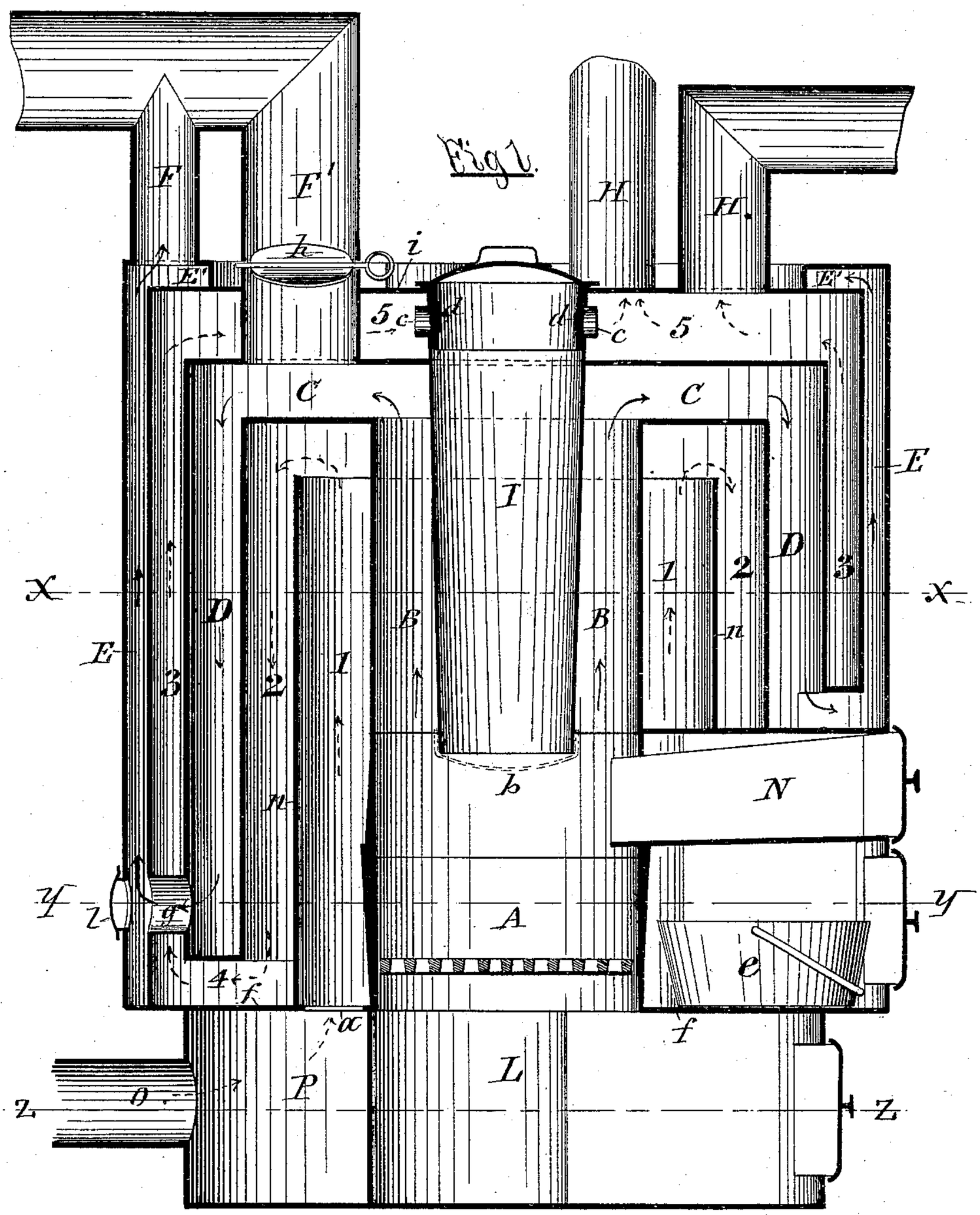
(No Model.) 3 Sheets—Sheet 1.

C. R. ALSOP.

HOT AIR FURNACE.

No. 345,564. Patented July 13, 1886.



Witnesses.

C. Bendixon

A. F. Walz.

Inventor:

Charles R. Alsop

per Hull, Lacey & Hay

his Attys

(No Model.) 3 Sheets—Sheet 2.

C. R. ALSOP.

HOT AIR FURNACE.

No. 345,564. Patented July 13, 1886.

Fig 2.

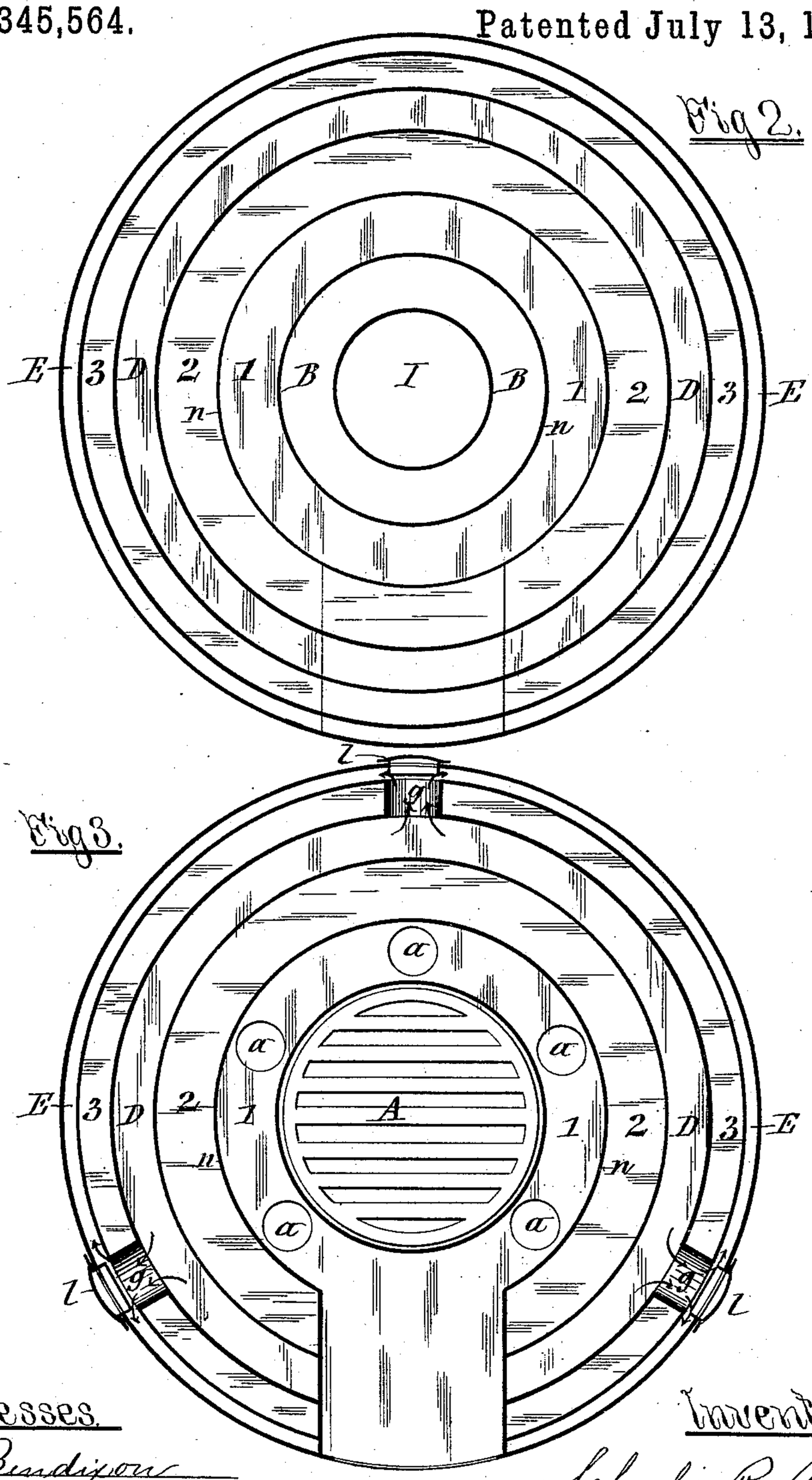


Fig 3.

Witnesses.

C. Bendixon

A. F. Walz.

Inventor.

Charles R. Alsop

per Knudt, Laass & Hay

his Attys.

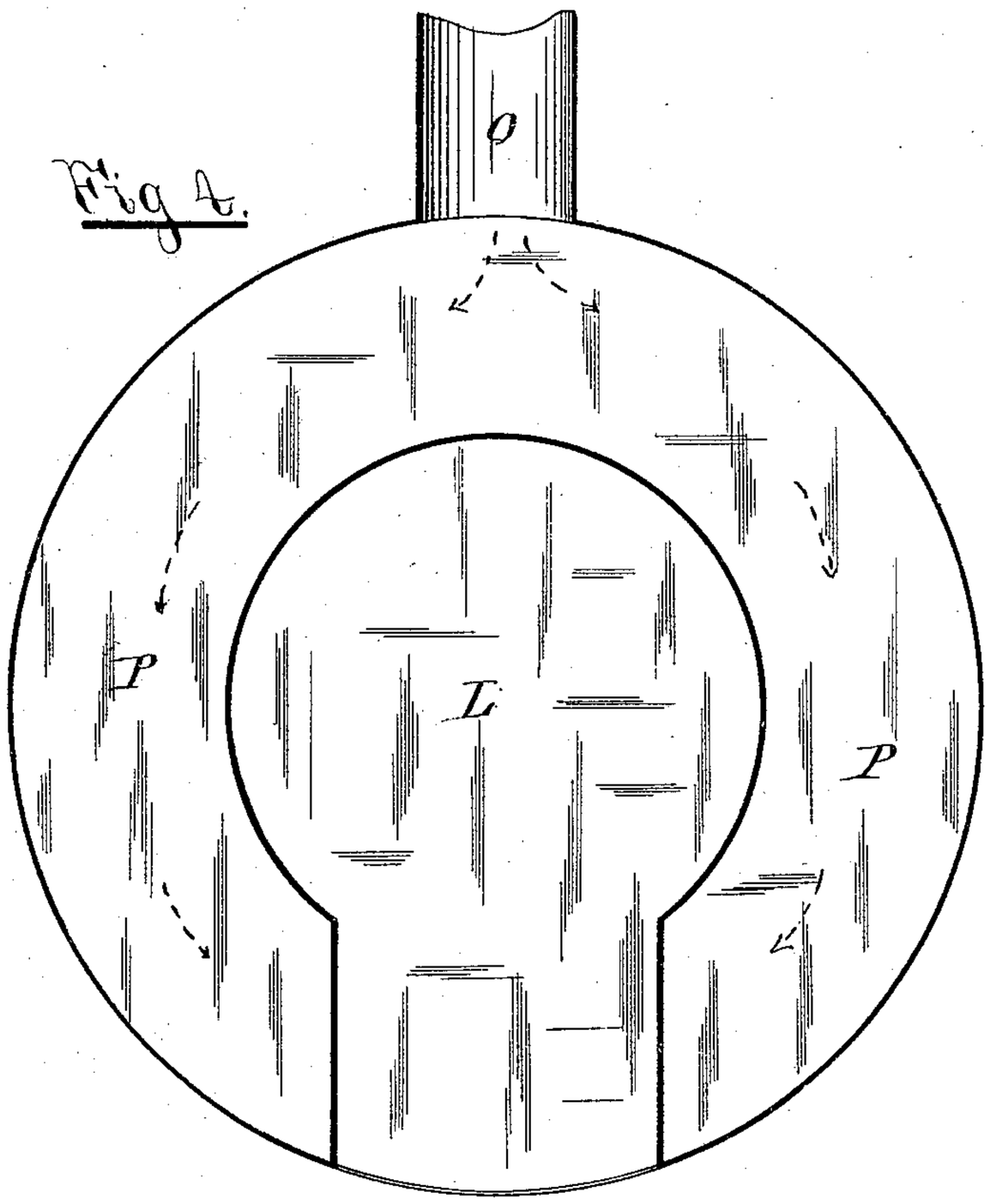
(No Model.) 3 Sheets—Sheet 3.

C. R. ALSOP.

HOT AIR FURNACE.

No. 345,564. Patented July 13, 1886.

Fig 4.



Witnesses.

C. Bendixson

A. F. Walz.

Inventor.

Charles R. Alsop

per Hull, Laass & Hoy

his attys.

UNITED STATES PATENT OFFICE.

CHARLES R. ALSOP, OF SYRACUSE, NEW YORK.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 345,564, dated July 13, 1886.

Application filed January 4, 1886. Serial No. 187,582. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. ALSOP, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Hot-Air Furnaces, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention consists in an improved combination, with the fire-pot and combustion-chamber, of an annular radiator surrounding the fire-pot and combustion-chamber and an annular smoke-jacket surrounding said radiator, with intervening annular vertical air-passages communicating with each other alternately at their upper and lower ends, whereby the air which circulates through the said passages is caused to effectually impinge those parts of the furnace through which the products of combustion pass, and thus said air becomes thoroughly heated by a minimum consumption of fuel; and the invention also consists in the combination, with the combustion-chamber and a hot-air passage above the same, of a magazine extending through the said air-passage, a cover removably connected to the lower end of said magazine, ports in the upper part of the magazine communicating with the aforesaid air-passage, and a stopper applied removably to said ports, by which arrangement said magazine can be converted into an air-heating chamber, all constructed and combined in the manner hereinafter more fully described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a vertical section of my improved hot-air furnace; and Figs. 2, 3, and 4 are horizontal transverse sections, respectively, on the lines *x x*, *y y*, and *z z*, Fig. 1.

Similar letters of reference indicate corresponding parts.

A denotes the fire-pot; L, the subjacent ash-pit, and B the combustion-chamber mounted on the fire-pot in any suitable and well-known manner.

N represents the chute, through which to introduce the fuel at the side of the furnace, and *e* is the water-pan arranged in the air-passage extending across the under side of the chute in the usual manner.

The upper end of the combustion-chamber B terminates in an annular radiator, C, which is extended horizontally or laterally outward therefrom and concentric therewith. From the peripheral portion of the radiator C is extended downward an annular vertical radiator, D, which surrounds the combustion-chamber and fire-pot, with an annular space between them, and around the exterior of the radiator D is arranged an annular vertical smoke-jacket, E, which is of a circumference to form an annular space, 3, between them, and reaches below and above said radiator, and by the horizontal annular plate *f* extending from the bottom of the smoke-jacket to the fire-pot, a horizontal annular air-passage, 4, is formed under the bottom of the radiator D. The smoke-jacket E communicates with the radiator D by flues *g g* at the base thereof. The upper end of the smoke-jacket terminates with a horizontal annular inward extension, E′, to which the exit-flue F is connected.

F′ represents the direct-draft exit-flue, which taps the radiator C, and is provided with a damper, *h*. By closing said damper the products of combustion are compelled to take the circuitous or tortuous passage from the radiator C down through the radiator D, thence to the base of the smoke-jacket E, thence up in the latter, and out throught the exit-flue F, as shown by full-lined arrows in Fig. 1 of the drawings, thereby retarding the escape of heat through said exit-flue, and causing the aforesaid radiators and smoke-jacket to become thoroughly heated. In the space between the combustion-chamber B and radiator D, I erect from the before-described bottom plate, *f*, an annular vertical partition, *n*, extending part way the height of said space and dividing the same into two annular vertical air-passages, 1 and 2, which communicate with each other at their upper ends. That portion of the plate *f* which extends across the bottom of the air-passage 1 is provided with apertures *a* for inlets of cold air for the cold-air chamber P to the passage 1. The cold air may be admitted to the chamber P either by apertures in the side of said chamber or by a pipe, O, extended to the outside of the building. The air-passage 2 intersects at its base the

horizontal annular air-passage 4, hereinbefore described, and thereby communicates with the annular vertical air-passage 3, formed by the space between the radiator D and smoke-jacket E. By an annular horizontal plate, *i*, above the radiator C, and joined to the upper edge of the inner shell of the smoke-jacket E, a horizontal annular air-passage, 5, is formed across the top of the radiator C, and made to communicate with the air-passage 3 at the upper end thereof.

H H represent the hot-air pipes, which are extended from the air-passage 5 to the apartments to be heated. The outer shell of the smoke-jacket is provided with apertures directly in front of the outer ends of the flues *g g*, and over said apertures are placed removable covers *l*. By removing said covers access can be had to the interior of the smoke-jacket E and radiator D for cleaning the same.

The operation of my improved hot-air furnace is as follows: In starting the fire in the furnace, the damper *h* is to be turned to open the direct exit-flue F, and thus increase the draft through the fire-pot and combustion-chamber. After the fire is well under way the aforesaid damper is to be closed to cause the products of combustion to pass successively through the radiators and smoke-jacket C D *g* E and out through the exit-pipe F, as represented by full-lined arrows in Fig. 1 of the drawings, in the manner hereinbefore described. In the meantime the cold air passes from the chamber P at the base of the furnace up through the passage 1, thence down through the passage 2, thence outward through the passage 4, thence up through the passage 3 and into the passage 5 at the top of the furnace. During the described circulation the air is brought into intimate contact with the heated sides and ends of the aforesaid combustion-chamber, radiators, and smoke-jacket, and is thereby caused to effectually absorb the heat therefrom, so that the escape of heat through the exit-flue F is reduced to a minimum. The air thus thoroughly heated is concentrated in the upper passage, 5, which is extended across the top of the combustion-chamber and first horizontal radiator, C, and the bottom of said air-passage 5 is thus effectually impinged by the products of combustion. The air which circulates through the said passage is therefore subjected to the most intense heat before it escapes to the ducts or pipes H H, which convey said air to the apartments to be supplied with heat.

I represents a fuel-magazine, which is extended through the upper air-passage, 5, down into the combustion-chamber B the usual distance to deliver the fuel to the fire-pot A. That portion of the magazine which is inclosed in the air-passage 5, I provide with ports *c c*, by which the magazine communicates with the aforesaid air-passage, and over said ports I arrange removable stoppers, by which said ports can be closed to prevent gases from passing from the magazine into the air-passage. Said stoppers are here represented in the form of a short cylinder slipped inside of the upper end of the magazine, as shown in Fig. 1 of the drawings. To the lower end of the magazine I fit removably a cover, *b*. By applying said cover to the magazine, as represented by dotted lines in Fig. 1 of the drawings, and removing the stoppers *d* from the ports *c*, I convert said magazine into a hot-air chamber communicating with the hot-air passage 5.

It will be observed that in my improved hot-air furnace the smoke-jacket E constitutes the casing which incloses the furnace and forms a warm envelope for the same; but, if desired, an additional casing may be placed around the described furnace.

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

1. A hot-air furnace comprising a fire-pot, subjacent ash-pit, and superposed combustion-chamber, all arranged central of the furnace, a radiator surrounding the fire-pot and combustion-chamber and communicating with the latter at the upper end thereof, a smoke-jacket surrounding the aforesaid radiator and communicating with the bottom portion thereof, an exit-flue connected to said jacket, two air-passages extending around the space between the radiator and combustion-chamber and fire-pot, the air-passage adjacent to the latter being provided with air-inlets at the base and connected with the other air-passage at the top, a third air-passage between the radiator and smoke-jacket and extending around the same and communicating with the second air-passage at the base thereof, an air-passage extending across the top of the furnace and communicating with the third air-passage, and hot-air pipes extending from the top air-passage, all combined to operate substantially as set forth.

2. In combination with the fire-pot A and combustion-chamber B, the annular radiator C, extended horizontally or laterally outward from the upper end of the combustion-chamber, the radiator D, extending downward from the peripheral portion of the radiator C and surrounding the combustion-chamber and fire-pot, the smoke-jacket E, surrounding the radiator D and communicating with the same at the base thereof, the exit-flue F, connected with the smoke-jacket E, the annular vertical air-passage 1, adjacent to the fire-pot and combustion-chamber and provided with cold-air inlets *a*, the annular vertical air-passage 2, between the passage 1 and radiator D and communicating with the passage 1 at the upper end, the annular vertical air-passage 3, between the radiator D and jacket E, the annular horizontal air-passage 4, under the radiator D and connecting the passages 2 and 3, and the annular horizontal air-passage 5, extended across the top of the radiator C and connected

with the passage 3 and hot-air pipes H, extended from the passage 5, substantially as described and shown.

3. The combination, with the combustion-chamber, of a magazine projecting above said combustion-chamber and provided thereat with ports communicating with the open air, stoppers removably applied to said ports, and removable covers, respectively on top and bottom of the magazine, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name and affixed my seal, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga and State of New York, this 2d day of January, 1886.

CHARLES R. ALSOP. [L. S.]

Witnesses:
FREDERICK H. GIBBS,
C. BENDIXON.