(No Model.) 2 Sheets—Sheet 1.

D. S. RICHARDSON.

HEATER.

No. 539,447. Patented May 21, 1895.

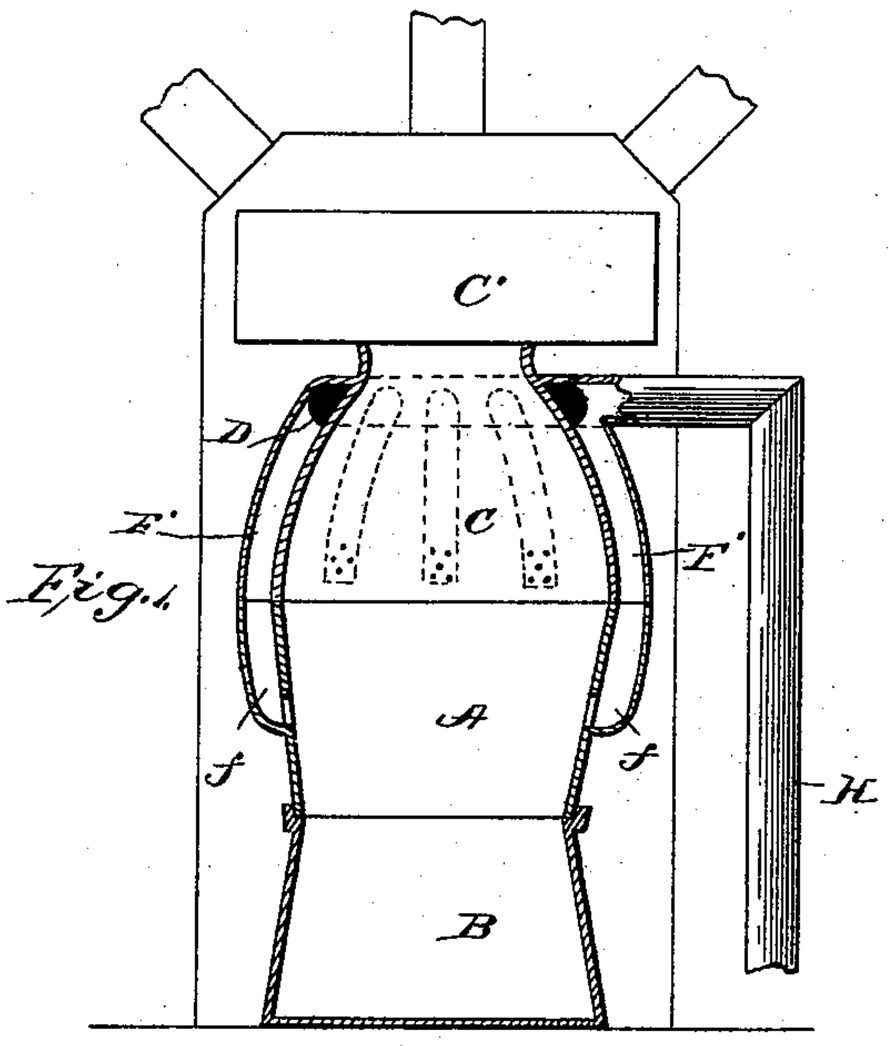

Fig. 1.

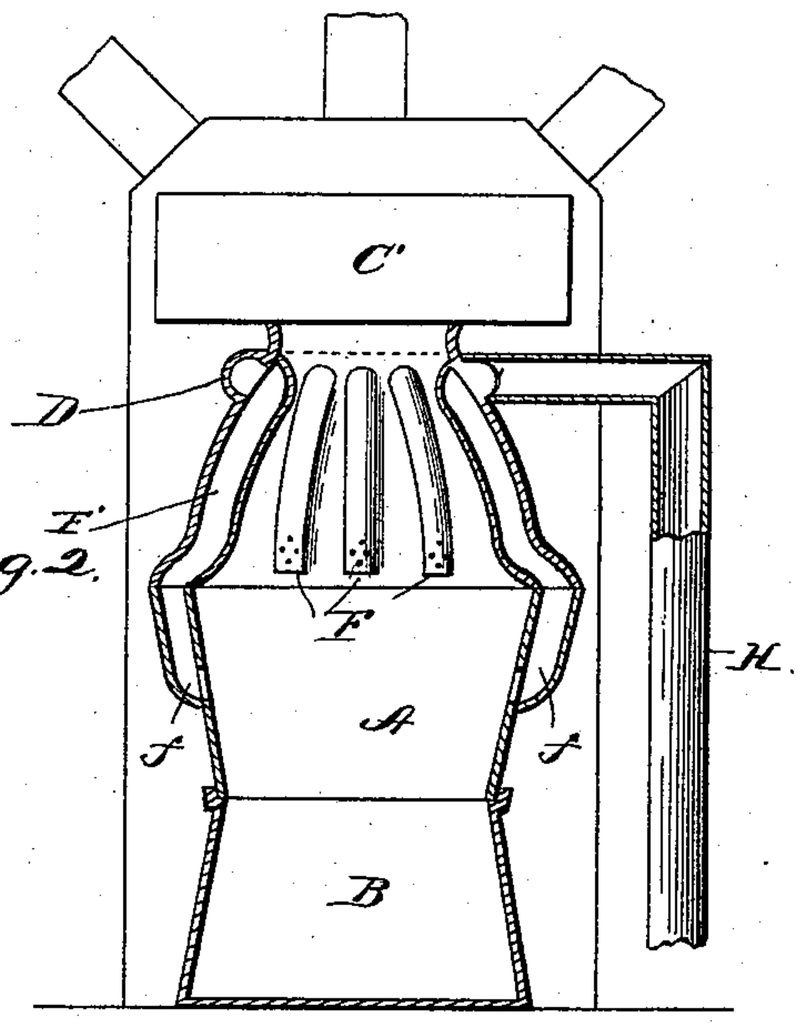

Fig. 2.

Fig. 3.

Fig. 4.

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Inventor:
Dwight S. Richardson,
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5

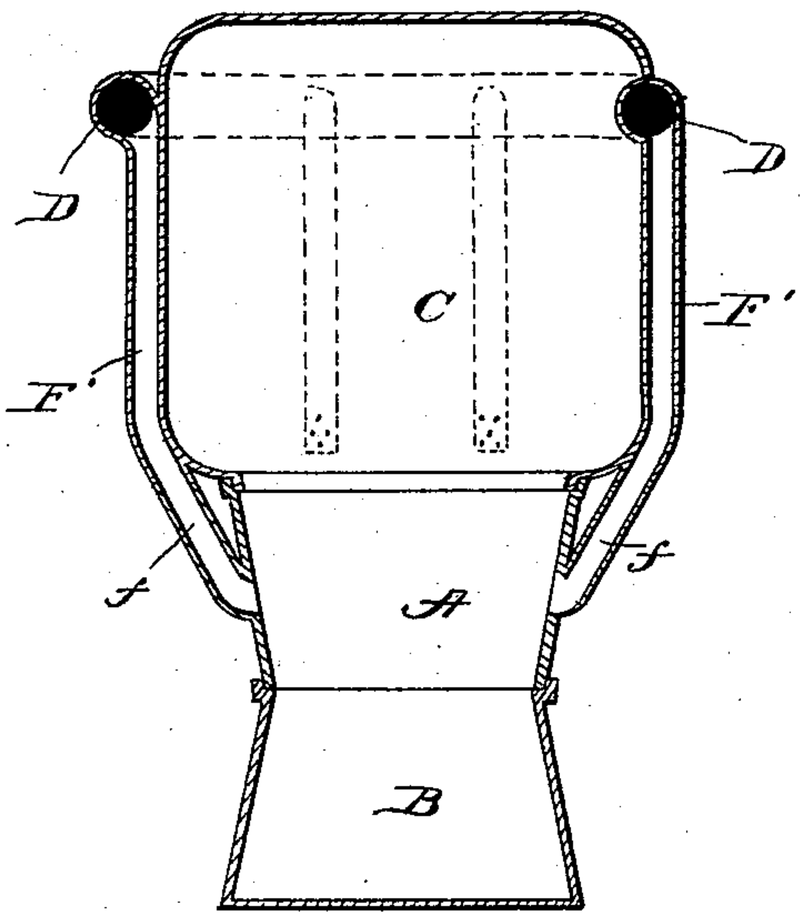


Fig. 7.

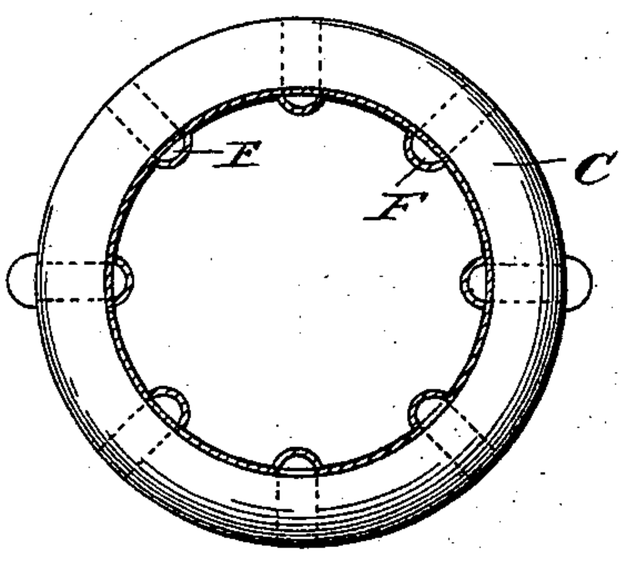


Fig. 6.

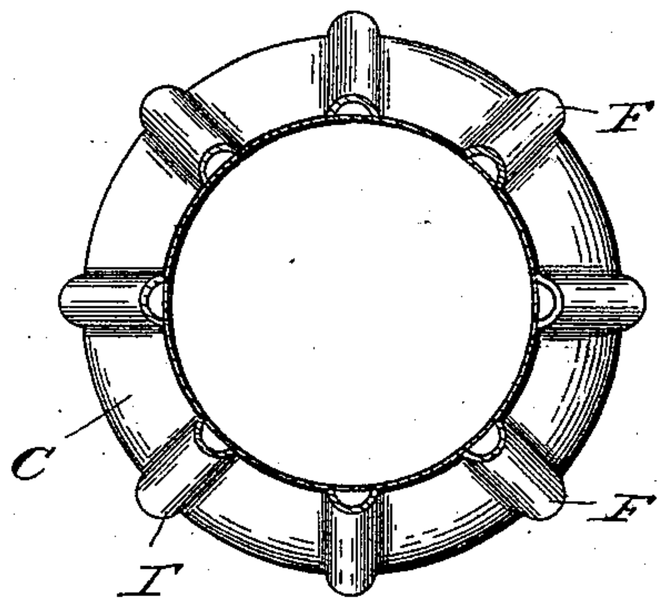


Fig. 8

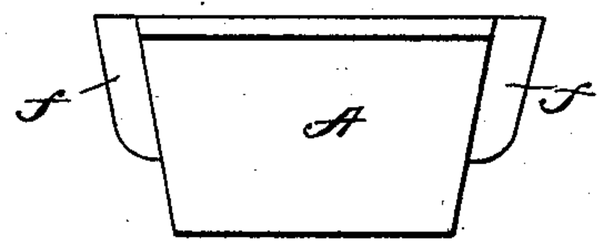
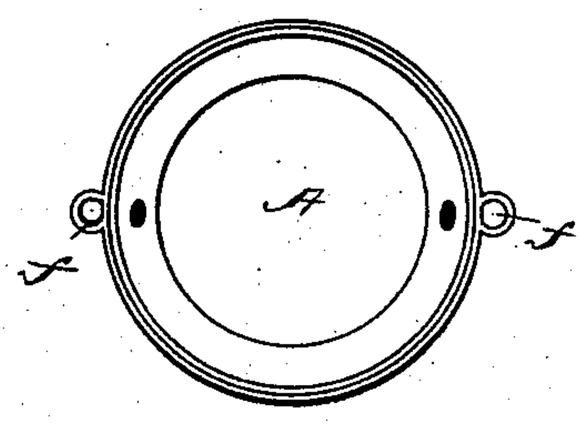


Fig. 9.



Witnesses:
J. M. Fowler Jr.
Alex. f. Stewart.

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his Attorneys.

UNITED STATES PATENT OFFICE.

DWIGHT S. RICHARDSON, OF BROOKLYN, NEW YORK.

HEATER.

SPECIFICATION forming part of Letters Patent No. 539,447, dated May 21, 1895.

Application filed December 22, 1894. Serial No. 532,721. (No model.)

To all whom it may concern:

Be it known that I, DWIGHT S. RICHARDSON, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Heaters; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates primarily to that class of heaters technically known as hot air furnaces and although I shall describe particularly its application to this class of heaters, it will be clear to those skilled in the art that features of this invention may be embodied in other styles of heaters without departing in the least from the invention.

The invention has for its object to provide an improved arrangement for supplying the requisite amount of air, at the right temperature, and at the right point, for insuring a practically perfect combustion or consumption of the fuel and of the gaseous products of combustion which would ordinarily pass off as black smoke, and while making provision for heating the incoming air to the proper temperature (approximately 800°) to secure its immediate intermixture with and consumption of the said products of combustion; to insure against the burning out of the heating devices for the air or the chilling or cooling effect thereon of the cold air flowing up around the outside of the fire pot.

Primarily, the invention may be said to consist in a heating device situated contiguous to and communicating with the combustion chamber of a heater, the said device being so placed as to be out of the influence of the cold air passing up, around the outside of the fire pot.

Further the invention consists in arranging the heating device contiguous to and about the combustion chamber above the lower portion of the latter, with discharge ducts leading down therefrom and opening into the lower portion of the combustion chamber.

Finally, the invention consists in certain novel details of construction and combinations and arrangements of parts all as will be now described and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figures 1, 2, 3, 4, and 5 are vertical sections through heaters embodying my invention, the portions not directly connected with the invention being in outline. Figs. 6 and 7 are horizontal sections through the combustion-chamber shown in Figs. 1 and 2, respectively. Figs. 8 and 9 are a side elevation and top plan view, respectively, of the preferred form of fire-pot, over which the combustion-chamber is located.

Like letters of reference in the several figures indicate the same parts.

The letter A indicates the fire pot which may be of any ordinary character, although that shown in Figs. 8 and 9 and to be presently described is preferred.

B is the ash pit and C the combustion chamber located above the fire pot, and in which the gaseous products of combustion from the body of fuel in the fire pot are consumed and the heat therefrom radiated both through the walls of the chamber itself and from the drum C′ located above the combustion chamber and provided with any ordinary arrangement of flues for extracting the heat from the said gaseous products before they are allowed to escape into the stack and thence into the open air.

Ordinarily, though not necessarily, the combustion chamber is contracted toward the top where it opens into the drum, to form a dome-like structure as shown clearly in Figs. 1, 2, 3 and 4 and about the upper portion of this dome in such position as to be out of the influence of cold air passing up around the fire pot and bottom of the combustion chamber, or in other words in such position as that the air coming in contact with its wall shall have been thoroughly heated, I locate the air heating device D for supplying the hot air to the combustion chamber. In Figs. 1, 2 and 3 it is shown as a chamber or duct formed with the combustion chamber, either by being cast integral therewith or by being made separately and applied thereto in such manner as that no air space intervenes between the interior of the combustion chamber and air heating chamber, in fact. In Fig. 3 the air heating chamber is shown as lying half within the combustion chamber.

In Fig. 4 the air heating chamber D is lo-

cated in proximity to but out of direct contact with the combustion chamber and the construction shown in Fig. 5 differs from what has been described only in the form of the combustion chamber itself, which is more nearly cylindrical or has its side walls more nearly perpendicular and overhangs the side of the fire pot to some extent. In this, as well as in all the forms illustrated, it will be observed that the air heating chamber is located about the combustion chamber above the lower position thereof in such position as to prevent any chilling effect from cold air passing up around the fire pot. Any air passing into contact with the outside of said chamber is thoroughly heated and instead of cooling tends to raise the temperature of the air passing into the combustion chamber.

From the air heating chamber a series of ducts F F′ lead down to the point or points where the highly heated air is to be discharged. The ducts F end preferably a short distance above the surface level of the fuel and the ducts F′, one or more in number, lead down to the fire pot.

For discharge orifices the ducts are preferably provided with a series of small perforations which serve to distribute and cause a more perfect commingling of the heated air with the products of combustion above the surface of the fuel causing the said products to be effectually consumed and as a consequence greatly augmenting the total heating capacity of the furnace.

The particular location of the downwardly extending ducts is not material, save that to secure the best results they should be in contact with or be formed in the wall of the combustion chamber as shown for instance in Figs. 6 and 7. I prefer to form them on the inside of the combustion chamber as shown in Figs. 2 and 7 where the full benefit of the heat from the combustion may be gained in bringing the air to the proper temperature before its discharge.

Where the fire pot and combustion chamber are made separate as is usually if not always the case, the ducts F′ have extensions *f* formed on the outside of the fire pot, which portions *f* open into the fire pot below the surface of the fuel, as shown, to supply the requisite amount of oxygen to the incandescent fuel.

The duct H for supplying air to the heating device should have its entrance below the level of the fire pot in order to prevent reversing or the escape of products of combustion when the upward draft of the chimney is light or is reduced for any reason, as well as to insure a proper supply of air as before described.

In the practical operation of a heater embodying my invention it will be found that the air for supplying oxygen to the gaseous products in the combustion chamber is heated during its passage through the hot air chamber and down the exit ducts, to the proper temperature to immediately combine with the gaseous products, without deadening the same at all, the result being that a practically perfect combustion of said products takes place.

By reason of the location of the heating devices there is little or no danger of the same burning out, and at the same time they are removed from the chilling influence of the cold air passing up outside of the fire pot.

In the claims for convenience in distinguishing between the chamber for supplying the warm air to the building and the heating chamber for supplying highly heated air to the combustion chamber, I shall term the latter the air superheating chamber.

Having thus described my invention, what I claim as new is—

1. The combination with a hot air furnace, of an air superheating device exposed to the air within the hot air chamber of the furnace and situated contiguous to and above the lower portion of the combustion chamber and having discharge openings into the lower portion of the combustion chamber, the said air superheating device being so located as to be out of the direct influence of cold air entering the heating chamber of the furnace; substantially as described.

2. The combination with a hot air furnace of an air superheating chamber exposed to the air within the hot air chamber and extending about and near the upper portion of the combustion chamber and out of the influence of cold air entering the hot air chamber of the furnace, and discharge ducts leading down from said air superheating chamber and discharging into the combustion chamber in proximity to the fire pot; substantially as described.

3. The combination with a hot air furnace embodying a fire pot and domed combustion chamber, of an air superheating chamber exposed to the air in the hot air chamber of the furnace and extending about and near the upper portion of the dome out of the influence of cold air passing up outside the fire pot, and discharge ducts leading from said air superheating chamber into the furnace for supplying air for combustion; substantially as described.

4. The combination with a hot air furnace embodying a fire pot and combustion chamber, of an air superheating chamber exposed to the air in the hot air chamber of the furnace and located about and near the upper portion of the combustion chamber and one wall of which is formed by the wall of the said combustion chamber, and discharge ducts leading from the air superheating chamber down to the lower portion of the combustion chamber to supply air for combustion; substantially as described.

5. The combination with a hot air furnace embodying a fire pot and domed combustion chamber, of an air superheating chamber exposed to the air in the hot air chamber of the furnace and located about the upper portion of the dome out of the influence of the cold

air passing up outside the fire pot, one wall of the air superheating chamber being formed by the wall of the combustion chamber, and discharge ducts extending from the air superheating chamber down to the lower portion of the furnace for supplying air for combustion; substantially as described.

6. The combination with a hot air furnace embodying a fire pot and combustion chamber, of an air superheating chamber exposed to the air in the hot air chamber of the furnace and extending about the upper portion of the combustion chamber and ducts leading therefrom down the inner side of the combustion chamber for supplying air for combustion; substantially as described.

7. The combination with a hot air furnace embodying a fire pot and combustion chamber, of an air superheating chamber extending about the upper portion of the combustion chamber and ducts formed in the wall of the combustion chamber leading from the air superheating chamber down to the lower portion of the furnace for supplying air for combustion; substantially as described.

8. The combination with a hot air furnace embodying a fire pot and combustion chamber, of an air superheating chamber formed in the wall of the upper portion of the combustion chamber and ducts formed in the wall of the combustion chamber leading from the air superheating chamber down to the lower portion of the furnace for supplying air for combustion; substantially as described.

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