Nov. 17, 1925. 1,561,741

M. L. PAGE

AIR HEATER

Filed Oct. 17, 1923

FIG. 1.

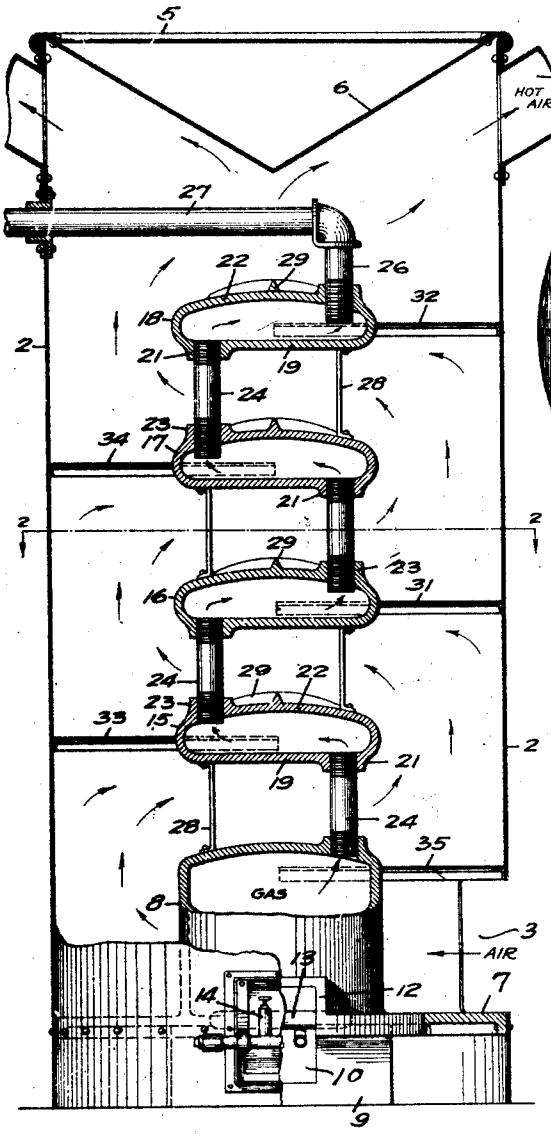


FIG. 2.

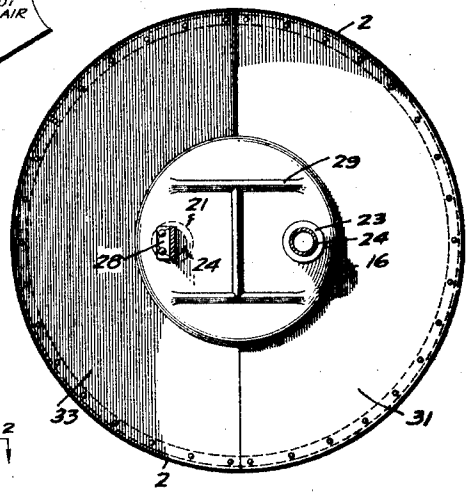
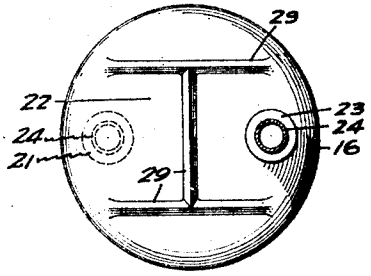


FIG. 3.



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UNITED STATES PATENT OFFICE.

MILLARD L. PAGE, OF REDWOOD CITY, CALIFORNIA.

AIR HEATER.

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To all whom it may concern:

Be it known that I, MILLARD L. PAGE, a citizen of the United States, and a resident of Redwood City, county of San Mateo, State of California, have invented a certain new and useful Air Heater, of which the following is a specification.

The invention relates to an air heater for installation in homes, dwellings and other places of habitation, to warm air and to introduce the air into the house.

An object of the invention is to provide an air heater, in which the air is heated by the combustion of fuel, in which the possibility of the air becoming contaminated with the gases of combustion is reduced to a minimum.

Another object of the invention is to provide an air heater in which the flow of the products of combustion through the heater is retarded so that a heater of high efficiency is produced.

Another object of the invention is to provide a gas fired air heater which is inexpensive in cost and efficient in operation.

The invention comprises other advantageous features, some of which with the foregoing will be set forth at length in the following description, where I shall outline in full that form of my invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings I have shown one form of heater embodying my invention but it is to be understood that I do not limit myself to such form, since the invention as set forth in the claims, may be embodied in a plurality of forms.

Referring to said drawing:—

Figure 1 is a vertical section through the heater of my invention.

Figure 2 is a cross section of the heater taken on the line 2—2, Figure 1.

Figure 3 is a top or plan view of one of the heating drums.

The heater of my invention comprises an outer casing 2, preferably formed of sheet metal and preferably covered with heat insulation material to prevent the loss of heat through the casing. The casing is preferably cylindrical in form and is provided on one side, adjacent the bottom, with an air inlet opening 3 which may be connected by a suitable conduit with the outside atmosphere. At its top the casing is provided with a plurality of hot air discharge conduits 4, preferably heat insulated, which extend to the portions of the house which it is desired to heat. The casing is usually provided with a flat top 5 and below the top there is arranged a deflecting cone 6 for directing the air to the outlet conduit.

The casing extends downward past the circular base plate 7 which is preferably formed of cast iron and which is preferably integral with the combustion chamber 8. The base plate rests upon a suitable hollow base 9 which supports it above the floor, and which is provided in its front wall with an opening 10. Formed on the base plate, and opening into the combustion chamber, is a hood 12 which registers with the opening 10 in the base, forming a passageway for air to support combustion of the fuel. The furnace is preferably gas fired and a double ring gas burer 13 is arranged within the combustion chamber, the flow of gas to the burners being controlled by the valves 14, one valve being associated with each burner ring.

Arranged within the casing, and of lesser diameter than the casing, are a plurality of vertically spaced heating drums 15, 16, 17 and 18 over which the air passes and through which the gases of combustion pass. These drums are preferably formed of cast iron and are connected together and connected to the combustion chamber so that the gases of combustion pass through the drums in series. Each drum is provided on its bottom wall 19, adjacent one side thereof, with an inlet opening 21 and is provided on its upper wall 22, adjacent the other side thereof, with an outlet opening 23, so that the gases of combustion enter the drum on one side, pass across the drum and discharge therefrom at the other side. The inlet and outlet openings 21 and 23 are preferably screw threaded and the drums are connected together in series and connected to the combustion chamber by screw threaded nipples 24 which screw into the openings in the drums, forming gas tight joints therewith. These nipples preferably consist of short lengths of pipes, preferably of about 3 inches in diameter, so that there is a rather slow movement of the gases of combustion through the drums. The successive nipples 24 are disposed at opposite sides of the drum so that the gases of combustion travel in a circuitous path through the series of drums. The top drum 18 is provided with a discharge

nipple 26 which is connected to a discharge conduit 27, which leads to a flue. The drum structure is preferably braced by means of straps 28 interposed between the successive drums at the side opposite the nipple 24. The rate at which heat is transferred from the drums to the air is determined by the speed of the air and the area of the surface of the drums, so that the greater the speed of the air, the greater the efficiency of the furnace. In order to permit the air to pass through the furnace at the maximum speed, I have formed the drums in the general shape of flattened spheres, thereby eliminating all sharp edges which would interfere with and retard the free flow of air through the furnace. The sides of the drums are rounded so that the air flows in a smooth curve through the furnace, with a minimum of disturbance, thereby permitting the air to travel with maximum velocity over the surfaces of the drums.

To retard and control the travel of the gases of combustion through the drums, the nipples 24 are entered into the outlet openings of the drums for gradually increasing distances in the successive drums through which the gases of combustion pass. The nipple 26 is preferably inserted into the drum 18 the maximum distance so that the gases are banked in this drum to the greatest extent. The nipple 24 extends into the drum 17 a lesser amount and the nipple may extend into the drum 16 to a position flush with the upper wall thereof or slightly below such wall. In practice the nipples are entered into the two upper drums, to positions below the under sides of the top wall of the drums, and the nipples are entered into the top drum for a greater extent than into the next lower drum, so that a gradually increasing banking or retarding effect is produced. The drums are preferably provided with ribs 29 on their upper surfaces to strengthen them.

Means are also provided for causing the air to travel in a circuitous path over the successive drums, so that the air continually sweeps the entire exposed surfaces of the drum. Arranged within the casing in staggered relation are a plurality of baffle walls, preferably semi-annular in shape. These baffle walls are arranged between the outer casing and the drums, and partly surround the successive drums, so that the air is caused to move in a circuitous path through the casing. The baffle walls 31 and 32 associated with the drums 16 and 18 are arranged at one side of the casing, and the baffle walls 33 and 34 associated with the drums 15 and 17 are arranged at the other side of the casing. The baffle wall 35 which occurs directly above the air inlet opening 3, causes the incoming air to sweep around the combustion chamber 8 before it passes upward through the casing. By this construction a maximum heating effect is obtained and due to the slow travel of the gases of combustion through the drums a very efficient heater is produced. By virtue of the fact that the combustion chamber 8 is integral with the base plate 7, that the casing 2 makes a tight joint with the flanged periphery of the base plate, and the air inlet 3 is disposed above the base plate 7, the possibility of gas or the products of combustion mixing with the air to be heated is reduced to a minimum. The joints in the structure through which the gases of combustion pass are gas tight, so that there is no possibility of leakage and consequently only warm fresh air is discharged into the house.

I claim:

1. An air heater comprising an outer casing having an air inlet opening adjacent the bottom and an outlet opening adjacent the top, a combustion chamber arranged within the casing adjacent the bottom, a plurality of vertically spaced oval drums arranged within the casing above the combustion chamber, said drums being provided with oppositely disposed inlet and outlet openings, nipples engaging in said openings and connecting the drums together in series and connecting the lower drum to the combustion chamber, an outlet conduit connected to the upper drum and baffle walls arranged in said casing and engaging said drums, to cause the air to travel freely in a smooth circuitous path sweeping the upper and lower surfaces of the drums.

2. In an air heater, a plurality of vertically spaced cast iron drums having vertically curved side walls meeting the top and bottom walls in smooth curves, a combustion chamber disposed below the lower drum, said drums being provided with oppositely disposed inlet and outlet openings, nipples engaging said openings and connecting the drums together in series and connecting the lower drum to the combustion chamber, a casing having an air inlet opening and an air outlet opening surrounding the drums and combustion chamber and semiannular baffle walls arranged in staggered relation between the casing and the successive drums to cause the air to travel in a smooth circuitous path over and around the successive drums.

3. In an air heater, a cylindrical outer casing having air inlet and outlet ports, a combustion chamber in said casing adjacent the bottom thereof, a plurality of circular, horizontally disposed, vertically spaced oval drums arranged in said casing, a conduit connecting the lower drum to the combustion chamber, conduits connecting the drums together in series, a discharge conduit connected to the upper drum, said conduits being arranged to cause the gases of combus-

tion to travel in a circuitous path through the series of drums, the inlet ends of the conduits extending below the top walls of the upper drums to retard the passage of the gases of combustion through the upper drums, and semiannular baffle walls arranged between the drums and the casing to cause the air to travel in a circuitous path through the casing, the curved sides of the drums serving to permit the air to flow with a minimum of retardation, whereby a maximum volume of air is caused to pass through the casing and around the drums.

In testimony whereof, I have hereunto set my hand.

MILLARD L. PAGE.