June 11, 1929. G. J. MEUER 1,717,057

ELECTRIC SWITCH

Filed March 11, 1925

Fig. 1.

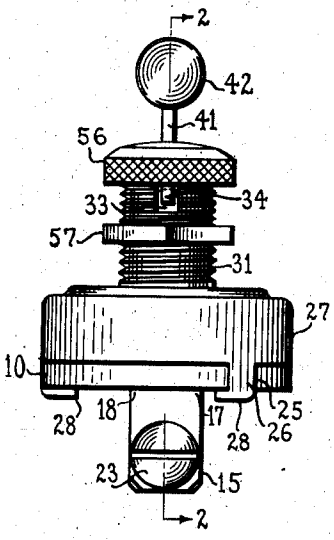


Fig. 2.

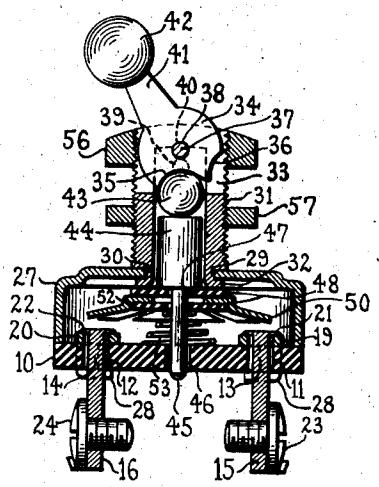


Fig. 3.

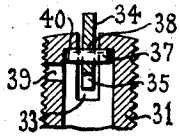


Fig. 4.

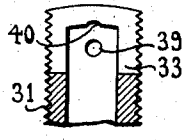
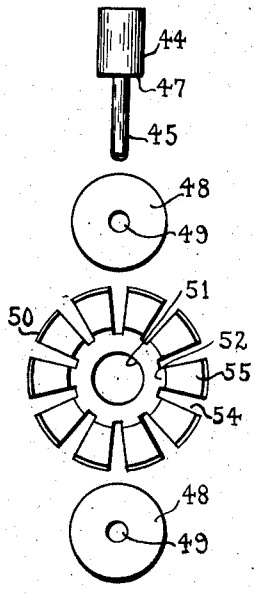


Fig. 5.



INVENTOR.

George J. Meuer

BY Fowler & Hubbard

ATTORNEY.

Patented June 11, 1929. 1,717,057

UNITED STATES PATENT OFFICE.

GEORGE J. MEUER, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CUTLER-HAMMER, INC., A CORPORATION OF DELAWARE.

ELECTRIC SWITCH.

Application filed March 11, 1925. Serial No. 14,608.

This invention relates to improvements in electric switches.

An object of the invention is to provide an electric switch which is neat and compact in appearance and efficient and reliable in operation.

Another object is to provide a switch having an improved form of movable and stationary contact elements.

Another object is to provide an improved switch for small current carrying devices such as automobile dash lights, radio apparatus and the like.

Another object is to provide a switch of the aforementioned character having relatively few parts, which may be quickly and accurately assembled.

Other objects and advantages of the invention will hereinafter appear.

In the accompanying drawing wherein is illustrated an embodiment of the invention,

Figure 1 is an enlarged side elevational view of the switch;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1,—certain of the parts being shown in elevation.

Figs. 3 and 4 are partial sectional views corresponding to Figs. 1 and 2, respectively, certain elements being omitted for purposes of illustration; and

Fig. 5 is a detail view of certain elements shown in Fig. 2.

Referring to the drawing, the numeral 10 designates a circular base member of suitable insulating material, said member being provided with spaced perforations 11 and 12 adapted to receive with a close fit the shank portions 13 and 14 of terminal members 15 and 16. Said shank portions are of reduced width to provide corners or shoulders 17 and 18 (Fig. 1) for engagement with the lower face of member 10, whereas the upper ends of said shank portions pass through small perforated plates 19 and 20, substantially elliptical in contour, and are riveted thereover as indicated at 21 and 22, said plates forming with said riveted ends relatively large stationary contact surfaces, as hereinafter more fully described. Terminal screws 23 and 24 provide for connection of the switch in a suitable circuit. While I have shown but two stationary contacts it will be apparent to those skilled in the art that the number thereof may be increased without otherwise modifying the switch structure.

The member 10 is preferably provided with three or more equally spaced notches 25 in the periphery thereof, said notches being adapted for flush reception of corresponding lugs or projections 26 on an inverted cup-shaped switch housing member 27, said lugs 26 when bent inwardly over the lower face of member 10, as indicated at 28, being adapted to securely hold the switch parts in assembled relation.

The housing member 27 is provided centrally of its upper surface with an opening 29 adapted to receive a reduced portion 30 of an externally threaded cylindrical member 31, said reduced portion being outwardly bent or riveted as indicated at 32 in a manner to secure members 27 and 31 against relative rotation.

The hollow closed end of member 31 is slotted as indicated at 33, to receive and permit oscillation of a cam member 34 having adjacent cam surfaces 35 and 36. Cam member 34 is pivoted by means of a floating pivot pin 37, which is insertable into a pivot hole 38 when the latter is in alinement with an opening 39 through one side of the member 31, after which said pin is moved upwardly and held in a groove or bearing 40, as hereinafter described. Member 34 is formed with an operating lever 41, said lever being preferably provided at the outer end thereof with an enlarged or rounded portion 42 to facilitate manual operation of the switch.

Enclosed within cylindrical member 31 and adapted for engagement by the cam surfaces 35 and 36, respectively, is a spherical member 43, preferably of steel. Member 43 is in turn adapted to engage the upper surface of a piston or plunger 44, which is guided in its movement by the inner wall of cylindrical member 31, said plunger being provided with a reduced portion or downward extension 45, which engages a corresponding opening 46 in member 10 to further assist in guiding the same.

The reduced portion 45 provides an annular shoulder 47 on member 44 against which a perforated insulating disk 48 is adapted to abut, the perforation 49 in said disk providing a relatively close fit around the extension 45. A second insulating disk

48 having a similar opening 49 is strung upon the extension 45, and interposed between said disks is a circular bridging contact member 50, said contact member having a relatively large central opening 51 to separate the same from said extension. Contact 50 is provided with an upwardly extending depressed portion 52 adapted to receive the lower disk 48 with a snug fit, whereby said disk will retain said contact in centered relation with respect to extension 45. Surrounding the extension 45 and interposed between lower disk 48 and the base 10 is a coiled spring 53 of substantially conical shape, the smaller end thereof pressing against the lower disk 48 and tending at all times to hold the contact 50 out of engagement with stationary contact surfaces 19, 21 and 20, 22; whereas the cam surface 36 is adapted through the intermediate members 43 and 44 to move contact 50 into bridging engagement with said stationary contacts against the action of said spring. Moreover, the spring 53 acts through said intermediate members to effect movement of said cam member 34 into either of its extreme positions with a snap action, and thus biases said cam against movement from its respective extreme positions.

As more clearly shown in Fig. 5, the contact member 50 is of circular contour, and is divided by a plurality of radial slots 54 to provide a corresponding number of radial spring contact fingers 55 to increase the resilience of said contact and thereby to insure more perfect engagement thereof with the stationary contacts.

As will be apparent, the fingers 55 permit additional downward movement of contact 50 after initial engagement thereof with stationary contacts 19, 21 and 20, 22, such additional movement effecting a desirable sliding or wiping engagement of the fingers 55 with said stationary contacts, whereas said fingers also permit the necessary slight reverse movement of said contact incident to registration of cam surface 36 with spherical member 43, without interrupting proper engagement of the contacts. The resilient contact fingers 55 also assist the coiled spring 53 in effecting interruption of circuit with a snap action upon movement of cam lever 41 to off position. The form of contact 50 obviates the necessity for any particular rotary arrangement of the same with respect to the stationary contacts, and also obviates the necessity for locking said movable contact against possible rotation thereof incident to operation of the switch.

As aforeindicated the cylindrical member 31 is externally screw-threaded, said member being further provided with cooperating nuts 56 and 57 for securing the device to any suitable or desired panel or board having an opening therethrough to receive the member 31. The nuts 56 and 57 are adapted to engage opposite sides of the panel to clamp the device rigidly in position. Obviously the position of either or both of the nuts 56 and 57 may be adjusted to accommodate various thicknesses of panel or other support.

In assembling the aforedescribed device, the cam 34 is inserted into slot 33 and the pivot pin 37 is dropped into the pivot hole 38 through opening 39. The cam is then drawn upwardly until the pin 37 rests in groove 40 which prevents lateral movement of the pin, whereas endwise movement of the latter is prevented by the inner wall of member 31. Spherical member 43 is then inserted, preferably with the deep cam surface 35 in receiving position. Plunger 44 is then inserted, and onto the projecting portion 45 thereof are strung the upper disk 48, bridging contact 50, lower disk 48, and coiled spring 53. The insulating member 10, with its previously attached contact and terminal members, is then moved into position with notches 25 in alinement with the unbent lugs or projections 26, such movement also effecting registration of extension 45 with opening 46 in member 10; whereupon the lugs 28 may be bent inwardly as illustrated to firmly hold all of the switch elements in operative position. The nuts 56 and 57 may, of course, be threaded onto the member 31 before or after the aforementioned assembling operation; whereas to attach the device to a support in the manner aforedescribed it is only necessary to remove the nut 56.

As illustrated in Fig. 2 the switch parts are in circuit breaking position, whereas upon movement of knob 42 to the right contact 50 will be forced into circuit making position against the action of spring 53, and as will be apparent movement of knob 42 in opposite directions to extreme positions is effected with a snap action.

I have thus provided a switch which is neat and compact in appearance and extremely efficient and reliable in operation. While I have shown but one form which my invention may assume in practice, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit and scope of my invention as defined in the appended claims.

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

1. In an electric switch, the combination with an insulating base having a plurality of stationary contacts, terminal members having portions penetrating said base and contacts and riveted thereto, a bridging conductor having a plurality of resilient contact fingers and adapted for rectilinear movement into and out of engagement with

said contacts, and means for effecting such movement with a snap action, said means comprising a spring biasing said conductor out of bridging relation and a pivoted sheet metal operating lever having a cam surface adapted in a given position to hold said conductor in bridging relation with said contacts, said spring being adapted to effect extreme movement of said lever in opposite directions with a snap action.

2. In an electric switch, the combination with an insulating plate, contacts and terminals having portions penetrating said plate and riveted thereto, an inverted cup-shaped member secured to said plate, a metallic supporting bushing secured to said member, a bridging contact movable within said member into and out of engagement with said first mentioned contacts, a coiled spring biasing said movable contact out of bridging relation to the other contacts, and means adapted in one position thereof to permit such biased movement of said bridging contact and in another position thereof to effect movement thereof in an opposite direction against the action of said spring, said means including a loosely pivoted sheet metal cam engaging a spherical member and a plunger for transmitting reciprocating movement of said spherical member, said plunger being adapted to move said bridging contact but insulated therefrom.

4. The combination with an insulating plate having a contact secured thereto, a movable contact spring-biased out of engagement with said first mentioned contact, a pivoted operating member, a floating metallic member for transmitting motion from said lever to said movable contact against the action of the spring, a projection on said metallic member engaging a portion of said plate to be guided thereby, and means for insulating said metallic member from said movable contact, said means comprising a plurality of insulating disks each to be centered by said projection and one of the same engaging a corresponding disk-shaped depression in said movable contact.

4. The combination with an insulating plate having an opening therethrough and contacts secured thereto, a bridging member spring-biased out of engagement with said contacts, a metallic member for transmitting motion to said bridging member against the action of the spring, a cam and a spherical member for transmitting motion to said metallic member, a projection on said metallic member extending through said opening to be guided thereby, and means for insulating and centering said bridging member with respect to said metallic member, said means comprising an insulating disk to be centered by said projection and engaging a co-operating disk-shaped depression in said bridging member.

5. The combination with an electric switch, of operating means therefor comprising a hollow member having a slotted end, a cam in said slot having a pivot hole therethrough, said member having an opening in one side thereof to permit insertion of a pivot pin into said hole, and said cam and pivot pin being thereafter movable out of alinement with said opening to prevent displacement of said pivot pin.

6. The combination with an electric switch, of operating means therefor comprising a tubular member having a closed end, said end having a slot extending therethrough, a cam having a pivot opening therein and said member having an opening in one side thereof at right angles to said slot to permit insertion of a pivot pin into the opening in said cam, said member having an internal groove into which said pin may be moved to prevent relative lateral movement thereof, said pin in such position being out of register with said opening in the tubular member to thereby prevent endwise movement of said pivot pin.

7. In an electric switch, the combination with a switch housing having an insulating plate at one end thereof, stationary contacts supported by said plate, a hollow bushing secured to the other end of said housing, a cylindrical member slidable within said bushing, a guide rod attached to said cylindrical member and engaging a corresponding opening in said plate, a pair of insulating disks having relatively small openings to permit centering thereof by said rod when passed therethrough, a disk-shaped bridging contact interposed between said disks, said bridging contact having a plurality of radial contact fingers and a depressed central portion to accommodate one of said insulating disks to be centered thereby, and a coiled spring interposed between said insulating plate and said last mentioned disk to bias said bridging contact out of engagement with said stationary contacts.

8. In an electric switch, the combination with a switch housing having an insulating plate at one end thereof, stationary contact and terminal members having portions penetrating said plate and riveted thereto, a metallic bushing at the other end of said housing, a cylindrical member slidable within said bushing, a guide rod attached to said cylindrical member and engaging the walls of a corresponding opening in said plate, a pair of insulating disks having relatively small openings to permit centering thereof by said rod when passed therethrough, a disk-shaped bridging contact interposed between said disks, said bridging contact being formed to provide a plurality of radial spring contact fingers and having a relatively large central opening and a depressed central portion to accommodate one

of said insulating disks for centering thereby, a coiled spring interposed between said insulating plate and said last mentioned disk to bias said bridging contact out of engagement with said stationary contacts, and means comprising a loosely pivoted cam lever for moving said bridging contact into engagement with said stationary contacts against the action of said spring.

9. In an electric switch, the combination with a switch housing having an insulating plate at one end thereof, stationary contacts supported by said plate, an externally screw-threaded bushing at the other end of said housing, a cylindrical member slidable within said bushing, a guide rod attached to said cylindrical member and engaging the walls of a corresponding opening in said plate, a pair of insulating disks having relatively small openings to permit centering thereof by said rod when passed therethrough, a disk-shaped bridging contact interposed between said disks, said bridging contact being formed to provide a plurality of radial spring contact fingers and having a relatively large central opening and a depressed central portion to accommodate one of said insulating disks for centering thereby, a coiled spring interposed between said insulating plate and said last mentioned disk to bias said bridging contact out of engagement with said stationary contacts, means for moving said bridging contact into engagement with said stationary contacts against the action of said spring, said means comprising a loosely pivoted cam lever and a spherical member to transmit motion therefrom to said cylindrical member and a nut co-operating with said bushing to clamp said switch to a supporting panel.

In witness whereof, I have hereunto subscribed my name.

GEORGE J. MEUER.

CERTIFICATE OF CORRECTION.

Patent No. 1,717,057. Granted June 11, 1929, to

GEORGE J. MEUER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 33, for first claim number "4" read "3"; same page and claim, line 37, for the word "member" read "lever"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of October, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)