J. W. CRARY.

Hot-Air Furnace.

No. 161,208. Patented March 23, 1875.

FIG. 1.

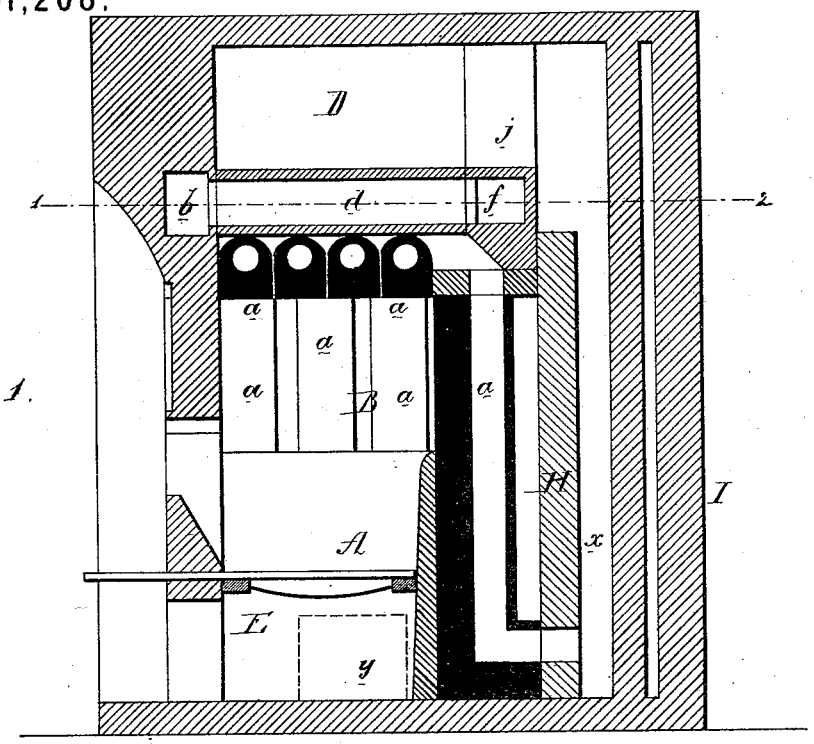


FIG. 3.

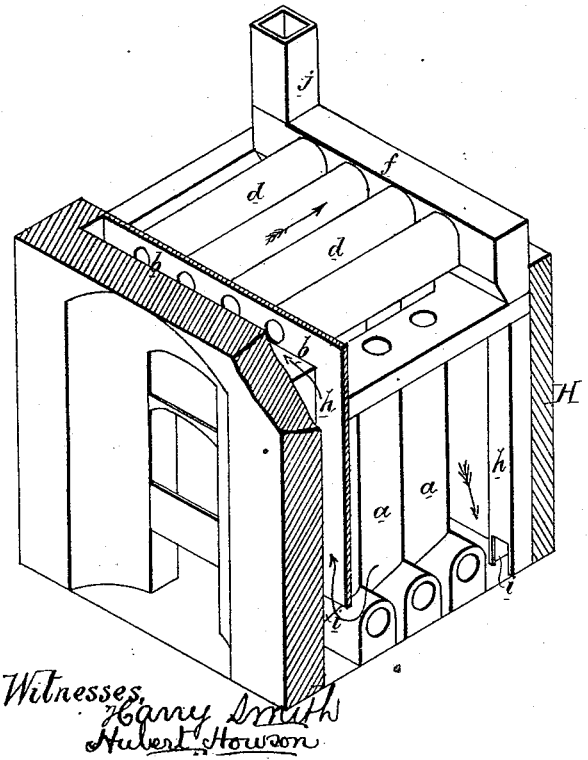
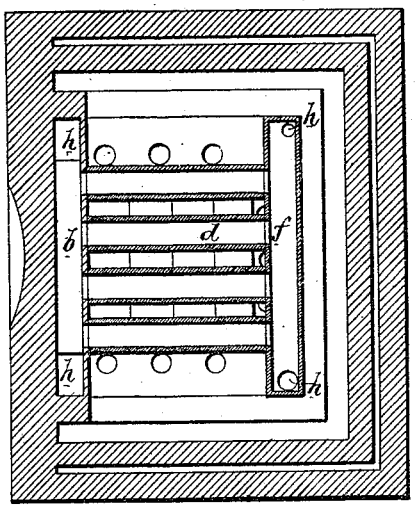


FIG. 2.



Witnesses,
Harry Smith
Hubert Howson

John W. Crary
by his Attys.
Howson and Sons

UNITED STATES PATENT OFFICE.

JOHN W. CRARY, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **161,208**, dated March 23, 1875; application filed December 14, 1874.

To all whom it may concern:

Be it known that I, JOHN W. CRARY, of Philadelphia, Pennsylvania, have invented certain Improvements in Heating-Furnaces, of which the following is a specification:

The objects of my invention are, first, to obtain from a heater a more wholesome heated air than such as is obtained by contact with metal surfaces; and, secondly, to so construct a heating-furnace that the products of combustion will be thoroughly distributed over the heating-chamber before passing to the outlet-flue; and these objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a vertical section of my improved heating-furnace; Fig. 2, a sectional plan on the line 1 2, Fig. 1; and Fig. 3, a perspective diagram of the furnace.

I have ascertained by experiment that by using unburnt clay in place of iron for air-heating surfaces of furnaces, the warm air is of a much more wholesome and agreeable character than such as is heated by contact with metal surfaces. The clay pipes are merely dried before being placed in position in the furnace, the heat to which they are afterward subjected never being sufficient to bake them.

The manner in which I prefer to arrange the pipes in a furnace is shown in the drawing, in which A represents the fire-place; B, the combustion-chamber, which is above and around the fire-place; D, the hot-air chamber, which surrounds the combustion-chamber; and E, the ash-pit. In the combustion-chamber, at each side of the fire-place, as well as at the back and top of the same, I arrange the air-heating pipes *a*, all of these pipes, with the exception of those forming the roof of the fire-place, communicating at the bottom with the air-chamber *x*, between the inner wall H and outer wall I of the furnace. This chamber *x* communicates with the exterior air through an opening, *y*, in the outer wall of the furnace, and also communicates at the top with the hot-air chamber D, so that the chamber acts in conjunction with the heating-pipes in warming the air admitted through the aperture *y*. This arrangement of the apertures for controlling the course of the products of combustion is an especial feature of my invention, and therefore demands more minute description.

In the front wall of the furnace, above the level of the top row of heating-pipes, I form a longitudinal gas passage or flue, *b*, which communicates, through pipes *d*, with a similar flue, *f*, at the back of the furnace. Both of these flues *b f* communicate at each end with gas-passages *h*, which extend to the bottom of the combustion-chamber, and are there provided with openings *i*, through which the products of combustion enter. The passage *f* has also at one end an outlet-flue, *j*, communicating with the chimney. By thus arranging the outlet-apertures the products of combustion are caused to circulate freely throughout the entire interior of the combustion-chamber, and in intimate contact with the heating-pipes *a* and partition-wall H.

Although I have described the heating-pipes *a* as being composed entirely of unburnt clay, it will be evident that they could be constructed of other material provided with a lining of unburnt clay without departing from my invention.

I claim—

1. In a heating-furnace, the combustion-chamber B and air-heating pipes *a* of clay, arranged at the sides, back, and top of said combustion-chamber, and combined with the surrounding air-space *x* and hot-air chamber D, all substantially as and for the purpose set forth.

2. The combination, in a heating-furnace, of a combustion-chamber, B, flues or passages communicating with the chimney, and openings *i*, forming communications between said flues and the combustion-chamber near the lower corners of the latter, as and for the purpose set forth.

3. The combination of the passages *b* and *f*, the connecting-pipes *d*, vertical flues *h*, having openings *i*, and exit-flue *j*, communicating with said passage *f*, all as and for the purpose set forth.

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

J. W. CRARY.

Witnesses:

HUBERT HOWSON,

HARRY SMITH.