

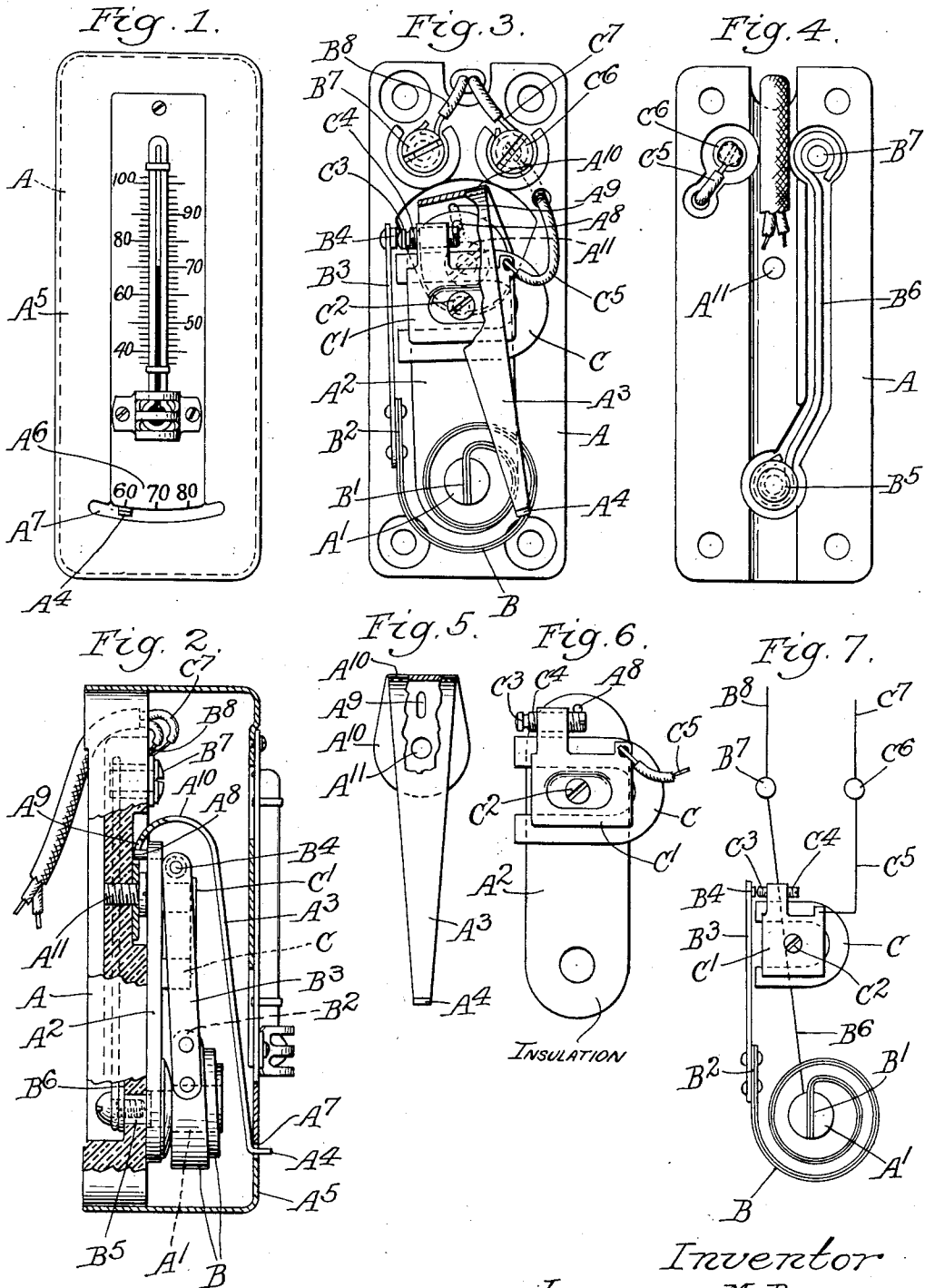
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THERMOSTAT

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UNITED STATES PATENT OFFICE

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THERMOSTAT

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My invention relates to improvements in thermostats and has for one object to provide a new and improved form of an especially sensitive thermostat which will respond readily to minute temperature variations. Another object is to provide a thermostat of small size having the sensitivity usually associated with large sized thermostats. Another object is the provision of an improved, sensitive and efficient thermostat particularly adapted for use with control systems for heaters, oil burners and the like, although I do not wish to be limited specifically to such use. Other objects will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawing, wherein—

Figure 1 is an elevation;

Figure 2 is a side elevation with parts in section;

Figure 3 is an elevation with the cover removed;

Figure 4 is a rear view;

Figure 5 is a detail;

Figure 6 is a detail; and

Figure 7 is an elevation of the thermostatic member proper.

Like parts are indicated by like symbols throughout the specification and drawing.

A indicates any suitable supporting base and A^1 is an adjusting shaft fixedly mounted on the base. Extending upwardly thence is a control arm structure generally indicated as A^2 which is of any suitable electric insulating material. The arm A^2 pivotally mounted on the shaft A^1 , may be rotated in response to rotation of the setting finger A^3 with its indicating hand A^4 aligned with the graduations of the exterior scale A^5 upon the cover A^6 . A^7 indicates a slot through which the projection A^4 outwardly projects, for manually setting the device. Any suitable connection may be made between the member A^3 and the member or lever A^2 but I indicate a pin or projection A^8 upon the member A^2 aligned with and penetrating a slot A^9 in the recurved portion A^{10} of the member A^3 , which is pivoted as at A^{11} upon the base A .

Mounted upon the adjusting shaft A^1 is any suitable thermo variable element generally indicated as B , herein shown as coiled with one end of the coil penetrating a slot B^1 in the end of the shaft A^1 . It will be understood that the coil is made up of two sheets of material having different co-efficients of expansion, so that a change in temperature causes a movement of the coil, tending to move its upper end B^2 either to the right or to the left as the case may be. Secured to the upper end B^2 of the coil B is an extension or leaf B^3 of any suitable metal adapted to respond to a magnetic pull. It terminates in a contact member B^4 . It will be understood that the shaft A^1 , the coil B and the member B^3 and the contact member B^4 are all electrically conductive. One end of the shaft A^1 may serve or be provided with a binding post, as indicated at B^5 , whereby the conductor B^6 may be secured thereto, which in turn extends to the binding post B^7 . The opposite end of the binding post B^7 is connected to any suitable conductor B^8 , which forms part of the control circuit adapted to be controlled by the thermostat.

Mounted upon the member A^2 is a permanent magnet C , herein shown as a horse shoe magnet. It may be clamped upon the member A^2 for example by the holding plate C^1 and the screw C^2 . Associated with the plate C^1 is a terminal C^3 which is shown as in screwthreaded relation with the plate, as at C^4 , to permit its adjustment. It is opposed to the terminal B^4 upon the leaf B^3 . It will be understood that the plate C^1 and the terminal C^3 are electrically conductive. They are connected as by the conductor C^5 with the binding post C^6 which in turn is in connection with the conductor C^7 which forms part of the circuit desired to be controlled.

It will be observed, as in Figure 3, that counter-clockwise rotation of the lever A^2 will move the contact C^3 against the contact B^4 . The arm A^2 , upon which the contact and magnet are mounted, is pivoted to the shaft A^1 . The opposite contact B^4 , being mounted on a flexible leaf, has a movement the substantial equivalent it would have were it pivoted at about the upper end B^2 of the coil

B. In other words the effect is as if the two contacts were eccentrically pivoted. The result is that when the lever A^3 is actuated to move the contacts together there is a slight sliding or wiping effect between the two contacts. This is sufficient to keep the contacts clean, as this slight wiping effect takes place almost every time the lever A^3 is actuated.

Since the particular circuit and particular mechanism to be controlled form no part of the present invention they are not indicated in detail. I have, however, shown the thermostat as adaptable for association with control means for a heating member. For example, in controlling the circuit for furnace dampers or draft controls or for oil burners, or for blower systems and air draft systems associated with furnaces I employ a housing A^5 with the slot A^7 calibrated to indicate the desired temperature, or the temperature at which the control mechanism is expected to go. Assume that the thermostat is employed with an electric control circuit for an electrically operated oil burner, if the house temperature is at 70 and the pointer A^4 is set at 75, the circuit will be closed because the rotation of the arm A^3 to put the pointer midway between the figures 70 and 80 on the scale will move the permanent magnet C so far to the left, referring to Figure 3, that it will draw the leaf B^3 and will thus oppose the contact B^4 to the contact C^3 and close the actuating circuit above described and diagrammatically sketched in Figure 7. When the temperature reaches 75 the response to the thermostatic member B to the increase in temperature will be an unwinding of the coil and the shape and characteristics of the thermostatic element will be such that this unwinding will, when the house temperature of 75 is reached, be sufficient to withdraw the leaf B^3 and thus the contact B^4 , breaking the actuating circuit. On the other hand, when the house temperature again drops below 75 the coil B will close down and, when the member B^3 approaches the magnet C, the magnet will exert its force and again close the circuit. The employment of the magnet provides a quick or snap action which reduces the lag or time necessary for the closure of the circuit to take place. One or the other of the contacts B^4 or C^3 may be made adjustable, and I have shown the contact C^3 as adjustable, in order to follow or adjust the closest approach of the leaf B^3 to the permanent magnet. This permits adjustment of the greatest effective action of the magnet upon the leaf B^3 and permits it to be set so that the magnet will not exert too powerful an attractive force to permit a prompt disengagement or circuit breaking in response to temperature changes.

It will be realized that whereas I have described and shown a practical and operative device, nevertheless many changes might be

made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawing to be taken as in a broad sense illustrative and diagrammatic rather than as limiting me to my specific showing.

I claim:

1. In a thermostat, a base, a thermostatically responsive member mounted upon said base, including a portion responsive to magnetic attraction, a magnet, and means for adjusting its position toward and away from the magnetically responsive portion of said thermostatically responsive member including a magnet support movably carried by the base and supporting the magnet on the base, and conductive connections mounted upon the magnet support and the thermostatically responsive member, said connections being adapted to form part of the circuit controlled by the thermostat.

2. The structure of claim 1 characterized in that the thermostatically responsive member comprises a coil arranged for torsional expansion and contraction and has an end normally fixed in relation to said base and a free end adapted to flex in response to variations in temperature, said upper end extending substantially tangential to the outermost convolution of said coil and said magnet being opposed to said free end.

3. The structure of claim 1 characterized in that indicating means are associated with the magnet support and are adapted for the setting of said magnet to close said circuit at any desired temperature within the normal range of control.

4. The structure of claim 1 characterized by the provision of a pivotal connection between the magnet and the base, a temperature selecting finger, and means for moving said magnet in response to movement of said temperature selecting finger.

5. In a thermostat, a base, a thermostatically responsive member mounted upon said base, one end of said member being secured to said base, the other being free to flex in response to changes in temperature, a magnet movably mounted upon said base, conductive contacts associated with the thermostatic member and the magnet, and arranged for make and break in response to flexure of said free end, means for adjusting said magnet toward or away from a free portion of the thermostatically responsive member, a movable indicator element and a graduated scale opposed thereto said indicator element being interlocked with the movable magnet mounting and being adapted by its position along said scale, to indicate the temperature at which the magnet will move the thermostatically responsive member into circuit closing position.

6. In a thermostat, a base, a thermostatical-

- ly responsive member mounted upon said base, including a portion responsive to magnetic attraction, a magnet movably mounted upon said base and means for varying its position in relation to the magnetically responsive portion of the thermostatically responsive member, and conductive connections associated with the magnet and the thermostatically responsive member, said connections and the thermostatically responsive member forming part of a circuit controlled by the thermostat, said parts being mounted to cause a wiping movement of one opposed contact against the other, in response to movement of the magnet. 70
7. In a thermostat, a base, a thermostatically responsive member mounted upon said base, including a portion responsive to magnetic attraction, a magnet movably mounted upon said base, a contact associated with said magnet, and an opposed contact associated with the thermostatically responsive member, said connections forming part of a circuit controlled by the thermostat, and means for moving the magnet to vary its position in relation to the magnetically responsive portion of the thermostatically responsive member, said means being at the same time adapted to wipe one of the opposed contacts across the other. 80
8. In a thermostat, a base, a thermostatically responsive member mounted upon said base, including a bimetallic coil, the inner end of which is secured to the base, a generally tangential extension from the outer, free end of the coil, a contact mounted upon said extension, a contact opposed to said first mentioned contact, and a permanent magnet opposed to said extension, said permanent magnet and said second mentioned contact being movably mounted upon said base for simultaneous adjustment toward and away from said extension. 85
9. In a thermostat, a base, a thermostatically responsive member mounted upon said base, including a bimetallic coil, the inner end of which is secured to the base, a generally tangential extension from the outer, free end of the coil, a contact mounted upon said extension, a contact opposed to said first mentioned contact, a movable support, a permanent magnet opposed to said extension, said magnet and said second mentioned contact being mounted upon said movable support, and means for adjusting said support, said contacts being adapted, when in conductive contact, to permit said extension closely to approach said magnet, while spacing it slightly away from the magnet. 90
10. In a thermostat, a base, a thermostatic member mounted thereon and including an extension of magnetic material, an arm pivotally mounted on the base and carrying a permanent magnet disposed in opposition to said magnetic extension, cooperating con- 95
- tacts carried by the thermostatic member and the pivoted arm, a second arm pivotally mounted on the base, said arms having interengaging features by which movement of the second mentioned arm is communicated to the first mentioned arm to adjust the magnet and the contact carried by the first mentioned arm with respect to the thermostatic member. 100
- Signed at St. Louis, State of Missouri, this 30th day of December, 1929. 105
- LAURENCE M. PERSONS. 110
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