

P. L. WEIMER.

HOT-BLAST OVENS FOR FURNACES.

No. 173,522.

Patented Feb. 15, 1876.

Fig. 1.

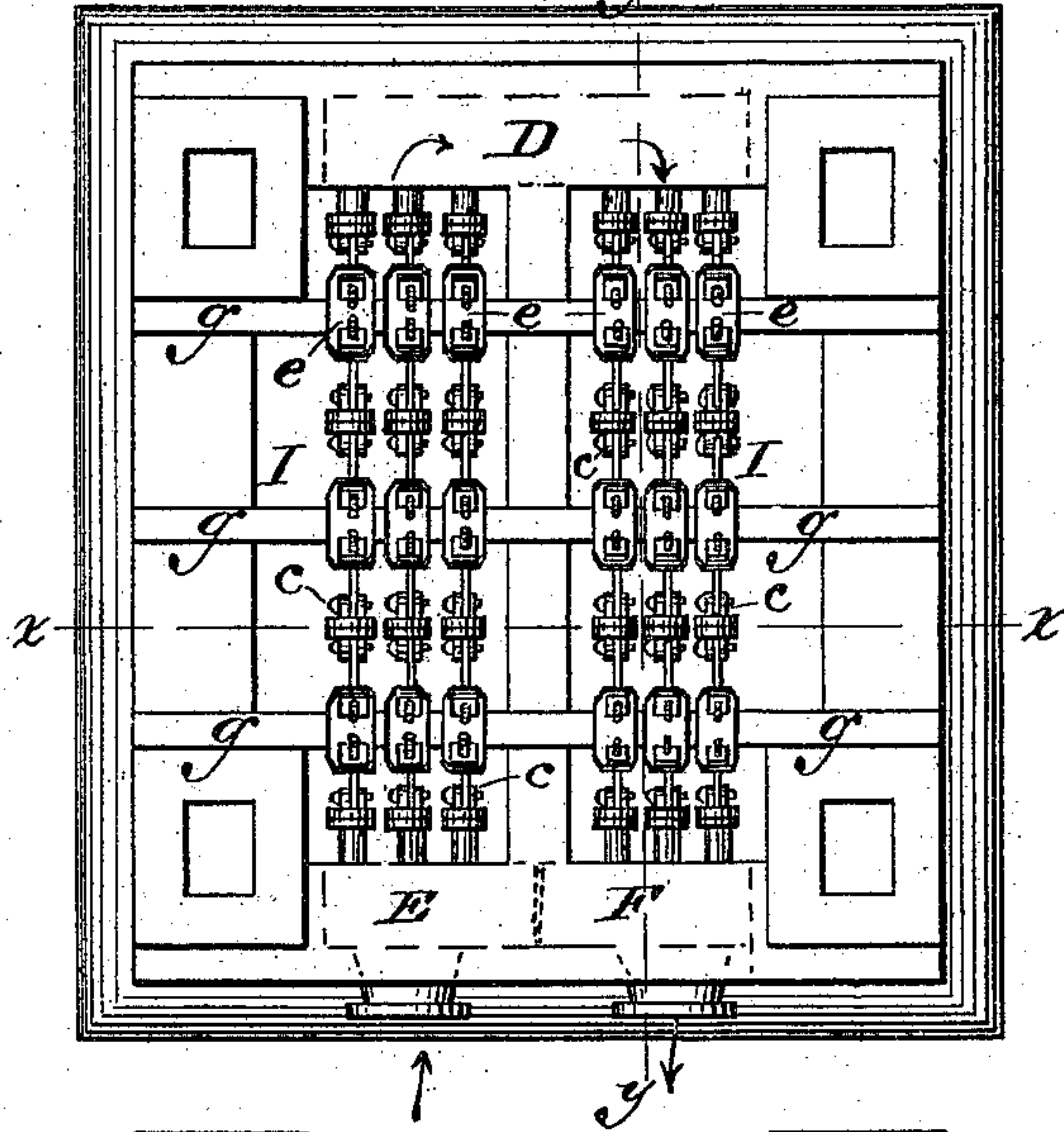
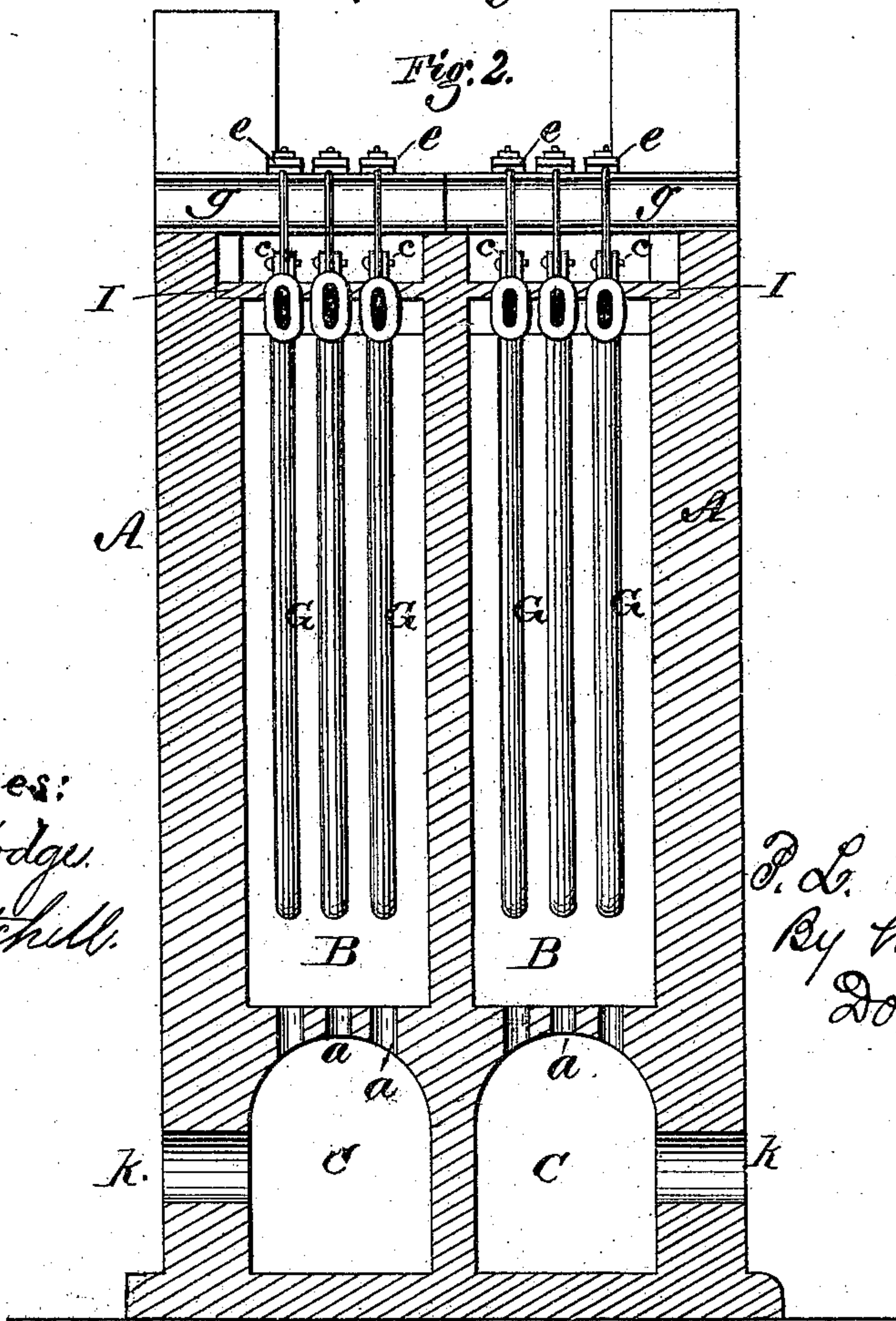


Fig. 2.



Witnesses:
Hull W. Dodge.
Donna Titchell.

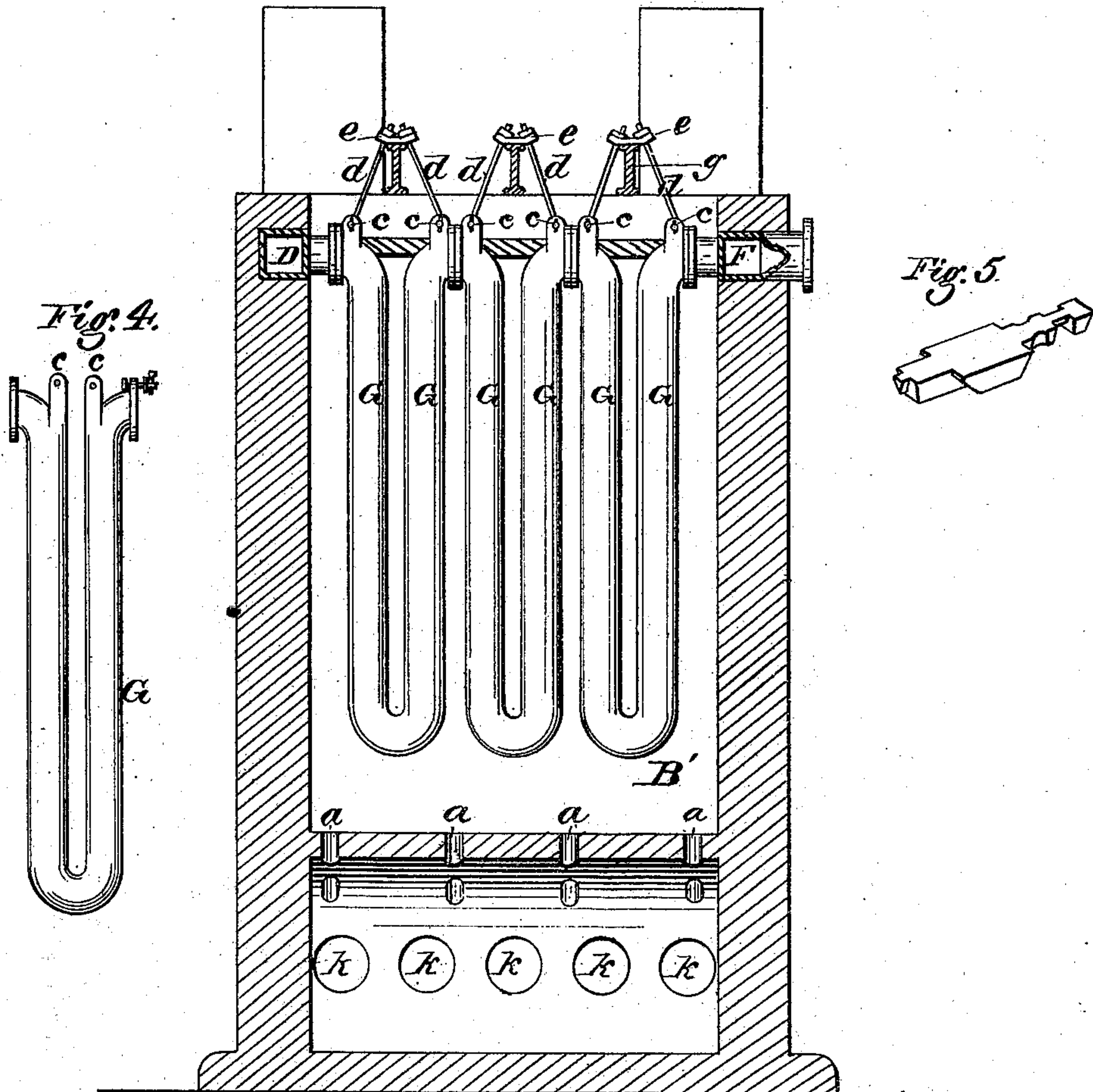
Inventor:
P. L. Weimer.
By his attys.
Dodge & Son.

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Fig. 3.



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UNITED STATES PATENT OFFICE

PETER L. WEIMER, OF LEBANON, PENNSYLVANIA.

IMPROVEMENT IN HOT-BLAST OVENS FOR FURNACES.

Specification forming part of Letters Patent No. 173,522, dated February 15, 1876; application filed December 23, 1875.

To all whom it may concern:

Be it known that I, PETER L. WEIMER, of Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain Improvements in Hot-Blast Ovens for Smelting-Furnaces, &c., of which the following is a specification:

The object of my invention is to overcome the various objections incident to hot-blast ovens of the ordinary construction; and to this end it consists in suspending the air-pipes from above; in connecting them at their upper ends; in the combination of separate pipe-chambers, having their pipes arranged to communicate with each other; in providing the combustion-chambers with a series of gas-inlets distributed along the sides; and in the special manner of suspending the pipes, arranging the mains or communicating-pipes, closing the tops of the pipe-chambers; and in other details, all of which improvements, with the advantages arising therefrom, will be hereinafter more fully explained.

The hot-blast ovens now in use consist almost universally of a series of vertical pipes standing in a fire-brick chamber upon horizontal mains or pipes embedded in the masonry, the heating of the pipes being effected by the hot gases and vapors ascending through openings from a combustion-chamber, which receives the heating-gas at one or both ends. In practice these stoves are found to be objectionable, and in the following respects: First, as it frequently happens that the vertical pipes are subjected to a higher temperature on one side than on the other, they have a tendency to warp or twist, and as this is assisted by the superincumbent weight of the pipes themselves they frequently have their integrity destroyed; second the mains or bed pipes, being necessarily embedded in the masonry in order to protect them from the oxidizing action of the heating-gases, they add nothing to the heating-surface, while at the same time they are heavy and expensive, a source of constant annoyance on account of their frequent leakage, due to the expansion and contraction of the metal and the settling of the masonry, and a serious obstruction to the proper arrangement of the flues leading from the combustion to the pipe chambers;

third, the construction does not permit the ready substitution of new pipes in place of those which may become defective; and, fourth, the gas, being admitted only at the end or ends of the combustion-chamber, produces an uneven temperature therein, and heats the different pipes unequally. The first two difficulties I overcome by suspending the vertical pipes from their upper ends instead of supporting them from below, and connecting them by small pipes or mains at the top instead of by the usual large mains at the foot. The suspension of the pipes overcomes the tendency to warp and twist, permits them to be made of far greater length than when arranged as usual, allows the objectionable mains in the masonry to be dispensed with, and permits the flues or passages from the combustion to the pipe chamber to be located as desired. The third objection I overcome by providing the combustion-chamber with numerous inlet-openings distributed at regular intervals along its side, and provided generally with valves or dampers to control the admission of the gas and render the combustion uniform in all parts of the chamber.

The fourth and last-mentioned objection I overcome by making the pipe in U-shaped sections, suspending them separately, and connecting them by key-bolts, so that either section may be released and removed quickly, and without affecting the others.

In the accompanying drawings I have represented the form, construction, and arrangement of parts which I consider the best adapted for practical operation.

Figure 1 represents a top plan view of my furnace; Fig. 2, a vertical section of the same on the line *xx*; Fig. 3, a section of the same on the line *yy*; Fig. 4, a view of one of the sections of pipes; Fig. 5, a view of one of the bricks used to form the top of the furnace.

A represents the walls of the furnace, which is divided by a central partition-wall into two pipe-chambers, B, and two combustion-chambers, C, the latter located below the former, and communicating therewith by the flues and openings *a*, as shown. G G represent my pendent air-pipes, consisting of a series of U-shaped sections, as in Fig. 4, having their ends turned outwardly, and connected with

each other, as shown in Fig. 3, so as to form a continuous serpentine pipe. These pipes may be of any required length and number, but in the drawings I have shown three of them arranged side by side in each pipe-chamber, each one consisting of three of the sections. Each section of pipe is provided at its upper ends with ears C, to which there are attached suspending-rods D, which latter are connected at their upper ends to plates *e* seated upon iron cross-beams *g*, which latter have their ends supported upon the walls of the furnace, as shown in Figs. 1, 2, and 3, each section of pipe being thus sustained independently of the others. In order to facilitate the removal of the sections their ends are flanged, planed true on the face, and secured together by key-bolts, which can be easily loosened and removed with a hammer. At the top of the oven, on one side, I place a pipe or main, D, connecting the pipes of the two chambers with each other, and on the other side of the oven I place two short pipes or mains, E and F, provided with openings or mouth-pieces, and connecting the former to the pipes of chamber B, and the latter to those of chamber B', as shown. The air, entering the main E, passes up and down through the pipes of chamber B, and thence through the main D and the pipes in chamber B', and finally out through the main F. The top of the chamber is closed by fire-bricks I, one of which is shown in Fig. 5, adapted to fit around and between the upper ends of the vertical pipes, as shown, the brick forming a cheap and durable top, which can be readily opened to prevent the removal of any particular section of pipe desired, and also a protection for the joints and suspending-rods.

In order to secure an even temperature in the combustion-chambers they are each provided, as shown in Figs. 1 and 3, with a number of gas inlets, *k*, distributed along the side, and with a corresponding series of the flues leading to the pipe-chamber above, so that the gas entering the chambers at the various points produces a uniform flame and temperature in all parts of the same, and thereby insures a uniform temperature of all the pipes. In the furnaces of ordinary construction, receiving the gas at the end or ends only, the temperature of the end pipes is always greater than that of the others; and as the natural tendency of the heating-vapors is toward the hottest pipes they are soon burnt out; but by my distribution of gas-inlets this evil is entirely overcome.

In order to give a better control of the temperature in different parts of the chamber the gas-inlets will each be provided, in practice, with a gate or valve, to control the admission of gas.

It is obvious that, in applying my improvements, the pipes may be made of any other suitable form, and arranged and suspended in any other manner, provided they hang freely from their upper ends in the chambers, the in-

vention consisting not merely in the special form and arrangement of parts, but, broadly, in the employment of pendent or suspended air-pipes in a hot-blast oven. It is also obvious that the pendent pipes may be used in hot-blast ovens having a different arrangement of pipe and combustion chambers; that my special combustion-chamber for producing a uniform temperature can be employed with air-pipes arranged in the usual manner upon supporting-mains; and that the number of pipe-chambers can be increased to any required extent, provided the pipes of each chamber communicate with those of the adjacent chambers. By means of my various improvements I completely overcome the difficulties experienced with the common ovens, and produce an oven which possesses great durability under the highest temperatures, which contains the minimum amount of metal, which is cheap and simple in its construction, which permits the ready substitution of new pipes, which permits the use of pipes of great length, which permits the pipes to be suspended high enough above the incoming vapors to prevent the usual destructive oxidation, and which applies the heat to the greatest possible advantage.

Having thus described my invention, what I claim is—

1. A hot-blast oven, having its air-conducting pipes suspended therein, substantially as shown and described.

2. In a hot-blast oven, a pendent air-conducting pipe, substantially as herein shown and described.

3. In a hot-blast oven, the combination of a heating-chamber, a combustion-chamber communicating therewith, and an air-conducting pipe or pipes, hung by their upper ends within the heating-chamber, substantially as shown and described.

4. In a hot-blast oven, the combination of the pipes G, provided with the lugs *c*, and suspended by the rods *d* from the beams *g*, substantially as shown.

5. In combination with the pipes suspended in the heating-chamber, the roof I, formed of brick, adapted to and sustained by the pipes, as and for the purpose described.

6. In a hot-blast oven, the combination of the heating-chamber B containing the series of air-pipes G, and the combustion-chamber C, provided with the series of flues and corresponding series of gas-inlets, for the purpose of equalizing the temperature, as set forth.

7. In a hot-blast oven, the combination of two or more communicating series of air-pipes mounted in separate heating-chambers, substantially as shown.

8. The combination of the two pipe or heating-chambers B C, combustion-chamber, two series of pipes, and the mains D, E, and F.

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Witnesses:

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