

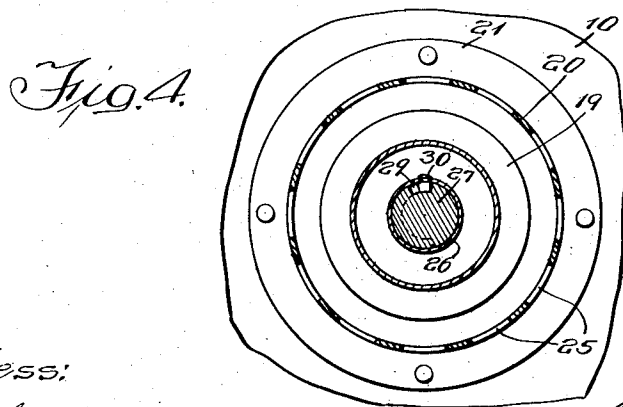
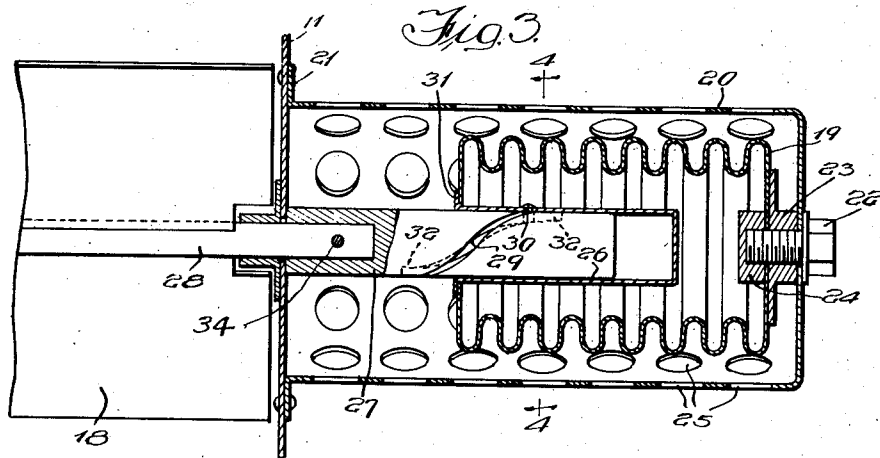
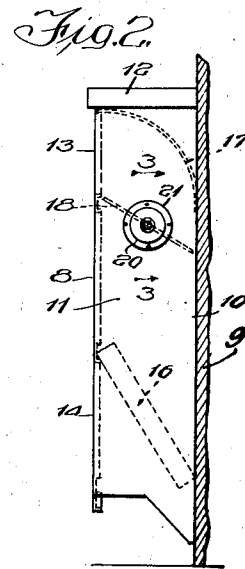
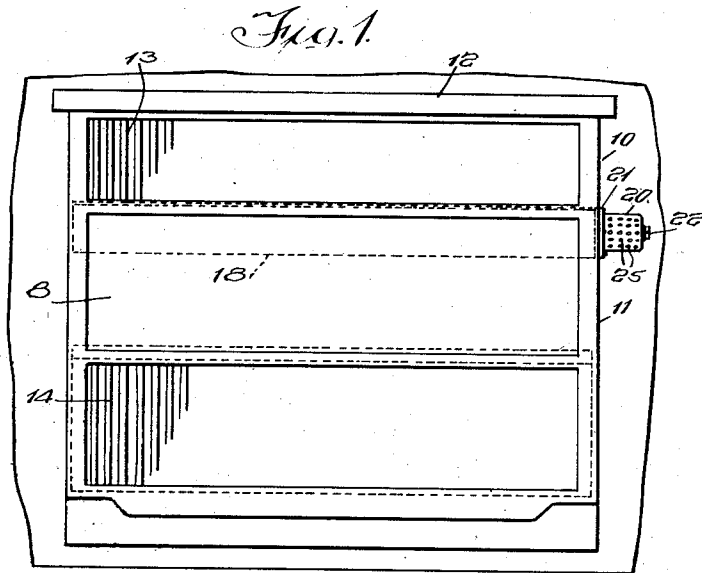
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A. B. MODINE

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THERMOSTATIC APPLIANCE

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THERMOSTATIC APPLIANCE

Application filed November 30, 1928. Serial No. 322,622.

My invention relates to thermostatic appliances and more particularly it relates to improved thermostatic means for automatically actuating or controlling the movement of dampers and similar devices which control or regulate temperatures in spaces which are artificially heated or cooled. I have shown my invention in connection with a damper operable to regulate the passage of air through a housing in which a radiator unit is positioned. It is equally as well adapted to actuate a damper or other similar devices which control the admission of air to a combustion chamber or the admission of artificially cooled air to a room, or to control the admission of refrigerating fluids into an artificially cooled space.

One of the objects of my invention is the provision of improved thermostatically controlled means for automatically controlling radiation or refrigeration in accordance with the temperature of the space to be artificially heated or cooled.

Another object of the invention is the provision of improved means operable to automatically control radiation or refrigeration through a range of temperature, the upper and lower limits of which have been predetermined.

Still another object of the invention is the provision of means which is automatically operable to control radiation or refrigeration for a range of temperature between predetermined limits and which is inactive for temperatures outside of said range.

A still further object of my invention is the provision of improved means for regulating a damper which is operatively connected with and in control of the admission of air to a radiator unit, whereby when the temperature of the room falls, the damper automatically opens in accordance with the drop in temperature and when the temperature rises, the damper will automatically close or move in the direction of its closed position.

Another object of the invention is the provision of a device that is simple, compact, convenient and satisfactory for its intended purpose.

Many other objects and advantages of the

construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a front elevational view of a heating appliance on which the device of my invention is mounted;

Fig. 2 is an end elevational view of the same;

Fig. 3 is a view along the line 3—3 of Fig. 2 drawn to a larger scale; and

Fig. 4 is a view along the line 4—4 of Fig. 3.

Referring now to the drawings, the numeral 10 generally designates a heating device which is adapted to be positioned in a wall of a room or to be attached to the wall in any desired manner as shown. In the construction shown, the rear wall 9 is the wall of a room in which the housing is located. Side walls 11, a top wall 12 and a front wall 13 complete the housing or enclosure in which a radiator unit 16 is positioned. The front wall 15 includes an upper grille 13 and a lower grille 14 separated by a plate 8.

The radiator unit 16 is positioned in the lower portion of the housing adjacent the grille 14. I preferably place the radiator unit 16 in inclined position as shown but it may be positioned either vertically or horizontally or at any other angle that may be desirable. A deflecting plate 17 is positioned in the upper portion of the housing to direct heated air currents, coming from the radiator unit 16, out through the grille 13 in a generally horizontal direction. The radiator unit 16 may be supplied with any heating fluid such as steam, hot water, or the like, but since this forms no part of the invention, no disclosure is made of any discharge or return pipes, the radiator unit being merely shown diagrammatically.

A damper 18 is mounted in the housing be-

tween the radiator unit 16 and the deflecting plate 17. The damper 18 is shown as pivotally mounted slightly below the lower edge of the grille 13 in such position that when the damper 18 is horizontal, rising air currents from the radiator unit 16 are not permitted to pass out through the grille 13 and the radiating effect of the unit 16 is substantially checked.

Provision is made for automatic opening and closing of the damper 18 with the variations of the temperature in the room in which the radiator unit is located. For this purpose, I have provided a thermostatic control which is connected with the damper 18 to rotate the same to horizontal position at a predetermined relatively high temperature and to a vertical position at a predetermined relatively low temperature. The thermostatic control takes the form of a thermostatic sylphon bellows 19 suitably mounted in a perforated cylindrical case 20. The bellows 19 and the case 20 are mounted on the outside of the housing 10 and in axial alignment with the damper 18. The cylindrical case 20 is shown as fastened to one of the side walls 11 of the housing by rivets 21 or any other suitable means. One end of the bellows 19 is fastened to the casing 20 by means of a bolt 22. The central end portion of the bellows 19 is provided with a shouldered washer 23 on its exterior and an inner centrally threaded cup member 24 into which the bolt 22 extends. The shouldered washer 23 and the cup member 24 cooperate with the bolt 22 to hold the end of the bellows 19 in fixed relation to the casing 20 and permits the expansion and contraction of the bellows in accordance with the temperature of the air in the casing. The casing 20 is provided with a plurality of perforations 25 for the purpose of free circulation of air through the casing whereby the temperature of the interior of the casing is maintained at substantially the temperature of the room.

A hollow cylindrical member 26 is mounted interiorly of the bellows 19. The inner end of the member 26 is closed and the outer end is open. The open outer end of the member 26 is provided with a flange 31 which is positioned to the free end of the bellows 19 by welding or any other suitable means. The member 26 thereby moves with the free end of the bellows 19 as it expands and contracts. A rod 27 is mounted in the member 26 as shown in Fig. 3. The damper 18 is fixedly mounted upon and rotatable with a shaft 28 which projects into the casing 20. The rod 27 is suitably cored to receive the projecting end of the shaft 28. The rod 27 and the shaft 28 are fastened together by a pin 34 so that rotation of the rod 27 rotates the damper 18. The damper 18, the casing 20, the bellows 19 and the rod 27 are preferably in longitudinal axial alignment.

As the bellows 19 expands with a rise in temperature it is desirable that the damper 18 rotate towards its horizontal closed position and as the bellows contracts with a drop in temperature, the damper should rotate towards its vertical open position. For this purpose, I have provided a spiral groove 29 on the external periphery of the rod 27. A pin 30, which is suitably mounted in the cylindrical member 26, travels in this groove as the member 26 moves longitudinally with the expansion and the contraction of the bellows 19 in accordance with variations in temperature. The spiral groove 29 may only partially encircle the rod 27 in which event, the rotation of the damper 18 will be correspondingly limited. I have shown the groove 29 as extending spirally through a semi-circumference of the rod 27 and as terminating at either end in a longitudinally extending groove 32. The pin 30 and the grooves 29 and 32 with which it engages provide one form of a mounting generally known as a bayonet mounting.

In the position of the thermostatic bellows 19 as indicated in Fig. 3, the damper is standing in vertical or open position. Upon the temperature of the room increasing, the thermostatic bellows will expand and the pin 30 will be moved in the spiral groove 29 to rotate the damper 18 towards its closed position. In the event of the occurrence of an extremely high temperature, the pin 30 will operate to turn the core through 180° from the position shown to the closed position of the damper 18 and any further increase of temperature will merely move the pin 30 in the longitudinally extending groove 32 without in any way effecting the position of the rod 27. A drop of temperature causes the opposite movement of the device whereby the damper is moved towards its open position and should the temperature fall below the temperature corresponding to the position of the bellows 19 as shown in Fig. 3, the bellows will contract and the pin 30 will move along the adjacent longitudinal groove 32 without in any way further affecting the position of the rod or of the damper 18. Thus, it will be seen that I have provided a thermostatic control device which is operable between a predetermined range of temperature to rotate a damper from opened to closed position and vice versa and for any temperatures beyond or outside of the range which is limited by such predetermined points, the bellows will be permitted to contract or expand without in any way changing the position of the damper.

While I have shown my device as connected with a damper controlling the passage of air over an enclosed radiator unit, it is obvious that it is also adapted for thermostatic control of dampers or similar devices which control the passage of fluids in any

artificial heating or refrigerating apparatus wherein the control of the flow of such fluids in accordance with changing temperature conditions is desirable.

5 Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

15 1. In a device of the kind described for moving a damper, the combination of, a thermostat and an element having spiral means which cooperates with the thermostat to move the damper towards its closed position as the temperature rises and towards its open position as the temperature falls, and means for holding said damper stationary for all movements of the thermostat occasioned by changes in temperature outside of said predetermined limits.

25 2. In a device of the kind described, the combination of means for rotating a damper, said means including a thermostatic bellows having one end fixed and the other end free to move axially of the damper in accordance with changes in temperature, and means connecting the bellows and damper, said means being rotatable upon expansion of the bellows to rotate the damper in one direction and upon contraction of the bellows to rotate the damper in the opposite direction.

30 3. In a device of the kind described, a thermostatic bellows having one end fixed and the other end free to move axially of a damper in accordance with changes in temperature, and means associated with the damper operable upon expansion of the bellows to rotate said means and the damper in one direction and upon contraction of the bellows to rotate the damper in the opposite direction through a range of temperature between predetermined limits, said means being inoperable to rotate the damper for temperature changes outside of said limits.

35 4. In a device for moving a damper mounted for rotation, the combination of a thermostatic bellows, in longitudinal alignment with the axis of rotation of the damper and movable along the axial line of the damper in accordance with changes in temperature, said device including a shaft projecting into the bellows and a bayonet mounting connecting said shaft and bellows whereby longitudinal movement of the bellows imparts rotation to the damper for all changes of temperature between predetermined limits.

40 5. In a device for moving a rotatably mounted damper, a thermostatic bellows in longitudinal alignment with the axis of rotation of the damper and movable along the

axial line of the damper in accordance with changes in temperature, said device including a shaft projecting into the bellows and a connection between said shaft and bellows whereby longitudinal movement of the bellows imparts rotation to the shaft between predetermined limits of temperature, said connection being ineffective to rotate the damper for all changes in temperature outside of said limits.

6. In a device of the kind described, the combination of a thermostatic bellows, a member along which the bellows is movable, said member providing means connecting said bellows with the shaft of a damper and having means whereby movement of the bellows axially of said means imparts rotative movement to said member.

7. In a device of the kind described, the combination of a thermostatic bellows, a damper shaft along the axis of which said bellows is movable, and means arranged circumferentially of the axis of the shaft providing means to rotate said shaft upon movement of said bellows along the axis of the shaft.

8. In a device of the kind described, the combination of a member providing a support, a thermostatic bellows connected at one end to said support, the opposite end of said bellows being movable relatively to the support, an element providing means for connecting the bellows with a rotatable damper, said element and bellows having means which cooperate with each other to impart rotative movement to said damper upon longitudinal movement of said bellows.

9. In a device of the kind described, the combination of a member providing a support, a thermostatic bellows connected to the support for movement relatively to the support, an element providing means for connecting the bellows with a damper, said bellows having means in which said element is mounted, said element and bellows having means which cooperate with each other to rotate said element upon expansion and contraction of said bellows.

In testimony whereof, I have hereunto signed my name.

ARTHUR B. MODINE.