

(No Model.)

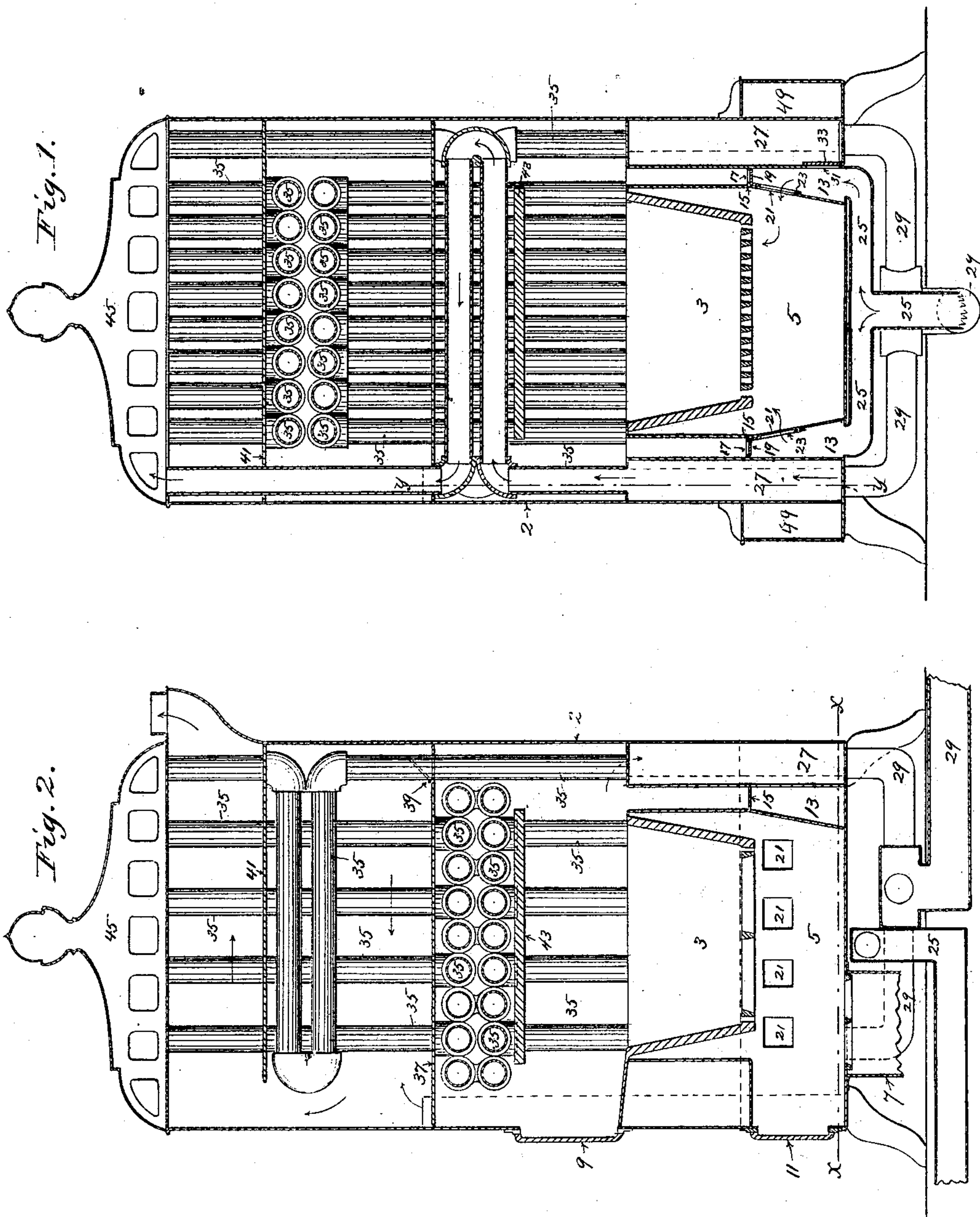
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H. J. FRIZELLE.

HEATER.

No. 366,719.

Patented July 19, 1887.



Witnesses

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(No Model.)

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Fig. 3.

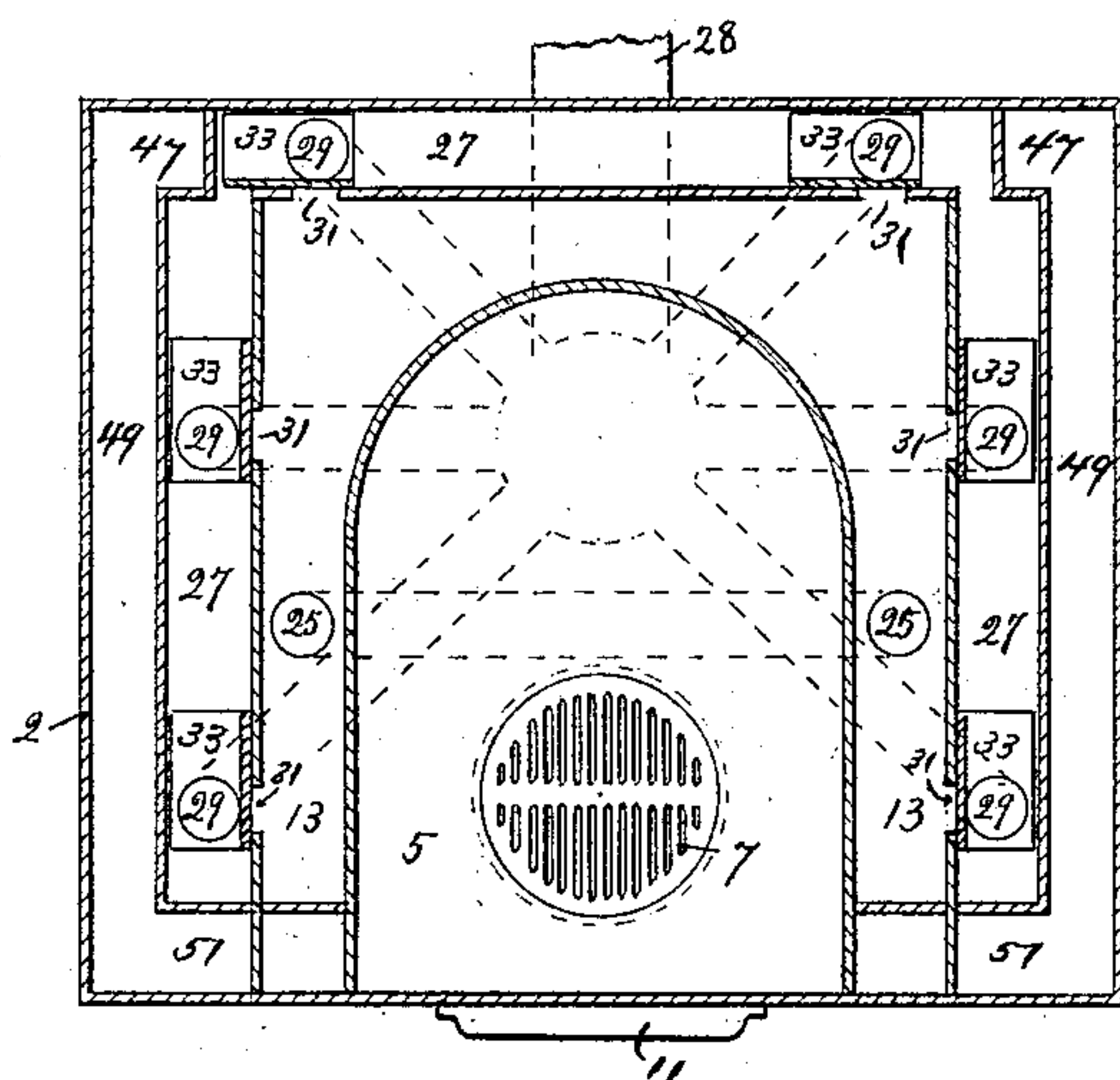
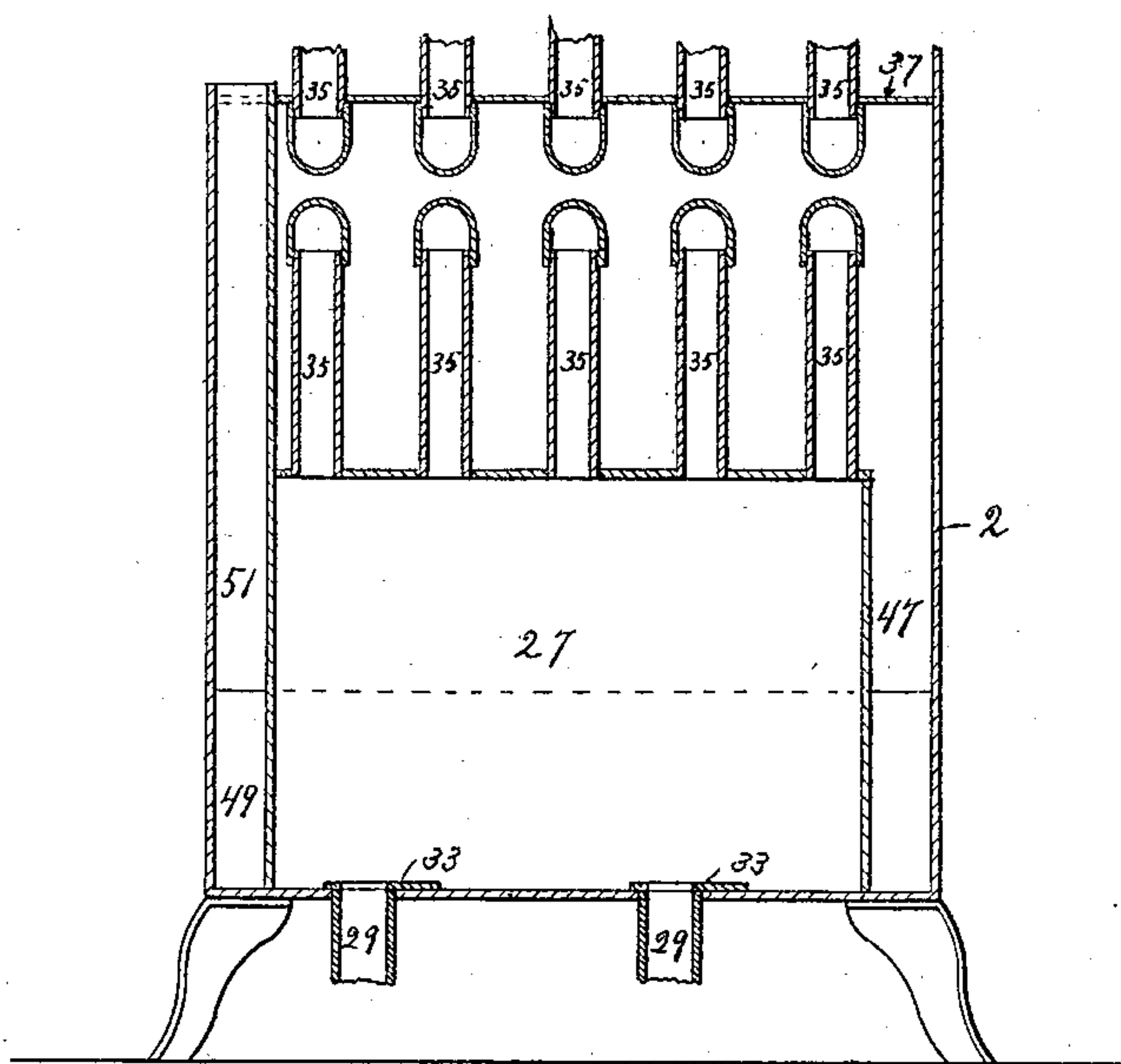


Fig. 4.



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Fig. 5.

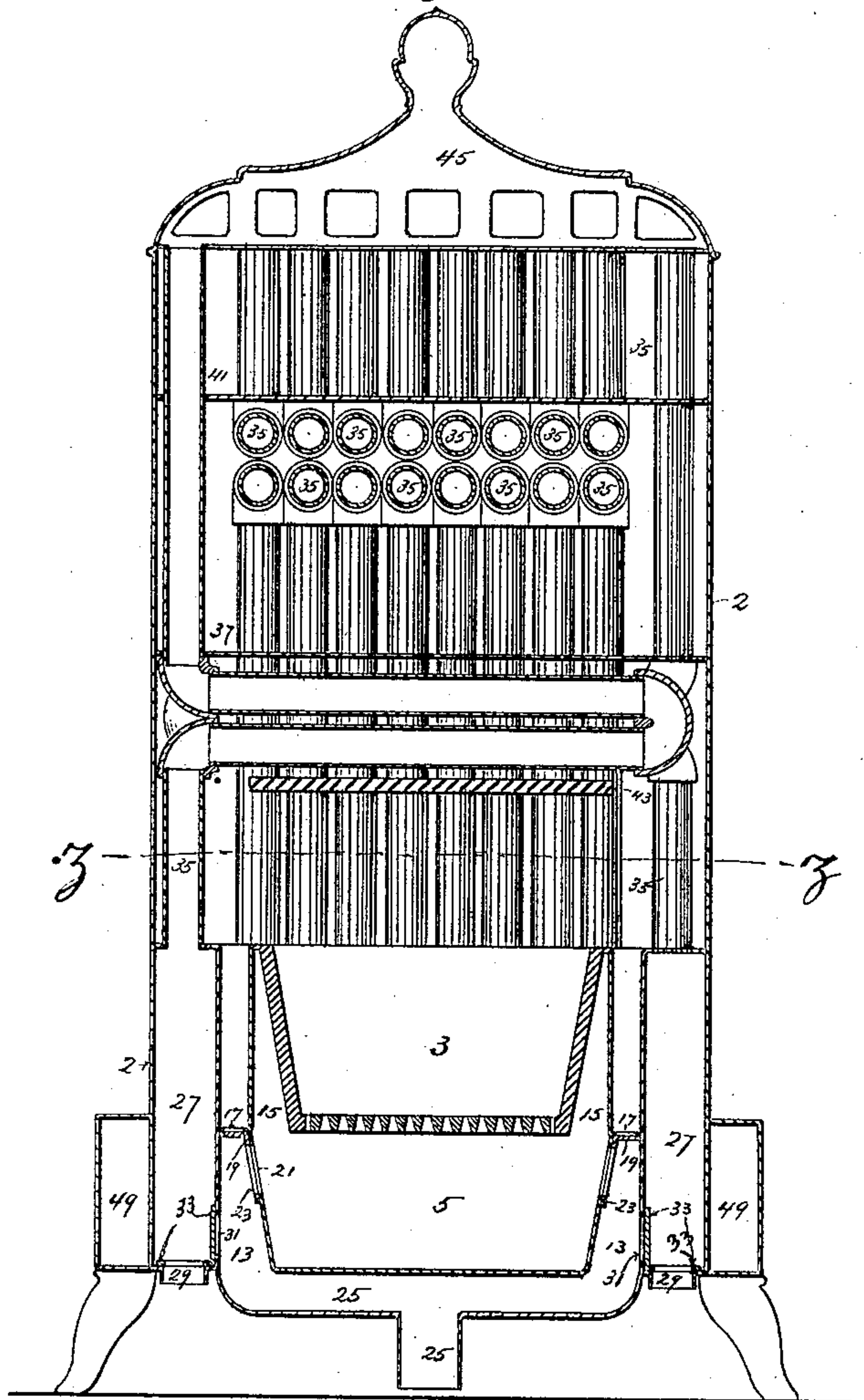
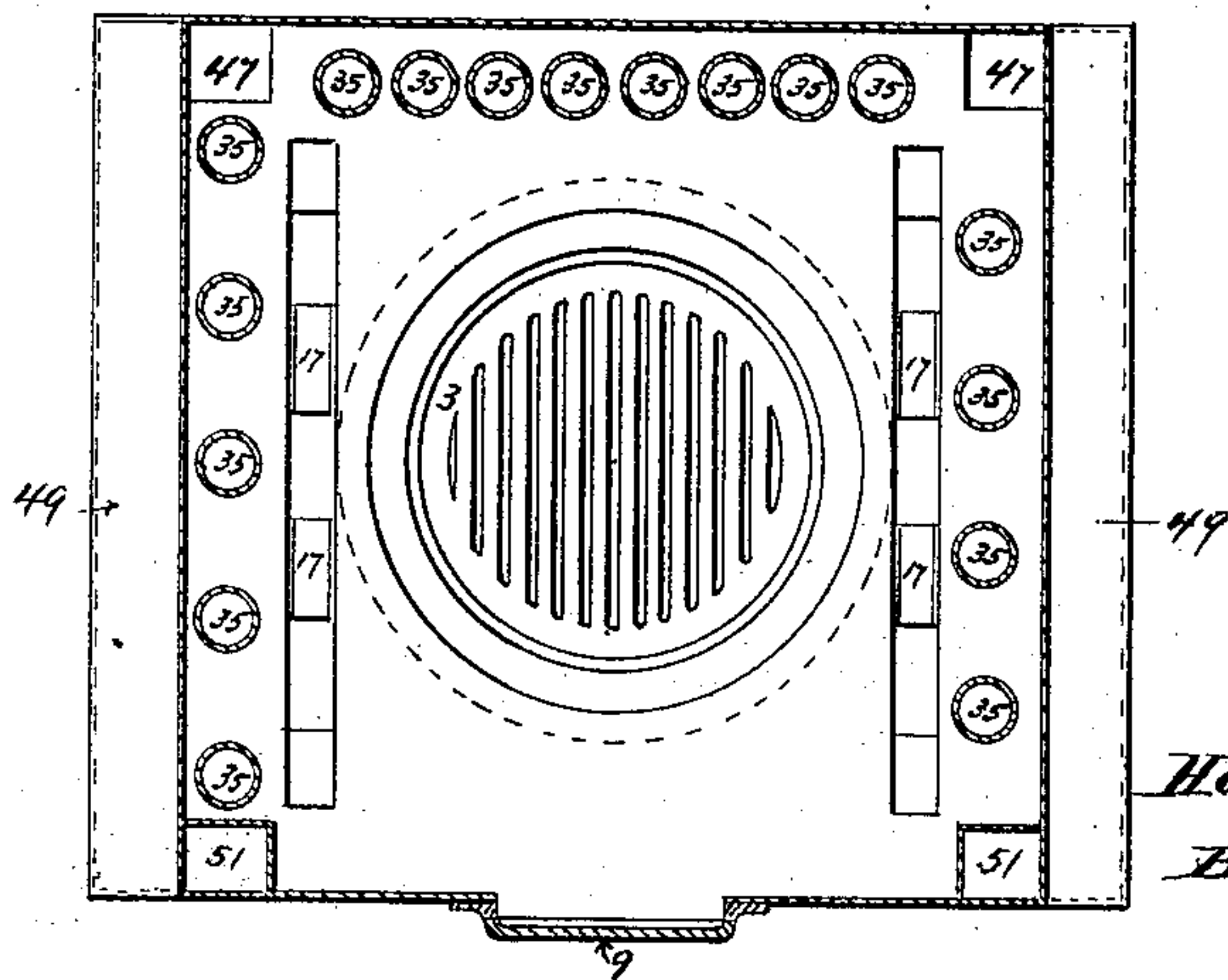


Fig. 6.



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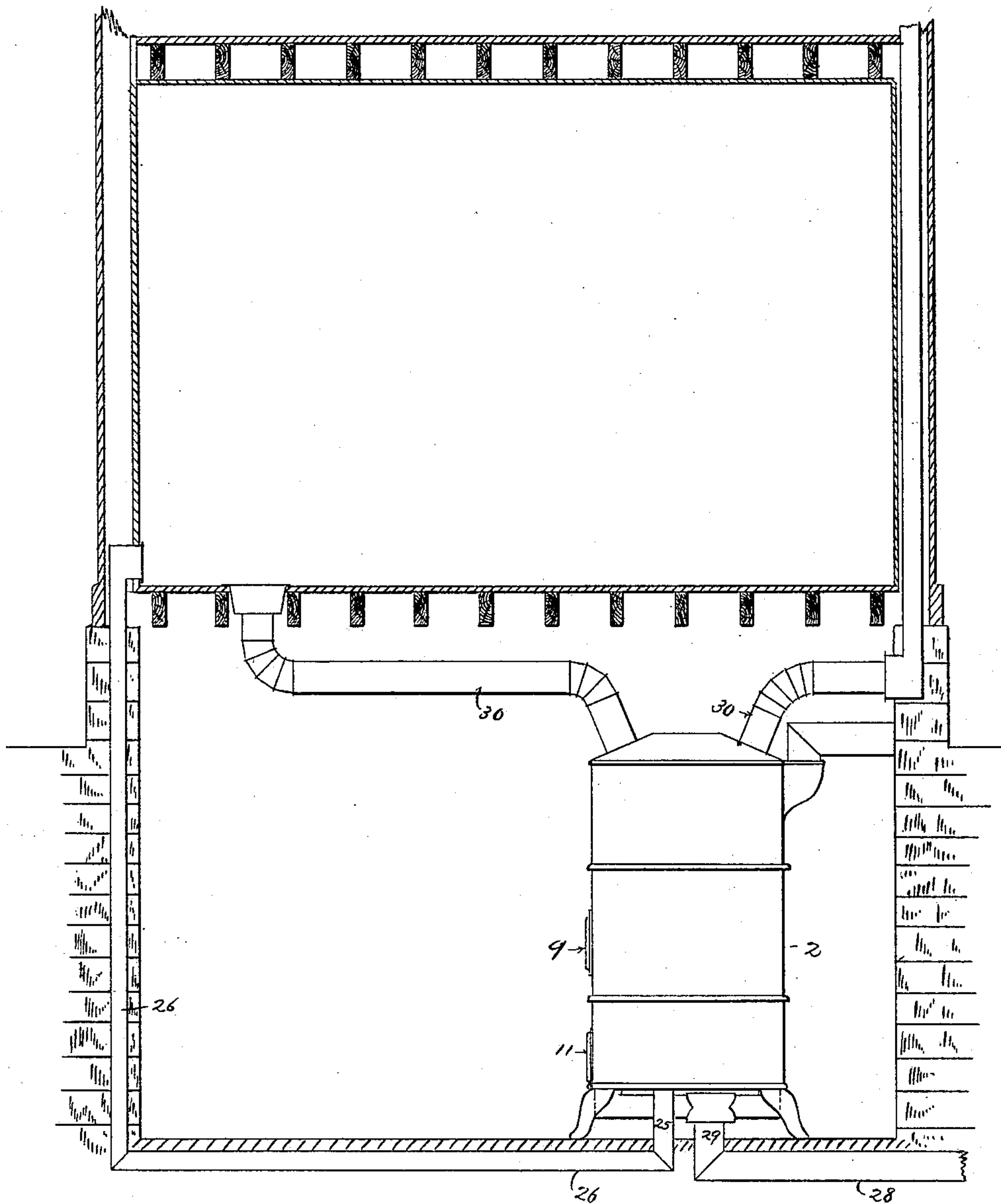
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Fig. 7.



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UNITED STATES PATENT OFFICE.

HORACE J. FRIZELLE, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF TO CHARLES A. HURLBURT, OF SAME PLACE.

HEATER.

SPECIFICATION forming part of Letters Patent No. 366,719, dated July 19, 1887.

Application filed November 16, 1886. Serial No. 219,004. (No model.)

To all whom it may concern:

Be it known that I, HORACE J. FRIZELLE, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain
5 Improvements in Heaters, of which the following is a specification.

This object of this invention is to provide a stove or furnace in which a large amount of air may be heated by the combustion of a small
10 amount of fuel, the heated air being thrown out into the room in which the stove or heater is located, or being conveyed through suitable pipes or flues to the rooms or apartments that it is desired to heat.

15 Another object is to provide such a stove or furnace with means by which the foul air in the room or rooms of the building may be drawn into a chamber below the fire-box, and thence passed through the fire-box, thereby
20 furnishing the draft for the fire, or passed into the combustion-chamber above the fire-box, where it will mingle with the products of combustion and pass with them into the smoke-pipe.

25 Other objects of the invention will be disclosed in the detailed description which follows.

In the accompanying drawings, forming a part of this specification, Figure 1 is a central
30 vertical section of one of my heaters. Fig. 2 is a similar section in a plane at right angles to that of Fig. 1. Fig. 3 is a horizontal section on line X X of Fig. 2. Fig. 4 is a partial sectional elevation on line Y Y of Fig. 1. Fig.
35 5 is a view similar to Fig. 1, but showing the heating and draft pipes arranged to take their supplies of air from the room, but at different distances from the floor. Fig. 6 is a horizontal
40 sectional section on line Z Z of Fig. 5. Fig. 7 is a sectional elevation of a portion of a building, showing the manner of connecting the pipes to the heater when it is used as a hot-air furnace.

In the drawings, 2 represents the casing of
45 the stove or furnace, and it may be of any suitable size, shape, or construction. Supported within the casing is a suitable fire-pot, 3, below which is an ash-box, 5, which may have a chute, 7, through which the ashes may be dis-
50 charged into a pit or room below. The furnace is provided with a suitable fire-door, 9,

and ash-door 11. Extending around three sides of the ash-chamber is an air-chamber, 13. (See Fig. 3.) This chamber I designate the
"draft and ventilating chamber." It is di- 55
vided into two compartments by a horizontal partition, 15, which is provided with openings 17 and dampers 19. The wall between the air-chamber and the ash-box is also provided with
openings 21 and dampers 23. I prefer to pro- 60
vide a combined damper, 19 23, which, when in position to close the openings 17, will leave the openings 21 uncovered, and vice versa. Any suitable construction of dampers may be
used for this purpose. A pipe, 25, opens into 65
the chamber 13, being preferably branched near its end, and connecting with both sides of the chamber. When the heater is placed directly in the room to be heated, this pipe
may lead from a point near the floor of the 70
room, as shown in Fig. 5. When the heater is placed in the cellar or basement of the house to be heated, as hot-air furnaces are commonly placed, it may be connected with suitable flues,
26, leading from the rooms of the building, as 75
shown in Fig. 7. In either case it will draw a supply of air from the room which will be more or less mixed with carbonic-acid gas. When the dampers 23 are open, this air will
pass into the ash-box below the grate, and will 80
pass thence through the fire-pot and supply the oxygen necessary for the combustion of the fuel.

When it is desired to check the fire, the damper 19 is opened and the damper 23 closed. 85
The air will then pass from the air-chamber 13 into the combustion-chamber above the fire-pot, where it will mingle with the products of combustion and pass out of the combustion-chamber into the smoke-flue. By this 90
means I am enabled to thoroughly ventilate the rooms of the house and to check the fire by closing its draft, without checking the ventilating-current.

Outside of the air-chamber 13 is another air- 95
chamber, 27, which is preferably formed as a continuous chamber, extending around three sides of the furnace, as shown in Fig. 3. This chamber I designate the "fresh-air chamber." It extends, preferably, to substantially the same 100
height as the fire-pot. A pipe, 29, is provided with several branches that connect it with each

compartment of the chamber 27. This pipe is to be connected with a suitable fresh-air flue, 28, so as to take the supply of fresh air from outside the building and conduct it into the chamber 27, as shown in Fig. 7. From the chamber 27 the fresh air passes into the heating-flues, as hereinafter described, and is then thrown out into the room from these flues, or is conducted to the rooms of the building through suitable flues, 30, (see Fig. 7,) in the usual way.

It is usually desirable to heat the rooms by means of heated fresh air only, and not to re-heat the air of the rooms. Sometimes, however, it is desirable to heat the rooms quickly, and when the fire is low, if the atmosphere outside is at a low temperature, it will take considerable time to heat fresh air drawn from outside the building. Under these circumstances the air of the rooms may be passed back through the furnace and reheated and again conducted into the rooms. For this purpose I provide a series of openings, 31, in the wall between the air-chamber 13 and the air-chamber 27. These openings I provide with dampers 33, which may close the openings or may close the pipes 25. When it is desired to reheat the air of the rooms, the dampers 33 may be moved to uncover the openings 31 and cover the ends of the pipes 29. A part of the air that passes into the chamber 13 through the pipe 25 will pass into the chamber 27, and then into the heating-flues and back into the rooms. To the top of the air-chamber 27 is secured a series of heating flues or pipes, 35, that extend upward through the combustion-chamber. Each of these flues has a revertible portion extending horizontally across the combustion-chamber and back again, as shown in Figs. 1 and 2. Each flue may be formed of suitable straight tubes, the horizontal tubes being connected to the vertical tubes and to each other by suitable couplings. The tubes upon the opposite sides of the combustion-chamber are arranged alternately with each other, so that the horizontal portions of one series come between the horizontal portions of the other, and the two series together form a horizontal partition extending across the combustion-chamber. A similar series of flues is arranged at the back side of the combustion-chamber, but with its horizontal revertible portions at a point above the horizontal portions of the other flues, as shown in Figs. 1 and 2.

A plate, 37, placed over the lower revertible flues extends entirely across the combustion-chamber, and is provided at the rear of the chamber with a damper, 39. A plate, 41, is placed over the upper flues and extends nearly to the front of the chamber, as shown in Fig. 2. A space is also left between the ends of the upper flues and the wall of the combustion-chamber, permitting the products of combustion to pass between the ends of the flues and the wall of the chamber.

A plate, 43, of soapstone or other suitable

material, may be placed under the revertible flues over the fire-pot to protect the flues from the extreme heat of the fire. A similar plate may be placed under the upper revertible flues and under the top plate of the chamber, if preferred.

The combustion-chamber is, it will be seen, divided into three sections—one below the lower revertible flues, one between the lower and upper flues, and one above the upper flues. The products of combustion rising from the fire-pot pass along under the lower flues to the back of the chamber, thence above the flues through the opening in the plate 37, thence along under the upper flues to the front of the chamber, thence above the flues through the space between the ends of the flues and the wall of the chamber, thence along over the flues to the back of the chamber, and out through the smoke-pipe.

The fresh air from the fresh-air chamber 27 passes into the flues 35, and as it rises in them it passes horizontally across and back through the combustion-chamber in the horizontal revertible portions of the flues. Through these revertible flues the air will have a slow passage, and at the same time be subjected to the high temperature resulting from the passage of the products of combustion along under and over said flues. The heated air from the flues passes into the air-chamber 45 at the top of the furnace, from which it may pass into the room or rooms through flues connected with the chamber, as shown in Fig. 7, or through suitable openings in its walls, as shown in Figs. 1 and 2.

At each back corner of the furnace I locate a diving-flue, 47, whose upper open end is substantially on a level with the top of the fire-pot. The lower end of this flue communicates with a horizontal flue, 49, extending to the front of the furnace outside the fresh-air chamber 27. (See Figs. 1 and 3.) At its forward end this flue connects with a vertical flue, 51, whose upper end opens into the second or middle section of the furnace above the plate 37.

When the damper 39 is closed, the products of combustion, after passing under the first revertible flues, pass into the diving-flue 47, thence through the horizontal flue 49, and then through the flue 31 into the second section of the combustion-chamber. The passage of the products of combustion through the furnace is thereby retarded, and as they pass through the flue 49 they aid in heating the air-chamber 27 and in raising the temperature of the air contained therein. These diving-flues may be arranged at the front of the furnace instead of being at the back, if preferred.

It will be seen from the foregoing description that the heater may be used either as a stove or as a hot-air furnace, that it will raise a large amount of air to a high temperature with a small quantity of fuel, and that it affords an excellent ventilating means for the rooms of the house.

When the heater is used as a stove and is

set in the room that is to be heated by it, the pipes 25 and 29 may both take their supply of air from the room, the pipe 25 taking its air from the point near the floor, so that the
 5 foul air will be drawn into it and thrown into the combustion-chamber, while the pipes 29 take their air at a higher level, and thus receive a supply of purer air, which will be reheated and again passed out into the room.
 10 This arrangement of pipes is clearly shown in Fig. 5.

I prefer that in all instances the draft-pipe 25 shall communicate with the heater through its bottom plate, so that the air for the draft
 15 of the heater is drawn from a point near the floor, and thus the foul air of the room is taken into the heater and passed out through the smoke-pipe. The heater thus serves as an efficient means for ventilating the rooms in which
 20 it is placed or with which it is connected.

I claim as my invention—

1. In a heater of the class described, the combination, with the fire-pot and the ash-box, of the two air-chambers 13 and 27, surrounding
 25 the base of the heater, the inner chamber communicating both with the ash-box and the combustion-chamber above the fire-pot, dampers controlling the openings between said chamber and said fire-pot and combustion-chamber,
 30 and a series of heating-flues, 35, connecting with said outer chamber and extending through said combustion-chamber above said fire-pot, substantially as described.

2. The combination, in a heater, with the
 35 fire-pot 3 and the ash-box 5, of the chamber 13, surrounding the ash-box and provided with openings communicating with the ash-box and other openings communicating with the combustion-chamber above the fire-pot, and
 40 the chamber 27, surrounding the chamber 13 and extending to the top of the fire-pot, and reversible heating-flues 35, extending from said chamber through the combustion-chamber above the fire-pot, substantially as described.

3. The combination, in a heater, with the fire-pot and combustion-chamber, of the fresh-air chamber 27, surrounding the fire-pot upon
 45 three sides of the heater, the heating-flues 35, connected with said chamber, the side flues having reversible portions extending horizontally across and back through the combustion-
 50 chamber and alternating with each other, and the rear flues having reversible portions extending horizontally across and back in said combustion-chamber at a higher level than the
 55 reversible portions of the side flues, all substantially as described.

4. The combination, in a heater, with the fire-pot and combustion-chamber, of the air-
 60 chamber 27, surrounding the fire-pot, the heating-flues 35, connected with said air-chamber, and extending horizontally across and back through said combustion-chamber and dividing said chamber into separate sections, the
 65 plate 37 above the lower section, having the damper 39, and the diving-flue connected with said lower section of the combustion-chamber,

extending downward and along said chamber 27 and upward into the combustion-chamber above the plate 37, substantially as described, 70
 and for the purpose set forth.

5. In a heater of the class described, the combination, with the combustion-chamber, of the series of flues 35, arranged at each side and at the back of said chamber, the side flues having the reversible portions extending in opposite
 75 directions horizontally across and back through said chamber from one side to the other on the same level and alternating with each other, and the back flues having the reversible portions extending at a higher level
 80 across and back through said chamber, substantially as described.

6. The combination, in a heater of the class described, with the combustion-chamber divided by the horizontally-reversible flues into
 85 a series of sections, of the fresh-air chamber 27, surrounding the base of the heater, and the diving-flues 47 49 51, extending from the lower section of the combustion-chamber to the base, 90
 along the fresh-air chamber, and up into the second section of the combustion-chamber, substantially as described.

7. The combination, with the combustion-chamber and air-heating flues extending
 95 through the combustion-chamber above the fire-pot, of the fresh-air chamber 27, communicating with said flues, the pipes 29, communicating with said chamber, the ventilating and draft chamber 13, communicating both with
 100 the combustion-chamber and with said chamber 27, and suitable dampers, as 33, by means of which either the pipes 29 or the openings between the chamber 13 and the chamber 27 may be closed, substantially as described, and 105
 for the purpose set forth.

8. The combination, in a heater, with the combustion-chamber and fire-pot, of the draft and ventilating chamber 13, communicating
 110 both with the fire-pot and the combustion-chamber above the fire-pot, the pipe 25, connected with said chamber and extending below the base of the heater, the air-chamber 27, the heating-flues 35, connected with said chamber and extending through the combustion-
 115 chamber, and the pipes 29, connected with said air-chamber and arranged to take their supply of air at a higher level than the pipe 25, as and for the purpose set forth.

9. The combination, in a heater, with the
 120 combustion-chamber and fire-pot, of the draft and ventilating pipe 25, extending downwardly from said heater, the air-chamber 27, surrounding the base of the heater, the heating-flues 35, connected with said chamber and extending
 125 through the combustion-chamber, and the pipes 29, connected with said air-chamber and arranged to take their supply of air at a higher level than the pipe 25, substantially as described. 130

10. The combination, in a heater, with the combustion-chamber and fire-pot, of the series
 of air-heating flues 35, arranged to take a supply of air at their lower ends, and having the

horizontally -reversible portions extending
across the combustion-chamber above the fire-
pot and dividing said combustion-chamber
into separate sections, and the draft and ven-
5 tilating chamber 13 at the base of the heater,
provided with openings communicating with
the ash-box below the fire-pot and other open-

ings communicating with the combustion-
chamber above the fire-pot, substantially as
described.

HORACE J. FRIZELLE.

In presence of—

R. H. SANFORD,

R. C. PAUL.