

June 16, 1959

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2,891,128

THERMOSTATIC CONTROLS

Filed Jan. 9, 1958

3 Sheets-Sheet 1

FIG. 2

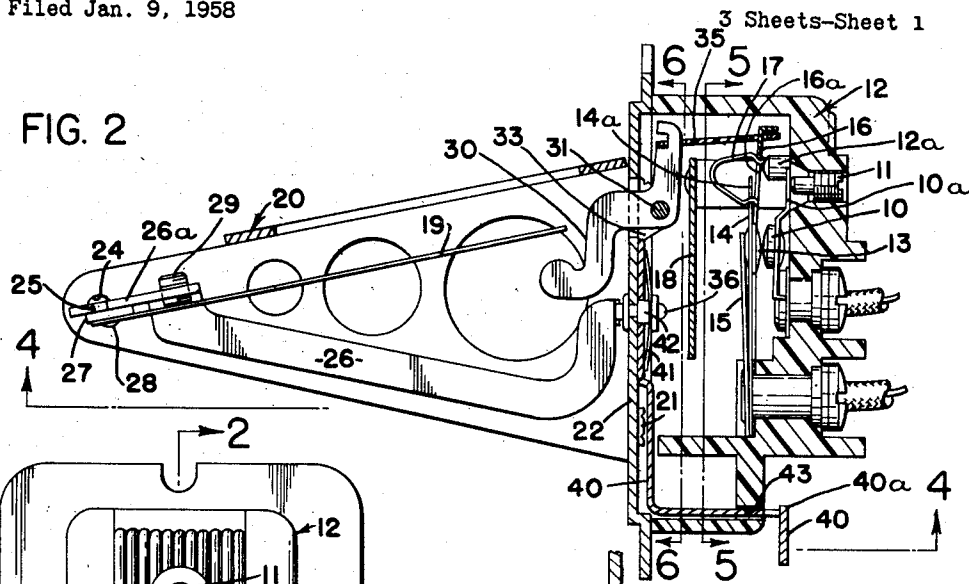
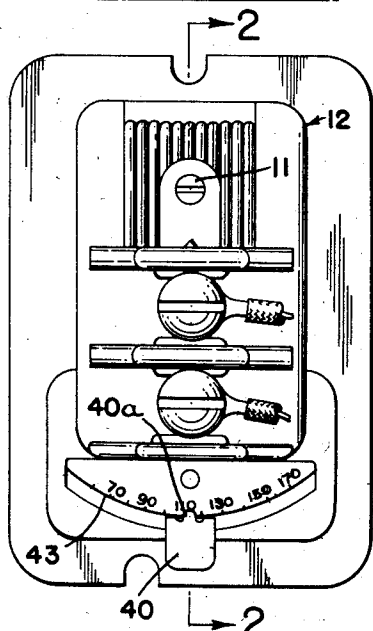


FIG. 1

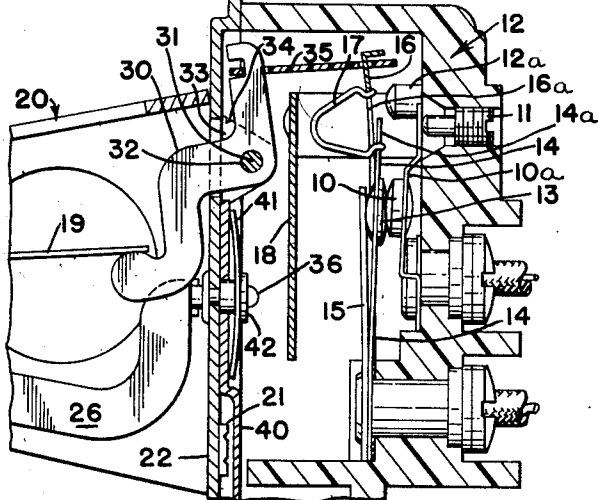


FIG. 3

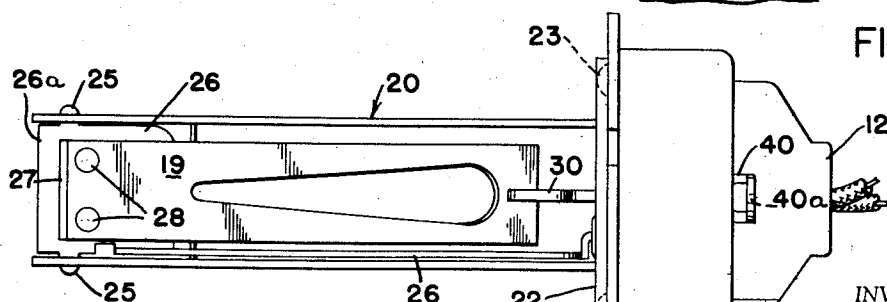


FIG. 4

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3 Sheets-Sheet 2

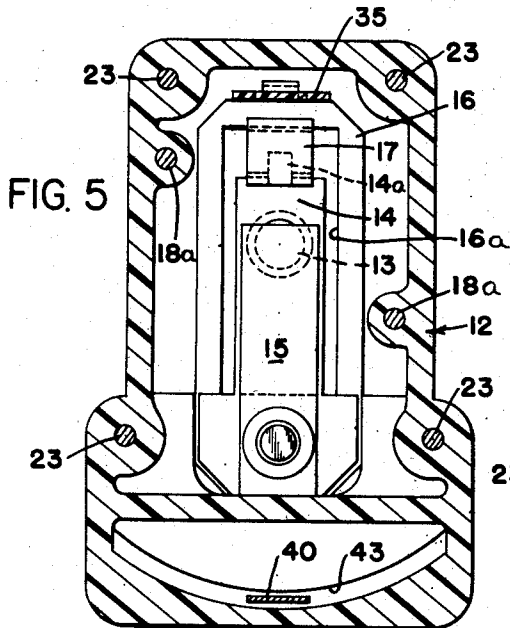
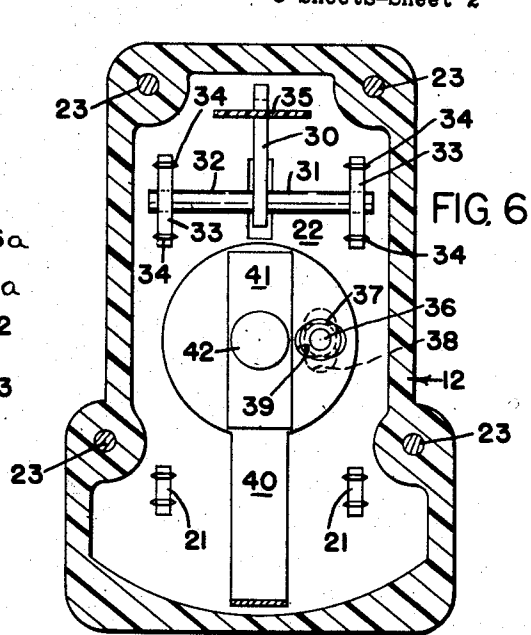
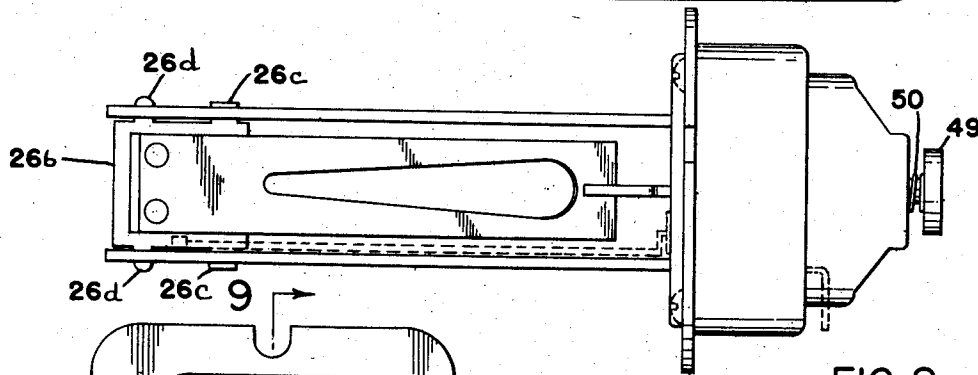
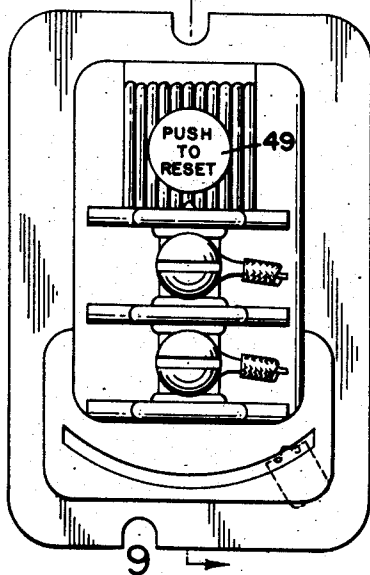


FIG. 7

FIG. 8

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FIG. 9

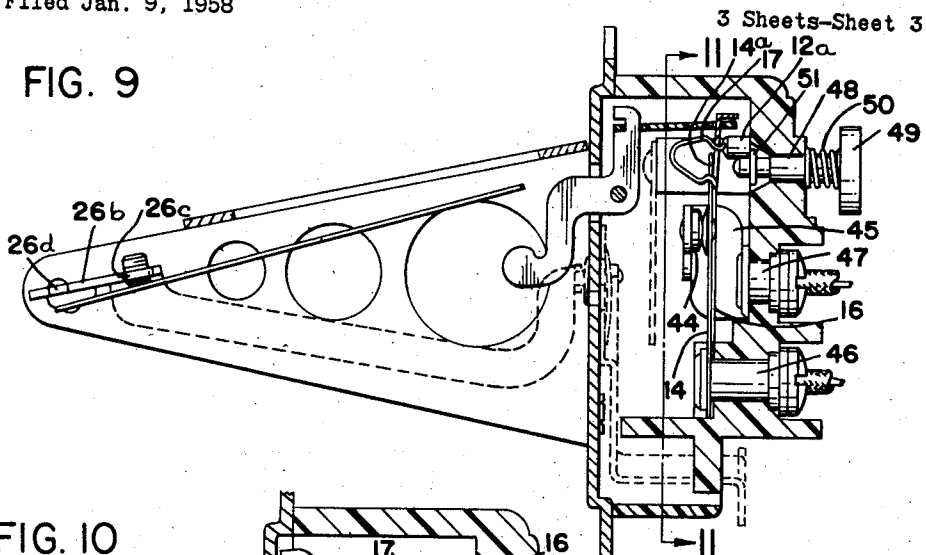


FIG. 10

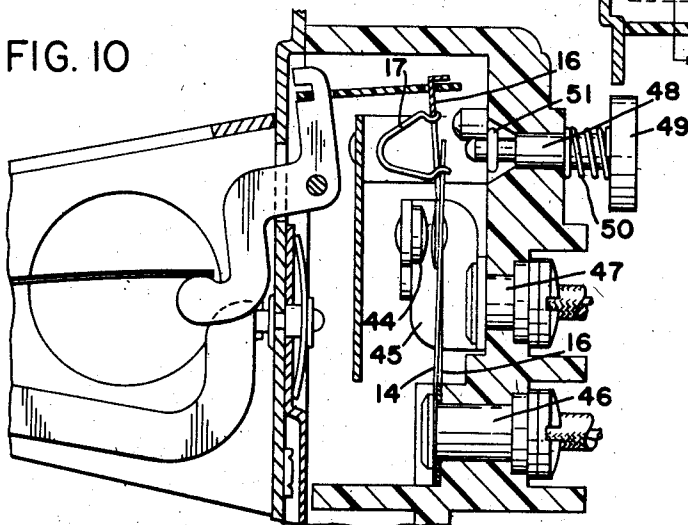
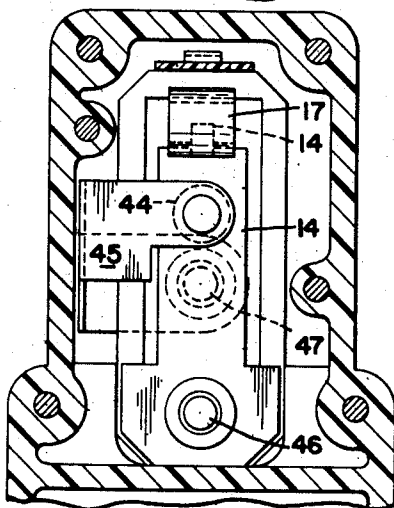


FIG. II



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2,891,128

THERMOSTATIC CONTROLS

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Application January 9, 1958, Serial No. 707,906

10 Claims. (Cl. 200—138)

This invention relates to thermostatic controls and more particularly to thermostatic switch assemblies comprising a bi-metallic thermo-sensitive element wherein some of its features are applicable to both make-and-break switches and breaker switches requiring to be manually re-set for re-closing the circuit after each opening of the switch.

It is among the objects of the present invention to provide improved mechanism for setting the bi-metallic element for actuating the switch at different predetermined temperatures; to provide such improved mechanism in a small, compact and inexpensive assembly; and to provide structure requiring minimum change of design for production of both the make-and-break and the re-set types of assemblies.

These and other objects and advantageous features of the invention, not at this time more particularly pointed out, will become more apparent as the nature of the invention is better understood from the following detailed description taken in conjunction with the accompanying drawings, wherein like reference characters denote corresponding parts and wherein:

Figure 1 is a front elevational view of a thermostatic control of the make-and-break type embodying my invention in its preferred form,

Figure 2 is a sectional view with parts shown in elevation of the same taken on the line 2—2 of Figure 1 showing the contacts separated,

Figure 3 is a fragmentary vertical sectional view corresponding to Figure 2 but on a larger scale and showing the circuit closed through the contacts,

Figure 4 is a bottom plan view of the assembly showing the bi-metallic element and adjacent parts taken on line 4—4 of Figure 2,

Figure 5 is a sectional view taken on the line 5—5 of Figure 2,

Figure 6 is a sectional view taken on the line 6—6 of Figure 2,

Figure 7 is a front elevational view of a thermostatic control re-set type embodying my invention in its preferred form,

Figure 8 is a bottom plan view of the device of Figure 7 rotated through ninety degrees,

Figure 9 is a sectional view taken on the line 9—9 of Figure 7, with the circuit through the contacts closed,

Figure 10 is an enlarged fragmentary sectional view corresponding to Figure 9 with the circuit open, and

Figure 11 is an enlarged fragmentary sectional view taken on the line 11—11 of Figure 9.

With reference to the drawings and particularly Figures 1 to 6 thereof, there is illustrated a thermostatic control embodying a normally open make-and-break switch, this assembly comprises a contact button 10, mounted upon a differential contact arm 10a which is adjustable by means of a differential screw 11 threaded through the front wall of the molded-plastic switch housing or case 12. Associated with the contact button 10

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is a moving contact button 13, mounted upon a spring contactor arm 14 having a back-up stop arm 15.

An actuating spring arm 16 is slotted as at 16a for passage back and forth past the contactor arm 14 and its back-up arm 15 to effect over-center action of a spring-clip snap-element 17. The upper end portion of the spring clip 17 is formed as a hook, in which is engaged the edge of the actuating arm 16 that defines the upper end of the latter's slot 16a; and its lower end portion is forked to straddle a tongue portion 14a which is the upper end part of the contactor arm 14. The forks are of hook form and are engaged with the edge faces of respective shoulders of the contactor arm at the sides of its tongue portion 14a.

A stop 12a, toward which the actuating spring arm 16 is lightly biased, integrally projects from the inner face of the front wall of the casing 12 and is adapted to be contacted by the upper end portion of the actuating arm 16 to stop rightward movement (as viewed in Figure 2) of the upper end of the spring clip 17 at such position that a moderate leftward movement of the upper end of the clip will carry it past-center with respect to its lower end as positioned by the back-up stop arm 15. An arc shield is shown at 18, supported from the wall of the casing, by either of screws 18a, 18a, Figure 5.

The bi-metallic element 19 is housed in an open-work tapered, stamped sheet-metal frame 20 which at its larger end has riveting or peening lugs 21, 21, Figures 2, 3 and 6, extending through, and securing the stamping to, a stamped-metal base plate 22, to which the switch housing 12 is secured by screws 23, 23, Figures 4, 5 and 6.

At the narrower end of the frame 20 its opposite side walls are formed to provide respective hinge-lug socket holes such as the hole 24, Figure 2, into which project respective hinge lugs 25, 25, Figures 2 and 4, formed upon opposite sides of the plate-like base portion 26a of a control or setting rocker-arm 26.

The adjacent end of the bi-metallic element 19 is secured to the hinged-plate portion 26a, with an interposed spacer plate 27, by rivets 28, 28. The spacer plate 27 holds the bi-metallic element off-set, in normally parallel relation, from an adjacent part of the hinge-plate 26a, for the functioning of an adjusting screw 29 which is threaded through the hinge-plate and bears against the bi-metallic element at a distance from the spacer plate. The bi-metallic element and the rocker arm stand in the relationship of the two sides of a V and the screw 29 is adapted to determine their angular relation to each other.

In downward movement the fore end of the bi-metallic element is adapted to come into contact with and move the adjacent arm of a bell-crank lever 30 which extends through a hole in the base-plate 22 of the switch-housing and is fulcrumed at 31 by being secured upon a rock-shaft 32, which is of substantial length for stability. The rock-shaft has its end portions rotatively mounted in respective journal-bracket ears 33, 33 which are formed on the frame stamping 20 and project into the switch housing through respective holes in the latter's base plate. The ears 33 can be peened at their base, as shown at 34, Figure 6, as a means for holding the frame 20 to the base plate 22.

The upwardly projecting arm of the bell-crank lever 30 is formed with a hook engaged in an opening in the adjacent end portion of a dielectric strip 35 which at its other end has slot-and-hook connection with the upper end of the switch-actuating arm 16.

For setting the adjusting and control rocker arm 26 at determinate positions about its hinge at 25, 25, its end remote from the hinge, is provided with a cam-follower stud 36 which, permissibly with a bushing 37, projects through a vertical slot 38, Figure 6, formed in the base plate 22 and also through a radial slot 39 formed in a disc-

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like hub portion of an adjusting-cam setting arm 40. The hub disc of the arm 40 is rotatably mounted on the inner face of the base plate, along with a bowed presser or brake spring 41, by means of a shouldered cam rivet 42. The adjusting arm 40 projects through an arcuate slot 43 formed in the front wall of the switch casing and, by V-slotting and binding is provided with an indicator projection 40a.

The mode of operation and the features of adjustment of this embodiment shown in Figures 1-6, comprising a normally open switch which is closed by pull of the dielectric connector 35, will be manifest from the foregoing description.

In the manually re-set embodiment shown in Figures 7 to 11, because of its being a re-set device, the parts shown in broken lines in Figures 7 to 9 can be omitted, or they can be retained, as indicated by the full line showing of the same parts in Figure 10. In case they are omitted, only the base portion 26b of the adjusting arm is retained. It is held in fixed position in the frame by lugs 26c, 26c, Figures 8 and 9, integrally projecting through complemental slots formed in the side walls of the frame, in addition to lugs 26d, 26d corresponding to the hinge-lugs 25 of Figures 2 and 4.

In this embodiment shown in Figures 7 to 11 the spring contactor arm 14 is reversed in its position on terminal rivet 46, as compared with the first described embodiment and the stationary contact button 44, mounted upon a U-bracket 45 secured by the other of the terminal rivets 47, is on the side of the moving-contact structure toward which the latter is drawn by the pulling dielectric strip 35. Such pulling action, effecting over-center snap action of the spring clip 17, changes the switch from the closed condition of Figure 9 to the open condition of Figure 10. When thus opened the switch remains open until manually closed because the space at the right of the moving contact structure is so unobstructed that the lower end of the spring clip can move the upper end of the arm 14 so far to the right that strain in the arm 14, acting through the clip as a strut, will continue to hold the actuating arm 16 in its leftward position as in Figure 10 in spite of the rightward bias of the arm 16.

For manually moving the upper end of the contactor arm 14 past-center to the left, from its position of Figure 10, and thus resetting the switch in its closed condition of Figure 9, a push-button structure is substituted for the differential adjusting screw 11 of the Figures 1 to 6 embodiment. The said structure comprises a push bar 48 slidably extending through a hole in the front wall of the switch housing and having a push button 49 formed on its outer end. A compression return spring 50 is interposed between the casing and the push-button and the inner end portion of the bar, within the housing, is provided with a lock spring or snap ring 51, Figures 9 and 10, as a stop-collar.

The mode of operation of this re-set embodiment will be manifest from the foregoing description.

Having thus described my invention so that those persons skilled in the art may understand and practice the same, what is desired to obtain by Letters Patent is embodied in the appended claims.

I claim:

1. A thermostatic control comprising a switch case including a base plate formed with an opening, switch parts mounted in said case and including a moving contact, a bell crank lever having one arm thereof extending through said opening, fulcrum means on said base plate

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for said lever, a frame secured to and projecting from said base plate, an elongated thermo-sensitive element pivotally mounted in outer extremity of said frame and having its free end in operative relationship to one arm of said lever, and means operatively associating the other arm of said lever with said moving contact.

2. A thermostatic control comprising a bi-metallic strip and an adjusting arm disposed at angle to each other and jointed at their adjacent end portions as a unitary structure, supporting means upon which said structure is pivotally mounted on an axis near the said adjacent end portions, switch-actuating means including a bell crank lever operatively associated with the outer free end of the said bi-metallic strip, and means for holding said adjusting arm, and consequently said structure, in different positions about the said axis whereby the relative positions of the free end of the bi-metallic strip and the bell crank lever may be changed to vary the temperature at which the switch actuating means may become operative.

3. A thermostatic control as defined in claim 2 and including adjusting means for changing the angular relationship of said bi-metallic strip to said adjusting arm.

4. A thermostatic control comprising a bi-metallic strip, rigid holding means secured to one end portion of said strip, a pair of spaced-apart frame elements between which said rigid holding means is mounted, said frame elements being formed with respective sockets and said rigid holding means having projections extending into said sockets respectively.

5. A thermostatic control as defined in claim 4 and including interlocking means near but spaced from the defined sockets and projections and interlocking said rigid holding means and said frame elements against relative rotation about the axis of said sockets.

6. A thermostatic control as defined in claim 2 in which the means for holding the adjusting arm in different positions as defined comprises a stud projecting from said arm, a fixed plate element formed with a cam slot through which also the said stud extends, the two said slots being in crossed relationship, and the last mentioned plate element being mounted for movement at an angle to at least one of said slots.

7. A thermostatic control as defined in claim 6 in which the second mentioned one of the defined plate elements is rotatably mounted.

8. A thermostatic control as defined in claim 2 and comprising cam means as the means for holding the adjusting arm as defined.

9. Adjusting means for a thermostatic control, said means comprising a fixed plate element formed with a cam slot, a plate element rotatively mounted in face-to-face relation to said fixed plate element and formed with a cam slot in crossed relation to the slot of the fixed plate element, an adjusting cam-follower element engaged in both of the said slots.

10. Adjusting means as defined in claim 9 in which the rotatively mounted plate element is a hub portion of a thermostat setting arm.

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Disclaimer

2,891,128.—*John D. Bolesky*, Mansfield, Ohio. THERMOSTATIC CONTROLS.
Patent dated June 16, 1959. Disclaimer filed Oct. 16, 1962, by the
assignee, *Therm-O-Disc, Incorporated*.

Hereby enters this disclaimer to claims 9 and 10 of said patent.
[*Official Gazette November 20, 1962.*]

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