Dec. 8, 1931. J. A. MARTIN 1,834,958

AUTOMATIC TEMPERATURE CONTROL FOR HEATERS

Filed Oct. 8, 1928

Fig. 7.

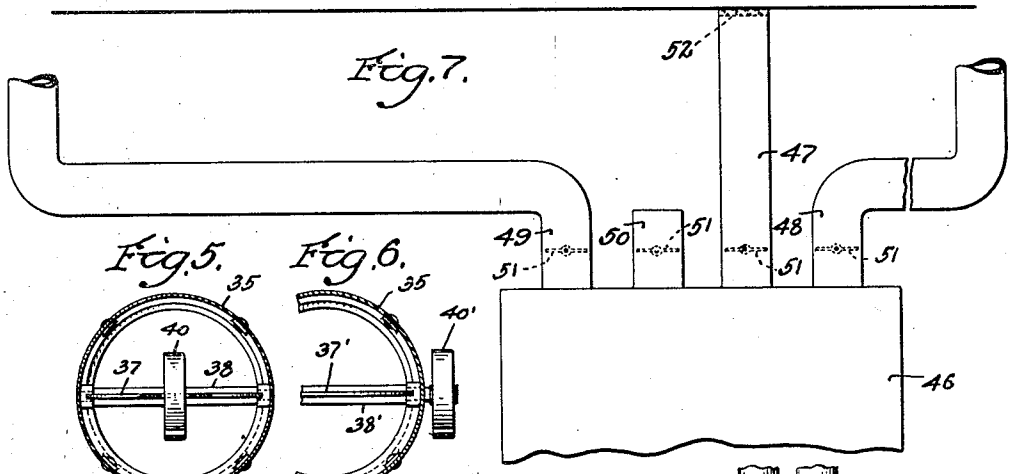


Fig. 5.

Fig. 6.

Fig. 2.

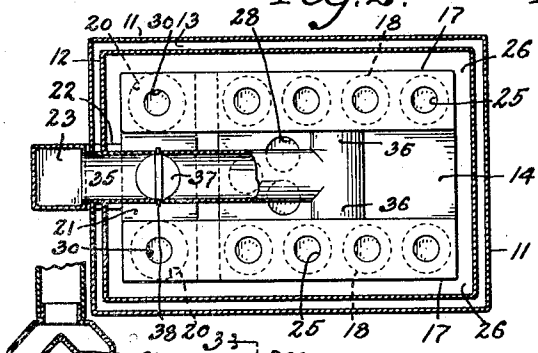


Fig. 3.

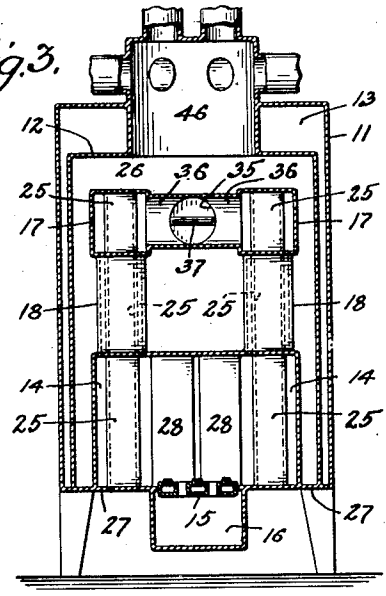


Fig. 1.

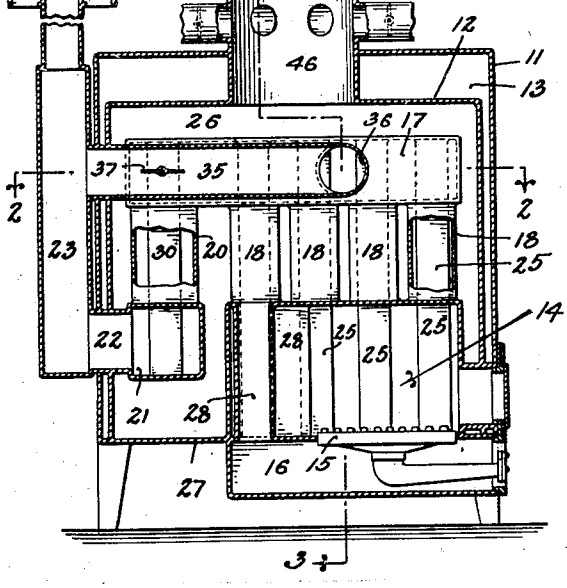
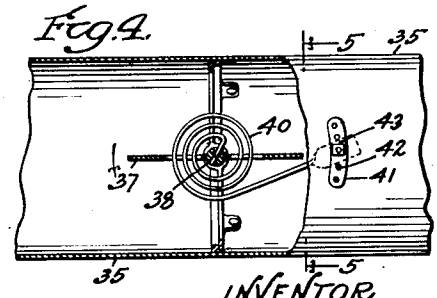


Fig. 4.



INVENTOR
JESSE A. MARTIN
By
Thurston Kalmbach
ATTORNEY

Patented Dec. 8, 1931 1,834,958

UNITED STATES PATENT OFFICE

JESSE A. MARTIN, OF LOS ANGELES, CALIFORNIA

AUTOMATIC TEMPERATURE CONTROL FOR HEATERS

Application filed October 8, 1928. Serial No. 311,177.

My invention relates to the heating of buildings by artificial heat, being more specifically automatically operated dampers arranged in the flue pipes and heat delivery pipes of a furnace or heater whereby the operation of the heater is automatically adjusted.

Gas heaters are ordinarily constructed with a fire box, headers and connecting flue pipes or passages so that the heated products of combustion are caused to travel in a tortuous path through the heater. When such furnaces or heaters are started the chimney and flues are usually cold so that considerable time is required before the furnace becomes heated due to the fact that the products of combustion must travel over a long, cold tortuous path until proper draft is established by the heating of the chimney.

It is also a fact that, when the fire is first started, due to the absence of sufficient draft in the stack to withdraw the products of combustion, the products of combustion tend to condense upon the walls of the furnace. This condensation forms a harmful and undesirable corrosion on the furnace wall. To overcome these objectionable features I provide a by-pass for the products of combustion controlled by an automatic damper by means of which, when the furnace is started, the heated gases pass more directly to the chimney whereby the chimney is quickly heated and proper draft insured, at which time the by-pass is closed and the heated gases travel their normal course through the furnace. On extinguishing the fire the by-pass is automatically opened allowing the incoming cold air to pass to the chimney, thereby obviating the above-mentioned condensation in the furnace.

Furnaces of the type referred to are usually provided with a series of heat delivery pipes which discharge into rooms situated at varying distances from the furnace, pipes of varying lengths being used for this purpose. It is a known fact that the shorter in length the pipe the more heat delivered, which results in uneven distribution of heat.

To overcome this objectionable feature I provide in each heat delivery pipe a damper which is automatically operated according to the heat in the pipe so that heat is evenly distributed through the pipes regardless of length. The dampers referred to are of the thermostatically controlled type and those dampers arranged in the heat discharge pipe are provided with thermostats so constructed that they are sensitive to operate their associated dampers so that the same temperature of heated air is delivered to all the rooms.

It is one of the principal objects of my invention to provide a hot air furnace or heater with automatically operated control means of simple form and construction whereby the passage of the products of combustion through the heater is regulated and also automatically operated control means separately controlling the delivery of heated air from the furnace to the rooms to be heated.

Other objects and advantages will appear hereinafter from the following description and drawings.

Referring to the drawings which are for illustrative purposes only;

Fig. 1 is a vertical sectional view of a hot air furnace showing an embodiment of my invention.

Fig. 2 is a sectional plan view on line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 1.

Fig. 4 is an enlarged sectional view of the flue by-pass showing a damper therein with thermostat attached thereto.

Fig. 5 is a sectional view on line 5—5 of Fig. 4.

Fig. 6 is a sectional view similar to Fig. 5 but showing a modified form of damper construction; and

Fig. 7 is a diagrammatic view of the discharge pipes of the furnace and heat collecting chamber.

More specifically describing the furnace illustrated in the drawings, 11 designates the outer wall of the furnace and 12 the inner wall spaced apart from the outer wall to form a heat insulating space 13 therebetween. 14 designates the fire box having a burner 15

therein and an air intake box 16 formed therebelow.

Mounted above the fire box are two headers 17 which receive the heated products of combustion from the fire box through flues 18, the products of combustion or heated gases passing from the headers downwardly from such headers through flues 20 to a lower header 21 which is connected by means of a pipe 22 to the stack 23. A portion of the air to be heated is taken from below the furnace by means of pipes 25 into the heated air chamber 26 of the furnace, which pipes extend from the bottom wall 27 through the fire chamber, thence through the flues 18 and through headers 17. Other air pipes are provided as indicated at 28 which extend vertically through the fire box as well as additional pipes 30 which extend vertically through headers 17, flues 20 and lower header 21.

From the description of the furnace hereinabove, it will be noted that the heated gases or products of combustion from the fire box or chamber 14 first travel upwardly through flues 18 into the headers 17, thence downwardly through flues 20 into the lower header and through pipe 22 to the stack.

Means are provided for by-passing these heated gases directly from the headers 17 to the stack which consists of a by-pass pipe 35 connected to the stack at one end and having branch pipes 36 to each of the headers 17. Located in the pipe 35 is a damper 37 rotatably mounted therein on a shaft 38, the central portion of the damper being cut out to receive a spiral or coiled thermostat 40, one end of which is secured to the shaft 38 in any suitable manner and the other end of which is flattened to ride over a quadrant 41, such flattened end of the thermostat and the quadrant 41 being provided with corresponding holes 42 so that tension on the thermostat can be regulated and adjusted by means of a bolt 43.

This thermostat 40 is adjusted so that, when the furnace is cold, the damper 37 is in open position as shown in Figs. 1, 2 and 4 so that, when the fire is started, the length of the passage traversed by the products of combustion is shortened; that is, such products of combustion pass directly from the headers 17 through by-pass pipe 35 to the stack or chimney 23, but, as the furnace becomes heated, the damper 37 closes and the products of combustion pass throughout the length of the headers 17, thence through flues 20 to the header 21 before reaching the chimney so that a maximum amount of heat is taken up by the air. When the furnace fire is extinguished, the cold air rushing into the furnace causes the thermostat 40 to open the damper 37 so that the cold air is by-passed through pipe 35 to the stack and condensation of moisture in the furnace is minimized.

The air heated in the furnace collects in a collection chamber 46, being conducted from such chamber by hot air discharge pipes 47, 48 and 49. These pipes 47 to 49, inclusive, as indicated diagrammatically as shown in Fig. 6, are of different lengths, the pipe 47 being the shortest pipe, 49 the longest and 48 a pipe of intermediate length. 50 designates a relief pipe. Each of the pipes 47 to 50, inclusive, are provided with a thermostat controlled damper indicated in dotted lines at 51 of the same general construction as shown in Fig. 4, the damper being advanced substantially 90° relative to the former construction, so that it is opened instead of closed by an increase in temperature.

It is to be understood that each of the pipes 47 to 49, inclusive, is provided at its room outlet end with a manually operated register as indicated in dotted lines at 52 on the pipe 47, such being the usual provision made in installations of heating equipment for houses and the like.

For the purpose of even distribution of heated air through pipes 47, 48 and 49, the respective thermostats in said pipes are adjusted so that the thermostat in the longest pipe 49 will be more sensitive to heat than the others, resulting in a quicker opening of the damper in that pipe, the thermostat in pipe 47 being adjusted so as to get a slower opening of its associated damper, and the thermostat in pipe 48 acting slower than one in the long pipe and quicker than the one in the short pipe whereby the amount of heat delivered through all the pipes is approximately the same. The vent relief pipe 50 is also provided with a thermostat controlled damper 51 which operates to vent hot air into the cellar or room in which the furnace is situated, the thermostat on such damper being regulated so that the damper is only opened by the collection of excessively heated air in the furnace which would be occasioned by closing of the registers in the outlet ends of the heat delivery pipes.

It will be understood that, when the fire in the furnace is extinguished, cold air is drawn through the furnace and into the pipes 47, 48 and 49, and the valves 51 are so adjusted that the temperature drop caused by the incoming cold air is effective to close these valves and prevent the admission of cold air to the house.

60 designates a draft relief device in the stack which consists of a member 61 which extends across the stack, the stack at such point being formed with a skirt 62 open at the bottom so that in the event of sudden down draft in the stack the same is diverted into the enlarged space in the skirt 62. The skirt during ordinary operation allows air to enter the stack through the open bottom of the skirt which air mixes with the products of combus-

tion and prevents overheating of the stack and excessive draft.

Fig. 6 illustrates a modified form of thermostat controlled damper 37′ adapted for optional use in the replacement of the damper 37 in the by-pass pipe 35. The thermostatic coil 40′ in this type of damper is adapted to be actuated partially by heat conducted from the damper supporting shaft 38 and partially by the hot air in the heated air chamber 26 in which the damper is positioned. Although a valve of this character demands a greater sensitivity in the thermostat to produce the same action as would be obtained in a valve of the character shown in Fig. 5, such a construction obviously increases the accessibility of the thermostat and precludes the possibility of an accumulation of soot forming thereon such as might occur in the use of a valve of the other type with a coal or wood burning furnace.

It will be understood that while I have herein described and illustrated one embodiment of the invention, that the flame control damper is not limited in its use to gas fired hot air furnaces, but may be adapted with equal facility to steam or hot water boilers or any type of furnace or heater which is provided with a vent or stack, also that various other modifications, such as varying the position of the thermostatic coil relative to the valve plate, etc., might be made. The invention is therefore not limited to the precise construction set forth but includes within its scope whatever changes fairly come within the spirit of the appended claims.

I claim as my invention:

1. A hot air furnace embodying: a heat chamber; a combustion chamber; a stack; indirect conducting means between said combustion chamber and said stack for conducting products of combustion from said combustion chamber to said stack; a by-pass for conducting products of combustion directly from said combustion chamber to said stack; automatic means for closing said by-pass after said stack has been heated to a predetermined temperature; heated air discharge pipes connected to said heat chamber; and automatic means for closing said pipes against air passage until said combustion chamber has been heated to a predetermined temperature.

2. A hot air furnace embodying: a heat chamber; a combustion chamber; a stack; indirect conducting means between said combustion chamber and said stack for conducting products of combustion from said combustion chamber to said stack; a by-pass for conducting products of combustion directly from said combustion chamber to said stack; automatic means for closing said by-pass after said stack has been heated to a predetermined temperature; a series of heated air discharge pipes of unequal length connected to said heat chamber; a damper in each pipe and thermostatically controlled damper operating means for opening said dampers after said combustion chamber has been heated to a predetermined temperature.

3. A hot air furnace embodying: a heat chamber; a combustion chamber; a stack; indirect conducting means between said combustion chamber and said stack for conducting products of combustion from said combustion chamber to said stack; a by-pass for conducting products of combustion directly from said combustion chamber to said stack; automatic means for closing said by-pass after said stack has been heated to a predetermined temperature; a series of heated air discharge pipes of unequal length connected to said heat chamber, a damper in each pipe and thermostatically controlled damper operating means for operating said damper after said combustion chamber has been heated to a predetermined temperature, said thermostatically controlled damper operating means being adjustable to evenly distribute the heated air through said pipes.

4. In a heating unit: a furnace; a heated air chamber in said furnace; a series of heated air discharge pipes of unequal length connected with said chamber; a damper in each of said pipes; and automatic temperature responsive means in said pipes for actuating said dampers, said damper actuating means being of sensitivity increasing in proportion to the lengths of the respective pipes.

5. In a heating unit: a furnace; a heated air chamber in said furnace; a series of heated air discharge pipes of unequal length connected with said chamber; a damper in each of said pipes; and automatic temperature responsive means in said pipes for actuating said dampers, said damper actuating means being of sensitivity increasing in proportion to the lengths of the respective pipes and one of said pipes being a relief pipe in which the sensitivity of the damper actuating means therein is substantially below the sensitivity of the damper actuating means in any of the other pipes.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 18th day of September, 1928.

JESSE A. MARTIN.