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2,292,082

TEMPERATURE CONTROL

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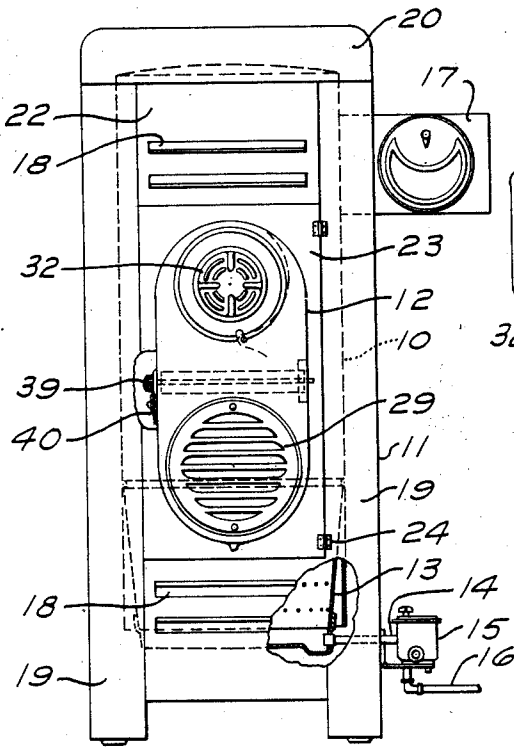


FIG. 1

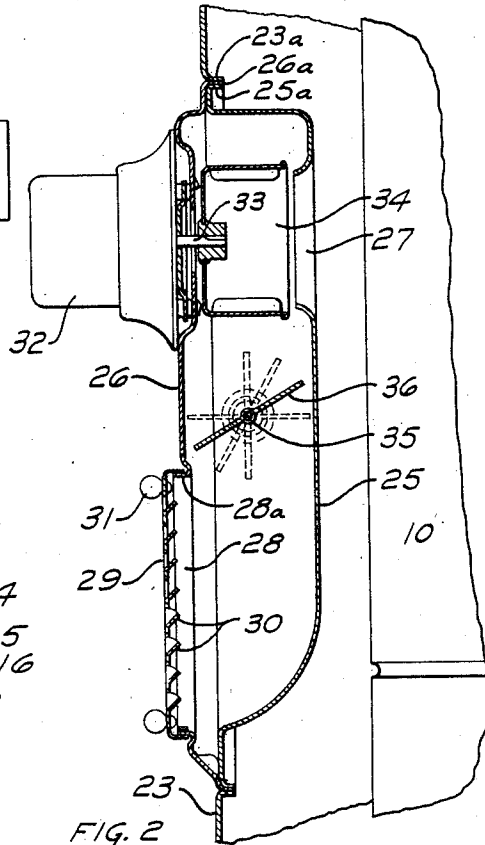


FIG. 2

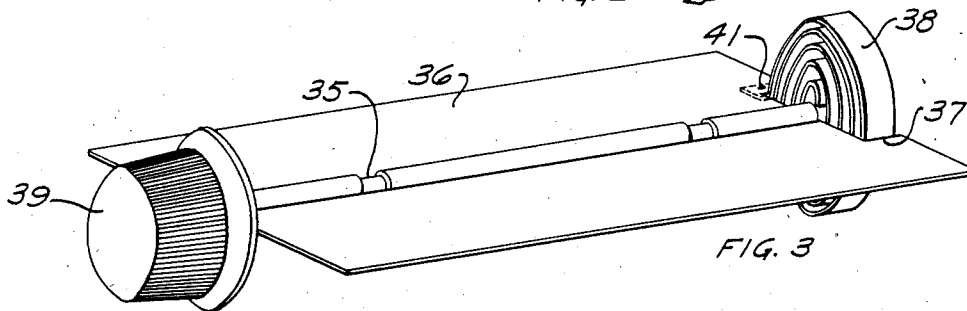


FIG. 3

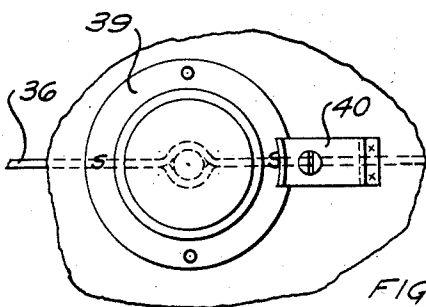


FIG. 4

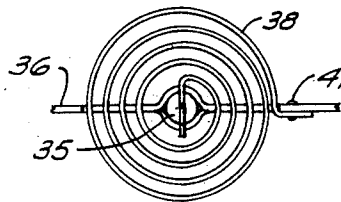


FIG. 5

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TEMPERATURE CONTROL

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1 Claim. (Cl. 236—10)

This invention relates to a novel damper for use with combustion apparatus, and to the combination of such a damper with a heater having an air tube and fan for the discharge of heated air from the heater.

Ordinary circulating type space heaters usually have not been equipped with fans for aiding the circulation of heat. There is a growing tendency toward providing fans for such heaters as their use permits the more even distribution of heat throughout the room to be heated. The air that is blown out of the heater by the fan may be cold when the heater is first put into operation. Moving cold air is decidedly uncomfortable if it strikes a person in the room to be heated.

It is the primary object of this invention to provide a novel thermostatically controlled damper for automatically maintaining the air expelled from the heater by the fan between substantially constant predetermined temperature limits, within the range of human comfort.

Another object of the invention is to provide an automatic control of the type mentioned which can be regulated manually so as not to interfere with the circulation of cool air by the fan when desired.

Still another object of the invention is to provide a thermostatically operated damper of simple construction which is economically fabricated and assembled.

A still further object is the provision of a forced air circulating unit for a heater in which a thermostatically controlled damper is incorporated.

These objects will more fully appear in the following specification when read in connection with the accompanying drawing, wherein:

Figure 1 is a side elevational view of a circulating heater embodying the invention, parts being broken away to show the interior of the heater;

Figure 2 is a fragmentary cross-sectional view taken on substantially the line 2—2 of Figure 1;

Figure 3 is a perspective view of the air control itself;

Figure 4 is a fragmentary end elevational view of the air tube showing the control knob and its retainer; and

Figure 5 is an end elevational view of the thermostatic element for operating the air control.

Referring now more particularly to the drawing, the invention is shown as embodied in a room heater of the circulating type. In general the heater comprises a heat exchanger 10, and

an outer casing 11 surrounding the heat exchanger in spaced relation to the walls thereof, the casing having in a side panel thereof an air tube 12 in which is incorporated the air control.

The heat exchanger 10 consists of a cylindrical steel shell having a burner 13 of the vaporizing pot type positioned in its lower end. Connected to the burner by means of a short pipe 14 is a fuel metering device 15. The latter is connected by means of a pipe 16 to a suitable source of fuel supply. Adjacent the upper end of the heat exchanger is a flue outlet 17.

The outer casing 11 consists of four corner posts 19, a top wall 20 at their upper ends, and panels 22 intermediate the corner posts. The panels 22 terminate a short distance above the lower ends of the corner posts. Thus, the lower end of the casing 11 is open to admit cool air from the floor to the burner 13 and to the space between the heat exchanger 10 and the outer casing 11. The panels 22 are provided with louvres 18 through which air may circulate.

One of the side panels 22 includes as a part thereof a hinged door 23. The hinged door 23 has an oval opening therein defined by a flange 23a into which is secured the air tube 12. The air tube 12 is made up of two sheet metal stampings 25 and 26. The inner stamping 25 is relatively deeply dish-shaped and has a peripheral flange 25a. The outer stamping 26 has a peripheral flange 26a. The two flanges 25a and 26a are nested together and fitted against the flange 23a. See Figure 2. All three flanges are welded or otherwise secured together.

The air tube is provided with an inlet opening 27 and an outlet opening 28. The former is near the upper end of the inner stamping 25. The opening 28 is near the lower end of the outer stamping 26 and is defined by a flange 28a. A grille 29 having a plurality of louvres 30 is rotatably mounted on the flange 28a. The grille is provided with knobs 31 by which it can be rotated.

Mounted on the stamping 26 at its upper end is an electric motor 32. The shaft 33 of the motor extends through the stamping 26 into the interior of the air tube 12 and carries a centrifugal fan 34. The centrifugal fan 34 is located with its inlet adjacent the inlet opening 27 in the air tube 12.

Extending transversely of the air tube is a shaft 35. The shaft is rotatably mounted in bearings in the opposite sides of the inner stamping 25. A damper 36 is rotatably mounted upon the shaft 35. The damper is of substantially the

same shape and area as the horizontal cross-section of the air tube 12. One end of the damper is provided with a rectangular notch 37. Into this notch 37 a spiral thermostatic element 38 is placed, as best shown in Figure 3. One end of the thermostatic element 38 is attached to the damper 36 by a rivet 41. The other end of the thermostatic element extends through a slot in the adjacent end of the shaft 35 and is thereby held against rotation relative thereto.

An adjusting knob 39 is securely attached to the end of the shaft 35 opposite the thermostatic element 38. The knob 39 is located outside of the air tube 12 and between the panel 22 and the heat exchanger 10. A resilient latch 40 is attached to the exterior of the adjacent side wall of the air tube. This latch 40 frictionally engages the knob 39 and holds it in any position in which the knob is set. Preferably the knob is provided with indicia such as the letters S and O (see Figure 4) which cooperate with the latch 40 functioning as a pointer, to indicate the setting of the damper 36.

Under normal operating conditions in cold weather when the circulating heater is employed to furnish heat to the room, the knob is adjusted so that either letter S is adjacent the latch 40. When so adjusted the damper will be shut if the burner is cold. Thus, when the burner is first ignited, or is operating at its lowest stage of operation, the fan 34 may be switched on and no air will be discharged from the air tube. Any heat generated by the burner will rise directly through the casing toward the ceiling of the room.

When the metering device 15 is adjusted so as to increase the flow of fuel to the burner, combustion will proceed at a faster rate and more heat will be generated by the heat exchanger. The increased heat will act upon the thermostatic element 38 causing it to expand and rotate the damper 36 on the shaft 35 toward its open position. The fan 34 will then pick up a certain quantity of air, depending upon how far the damper 36 is open, and force it through the air tube 12 into the room. A still further increase in the fuel supply will produce more heat, thereby opening the damper still further. Eventually the damper will open completely. It will be obvious, therefore, that as the heat exchanger becomes hotter, more air can be passed through the air tube and still maintain a reasonably high temperature therein. By employing a thermostatic element which has the proper operating characteristics, the damper can be made to maintain the air emanating from the air tube at a substantially constant temperature.

During hot weather it is often desirable to operate the fan 34 to circulate air in a room even though the burner is not operating. Operation of the fan under such conditions tends to stir up the air in the room and maintain a cooler and consequently more comfortable temperature. When it is desired to operate the fan as a means for circulating air within the room even though the burner is cold, the shaft 35 may be rotated by means of the knob 39 through an angle of 90 degrees from its shut position. In other words, one of the letters O will be placed adjacent the latch 40. This may be easily accomplished by opening the door 23 to gain access to the knob 39 and thereafter rotating the latter the desired amount. Of course, when the heat exchanger 10 is cold, the temperature of the air passing through the air tube 12 is so low as to have no appreciable effect upon the thermostatic element 38.

From the foregoing it will be evident that this invention provides an automatic control whereby the temperature of air circulated by a fan in a space heater may be maintained substantially constant. It also provides a means for permitting cold air to be circulated by the fan if desired. The scope of the invention is indicated in the appended claim.

A unitary air circulator of a character suitable for use with a source of external heat which comprises an elongated air tube having an inlet opening at one end thereof for admission thereto of heated air and an outlet opening at the other end for the discharge of heated air, a fan disposed within the tube adjacent one of said openings for circulating air through said tube, a motor outside of the tube and connected to the fan for operating the fan, a damper disposed within the tube between said openings, said damper being adjustable to control the volume of air circulated through said tube, said damper comprising a damper blade rotatably mounted on a shaft, thermostatic means connected to said blade and shaft for rotating said blade on said shaft to open or close the damper in response to an increase or decrease respectively in the temperature of the air within the tube, said shaft being rotatably connected to said air tube to permit adjustment of said damper blade within said tube independently of its adjustment by said thermostatic means, said fan, damper and thermostat constituting the only apparatus within the tube.

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