A. H. BARTLETT.

Hot-Air Furnace.

No. 12,305. Patented Jan. 30, 1855.

Fig. 3.

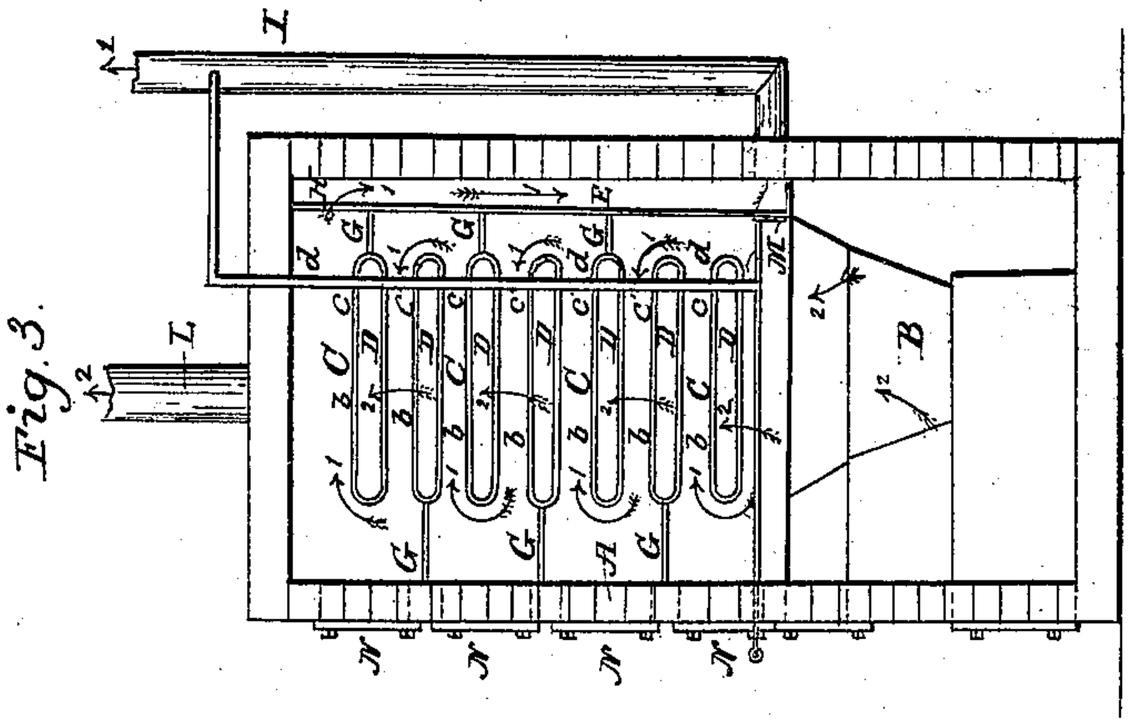


Fig. 2.

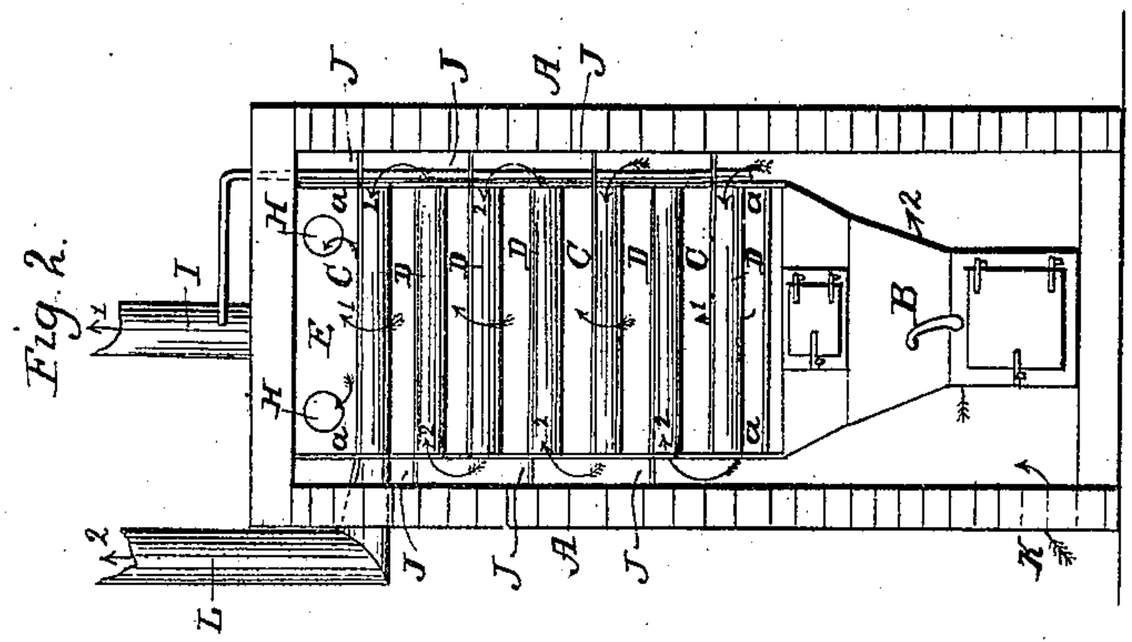
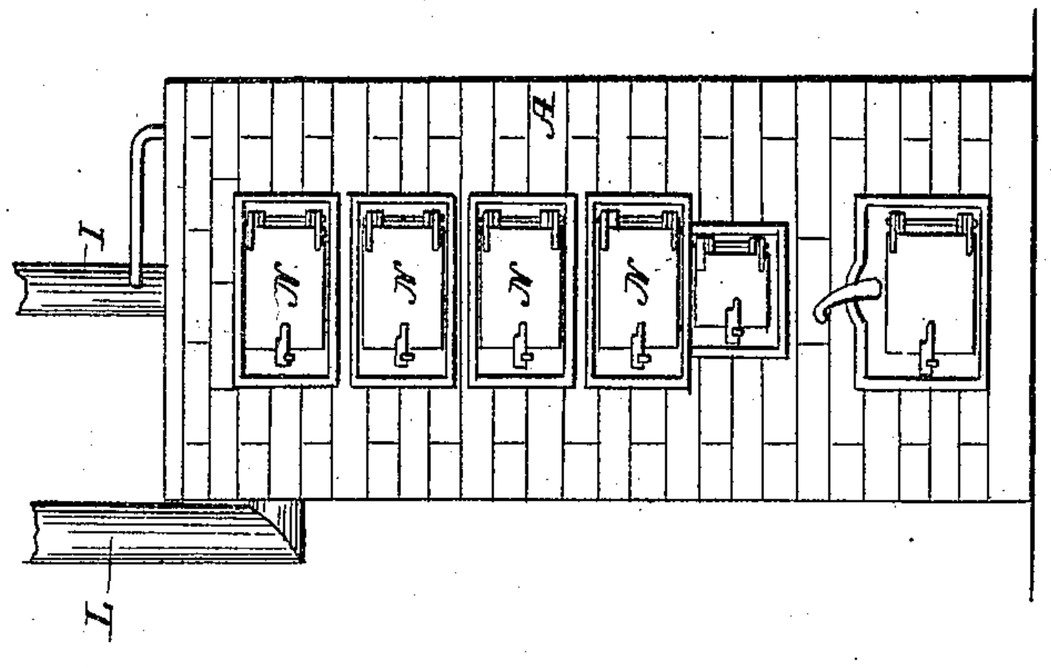


Fig. 1.



UNITED STATES PATENT OFFICE.

ABEL H. BARTLETT, OF KINGS BRIDGE, NEW YORK.

HOT-AIR FURNACE.

Specification of Letters Patent No. 12,305, dated January 30, 1855.

To all whom it may concern:

Be it known that I, ABEL H. BARTLETT, of Kings Bridge, in the county of Westchester and State of New York, 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 of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a front view of my improved furnace. Fig. 2 is also a front view of ditto, the casing or masonry nearest the eye being removed. Fig. 3 is a side view of ditto, with the casing or masonry nearest the eye removed.

Similar letters of reference indicate corresponding parts in the several figures.

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

A represents the casing or wall of masonry which surrounds the furnace.

B is the fire chamber and C is the flue of the fire chamber which is of serpentine form and passes around flat horizontal chambers D which form the air heating chamber, the horizontal chambers D extending the width of the chamber or compartment which forms the flue C both ends of the chambers D communicating with the space between the side plates (*a*) of the flue C and the masonry A as shown in Fig. 2. A suitable space is left between the chambers D to allow the flue C to be of the requisite size.

E is the back plate of the flue C or rather the upright portion of it a space being left between the plate E and masonry A said space being a continuation of the flue C and having a downward draft as will be hereafter explained.

G are plates which are connected alternately to the sides of the chambers D and the back plate E and masonry A at the front of the furnace see Fig. 3 for the purpose of causing the draft and heat from the fire chamber B to ascend in serpentine form and between the chambers D.

H H are openings at the upper part of the plate E and I is the smoke pipe which communicates with the lower part of the space between the plate E and masonry A as shown in Fig. 3.

J, Fig. 2, are plates which are connected alternately to the upper ends of the chambers D and the masonry A for the purpose of causing the cold air to ascend in serpentine form through the chambers D.

K, see Fig. 2, is an opening at the lower part of the masonry A, through which the cold air is admitted and L is a pipe which communicates with one end of the uppermost chamber D.

M is a damper at the lower part of the space between the plate E and masonry A, see Fig. 3.

If a direct draft is required at first in order that the fire may be made quickly, the damper M is opened and the draft is direct from the fire chamber B to the smoke pipe I. When the damper M is closed the draft and heat pass upward through the flue C in the direction indicated by arrows 1—the plates G causing the heat to pass upward in serpentine form and horizontally between the chambers D, the heat passes over the uppermost chamber D and through the openings H and down the space between the plate E and masonry A into the pipe I. The cold air meanwhile passes through the opening K at the lower part of the masonry A and ascends, passing in one end of the lower chamber D and out at the opposite end, and in consequence of the plates J ascends in serpentine form through the chambers D as indicated by the arrows 2, see Figs. 1 and 2 and the air in passing through each of the chambers D is subjected in broad thin layers to two broad heated surfaces of the flue C and when the air reaches the uppermost chamber D it passes in a perfectly heated state into the hot air pipe L. Thus it will be seen that the air to be heated and the draft and heat from the fire chamber pass upward simultaneously in their respective passages and cross each other at right angles, the air in the chambers D being exposed to two heated surfaces of the flue C viz above and below and the horizontal portions of the flue C communicating heat to two surfaces of the chambers D, also above and below. This will be understood by referring to Fig. 3. The cold air therefore that enters the opening K passes over a great area of heating surface in passing upward to the pipe L.

The air heating chambers D are lined or are formed of two thicknesses of metal so as to leave a space (*b*) around each chamber, see Fig. 3, and these spaces are connected by small horizontal pipes (*c*) to a vertical pipe (*d*) which communicates with the smoke pipe I. By this arrangement the air

in passing through the chambers D is prevented from being impregnated with any deleterious gases that may escape through the pores of the iron of the flue C, for when it has passed through the inner thickness of metal into the spaces (*b*) it will instead of passing through the outer thickness, naturally pass through the small pipes (*c*) into the vertical pipe (*d*) and thence into the smoke pipe I. The heated air therefore passes into the pipe L in a perfectly pure state and may be conveyed therefrom through suitable pipes to the apartments designed to be heated.

The doors designated by N in Figs. 1 and 3 are merely for the purpose of enabling the flue C to be cleaned.

I do not claim, of itself, as new in a hot air furnace, preventing the admixture of deleterious gases, generated on hot metallic surfaces, with the warmed fresh air, by means of jacketed air spaces interposed between the surfaces exposed to the action of the fire and the air to be heated; nor yet, providing an escape pipe or passage to carry off the deleterious gases, but

I do claim as new and useful herein, and desire to secure by Letters Patent,

1. In combination with the arrangement herein specified of the serpentine fire and air flues or courses (C and D), providing each horizontal flue with an escape casing or jacket connected by branch or otherwise (each horizontal casing) with a gas pipe or pipes uniting them with the chimney as shown and described; whereby a sure and quick escape is established for the deleterious gases at each horizontal flue travel, where the fire and air are retarded in taking their upward course and the air being heated consequently more exposed to absorption of deleterious gas; and whereby the stratum of air being heated, and traveling in succession the several horizontal flues (D), is protected from admixture with it of the deleterious gas throughout its entire exposure to heat in the furnace as represented and described.

2. I claim the arrangement of the fire flues (C) and air heating passages (D) herein specified and traversing at right angles to each other, when combined with division plates, or their equivalents, so arranged that the one stratum or current of air to be heated passes upward throughout the several hot air passages or channels in a serpentine course similar to, but at right angles with, the course given the flame, simultaneously passing upward in the fire flues (C), over, under and between the hot air passages or flues (D) as shown and described.

ABEL H. BARTLETT.

Witnesses:
S. H. WALES,
I. G. MASON.