

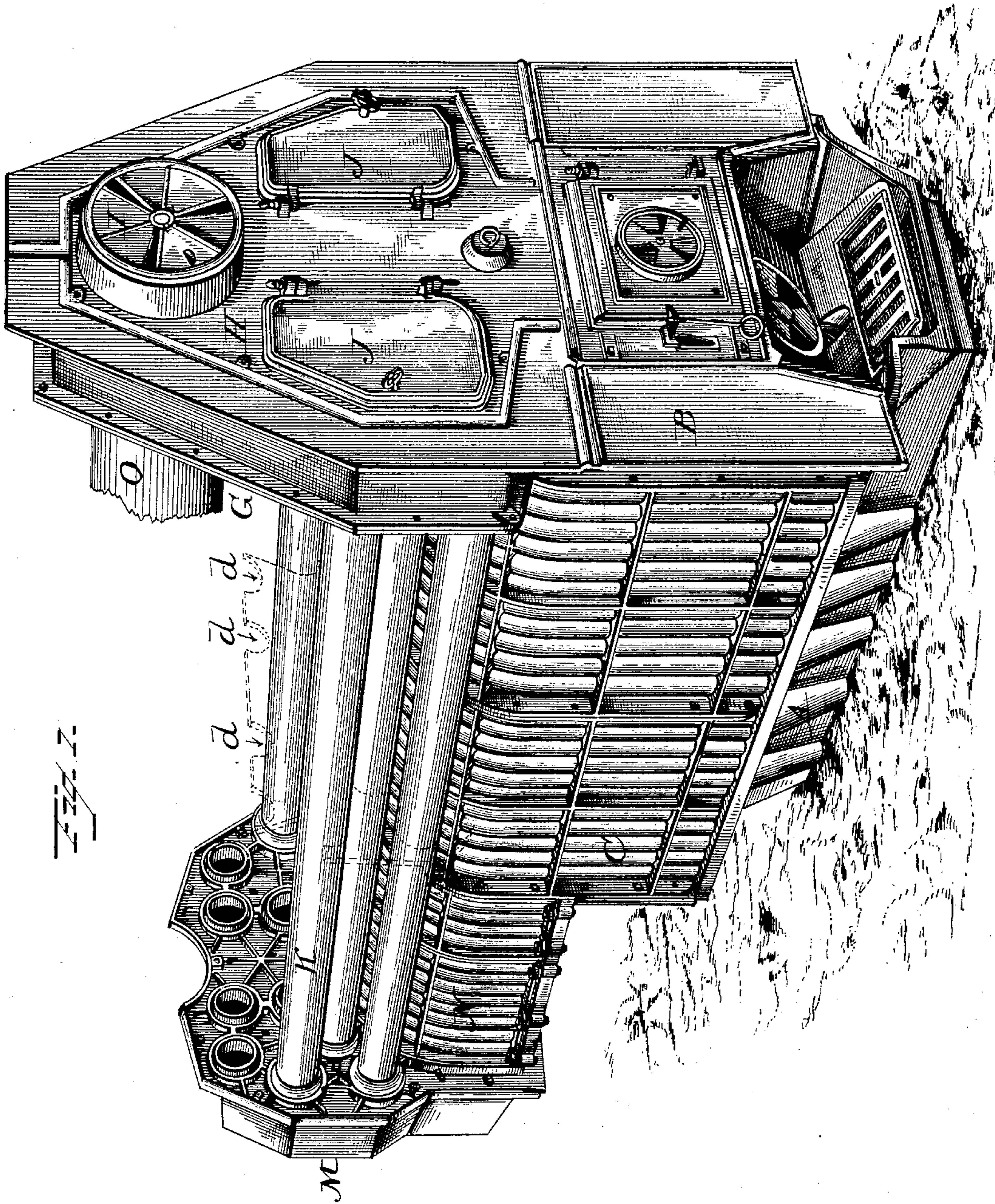
(No Model.)

3 Sheets—Sheet 1.

O. JONES.
HOT AIR FURNACE.

No. 315,040.

Patented Apr. 7, 1885.



WITNESSES:
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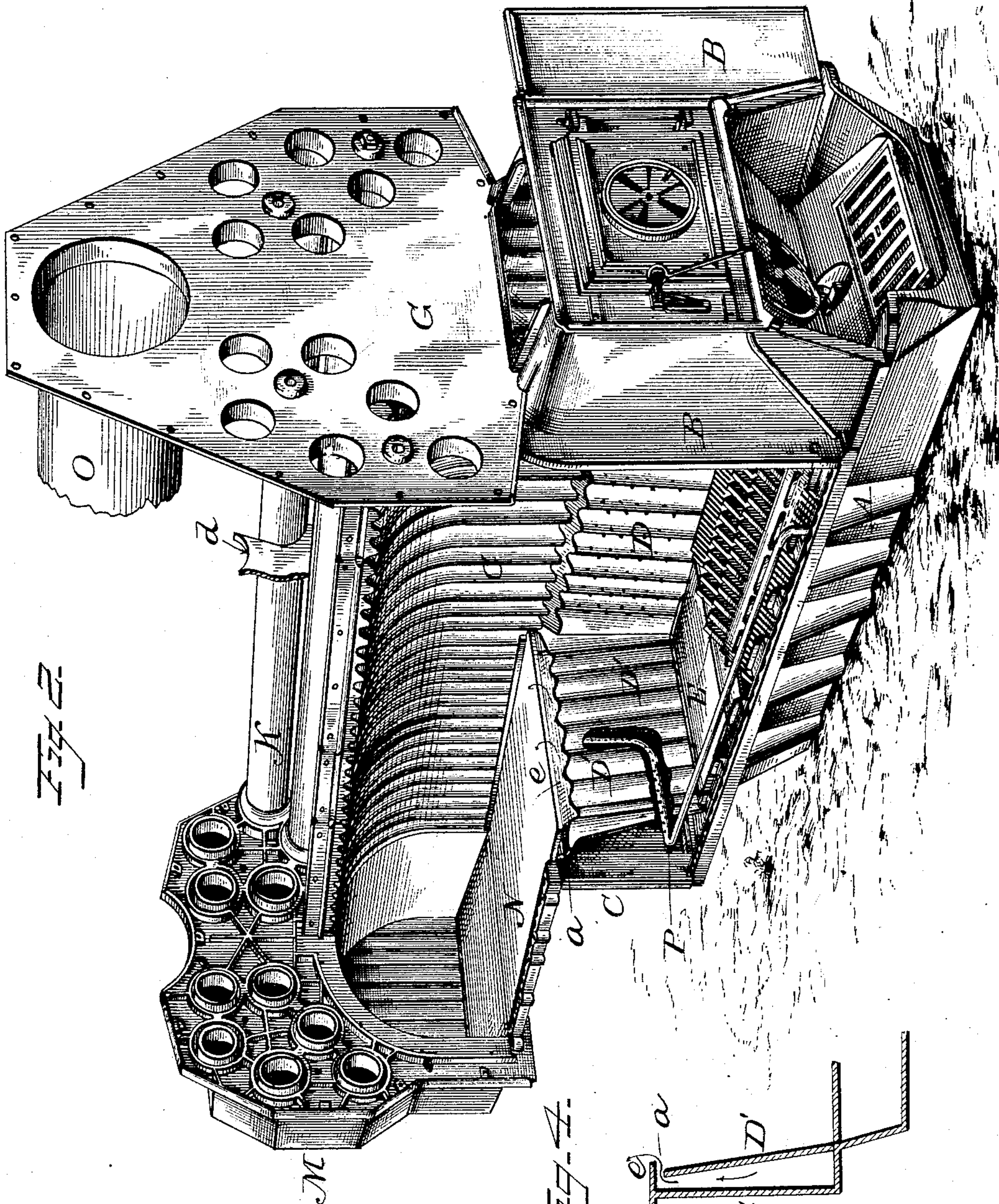
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3 Sheets—Sheet 2.

O. JONES.
HOT AIR FURNACE.

No. 315,040.

Patented Apr. 7, 1885.



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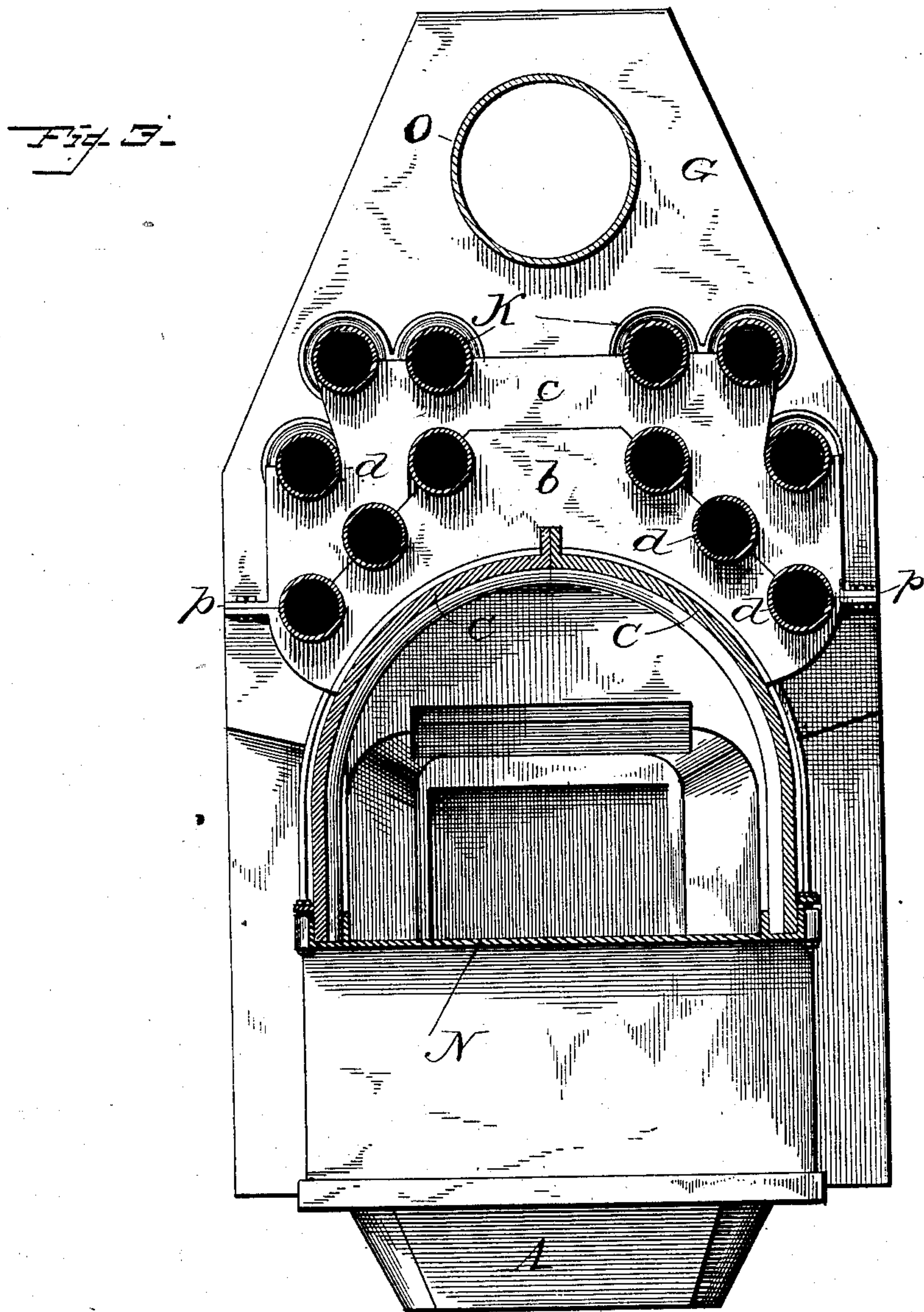
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HOT AIR FURNACE.

No. 315,040.

Patented Apr. 7, 1885.



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UNITED STATES PATENT OFFICE.

OTIS JONES, OF CHICAGO, ILLINOIS.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 315,040, dated April 7, 1885.

Application filed September 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, OTIS JONES, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

This invention relates to the heater or furnace known as the "Ruttan" furnace or air-warmer; and the invention consists in certain details of construction, whereby fresh air is more perfectly mingled with the hot gases and the latter consumed, the furnace more easily set up, the flues provided with a support between their ends, and a convenient chamber provided for the insertion of a water back or heater for warming rooms by hot water, when desired, all as hereinafter more fully set forth.

Figure 1 is a perspective view of the improved furnace with some of the flues omitted. Fig. 2 is a similar view shown in section, and Fig. 3 is a transverse vertical section through the rear chamber, N, looking toward the front, and Fig. 4 a sectional view showing the detail.

As heretofore constructed these furnaces have been made with an oblong fire-box, C, composed of corrugated plates of cast-iron united along their center at the top, and with a vertical chamber at the front and rear ends connected by a series of flues, K, as shown in Figs. 1 and 2, but without the rear extension or gas-chamber, N, in lieu of which a series of short pipes or flues were used, said flues extending from the rear wall of the fire-box C back to the rear drum or chamber, M. It was also provided with corrugated metallic lining-plates D, set inclined, to form an air-space between them and the sides of the fire-box C, said plates being perforated for the escape of the air at various points, as shown in Fig. 2, said plates being removable. While the furnace thus constructed has given good results, certain difficulties have been encountered which it is the object of my present invention to overcome, and thus render the apparatus still more perfect.

My first improvement consists in substituting for the short tubes at the rear of the fire-box the chamber N, as shown in Figs. 1 and 2. By this means I overcome the difficulty heretofore encountered in setting up the furnace, as these several short tubes—some five or six in num-

ber—had to be held each in its proper position while the parts were being put together, which was a difficult and tedious operation. Another great advantage of this chamber N is to provide a space for mixing or mingling a supply of fresh-heated air with the hot gases and products of combustion, so as to consume the gases and smoke, more especially when soft coal is used for fuel; to facilitate the removal of the soot and fine ashes from the flues K above, and also to provide a convenient means for using a water back or heater when it is desired to warm rooms on the same floor, or at distant points where air-flues cannot be conveniently extended, by hot water, as hereinafter more fully described.

In order to deliver a supply of fresh air at the proper point to unite with and produce a more perfect combustion of the gases and smoke, I insert within the fire-box C, on each side, an air-pipe, P, which, as shown in Fig. 2, is located in the space between the lining-plates D and the walls of the fire-box, the front end of said pipes opening into the ash-pit near its front, as shown, or extending out through the front plate, B, as indicated in dotted lines in Fig. 2, as may be preferred. At the rear these pipes P are bent and pass into the space in rear of the rear plate, D', and may or may not have their ends turned upward, as shown in Fig. 2. That portion of the pipe P which is in rear of the plate D is either perforated, as shown, with a series of small holes for the escape of the air, or it may have a slit formed in it; or the pipe itself may terminate at a point just after it has entered the space behind the plate, its function being to deliver the air into this space in such a manner that as it escapes from this space it shall be delivered either in small jets or in a thin film, so as to be the more thoroughly and readily mixed with the hot gases as they pass from the fire-box C into the chamber N.

In order to more effectually secure this result, and at the same time prevent this space in rear of plate D' from becoming filled up or clogged with the soot and ashes as they are drawn forward from the rear of chamber N after having been shoved therein from the flues K above, I make the bottom plate of the chamber N with a projecting edge, e, which shall project over the upper edge of the plate

D' far enough to prevent the ashes, as they are drawn forward from the chamber N, from falling into the air-space in rear of the plate D', as shown in Figs. 2 and 4. The upper edge of plate D' does not quite reach up to the under side of the projection *e*, thereby leaving a narrow space, *a*, through which the air escapes, as indicated by the arrows in Fig. 2. It will readily be seen that the pipes P and the plate D' will necessarily be kept very hot, and that, consequently, the air passing through and in contact with them will be heated by the time it is delivered through the slit *a*, and will therefore be in the best possible condition to mingle with the hot gases and aid in their combustion. It will further be seen that by delivering the air in a thin stratum just at the point where the smoke, gases, and flame pass from the fire-box into the chamber N it will be mixed or mingled therewith in the most efficient manner, and thus the thorough combustion of the gases and smoke will be secured in the chamber N. This of itself will greatly lessen the amount of soot passing up into the flues K, and also the quantity of smoke escaping from the chimney, both of which are very desirable objects, especially when soft coal is used. It will also be seen that the ashes and soot, which are shoved out of the flues K into the rear part of chamber N, can be removed far more readily than when the short tubes were used, as heretofore stated.

It occasionally happens that it is desired to warm a room on the same floor with the furnace, or even on a lower level, and also to warm one or more rooms located at a distant point, where a warm-air flue cannot be conveniently carried, and in such cases this chamber N forms a most convenient place for the location of a water-back for heating water, which can be conducted from thence through pipes to coils located in the rooms to be thus warmed, in the usual manner where hot water is employed for that purpose.

The next part of my invention consists in providing a support for the long flues or tubes K at one or more points between their ends. This support, as shown in Figs. 2 and 3 and by dotted lines in Fig. 1, consists of a plate, *b*, having its lower edge of a suitable form to rest upon the exterior of the fire-box C, with semicircular recesses *d* in its opposite edge at points corresponding with the position of the flues or tubes K composing the lower tier, as shown clearly in Fig. 3. I then provide a second plate, *c*, of such a form as to fit upon this lower plate, *b*, and the lower tier of flues K, the upper edge of this plate *c* being in like manner provided with recesses to receive the upper tier of flues K, as shown. If desired, these plates may be provided with flanges

p, at their outer edges or at any other point, by which they may be bolted together; but in practice I do not find this necessary. It is obvious that this support must be varied in form and in number of parts, according to the number and location of the tubes to be supported. If there be but a single tier of tubes, then one plate only will be needed. It is also obvious that instead of making it in the form of a solid plate it may be made in the form of a mere spider or open truss, as may be desired. The advantages or objects of this support are, first, to hold the tubes K in their proper position after they have been secured at either end to the front or rear drum and while they are being fitted to the drum at the opposite end; and, second, to prevent the tubes K from sagging at their center, when heated, and which sagging tends to open the joints where connected to the drums, or draw the plates to which they are secured out of position. The front drum, composed of the front and rear plates, H and G, with its damper I, opposite the smoke-pipe O, and the doors J, for affording access to the flues or tubes K for cleaning them out, form no part of my present invention, they being the same as used in the furnace as heretofore constructed.

I am aware that various arrangements have been devised for introducing air into furnaces for steam-boilers at or through the bridge-walls, and that baffle walls and plates have been arranged in the fire-chambers of furnaces for deflecting the heat and smoke, and I do not claim either of these; but,

Having described my invention, what I claim is—

1. The combination, in a hot-air furnace, of the fire-box C, the fire-plate D' at the rear thereof, with an air-space between it and the wall of the fire-box, and pipes P, arranged to introduce air into the same, with the elevated combustion-chamber N, having its bottom plate, *e*, arranged to project over the mouth of the air-space, substantially as shown and described, whereby a current of air is mingled with the gases as they enter the combustion-chamber, and the ashes and soot drawn from said chamber are prevented from entering the air-space, as set forth.

2. The combination, in a heating-furnace, of a fire box or body, C, and a series of horizontal tubes, H, arranged above the body, with the plates *b c*, constructed substantially as shown and described, whereby they are adapted to support the tubes, as set forth.

OTIS JONES.

Witnesses:

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FRED. M. BAILEY.