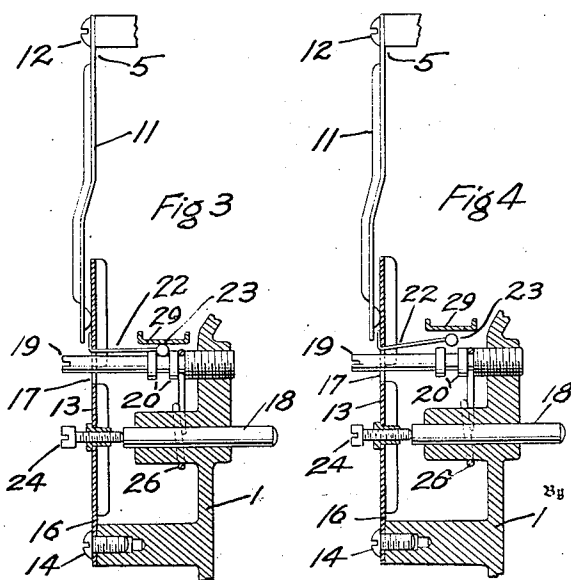
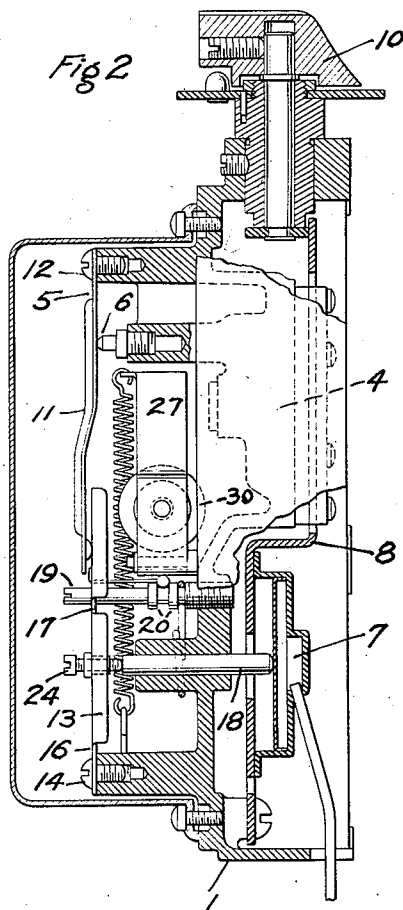
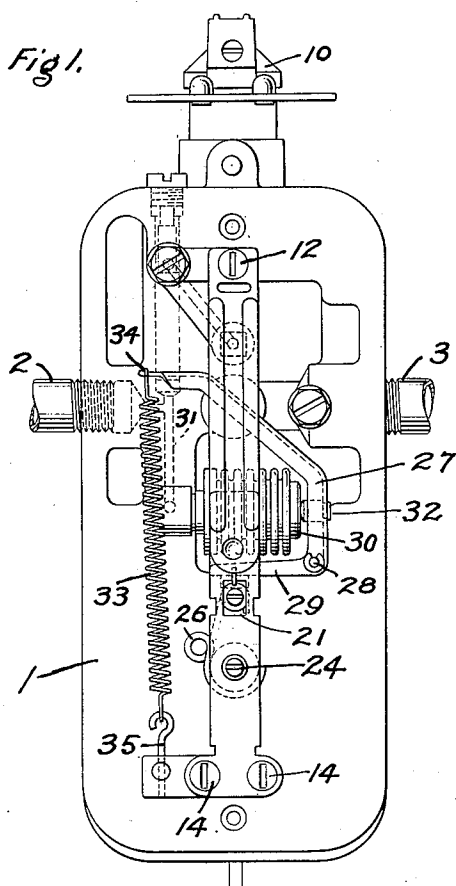


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REVERSIBLE THERMOSTAT

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REVERSIBLE THERMOSTAT

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This invention relates to an improvement in thermostats. Specifically it is concerned with a winter-summer thermostat which may be changed over from one which controls a heating system to one which controls a cooling system without the necessity of any manual adjustment being made at the instrument.

The manner in which the change-over is accomplished is by the use of a novel linkage and supporting means for the linkage which permits a flexible arm to operate selectively as a simple rigid lever or as a flexible compound lever. The instrument can thus be changed from a class 1 to a class 2 instrument. It is also possible by the invention to effect this change simultaneously as to a plurality of the improved thermostats, thus affording a system which is of particular utility in buildings where a plurality of thermostats are used.

The invention is shown in the drawings and described as embodied in a gradual acting thermostat of the type in which the thermostat controls the action of a pneumatic relay. It will be apparent that the novel motion transmitting linkage may be employed in many other types of thermostats such as are well known in the art.

A preferred embodiment of my invention is shown in the accompanying drawing, in which:

Fig. 1 is a front elevation of the thermostat with the cover removed.

Fig. 2 is an axial cross-sectional view of the invention some parts being shown in elevation.

Fig. 3 is a fragmentary cross-sectional view of the motion transmitting linkage in condition to act as a class 1 instrument.

Fig. 4 is a similar fragmentary view with parts conditioned to act as a class 2 thermostat.

The thermostat comprises a body 1 having a supply air connection 2 and a branch line 3. Interposed between the supply air connection and the branch line is a pneumatic relay, indicated generally at 4, having the conventional leak port 6. A thermostatic cell 7 is mounted on the plate 8. The plate 8 is flexible and adjustable by means of the adjusting knob and cam assembly indicated generally at 10. A lid or valve 11 having a flexing portion 5 which lightly biases it in a direction to close the leak port is fastened to the body by screw 12 and overlies the leak port 6. The arrangement of parts so far described is conventional, and not here claimed.

A lever 13 of substantially channel form is fastened to the body by screws 14. The flanges of the channel are cut away at 16 and 17 thus ren-

dering the lever flexible at these points. The flexible portion 16 acts as a light spring to urge the lever to swing inward toward push rod 18 hereinafter described. A push rod 18 slidable in a guideway formed in the body 1 is interposed between the lever 13 and the moving wall of the thermostatic cell 7, and is adapted to deflect the lever 13 laterally in response to changes of temperature. A post 19 is threaded into the body 1, and carries annular shoulders 20. The lever 13 has near the point 17 a rectangular opening 21 through which the post 19 passes.

Attached to the lever at the upper edge of the opening 21 is a spring wire 22 which carries a lock pin 23. The lever 13 is laterally adjustable relatively to the end of the rod 18 by means of the adjusting screw 24. A spring 26 attached to the post 19 and a projection on the body 1 biases the post downward so that it will have no play and will be frictionally retained in its adjusted position. A curved arm 27 is hingedly mounted on the body 1 by means of a pin 28. The arm 27 has a foot portion 29. A flexible bellows 30 is attached to the body and is subject to pressures existing in the supply air connection through the passage 31 (Fig. 1). The bellows 30 engages a thrust screw 32 on the arm 27. A spring 33 is attached to the arm at 34 and to the body at 35 and urges the arm against the bellows 30.

The operation of the thermostat will be best understood by reference to Figs. 3 and 4. All statements of direction in this description refer to the thermostat as seen in these figures.

In the direct acting (class 1) position, the locking pin 23 is held between the annular shoulders 20 by the foot 29 of the curved arm 27. The outer shoulder acts as a catch and wire 22 then acts as a secondary fulcrum about which the outer end of lever 13 swings. An increase of temperature will cause the flexible diaphragm of the cell 7 to flex to the left urging the rod 18 to the left. This will cause the lever 13 to flex between its two points of constraint (14 and 22). Since the lever is cut away at 17 most of this flexure will be concentrated in this region. The outer end of lever 13 (from 17 to the free end) will remain substantially straight. Thus it will be seen that the free end of the lever will move to the right, as viewed in Fig. 3, permitting the lid 11 to move to the right and throttle the flow of air from the leak port 6.

The lock pin 23 is held between the shoulders 20 by the action of the spring 33. If the supply air pressure is increased the force exerted by the bellows 30 will overpower the spring 33 and

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the foot 29 will be raised, freeing the locking pin 23 from the catch flange 20. When the pin is freed, the parts are in the position shown in Fig. 4, lever 13 will function as a rigid arm, and the instrument will operate as a class 2 instrument. An increase of temperature causes the rod 18 to move to the left as before, but since the lever 13 is no longer constrained at 22, there is no reversal of action by its flexure. In this case substantially the only flexure takes place at 16, the flexible mounts of lid 11 being such as to exert only a light load on the free end of the lever 13. The lid 11 being thus moved to the left away from leak port will result in an increased flow through the leak port.

From the above it may be seen that the instrument can easily be changed from one class of thermostat to the other. Since the invention is shown as embodied in a pneumatic thermostat, it is expedient to use a change in the supply air pressure to accomplish the change-over. This could be accomplished, however, by any suitable motor which would move the locking pin 23 to and from its position between the annular shoulders 20.

It will be noted that the position of flanges 20 may be adjusted by turning the post 19. This adjustment will affect only the class 1 setting of the instrument. It is possible, therefore, to set the instrument so that the controlled temperature may differ between the winter and summer settings.

I claim:

1. The combination of a sensing element which moves in response to variations of a physical quantity; a movable controlling element; means for biasing said controlling element in one direction; a fulcrum; a lever mounted on said fulcrum and engaging said controlling element, said lever having between the fulcrum and its point of engagement with the controlling element an elastic flexible portion whose rigidity is such that the lever can move the controlling element against its bias without substantial flexure of the lever; connecting means through which the sensing element reacts upon that part of the lever which is between the fulcrum and said flexible portion; and a secondary fulcrum capable of being rendered alternatively effective

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and ineffective to restrain the lever at a point between the flexible portion and its point of engagement with the controlling element.

2. The combination defined in claim 1 in which the secondary fulcrum comprises a latch keeper and coacting latch one mounted on the lever and the other on a fixed support and one laterally displaceable relatively to the other to cause them to engage or disengage, and means for effecting said lateral displacement.

3. The combination defined in claim 1 in which the secondary fulcrum comprises a restraining member capable of lateral flexure, attached to the lever at one end and having a latch nose at the other end, a latch keeper mounted on a fixed support, means for adjusting said keeper in the direction of motion of said lever, and means for flexing said member to alternative positions in which, respectively, it will and will not engage said keeper.

4. The combination of a support; a lever adapted to be deflected laterally; a fulcrum carried by said support and attached to one end of said lever; a shiftable member carried by said lever adapted selectively to be freed from said support or to engage it and act as a second fulcrum for said lever, said lever having a flexible zone intermediate said fulcrum; means responsive to an atmospheric condition guided to react laterally on said lever at a point intermediate said fulcrum; a controlling member adapted to be positioned by lateral movement of the free end of said lever; and motor means to shift said shiftable member.

5. The combination defined in claim 4 said lever having a second flexible zone intermediate said fulcrum and said shiftable member; one of said zones being adjacent said first mentioned fulcrum and the other being adjacent said shiftable member.

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