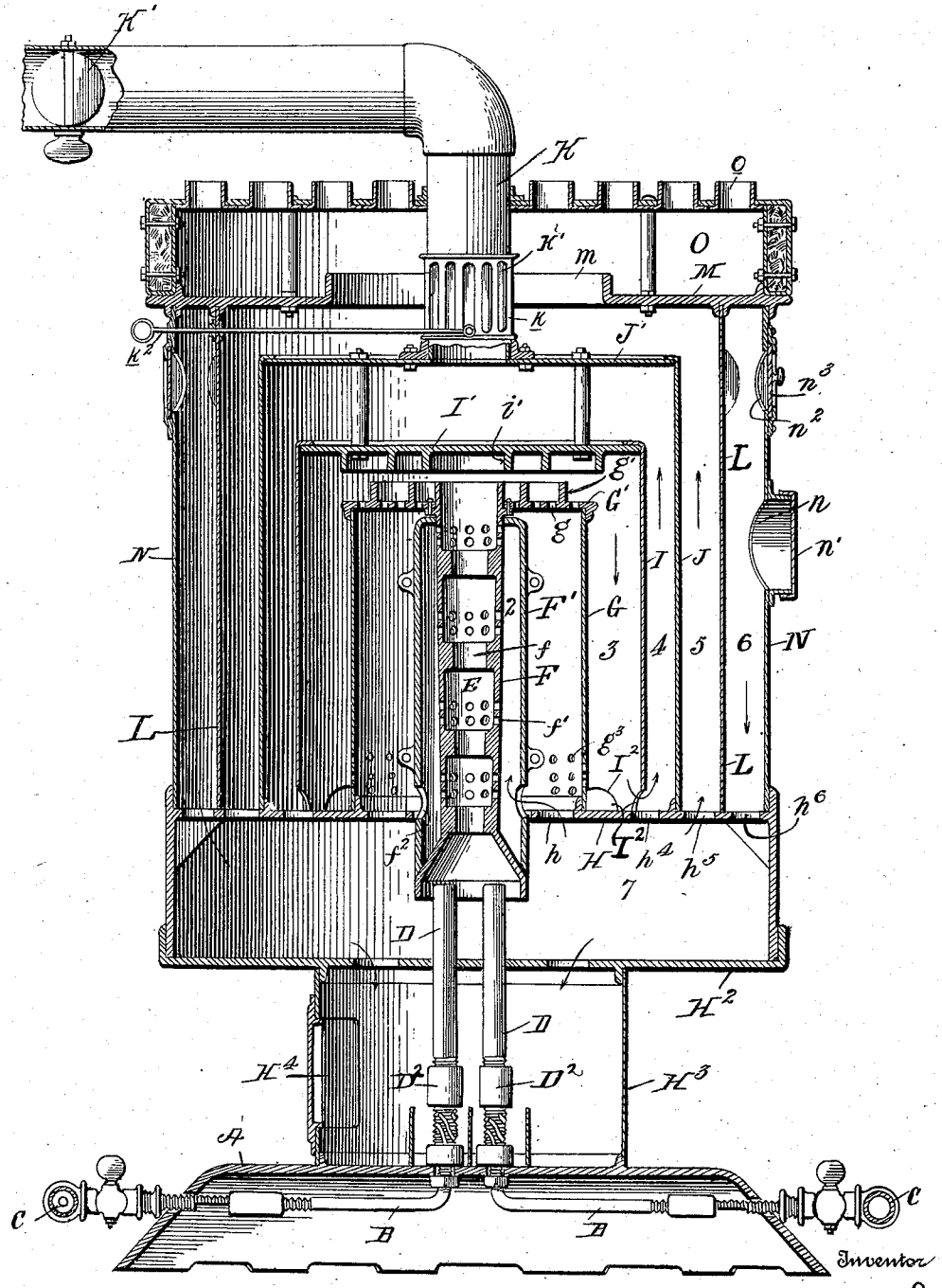
No. 867,906. PATENTED OCT. 8, 1907.

V. W. BLANCHARD.

GAS BURNING AIR HEATING FURNACE.

APPLICATION FILED JAN. 22, 1906.



THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y.

GAS-BURNING AIR-HEATING FURNACE.

No. 867,906. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed January 22, 1906. Serial No. 297,246.

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Gas-Burning Air-Heating Furnaces; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel gas burning air heating furnace for use in dwellings and large buildings and designed to take the place of the air heating furnaces now in use burning hard fuel.

The invention in particular is an improvement upon the furnace shown in my application No. 297,245 filed January 22, 1906.

In the present invention the products of combustion and the heated air may be kept separate or may be commingled and sent to the rooms to be heated according to the preference of the user.

In the present invention I provide means for entirely consuming the gaseous fuel and converting it into a useful safe heating gas by either supplying it with air in such quantities that not only are all the combustible elements in the gaseous fuel oxidized but the resultant gases are in a measure re-oxygenated by admixture of large quantities of air more than sufficient to insure thorough combustion so that the resultant gases issuing from the mouth of the furnace contain sufficient oxygen to support respiration; and such gases are well adapted for direct heating of rooms by discharging them thereinto through the ordinary air supplied in hot air pipes. The furnace is moreover provided with means for heating large quantities of air by the products of combustion but separately therefrom which air can be sent to the living rooms through the air ducts without being commingled with the products of combustion. Again, if desired, the products of combustion and the air can be commingled in the distributing chamber and together sent to the living room.

The present invention resides in the novel means and apparatus hereinafter described and claimed and the accompanying drawing illustrates a vertical central section through such an apparatus.

In the base A, of any suitable construction, are arranged primary mixing-tubes B receiving gas from supply pipes C and discharging into secondary mixing-tubes D located at the center of the base and discharged into the lower end of the burner F, which is preferably constructed substantially as described in my application No. 297,240 filed January 22, 1906, and is provided with a series of annular flanges or constrictions f and numerous perforations f'. The burner is surrounded by a jacket F′ leaving an air heating space 2 between the burner and jacket from which the air is supplied to the perforations f'.

The burner is suspended from a perforated plate G′ mounted on the upper end of a cylinder G, surrounding the burner and its jacket, which is supported upon a plate H which in turn is supported upon a plate H^2 mounted on top of a cylinder H^3 surrounding the secondary mixing tubes D and supported upon the base A.

The chamber 7 between the plates H and H^2 forms an air space which communicates with the space 2 through apertures h and openings f^2 in the jacket F′.

Surrounding cylinder G is a second cylinder I which is supported on plate H and has its upper end closed by a plate I′ located a short distance above plate G′ and preferably provided with a series of annular depending rings or ribs i' which alternate with and are opposed to similar upstanding ribs g' on plate G′, the latter plate being perforated at g to admit air to flow upwardly in jets into the space between the plates G′, I′, the air entering the cylinder G from the chamber 7 through the openings h.

The space between the cylinders G and I forms a descending flue 3 for the products of combustion and at the lower end of this flue the products of combustion pass through openings I^2 in the lower end of cylinder I into an ascending flue 4 formed between the cylinder I and a third cylinder J surrounding the same and supported upon plate H and having its upper end closed by a plate J′ in which is an opening connected with a pipe K which leads to the uptake or chimney, so that the products of combustion may escape through pipe K to the chimney.

Surrounding the cylinder J is an annular partition L fitted between the plate H and the top plate M of the casing; and exterior to the partition L is a casing N fitted between the plates H and M. The top plate M of the casing is provided with a central opening m for the escape of heated air into a distributing chamber O on top of the casing, as shown, from which chamber the hot air may be conducted off through pipes connected to the collars o on top of the distributing chamber, as shown.

The casing N is preferably made air-tight and air may be supplied thereto through an opening n connected to a cold air pipe. As shown, however, this opening n is closed by a cap n' and air is admitted into the upper end of the casing through openings n^2 regulable and closable by an annular valve n^3.

The space between the casing N and partition L forms a descending air flue 6 which connects at bottom with the chamber 7 through openings h^6 in plate H. The space between the partition L and cylinder J

forms an ascending air heating flue 5 which communicates at bottom with chamber 7 through openings h^5 in plate H.

The cylinder H^3 may be provided with an opening through which access can be had to the regulating sleeves D^2 on the tubes D, said opening being closed by a door H^4 when the apparatus is in operation.

Operation: Suitable mixtures of gas and air are admitted through the tubes B and D into the lower end of the burner, and flowing upwardly therethrough are consumed and completely oxidized by admixture with the large quantities of air entering through the jets f' substantially described in my application No. 297,240 aforesaid. The products of combustion escape from the burner into the space between the plates I', G', the former plate becoming intensely heated by reason of the impact of the hot gases thereagainst. The gases are deflected outwardly to the flue 3 and are subjected to the further action of heated jets of air rising through the apertures g in plates G', and are further heated by contact with the annular ribs i', g', the former of which tends to retain any unconsumed hydrogen gas while the latter detains any heavy unconsumed elements until thoroughly oxidized. The gases descend through flues 3 and are further admixed with air jetted thereinto through apertures g^3 on the lower end of cylinder G, and as the gases pass into flues 4 they are commingled with further fresh air admitted through openings h^4 in plate H. In this manner a greater quantity of air than is necessary to produce complete oxidation of all the combustible elements is supplied to the gases while they are intensely heated, and this mixture rises through flues 4 to the pipe K and may be discharged into the chimney if the valve K' in said pipe be open, and it be so desired by the operator. As these gases are not deleterious to health I propose to utilize them to heat the rooms and for this purpose provide a series of openings k in the pipe K within the outlet m of the hot air flues which openings are closable by a valve k', which can be operated from the outside of the case by a pull-rod k^2. When this valve k' is opened, the valve K' is closed or partly closed, and the highly heated products of combustion oxygenated by the large admixture of fresh air are diverted into the distributing chamber O and pass to the various apartments of the building through the hot air pipes. Cold fresh air is admitted into the upper ends of air flue 6 through the openings n^2 and passes down into chamber 7 where it is distributed to supply the tubes D and burner F as already explained. But the greater quantity of this air passes up through flues 5 and is heated by contact with the hot walls J of flue 4 and the hot top plate J' before it reaches the distributing chamber O. If the valve k' is closed the hot air alone will be distributed through the rooms. If the valve k' be opened the hot air and the oxygenated hot products of combustion are commingled in chamber O and together pass to the hot air registers in the building. Thus by this apparatus I am able to supply highly oxygenated hot products of combustion alone or fresh air alone, or combine the two. In the latter case every heat unit generated in the apparatus is utilized to the very best advantage and a furnace of this nature of small size will supply enough heat to warm a large building.

Having thus described my invention what I therefore claim as new and desire to secure by Letters Patent thereon is:

1. In a gas burning hot air furnace, the combination of a burner, a descending flue exterior to the burner communicating therewith, an ascending flue exterior to the descending flue communicating therewith, and means for supplying heated air to the burner and to said flues; with a distributing chamber connected with the flues, an outlet pipe and a valved opening in the outlet pipe for the products of combustion whereby the products of combustion may be admitted into said distributing chamber.

2. In a gas burning hot air furnace, the combination of a burner, a descending flue exterior to the burner communicating therewith, an ascending flue exterior to the descending flue communicating therewith, and an outlet from the upper end of the ascending flue; with means for supplying gaseous fuel to said burner, and means for supplying heated air to the burner and to said flues; with a distributing chamber, and a valved opening in the outlet flue whereby the products of combustion may be admitted into said distributing chamber.

3. In a gas burning hot air furnace, the combination of a burner, a descending flue exterior to the burner communicating therewith, an ascending flue exterior to said descending flue and communicating therewith, a valved outlet from the upper end of the said ascending flue, means for supplying gaseous fuel to said burner, and means for supplying heated air to the burner and to said flues; with a distributing chamber above the said ascending flue, an ascending air flue surrounding the said ascending flue, a descending air flue surrounding the ascending air flue, and an air chamber below the said flues communicating therewith.

4. The combination of a casing having an air chamber at its lower end and a distributing chamber at its upper end, a burner in the casing, a cylinder surrounding the burner, a second cylinder surrounding the first cylinder, and a plate closing the second cylinder above the burner, a third cylinder surrounding the second cylinder, an outlet flue connected with said third cylinder, a partition between the walls of the casing and said third cylinder forming an exterior descending air flue and an interior ascending air flue, the latter communicating with the distributing chamber, and said air chamber communicating with said flues and with the burner.

5. The combination of a casing having an air chamber at its lower end and a distributing chamber at its upper end, a burner located centrally in the casing, a cylinder surrounding the burner, a second cylinder surrounding the first cylinder, a plate closing the second cylinder above the burner, a third cylinder surrounding the second cylinder, a plate closing the upper end of the third cylinder, and an outlet flue connected with said plate; with a partition between the walls of the casing and said third cylinder forming an exterior descending air flue and an interior ascending air flue, the latter communicating with the distributing chamber, and said air chamber communicating with said flues, and with the burner.

6. The combination of a burner, the cylinder inclosing the burner, a perforated plate on the upper end of said cylinder to which the burner is attached, said plate being provided with annular upstanding ribs, a second cylinder inclosing the first cylinder, a plate closing the upper end of the cylinder above the burner and provided with downwardly projecting annular ribs the space between said cylinders forming a descending flue for the products of combustion, a third cylinder exterior to the second cylinder forming an ascending flue, and an outlet for the gases at the top of the third cylinder.

7. The combination of a burner, a cylinder inclosing the burner, a plate on the upper end of said cylinder to which the burner is attached, a second cylinder inclosing the first cylinder, a plate closing the upper end of the cylinder above the burner, the space between said cylinders forming a descending flue for the products of combustion, and a third cylinder exterior to the second cylinder forming an ascending flue, and an outlet for the gases at the

top of the third cylinder, a distributing chamber above said third cylinder, a casing surrounding said cylinders, and an annular partition between the cylinder and casing forming an exterior descending air flue and an interior ascending air flue, the latter communicating with the distributing chamber.

8. The combination of a burner, the cylinder inclosing the burner, a perforated plate on the upper end of said cylinder to which the burner is attached, said plate being provided with annular upstanding ribs, a second cylinder inclosing the first cylinder, a plate closing the upper end of the cylinder above the burner and provided with downwardly projecting annular ribs, the space between said cylinders forming a descending flue for the products of combustion, a third cylinder exterior to the second cylinder forming an ascending flue, and an outlet for the gases at the top of the third cylinder, and a distributing chamber above the third cylinder with an air chamber below all said cylinders and communicating with the burner and with the several flues, and a valve whereby the products of combustion may be kept separate from or commingled with the fresh air in the distributing chamber.

9. The combination of a burner, a cylinder inclosing the burner, a plate on the upper end of said cylinder to which the burner is attached, a second cylinder inclosing the first cylinder, a plate closing the upper end of the cylinder above the burner, the space between said cylinders forming a descending flue for the products of combustion, and a third cylinder exterior to second cylinder forming an ascending flue, and an outlet for the gases at the top of the third cylinder, a distributing chamber above said third cylinder, a casing surrounding said cylinders, an annular partition between the cylinder and casing forming exterior descending and interior ascending air flues, the latter communicating with the distributing chamber, an air chamber below all said cylinders communicating with the burner and with the several flues, and valves whereby the products of combustion may be kept separate from or commingling with the fresh air in the distributing chamber.

10. The combination of a burner, a plate surrounding the upper end of the burner, provided with upstanding rings or ribs and perforations for the admission of air, and a plate overlying the burner and provided with depending ribs for the purpose described, the depending ribs alternating in position with the upstanding ribs.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

VIRGIL W. BLANCHARD.

In presence of—

JAMES R. MANSFIELD,

L. E. WITHAM.