July 31, 1962 F. D. PATTI 3,047,699

ELECTRIC SWITCH

Filed May 21, 1959

Fig. 1.

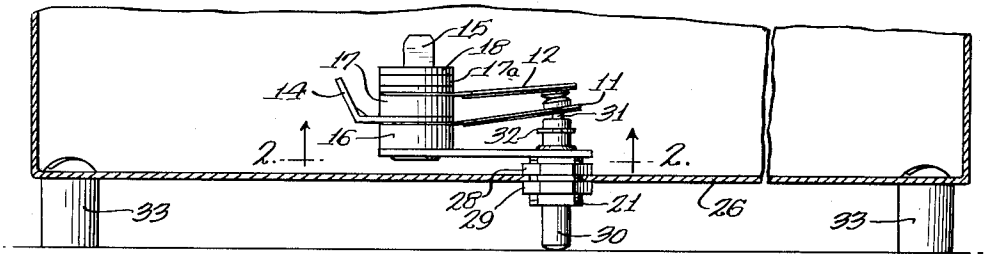
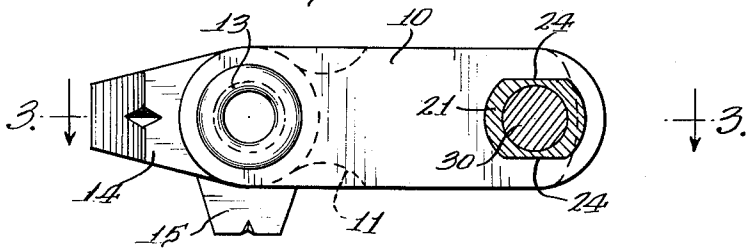


Fig. 2.



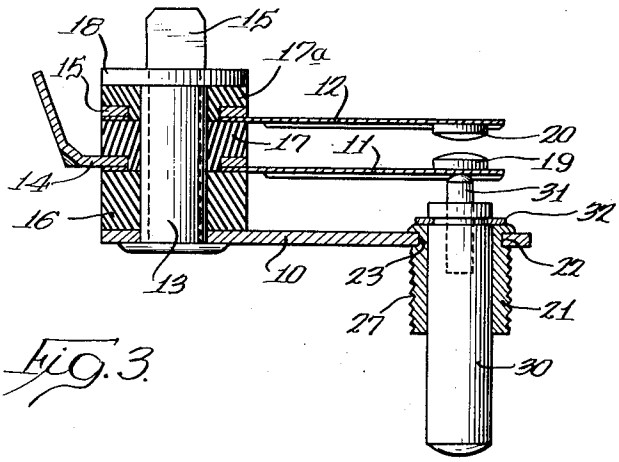


Fig. 3.

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United States Patent Office 3,047,699 Patented July 31, 1962

3,047,699

ELECTRIC SWITCH

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Filed May 21, 1959, Ser. No. 814,817
5 Claims. (Cl. 200—159)

This invention relates to a switching mechanism for controlling an electric circuit, and more particularly a switching mechanism of the type having an actuating member of constant stroke between operated and return positions of adjustment and movable from one to the other of said positions in response to displacement of said actuating member from a selected normal position corresponding to a first condition of a surface engaged by said actuating member to a selected abnormal position corresponding to a second condition of a surface engaged by said actuating member until said surface engaged by said actuating member is restored to said first condition. Tip-over switches for opening the electric circuit to an electrically operated room heating appliance represent a switch mechanism of the type with which this invention, in one example thereof, has specific application.

It is an object of this invention to provide a switch of the character indicated embodying novel features of construction and design which not only offers accuracy of operation but an assembly and arrangement of parts which lends itself to simple and relatively inexpensive manufacture as well as application.

Additional features and advantages of this invention will become apparent as the following description proceeds and the features of novelty which characterize this invention will be set forth in the claims appended to and forming a part of this specification.

For a more complete understanding of this invention reference is had to the accompanying drawings in which:

FIG. 1 is a side elevation, partly in section, of an electrically operated room heating unit showing the switch mechanism embodying the features of this invention, with the actuating member in operating position.

FIG. 2 is an enlarged view taken along line 2—2 of FIG. 1 in a direction inwardly of the appliance to which it is secured.

FIG. 3 is an enlarged sectional view taken along line 3—3 in the direction of the arrows appearing in FIG. 2.

Reference being had more particularly to the drawings, numeral 10 designates a bracket or base plate to which the end portion of a first contact arm 11 and an end portion of a second contact arm 12 are fastened in stacked arrangement about a hollow rivet 13 passing through an opening in the bracket 10 for permanent attachment to the latter, with the arm 12 and the base 10 in straddling relation to arm 11. Rivet 13 also supports a terminal lug 14 in electrical contact with arm 11 as well as a terminal lug 15 in electrical contact with arm 12. Contact arm 11 and its terminal lug 14 are supported on the rivet 13 in spaced opposed relation to the bracket 10 by means of an insulating spacer 16. The contact arm 12 and its terminal lug 15 are supported in spaced opposed relation to the contact arm 11 and its terminal lug 14 by an insulating spacer 17. A third insulating spacer 17a is supported on the rivet 13 between the contact arm 12 and its terminal lug 15 and the head 18 at the end of the rivet 13 remote from the bracket 10.

A contact 19 is carried at the outer end of the contact arm 11 facing the contact arm 12 and a similar contact 20 is mounted on the outer end of the contact arm 12 facing the contact 19 on contact arm 11. The contact arm 11 is resiliently biased in a direction away from the contact arm 12 causing the contact 19 on the arm 11 to normally occupy a position at a distance away from the contact 20 on the arm 12.

The bracket 10 is also provided with a sleeve 21, said sleeve having a reduced end portion 22 passing through an opening 23 in the bracket 10 for arrangement along an axis in spaced parallel relation to the rivet 13 and substantially in alignment with the contacts 19 and 20 on the arms 11 and 12, respectively. The sleeve has opposed flats 24 for acceptance in a non-circular opening in the wall 26 of an appliance such, for example, as an electric space heater, whereby the sleeve is trapped against rotation relative to the opening in the wall 26. Threads 27 on the exterior of the sleeve 21 cooperate with nuts 28 and 29 engaging said threads to establish a rigid connection between the sleeve 21 and the wall 26 of the appliance in which the sleeve 21 is mounted.

A rod 30 is slidably supported in the sleeve 21 for movement inwardly of the area occupied by the contact arm 11, corresponding to an operating position as shown in FIG. 1 and for movement outwardly of said area corresponding to a return position as shown in FIG. 3. An insulating tip 31 suitably mounted on and forming an inward extension of the rod 30 is engaged by the surface of the contact arm 11 opposite the inner end of said tip 31. The stress of the contact arm 11 which normally urges the contact 11 in a direction away from the contact arm 12 is effective to exert pressure against the tip 31 in a corresponding direction with the result that the rod 31 is thereby resiliently maintained in a return position as shown in FIG. 3. A stop ring 32 fixed to the portion of the rod 30 inwardly of the wall 26 has engagement with the inner limits of the sleeve 21 to limit the travel of the rod 30 in an outward direction thereby establishing the return position of said rod 30. The distance which the rod 30 travels to reach an operating position corresponds to the distance between the contacts 19 and 20, and, as shown in FIG. 1, the outer end of the rod 30 is situated in coplanar relation to the support engaging surfaces of feet 33 secured to and projecting downwardly from the wall 26 of the heating unit when the rod 30 is in such operating position. Thus, while the feet 33 have downward engagement with a supporting surface opposite thereto (said surface being represented by a straight line along the bottom of FIG. 1) and the heating unit is thereby maintained in erect position, the contact arm 11 yields to the inward pressure applied thereto by the tip 31 of the rod 30 via gravitational force exerted by the heating unit in the direction of said supporting surface opposite the outer end of the rod 30, to move said contact arm 11 toward the contact arm 12 and to accordingly bring contact 19 into circuit closing engagement with contact 20. When the heating unit is displaced from such erect position, as, for example, tipped over, and the resistance to outward movement of the rod 30 is no longer supplied by the supporting surface, the inherent stress of the contact arm 11 urging its movement to a return position allows the contact 19 to move out of engagement from the contact 20, thereby opening the circuit.

While the distance travelled by the rod 30 between its operating and return positions remains constant in relation to the bracket 10, the location of the latter relative to the wall 26 may be varied along the length of the sleeve 21 by adjusting the nuts 28 and 29 to a selected position corresponding to the desired position of the bracket 10 relative to said wall 26. Thus the distance from said wall 26 to the outer end of the rod 30 may be conveniently varied to suit specific requirements of a wide range of different appliance designs as well as a variation in type of installation with which the switch of this invention might be associated.

It will be understood whether either of the contact arms 11 and 12 is resiliently biased to occupy one of two positions relative to the other contact arm, movement of

the rod **30** toward or away from the area occupied by said contact arm in its normally biased position may be utilized to establish engagement or disengagement of the contacts carried by said arms. Such movement of the rod **30** is likewise available as actuating means with which the resiliently biased contact arm has engagement whether the rod **30** enters the area occupied by said resiliently biased contact arm from a direction in which either of said arms is nearest to the line of approach of said rod **30** as it enters said area. Accordingly a wide range of variations in the arrangement of the contact arms **11** and **12** to each other as well as the direction of movement of the rod in relation to the area occupied by said contact arms is available in a switch assembly embodying the features of this invention.

Since the switch assembly of this invention provides a complete pre-assembled unit embodying mounting means to fit a given opening in the framework of a product requiring use of a switch controlled by an operating member, the manufacturer of such a product is able to avoid the need to maintain an inventory of parts as heretofore required in connection with switches of the character indicated. Production operations are also confined to the simple step of fitting the single mounting part of the switch in the opening provided therefor. Furthermore, the mounting means with which the present switch is equipped allows for convenient adjustment to correctly accommodate varying conditions of clearance conditions in the path of the actuating member thereby increasing the adaptability of this switch assembly from one form of installation to another.

While the foregoing description is now believed to be a preferred embodiment of the invention, it is to be understood that changes and modifications may be made therein as indicated without departing from the spirit of this invention, and it is intended that all such changes and modifications be included within the scope of the appended claims.

What is claimed is:

1. A switch including a base, first and second contact arms, stack means rigidly joining said base and said arms in superposed relation with one of said arms and said base in straddling relation to the other of said arms, said stack means extending along an axis perpendicular to the plane of said base, said first contact arm being movable relative to the second contact arm between operating and return positions and biased to normally occupy one of said positions, a contact on said first contact arm engageable with a contact on said second contact arm when said first arm is in operating position, and means for securing said switch to a supporting panel, said means including a sleeve fixed to said base to define a tubular guideway leading to the area occupied by said first arm along an axis parallel to the axis of said stack means, said sleeve being externally threaded, a pair of nuts having threaded connection with said threads on said sleeve which nuts provide opposed surfaces between which said supporting panel may be engaged along edge portions of an opening in said supporting panel at selected positions along the length of said sleeve, and an actuating member with which the first contact arm is engageable at a free end thereof to move said first arm relative to said second arm toward a position opposite to the normally biased position of said first arm, said actuating member comprising a rod having guided movement in said sleeve toward and away from the area occupied by said first arm.

2. A switch according to claim 1 wherein a stop on said rod has engageable relation with an end portion of said sleeve to limit movement of the rod in a direction away from said first contact arm.

3. A switch according to claim 1 wherein said first contact arm is biased toward said return position.

4. A switch according to claim 1 wherein said first contact arm is biased toward said return position, and said first contact arm is operative to urge said rod in a direction away from said first contact arm.

5. A switch according to claim 1 wherein a stop on said rod has engagement with an end portion of said sleeve to limit movement of the rod in a direction away from said first contact arm, and said rod is urged toward said limit of movement under stress applied by said first contact arm.

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