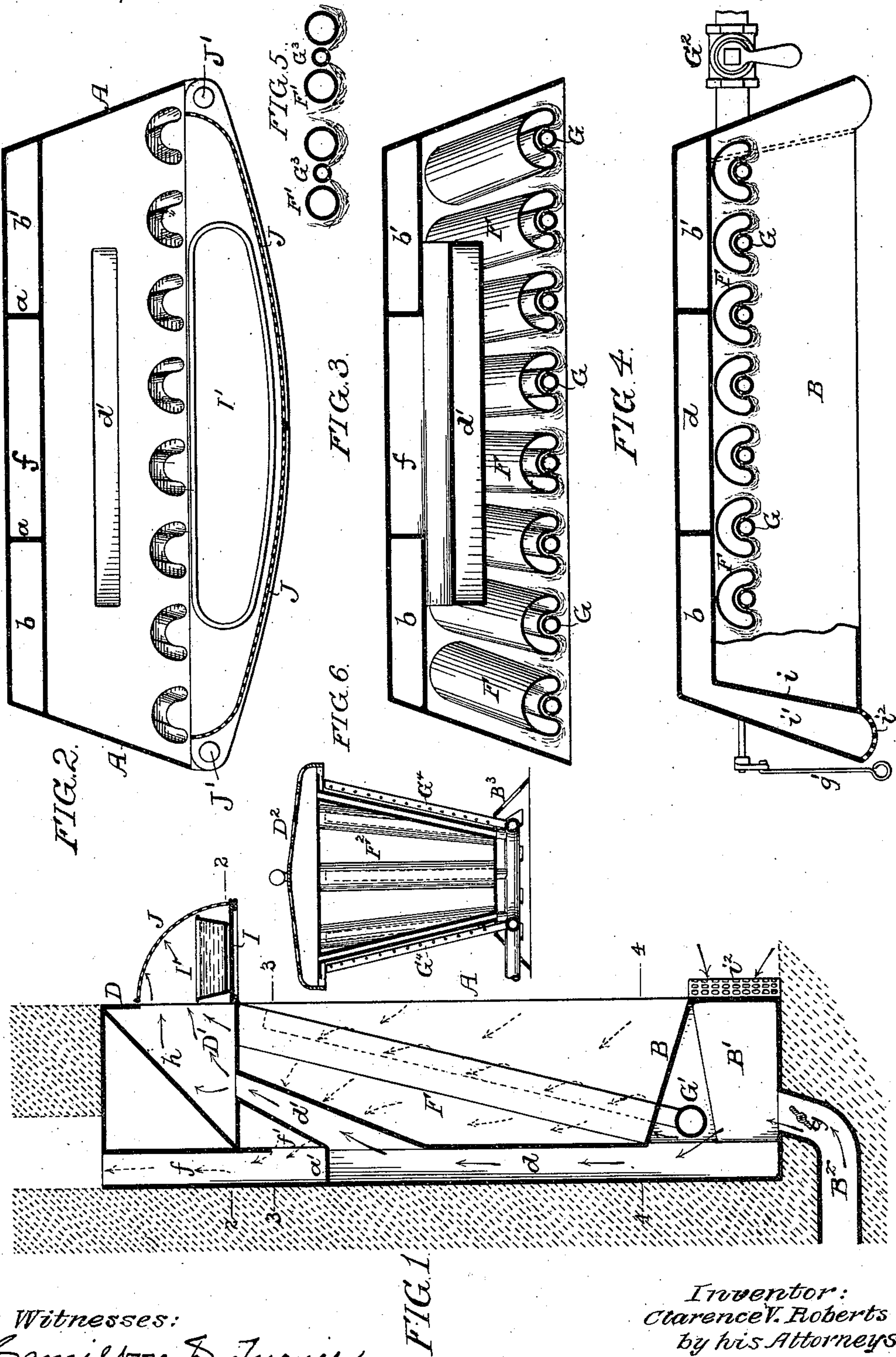


(No Model.)

C. V. ROBERTS.
VENTILATING AIR HEATER.

No. 574,271.

Patented Dec. 29, 1896.



Witnesses:
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UNITED STATES PATENT OFFICE.

CLARENCE V. ROBERTS, OF PHILADELPHIA, PENNSYLVANIA.

VENTILATING AIR-HEATER.

SPECIFICATION forming part of Letters Patent No. 574,271, dated December 29, 1896.

Application filed January 31, 1895. Serial No. 536,840. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE V. ROBERTS, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Ventilating Air-Heaters, of which the following is a specification.

The object of my invention is to construct an air heating and ventilating device for rooms or apartments in such manner that gas may be effectively used as a fuel with the maximum of heating effect and without any vitiation of the air in said room or apartment, the gas flames, on the contrary, serving as an efficient aid in effecting the proper ventilation of the room by the withdrawal of air therefrom, while the hot air projected into the room is prevented from coming into direct contact with the gas flames.

In the accompanying drawings, Figure 1 is a vertical sectional view of a heating and ventilating device constructed in accordance with my invention and adapted for use in an ordinary fireplace. Fig. 2 is a sectional plan view of the same, taken on the line 2 2, Fig. 1. Fig. 3 is a sectional plan view on the line 3 3, Fig. 1. Fig. 4 is a sectional plan view on the line 4 4, Fig. 1. Fig. 5 is a diagram illustrating a modification of my invention; and Fig. 6 is a sectional view, on a reduced scale, illustrating another modification.

A represents a casing constructed for application to a fireplace, or it may be designed as an outstanding stove, to be connected by means of a smoke-pipe with a chimney-flue, the fireplace form of the device which I have selected for illustration being used simply for convenience.

Extending laterally across the bottom of the casing A is a box B, and across the top of the casing extends a box D, and the casing has a double back divided by vertical partitions *a* into four flues *b*, *b'*, *d*, and *f*, the last being separated from the flue *d* by a horizontal partition *a'* and communicating with the combustion-chamber of the casing through an opening *f'* above said horizontal partition *a'*. The flue *d* communicates with the chamber D' within the box D through a flue *d'*, and said chamber is also in communication through a series of tubes F with a chamber

B' within the box B at the base of the casing, the latter chamber communicating through a pipe B² with the outside air, and said pipe B² having a valve or damper *g* provided with a suitable operating-rod *g'*, so that the supply of air to the chamber B' can be readily regulated. The chamber B' is also in communication with the lower end of the flue *d*. Hence the air from said chamber B' can gain access to the chamber D' both through the pipes or tubes F and through the flue *d*.

The tubes F are of concave form, as represented in Figs. 3 and 4, and in the concave front of each tube is located a burner-pipe G, these burner-pipes being closed at the upper ends, but communicating at their lower ends with a gas-supply pipe G', which extends transversely across the chamber B' and is provided on the outside of the casing A with a suitable valve G² for regulating the flow of gas.

Each of the burner-pipes G has one or more rows of openings, preferably arranged on the inner side of the pipe, as shown in Fig. 3, so that the jets of gas escaping from these openings strike the concave faces of the tubes F as soon as ignited, the flame then passing around the front of each tube and the products of combustion escaping through the spaces between the tubes so as to lap the sides of the same.

After leaving the tubes F the products of combustion strike the front wall of the rear flue *d* and then pass around the casing of the flue *d'* and escape into the discharge-flue *f* through the opening *f'*. The tubes F and the casing of the flues *d* *d'* thus become highly heated. Hence the cold air ascending from the chamber B' to the upper chamber D' through said tubes and flues likewise becomes heated and escapes from the open front of the box D into the room or apartment, an inclined deflector *h* within said box D serving to direct the heated air outward.

On a shelf I in front of the box D is a water-pan I', which is screened from view by means of a perforated casing J, preferably made in the form of opposite halves hinged at J' and susceptible of being readily separated in order to permit access to the water-pan, the contents of the latter serving, by

evaporation, to moisten the heated air as the latter flows over the pan before escaping through the perforations of the casing J.

At each end of the lower box B is a casing *i*, inclosing a passage *i'*, communicating with the corresponding side flue *b* or *b'*, this passage *i'* receiving air from the room or apartment through a perforated or grated front *i''* and discharging said air into the flues *b* *b'*, in which it ascends to the chimney, it being understood that these flues extend to the top of the heater alongside of the flue *f*.

The positive withdrawal of considerable volumes of air from points near the floor of the room or apartment is thus provided for in addition to the large volumes of air which are drawn inward and upward by the gas flames. Hence the thorough ventilation of the room or apartment is insured, and any vitiation of the air in said room or apartment by the gas flames is effectually prevented, as all of the air which comes into direct contact with said flames is caused to pass with the other products of combustion up through the flue *f* and into the chimney.

The tubes F are by preference inclined forwardly from bottom to top, so that the heat reflected thereby is thrown downwardly as well as outwardly, and said tubes are also inclined laterally, so as to provide wider spaces between the same at the top than at the bottom, in order to insure a free passage for the products of combustion in the upper portion of the combustion-chamber.

There can be no direct downflow of the volumes of heated air issuing from the box D, for the entire volume of air in front of the combustion-chamber is so highly heated by radiation and reflection that it has a constant tendency to rise. Hence there is a continuous flow of air from distant portions of the room toward the open front of the combustion-chamber, a portion of this air, as it rises in front of the combustion-chamber, being drawn inward to support the combustion of the gas flames and to supply the draft created by the chimney.

While it is preferred in all cases to provide for an inflow of external air directly to the base-chamber B', this is not absolutely essential to the broadest embodiment of my invention, as cold air may, if desired, be drawn directly from the room near the floor into the chamber B' through suitable openings in the front of the box B, and although I prefer to use the concave form of heating-tube F partially embracing the burner-pipe, as shown and described, I can in some cases locate a burner-pipe G⁵ between adjoining tubes F', as shown, for instance, in Fig. 5, and the tubes alone or the flues *d* *d'* may alone, if desired, be used as the agency for heating the air, although, of course, the use of both sets of air-ducts is to be preferred. The hot-air box D may also be dispensed with, if desired, and

the air-ducts permitted to discharge directly into the room.

In Fig. 6 I have shown a form of outstanding stove embodying my invention and having a series of tubes F² projecting upwardly from a perforated base B³, which incloses the cold-air chamber, the tubes being heated by jets from upright burner-tubes G⁴ and the structure being surmounted by a perforated cap or hood D².

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of the cold-air box, a series of upright air-ducts communicating therewith and open at their upper ends for the discharge of heated air therefrom, said air-ducts being separated laterally one from another with upright gas-burner tubes located in proximity to said air-ducts and discharging their jets toward the front of the same, whereby the products of combustion pass from front to rear of the air-ducts through the vertical spaces between the latter, substantially as specified.

2. The combination of the lower cold-air box and the upper hot-air box, upright air-ducts connecting the same and providing for the flow of air from one to the other, said air-ducts being separated laterally one from another, and upright gas-burners discharging jets in front of said upright air-ducts, whereby the products of combustion can escape through the vertical spaces between the latter, substantially as specified.

3. The combination of the cold-air box, and the concave air-ducts communicating therewith, projecting upwardly therefrom, and open at their upper ends for the discharge of heated air, with perforated gas-burner pipes disposed in the concave fronts of said ducts, substantially as specified.

4. The combination of the bottom cold-air box, the top casing inclosing the hot-air chamber, a hollow rear casing projecting upwardly from the cold-air box and inclosing a duct which communicates at the lower end with said cold-air box and at the upper end with the hot-air chamber, a series of upright air-ducts located in front of said casing and likewise communicating with said cold-air box at the bottom and discharging into the hot-air chamber at the top, and upright gas-burner pipes discharging their jets in proximity to said upright air-ducts, substantially as specified.

5. The combination of the casing inclosing the combustion-chamber and having a cold-air box at the bottom and a hot-air chamber at the top, the double back partitioned to form an air-duct in the lower portion and a discharge-flue in the upper portion, said air-duct communicating with the cold-air box at the bottom and with the hot-air chamber at the top, and said discharge-flue communicating with the combustion-chamber, upright air-

ducts communicating with the cold-air box and discharging into the hot-air chamber, and upright gas-burner pipes discharging their jets in proximity to said ducts, substantially as specified.

6. The combination of the casing having a cold-air box at the bottom, upright air-ducts communicating therewith and open at their upper ends for the escape of heated air, upright gas-burner pipes discharging their jets in proximity to said ducts, a discharge-flue communicating with the combustion-chamber, and air-exhaust flues flanking the discharge-flue, said air-exhaust flues communicating at their upper ends with the chimney and at their lower ends with air-inlets at the lower portion of the casing, substantially as specified.

7. A casing having an air-box at the bottom and a hollow back partitioned so as to divide

the chamber within it into three parts, namely, an air-duct communicating with said air-box, a discharge-flue communicating with the combustion-chamber, and ventilating-flues communicating with the chimney and with the room or apartment at the bottom of the casing, in combination with upright air-ducts communicating with the cold-air box, and open at their upper ends for the discharge of heated air, and upright burner-tubes discharging their jets in proximity to said upright air-ducts, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLARENCE V. ROBERTS.

Witnesses:

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