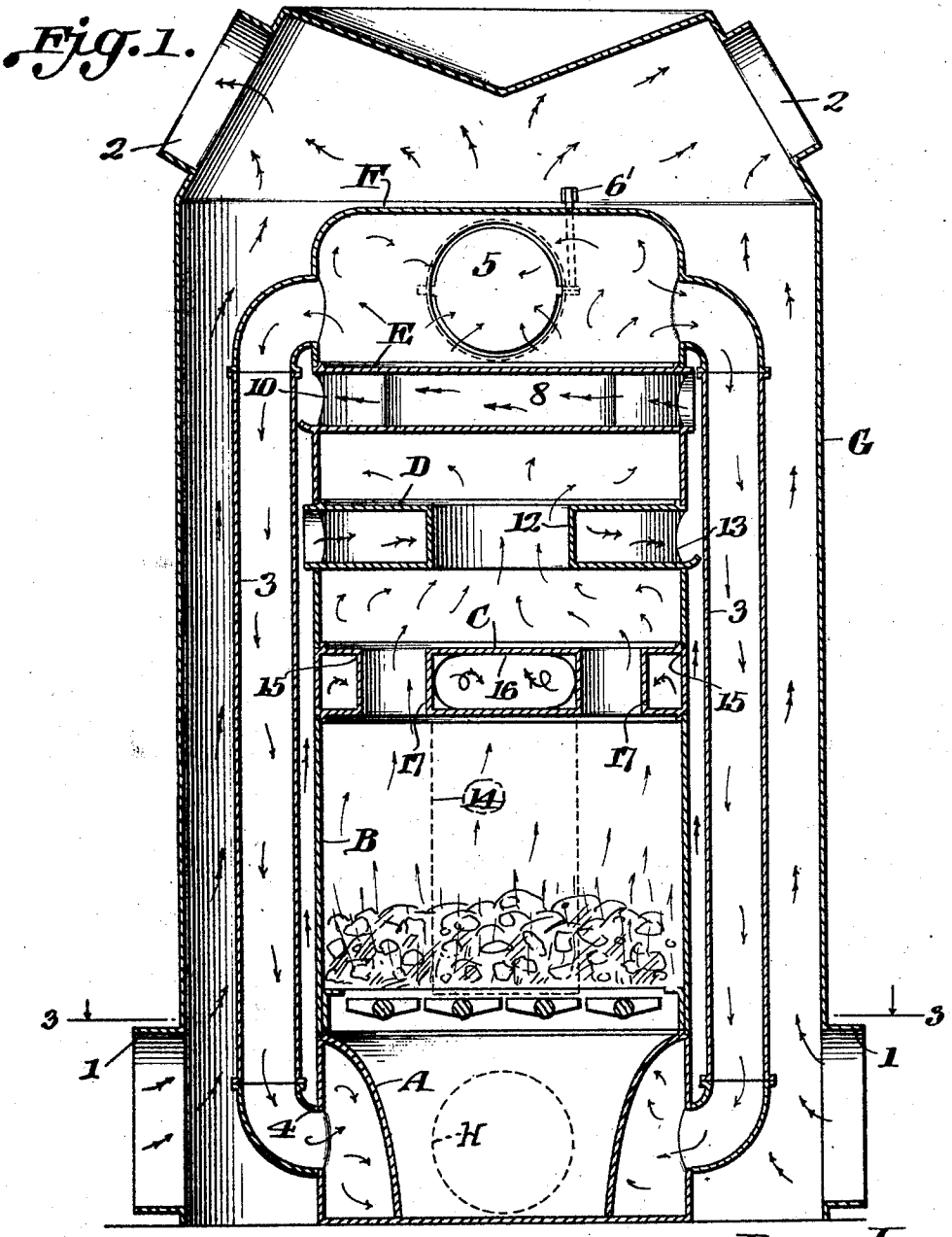
Oct. 26, 1926. 1,604,833

W. V. LINDSAY

HOT AIR FURNACE

Filed March 19, 1926 3 Sheets-Sheet 1

Fig. 1.



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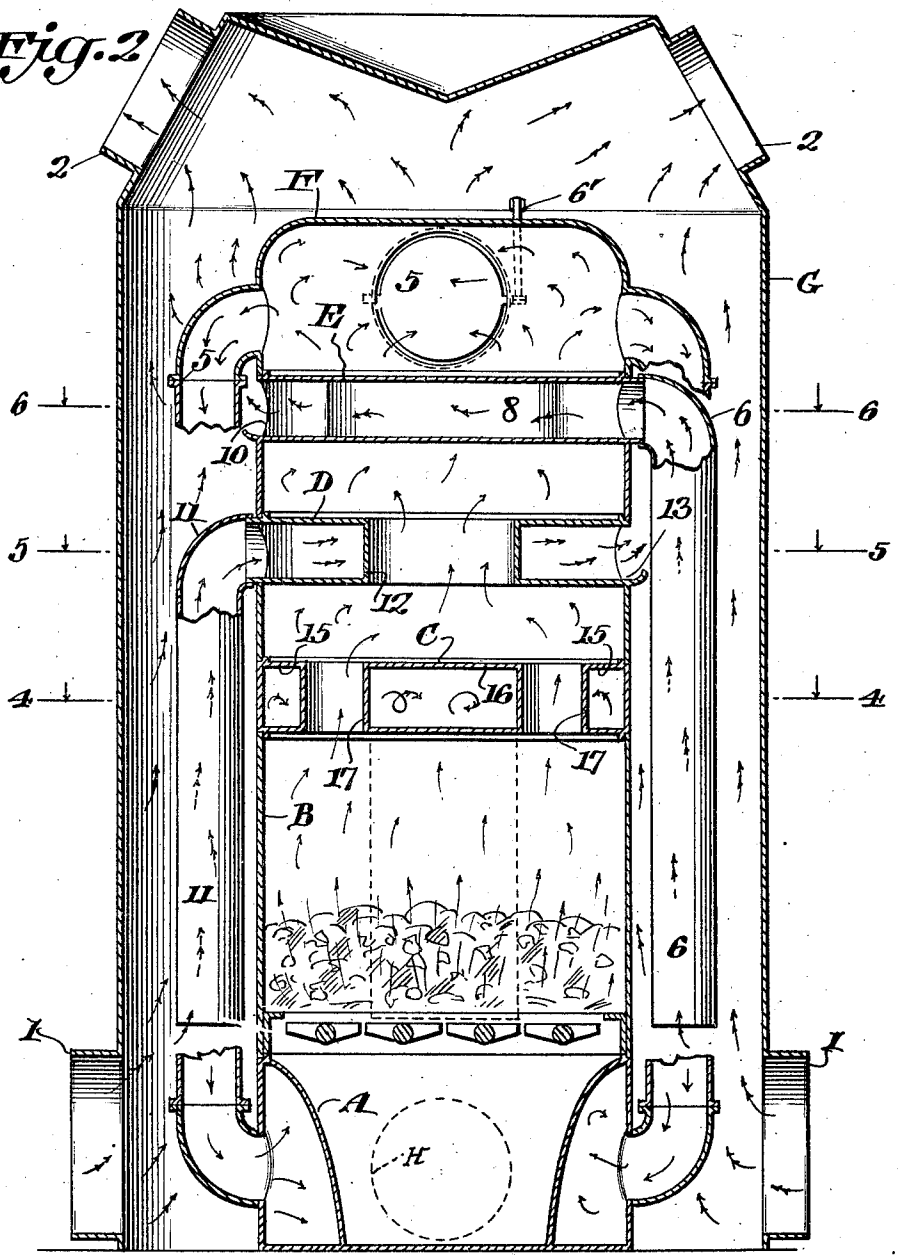
Oct. 26, 1926. **1,604,833**

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Fig. 2



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HOT AIR FURNACE

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Fig. 3

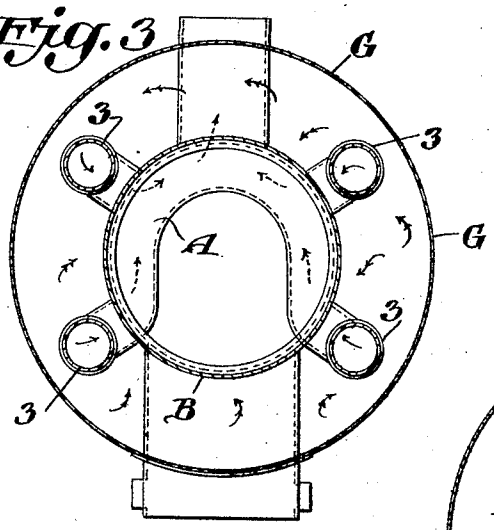


Fig. 4.

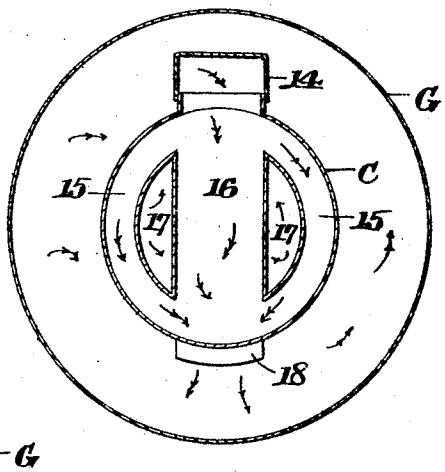


Fig. 5.

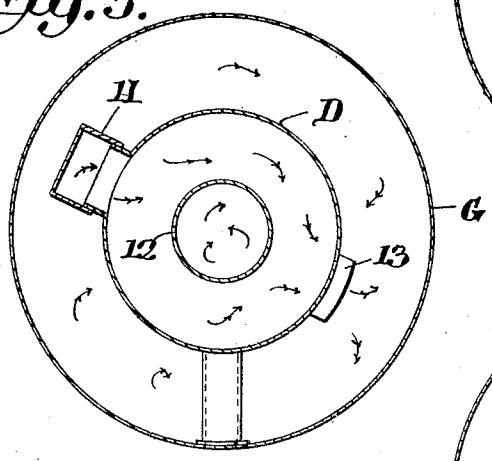
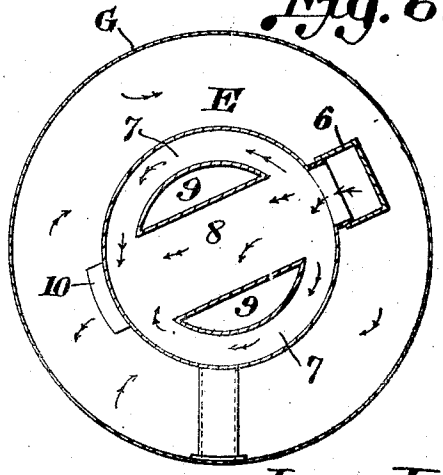


Fig. 6.



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Patented Oct. 26, 1926. 1,604,833

UNITED STATES PATENT OFFICE.

WILLIAM V. LINDSAY, OF WINONA, MINNESOTA.

HOT-AIR FURNACE.

Application filed March 19, 1926. Serial No. 95,921.

This invention relates to a hot air furnace of the down draught type, which is so constructed that the air to be heated is brought into contact with a very large amount of radiating surface which is heated by the fire or products of combustion. Practically all of the heat value of the fuel is utilized before the products of combustion pass out of the furnace. The invention also provides a furnace so constructed that it can be easily built and assembled and which will be simple and efficient in construction and operation.

In the drawings:

Figure 1 is a vertical section through the furnace with parts omitted.

Figure 2 is a similar section omitting some parts shown in Figure 1 and illustrating others not shown therein.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is a section on the line 5—5 of Figure 2.

Figure 6 is a section on the line 6—6 of Figure 2.

The furnace proper is composed of six sections which may be constructed separately and assembled to form the furnace. These sections comprise an ash box A, fire box B, three superheater sections C, D and E, and a fire dome F. Surrounding the whole and spaced therefrom at a proper distance, depending upon the size of the furnace, is a casing G which may be formed of galvanized sheet steel, brick, or other suitable material.

The bottom of the casing G is provided with one or more inlet pipes 1 which may be extended to any suitable point for the reception of the incoming air to be heated. The top of the casing G is provided with a plurality of outlet pipes 2 which are suitably connected to the hot air system of the building. The construction and arrangements of these pipes may be such as desired.

A plurality of pipes 3 illustrated in the form shown as being four in number, are connected at their lower ends to elbows 4 fitted in the outer wall of the bottom section and communicating with the chamber partially surrounding the ash box. At their upper ends these pipes 3 are connected to similar elbows or extensions of the dome F. Throughout the illustrations, the movement of the products of combustion is indicated by arrows with single heads while the movement of the air which is heated and transmitted to the hot air system of the building is indicated with arrows with double heads. The fire dome F is provided with any usual damper 5 controlled by a lever 6′ through which products of combustion may be permitted to escape into the stack or chimney. The chamber which partially surrounds the fire box is connected to a flue H shown in full lines in Figure 3 and in dotted lines in Figures 1 and 2, which flue communicates with the stack or chimney.

Referring particularly to Figures 2 and 6, it is noted that a pipe 6 is connected at its upper end to the superheater section E and extends downwardly, having an open lower end slightly above the inlet pipe 1. The superheater section E has an upper circular passage 7 and a transverse passage 8 leaving similar passageways 9 through which pass the products of combustion. At the opposite side of the superheater section E is an opening 10 through which the heated air passes into the space within the casing G.

A similar pipe 11 is attached at its upper end to the superheater section D and extends downwardly, terminating at approximately the same level as the lower end of the pipe 6. The air to be heated passes through this pipe 11 into the superheater section D which is shown in cross-section in Figure 5 and has an annular portion surrounding the central passageway 12, through which pass the products of combustion. An exit opening 13 is also provided through which the air passes into the space within the furnace casing G.

As shown in Figure 4, a similar pipe 14 is connected at its upper end with the superheater section C and its open lower end terminates in substantially the same plane as the pipes 6 and 11. A comparison of Fig-

ures 4 and 6 will show that the superheater section C is substantially the same as E except arranged in a different manner. It provides a peripherial passage 15 and a central passage 16 for the air to be heated and similar passageways 17 intermediate for the products of combustion. An exit opening 18 opens into the space within the furnace casing G.

The relative arrangement of the four pipes 3 and the pipes 6, 11 and 14 is evident from the sections shown in Figures 3 to 6 inclusive. Strictly speaking, the pipes 3 should not appear in Figure 2, but the upper and lower portions thereof are shown to give an idea of the general arrangement with reference to the pipes 6, 11 and 14.

The products of combustion and heated air which rise from the fire box pass through the passageways 17 in the superheater section E into the open space between the sections C and D, thence through the passage 12 in the superheater section D, thence into the open space between the sections D and E through the passages 9 in the section E, and into the fire dome F. If the damper is closed, substantially all of the heated air and products of combustion will pass downward through the pipes 3 and into the chamber surrounding the bottom of the ash box except on its front side, and thence into the flue H. At any time desired, the damper 5 may be opened partially or completely to allow the escape of a portion of the heated air and products of combustion.

At the same time the air to be heated is passing in through the openings or inlet pipes 1, a portion of this air rises directly in the space between the casing G and the furnace proper and passes out through the pipes 2 into the heating system of the dwelling. This air passes in close contact with the outer walls of the furnace section and is heated thereby. At the same time air passes upward through the pipes 6, 11, and 14 and into the superheater sections E, D, and C respectively, wherein it circulates around the walls of the passages through which the products of combustion are passing. It is obvious that the above described circulation of the products of combustion and heated air from the furnace together with the particular distribution of passages for the air to be heated will result in providing a great amount of surface from which radiation will take place and, therefore, utilizing a larger proportion of the heat obtained from the combustion of the fuel than is usual.

The usual features of a furnace, such as the door of the ash box, the door to the fire box and the usual doors for cleaning out the various sections are all made of any suitable type and as they form no part of the invention, they have been omitted. It is further to be noted, that in order to avoid confusion upon the drawings certain elements have been omitted from the sectional views 3 to 6. It is obvious that various detail changes may be made in the precise construction of the various elements without in any way departing from the spirit of the invention, which is to be regarded as limited only by the scope of the appended claims.

I claim as my invention:

1. A hot air furnace comprising an outer casing, and a furnace proper within said casing and spaced therefrom, said casing being provided with passages for the inlet and outlet of air to be heated, and said furnace proper including a plurality of superheater sections provided with passages for the circulation of the air to be heated and with openings for the transit of the products of combustion, and a plurality of downwardly extending pipes each open at its lower end and connected at its upper end to one of said sections to admit air to be heated.

2. A hot air furnace comprising an outer casing, a furnace proper within said casing and spaced therefrom, said casing being provided with passages for the inlet and outlet of air to be heated, and said furnace proper including a plurality of superheater sections provided with passages for the circulation of the air to be heated and with openings for the transit of the products of combustion, and means separate from said sections for permitting the products of combustion to pass from the top of the furnace proper to the bottom thereof.

3 A hot air furnace comprising an outer casing, a furnace proper within said casing and spaced therefrom, said casing being provided with passages for the inlet and outlet of air to be heated, and said furnace proper including a plurality of superheater sections provided with openings for the transit of the products of combustion, a plurality of pipes connected to said superheater sections and having lower open ends near the bottom of the furnace for the admission of air to be heated, and openings at the opposite edges of said sections for the exit of the heated air.

4. A hot air furnace comprising an outer casing, a furnace proper within said casing and spaced therefrom, said casing being provided with passages for the inlet and outlet of air to be heated, and said furnace proper including a plurality of superheater sections provided with passages for the circulation of the air to be heated and with openings for the transit of the products of combustion, a fire dome above the upper superheater section, and means for permitting the products of combustion to pass from the fire dome to the bottom of the furnace proper.

5. A hot air furnace comprising an outer

casing, a furnace proper within said casing and spaced therefrom, said casing being provided with passages for the inlet and outlet of air to be heated, and said furnace proper comprising a plurality of superheater sections, a downwardly extending pipe connected with each superheater section for the admission of air to be heated, said pipes being spaced from the outer wall of the furnace proper and from said casing, and said sections being provided with vertical passages for the transit of the products of combustion.

In testimony whereof, I have hereunto subscribed my name.

WILLIAM V. LINDSAY.