

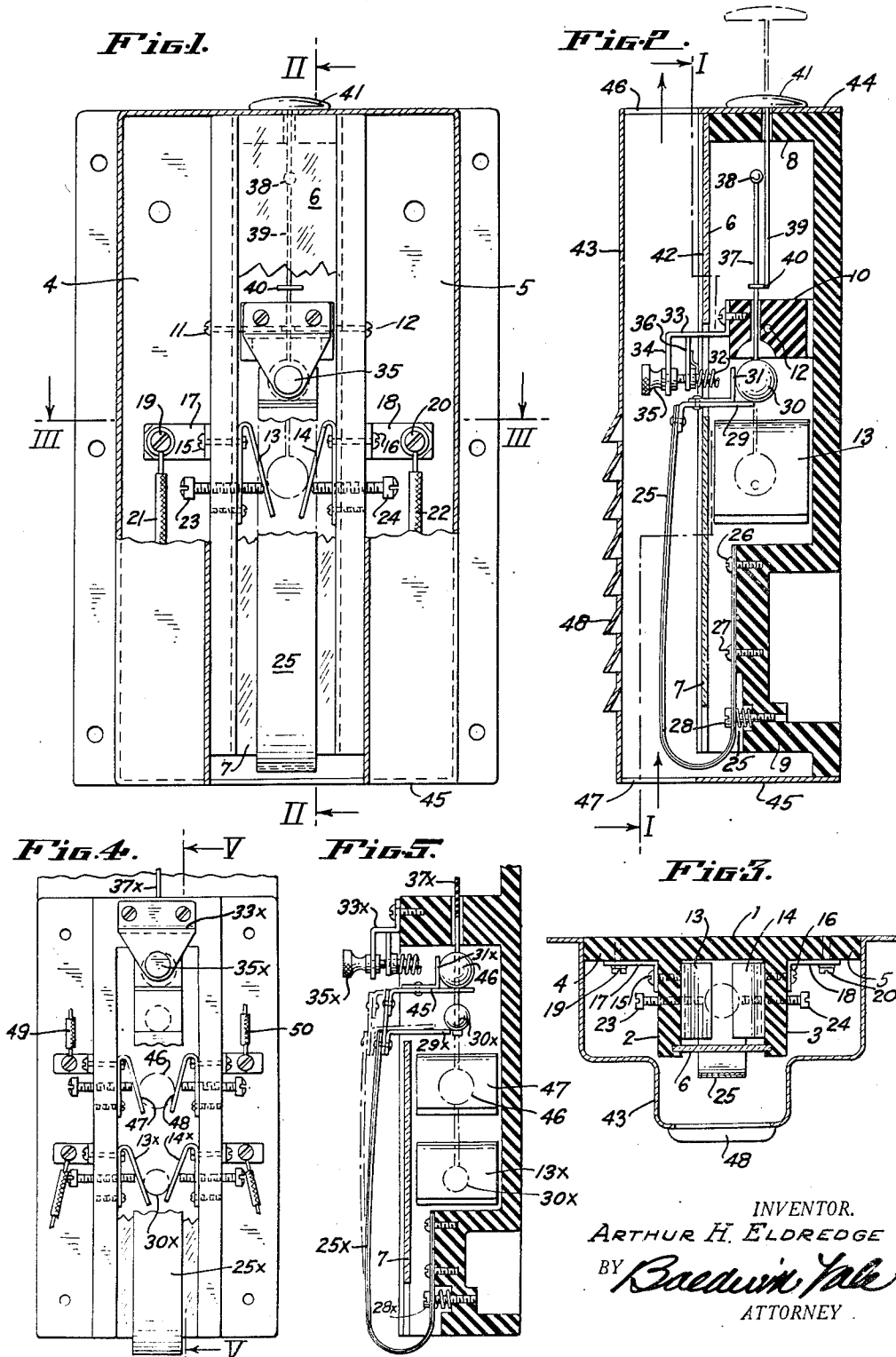
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THERMOSTATIC SWITCH

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THERMOSTATIC SWITCH

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This invention relates to improvements in thermostatic switches and more particularly to the circuit closing means thereof.

Among the objects of the invention is to achieve maximal accuracy in the functioning of the thermostatic element relative to the electric circuit controlled thereby.

Another object is to eliminate arcing "fluttering" and to establish positive contact in the switch, in accordance with the adjusted rating of the thermal element.

Another object is to enable the closing of a plurality of circuits progressively under the control of a single thermal element.

Another object is to provide a thermostatic switch especially adopted for use in fire alarm systems whether permanent or portable.

A further object is to provide for resetting the switch for repeat operation.

Other objects and advantages will appear as the description progresses.

In this specification and the accompanying drawings, the invention is disclosed in its preferred form, but it is to be understood that it is not limited to this form, because it may be embodied in modifications within the spirit of the invention as defined in the claims following the description.

In the one sheet of drawings:

Fig. 1 is a front elevation of a thermostatic valve constructed in accordance with this invention. The protective shield is shown in vertical section on the line I—I, Fig. 2.

Fig. 2 is a side view of the same in vertical section on the line II—II, Fig. 1.

Fig. 3 is a cross section of the same taken on the line III—III, Fig. 1.

Fig. 4 is a reduced detail of a modification of the same in front elevation showing a plurality of switches actuated by a single thermal element.

Fig. 5 is a vertical section of the same on the line V—V, Fig. 4.

In detail the construction illustrated in the drawing, referring first to Fig. 3, comprises the molded dielectric base 1, having the side walls 2, 3 set back from the sides of the base to form the lateral flanges 4, 5. These side walls are grooved to receive the glass panels 6, 7. The space between these walls is closed at the top by the integral top 8, and at the bottom by the integral block 9, see Fig. 2. The intermediate guide 10 is fixed between the side walls 2, 3 by the screws 11, 12, see Figs. 2, 3.

The V shape contact plates 13, 14 are fixed to the inner faces of the side walls by the screw bolts

15, 16 that also fix the brackets 17, 18 to the outer faces of the side walls. The binding screws 19, 20 threaded into the flanges 4, 5 of the base act as terminals connecting the wires 21, 22 to their respective contact plates 13, 14. The adjusting screws 23, 24 are threaded through the side walls to provide means for spreading their respective plates 17, 18 to vary the space therebetween.

The thermal element comprises the conventional bi-metallic strip 25 having its lower portion bent back upon itself and its end fastened to the face of the block 9 at 26, 27. The adjusting screw 28 is threaded in this block with its head engaging the strip 25 for adjusting the position of the upper end of the strip. The interposed spring 25 renders the adjustment at 25 more positive.

This head consists of the horizontal plate 29 riveted or welded to the upper end of the strip 25 to support the ball 30. It is preferable not to make the head assembly 29 a continuation of the thermal element 25, because the bi-metallic structure would be warped and distorted thereby and interfere with the accuracy of its functioning. The vertical abutment 31 is fixed to the upper face of the plate 29, in juxtaposition to the cushion spring 32. The bracket 33 is mounted on the block 10 and has the angular end 34. The adjusting screw 35 is swiveled in the end 34 and has the running nut 36 thereon which is held against turning by its sliding contact with the bracket 33. The spring 32 is mounted on this nut 36 by which it is positioned relative to the abutment 31.

The ball 30 is fixed on the end of the stem 37 extending upwardly through and slideable in the guide 10, and has the head 38 thereon. The manual switch resetting means consists of the wire 39, having the loop 40 adapted to engage beneath the head 38, and extending upwardly through the top 8 and terminating in the button handle 41. The upper glass panel 42, similar to the panel 7, encloses the upper portion of the mechanism against dust accumulation.

The protective shield 43 fully surrounds the assembly and engages the base 1 and has the top 44 and the bottom 45. These have the top and bottom openings 46, 47 respectively to promote a draft of air through the shield past the thermal element 25. The full exposure of this element to surrounding atmospheric conditions is further assured by the open covers at 48, without exposing the shielded mechanism to injury or tampering.

The invention operates substantially as follows:

The gradual rise of room temperature causes the bow of the thermal element 25 to unbend. This causes the head 29 to swing outward until it releases the ball 30 which then drops by gravity.

The descending ball lodges between the contact plates 13, 14, closing the circuit through the wires 21, 22 and the intermediate parts, see dotted lines.

As the head 29 swings outward the abutment 31 engages and compresses the hair-like spring 32. The added tension of this spring counterbalances the swing of the thermal element at the critical point where it is about to release the ball 30. Otherwise the weight and cam-like action of the descending ball would tend to spread the thermal element 25 causing it to vibrate or flutter, with the result that precision in the adjusted thermal rating of the thermostatic switch by means of the screw 28, may not be accurate with the rise in temperature that it is desired to register on the alarm circuit 21—22. Adjustment of the spring tension is accomplished by advancing or retracting the spring by turning the screw 35 to a point where the ball 30 is released at the desired degree of temperature. The increased bi-metallic tension built up in the thermal element 25 by the mechanical resistance of the spring 32, renders the element 25 less responsive to sudden fluctuations in room temperature caused by drafts or atmospheric eddies. In practice it has been demonstrated that the spring 32 is a valuable contribution to the calibrated accuracy of thermostatic controls in this class.

The mechanism is reset for operation by lifting the exposed button 41, which causes the ball 30 to displace the head 29 until the ball again rests thereon when the button 41 is released. If desired an adhesive or other form of seal can be applied to the top 8 across the button 41 to detect or prevent tampering therewith.

The modifications illustrated in Figs. 4, 5 are similar in structure and mode of operation to those described, except for the additional circuit or circuits actuated by a common thermal element. In the interests of brevity similarities in the combinative elements will be identified by the same numerals with the addition of x.

Referring to Fig. 5, the thermal element 35x, has the additional head 45 fixed thereto, that is bifurcated or slotted to pass the stem 37x which is of any suitable dielectric material, upon which the second ball 46 is slidable. In the modification the abutment 31x is transferred to the head 45.

This modification is particularly designed to give a preliminary local warning through the circuit 21x, 22x at the desired temperature rise; then to close the second circuit for remote warning to the fire department or elsewhere.

After the first and smaller ball 30x has dropped as described, the ball 46 is retained on the head 45 until a higher temperature further opens the thermal unit 25x and withdraws the head 45 from beneath the larger ball 46 which slides down the dielectric stem 37x, and lodges between the contact plates 47, 48 to close the circuit through the wires 49, 50 for any desired purpose.

The modification is reset for repeat operations by lifting the wire 39 as previously described. This forces the ball 46 past the head 45, and the ball 30x past the head 29x by which they are respectively supported.

While this invention has been particularly described with reference to its application to fire alarm systems, it is equally applicable to other uses where a critical rise in temperature is the controlling factor, such as damper and fuel controls or the like.

Having thus described this invention what is claimed and desired to secure by Letters Patent is:

1. A thermostatic instrument including a base; a pair of insulated interspaced contacts mounted on said base; an independent contactor guided on said base in operative relation to said contacts; a thermostatic element normally maintaining said contactor out of contact with said contacts until said thermostatic element responds to a rise in temperature; and means on said base for interposing a resilient cushion in the path of expansion of said thermostatic element when it is about to release said contactor.

2. A thermostatic instrument including a base; a pair of insulated interspaced contacts on said base; a second pair of similar contacts on said base but spaced further apart than the distance between said first pair of contacts; an independent contactor guided on said base and adapted to pass between said first contacts and engage said second pair of contacts; a second independent contactor guided on said base and adapted to stop between said first pair of contacts; a thermostatic element on said base and having a radial path of expansion; and interspaced heads on said thermostatic element adapted to independently maintain their respective contactors normally out of contact with their respective pairs of contacts until said thermostatic element responds to a rise in temperature.

3. A thermostatic instrument including a base; a pair of separated contacts on said base; a gravitating contactor guided on said base in vertical alinement with said contacts; and a thermostatic element supporting said contactor and arranged to move laterally to the vertical alinement of said contactor and said contacts to release said contactor when said thermostatic element responds to a rise in temperature.

4. A thermostatic instrument including a base; a pair of separated contacts on said base; a second pair of contacts on said base; a pair of gravitating contactors guided on said base in vertical alinement with said first and second pairs of contacts; a thermostatic element independently supporting said contactors and adapted to release said contactors seriatim as the thermostatic element responds to a progressive rise in temperature.

5. A thermostatic instrument including a base; a pair of separated contacts on said base; a second pair of contacts on said base in vertical alinement above and having a wider separation than said first pair of contacts; a pair of gravitating contactors of different widths adapted to rest between their respective pairs of contacts; a thermostatic element independently supporting said contactors and adapted to release said contactors seriatim as the thermostatic element responds to a progressive rise in temperature.

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