June 5, 1934. D. J. STEWART 1,961,649

THERMOSTAT

Filed Oct. 27, 1930

Fig. 1.

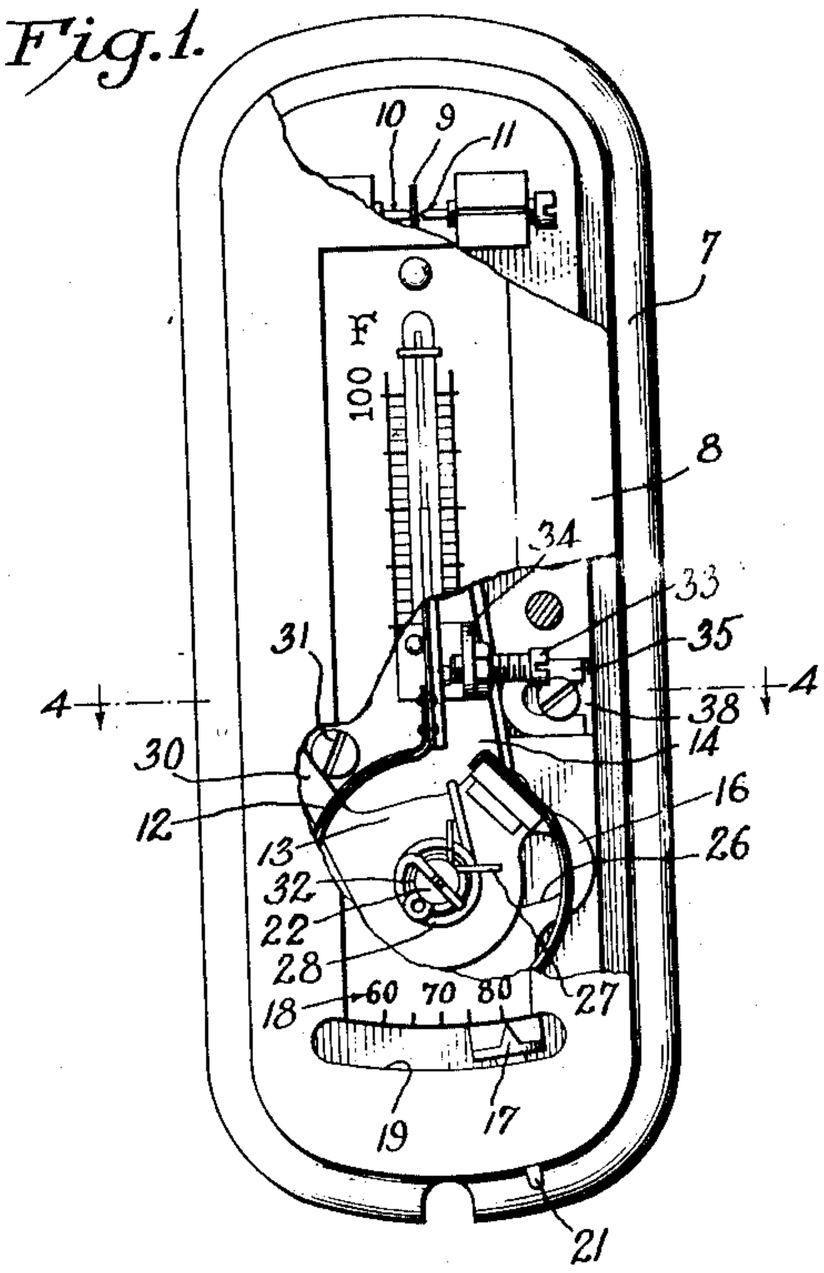


Fig. 2.

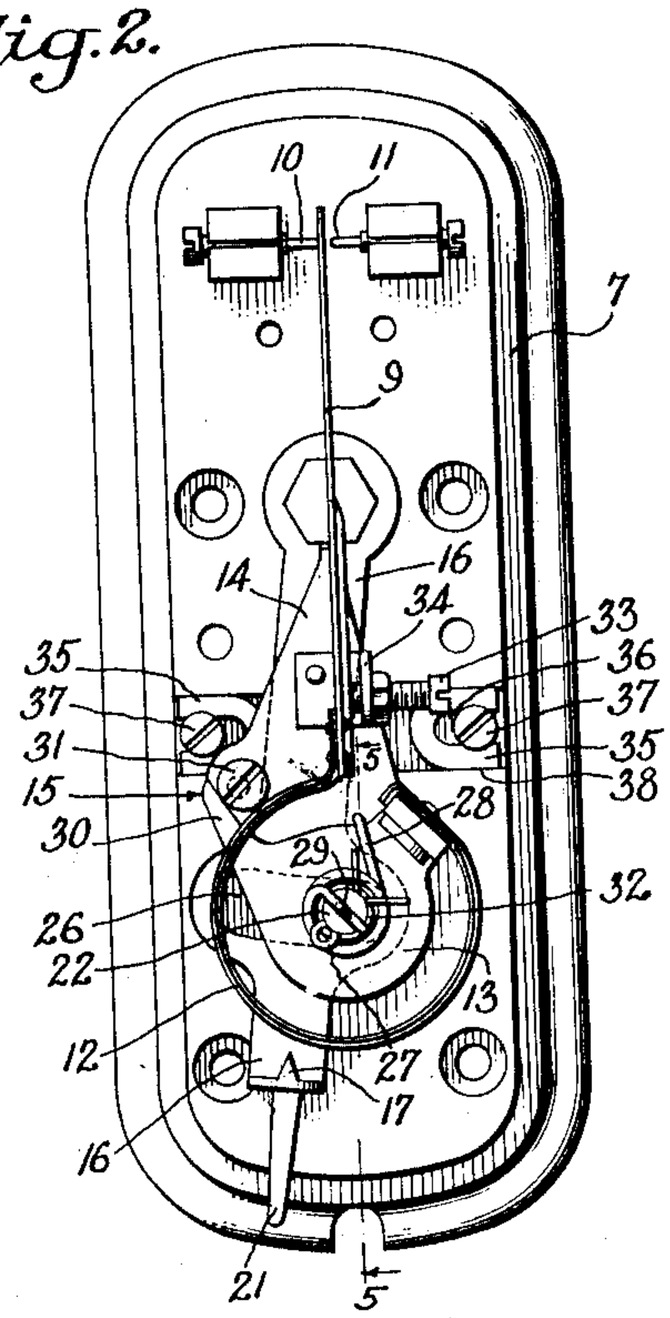


Fig. 3.

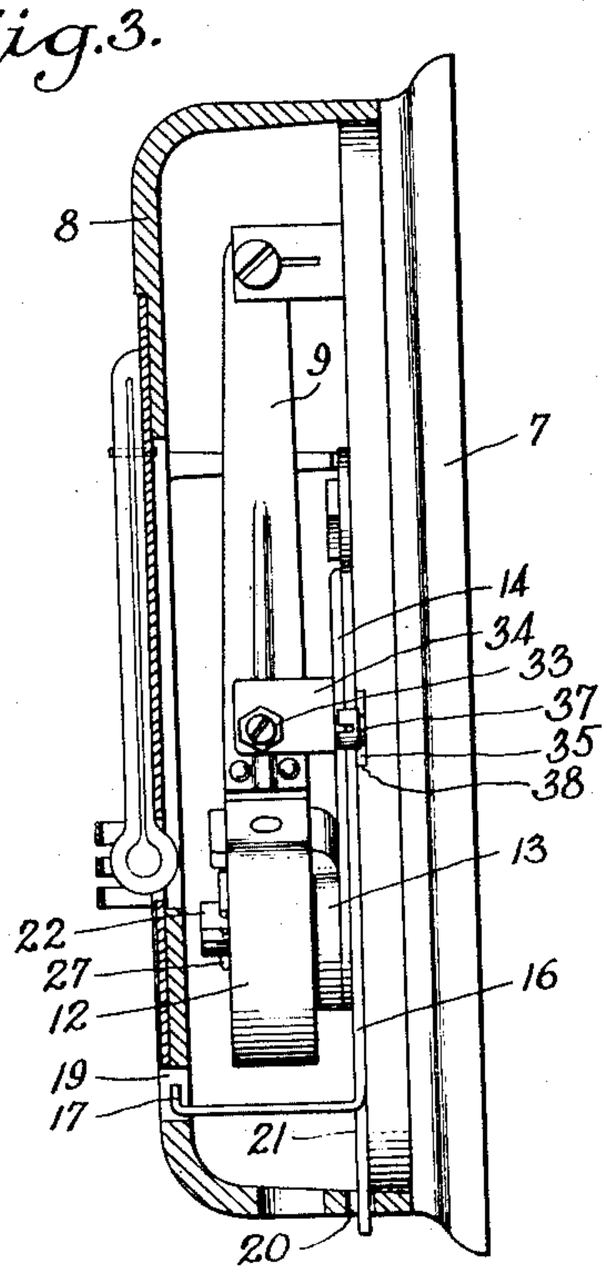


Fig. 4.

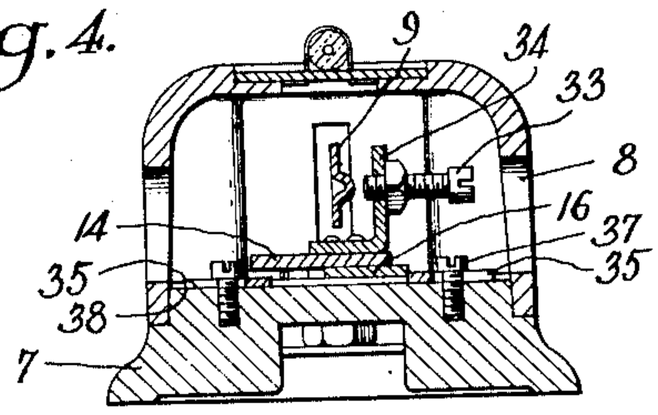
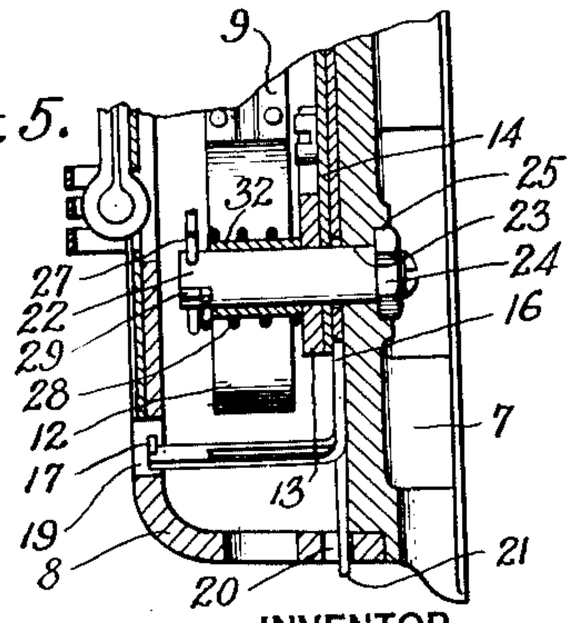


Fig. 5.



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UNITED STATES PATENT OFFICE

1,961,649

THERMOSTAT

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Application October 27, 1930, Serial No. 491,505

14 Claims. (Cl. 200—139)

The invention pertains to wall thermostats of the type employed in heat regulating systems and has more particular reference to thermostats of the type which includes a pivotal support for the thermostatic element, and a manually operable adjusting lever which is arranged to move the support to vary the setting of the thermostat as may be desired.

In one aspect the invention concerns a connection between the pivotal support and the adjusting lever, which includes an eccentric stud capable of individual adjustment to vary the relation between the lever and the support. In prior constructions said stud forms part of a pin-and-slot connection of which the slot is intended to be made of a size such that it will receive the stud tightly between opposed walls and thus avoid any play between the support and the lever. Experience has shown however that such a tight fit of the stud in the slot can be effected only by the exercise of especial precaution in the manufacture of the device, and frequently difficulty arises on this account. It is therefore one object of my invention to provide a construction for the thermostat such that the difficulty referred to is effectually avoided.

In the use of wall thermostats in heat regulating systems, it is frequently desirable to provide for a continuous supply of heat regardless of fluctuations in the temperature adjacent the thermostat, or for a continuous interruption of the heat supply. Another object of my invention is to provide in such a thermostat means of an advantageous character which is operable at will to prevent the thermostat from responding to temperature variations and thereby effecting any change in the condition of the circuit controlled thereby.

A further object is to provide simple and conveniently adjustable means for determining the high and low limits of control.

The objects of the invention thus generally stated, together with other and ancillary advantages, are attained by the construction and arrangement illustrated in the accompanying drawing and constituting a preferred embodiment of the invention. In the drawing:

Figure 1 is a front view of a wall thermostat constructed in accordance with my invention, a portion of the front cover being broken away to expose parts of the device.

Fig. 2 is a similar view with the front cover wholly removed.

Fig. 3 is an edge elevational view with the cover shown in section.

Fig. 4 is a transverse sectional view taken approximately in the plane of line 4—4 of Fig. 1.

Fig. 5 is a longitudinal sectional view through the lower end of the thermostat taken approximately in the plane of line 5—5 of Fig. 2.

As herein shown, the thermostat in which my invention is embodied comprises an elongated base plate 7 adapted to be secured in upright position upon a wall or other support. A cover 8 is removably mounted upon the base 7 and serves to enclose the operating parts which are mounted on the front wall of the base. Such parts comprise an elongated member or tongue 9 constituting the movable contact member of two control switches having stationary contacts 10 and 11 respectively. The upper end of the tongue, as herein shown, is disposed between said stationary contacts, and its lower end is attached to one end of an elongated bimetallic thermostatic element 12 herein of substantially circular form. The other end of said element is secured to a supporting member 13 pivotally mounted on the base 7 near the lower end thereof. Pivoted coaxially of the supporting member 13 in underlying relation thereto is an adjusting lever 14 having a pivotal and sliding connection generally designated by the numeral 15 with said supporting member. The lever 14 extends upwardly from the pivotal support 13 and is manually operable. Thus its upper end is suitably pivoted to a hand-operated setting arm 16 pivoted to the base 7. Said arm extends downwardly to the lower end of the base where it is bent forwardly to provide a support for a pointer 17 cooperating with a scale 18 formed at the upper edge of a slot 19 in the cover; and depending from the arm through a slot 20 in the cover is an operating finger 21.

It will be observed that the pivotal support 13 and the lever 14 are arranged for operation in adjacent parallel planes. To provide an improved operative connection between the pivotal support 13 and the adjusting lever 14, and thus avoid the necessity of great accuracy in construction for the purpose of insuring against play between the pivotal support and the adjusting lever, I place the support under spring pressure in one direction, and provide a one-way bearing engagement between the two parts which is maintained by the spring. Thus the pivotal support 13 is mounted on the base 7 through the medium of a normally stationary shaft 22 extending through an aperture 23 in the base and having a polygonal head 24 secured on its rear end. The shaft is normally held stationary by the head 24 engaging in a similarly shaped socket 25 formed in the rear wall of the base. The support 13 is mounted on the shaft 22 in spaced relation to the base 7, with the adjusting lever 14 and setting arm 16 interposed between the support and the base. The shaft thus provides a pivotal support for the adjusting lever 14. The arm 16 is provided with an enlarged portion slotted as at 26 (Fig. 2) to receive the shaft 22, the slot being of a

length such as to permit of swinging movement of the arm from side to side.

The forward end of the shaft 22 carries a cotter pin 27 between which and the pivotal member 13 is interposed a coiled spring 28, one end of which is anchored in a slot 29 in the forward end of the shaft and the other end of which is anchored to the pivotal support as illustrated in Fig. 2. Said spring is arranged to exert a force upon the support 13 to rotate it in a clockwise direction (Fig. 2) and carry an arm 30 thereon into engagement with an eccentrically mounted stud 31 on the lever 14; and the tension of the spring is such that in the operation of the lever 14 by the setting arm 16, the arm 30 on the support will follow the stud 31 in tightly bearing relation. Thus it will be seen that a pivotal and sliding connection is provided between the lever 14 and the superimposed supporting member 13 which effectually prevents any play occurring between these parts in either direction of movement thereof.

The tension of the spring 28 may be adjusted readily when the cotter pin is removed, by means of a screw driver or the like inserted in the slot 29 at the forward end of the shaft. In this operation a rearward pressure is placed upon the shaft sufficient to remove the head 24 from its socket 25, whereupon the shaft may be turned in the desired direction to change the position of the head relative to the socket. The shaft is then permitted to be returned by the action of the spring 28. Preferably a sleeve 32 is interposed between the shaft 22 and the spring 28 which sleeve is made of such length that when the cotter pin 27 is in place it is impossible to move the shaft axially far enough to disengage the head 24 from its socket.

It will be observed that the spring 28 is a combined torsion and expansion spring, which serves not only to maintain the desired bearing relation between the arm 30 of the support 13 and the stud 31, but also serves to hold the shaft 22 in position. Moreover, it maintains frictional pressure upon the surfaces of the setting lever 16 which is desirable to cause it to be held in any desired set position.

In order that it may be possible when desired to lock the tongue 9 against one of the stationary switch contacts 10, 11 and thus provide against any change by the thermostat in the condition of the control circuit, I provide on the lever 14 an abutment operable through the medium of the setting lever 16 into holding relation to the tongue. This abutment in the present instance comprises set screw 33 adjustably mounted in a bracket 34 secured on the forward side of the lever 14. It will be apparent that when the lever 14 is operated to one extreme position (that herein shown being the lower temperature limit) the screw will engage the tongue and hold it against one of the stationary contacts (herein the contact 10). Thus with the arrangement shown it is possible to lock the thermostat in a position in which it continuously calls for heat regardless of fluctuations in the room temperature. Obviously, where it may be desired to lock the thermostat in a position in which it will cut off the supply of heat continuously, this may be accomplished by reversing the position of the set screw to the opposite side of the tongue.

To provide simple and conveniently adjustable means for determining the high and low limits of manual adjustment. I employ a pair of stops 35, one on each side of the setting lever 16 at a point spaced from the pivotal axis of the latter. Each of these stops is in the form of a U-shaped member providing an open ended slot 36 for receiving the shank of a screw 37 anchored in the base 7. These stops are slidable in transverse guide-ways 38 when being adjusted.

I claim as my invention:

1. A thermostat comprising, in combination, a switch having stationary and movable contacts, a thermostatic element for controlling said movable contact, and means for adjusting said movable contact comprising a pivotal member connected to the thermostatic element and a lever arranged for manual operation, said member and lever being arranged in superimposed relation and having abutments arranged to coact to permit relative pivotal and sliding movement between them, and spring means acting on said member for maintaining interengaging relation between said abutments in the various set positions of the manually operable member.

2. A thermostat having a control switch including stationary and movable contacts, a thermostatic element for controlling said switch, and means for adjusting said element comprising two pivotal members mounted in superimposed relation for operation in adjacent parallel planes, one of said members being connected with said thermostatic element and constituting a support therefor, and the other member being arranged for manual operation, and spring means acting upon the supporting member and tending to move it in one direction, one of said members having an abutment thereon projecting into the plane of operation of the other member, and said spring means being effective to maintain an inter-engaging relation between the two members in various positions of adjustment of the manually operable member.

3. A thermostat having a control switch including stationary and movable contacts, a thermostatic element for controlling said switch, and means for adjusting said element comprising a manually movable adjusting member, an abutment on said member, a pivotal support carrying said thermostatic element and having a part arranged to bear against said abutment, a bearing shaft on which said support is mounted to turn, a spring having one end anchored to said shaft and the other end to said support, said spring acting to hold the support with a predetermined pressure against the abutment on the adjusting member so as to follow said abutment in the movements of the adjusting member, and said shaft being adjustable rotatably to vary the tension exerted by said spring upon the pivotal support.

4. A thermostat having a control switch including stationary and movable contacts, a thermostatic element for controlling said switch, and means for adjusting said element comprising a manually movable adjusting member, an abutment on said member, a pivotal supporting member carrying said thermostatic element and having a part arranged to bear against said abutment, a bearing shaft on which said supporting member is mounted to turn, a spring having one end anchored to said shaft and the other end to said supporting member, said spring acting to hold the supporting member with a predetermined pressure against the abutment on the adjusting member so as to follow said abutment in the movements of the adjusting member, and said shaft being mounted for axial movement into disengaged relation to said base whereby to per-

mit of the rotation of the stud for the purpose of adjusting the spring tension.

5. A thermostat comprising a base, a shaft mounted in the base, a supporting member pivotally mounted on said shaft, a bimetallic thermostatic element having one end secured to said supporting member, a switch member on the other end of said thermostatic element, an adjusting lever also mounted on said shaft, said supporting member and lever having coacting abutments one of which is in the form of an eccentric adjustable stud, and spring means acting upon said supporting member to maintain engaging relation between said abutments in the operation of said adjusting lever.

6. A thermostat comprising a base, a shaft mounted in the base, a supporting member pivotally mounted on said shaft, a bimetallic thermostatic element having one end secured to said supporting member, a switch member on the other end of said thermostatic element, an adjusting lever also mounted on said shaft, said supporting member and lever having coacting abutments one of which is in the form of an eccentric adjustable stud, a setting arm for operating said adjusting lever, and spring means acting upon said supporting member to maintain engaging relation between said abutments in the operation of said setting arm, said spring being anchored to said shaft, and said shaft normally interengaging with said base to prevent rotation of the shaft but movable into disengaged relation with the base to vary the tension on said spring.

7. A thermostat comprising a base, a shaft mounted in the base, a supporting member pivotally mounted on said shaft, a bimetallic thermostatic element having one end secured to said supporting member, a switch member on the other end of said thermostatic element, an adjusting lever also mounted on said shaft, said supporting member and lever having coacting abutments one of which is in the form of an eccentric adjustable stud, a setting arm pivoted to the base for operating said adjusting lever, and spring means acting upon said supporting member to maintain engaging relation between said abutments in the operation of said setting arm, said spring also acting to hold the setting arm in frictional engagement with the base.

8. A thermostat comprising a base, a shaft mounted in the base, a supporting member pivotally mounted on said shaft, a bimetallic thermostatic element having one end secured to said supporting member, a switch member on the other end of said thermostatic element, an adjusting lever also mounted on said shaft, said supporting member and lever having coacting abutments one of which is in the form of an eccentric adjustable stud, a setting lever for operating said adjusting lever, and a spring acting upon said supporting member to maintain engaging relation between said abutments in the operation of said setting lever, said shaft having a part normally interengaging with said base and movable axially thereof into disengaged relation to the base, and said spring being coiled about said shaft and having one end anchored thereto so as to exert pressure on the shaft in a direction to prevent its disengagement from the base.

9. A thermostat comprising a base, a shaft mounted in the base, a supporting member pivotally mounted on said shaft, a bimetallic thermostatic element having one end secured to said supporting member, a switch member on the other end of said thermostatic element, an adjusting lever also mounted on said shaft, said supporting member and lever having coacting abutments one of which is in the form of an eccentric adjustable stud, a setting lever for operating said adjusting lever, and a spring acting upon said supporting member to maintain engaging relation between said abutments in the operation of said setting lever, said shaft having a part normally interengaging with said base and movable axially thereof into disengaged relation to the base, and said spring being coiled about said shaft and having one end anchored thereto so as to exert pressure on the shaft in a direction to prevent its disengagement from the base, and means acting positively to limit the axial movement of said shaft so as to hold the latter in interengaging relation with the base.

10. A thermostat of the character set forth comprising a casing, a movable switch member, a thermostatic element carrying said switch member, an adjustable support for said thermostatic element, manually operable means for moving said support to adjust the switch member including a hand lever projecting from the casing, a second lever having a pivotal connection with the hand lever adjacent its fulcrum, and a part on said second lever adapted when the hand lever is moved to one extreme position to hold said switch member also in one extreme position.

11. A thermostat of the character set forth comprising a movable switch member, a thermostatic element carrying said switch member, an adjustable support for said thermostatic element, means for moving said support to adjust the switch member including a manually operable lever, a bracket secured to said lever, and a screw adjustably mounted on said bracket and adapted when the lever is moved into one extreme position to engage with said switch member to hold it against movement by the thermostatic element.

12. A thermostat of the character set forth, comprising a pair of switch contacts, a thermostatic element normally operable to move one of said contacts relative to the other in response to changes in temperature, manually operable means operatively associated with said element to adjust the movable contact, and a device operable by said means into a position to hold said contacts in relatively fixed relation regardless of temperature changes.

13. A thermostat comprising a base, a movable switch member, a thermostatic element carrying said switch member, a pivotal support for said element, means for moving said pivotal support to adjust the thermostatic element including a lever pivoted flat upon the base, said base having a transverse groove therein, and a pair of stops disposed in said groove on opposite sides of the lever and adjustable transversely of the base to determine the upper and lower limits of adjustment by the lever.

14. A thermostat comprising a base, a movable switch member, a thermostatic element carrying said switch member, a pivotal support for said element, means for moving said pivotal support to adjust the thermostatic element including a lever pivoted flat upon the base, a pair of stops on opposite sides of the lever guided for adjusting movement transversely of the base to determine the upper and lower limits of adjustment by the lever, said stops being in the form of U-shaped members providing slots therein, and fastening screws entered through said slots into the base.

DUNCAN J. STEWART.