

[54] **COMBINATION HEATING AND HUMIDIFYING SYSTEM**

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[58] Field of Search **236/11, 44 L, 44 A; 126/113; 165/20**

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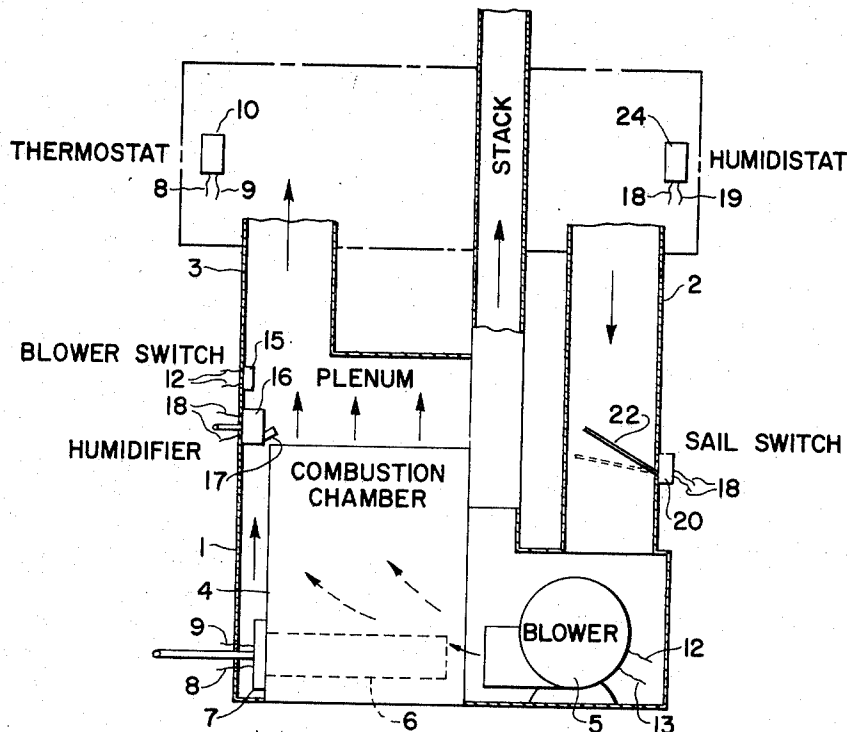
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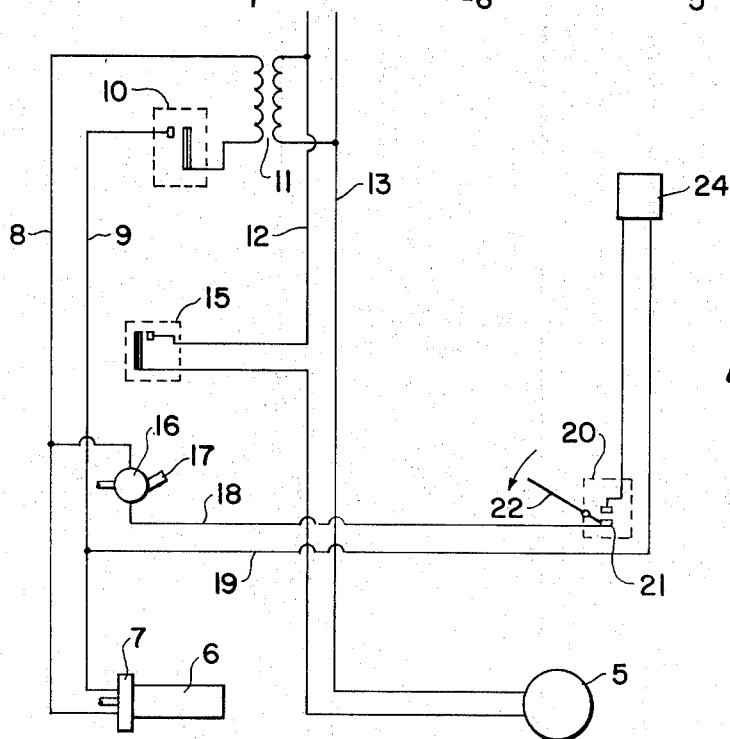
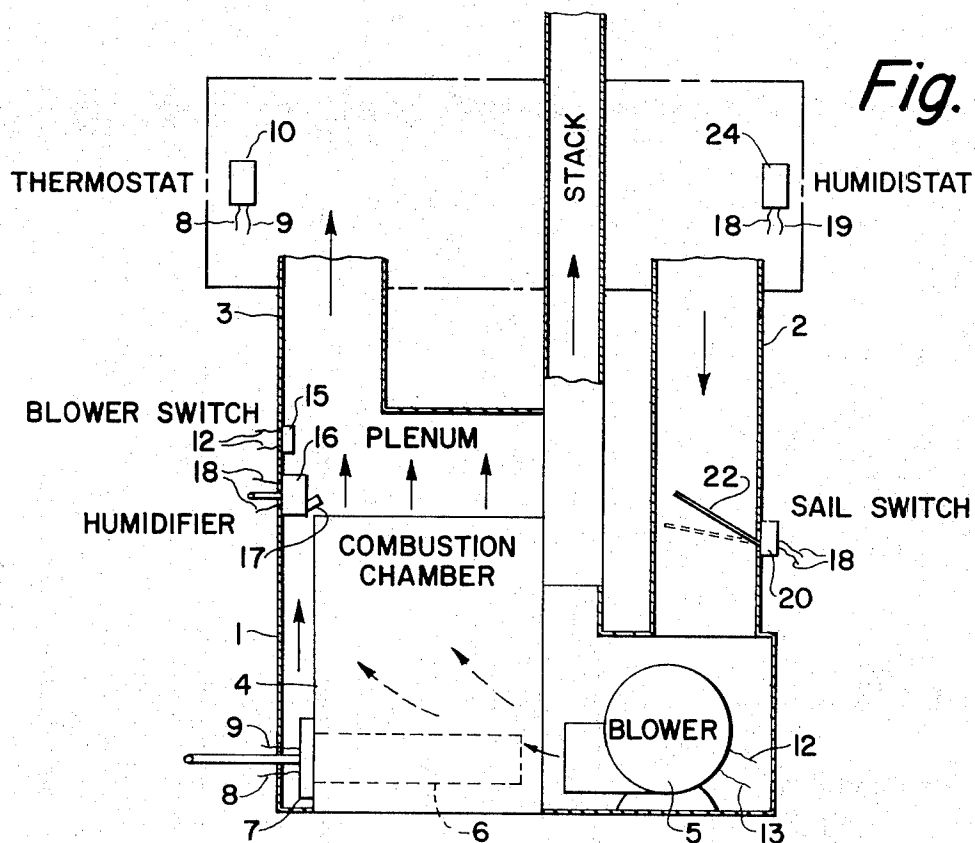
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ABSTRACT

A normally shut off, electrically operated, spray humidifier is provided for humidifying a flow of air produced by a furnace blower controlled by a heat-responsive switch that is independent of the thermostat circuit which controls the furnace burner. The humidifier is connected in the thermostat circuit through a normally open switch that is closed only when a sail, operatively connected with the switch, is moved by the flow of air produced by the blower. Consequently, the humidifier does not start to operate until the flow of air begins, but the humidifier is shut off when the burner is turned off.

1 Claim, 2 Drawing Figures





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COMBINATION HEATING AND HUMIDIFYING SYSTEM

The most efficient way of humidifying the atmosphere in an area heated by a forced warm air furnace is to spray a fine mist of water into the warm air leaving the furnace. The water mist is immediately evaporated by the warm air and does not collect in droplets in the furnace or the ducts, which would cause corrosion. Such collection of water will occur, however, if the spray is turned on before the air from the furnace is warm enough to evaporate the water or if the spray continues after the burner has shut off and the continuing flow of air from the blower cools down to the point where it no longer evaporates the water.

It is among the objects of this invention to provide a heating and humidifying system in which the humidifying water is introduced in the form of a spray, in which the spray is not turned on until the air from the furnace is warm enough to evaporate the water immediately, in which the spray is turned off before the air from the furnace cools enough to stop evaporating the water, and which is simple and does not require electric relays.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a somewhat diagrammatic section through a furnace provided with my humidifying system; and

FIG. 2 is a wiring diagram of the heating and humidifying systems.

Referring to the drawings, a warm air furnace 1 having a cold air inlet duct 2 and a warm air outlet duct 3 is provided with the usual combustion chamber 4, around which air from the inlet duct is circulated by an electric blower 5 so that the air can pick up heat from the combustion chamber and become warmed by it before reaching the outlet duct. The forced flow of air through the furnace is continuous as long as the blower operates. The combustion chamber burner 6 may be gas-fired or oil-fired, but in either case the fuel to the burner normally is turned off but is supplied to the burner whenever an electrically operated valve 7 is opened or an electric fuel pump is operated. The control of the burner is through wires 8 and 9 from the usual room thermostat 10, which may be operated by a transformer 11 connected into the house circuit wires 12 and 13. The thermostat normally is open, but as the surrounding area starts to cool, the thermostat closes to complete the circuit to the burner.

The blower operates independently of the thermostat because it is not connected into the thermostat circuit. It is operated directly by the house circuit and is controlled by a normally open heat-responsive switch 15, usually in the plenum of the furnace. This switch, shown in wire 12, does not close until the warm air leaving the furnace reaches a predetermined elevated temperature, and it will not reopen until the temperature drops a considerable number of degrees. When the switch closes, the blower comes on and produces a flow of air through the furnace. This flow will continue, even after the burner turns off, until the furnace cools down to the point where the blower switch opens again.

The heating system that has been described is conventional. The furnace also may be provided with additional safety switches and circuits to prevent overheating and to shut off the fuel in case of failure of ignition.

It is a feature of this invention that the warm air from the furnace is humidified by a spray humidifier provided with a novel control. The humidifier 16 includes

a normally closed solenoid valve that controls delivery of water to the spray nozzle 17, so the humidifier functions only while this valve is open. The humidifier obtains its electric current only from the thermostat circuit, such as through wires 18 and 19 connected to wires 8 and 9, respectively. However, if the humidifier were to be turned on every time the thermostat called for heat, there would be a considerable accumulation of water in the furnace and the ducts before the air from the furnace reached a high enough temperature to evaporate the spray. This highly undesirable condition is prevented in accordance with this invention by providing means for preventing the humidifier from being turned on until the furnace is hot enough to evaporate the spray. This is accomplished by connecting a normally open switch 20 in the humidifier circuit, such as in wire 18, and mounting this switch either in the warm air duct or the cold air return duct, preferably the latter. The switch contains a movable contact 21 (FIG. 2) that is actuated by a long vane or sail 22 pivotally mounted near one end in the switch housing. This sail extends through an opening in the adjoining duct and a considerable way across the duct.

As long as the blower is not operating, so that there is no forced circulation of air, the sail remains in its switch-open position shown in full lines in FIG. 1. On the other hand, as soon as a flow of air through the duct is produced by the blower, the downwardly flowing current of air impinging upon the sail causes it to swing down and close the switch, thereby completing the circuit to the humidifier to turn it on. It will be observed that this cannot occur until the air is moving and leaving the furnace warm enough to close the blower switch 15, which is set to close at a temperature high enough for the air to evaporate the water sprayed into the furnace by the humidifier.

The circuit that includes the humidifier and the sail switch can also include a conventional humidistat 24 that contains a normally closed switch. In case the humidity of the atmosphere in the area served by the humidistat starts to exceed the maximum for which the humidistat is set, the switch in the humidistat will open and thereby shut off the humidifier even though the sail switch is still closed.

It will be seen that with this invention the humidifier is turned on with the blower, but not by the blower, and turned off with the burner. Consequently, humidification does not start until the furnace is hot enough to take care of it properly, and it stops the moment heat input to the furnace is stopped, so no humidifying takes place while the furnace is cooling down. In other words, the humidifier is not on while the furnace is warming up or while it is cooling off. Also, if the blower should fail to shut off when it is supposed to, there is no danger of the humidifier continuing to operate, as there is when a humidifier is wired into the blower circuit. The circuits are simple, safe and avoid the use of relays.

Another advantage is that when the furnace is in an air conditioning system, the blower can operate without turning on the humidifier because the burner will remain off.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended

claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. The combination with a heating system having an electrically operated furnace burner for heating air, a thermostat circuit connected to the burner for turning it on and off, an electrically operated blower, and a heat-responsive switch adjacent the burner electrically connected with the blower for turning it on and off independently of the thermostat circuit to produce a flow of air; of a humidifying system comprising a normally

shut off electrically operated spray humidifier for humidifying said flow of air, an electric circuit for the humidifier deriving electric current from only the thermostat circuit for operating the humidifier, said humidifier circuit including a normally open switch, and a sail actuated by said flow of air for closing said last-mentioned switch to turn on the humidifier after the blower starts, whereby the humidifier starts to operate when said flow of air starts and stops when the burner is turned off.

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