Feb. 23, 1932. G. J. MEUER 1,846,430

ELECTRIC SWITCH

Filed Feb. 5, 1931

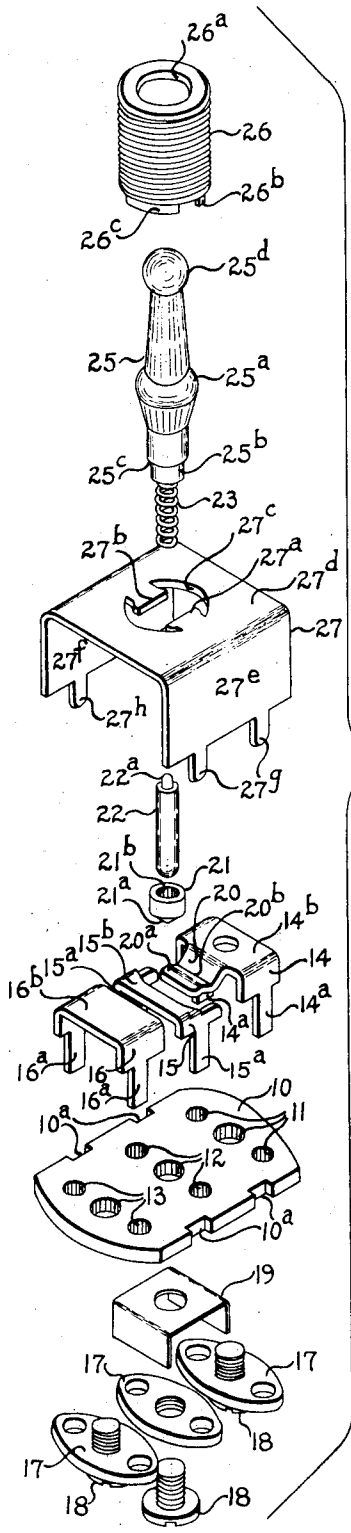


Fig. 1

Fig. 2

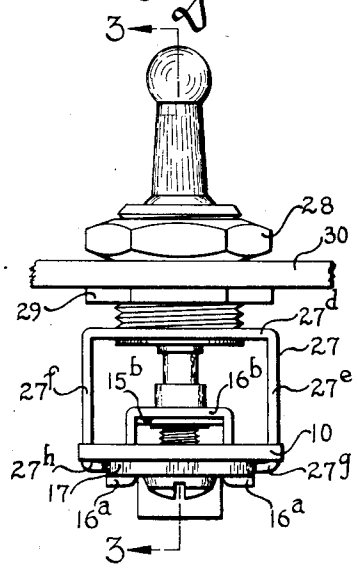
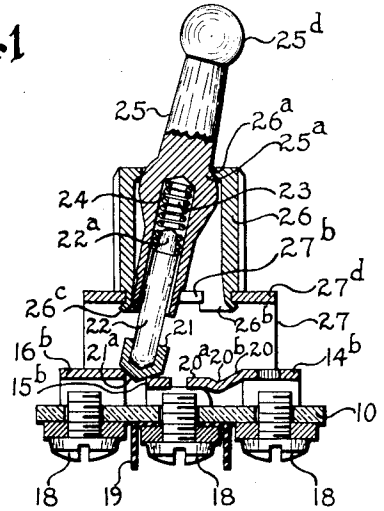


Fig. 3



Inventor
George J. Meuer
By Frank H. Hubbard
Attorney

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UNITED STATES PATENT OFFICE

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

ELECTRIC SWITCH

Application filed February 5, 1931. Serial No. 513,475.

This invention relates to improvements in electric switches.

An object of the invention is to provide a lever operated switch for multiple circuit control wherein an off position is provided for the switch in one extreme position of the lever.

Another object is to generally improve the details of construction and operation of switches of the character aforementioned.

Another object is to provide a novel form and arrangement of the stationary and movable contacts of the switch.

Another object is to provide improved means for pivotally supporting, guiding and retaining the oscillatable lever of the switch.

Other objects and advantages of the ininvention will hereinafter appear.

In the drawings, Figure 1 is an enlarged perspective view, in separated relation, of the several parts of a switch constructed in accordance with my invention.

Fig. 2 is an end elevation of the switch, illustrating the manner of attaching the same to a panel or other suitable support, and

Fig. 3 is a vertical section, on the line 3—3 of Fig. 2, the clamping nuts being omitted.

Referring to the drawings, the numeral 10 designates a flat punched plate of insulating material, such as laminated paper or fiber the laminations of which are impregnated with or bound together by the phenol-formaldehyde condensation product sold commercially under the trade-name of "bakelite". Plate 10 is provided with three equally spaced parallel groups of openings 11, 12 and 13.

The end openings of each group are respectively adapted to receive the reduced end portions 14^a, 15^a and 16^a of the arms of punched and stamped sheet metal contact members 14, 15 and 16 of substantially U-shape in cross section. The reduced end portions of said arms provide shoulders as illustrated whereby the connecting portions 14^b, 15^b and 16^b of said members are spaced predetermined distances above the upper surface of plate 10, it being noted that the portions 14^b, 16^b are located in a common plane while the portion 15^b is located in a plane slightly offset downwardly with respect thereto.

The reduced ends 14^a, 15^a, 16^a penetrate the opposite end openings formed in the terminal members 17 located on the lower surface of plate 10, said reduced ends being bent outwardly in opposite directions to rigidly and permanently secure the contacts and terminal members ot said plate (see Fig. 2). Terminal members 17 are preferably of substantially elliptical contour, as shown in Fig. 1, and each is provided with an intermediate tapped opening to receive the shank of a binding screw 18 of usual form. The intermediate openings of each group 11, 12 and 13 provide clearance for the shanks of the respective binding screws. A fiber strip 19 of inverted U-shape is preferably clamped between the middle terminal member 17 and plate 10 to insure against possible contact between the ends or beards of the wire terminals (not shown).

The contact and terminal members as thus far described are in general similar to those described and claimed in my Patent No. 1,666,338, dated April 17, 1928. However, it is required that the present switch shall have an off position at one extreme position of the operating lever, and accordingly the switch contacts 14, 15 and 16 are specially constructed and arranged for this purpose. Thus the adjacent edges of contact portions 16^b and 15^b are arranged in spaced parallelism, the opposite edge of portion 15^b being substantially cut away, as illustrated. Formed integrally with the portion 14^b of contact 14 and projecting downwardly and laterally with respect thereto is a tongue 20, the end 20^a of said tongue extending into the cut away area of portion 15^b and being located in the plane of the latter but spaced from the edge thereof. Tongue 20 is bent or formed to provide a groove 20^b to receive and retain the movable contactor 21 of the switch whereby an off position is provided for the latter.

Contactor 21 preferably comprises a hollow cylindrical metal member having a closed and cone-shaped lower end 21^a, the cavity 21^b in said member being symmetrically proportioned with respect to the external dimen-

sions thereof whereby a uniform wall thickness is provided for the piece. Contactor 21 is preferably machined to the form illustrated, but it is to be understood that the same may be stamped from sheet metal of the desired thickness.

Fitting loosely within the cavity 21^b (but without substantial clearance) is the rounded lower end of a plunger 22, which is preferably of cylindrical cross section and molded from insulating material, such as bakelite. The upper end 22^a of said plunger is reduced to fit within the lower end of a coiled compression spring 23, said plunger and said spring being telescopically received within a cylindrical cavity 24 in the lower end of a lever 25, whereby said spring tends to eject the plunger.

Lever 25 is provided with a hemispherical enlargement 25^a which is adapted to bear against the annular internal flange 26^a in the externally threaded hollow metal bushing 26. The lower end of said bushing 26 is provided with vertically extending arcuate or segmental flange portions 26^b, 26^c the adjacent edges of which are spaced at diametrically opposite points to accommodate the root portions of lugs 27^a, 27^b which project into the substantially circular opening 27^c provided in the top wall 27^d of an inverted U-shaped sheet metal housing 27. As shown, the adjacent ends of lugs 27^a, 27^b are somewhat wider than the root portions thereof respectively, the width of said end portions being preferably substantially greater than one-third of the diameter of opening 27^c aforementioned, and said ends being spaced apart a distance substantially equal to said width thereoef.

The flange portions 26^b, 26^c of the bushing are inserted through opening 27^c in the housing and upset over the lower surface of the top wall 27^d thereof, as shown in Fig. 3. The lower end of lever 25 is reduced in diameter to provide the portion 25^b which is guided by the edges of lugs 27^a, 27^b to restrict the lever to oscillatory movement in a single plane. The annular shoulder 25^c thus formed on lever 25 is adapted to slightly overlie the upper surfaces of lugs 27^a, 27^b whereby the lever is restrained against substantial downward displacement with respect to the bushing.

Housing 27 is provided with downwardly extending parallel arms 27^e, 27^f the lower ends of which are provided with pairs of lugs 27^g, 27^h to be received within the correspondingly located notches 10^a at opposite longitudinal edges of plate 10, said lugs 27^g, 27^h being bent inwardly over plate 10 (as shown in Fig. 2) to rigidly and permanently secure the switch parts to each other.

The usual clamping nuts 28, 29 may be provided to attach the switch to a panel 30 or other suitable support.

The manner of operating the switch mechanism will be at once apparent. Thus in Fig. 3, assuming extreme left-hand positioning of the handle portion 25^d of lever 25, the contactor 21 will be positioned within groove 20^b in tongue 20, whereby an off position of the switch is provided. If handle portion 25^d is then pressed toward the right the cone-shaped end 21^a of the contactor rides out of groove 20^b, with a consequent storage of energy in spring 23 and the contactor moves rapidly over the flat portion 20^a of tongue 20 and into bridging engagement with the edge of the latter and the adjacent edge of portion 15^b of contact 15. Upon subsequent movement of said handle portion 25^d toward the right contactor 21 is moved with a quick action from the position thereof last mentioned into bridging engagement with the adjacent edges of portions 15^b, 16^b of contacts 15, 16.

Thus it may be assumed that a common circuit wire is to be connected to the terminal of contact member 15, the terminals of contacts 14 and 16 being respectively connected to branch or individual circuits. A switch of the character herein described is particularly well adapted for the control of two-speed fan motor circuits, although as will be understood the switch mechanism per se is of more or less general utility. Various changes in the details of construction and arrangement of the switch parts will at once suggest themselves to those skilled in the art, and without departing from the spirit and scope of my invention as defined in the appended claims.

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

1. In an electric switch, in combination, a flat punched plate of insulating material, said plate having at least three groups of alined openings formed therein, the respective groups of openings being arranged in equally spaced parallel relation to each other, three contact members of substantially U-shape in cross section, the arms of said members having reduced end portions insertable through the end openings of the respective groups to provide for attachment of said members to said base with the contact portions of the former spaced predetermined distances from the latter, the contact portion of the intermediate member being substantially cut away at one side thereof and the end member adjacent to said side having an integral tongue offset downwardly therefrom and projecting into the cut away area of said intermediate member but spaced from the edge of the latter, said tongue having a groove formed therein, the other end member having its edge spaced from said intermediate member, and a contactor movable selectively to bridge said last mentioned end member and said intermediate member or to bridge said intermediate member and said tongue, said contactor being also movable into the groove in said tongue to provide an

off position therefor at one extreme position thereof.

2. In an electric switch, in combination, a flat punched plate of insulating material, said plate having at least three groups of alined openings formed therein, the respective groups of openings being arranged in equally spaced parallel relation to each other, three contact members of substantially U-shape in cross section, the arms of said members having reduced end portions insertable through the end openings of the respective groups to provide for attachment of said members to said base with the contact portions of the former spaced predetermined distances from the latter, the contact portion of the intermediate member being substantially cut away at one side thereof and the end member adjacent to said side having an integral tongue offset downwardly therefrom and projecting into the cut away area of said intermediate member but spaced from the edge of the latter, said tongue having a groove formed therein, the other end member having its edge spaced from said intermediate member, a contactor movable selectively to bridge said last mentioned end member and said intermediate member or to bridge said intermediate member and said tongue, said contactor being also movable into the groove in said tongue to provide an off position therefor at one extreme position thereof, said contactor comprising a hollow substantially cylindrical member having a closed and cone-shaped lower end, and a spring pressed plunger having operative engagement with said contactor, for the purpose set forth.

3. In an electric switch, in combination, a flat punched plate of insulating material, said plate having at least three groups of alined openings formed therein, the respective groups of openings being arranged in equally spaced parallel relation to each other, three contact members of substantially U-shape in cross section, the arms of said members having reduced end portions insertable through the end openings of the respective groups to provide for attachment of said members to said base with the contact portions of the former spaced predetermined distances from the latter, the contact portion of the intermediate member being substantially cut away at one side thereof and the end member adjacent to said side having an integral tongue offset downwardly therefrom and projecting into the cut away area of said intermediate member but spaced from the edge of the latter, said tongue having a groove formed therein, the other end member having its edge spaced from said intermediate member, a contactor movable selectively to bridge said last mentioned end member and said intermediate member or to bridge said intermediate member and said tongue, said contactor being also movable into the groove in said tongue to provide an off position therefore at one extreme position thereof, said contactor comprising a hollow substantially cylindrical metal member having a closed and cone-shaped lower end, an insulating plunger fitted into said hollow member a pivoted lever to telescopically receive said plunger, and a coiled compression spring interposed between said lever and said plunger.

4. In an electric switch, in combination, a flat punched plate of insulating material, a plurality of punched and stamped sheet metal contact members secured to said plate and having the contact portions thereof spaced above the upper surface of said plate, one of said contact portions being cut away at one side thereof, the other of said contact portions having a tongue projecting into the cut away area, and a contactor movable along said tongue into and out of engagement with said first mentioned contact portion.

5. In an electric switch adapted for one-hole mounting on a panel or other suitable support, in combination, a sheet metal housing having a top wall, said wall having an opening of substantially circular contour formed therein, a pair of diametrically opposed lugs formed integrally with said wall and projecting into said opening, the ends of said lugs being spaced a predetermined distance from each other and being of greater width than the root portions thereof, an externally threaded hollow metal bushing having an internal annular flange, a lever having an enlargement pivotally engaging said flange, said lever having a reduced portion guided by the lug ends to restrict the same to oscillatory movement in a single plane, said reduced portion providing a shoulder engageable with the upper surfaces of said lugs to prevent downward displacement of said lever, and said bushing having a flange notched at diametrically opposite points to accommodate the root portions of said lugs, said flange being upset over the lower surface of said top wall to secure all of said parts in assembled relation to each other.

6. In an electric switch adapted for one-hole mounting on a panel or other suitable support, in combination, a sheet metal housing having a top wall, said wall having an opening of substantially circular contour formed therein, a pair of diametrically opposed lugs formed integrally with said wall and projecting into said opening, the adjacent ends of said lugs having a width substantially greater than one-third of the diameter of said opening and being spaced apart a distance substantially equal to said width, an externally threaded hollow metal bushing having an internal annular flange at the upper end thereof, a lever having a hemispherical enlargement pivotally engaging said flange, said lever having a reduced cylindrical lower end to be guided by said

lugs for oscillatory movement in a single plane, said bushing having vertical arcuate lugs or flanges adapted to penetrate said opening, said last mentioned lugs being upset over the lower surface of said top wall to rigidly and permanently secure all of said parts in assembled relation to each other.

7. In an electric switch, in combination, a flat punched plate of insulating material, a plurality of U-shaped sheet metal contact members secured to said plate and having the contact portions thereof spaced from the upper surface of said plate, the contact portion of one of said members comprising a laterally extending tongue, the contact portion of the adjacent member being laterally cut away to accommodate said tongue, the end edge of said tongue being located in the plane of said last mentioned contact member and spaced from the edge of the latter, and said tongue having a groove formed therein to provide an off position for the movable contactor of the switch.

8. In an electric switch, in combination, a flat punched plate of insulating material, a plurality of U-shaped sheet metal contact members secured to said plate and having the contact portions thereof spaced from the upper surface of said plate, the contact portion of one of said members comprising a laterally extending tongue, the contact portion of the adjacent member being laterally cut away to accommodate said tongue, the end edge of said tongue being located in the plane of said last mentioned contact member and spaced from the edge of the latter, said tongue having a groove formed therein to provide an off position for the movable contactor of the switch, and a third member having the contact portion thereof spaced upwardly and laterally with respect to said second mentioned contact portion.

9. A stationary contact for electric switches, comprising a punched and stamped sheet metal member of substantially U-shape in cross section, the arms of said member having reduced ends providing bendable lugs for attachment thereof to a suitable support and shoulders for spacing a portion of said member from said support, said spaced portion having a tongue formed integrally therewith and extending downwardly and laterally with respect thereto.

10. A stationary contact for electric switches, comprising a punched and stamped sheet metal member of substantially U-shape in cross section, the arms of said member having reduced ends providing bendable lugs for attachment thereof to a suitable support and shoulders for spacing a portion of said member from said support, said spaced portion having a laterally extending tongue formed integrally therewith, said tongue being bent to provide a stop groove intermediate the ends thereof, and the free end of said tongue being offset downwardly in a plane parallel to said spaced portion, for the purpose set forth.

11. As an article of manufacture, a bridging contactor for electric switches, said contactor comprising a cylindrical metal member having a closed and cone-shaped lower end, said member having a cavity symmetrically proportioned with respect thereto to provide a uniform wall thickness of the piece.

12. In an electric switch, in combination, a bridging contactor comprising a hollow metal member having a uniform wall thickness throughout, said member having a cylindrical body portion and a closed and cone-shaped lower end, and a plurality of punched sheet metal contacts with the adjacent parallel edge portions of which said cone-shaped end of the member is adapted to simultaneously engage.

13. In an electric switch, in combination, a bridging contactor comprising a hollow metal member having a uniform wall thickness throughout, said member having a cylindrical body portion and a closed and cone-shaped lower end, a plurality of punched sheet metal contacts with the adjacent parallel edge portions of which said cone-shaped end of the member is adapted to simultaneously engage, an insulating plunger loosely fitted into said hollow metal member, an oscillatable lever having telescopic engagement with said plunger, and a coiled compression spring interposed between said lever and said plunger.

In witness whereof, I have hereunto subscribed my name.

GEORGE J. MEUER.