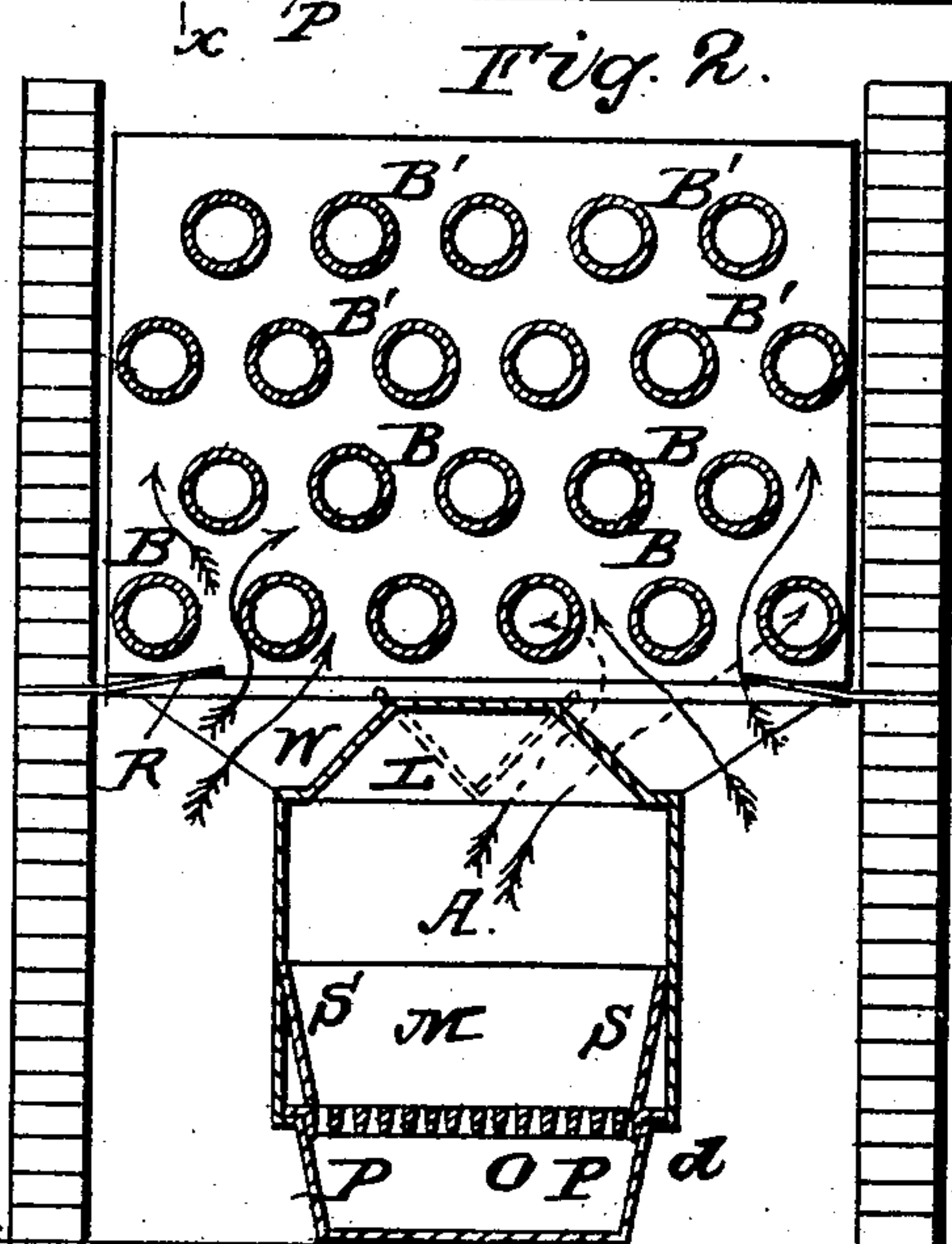
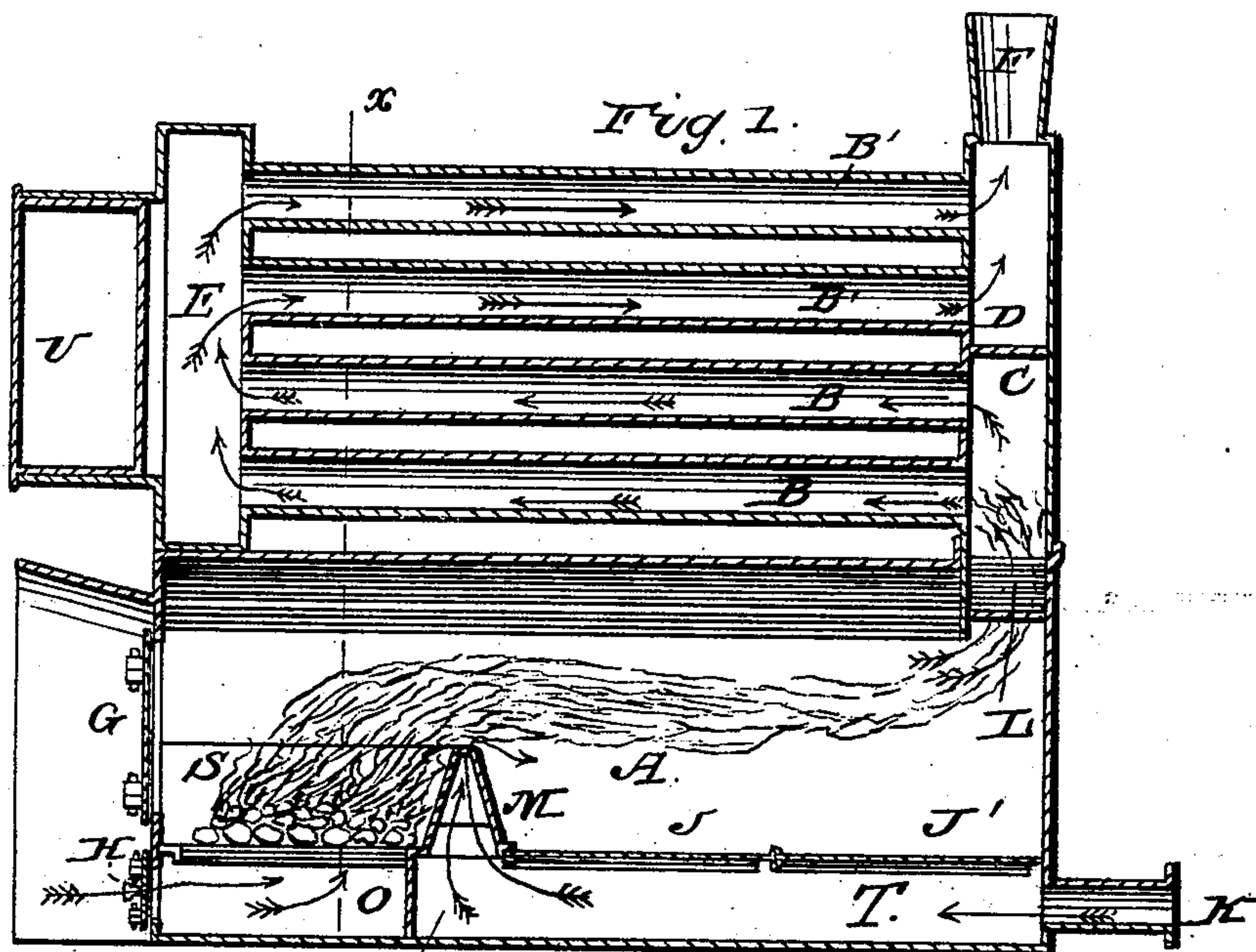


O. N. HART.
Hot-Air Furnace.

No. 92,822.

Patented July 20, 1869.



Witnesses
R. F. Dodge
L. Hailer

Inventor
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United States Patent Office.

ORANGE N. HART, OF WINONA, MINNESOTA.

Letters Patent No. 92,822, dated July 20, 1869.

HOT-AIR FURNACE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ORANGE N. HART, of Winona, in the county of Winona, and State of Minnesota, have invented certain new and useful Improvements in Hot-Air Furnaces for heating buildings; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use my invention, I will proceed to describe it.

My invention relates to hot-air furnaces for heating buildings; and consists in the novel construction and arrangement of the fire-box and smoke-flues, whereby I obtain a large radiating surface; of the gas-burning apparatus, by which it is adapted to burning various kinds of fuel; also in placing deflectors, to direct the air in and among the smoke-flues; and in several minor details, all as hereinafter described.

Figure 1 is a longitudinal vertical section through the centre of my furnace.

Figure 2, a vertical cross-section on the line $x x$ of fig. 1.

I construct a cast-iron fire-box, A, of the form shown in the drawings, and of any suitable size, and locate in it, at one end, the fire-grate a , and provide a large door, G, opening into the fire-box above the grate, and a small door, h , provided with and opening into the ash-pit O, below the grate, all as shown in fig. 1.

Across the fire-box, immediately in the rear of the grate, I locate a gas-burning device, M, resting on the ledges d , and along the upper sides of the grate a , place fire-plates S, to prevent the case from being burned out, and so as to admit the passage of air up behind them.

Back of the gas-burning device, I locate removable plates J J', resting on the ledges d , so as to extend from the gas-burner to the back end of the furnace, and divide off from the fire-box A, a cold-air chamber T. This cold-air chamber T is separated from the ash-pit by a vertical plate, P, and receives air through a pipe, K.

The gas-burner is of the form of an inverted V, with its lower side communicating with the cold-air chamber T, and is provided with a fine slit or opening along its upper edge, as shown in fig. 1.

At the back end of the fire-box, I provide an escape-flue, W, for the passage of the flame and smoke.

This flue increases in width from the fire-box upward, and is of about twice the width of the fire-box at its widest part.

At the centre of this flue, I place a V-shaped diaphragm, L, to divide the ascending flames.

On top of the flue W, I locate a rectangular drum, C, open at its lower side, and divided at its middle by a horizontal partition, D.

On top of the front end of the fire-box A, I place another rectangular drum, E, provided in its front with a large opening, filled by a hollow iron door or drawer, U, as shown in fig. 1.

The drums C and E, I connect by a series of horizontal flues or pipes, B B', twenty or more in number.

In the drum C, the lower flues B open below the partition D, and the upper series, B', above the partition, as shown in fig. 1.

The furnace thus constructed, I surround on four sides with brick-work, leaving a space of about an inch between the walls and the sides of the drums, and provide the doors and the opening filled by U with projecting flanges extending through the brick-walls in the usual manner, so that access may be had from the outside.

On the inside of the brick-work, a little below the lower flues B, I secure inwardly-projecting plates R, inclining upward from their outer to their inner edges, as shown in fig. 2. These plates extend along both sides and across the back end of the furnace.

When the furnace is situated where the air is very damp, I draw the air to be heated through one or more pipes, entering the brick-work near the floor, from outside the building.

When located where the air is sufficiently dry, I form a series of openings through the brick-work, near the floor, and use air from the surrounding room.

My furnace operates as follows:

The fire being built on the grate a , the smoke and flame pass back over the gas-burner M, and meeting at the orifice of said burner a current of fresh air from the chamber T, which, uniting with the gas, increases its combustion.

The flame and smoke pass along to the back of the fire-box, and up through flue M (being divided or spread in their ascent by the diaphragm L,) into the lower portion of the drum C, when they are stopped by partition D, and caused to pass back through flues B to the drum E, and from thence along through the flues B', to the upper portion of drum C, and into the stack F, the red arrows on the drawing indicating the course of the smoke, and the blue arrows that of the air.

The course of the air to be heated is indicated by the blue arrows in fig. 2, entering near the base, and ascending in contact with the fire-box, and passing up around the drums and flues, and out at the top, whence it may be conveyed, in suitable pipes, wherever required.

The ascending air, next the walls, strikes against the plates R, and is directed inward among the flues, thus insuring its being thoroughly heated.

When short wood or coal is to be used as fuel, the gas-burner is arranged as shown in the drawing, but when longer wood is used, the burner is moved back, and placed between the plates J and J', the plate J

being moved forward against the grate; or, when necessary, as in using very long wood, may be placed back of both plates, thus always letting in the cold air just where the flame leaves the fuel, it being necessary, when the gas-burner is moved back, to add additional fire-plates S. Or, if preferred, additional sections of grate-bars may be substituted for the plates in front of the gas-burner, when the latter is moved back.

By removing the hollow drawer U, access is had to the open ends of all the flues, which may be readily cleaned by inserting proper instruments through the opening.

A furnace constructed in this manner, presents a very large radiating surface, will burn various sizes and kinds of fuel, and is so arranged that all of its parts may be easily reached for cleaning.

Having thus described my invention,
What I claim, is—

1. The adjustable gas-burner M, and plates J and J', arranged as described, for the purpose of adapting the furnace to the use of various sizes and kinds of fuel, as herein set forth.

2. The combination of the furnace or fire-chamber, constructed as herein described, with the air-heating devices, consisting of the drums D E, flues B and B', with the stationary diaphragm D and deflector L, all constructed and arranged substantially as described.

ORANGE N. HART.

Witnesses:

WM. W. BILLSON,
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