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2,835,448

HEATING SYSTEM AND BLOWER CONTROL MEANS THEREFOR

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Fig. 1

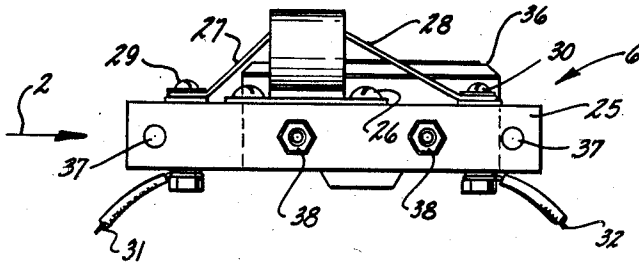


Fig-2

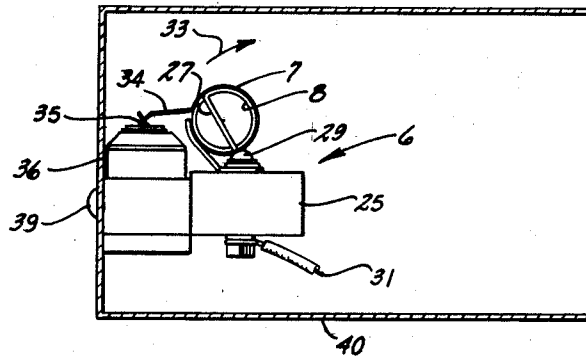
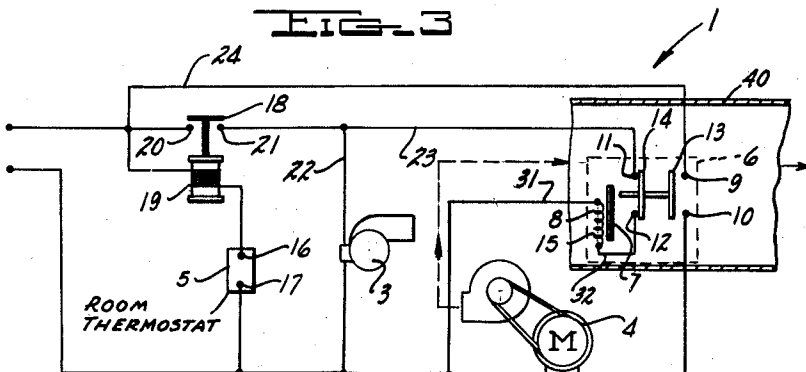


FIG. 3



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HEATING SYSTEM AND BLOWER CONTROL MEANS THEREFOR

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5 Claims. (Cl. 236—9)

This invention relates to a heating system and blower control means therefor.

In one known heating system there is employed a gas burner, oil burner or other heat producer operating in a combination chamber. Blower means is provided for circulating air around the outside of the combustion chamber and through hot air duct means to the rooms to be heated. Thermostat means is provided in at least one of the rooms to be heated. This thermostat means controls the operation of the heat producer and blower means.

When the thermostat means puts the heat producer into operation from a cold condition the air surrounding the combustion chamber is at a low temperature. If the blower means were to be started simultaneously with the heat producer the first air delivered to the rooms would be cold air. Delivery of cold air is undesirable, and it is advantageous to delay starting of the blower means until the heat producer has had sufficient time to heat up the air surrounding the combustion chamber.

When the thermostat means puts the heat producer out of operation there is still a considerable quantity of heat in the combustion chamber and air surrounding said chamber. For economic reasons it is advantageous that this heat be delivered to the rooms, and it is desirable therefore to delay stopping of the blower means until some time after the heat producer is put out of operation.

One object of the present invention is to provide a heating system and blower control means therefor, wherein starting of the air delivery blower means is delayed until the heat producer has had sufficient time to heat the air surrounding the combustion chamber.

Another object is to provide a heating system and blower control means therefor, wherein starting of the heat producer is not accompanied by delivery of cold air to the rooms being heated.

Another object is to provide a heating system and blower control means therefor, wherein stopping of the air delivery blower means is delayed until said blower means has had sufficient time to extract a maximum amount of heat from the combustion chamber and air surrounding said chamber.

Another object is to provide a heating system and blower control means therefor, wherein a maximum quantity of heat may be delivered to the rooms being heated.

Another object is to provide a blower control means which is directly responsive to air duct temperatures to effect stopping of the blower means. Responsiveness to air duct temperatures (as opposed to a time period response) insures that delivery of heat to the rooms will be at a maximum, irrespective of variations in heat producer action and external temperatures.

Another object is to provide a blower control means having the above mentioned functions and being constructed

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as a unitary assembly, whereby to permit of its ready installation at a single point in the heating system.

Another object is to provide a blower control means having the above mentioned functions and being susceptible of manufacture at a relatively low cost.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

Fig. 1 is an elevational view of one blower control means which may be employed in the invention,

Fig. 2 is a view taken in the direction of arrow 2 in Fig. 1, and

Fig. 3 is a diagrammatic showing of a heating system constructed according to the invention.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In Fig. 3 there is shown diagrammatically a heating system 1 comprising a heat producer 3 and a motor-operated blower means 4 for circulating air heated by heat producer 3 into the rooms (not shown) which it is desired to heat. Room thermostat means 5 is provided for controlling the operation of heat producer 3, and control means 6 is provided for controlling the operation of blower means 4. Control means 6 is positioned in a hot air duct means 40 which interconnects blower means 4 and the rooms being heated.

Control means 6 includes an electrically and thermally responsive power means 15. Means 15 includes a bimetallic element 7 and a resistance heater 8. Two pairs of contact elements are provided at 9 through 12, and two switch arms are provided at 13 and 14. With no current flow through heater 8, and the air in the duct means at a low temperature the control mechanisms are in their Fig. 3 positions. Current flow through heater 8 causes element 7 to subsequently expand so as to close switch arm 13 against contact elements 9 and 10, and open switch arm 14 between contact elements 11 and 12.

Operation of heating system 1 is such that when thermostat means 5 calls for heat and its contacts 16 and 17 are closed, switch arm 18 of relay 19 is closed against contacts 20 and 21 so as to deliver current through lines 22 and 23. Line 24 faces an open circuit at 9, 10 so there is no current flow through line 24.

Current flow through line 22 puts heat producer 3 into operation. Current flow through line 23 energizes heater 8 so as to expand element 7 in the direction of arrow 25. After a predetermined time period element 7 has expanded sufficiently to open switch arm 14 and close switch arm 13. Opening of switch arm 14 de-energizes heater 8 but the predetermined time period is such as to permit heat producer means 3 to heat the air surrounding the combustion chamber. Element 7 is positioned in this air, and the heat therefrom holds the element in its expanded position, even though heater 8 is deenergized.

Closing of switch arm 13 starts blower means 4. The above mentioned time period delays starting of the blower means and thereby insures that the first air delivered to the rooms is hot air, not cold air.

When thermostat means 5 calls for a stoppage of heat

producer operation its contacts 16 and 17 are opened and switch arm 18 is raised to its Fig. 3 position. Current flow through line 22 is thereby stopped so as to put heat producer 3 out of operation. Blower means 4 however continues to operate.

Stoppage of heat producer 3 causes the temperatures of the gases in the heat producer combustion chamber and the air surrounding said chamber to be lowered. Blower 4 moves the air away from around the chamber and replaces it with cold air so as to extract heat from the system and deliver it to the rooms being heated. When the air in the air delivery duct means falls to a predetermined temperature it is no longer capable of holding element 7 in its expanded position. Element 7 moves to its Fig. 3 position and blower means 4 is thereby stopped.

The exact construction of control means 6 may be varied, but one suitable construction is shown in Figs. 1 and 2. The illustrated construction includes a mounting block 25 on which is secured by screws 26 the aforementioned power means 15. Means 15 may be of the same construction as mechanism 1 in United States Patent No. 2,352,439 issued to W. S. Landon. Conductors 27 and 28 lead from power means 15 to two terminals 29 and 30. Other conductors 31 and 32 lead from terminals 29 and 30.

Operation of means 15 is such that current flow from conductor 32 is transmitted through terminal 30, conductor 28, cylindrically formed resistance heater 8, conductor 27, terminal 29 and conductor 31. Current flow through resistance heater 8 causes it to be heated so as to expand bi-metallic element 7 in the direction of arrow 33 (Fig. 2). Element 7 carries an arm 34 which, as a result of the bi-metallic element expansion, moves away from a contact button 35. Button 35 is the actuator mechanism for a double pole, double throw switch 36. The four poles of switch 36 correspond to contacts 9 through 12 shown in Fig. 3. Upward movement of button 35 allows contacts 9 and 10 to be closed by a spring mechanism (not shown) in switch 36, and downward movement of button 35 (as during contractive movement of element 7) causes contacts 11 and 12 to be closed. The previously mentioned time period between energization of heater 8 and closing of contacts 9 and 10 may be varied by suitable bending of arm 34. Bending the end of arm 34 toward button 35 will increase the time period, and bending the end of arm 34 away from button 35 will decrease the time period.

In order that the Fig. 1 control means may be suitably mounted in the hot air delivery duct means block 25 is provided with two through holes 37 for reception of mounting bolts 40. Nut-bolt means 38 secure switch 36 on block 25.

The Fig. 1 mechanism is a unitary, relatively low cost item which can be readily installed at a single location in the heating system by unskilled personnel.

I claim:

1. A room heating system comprising a heat producer; blower means for circulating the air heated by said heat producer; hot air duct means in communication with said blower means; blower control means; said control means comprising (1) openable and closable blower control switch elements, (2) power means responsive to duct temperatures and electric current for actuating said blower switch elements, and (3) openable and closable switch elements for controlling electric current to said

power means; and thermostat means operable in response to decrease in room temperature to start the heat producer and supply current to the power means, and operable in response to increase in room temperature to stop the heat producer and interrupt current flow to the power means; current flow to the power means causing the first switch elements to be closed and the second switch elements to be opened whereby to start the blower means; subsequent hot air flow through the duct means causing the power means to maintain the first switch elements closed and the second switch elements opened after interruption of current flow to the power means; decrease in air duct temperature causing the power means to open the first switch elements and close the second switch elements.

2. A heating system comprising a heat producer; blower means for circulating the air heated by said heat producer; hot air duct means in communication with said blower means; a multi-metallic element in the hot air duct means; resistance heater means operable to expand said element; first switch means operable by expansive movement of the element to start the blower means; and second switch means operable by expansive movement of the element to deenergize the heater means; air in the duct means serving to maintain the element in an expanded condition until the temperature of said air falls below a predetermined value.

3. A room heating system comprising a heat producer; blower means for circulating the air heated by said heat producer; hot air duct means in communication with said blower means; a multi-metallic element in the hot air duct means; resistance heater means operable to expand said element; thermostat means operable in response to decrease in room temperature to start the heat producer and supply current to the heater means, and operable in response to increase in room temperature to stop the heat producer and interrupt current flow to the heater means; first switch means operable by expansive movement of the element to start the blower means; and second switch means operable by expansive movement of the element to deenergize the heater means; air in the duct means serving to maintain the element in an expanded condition until the temperature of said air falls below a predetermined value after stopping of the heat producer.

4. The combination of claim 3 wherein the multi-metallic element includes a cylindrical portion and an arm portion extending from said cylindrical portion; and the resistance heater means is positioned adjacent the inner surface of said cylindrical portion; said first and second switch means being provided with a common actuator button, and said button being positioned in the path of movement of the aforementioned arm portion.

5. The combination of claim 4 wherein the arm portion is of bendable material and is free to be bent relative to the contact button without actuating the switch means, whereby to vary the time lag between energization of the heater means and energization of the first switch means.

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