

Nov. 28, 1950

W. F. CRELL
AIR HEATING FURNACE FOR ALTERNATIVE FORCED
AND CONVECTION AIR FLOWS

2,532,089

Filed April 8, 1946

2 Sheets-Sheet 1

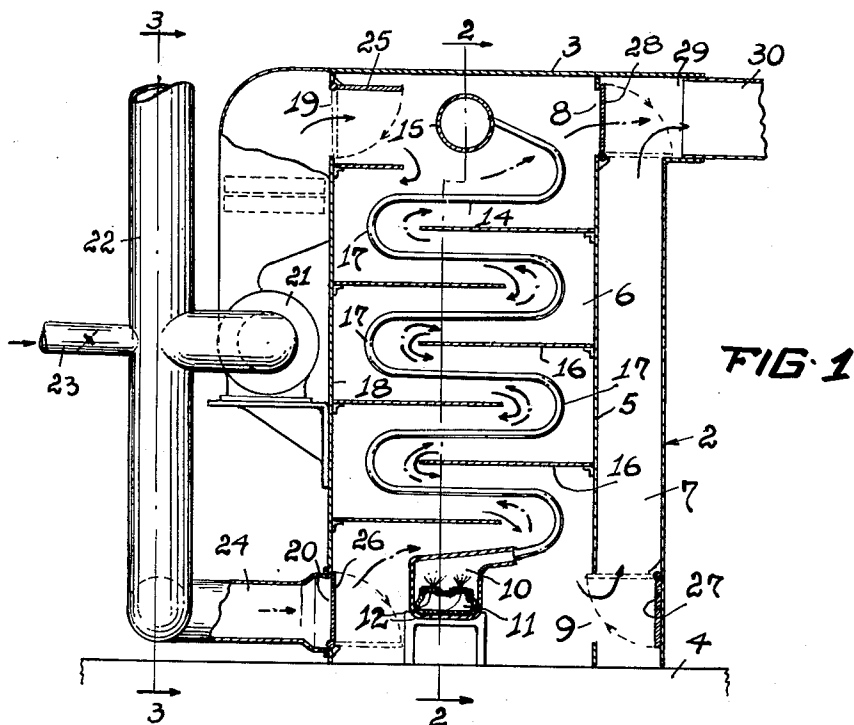


FIG. 1

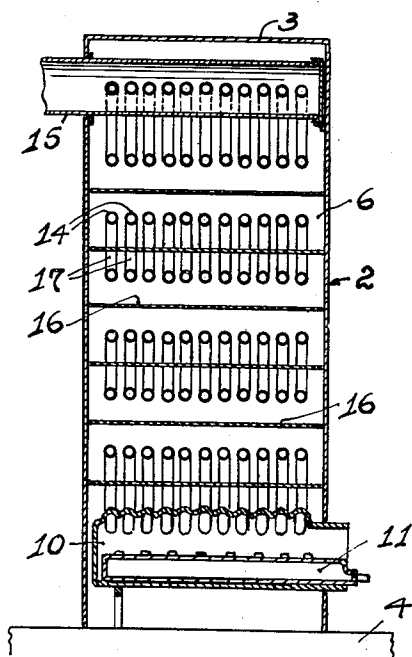


FIG. 2

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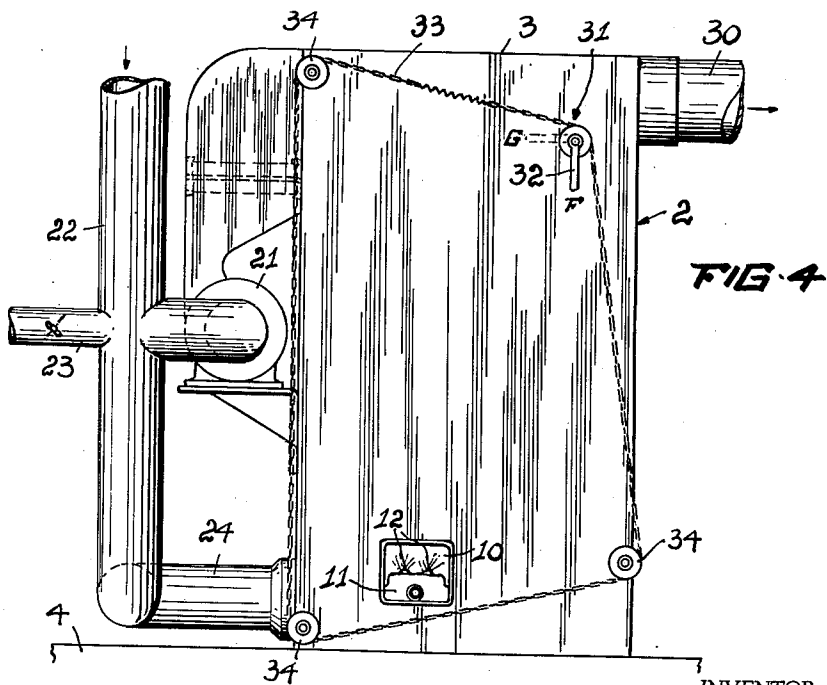
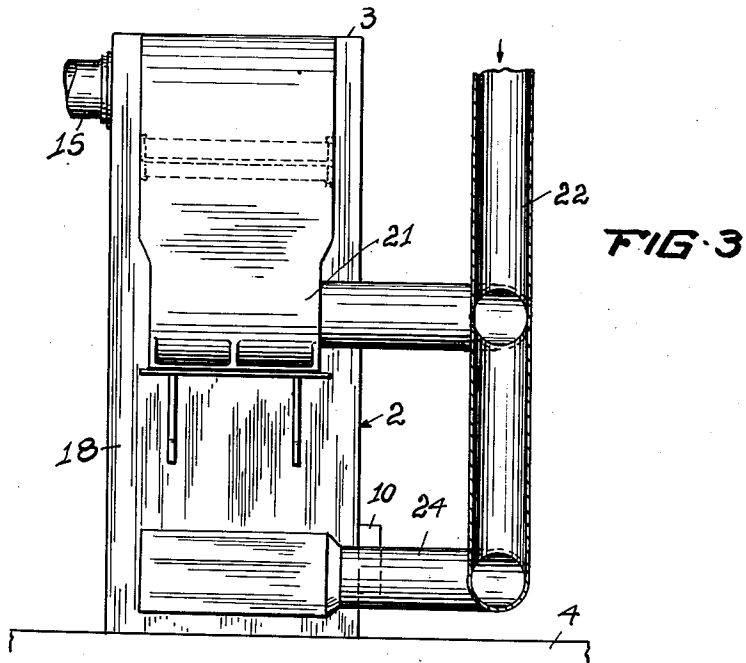
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UNITED STATES PATENT OFFICE

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AIR-HEATING FURNACE FOR ALTERNATIVE
FORCED AND CONVECTION AIR FLOWS

Willy F. Crell, Cleveland, Ohio

Application April 8, 1946, Serial No. 660,381

3 Claims. (Cl. 126—110)

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The present invention relates to heaters, furnaces, and the like, and is more particularly concerned with domestic heaters or furnaces especially constructed for the use of gas or oil as a fuel, but it is to be understood that the invention is not necessarily limited to any particular kind of fuel.

Heaters and furnaces effect movement of the fluid to be heated by gravity in so-called gravity heating systems or by forced draft in so-called forced draft heating systems, which systems are highly efficient only under favorable conditions and, therefore, both gravity and forced draft heaters and furnaces generally cannot operate at high efficiency.

The general object of the present invention is the provision of a heater or furnace which includes both a gravity heating system and a forced draft system, the systems being coordinated for selective and individual movement of the fluid to be heated by gravity or forced draft for selective individual use of either heating system and highest possible efficiency of the heater or furnace.

Such a general object of the invention is attained by a furnace provided with both a gravity heating system and a forced draft heating system, which furnace includes a heating chamber adapted to communicate and form part of either the gravity heating system or the forced draft heating system, and which embodies means to selectively prevent communication of the heating chamber with the gravity heating system or the forced draft heating system.

Another object of the invention therefore is the provision of a furnace having passage ways for a gravity heating system and a forced draft heating system and including a single heating chamber adapted to be selectively brought into communication with the passage ways of the gravity heating system or the forced draft heating system.

Gravity heating systems have in the heating chamber an upwardly directed flow of the fluid to be heated, therefore, heat absorption by such fluid decreases when same travels upwardly through the heating chamber away from the source of heating energy. Forced draft heating systems have in their heating chamber a flow of the fluid to be heated directed so as to obtain best possible heat absorption by the fluid when travelling through such heating chamber, that is, the direction of travel of such fluid in the heating chamber is generally toward the source of heat energy, that is, downwardly, as the

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source of heat is located at the bottom portion of a furnace.

A further object of the invention, therefore, is the provision of a furnace having passage ways for a gravity heating system and a forced draft heating system, a single heating chamber and means to selectively bring the heating chamber in communication with the passage ways of the gravity heating system or the forced draft heating system, so that the fluid to be heated travels in said heating chamber in an upward direction when such chamber communicates with the passage ways of the gravity heating system, and travels in said heating chamber in a downward direction when such chamber communicates with the passage ways of the forced draft heating system.

With the above and other incidental objects in view, the invention has other marked improvements and superiorities which radically distinguish it from presently known structures. These improvements or superior characteristics embodying certain novel features of construction are clearly set forth in the appended claims; and a preferred form of embodiment of the invention is hereinafter shown with reference to the accompanying drawings forming part of the specification.

In the drawings:

Fig. 1 is a vertical sectional view of a gas heated furnace embodying the invention, the furnace including a gravity heating system, a forced draft heating system, and means for selectively operating either system and direct the flow of fluid through the heating chamber in the direction best suited for the respective heating system.

Fig. 2 is a vertical cross sectional view through the furnace shown in Fig. 1, the section being taken on line 2—2 of Fig. 1.

Fig. 3 is a side-view, partly in section, of the furnace shown in Fig. 1, the section being taken on line 3—3 of Fig. 1.

Fig. 4 is a front-view of the furnace shown in Fig. 1, showing the operating means for selectively coupling the heating chamber with the gravity heating system or the forced draft heating system.

Referring now more particularly to the structure shown in the drawings, the furnace disclosed therein embodies a casing 2 of substantially rectangular cross section closed at its top 3 and supported on a base 4, preferably cemented thereto. This casing is subdivided by a vertical wall 5 into a heating chamber 6 and a passage way 7 in valve-controlled communication with each

other through openings 8 and 9 in the top and bottom portions of vertical wall 5. Heating chamber 6 supports in its lower part a combustion chamber 10 which has disposed therein a gas burner 11 provided with the usual outlet openings 12 for combustible gas. This burner, which is supplied with gas from any suitable source and controlled in any suitable manner, extends substantially the entire length of the combustion chamber which is open at its front end and outwardly extended of casing 2 to provide the chamber with sufficient combustion supporting air. Combustion chamber 10 communicates through a plurality of separate individual zigzag-shaped pipes 14 within chamber 6 with a header 15 also within said chamber, which header is extended outside of casing 2 for leading combusted gas to a flue or chimney. A plurality of baffle plate members 16, preferably arranged opposite the coil portions 17 of pipes 14, provides a circuitous path for fluid travelling through chamber 6, as will be later described.

Heating chamber 6, in addition to openings 8 and 9 in wall 5, has in its wall 18 opposite wall 5 and its openings 8 and 9 other valve-controlled openings 19 and 20 to form said heating chamber with opposed upper and lower valve-controlled inlet and outlet openings, as will be described hereinafter. Openings 19 and 20 are the inlet openings for chamber 6 and openings 8 and 9 the outlet openings for said chamber. Upper inlet opening 19 effects valve-controlled communication of chamber 6 with an air compressor 21 communicating with the cold air return pipe 22 which also communicates with the open air through a valve-controlled branch pipe 23 and is extended at its lower end portion 24 into lower inlet opening 20 of chamber 6 (see Fig. 1).

The inlet and outlet openings 19, 20 and 8, 9 are controlled by valve members 25, 26 and 27, 28, respectively, pivotally supported by the respective walls 18 and 5. These valves, when shifted to their one position, are set for forced draft operation of the furnace, in which operation air is drawn through cold air return pipe 22, forced through upper intake opening 19 in wall 18 into heating chamber 6, hence forced in heat exchange with pipes 14 downwardly through the circuitous path in said chamber to and through lower outlet opening 9 and, finally, upwardly through passageway 7, outlet 29 and pipe 30 into the rooms to be heated, all as indicated by full line arrows in Fig. 1 of the drawings. The valves 19, 20 and 8, 9, when shifted to their other position by means of a mechanism 31 including a handle 32 actuating a chain 33 engaging chain pulleys 34 at the ends of the pivot shafts of said valves, are set for gravity operation of the furnace. In such an operation air enters through cold air return pipe 22, its lower end portion 24 and lower intake opening 20 in wall 18 into heating chamber 6 and travels in heat exchange with pipes 14 upwardly through the circuitous path in said chamber to and through upper outlet opening 8 and pipe 30 into the rooms to be heated, all as indicated by dash-dotted line arrows in Fig. 1 of the drawings.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of the invention, and it is therefore not the purpose to limit the patent granted thereon oth-

erwise than necessitated by the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In a furnace, selectively actuated, associated gravity and forced draft air heating systems, said systems including means defining a heating chamber common to both systems, means defining inlet and outlet passages in both the upper and lower portions of said heating chamber, valve means for each of said inlet and outlet passage means, controlling means for said valve means, an air intake passage with branches communicating with the said air inlet passages, and a blower in the branch communicating with the inlet passage in the upper portion of the heating chamber, said controlling means in one position effecting closing of valve means for the inlet passage in the upper portion of the heating chamber and the outlet passage in the lower portion thereof and opening of the valve means for the remaining other passages of such heating chamber to effect operation of the gravity heating system having the air to be heated traveling upwardly in the heating chamber, and said controlling means in another position effecting closing of the valve means for the outlet passage in the upper portion of the heating chamber and the inlet passage in the lower portion thereof and opening of the valve means for the remaining passages to effect operation of the forced draft heating system, forcing by said blower in the said one branch of the air intake passage air to be heated into and through the inlet passage in the top portion of the heating chamber and downward travel of such air in the heating chamber.

2. A furnace as described in claim 1 including means defining a combustion chamber in the lower portion of said heating chamber, a plurality of flue pipes extending from said combustion chamber upwardly in said heating chamber, and a header arranged in the upper portion of said heating chamber and connected to said flue pipes and extended outside of said heating chamber.

3. A furnace as described in claim 1 including means defining a combustion chamber in the lower portion of said heating chamber, a plurality of individual zig-zag shaped flue pipes extending from said combustion chamber upwardly in said heating chamber, a header arranged in the upper portion of said heating chamber and connected to said flue pipes and extended outside of said heating chamber, and a plurality of baffle plate members arranged opposite to the curved portions of said flue pipes to provide a circuitous path for air travelling through said heating chamber.

WILLY F. CRELL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,694,392	Miller	Dec. 11, 1928
1,830,273	Hill	Nov. 3, 1931
1,943,053	Boisset	Jan. 9, 1934
1,965,102	Jerome	July 3, 1934
2,247,849	Ritter	July 1, 1941