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THERMOSTAT

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FIG. 1.

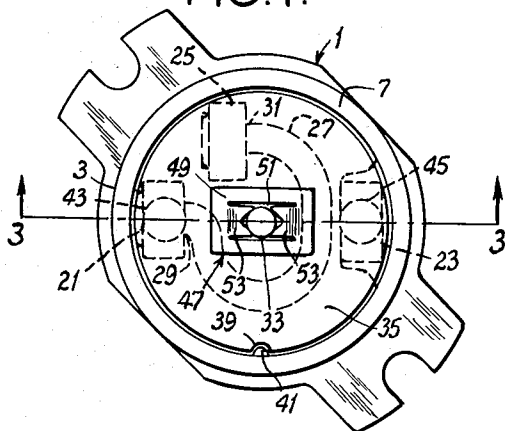


FIG. 2.

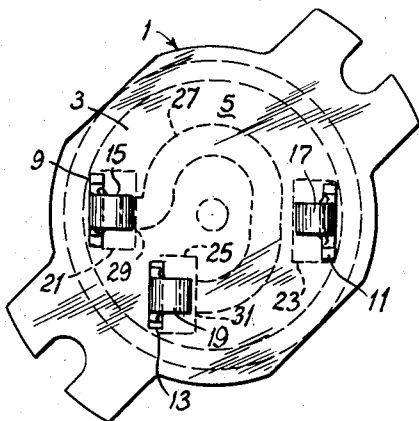


FIG. 5.

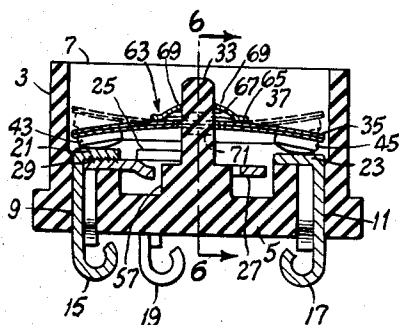


FIG. 3.

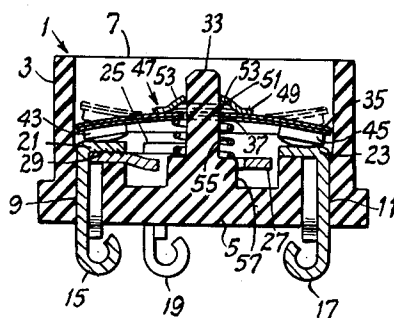


FIG. 4.

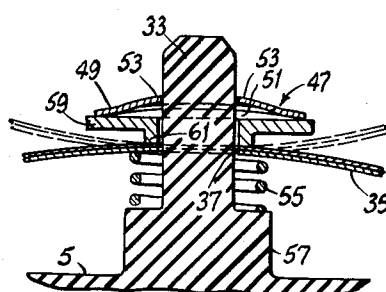


FIG. 7.

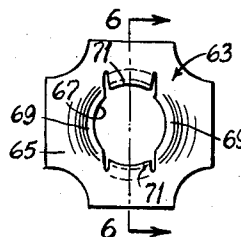
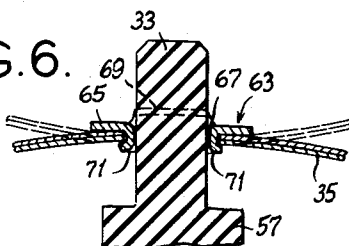


FIG. 6.



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This invention relates to thermostats, and more particularly to novel means for mounting thermostats to form electrical switches.

Among the several objects of the invention may be noted the provision of a clutch-type mounting means for adjustably mounting a thermostatic member on a post in an electrical switch controlled thereby, whereby the position of the thermostatic member may be readily changed but automatically fixed at a desired position on the post; the provision of an improved type of post adapted to increase electrical clearance between switch terminals and reduce flash-over therebetween; the provision of a switch construction which permits convenient fine calibrating adjustment of the thermostatic member; and the provision of means of the class described which is simple and compact in form and of low cost to manufacture and assemble. 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 top plan view of a thermostatic switch with the cover removed therefrom;

FIG. 2 is a bottom view of FIG. 1;

FIG. 3 is an axial section taken on line 3-3 of FIG. 1;

FIG. 4 is an enlarged fragmentary axial section showing an alternative embodiment of the invention;

FIG. 5 is an axial section showing an alternative embodiment of the invention;

FIG. 6 is an enlarged detail of parts, being taken on lines 6-6 of FIGS. 5 and 7; and,

FIG. 7 is a top plan view of a form of claw-type washer used in the form of the invention shown in FIGS. 5 and 6.

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

Referring to the drawings, the invention is shown as applied to a heater-type thermostatic switch generally designated 1. The switch comprises a non-conductive molded switch housing 3 composed of a suitable thermosetting synthetic resin in the form of a cup having a bottom 5 and an open top 7 adapted to receive a cover (not shown). Supported within suitable openings within the bottom 5 are conductive clips 9, 11 and 13. These are extended to form an array of outside line terminals 15, 17 and 19, respectively. Two of these conductive clips 9 and 11 also form stationary or fixed inside contacts 21 and 23 within the housing 3. The other conductive clip 13 carries an inside portion 25 corresponding to the contacts 21 and 23, except that portion 25 does not act as a contact. The members 21 and 25 form the terminals of a heater element 27 secured thereto as shown at 29 and 31, respectively. Heater element 27 is of the conventional type and may be composed of "Nichrome" or the like.

Extending up from the bottom 5 is a nonconductive supporting post 33 having a free end for supporting a composite snap-acting thermostatic disc 35, the latter having an opening 37 loosely surrounding the post 33. The post 33 may, as shown, be molded integrally with the housing 3. Alternatively, it might be nonintegral and

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otherwise secured to the bottom 5. The disc 35 is provided with a marginal notch 39 engaging loosely with rib 41 formed on the inside of the housing 3 to prevent rotation of the disc while allowing snap acting of the disc in response to temperature changes. The disc 35 also carries movable contacts 43 and 45 on opposite sides at a right angle to notch 39. In the so-called cold position of the thermostatic member 35, as shown in solid lines in FIGS. 3 and 6, contacts 43 and 45 engage contacts 21 and 23, respectively.

In accordance with the invention, means are provided for conveniently adjustably mounting the thermostatic member 35 on the post 33. As shown in FIGS. 1-3, these means may comprise a claw-type sheet-metal washer generally designated 47. Washer 47 consists of a body portion 49, an opening 51 adapted to surround the post 33 and struck-out raised gripping fingers 53 which extend inward from body portion 49 into clutching or gripping relationship with the post 33. The outer body portion of washer 47 is in more or less flatwise engagement with the upper surface of the disc 35 in an area close to the post 33. The clutching fingers 53 support the disc 35 on the post 33 in any desired position by frictional and biting engagement with the post. The nonmetallic character of the post 33 facilitates the gripping action of the washer 47.

As shown, the post 33 preferably has a smooth exterior surface which is adapted to be smoothly, slidably engaged by fingers 53 by pressing the washer onto the post. A spring 55 is positioned between the disc 35 and the base 57 of the post 33 and surrounds the post. The upper surface of spring 55 bears against the underside of disc 35, while the lower surface of spring 55 bears against the upper surface of base 57. In response to a current-induced temperature change, disc 35 will by snap action assume the flexed position suggested by the dotted lines in FIG. 3. When this occurs, spring 55 acts to hold the disc 35 up against the washer 47. Since the grip on the post 33 of fingers 53 is in the nature of a one-way clutching action, the spring 55 cannot push the washer toward the free end of the post.

FIG. 4 shows an alternative form of the invention in which an arbor-forming collar 59 is positioned between washer 47 and disc 35. In this embodiment, as shown, the outer portion of washer 47 is in engagement with the upper surface of collar 59 and a central axial extension 61 from collar 59 is in engagement with a more central portion of the upper surface of the disc 35, thus holding it in an area immediately adjacent the post 33. This arrangement permits greater freedom of flexing of disc 35 in response to a temperature change (see the dotted lines in FIG. 4). Here again, with disc 35 in a flexed condition, spring 55 acts to hold the disc 35 in supported position and the one-way clutching action between the washer and post prevents the washer from being pushed up.

FIGS. 5-7 show another form of the invention in which a snap-acting disc 35 is mounted on the post 33 by means of another form of washer designated 63. Washer 63 consists of a body portion 65 having an opening 67 therein surrounding the post 33. A pair of oppositely formed, raised struck-up gripping fingers 69 extends inward from body portion 65 into gripping relation with the post 33. At right angles to fingers 69 is a pair of oppositely formed struck-down fingers 71. The latter extend down through opening 67 in disc 35 and are then bent outward to clinch the disc 35. The clinch is loose enough not to interfere with proper flexing of the disc in response to temperature changes. Also, the fingers 71 provide support on the post in addition to that provided by the fingers 69. In this embodiment of the invention, the fingers 69 by reason of their gripping relationship with the post 33 act as a clutch element supporting the

disc 35 in a desired fixed position. When the disc 35, in response to a current-induced temperature rise, snaps from the position shown in solid lines to the flexed position shown in dotted lines in FIGS. 6 and 7, fingers 71 function to support the disc 35.

The thermostatic switches of all forms of the invention may readily be assembled and calibrated. In assembling the switch of FIGS. 1-3, a spring is first applied to the post 33, then a thermostatic disc 35 is applied, and finally a washer 47 over the disc. The washer is then pressed down until the movable contacts 43 and 45 carried by the thermostatic disc 35 engage fixed contacts 21 and 23. The unit is then ready for calibration, the procedure being to subject the switch to controlled ambient temperature conditions and record the temperature at which disc 35 snaps from the closed position to the open position. Following the initial temperature reading obtained by this method, adjustment of the disc may be made by pressing the washer 47 down against the disc and reacting spring 55. This increases the contact pressure between the movable contacts 43 and 45 and the fixed contacts 21 and 23. The fingers 53 readily allow advancement of the washer on the post and an automatic gripping action on the post in any desired position. This fixes the position of the disc 35 with respect to the post 33. Reverse movement of the washer on the post is prevented by the tendency of the upwardly sloping fingers 53 to gouge the post and oppose upward movement. The temperature at which the disc 35 snaps may then be determined after each advancing adjustment until the desired temperature for operation is reached.

The alternative constructions shown in FIG. 4 and in FIGS. 5-7 may be assembled and calibrated in the same manner, except that in assembling the switch of FIG. 4, the collar 59 is sandwiched between the disc 35 and washer 47, and in the case of FIGS. 5-7, the washer 63 is preassembled with the disc. Here again, fine adjustment of the disc 35 relative to the post 33 is provided by moving washer 47 (in the FIG. 4 construction) or washer 63 (in the construction of FIGS. 5-7), fingers 53 and 69, respectively, being adapted frictionally to engage the post 33 and maintain the disc 35 in any desired position and by one-way clutch action preventing reverse movement.

In the form of the invention shown in FIGS. 5-7 the fingers clinch the disc, but it will be understood that the clinch is loose enough so as not to interfere with proper disc operation in response to temperature changes.

Besides providing for a low-cost disc mounting and calibrating means, the invention provides for a low-cost post having certain advantages. Heretofore posts have generally been metal screws threaded through the bottom of the switch and provided with an outside lock nut engaging the switch bottom. The disc was supported at the upper end of the post and its position calibrated by threading the post in the base, after which it was locked by the lock nut. This held the disc in proper position. This was not only expensive to manufacture and calibrate but placed the conductive outer end of the post and its lock nut in a position between the terminals such as 15,

17 and 19 and thereby reduced the electrical clearance between these and increased the danger of flash-over. By means of the present less costly integrally molded non-adjustable insulating post, no conductive material appears on the bottom of the switch between its bottom terminals, all calibration being accomplished by axial movement of the disc on the post through use of the low-cost one-way clutch member.

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.

We claim:

1. A thermostatic switch comprising a fixed contact, a fixed post, a thermostatic sheet having an opening loosely surrounding said post, said sheet having a movable contact engageable and disengageable with said fixed contact upon thermostatic flexing of the sheet, means supporting said sheet with respect to the post comprising a substantially nonrotary one-way clutch element slidable on the post, means adapted to hold the sheet for substantially nonrotary movement with said clutch element, said clutch element being adapted to be adjusted in one direction for movement of said movable contact toward and against said fixed contact to provide adjustable sheet flexure but otherwise to clutch the post to maintain the adjusted position of the sheet with respect thereto.

2. A thermostatic switch comprising an insulating base opposite fixed contacts carried by said base, a fixed post therebetween composed of electrically insulating material extending from said base, a conductive thermostatic sheet having an opening loosely surrounding said post, said sheet having opposite movable contacts on one side engageable and disengageable with said fixed contacts upon thermostatic flexing of the sheet, means supporting said sheet with respect to the post comprising a one-way clutch element slidable on the post, means adapted to hold the sheet for movement with said clutch element, said clutch element being adapted to be adjusted in one direction for movement of said movable contacts toward and against said fixed contacts to provide adjustable preliminary flexure in the sheet but otherwise to clutch the post to fix the adjusted position of the sheet with respect thereto.

3. A thermostatic switch according to claim 2, wherein said post and said base are integrally molded from the same insulating material.

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