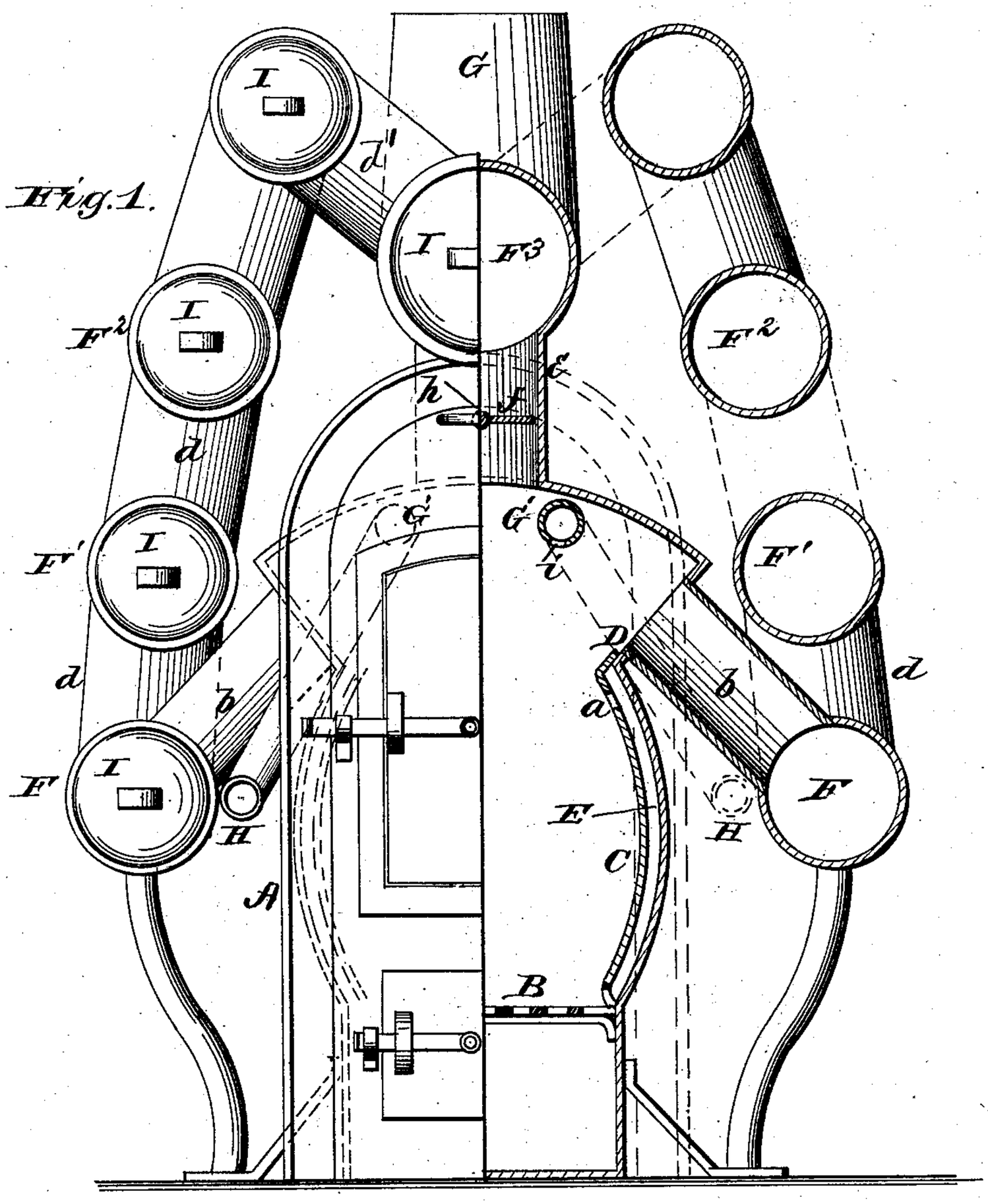
2 Sheets—Sheet 1.

O. C. STAFFORD.
Hot-Air Furnace.

No. 224,488. **Patented Feb. 10, 1880.**

Fig. 1.



WITNESSES
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2 Sheets—Sheet 2.

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Fig. 3.

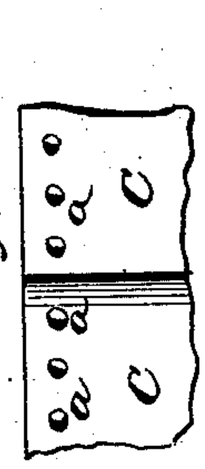
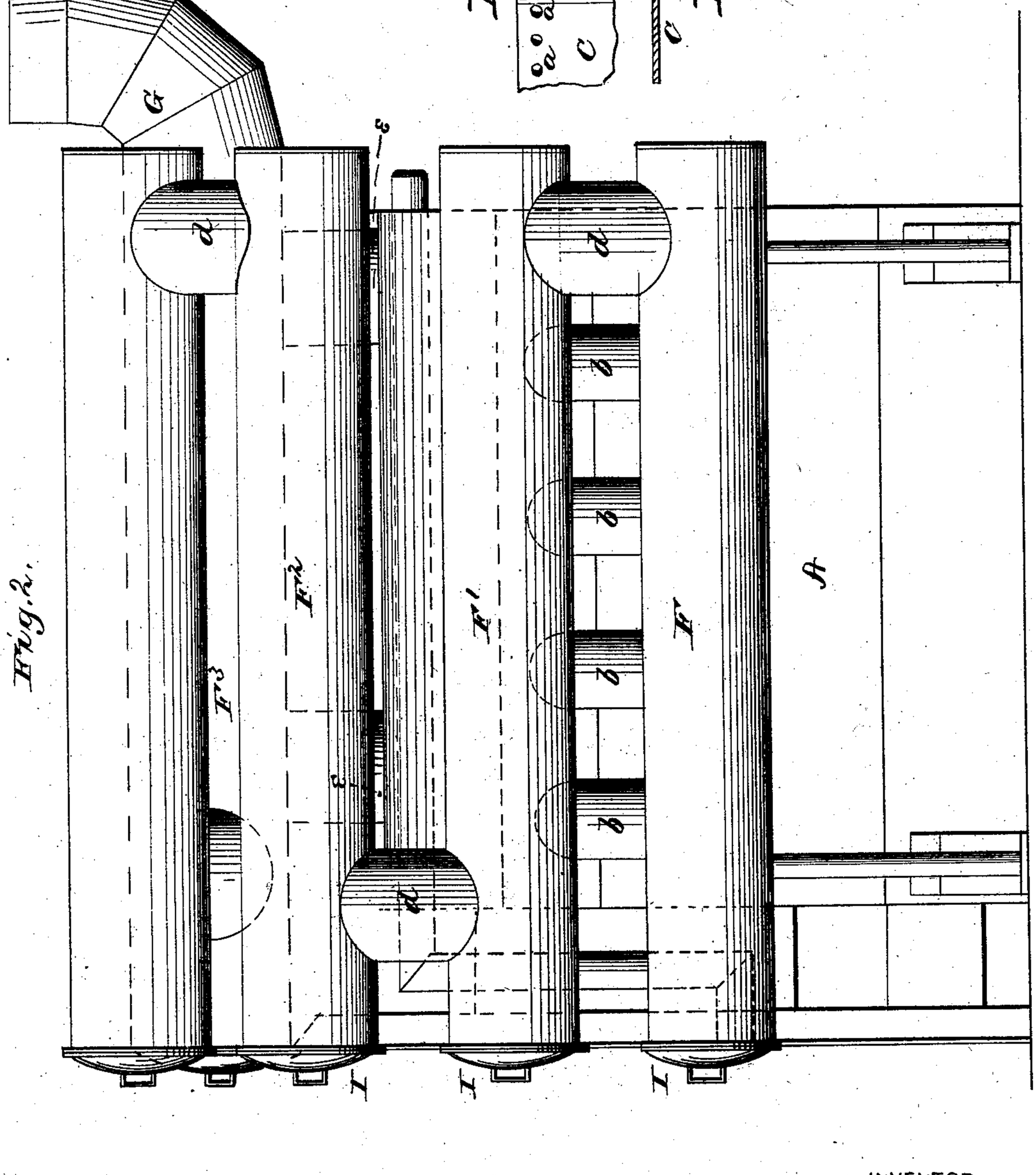


Fig. 4.

Fig. 2.



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Alexander Keaton
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UNITED STATES PATENT OFFICE.

OSCAR C. STAFFORD, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO L. STAFFORD, OF SAME PLACE.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 224,488, dated February 10, 1880.

Application filed May 10, 1879.

To all whom it may concern:

Be it known that I, OSCAR C. STAFFORD, of Minneapolis, in the county of Hennepin, and in the State of Minnesota, have invented certain new and useful Improvements in Hot-Air Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in a hot-air furnace composed of certain parts constructed, arranged, and combined as hereinafter more fully set forth, and pointed out in the claims.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a front elevation, partly in section, showing my improved hot-air furnace. Fig. 2 is a side view of the same. Figs. 3 and 4 are detailed views, showing the construction of the lining.

A represents the shell of the furnace, formed oval at the top, as shown, and provided with the grate B, above which is the fire-chamber, and below the same the ash-pit. Above the grate B on each side is a cast-iron lining made of a series of vertically-divided sections, C C, of suitable form to be put in through the door at the front.

The sections of the lining are made to overlap each other at the adjacent edges, as shown in Figs. 3 and 4, and when any section becomes burned out it can easily be removed and another put in through the front door of the furnace without taking the furnace apart.

Above the sectional lining on each side of the furnace is formed a ledge, D, in the shell, which ledge connects the upper edge of the lining with the shell, and thus forms an air-chamber, E, on each side of the furnace. Into these chambers air is admitted at the bottom from the ash-pit below the grate, which air keeps the linings comparatively cool, and the air becoming heated in said chambers escapes through perforations *a a* along the upper edges of the linings into the fire-box to aid combustion.

From the ledge D, on each side of the furnace, a series of pipes, *b b*, lead outward and downward at an angle of about forty-five degrees into a horizontal radiator-flue, F, at the side of the furnace. This flue F has a connection, *d*, near its rear end with a similar flue, F′; this connects near the front end with another flue, F²; and so on, any number of horizontal radiating-flues may be used on each side of the furnace, with connections at alternate ends, until finally the two systems connect by downwardly-inclined pipes *d′* with a central flue, F³, on top of the furnace at or near the front end. The rear end of this flue F³ has an elbow, G, to form connection with the chimney or other outlet for the products of combustion, which pass first through the two systems of flues.

It will be noticed that in each system of radiator-flues, as described, there are two places—one at the bottom and one at the top—where the draft is downward. This materially retards the passage of the products of combustion, so that the greatest possible percentage of heat will be utilized in heating the different flues before the said products escape through the chimney.

The top or center flue, F³, has also connections, *e e*, for carrying the products of combustion directly from the furnace to said flue. In these connecting-pipes *e* are dampers *f*, which are operated from the front of the furnace by a single rod, *h*. When these dampers are open the products of combustion will pass directly from the furnace to the flue F³; but when the dampers are closed the products of combustion must pass through the short pipes *b* on both sides, and through the two systems of radiating-flues to the central flue, F³, and from this to the chimney.

Attached to or near the under side of the top of the furnace A are two longitudinal pipes, G′ G′, arranged one near each side. These pipes are perforated on their under sides, as shown at *i i*, and their front ends connect with pipes H H, so that cold air will pass into said

pipes G′, and through the perforations *i* into the furnace on top of the fire for the purpose of completing the combustion.

One end of each radiator-flue is made to project through the brick wall which incloses the furnace, and this end of each flue is provided with a cap, I, thereby making it a very easy matter to clean them often, so as to radiate the heat better.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hot-air furnace, the vertically-divided sectional lining C, having the sections provided with openings *a* near the top, and constructed to overlap each other, in combination with the furnace-shell A, formed with a ledge, D, on each side, and forming air-chambers E, substantially as and for the purposes herein set forth.

2. In a hot-air furnace, the combination of a fire-box provided with a ledge, D, on each side, as described, two systems of radiating-flues connected with the fire-box by downwardly-inclined pipes *b*, and a central radiating-flue connected with the top flue of each system by a downwardly-inclined pipe, *d′*, substantially as and for the purposes herein set forth.

3. As an entirety, a hot-air furnace composed, essentially, of the furnace A, provided with a ledge, D, on each side, as described, the lining C, provided with top openings, *a*, air-chambers E, radiator-flues F F′ F² F³, with connecting-pipes, and the perforated air-pipes G′, all constructed, arranged, and combined substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of May, 1879.

O. C. STAFFORD.

Witnesses:
ZAC STAFFORD,
ELISHA MORSE.