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TEMPERATURE CONTROL APPARATUS

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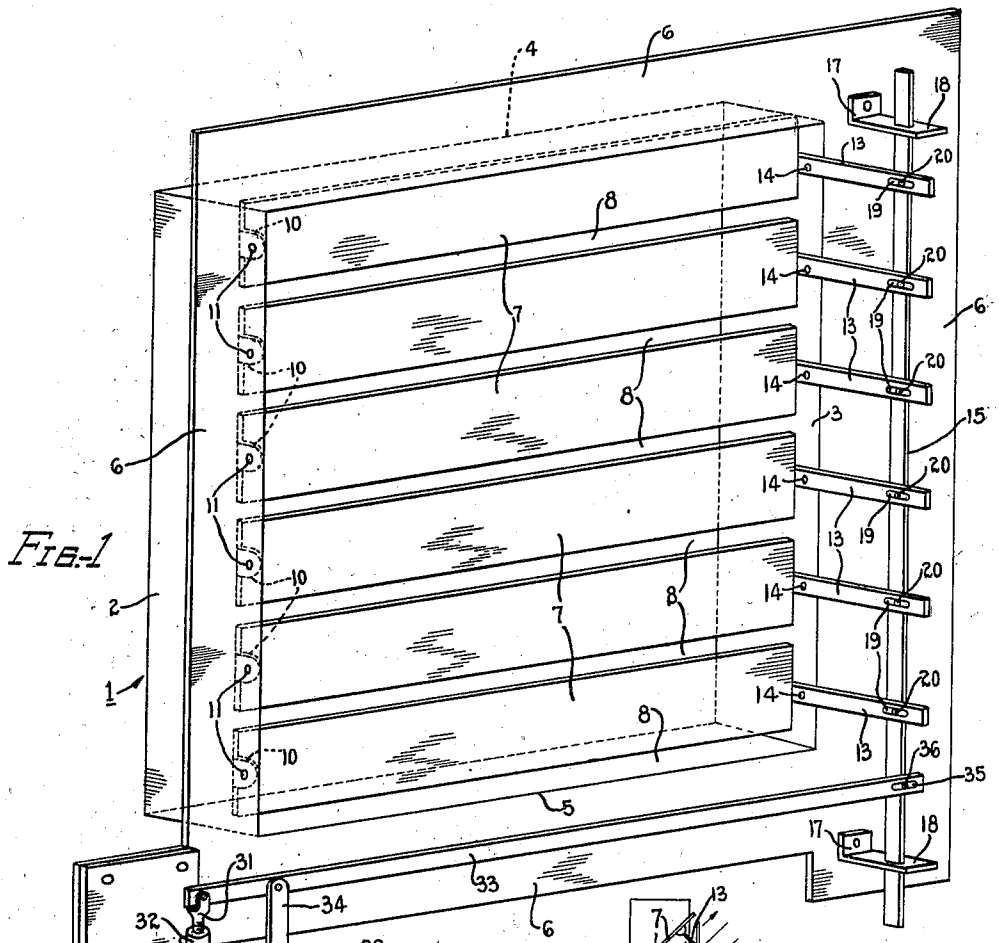


FIG-1

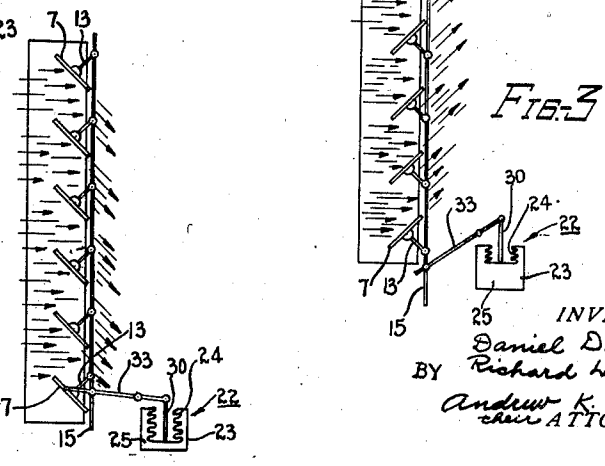


FIG-3

FIG-2

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TEMPERATURE CONTROL APPARATUS

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6 Claims. (Cl. 236—1)

Our invention relates generally to control apparatuses; and more particularly to apparatuses for controlling the temperature of a room or other enclosed space to be air conditioned.

One of the objects of our invention is to provide a control apparatus for controlling the temperature of a room or other enclosed space both in winter and in summer.

Another object of our invention is to provide a single thermostatic power element for actuating a damper means to automatically control the temperature of a room or other enclosed space both in winter and in summer.

Another object of our invention is to provide a temperature control apparatus that will automatically change from a summer to a winter control, and vice versa, upon predetermined change in temperature of the region to be air conditioned.

Another object of our invention is to provide an apparatus of the above mentioned character which will automatically operate in response to temperature to direct the warm air downward and the cool air upward in the region to be air conditioned.

Another object of our invention is to provide a control apparatus of the above mentioned character and one that is efficient in operation and inexpensive to manufacture.

The invention consists in the improved construction and combination of parts, to be more fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawing, to be taken as a part of this specification, we have fully and clearly illustrated our invention, in which drawing—

Figure 1 is a view shown in perspective of our control apparatus;

Fig. 2 is a diagrammatic view of our apparatus showing the parts thereof in the positions they will assume during the heating season, and

Fig. 3 is a similar diagrammatic view of our apparatus showing the parts thereof in the positions they will assume during the cooling season.

Referring to the drawing by characters of reference, our apparatus preferably includes a supporting member in the form of a frame or housing 1 having side walls 2, 3, a top wall 4 and a bottom wall 5, these walls cooperating to provide a passage for air. The housing 1 may be positioned in an opening in a wall (not shown) of a room, or other enclosed space to be air conditioned, and may be connected to the outlet of an air supply duct (not shown). In the present instance the housing 1 is formed having an outturned or lateral flange 6 that extends along the sides, top and bottom edges of the housing at the outlet thereof.

A plurality of pivotal louvers or dampers 7 control the volume of air flowing into the region to be air conditioned, and these dampers 7 are preferably positioned within the housing 1 adjacent the outlet thereof. The dampers 7 may be rectangular-shaped, plate-like members, as shown, and preferably the dampers extend lengthwise across the width of the housing 1 having their opposite ends disposed adjacent the opposite side walls 2 and 3. The dampers 7 are preferably positioned one above the other in vertical alignment, and these dampers are preferably simultaneously movable and have a neutral position, as shown in Fig. 1, in which position the dampers are all disposed in the same vertical plane. The dampers 7 are preferably arranged such that when they are in the neutral position there are spaces 8 between the opposed longitudinal edges of the dampers to permit a minimum of air flow into the region to be air conditioned.

At their ends, adjacent the housing side wall 2, each of the dampers 7 may be provided with an integral ear or flange 10 that preferably extends forwardly from and substantially transverse to the face of its damper, and these ears 10 may be apertured to pivotally receive pivot pins 11 that may be secured in and to the housing end wall 2. At their other ends each of the dampers 7 preferably is provided with an integral arm 13 that may extend substantially parallel with the ears 10, and these arms may be apertured to pivotally receive pivot pins 14 that may be secured in and to the housing side wall 3. The arms 13 project forwardly of the face of flange 6 and pivotally connect to a common connecting member 15 that is vertically reciprocal to pivot the dampers 7 simultaneously. A pair of vertically spaced guide members 17 are preferably provided for guiding the reciprocal connecting member 15 and these guide members may be in the form of L-shaped plate members. The L-shaped guide members 17 each have a substantially horizontally and forwardly extending plate portion 18, and these plate portions 18 may be provided with aligning apertures for slidably receiving and guiding the vertically reciprocal connecting member 15. Each of the damper arms 13 may be provided adjacent its outer end with a slot 19 extending longitudinally of the arm, and rigidly secured to the connecting member 15 there may be provided a plurality of vertically spaced, laterally projecting

pins 20 for engaging one in each of the slots 19 to connect the pivotal dampers 7 to the reciprocal connecting member 15.

Mounted on the housing flange 6, preferably at the bottom of the housing 1 adjacent side wall 2, there is a thermostatic power element 22 for actuating the dampers 7. The power element 22 comprises, in general, a container 23 and a bellows member 24 cooperating with the container to provide an expansible chamber 25 for containing a temperature responsive, expansible-contractible fluid such as methyl chloride. The thermostatic power element 22 is to be arranged to respond to the temperature of a room or other enclosed space to be air conditioned and may be mounted on the housing flange 6 by an L-shaped bracket 27. The bracket 27 has a forwardly extending, substantially horizontally disposed plate portion or leg 28, to the underside of which the power element 22 may be rigidly secured. The movable wall of the bellows 24 carries a thrust member or connecting rod 30 that extends upwardly through an aperture in the bracket horizontal portion 28 and is adjustably connected to a yoke 31 by means of a nut or turn-buckle 32. The yoke 31 is pivotally connected to one end of a lever 33, the other end of which is pivotally connected to the reciprocal connecting member 15. The lever 33 preferably extends substantially horizontally across the housing 1, below the outlet thereof, and may be pivotally supported on an upstanding plate portion 34 that may be formed out of the horizontal leg 28 of the L-shaped bracket 27. The lever 33 may be pivotally connected to the reciprocal member 15 by providing the lever with a longitudinally extending slot 35 for receiving a pin 36 carried by the member 15.

The operation of our control apparatus is as follows: By means of the manually operable turn-buckle 32 the temperature to be maintained in the room, or other space to be air conditioned, can be established. When the desired or established temperature, say 72° F., in the room to be air conditioned has been reached, the dampers 7 will be in their neutral position, as shown in Fig. 1, permitting minimum volume of air to discharge into the room through the spaces 8. During the heating season when the temperature of the room decreases to a temperature below 72° F., the fluid of the power element 22 will correspondingly contract and the dampers 7 will be pivoted from neutral position in a counterclockwise direction, as seen in Fig. 2, to increase the volume of heated air discharging into the room to balance the decrease in temperature. When the dampers 7 are pivoted in a counterclockwise direction they are disposed to direct the heated air downward in the room which, as is well known, is desired in view of the tendency of relatively warm air to rise. When the temperature of the room again reaches 72° F. the dampers 7 will be pivoted to their neutral position by the power element 22. During the cooling season, or in the summer, when it is desired to supply cool air to the room to maintain a comfortable temperature in the room, the expansible-contractible fluid will expand when the temperature of the room air rises above 72° F. and the dampers 7 will be pivoted in a clockwise direction, as seen in Fig. 3, to increase the volume of cool air discharging into the room to balance the increase in room temperature. When the dampers 7 are pivoted in a clockwise direction to increase the volume of cool air entering the room, the dampers are positioned to direct the cool air in an upward direction in the room which, as is well known, is desirable since the relatively cool and heavy air will descend. The dampers 7 thus control the volume and direction of discharge of the air both in cooling and in heating of a room or other enclosed space to be air conditioned.

What we claim and desire to secure by Letters Patent of the United States is:

1. An apparatus for controlling the temperature of a region into which warm air is discharged in winter and into which cool air is discharged in summer comprising a damper member for controlling the entrance of both the warm air and the cool air into said region, and movable in opposite directions from a closed position and a thermostatic power element responsive to the temperature of the region for actuating said damper member to vary the volume of air discharging into the region so as to maintain the region at a predetermined substantially constant temperature in winter and at a second predetermined substantially constant temperature in summer.

2. An apparatus for controlling the temperature of a region into which warm air is discharged in winter and into which cool air is discharged in summer comprising a damper member for controlling the entrance and direction of discharge of both the warm and the cool air into said region and movable in opposite directions from a closed position, and a thermostatic power element responsive to the temperature of the region for actuating said damper member in accordance with changes in temperature in the region so as to maintain the region at a predetermined substantially constant temperature in winter and at a second predetermined substantially constant temperature in summer, said power element moving said damper member to deflect the air in one direction in summer and moving the damper member to deflect the air in another direction in winter.

3. An apparatus for controlling the temperature of a region into which warm air is discharged in winter and into which cool air is discharged in summer comprising a pivoted damper member for controlling the entrance of both the cool and warm air into the region and movable in opposite directions from a closed position, said damper member being movable in one direction to direct the cool air upward during the summer and being movable in the opposite direction to direct the warm air downward during the winter, and a thermostatic power element responsive to the temperature of the region for actuating said damper member both in winter and in summer to vary the volume of air entering the region in accordance with the temperature of the region.

4. An apparatus for controlling the temperature of a region into which warm air is discharged in winter and into which cool air is discharged in summer comprising a pivoted damper for controlling the entrance of both the warm and the cool air into the region, said damper having a neutral position and being movable from said neutral position in one direction to increase the volume of warm air flowing into the region and direct the warm air downwardly, said damper being movable from neutral position in the opposite direction to increase the volume of cool air entering the region in summer and directing the cool air upwardly, and a thermostatic power element responsive to the temperature of the region for moving said damper toward and away from

said neutral position to maintain a predetermined substantially constant temperature of the air in the region during summer and a second predetermined substantially constant temperature of the air in the region during winter.

5. An apparatus for controlling the temperature of a region into which warm air is discharged in winter and into which cool air is discharged in summer comprising, a plurality of damper members for controlling the entrance of both the cool air and the warm air into the region and for directing the cool air upward and the warm air downward, said damper members being simultaneously movable and having a neutral position with the damper members being relatively spaced in neutral position so that some air can pass therebetween into the region, said damper members being movable in one direction from neutral position to increase the volume of cool air entering the region and for directing the cool air upward and being movable in the opposite direction from neutral position to increase the volume of warm air entering the region and for directing the warm air downward, and a thermostatic power element responsive to the temperature of the air of said region to move said damper members in said one direction during the cooling season and for moving said damper members in said opposite direction during the heating season, said thermostatic element moving said damper members toward and away from said neutral position in accordance with temperature changes in the region so as to maintain a substantially constant temperature therein.

6. An apparatus for controlling the temperature of a region into which cool air is discharged in summer and into which warm air is discharged in winter comprising, a frame defining a discharge opening for the discharge of both the cool and the warm air into the region, a plurality of damper members arranged to control the volume of air discharged from said opening, said damper members being simultaneously movable and having a neutral position substantially closing said opening, said damper members being movable from neutral position in one direction to increase the volume of cool air entering the region and for directing the air upward, said damper members being movable from neutral position in the opposite direction to increase the volume of warm air entering the region and for directing the air downward, a thermostatic power element responsive to the temperature of the air of the region for actuating said damper members both in summer and in winter, and means connecting said power element and said damper members.

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