

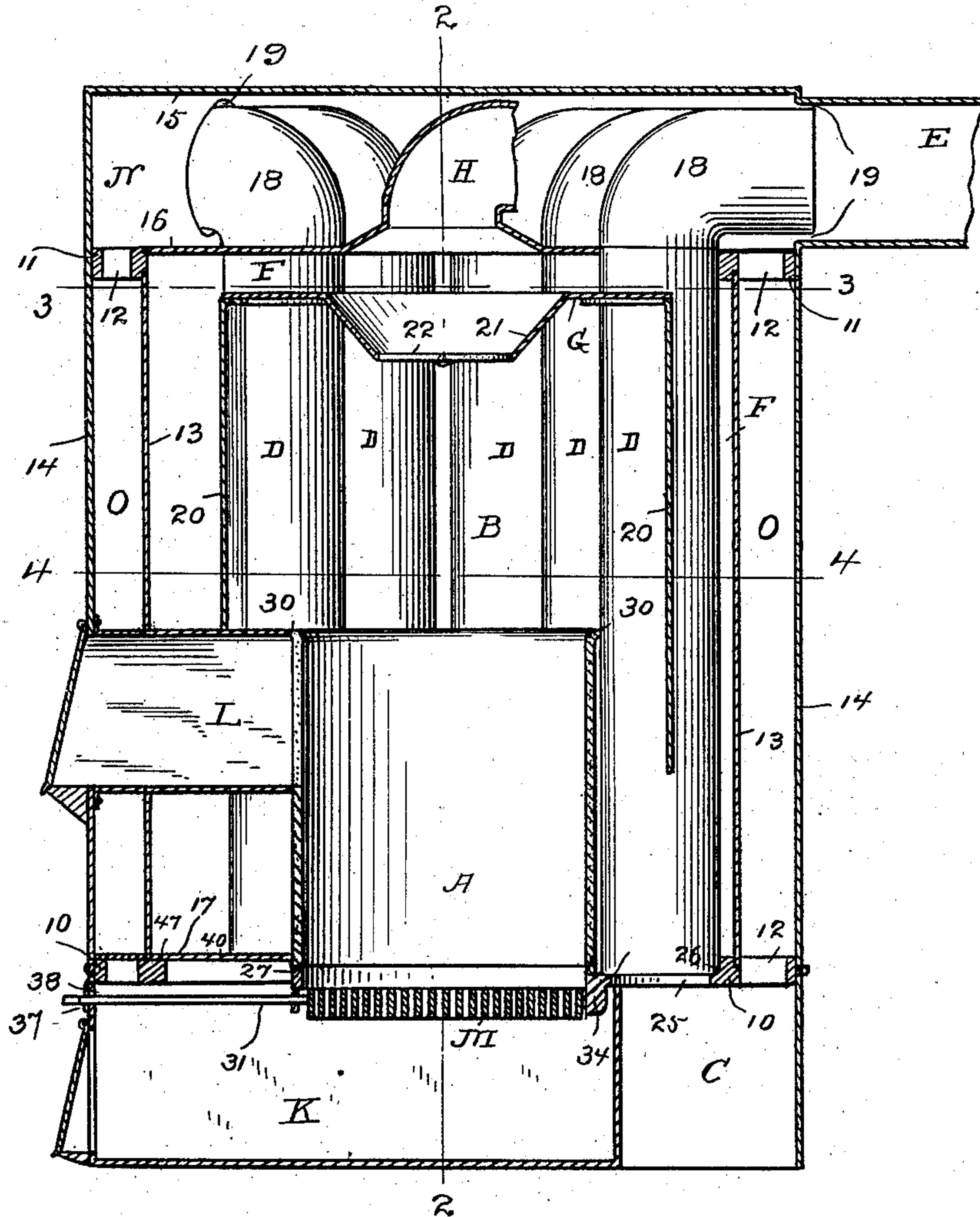
F. I. JONES.
HOT AIR FURNACE.

(Application filed July 31, 1902.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



WITNESSES.

H. A. Lamb.
S. W. Acherton.

INVENTOR.

Frank I. Jones
By A. M. Wooster
Atty

No. 717,502.

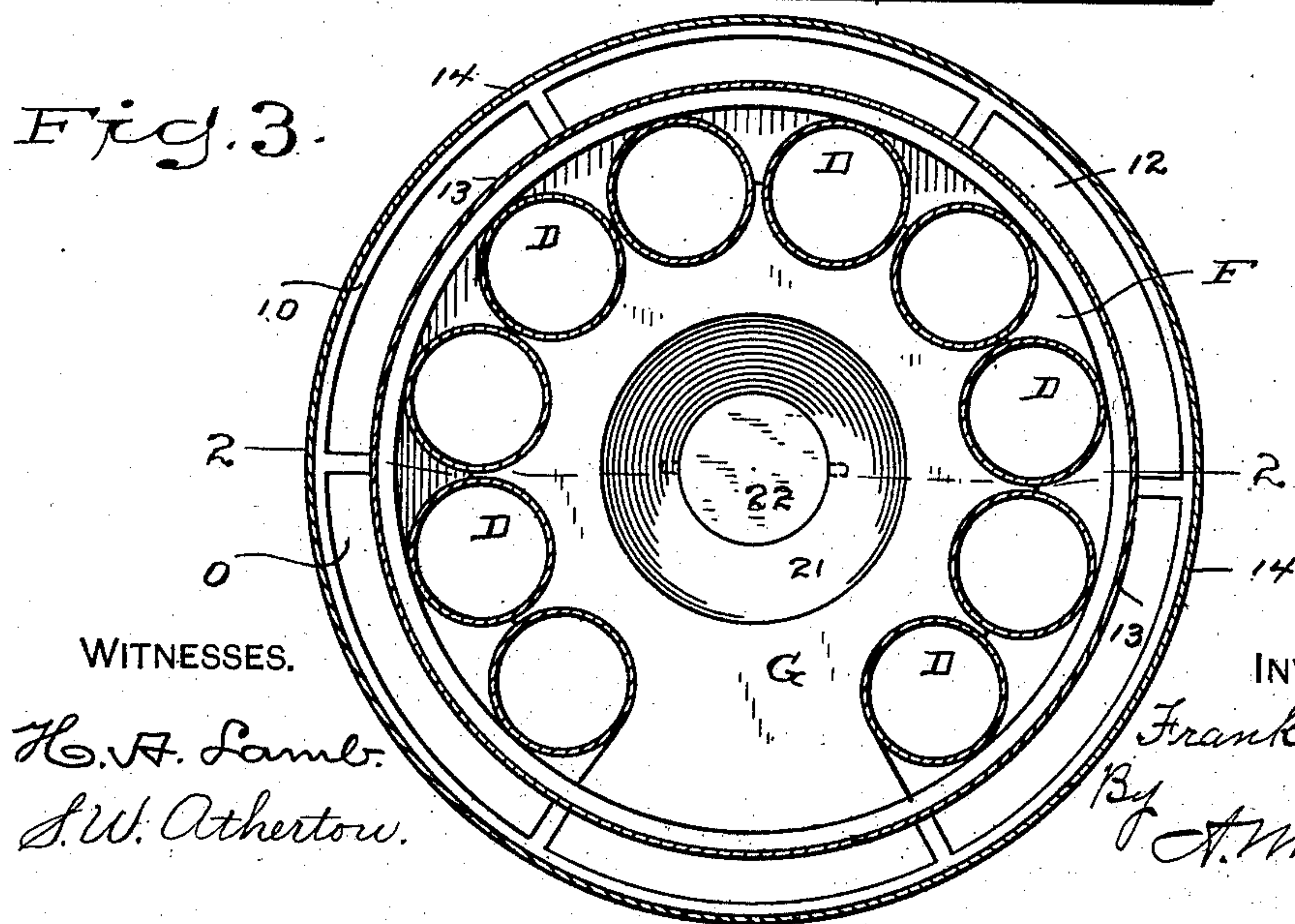
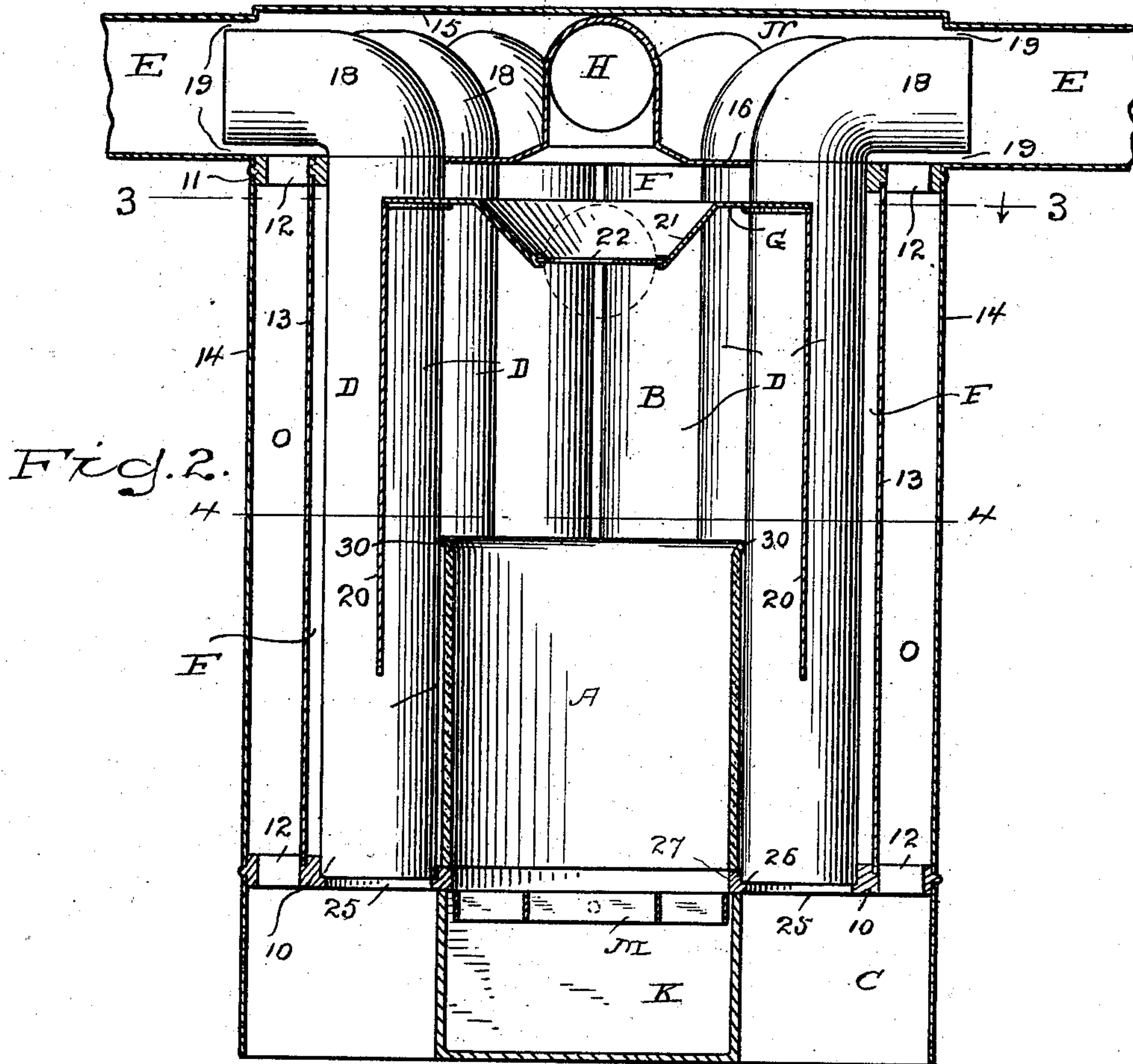
Patented Dec. 30, 1902.

F. I. JONES.
HOT AIR FURNACE.

(Application filed July 31, 1902.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES.

H. A. Lamb.
S. W. Atherton.

INVENTOR.

Frank S. Jones
By A. M. Wooster
Atty.

No. 717,502.

Patented Dec. 30, 1902.

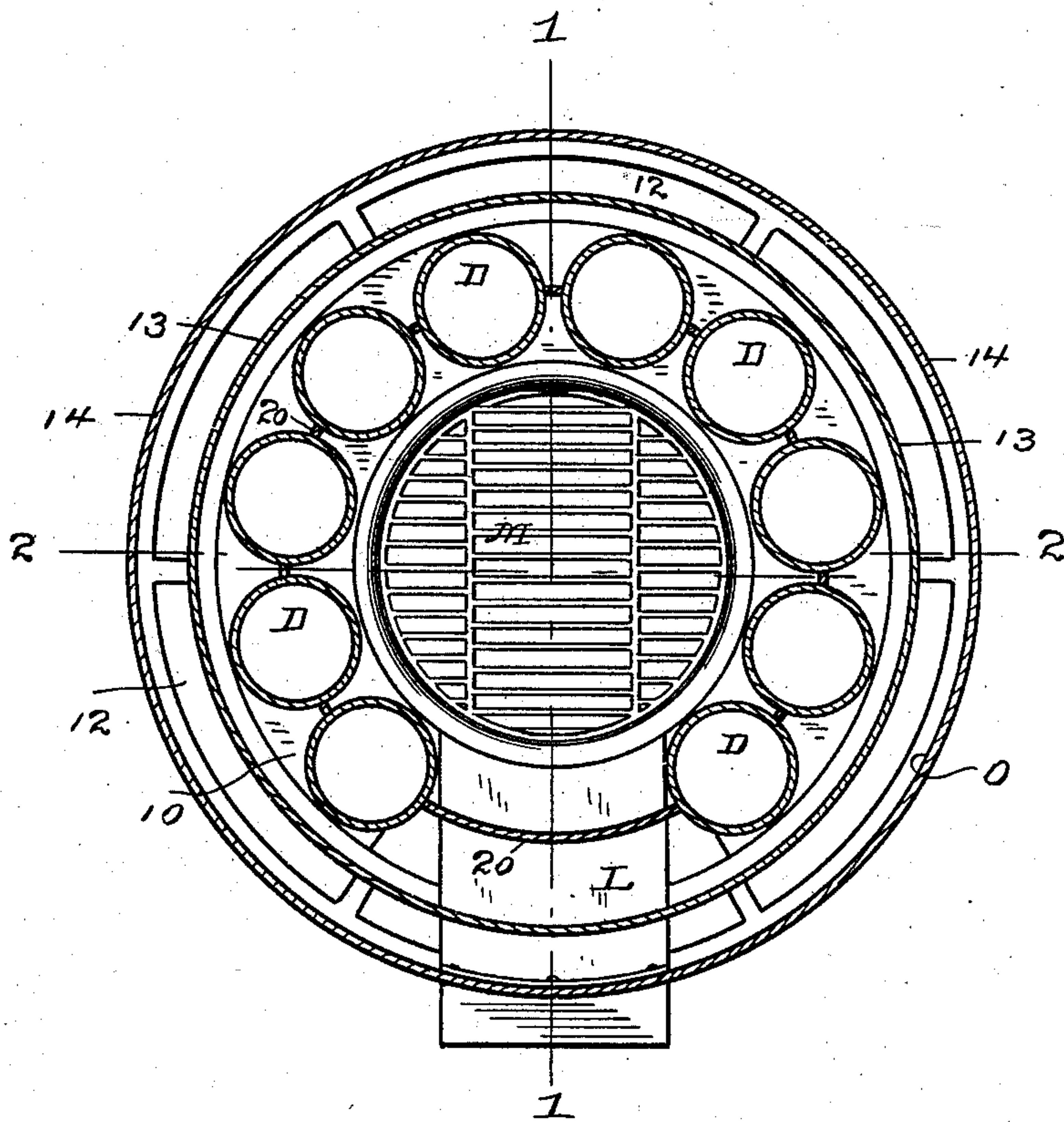
F. I. JONES.
HOT AIR FURNACE.

(Application filed July 31, 1902.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 4.



WITNESSES.

H. A. Lamb.
J. W. Atherton.

INVENTOR.

Frank I. Jones
By A. M. Wooster
Atty.

UNITED STATES PATENT OFFICE.

FRANK I. JONES, OF NORWALK, CONNECTICUT.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 717,502, dated December 30, 1902.

Application filed July 31, 1902. Serial No. 117,785. (No model.)

To all whom it may concern:

Be it known that I, FRANK I. JONES, a citizen of the United States, residing at Norwalk, county of Fairfield, State of Connecticut, have invented a new and useful Hot-Air Furnace, of which the following is a specification.

In hot-air furnaces as ordinarily constructed the air-pipes are relatively short—that is, they do not extend below the top of the fire-pot—the products of combustion do not pass downward and around heating-surfaces, but pass upward and then directly out to the chimney, and the air to be heated comes in direct contact with the fire-pot and is thus liable to become overheated or “burned,” as the fire-pot in use not infrequently becomes red hot.

This invention has for its general object to produce a furnace in which with a minimum coal consumption a large volume of air shall be thoroughly heated, but without danger of becoming overheated or burned, and thus rendered unfit to breathe. I have with this end in view devised a novel furnace in which, with the exception of the space occupied by the coal-chute and ash-pit, the fire-pot shall be surrounded by relatively large air-pipes, extending from a cold-air reservoir at the bottom of the furnace to a hot-air reservoir at the top, so that the air cannot by any possibility come in contact with the fire-pot and be overheated or burned, but a large volume of adequately-heated air will be delivered to the rooms. The upper portions of the air-pipes are connected by bridge-walls, so that the products of combustion in order to leave the combustion-chamber must pass downward and between the air-pipes and then upward back of the air-pipes before they can pass to the chimney, the entire surface of relatively large air-pipes extending from the bottom to the top of the furnace being thus constantly exposed to the heating action of the products of combustion, but without danger of overheating the air.

With the object above stated and other objects in view my invention consists in certain constructions and in certain parts, improvements, and combinations, which will be hereinafter described and then specifically pointed out in the claims hereunto appended.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section of my novel furnace on the line indicated by 1 1 in Fig. 4; Fig. 2, a vertical section on a line at right angles thereto, the line thereof being indicated by 2 2 in Figs. 1, 3, and 4; Fig. 3, a horizontal section on the line 3 3 in Figs. 1 and 2, and Fig. 4 is a horizontal section on the line 4 4 in Figs. 1 and 2.

A denotes the fire-pot as a whole; B, the combustion-chamber; F, the smoke-flue; C, the cold-air reservoir; D, air-pipes; N, the hot-air reservoir; E, delivery-pipes; G, the crown-sheet; H, the smoke-pipe; K, the ash-pit; L, the coal-chute, and M the grate.

10 denotes the lower plate, and 11 the upper plate, both of which are ring-shaped castings having openings 12 for the free passage of air. The inner and outer walls 13 and 14 are secured to these plates. The lower plate 10 is shown as provided with openings 25, corresponding with the air-pipes, with sockets 26 surrounding said openings, which receive and seat the lower ends of the air-pipes, and with an upwardly-extending circular rib 27, upon which the fire-pot rests. It is wholly immaterial, however, so far as the principle of the invention is concerned, whether these plates are made in one or in a plurality of castings.

15 denotes the upper wall, 16 an intermediate wall cast integral with or rigidly secured to upper plate 11, and 17 the top wall of the ash-pit, which may be cast integral with or secured to lower plate 10. The air-pipes extend from the cold-air reservoir up through the intermediate wall 16. Between the top wall and the intermediate wall is the hot-air reservoir N. The air-pipes may open directly into the hot-air reservoir, although I preferably provide at their upper ends elbows 18, which extend a short distance into the delivery-pipes E. It should be noted, however, that the delivery-pipes are of greater diameter than the air-pipes and the elbows, so as to leave a clear space, as at 19, between the elbows and the delivery-pipes, as will be more fully explained.

An important feature of my invention is a series of bridge-walls 20 between the air-pipes, said walls extending from approximately the mid-height of the fire-pot to the

crown-sheet G. The crown-sheet, the air-pipes, and the bridge-walls inclose what I have termed the "combustion-chamber"—that is, a chamber above the fire-pot in which the gases thrown off by the combustion of coal in the fire-pot are consumed. Between the air-pipes and bridge-walls and inner wall 13 and between the crown-sheet and intermediate wall 16 is a space extending entirely around and over the combustion-chamber, which I have termed the "smoke-flue" and have indicated by F. The smoke-pipe H leads out from the top of this flue. It will be noted that the products of combustion first rise in the combustion-chamber and then pass downward and under bridge-walls 20 and between the air-pipes and then upward on the other side of the air-pipes—that is, in the smoke-flue lying between the air-pipes and bridge-walls and the inner wall and under the hot-air chamber that is between the crown-sheet and the intermediate wall. It will thus be seen that the entire exterior surface of the air-pipes is subjected to the direct action of the products of combustion before they can leave the furnace by the smoke-pipe. The crown-sheet is shown as provided with a central depression 21 to receive ashes, soot, &c., that may be deposited in the upper part of the smoke-flue. At the center of the depression is a damper 22, which may be operated by any suitable connection (not shown) from the outside of the furnace. This damper when closed, as shown in the drawings, cuts off the direct passage of the products of combustion to the smoke-pipe and causes them to pass downward under the lower ends of walls 20. When the damper is opened, however, as indicated by dotted lines in Fig. 2, the products of combustion may pass directly through the upper portion of the smoke-flue and into the smoke-pipe, and ashes, soot, &c., that may have collected in depression 21 will drop down into the fire-pot. This damper may be opened in order to give a strong draft in building a fire or should the fire become low. Between the inner wall 13 and the outer wall 14 is an air-chamber O, surrounding the furnace, which connects with cold-air reservoir C and with hot-air reservoir N through openings 12 in plates 10 and 11. It will be noted, however, in Figs. 1 and 3, that wall 17, which may be made integral with or attached to lower plate 10, lies between this chamber and the ash-pit, so as to close the latter tightly.

It will thus be seen that the construction of the furnace is such as to render it impossible for the dust of the furnace or for gas from the combustion-chamber or smoke-flue to get into the air-pipes or either the cold or hot air reservoirs, while at the same time perfect circulation of air in the entire furnace is maintained—this for the reason that the cold and hot reservoirs, the air-chamber, the air-pipes, and the delivery-pipes are all in free communication, so that they comprise,

in fact, one continuous air-receptacle, cold air being received in any suitable manner (not shown) in the cold-air reservoir at the bottom, rising in the air-pipes and air-chamber, and being conveyed to the rooms in which it is wanted by the delivery-pipes, the exterior of the furnace remaining perfectly cool, no matter how hot the fire may be. This is an important feature, as it gives to the furnace at all times the use of all of the pipes in which the air is heated and renders burning or overheating of the air in any of the pipes practically impossible. Suppose that all but one or two of the delivery-pipes are closed. No air will of course be delivered by these pipes; but the corresponding air-pipes will be in use just the same, owing to the fact that the air-pipes open into the hot-air reservoir, or where elbows are used extending a short distance into the delivery-pipes an open space 19 between the elbows on the air-pipes and the delivery-pipes is left entirely around, so that the hot air rising in the air-pipes, whose corresponding delivery-pipes are closed, will pass freely back into the hot-air reservoir and to other delivery-pipes. An important advantage which results from providing the spaces 19 between the air-pipes and the delivery-pipes is that the more highly-heated air in the air-pipes will siphon air from the hot-air reservoir into the delivery-pipes and force the currents of air therein forward with such velocity as to insure that the heated air even in horizontal pipes will reach any room which it can reasonably be expected to heat. This feature is especially valuable when any of the delivery-pipes are very long or when a strong wind interferes with the normal working of the furnace or renders it difficult to convey heated air to any special room or rooms in a house.

Having thus described my invention, I claim—

1. A furnace comprising a fire-pot, a combustion-chamber, a cold-air reservoir at the bottom, a hot-air reservoir at the top, air-pipes extending from the cold-air reservoir to the hot-air reservoir, bridge-walls between the air-pipes extending from the top of the combustion-chamber below the top of the fire-pot and a smoke-flue inclosing the air-tubes and combustion-chamber at the sides and top, so that the products of combustion are caused to pass downward under the bridge-walls and between the air-pipes and then upward in the smoke-flue on the other side of the air-pipes and over the combustion-chamber.

2. A furnace comprising a fire-pot, a combustion-chamber, a cold-air reservoir at the bottom, a hot-air reservoir at the top, air-pipes extending from the cold-air reservoir to the hot-air reservoir, bridge-walls between the air-pipes extending from the top of the combustion-chamber below the top of the fire-pot, a smoke-flue on the outer side of the air-pipes and bridge-walls and between the combustion-

chamber and the hot-air reservoir, and an air-chamber outside of the smoke-flue and communicating with the cold and hot air reservoirs.

5 3. In a furnace the combination with a cold-air reservoir, a hot-air reservoir, a fire-pot and walls 13 and 16, of air-pipes contiguous to the fire-pot and extending from the cold-air reservoir to the hot-air reservoir, a crown-sheet
10 over the fire-pot and bridge-walls between the air-pipes extending from the crown-sheet below the top of the fire-pot, whereby a combustion-chamber is formed over the fire-pot and a smoke-flue is formed between said
15 bridge-walls and walls 13 and between the crown-sheet and wall 16.

4. In a furnace the combination with a cold-air reservoir, a hot-air reservoir, a fire-pot and inner, outer and intermediate walls, of air-
20 pipes contiguous to the fire-pot and extending from the cold-air reservoir to the hot-air reservoir, a crown-sheet over the fire-pot and bridge-walls between the air-pipes extending from the crown-sheet below the top of the fire-
25 pot, whereby a combustion-chamber is formed over the fire-pot, a smoke-flue is formed between the bridge-walls and the inner wall and between the crown-sheet and the intermediate wall, and an air-chamber extending
30 from the cold-air reservoir to the hot-air reservoir is formed between the inner and outer walls.

5. In a furnace the combination with a cold-air reservoir, a fire-pot and inner, outer, upper and intermediate walls, of air-pipes contiguous to the fire-pot, a crown-sheet over the fire-pot and bridge-walls between the air-pipes extending from the crown-sheet below the fire-pot, whereby a combustion-chamber
40 is formed by the air-pipes, bridge-walls and crown-sheet, a smoke-flue is formed outside the combustion-chamber by the inner and intermediate walls, an air-chamber is formed between the outer and inner walls and a hot-air reservoir is formed between the crown-sheet and the upper wall.
45

6. In a furnace the combination with a fire-pot and walls 13 and 16, of air-pipes contiguous to the fire-pot, a crown-sheet over the
50 fire-pot and bridge-walls between the air-pipes extending from the crown-sheet below the top of the fire-pot, whereby a combustion-chamber is formed over the fire-pot and a smoke-flue is formed between said bridge-walls and wall 13 and between the crown-sheet and wall 16.
55

7. In a furnace the combination with a fire-pot and inner, outer, upper and intermediate walls, of air-pipes contiguous to the fire-pot, a crown-sheet over the fire-pot and bridge-walls between the air-pipes extending from the crown-sheet below the top of the fire-pot, whereby a combustion-chamber is formed over the fire-pot, a smoke-flue between the
60 combustion-chamber and the inner wall and between the crown-sheet and the intermediate wall, a hot-air chamber is formed between

the upper and intermediate walls, and an air-chamber is formed between the inner and outer walls.

8. In a furnace the combination with a fire-pot and walls 13 and 16, of air-pipes contiguous to the fire-pot, a crown-sheet having a depression to receive ashes and soot and a damper, for the purpose set forth, and bridge-
75 walls between the air-pipes extending from the crown-sheet below the top of the fire-pot, substantially as shown, for the purpose specified.

9. In a furnace, the combination with a fire-pot, a cold-air reservoir below the fire-pot and a hot-air reservoir at the top of the furnace, of air-pipes connecting the reservoirs and separated from the fire-pot by a space, a crown-sheet, a smoke-outlet leading from a
85 point centrally above the crown-sheet, and bridge-walls between the air-pipes extending from the crown-sheet below the top of the fire-pot, substantially as described, whereby the air-pipes are equally heated without
90 overheating by the walls of the fire-pot.

10. In a furnace the combination with a fire-pot, of a combustion-chamber formed by a crown-sheet, air-pipes and bridge-walls between the air-pipes and extending from the
95 crown-sheet below the top of the fire-pot, a smoke-outlet leading from a point centrally above the crown-sheet, said air-pipes being separated from the fire-pot by a space to prevent overheating, the said bridge-walls causing the surfaces of the air-pipes to be equally
100 heated.

11. In a furnace the combination with a fire-pot, of a combustion-chamber formed by a crown-sheet, air-pipes and bridge-walls between the air-pipes extending from the crown-sheet below the top of the fire-pot, said crown-sheet having a central depression and a damper, a smoke-outlet leading from a point centrally above the crown-sheet, said air-pipes
110 being separated from the fire-pot by a space to prevent overheating, the said bridge-walls causing the surfaces of the air-pipes to be equally heated, substantially as described.

12. In a furnace the combination with a fire-pot and a combustion-chamber formed by a crown-sheet, air-pipes and bridge-walls between the air-pipes and extending from the crown-sheet below the top of the fire-pot, of a hot-air reservoir and delivery-pipes leading
120 therefrom, said air-pipes extending a short distance into the delivery-pipes leaving a space between the air-pipes and the delivery-pipes, so that air may pass back into the reservoir when a delivery-pipe is closed, the escape-outlet for the products of combustion being over the center of the crown-sheet.
125

13. In a furnace the combination with a cold-air reservoir and a hot-air reservoir, of a series of air-pipes connecting said reservoirs and corresponding delivery-pipes leading from the hot-air reservoirs, and outer and inner walls forming an air-chamber surrounding said pipes, said air-chamber communicat-
130

ing with the hot-air reservoir and open at its bottom.

14. In a furnace the combination with a series of air-pipes, of a fire-box, bridge-walls connecting said pipes at their upper ends to deflect the products of combustion downward and upward over the surfaces of the air-pipes, an inner wall 13 and an outer wall 14 whereby an air-chamber is formed, of a cold-air reservoir and a hot-air reservoir, which are connected by the air-chamber and the air-pipes.

15. In a furnace the combination with a fire-pot, a series of air-pipes contiguous thereto, bridge-walls between the upper ends of the air-pipes, and a crown-sheet forming with said air-pipes and bridge-walls a combustion-chamber, a wall 13 and a wall 16 whereby a smoke-flue is formed outside the combustion-chamber and a smoke-pipe leading from the top of the smoke-flue, the products of combustion passing over the inner side of the air-pipes downward between the air-pipes and under the bridge-walls and upward in the smoke-flue on the outer side of the air-pipes.

16. In a furnace the combination with a cold-air reservoir and a hot-air reservoir, of a combustion-chamber, a series of air-pipes connecting the reservoirs and connected at their upper ends, whereby the side wall of the combustion-chamber is formed, an air-chamber also connecting the air-reservoirs, a

smoke-flue lying between the air-chamber and the air-pipes, a fire-pot, and means for deflecting the products of combustion downward and upward over the surfaces of the air-pipes.

17. In a furnace, the combination with cold and hot air reservoirs, of a fire-pot, a combustion-chamber formed by a crown-sheet, air-pipes connecting said reservoirs and bridge-walls connecting the upper ends of said air-pipes, a smoke-outlet leading from a point centrally above the crown-sheet, said bridge-walls deflecting the products of combustion downward and upward over the surfaces of the air-pipes.

18. In a furnace the combination with cold and hot air reservoirs, of a combustion-chamber formed by a crown-sheet, air-pipes connecting said reservoirs and bridge-walls connecting the upper ends of the air-pipes, a smoke-flue inclosing the combustion-chamber and connecting therewith below the bridge-walls, and an air-chamber inclosing the smoke-flue and connecting with the hot and cold air reservoirs.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK I. JONES.

Witnesses:

CHESTER S. SELLECK,
NEIL PIERCE.