No. 801,824. PATENTED OCT. 10, 1905.

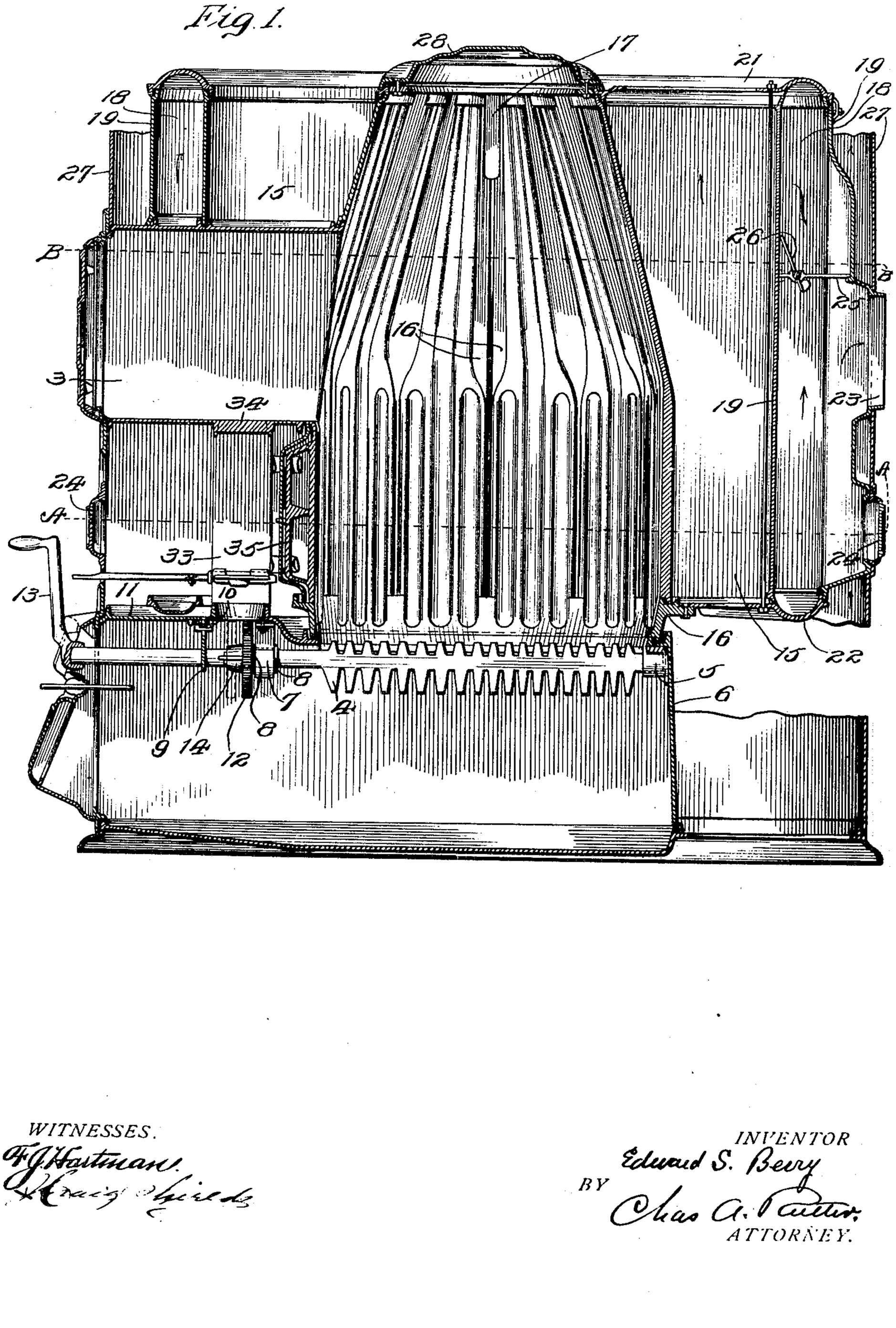
E. S. BERRY.

HEATING FURNACE.

APPLICATION FILED OCT. 1, 1904.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES.

F. J. Hartman.

Chas. A. Fairfield

INVENTOR

Edward S. Berry

BY

Chas A. Fairfield

ATTORNEY.

No. 801,824. PATENTED OCT. 10, 1905.

E. S. BERRY.

HEATING FURNACE.

APPLICATION FILED OCT. 1, 1904.

4 SHEETS—SHEET 2.

Fig. 2.

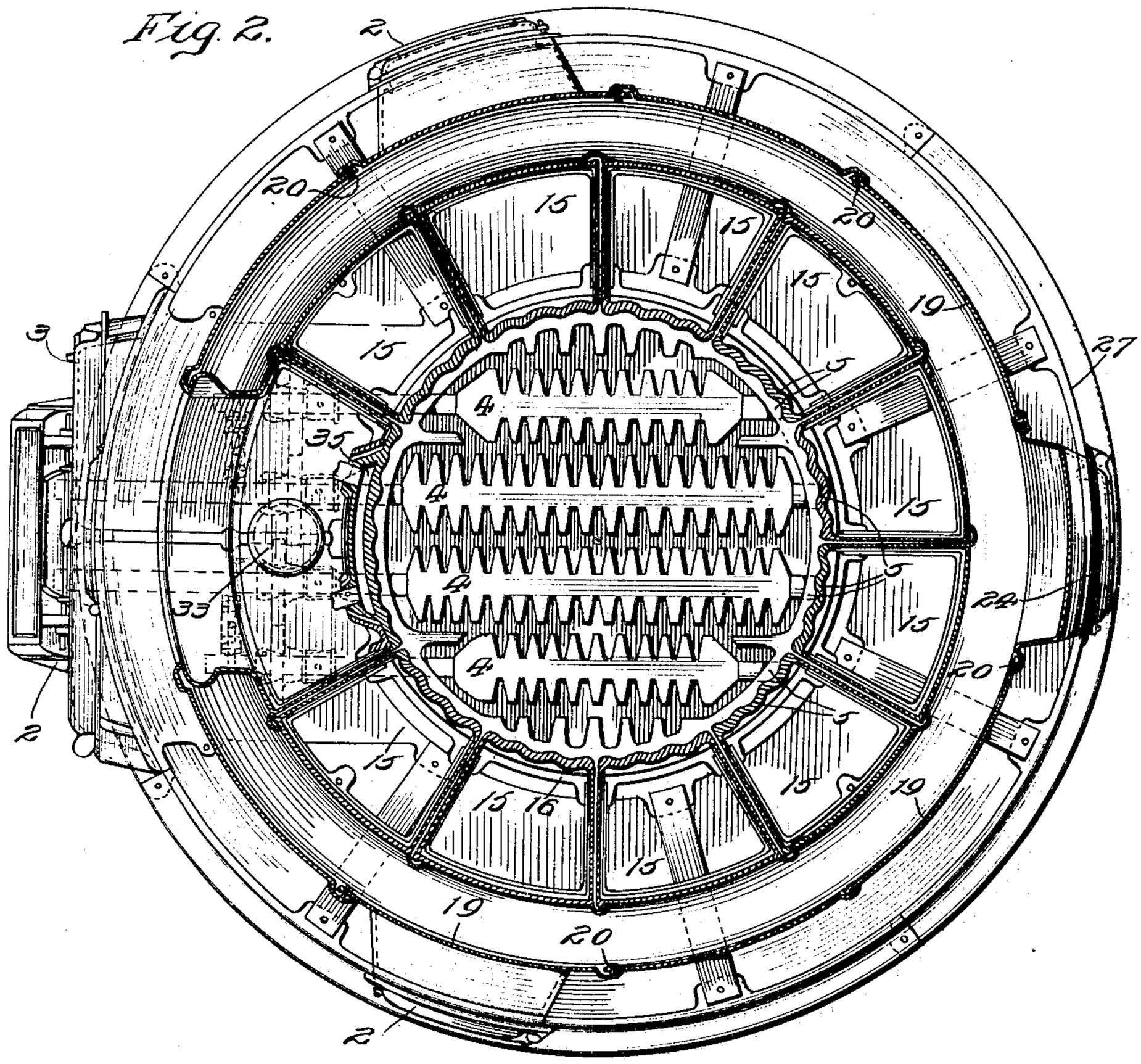


Fig. 8.

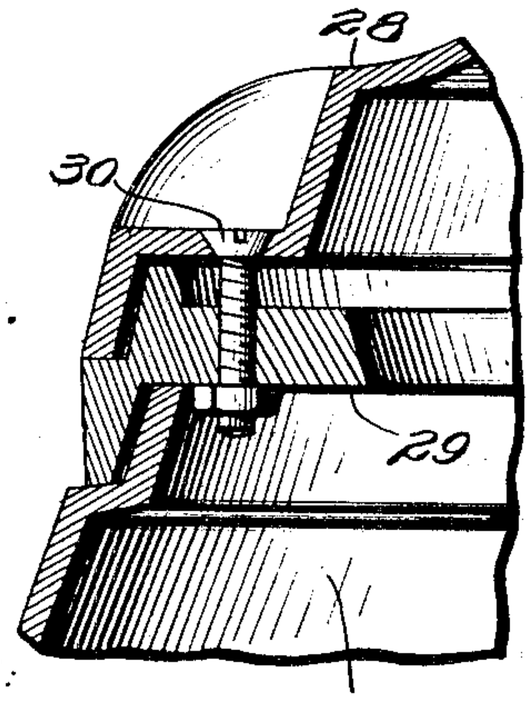
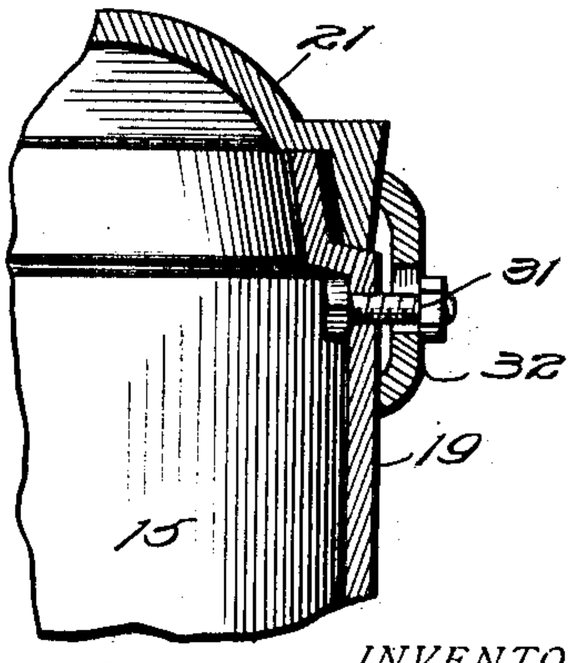


Fig. 9.



WITNESSES:

F. J. Hartmann.

Max Loeb

INVENTOR

Edward S. Berry

BY

Chas A. Patten.

ATTORNEY.

No. 801,824. PATENTED OCT. 10, 1905.

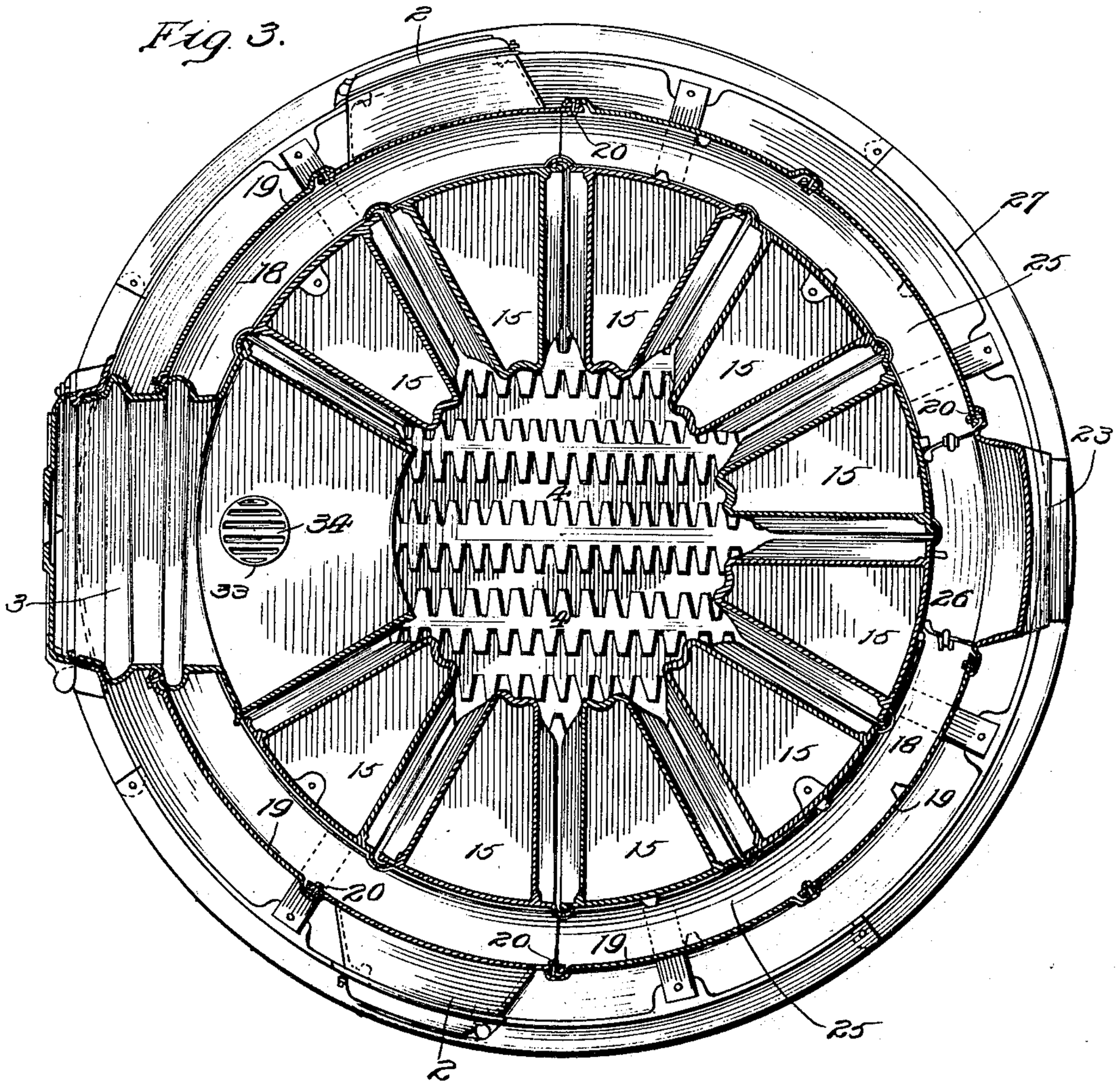
E. S. BERRY.

HEATING FURNACE.

APPLICATION FILED OCT. 1, 1904.

4 SHEETS—SHEET 3.

Fig. 3.



WITNESSES:

F. J. Hartmann.

Louis J. Weed.

INVENTOR

Edward S. Berry

BY

Chas A. Carter.

ATTORNEY.

No. 801,824. PATENTED OCT. 10, 1905.

E. S. BERRY.

HEATING FURNACE.

APPLICATION FILED OCT. 1, 1904.

4 SHEETS—SHEET 4.

Fig. 4.

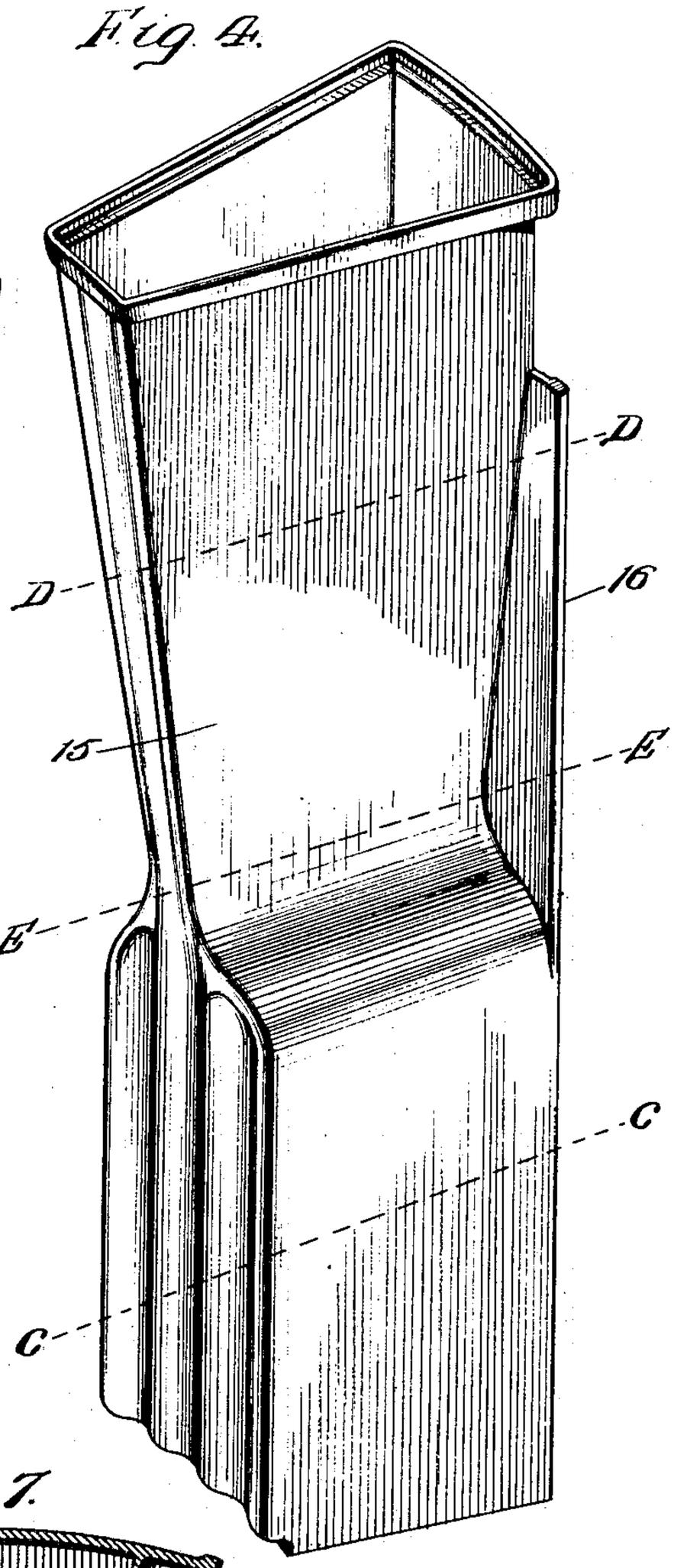


Fig. 6.

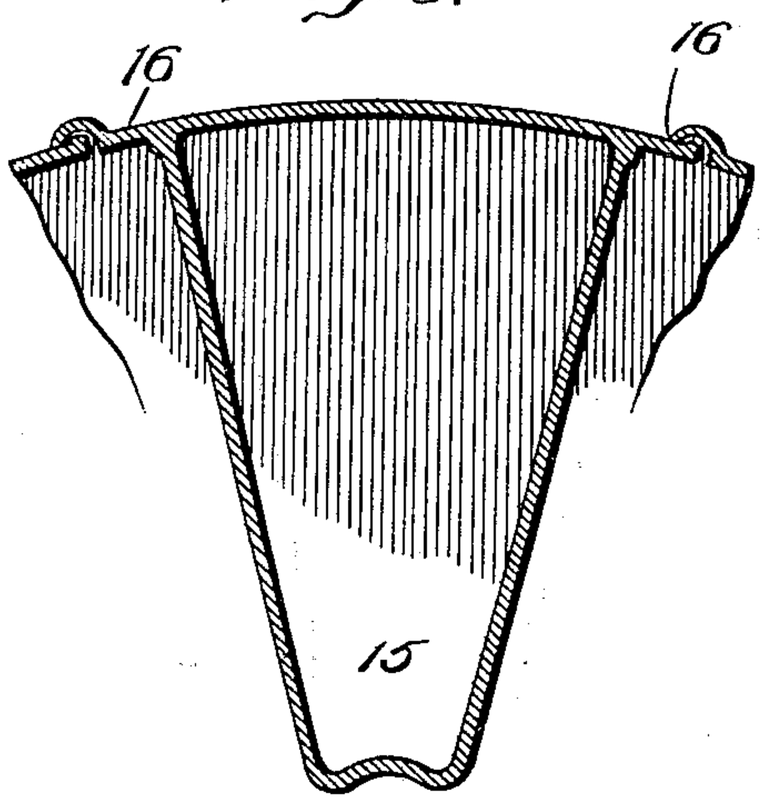


Fig. 5.

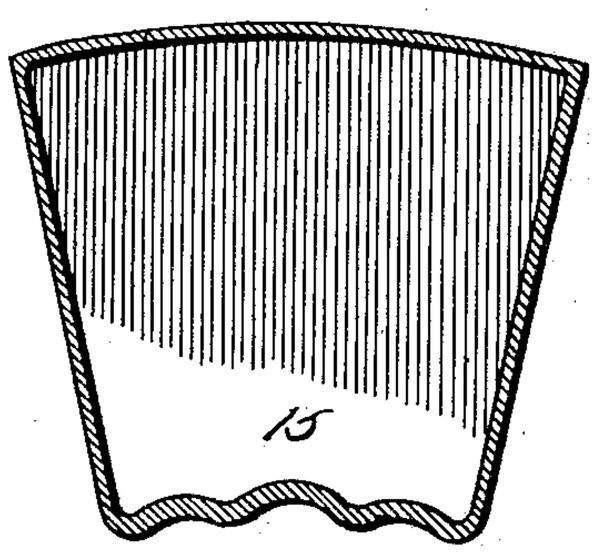
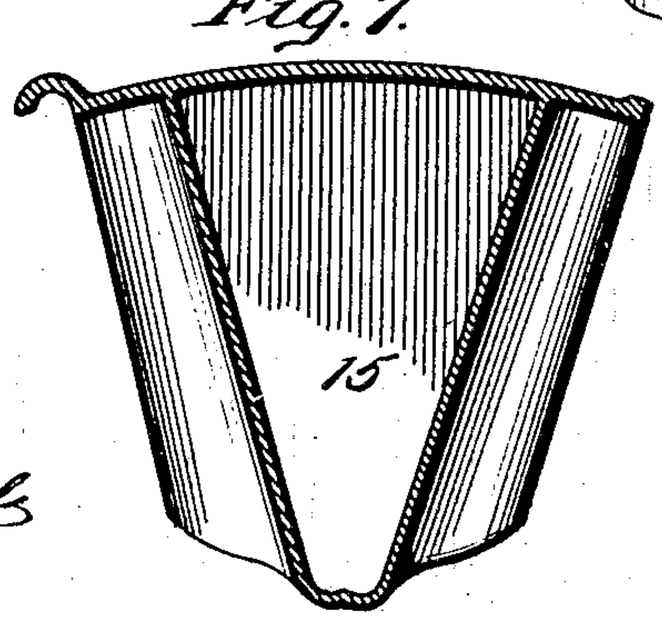


Fig. 7.



WITNESSES:

F. J. Hartman.

Craig Sweeds

INVENTOR

Edward S. Berry

BY

Chas A. Carter.

ATTORNEY.

UNITED STATES PATENT OFFICE.

EDWARD S. BERRY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JAMES SPEAR STOVE AND HEATING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

HEATING-FURNACE.

No. 801,824. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed October 1, 1904. Serial No. 226,771.

To all whom it may concern:

Be it known that I, EDWARD S. BERRY, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Heating-Furnaces, of which the following is a specification.

My invention relates to improvements in heating-furnaces; and the object of my invention is to furnish an efficient and simple furnace for heating air or with suitable modifications for heating water for heating houses of any description.

My invention contemplates an arrangement of parts that can be put in place or taken down with the minimum expenditure of time and labor, and to this end the fastenings of the several parts of the furnace are of such a character that if necessary they can be cut or broken without destroying any parts of the furnace proper.

The air or water is heated in a series or set of separate flues or chambers which surround the fire-chamber and which extend up above the fire-chamber, forming together a combustion-chamber which will take up a maximum amount of heat from the fire. The tops of the flues may discharge into a common reservoir connected in a suitable manner with the rooms to be heated, or one or more of these flues may be connected directly with a space that is to be heated. If desired, each flue may be connected directly with and heat a separate place.

In order to provide for a free passage of air through the flues, their cross-section increases as they pass upward, and the sides of the flues that are exposed to the heat overhang the grate, so that they are more directly exposed to the heat and at the same time present an overhanging surface upon which the accumulation of any considerable quantity of soot and dust is practically impossible.

In the accompanying drawings, forming part of this specification, and in which similar numerals of reference indicate similar parts throughout the several views, Figure 1 is a central sectional elevation through a hot-air furnace embodying my improvements; Fig. 2, a section of Fig. 1 on line A A; Fig. 3, a section of Fig. 1 on line B B; Fig. 4, a perspective view of one of the flues or columns in which the air is heated; Fig. 5, a transverse section of Fig. 4 on line C C; Fig. 6, a transverse section of Fig. 4 on line D D; Fig. 7, a transverse section of Fig. 4 on line E E; Fig. 8, a sectional view showing the means for securing together the upper inner ends of the air-flues; Fig. 9, a sectional view showing the means for securing the top or cover and the outer sides of the smoke-flue.

1 is the ash-pit of the furnace, which is furnished with the usual cleaning-doors 2.

3 is the coal-chute.

4 represents the grate-bars.

15 represents flues in which the air is heated. These flues are cast, forming each an independent section, and they are so arranged as to form the sides and top of the fire-chamber.

16 is a wheel-like casting which rests upon the top of the sides of the ash-pit, which carries the sections or flues 15, which latter are hollow to permit the passage of air.

The lower parts of the flues 15—that is, the parts extending from the grate-bars to or slightly above the bottom of the coal-chute 3—have four walls, all of which are substantially vertical; but from a point at or near the bottom of the chute 3 the inner and side walls of the flues rake outwardly, the outer wall of the flues remaining substantially vertical throughout their entire length. This construction is clearly shown in Figs. 4, 5, 6, and 7 and results in a flue the cross-section of which increases in area as it rises, this construction affording a free passage for the air, which becomes more highly heated and correspondingly expanded as it rises in the flues.

At the rear sides the flues are furnished with flanges 16 to close the space that would otherwise be left between the several flues when in place. As shown best in Fig. 4, the flanges 16 extend from the top of the base of the flues—that is to say, from at or near the top of the fire-chamber—to a point some distance below the extreme upper end of the flues. When the several flues are in place, the sides of their bases, that part of them which forms the fire-chamber proper, touch and form a joint sufficiently tight for all practical purposes, while the flanges 16 form a joint between the tapering sides of the flues above their straight-sided bases. As has been before stated and as shown in the drawings,

the flanges 16 do not extend quite to the top of the flues, and when the flues are in place the omission of the flanges at this point forms openings 17, Fig. 1, for the passage of smoke and other products of combustion, which are through these openings discharged into a smoke-flue 18, which surrounds the furnace, the inner walls of this flue being formed by the outer walls of the flues 15, while its outer wall is formed by a series of thin castings or plates 19, which are secured together by bolts 20 or other suitable and convenient means. The top and bottom of the smoke-flue are closed by covers 21 22, respectively, and the flue is furnished with a smoke-collar 23, Figs. 1 and 3, which is connected with the chimney.

From Fig. 1 it will be seen that the smoke-collar 23 is placed substantially opposite and at the same height as the coal-chute 3 and that beneath the coal-chute and smoke-collar are placed cleaning-doors 24. Of these latter there are sufficient to permit the thorough cleaning of the bottom of the flue 18.

25, Figs. 1 and 3, is a baffle-plate dividing the rear part of the flue 18 into an upper and a lower chamber.

26 is a damper in plate 25. If the damper be opened, the smoke and products of combustion, following the line of least resistance, will pass across the top of plate 25 down to the smoke-collar and thence to the chimney. If the damper 26 be closed, the smoke, &c., are forced to pass under the plate 25 to reach the chimney. This retards the draft and is not resorted to unless the fire be in good condition.

27 is a sheet-iron or brick covering surrounding and inclosing the furnace, as is usual.

28, Figs. 1 and 8, is a plate for securing the upper inner ends of the air-flues 15 and for covering the top of the fire space. This plate is secured to a ring 29 by a bolt 30. The ring 29 forms a seat for the under part of the plate 28 and is itself carried by the upper ends of the flues 15, as shown in Fig. 8.

In Fig. 9 the means for securing the cover 21 of the smoke-flue 18 to the outer wall 19 of this flue are shown, 31 being a bolt passing through the wall 19 and through a keeper 32, one leg of which bears against wall 19 and the other against cover 21.

33, Figs. 1, 2, and 3, is a dust-flue leading from the ash-pit to the bottom of the coal-chute 3. This flue is furnished with a register or damper 34, which may be opened or closed, as conditions may require.

35, Figs. 1 and 2, is a water-front the inner face of which forms a part of the fire-chamber of the furnace. This water-front is placed directly beneath the coal-chute 3 and at this point, in order to form an opening for the passage of coal to the furnace, one or two of the flues 15 are omitted, their place at the bottom being taken by the water-front or by a simple casting or plate which may be used interchangeably with the water-front. Above the coal-chute 3 short flues are used to fill up the space between the longer flues, of which there is one on either side of the chute.

The arrangement of grate-bars shown and described in this application will form the subject of a separate application.

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

1. A flue for a heating-furnace having a lower portion formed with four vertical walls and an upper portion formed with a vertical rear wall and an inner and two side walls all of which flare from their bottoms outwardly, the side walls of the lower portion of said flue being at their upper ends bent sharply inward to join the lower ends of the side walls of the upper portion of said flue so as to choke off or contract the flue at this point.

2. The combination with a heating-furnace, of a series of air-heating flues surrounding and forming a fire-pot and a combustion-chamber, the lower portion of each of said flues being formed with four vertical walls and the upper portions of each of said flues being formed with a substantially vertical rear wall and two side walls and an inner, or front, wall that flare from their bottoms outwardly, each of said flues being choked off, or contracted, at the junction of their lower and upper portions.

EDWARD S. BERRY.

Witnesses:
WAYNE P. RAMBO,
J. C. HERLEY.