

(No Model.)

2 Sheets—Sheet 1.

W. GERKHARDT.

STEAM GENERATING FURNACE.

No. 365,253.

Patented June 21, 1887.

Fig. I,

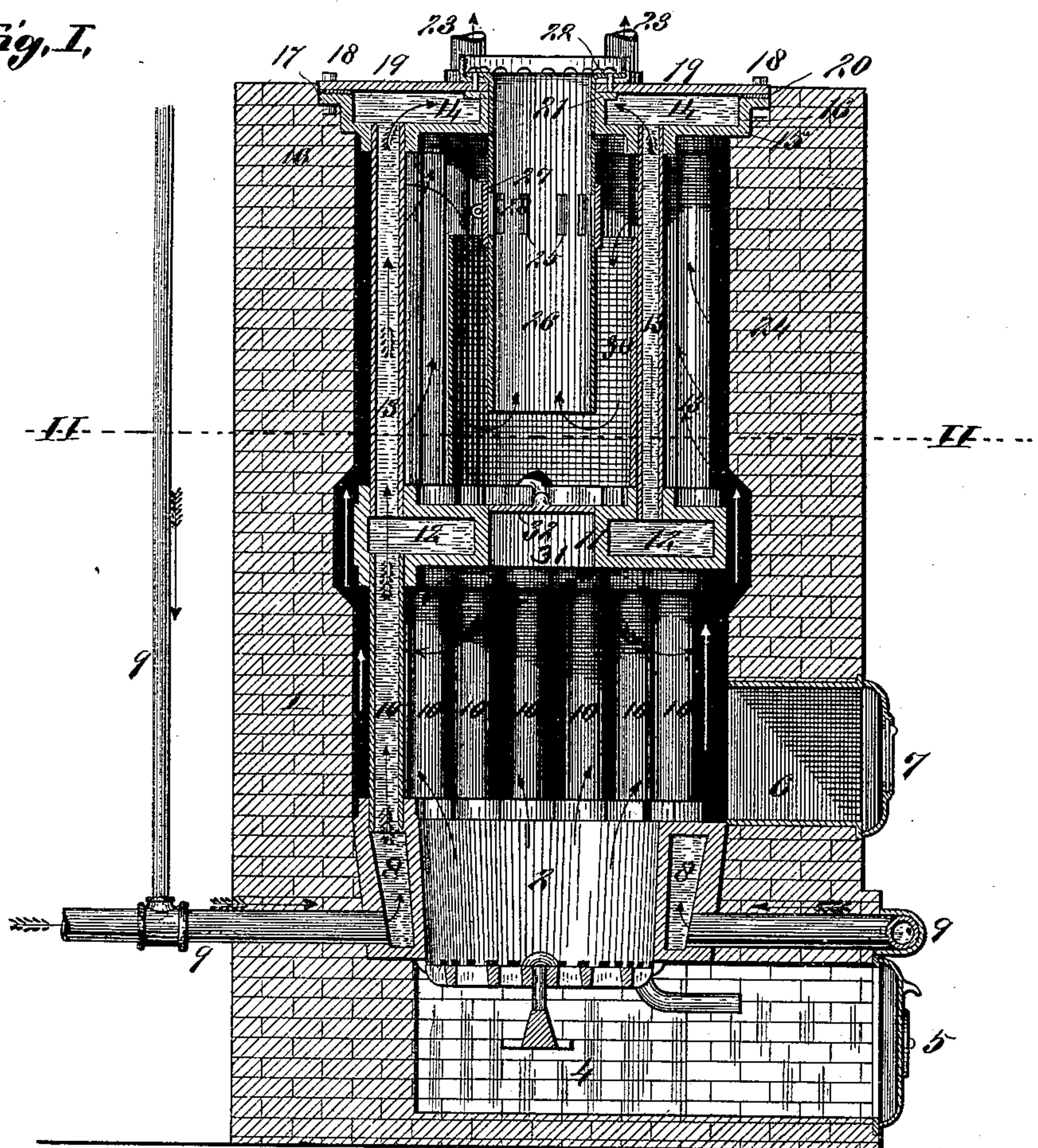
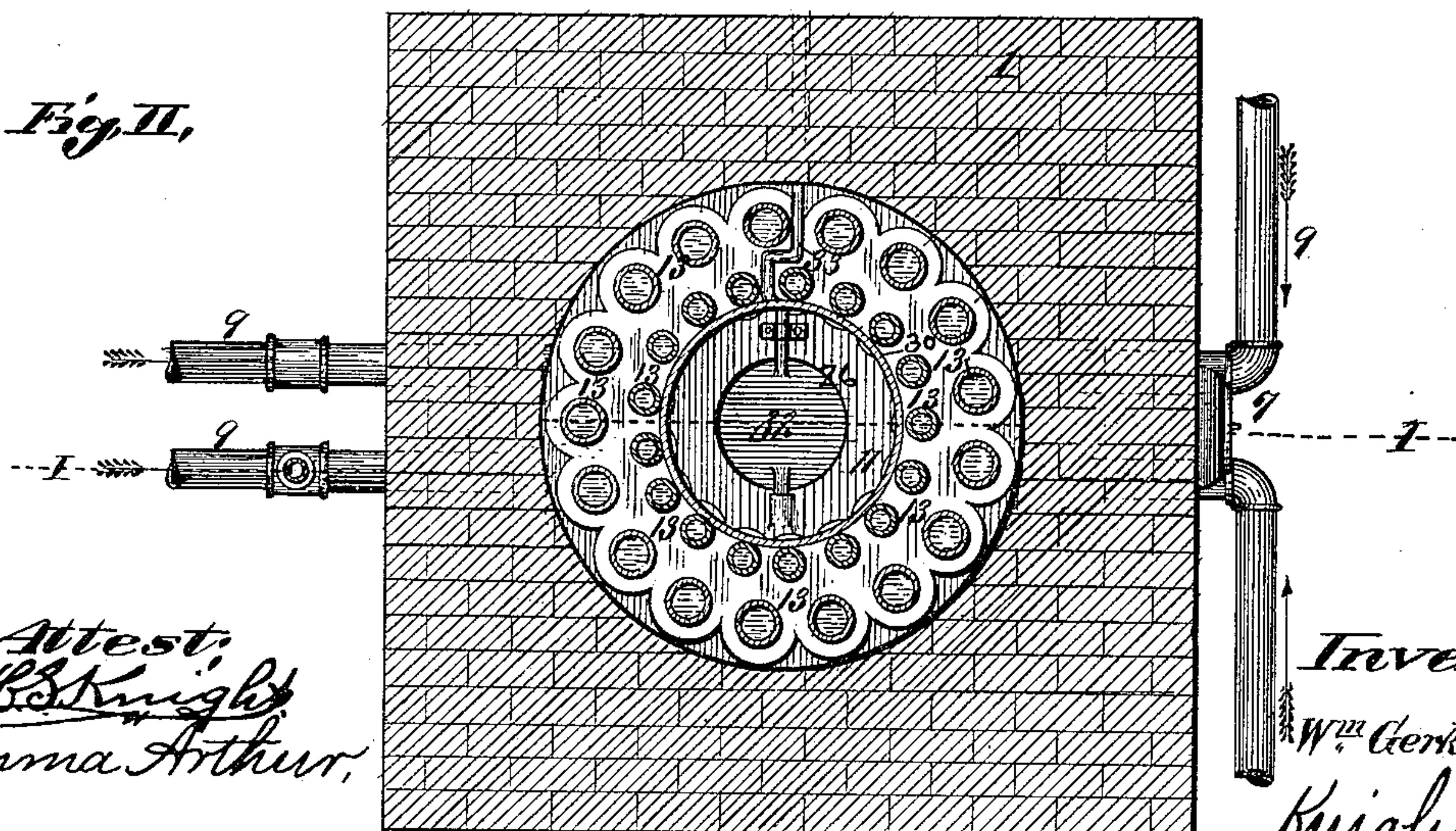


Fig. II,



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Emma Arthur,

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By *Knight Bros*

attys

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Fig. III,

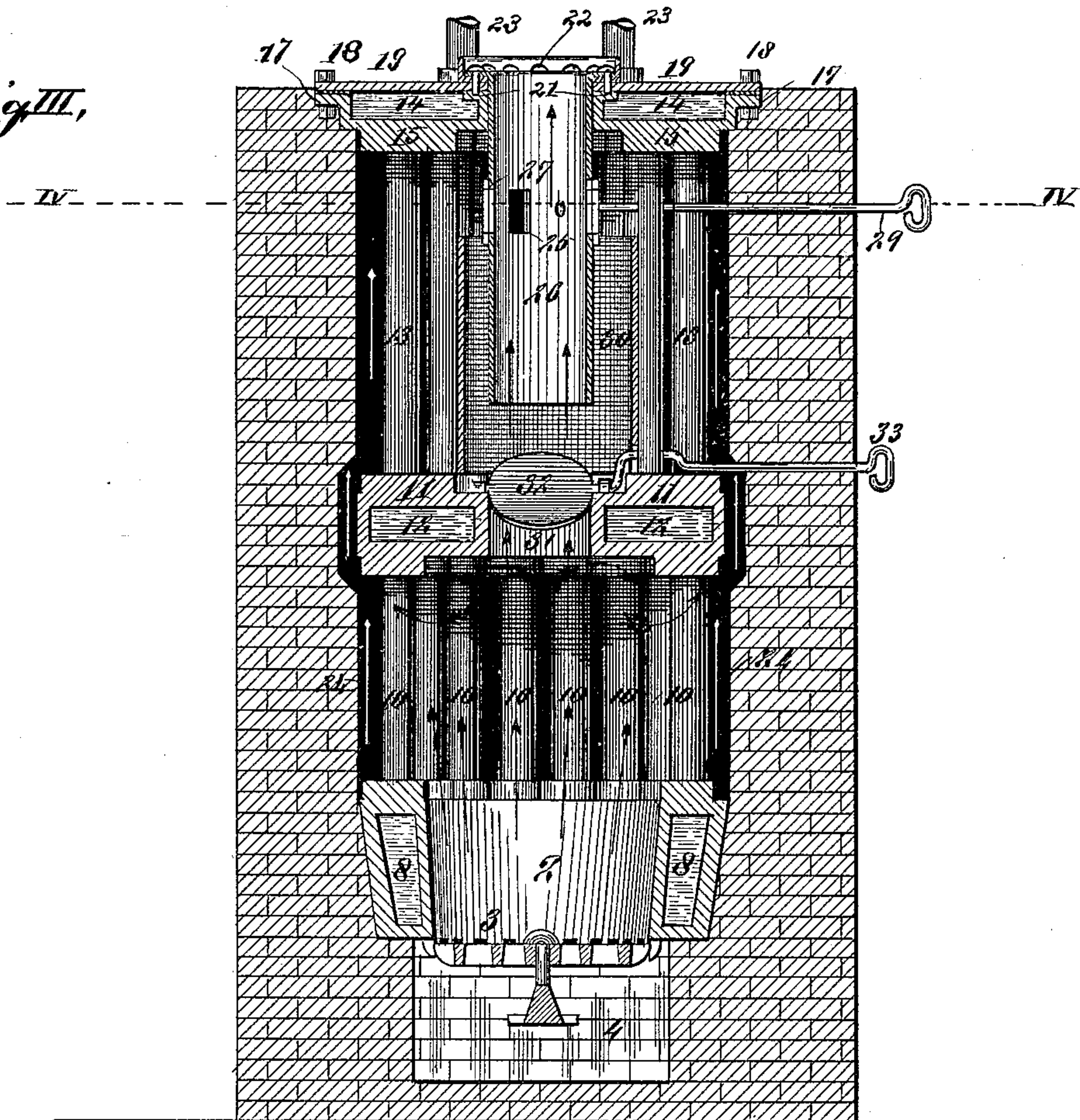
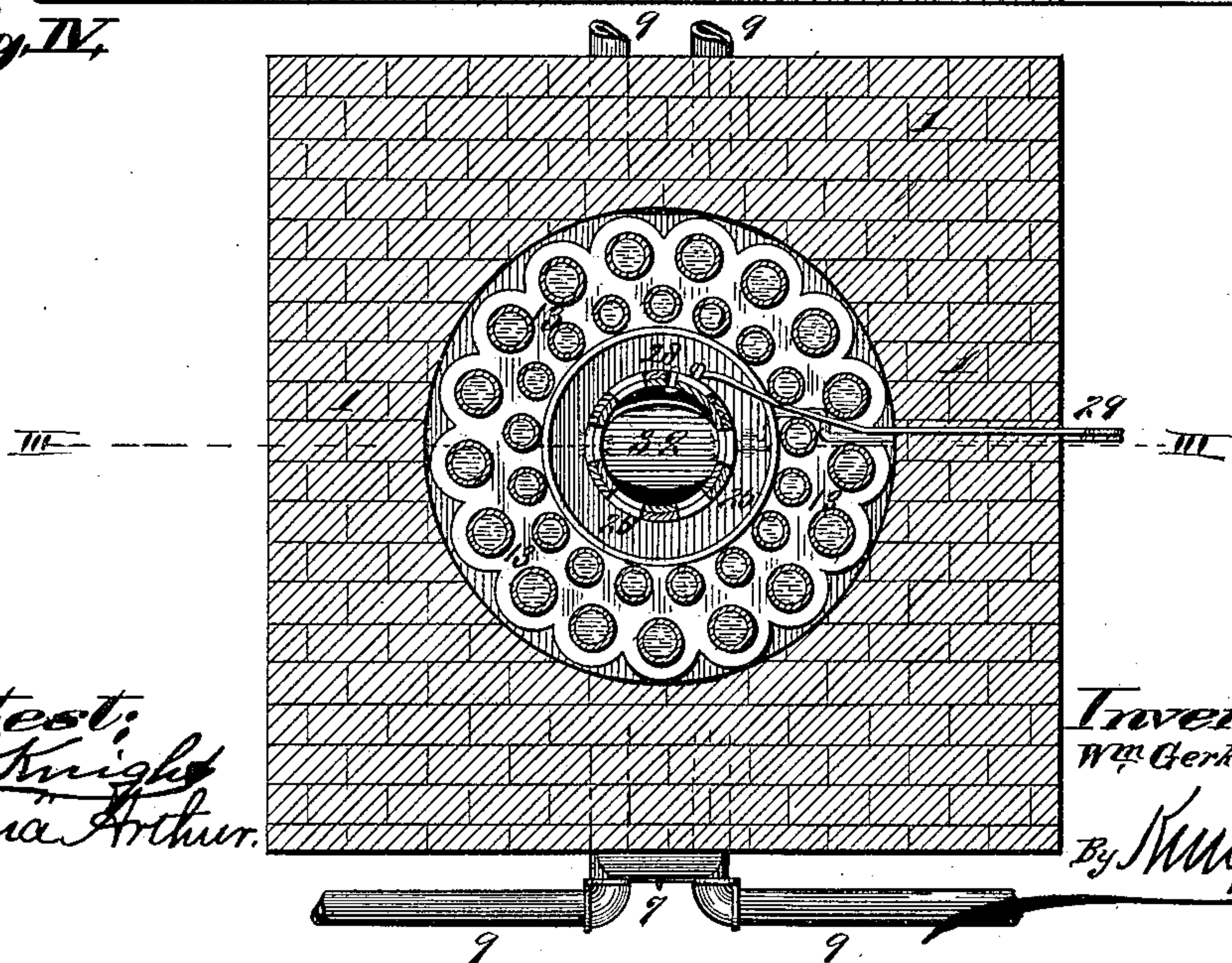


Fig. IV,



Attest:
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UNITED STATES PATENT OFFICE.

WILLIAM GERKHARDT, OF ST. LOUIS, MISSOURI.

STEAM-GENERATING FURNACE.

SPECIFICATION forming part of Letters Patent No. 365,253, dated June 21, 1887.

Application filed February 3, 1887. Serial No. 226,416. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GERKHARDT, of the city of St. Louis, in the State of Missouri, have invented certain new and useful
5 Improvements in Steam-Generating Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which—

10 Figure I is a vertical section of my improved furnace, taken on line I I, Fig. II. Fig. II is a transverse horizontal section taken on line II II, Fig. I. Fig. III is a vertical longitudinal section taken on line III III, Fig. IV; and
15 Fig. IV is a transverse horizontal section taken on line IV IV, Fig. III.

My invention relates to a hot-water and steam-generating furnace; and my invention consists in features of novelty, hereinafter fully
20 described, and pointed out in the claims.

Referring to the drawings, 1 represents the walls of the furnace, which are preferably made of brick.

2 represents the fire-box provided with a
25 grate, 3, and located over an ash-pit, 4, the ash-pit having a door, 5, through which access may be had to it, and the furnace is provided with a chute, 6, having a door, 7, through which the fuel is inserted into the fire-pot.
30 The fire-pot is made hollow, forming a water jacket or chamber, 8, with which connect cold-water pipes 9, as shown. Communicating with this jacket are a number of tubes, 10, to the upper ends of which is connected a hollow
35 ring, 11, forming a water-chamber, 12. To the upper side of the ring 12 are connected, at their lower ends, water pipes or tubes 13, the upper ends of which communicate with a water-chamber, 14, formed by a hollow ring, 15.
40 The lower part of the ring is cast with vertical sides 16, having an outturned flange, 17. Secured to the flange 17 by bolts 18 is an annular plate, 19, which forms the top of the ring, there being a gasket, 20, placed between
45 the plate and flange of the ring. The ring has also an inner flange, 21, to which the inner edge of the plate 19 is secured by bolts 22. By forming the upper ring in this way its top can be removed to allow access to the interior
50 of the chamber and to the tubes 13, when required, for the purpose of cleaning or repairing the parts.

23 represents hot-water pipes communicating with the chamber 14, and through which the water may be carried to any part of the
55 building.

The circulation of the water from the pipes 9 to the pipes 13 is indicated by the full arrows in Fig. I.

The products of combustion pass from the
60 fire-box 2 up between the tubes 10 and through the chamber or flue 24, between the tubes and the wall of the furnace, as indicated by featherless arrows in Figs. I and III. As the products of combustion ascend between the tubes
65 10, they impinge against the under side of the ring 12 and are deflected downward and outward, as shown by full arrows, passing between the ring and the wall of the furnace, and by impinging against the bottom of the cham-
70 ber heat the water therein, and they then pass upward between the flues 13 and out through openings 25 in a central flue, 26, which communicates with the chimney or uptake of the
75 furnace.

The openings 25 may be regulated in size or
75 entirely closed by a damper consisting of a ring, 27, that surrounds the flue 26, and which is provided with a perforated lug, 28, to which is connected the inner end of a rod, 29, (see
80 Figs. III and IV,) by which the ring may be turned to increase or diminish the size of the openings 25 to regulate the draft of the furnace; or the openings may be entirely closed
85 by this damper, and then the products of combustion will be compelled to pass downward to the lower end of the flue 26 before they can enter it.

To prevent the products of combustion entering the flue 26 at the bottom when it is de-
90 sired to have them pass through the perforations 25, I surround the lower end of the flue 26 with a larger tube or shell, 30, which is made fast to the ring 11. (See Fig. III.) This shell prevents the products of combustion pass-
95 ing into the lower end of the flue 26 until the damper 27 is closed, and even when the damper is closed the products are compelled to pass upward to the top of the furnace before they
100 can escape, thereby being utilized to heat the tubes 13, and to heat the water in the chamber 14 by impinging against the bottom of the ring 15.

The ring 11 has a central opening, 31, pro-

vided with a damper, 32, having a handle, 33, that extends through the wall of the furnace, and by which the damper is operated.

It will be seen that the opening 31 is in a direct line with the fire-box 2 and flue 26, so that when a direct draft is desired—as, for instance, when the fire is first lighted—it can be obtained by opening the damper 32, and then by closing the damper again the circulation already described is had.

With a furnace thus constructed a large amount of water-heating surface is had, and complete control over the products of combustion.

Two of the pipes 10 in front chute, 6, should be omitted to permit of the fuel being inserted into the fire-box.

I claim as my invention—

1. In a steam-generating furnace, the combination, with the fire-pot and the walls of the furnace, of a series of water-chambers and water-pipes connecting them, the passage for the products of combustion being through one chamber and between the outside of the next chamber and the wall of the casing, and so on alternately, substantially as set forth.

2. In a furnace, the combination of the fire-box provided with a water-chamber, intermediate ring provided with a water-chamber, upper ring provided with a water-chamber, tubes connecting the water-chambers, cold-water pipes communicating with the lower water-jacket, hot-water pipes communicating with the upper water-chamber, wall surrounding the fire-box, rings and tubes, and flue 26, provided with perforations through which the products of combustion pass, substantially as and for the purpose set forth.

3. In a furnace, the combination of the fire-box provided with a water-chamber, intermediate ring provided with a water-chamber, upper ring provided with a water-chamber, tubes forming communication between the various chambers, walls surrounding the fire-box, rings and tubes, flue or tube 26, provided with perforations controlled by a damper, and a shell, 30, substantially as and for the purpose set forth.

4. In a furnace, in combination with the water-chambers and tubes connecting the chambers, the perforated flue 26, provided with a damper, and shell 30, surrounding the lower end of the flue, for the purpose set forth.

5. In a steam-generating furnace, the com-

bination of the fire-box, the water-chambers, and pipes connecting said chambers, the upper water-chamber being of annular form, and having marginal flanges, to which the removable cover-ring is secured by bolts, substantially as set forth.

6. In a steam-generating furnace, the combination, with the walls of the furnace and the fire-box, of a series of water-chambers, and pipes connecting said chambers, the chambers being alternately provided with open passages for the products of combustion and arranged so as to have contact with the side walls of the furnace, substantially as set forth.

7. In a steam-generating furnace, the combination, with the walls of the furnace, of a water-chamber surrounding the fire-box, superposed water-chambers, a passage between the first water-chamber above the fire-box and the walls of the furnace, a passage through said chamber, and a damper placed in the latter passage, substantially as set forth.

8. In a steam-generating furnace, the combination, with a pair of water-chambers and pipes connecting them, of a passage between the outside of one of said chambers and the wall of the furnace and through the other of said chambers for the products of combustion, and a large tube or shell, 30, projecting from one of said chambers toward the other and situated within the group of connecting-pipes, substantially as set forth.

9. The combination, with the annular water-chambers 8, 12, and 14 and the pipes connecting them, of the passage between the chamber 12 and the wall of the furnace, the shell or ring 30, projecting from the chamber 12 toward the chamber 14, situated within the group of connecting-pipes, and the passage through the chamber 14, for the products of combustion, substantially as set forth.

10. The combination, with the annular water-chambers 8, 12, and 14 and the pipes connecting them, of the passage between the chamber 12 and the wall of the furnace for the products of combustion, the shell or tube 30, projecting upward from the chamber 12 and within the group of connecting-pipes, and the damper 32, for controlling the passage through the chamber 12, substantially as set forth.

WM. GERKHARDT.

In presence of—

GEO. H. KNIGHT,
JOS. WAHLE.