of this class which is foolproof, economical to construct and protected against weather. 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 one of various possible embodiments of the invention is illustrated,

Fig. 1 is a side elevation illustrating a typical form of switch to which the invention is applicable, the switch being shown in closed position;

Fig. 2 is a plan view of Fig. 1 but showing the switch in a partially open position;

Fig. 3 is an enlarged side elevation of the rotary switch contact parts per se, parts being shown in section;

Fig. 4 is a bottom plan view of parts of Fig. 3, as viewed from line 4—4, a cover part having been removed and the parts assembled for clockwise opening action; and,

Fig. 5 is a view similar to Fig. 4, but showing the parts assembled for anticlockwise opening action.

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

Referring now more particularly to Figs. 1 and 2, these show certain general features of the switch assembly as described in said application and to which the present invention applies. Numeral 1 indicates a supporting bracket for the switch parts. At 3 is shown a stationary mount for a stationary insulator stack 5. At 7 is shown a rotary mount for a rotary insulator stack 9. The insulator stacks 5 and 9 are indicated diagrammatically by dotted lines, inasmuch as any one of a number of available one-piece insulators, or stacked insulator assemblies, may be supported on 3 and 7.

A conductive bracket 11 is attached to the top of the rotary stack 9, as indicated at 13. At 15 is shown a non-rotary line terminal in which the bracket 11 rotates, as described in said application. Current from a line attached to the terminal 15 can pass to the conductive bracket 11 in any rotary position of the latter. Attached to the bracket 11 is a conductive switch arm 17, the beveled end piece 19 of which is horizontally swingable. In order to swing this arm 17, there is provided at the bottom of the rotary insulator 9 an operating arm 21, whereby the assembly of the insulator 9, bracket 11 and switch arm 17 may be turned.

On the top of the stationary insulator 5 is attached a conductive bracket 23. The attachment is indexed 25 in Fig. 1. The bracket 23 is provided with a line terminal portion 27. As shown in Fig. 3, there is a vertically threaded opening 29 in the bracket 23 for accepting the vertically threaded shank 31 of a rotary bracket 33. The latter carries a group of four spring contact clips 35, adapted to accept and nest the end 19 of the switch arm when the switch is swung to the closed position indicated in Fig. 1. The threads at 29 and 31 are preferably silver-plated, for maximum conductivity of current between their surfaces.

When the switch moves toward open position, as indicated in Fig. 2, the end 19 of the switch arm 17 leaves the nest of clips 35, thus breaking the circuit. Current is borne between the line terminals 15 and 27 only when the switch is closed. Threaded on the upper end of the shank 31 and located just below the bracket 33 is a skirt member 37, between which and the threads 29 is located a resilient washer 39. Both the skirt member 37 and the washer 39 are for weather protection.

The lower part of the bracket 23 is formed as a square socket 41, open on the bottom and adapted to be closed by a cover 43. A stub end 45 of the shank 31 extends into the socket 41 and is noncircular, as indicated in Figs. 4 and 5. This stub end 45 keys loosely into a noncircular opening 47 of a driving ring 49. The profile of the ring includes opposite cam platforms 51 and 53, flanked by opposite stop lugs 55 and 57, respectively, and also oppositely flanked by sloping cam lift portions 56 and 58. The respective platforms, lift portions and lugs are engageable with a ball detent 59, carried in a socket of a slider 61. The slider 61 is located in a case 63 which is threaded into the bracket 23, the threads being staked. A compression spring 65, located in the case 63, biases the slider 61, so as to press the ball detent 59 toward the ring 49.

The ring also carries opposite lugs 67 and 69, engageable with compression springs 71 and 73, respectively, the latter being located in opposite corners of the socket 41. On opposite faces of the ring 49 are pairs of supporting pads 75 and 77, respectively. Since there is a loose keyed connection between the male and female noncircular shapes 45 and 47, one pair of these pads rests upon the cover 43, the particular pair depending upon which side the ring 49 is laid on the cover. In Fig. 3 the positions of parts correspond to those shown in Fig. 4. In these positions, pads 75 rest on the cover 43.

Referring to Fig. 4, the assembly is shown arranged to provide clockwise opening movement of the bracket 33 with its clips 35, the bracket being considered as viewed from the bottom. This movement from the closed position is afforded in the initial instance by anticlockwise movement of the arm 17, also as viewed from the bottom. It will be seen that when the switch is closed, the arrangement is such (Fig. 4) that the lugs 67 and 69 compress the springs 71 and 73. Also, one of the platforms (53) is engaged by the spring-pressed ball detent 59, so as to place a bias on the shank 31, thus pressing its male threads into tight engagement with the female threads 29 in the bracket 23. This increases the contact pressure

at the threads and decreases the contact resistance during the time that the switch is closed, which is of course the time during which it carries current. In the closed position of the switch, the thrust from the detent 59 has no rotary opening effect since all thrust on the ring 49 is radial.

In order to open the switch, the insulator 9 is rotated, thus rotating the switch arm from the Fig. 1 through the Fig. 3 position. This initially starts rotation of the clips 35, including the bracket 33, shank 31 and the ring 49 carried at its lower end. The direction of opening movement of the ring is shown by the arrow of Fig. 4. The platform 53 leaves the ball detent 59, thus relieving the threads of members 29 and 31 of the lateral pressure. At the same time, the lift portion 58 is engaged by the detent 59 to aid in switch-opening movement. As the end 19 of the arm 17 leaves the clips 35, the springs 71 and 73 take up and continue the motion to open position of the clip assembly, the threads being relieved of said lateral pressure. It will be noted that springs 71 and 73 may to some extent continue opening movement of the clips 35, even though the end 19 of the switch arm 17 may have left these clips. Maximum opening movement is determined by engagement of lug 69 with a stop 79. Upon reclosing the switch, the ring 49 reassumes the position shown in Fig. 4, the appropriate lug 57 limiting the closing motion of the clip assembly.

It is sometimes desirable to have the opening movement of the switch reversed, in which event the swinging movement of arm 17 is accomplished in the direction opposite to that shown in Fig. 2. In this event the position of the bevelled end 19 on arm 17 is reversed. This requires a reversal of the swinging movement of the contact clips 35. To provide for this, cover 43 is removed and the ring 49 turned over from the Fig. 4 position to the Fig. 5 position, the springs 71 and 73 being placed in opposite corners of the square socket 41, as indicated. This places the platform 51 for engagement with the ball detent 59, and the opening movement will be as indicated by the arrow in Fig. 5. Again substantial contact pressure crosswise of the threads is attained only when the switch is closed, and is relieved as the switch is opened, so that the springs 71 and 73, assisted by action of the ball 59 on slope 52, may easily move the clips 35 to full open position.

It will be understood from Fig. 2 that the switch arm 17 is only partially open, and that in full-open position it assumes a position at 90° with respect to its switch-closed position. However, clips 35 are shown in their full-open position.

It will be understood that, while the threading of the bearing between the shank 31 and the bracket 23 is quite desirable in obtaining improved conductivity, and that this threading enhances the effect of the thrust from spring 65 in increasing contact pressure and decreasing contact resistance, nevertheless some of the advantage of the invention may be obtained in a construction in which the shank 31 and the opening through which it passes are unthreaded and may consist of plain cylinders, cones or the like. This is because of the occurrence of the crosswise or canting action on the shank during switch closure.

In view of the above, it will be seen that the invention consists in conductive members one of which is formed as a shank rotary in an opening in the other, (both preferably threaded), and having switch-closed positions during which they carry current and switch-open positions during which they do not carry current. Cam means is carried by one of the members and a detent is carried by the other member engageable by said cam means when said other member is in a switch-closed position. Resilient means bearing on the detent member forces it to apply a substantial crosswise force only when the detent is engaged by the lug. This increases contact pressure between the bearing surfaces of the two members in a switch-closed position, which, however, is reduced during switch-opening operations.

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. A rotary switch contact assembly comprising conductive members one of which is formed as a helically threaded shank rotary within and threadably engaging a threaded opening in the other, said members relative to one another having switch-closed and switch-opened positions, cam means carried by one of the members and a detent carried by the other member engageable by said cam means when the members are in a switch-closed position, said cam means and detent being adapted to apply a substantial force crosswise of the helices of the threaded portions of the conductive members only when the detent is engaged, whereby thread contact pressure is increased between said members when in a switch-closed position but is reduced in a switch-opened position.

2. A rotary switch contact assembly comprising conductive members one of which is formed as a shank rotary within an opening in the other, said members relative to one another having switch-closed and switch-open positions, cam means carried by one of the members and a detent carried by the other member engageable by said cam means when the members are in a switch-closed position, said cam means and detent being adapted to apply a substantial force crosswise of the axis of said shank only when the detent is engaged, whereby contact pressure is increased between said members when in a switch-closed position but is reduced in a switch-opening position.

3. A rotary switch contact assembly made according to claim 2, wherein said shank and opening are cooperatively threaded.

4. A rotary switch contact assembly made according to claim 2, including lug means adjacent said cam means adapted to determine the relative switch-closed position of the members.

5. A rotary switch contact assembly made according to claim 2, including cam slopes adjacent said cam means adapted to assist in the relative rotation of said members during switch-opening movement.

6. A rotary switch contact assembly made according to claim 2, wherein said shank and opening are cooperatively threaded and including lug means adjacent said cam means adapted to determine the relative switch-closed position of the members.

7. A rotary switch contact assembly made according to claim 6, including cam slopes adjacent said cam means adapted to assist in the relative rotation of said members during switch-opening movement.

8. A rotary switch contact assembly made according to claim 1, including stops operatively connected with the respective conductive members, said stops being engageable to predetermine maximum switch-opening movement of one conductive member relative to the other, and spring means reactive between the conductive members adapted to be deflected sufficiently to engender a reaction during switch-closing movements between said members, thereby in the absence of said substantial force during switch-opening movement to apply a complete switch-opening action between said conductive members as determined by engagement between said stops.

9. A rotary switch contact assembly made according to claim 2, including stops operatively connected with the respective conductive members, said stops being engageable to predetermine maximum switch-opening movement of one conductive member relative to the other, and spring means reactive between the conductive members

adapted to be deflected sufficiently to engender a reaction during switch-closing movements between said members, thereby in the absence of said substantial force during switch-opening movement to apply a complete switch-opening action between said conductive members as determined by engagement between said tops.

References Cited in the file of this patent

UNITED STATES PATENTS

2,673,913 Heberlein ---------- Mar. 30, 1954