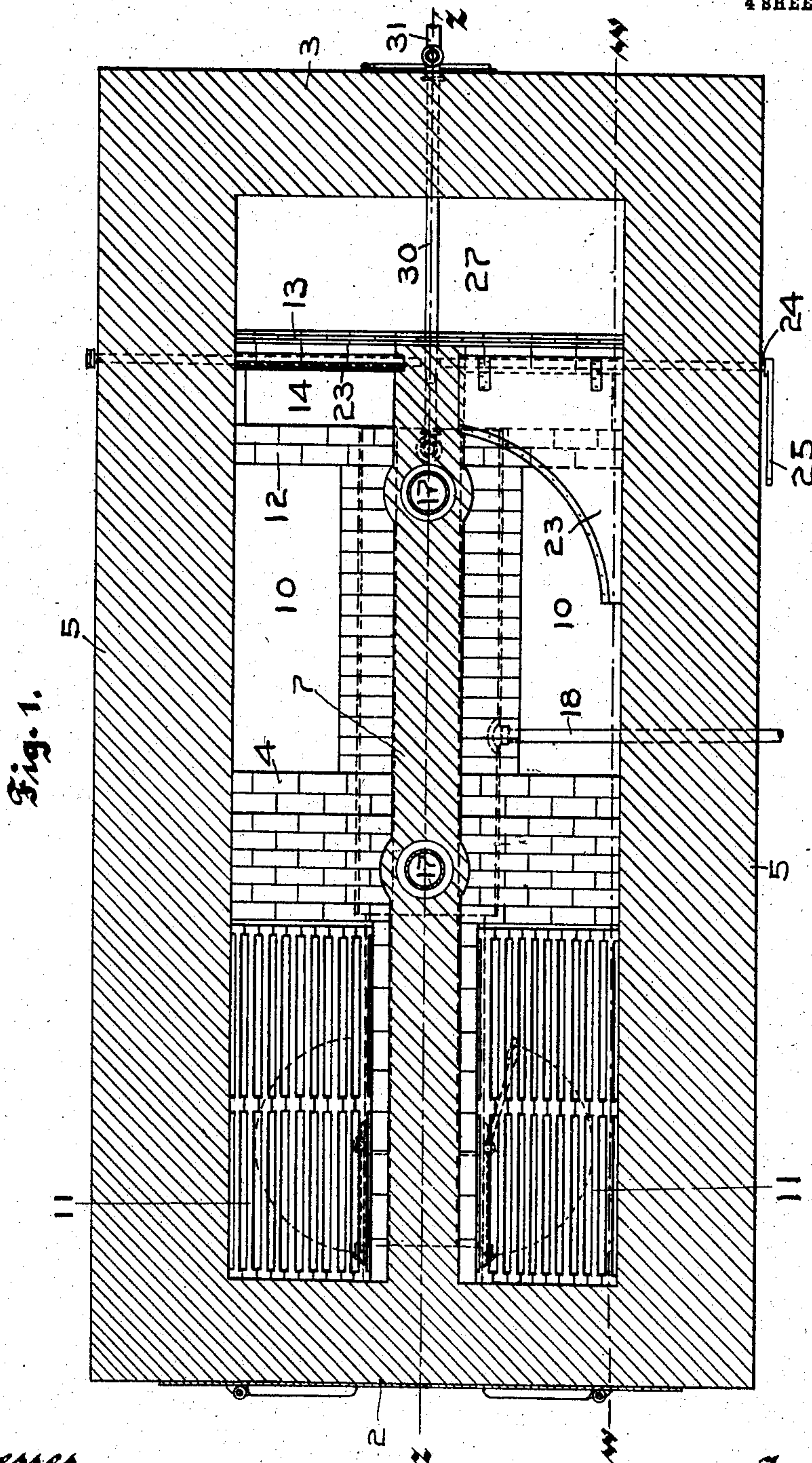


No. 781,547.

PATENTED JAN. 31, 1905.

S. F. PIERCE.
BOILER FURNACE.
APPLICATION FILED OCT. 10, 1904.

4 SHEETS—SHEET 1.



Witnesses,
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Emily F. Otis

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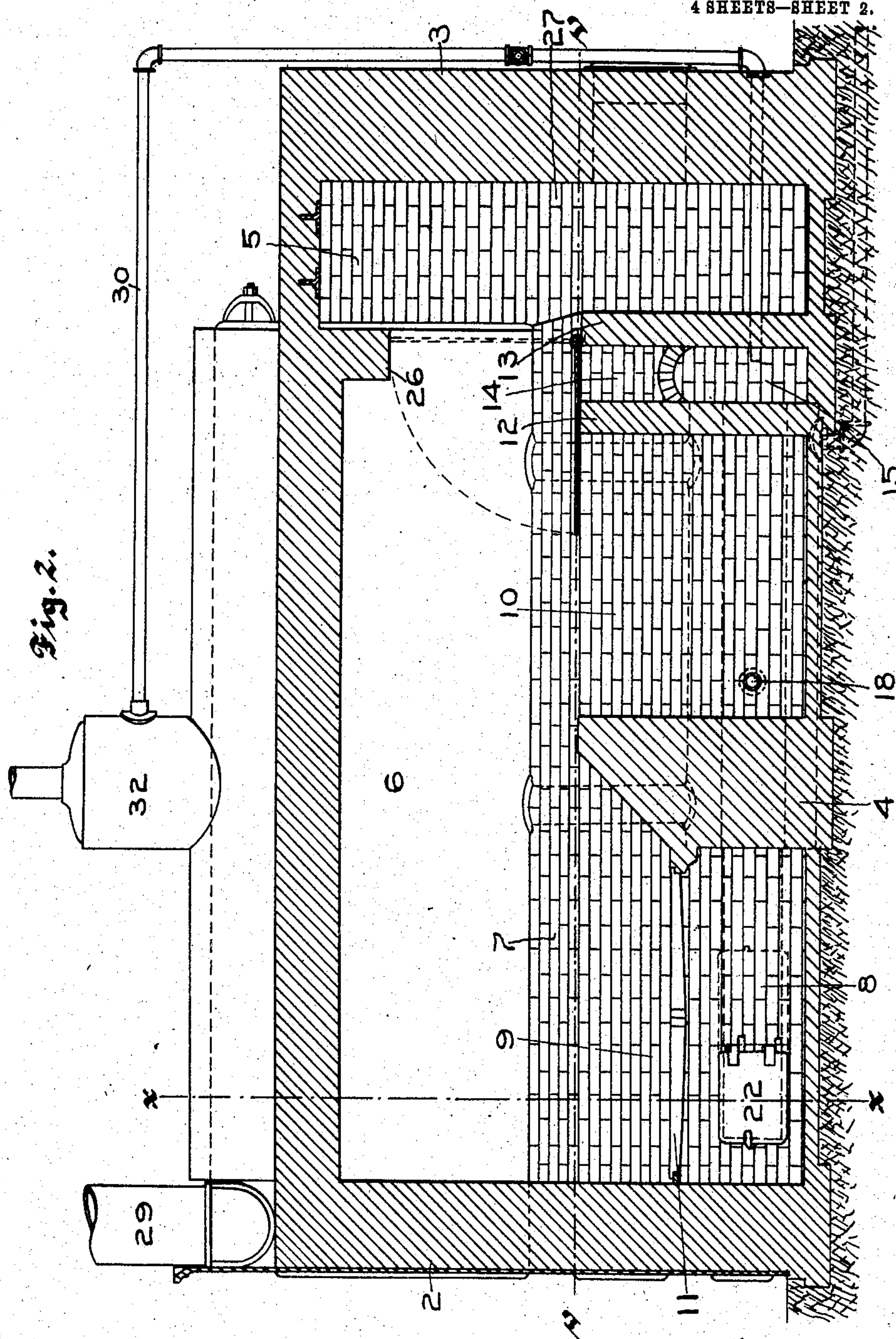
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 4.

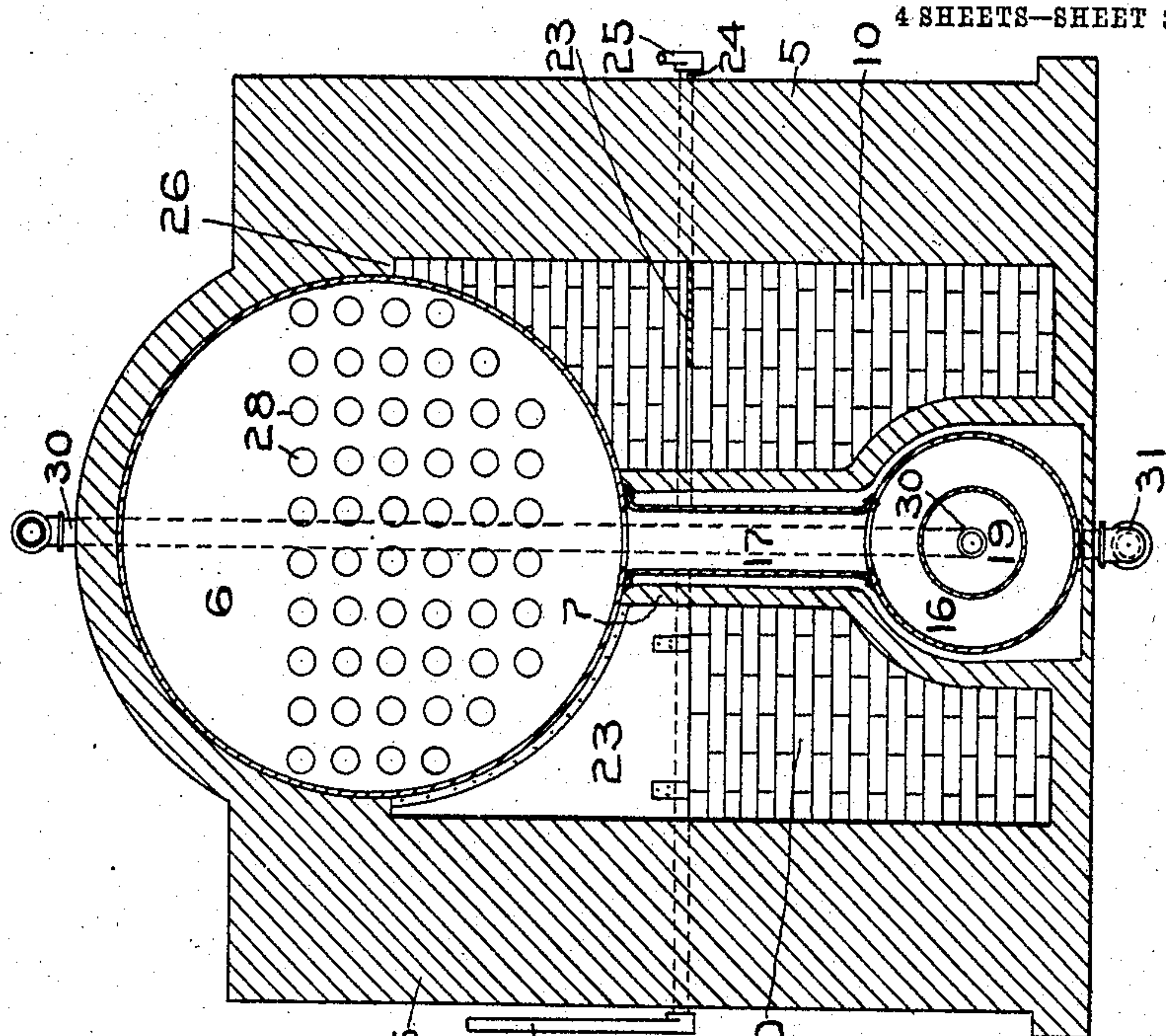
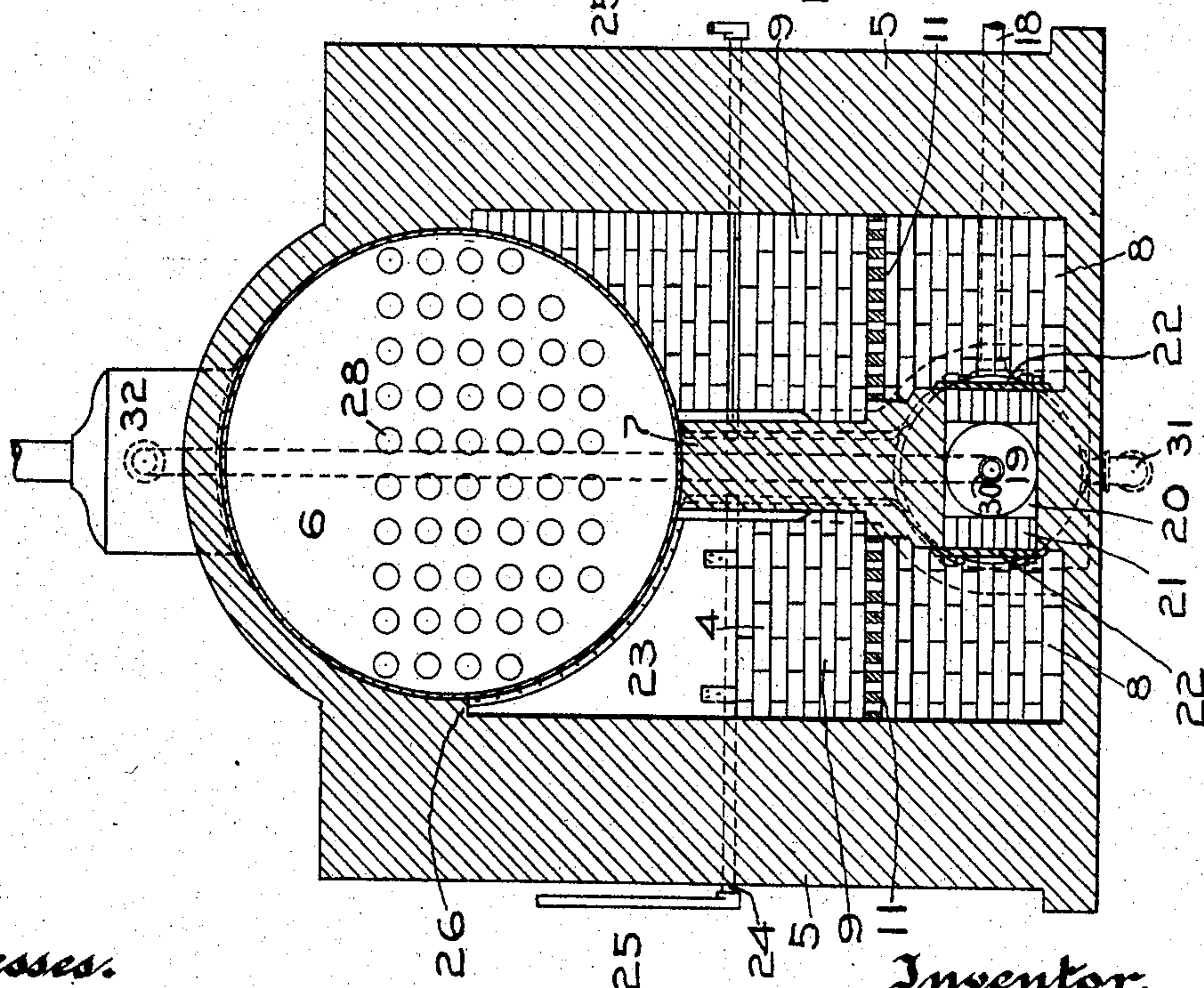


Fig. 3.



2 Witnesses.
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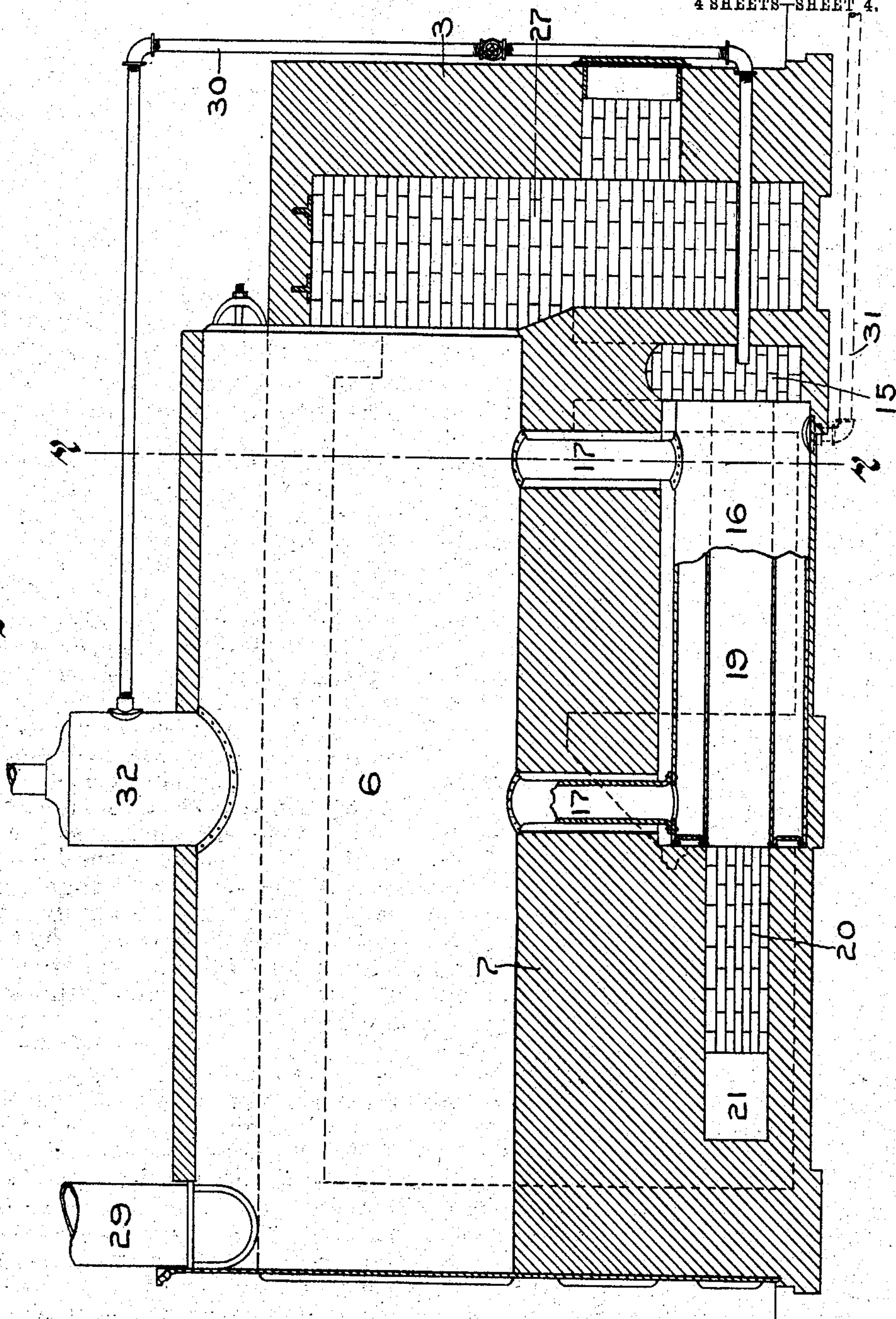
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4 SHEETS—SHEET 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

SIMEON F. PIERCE, OF ST. PAUL, MINNESOTA.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 781,547, dated January 31, 1905.

Application filed October 10, 1904. Serial No. 227,794.

To all whom it may concern:

Be it known that I, SIMEON F. PIERCE, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Boiler-Furnaces, of which the following is a specification.

My invention relates to improvements in boiler-furnaces, its object being to provide improved means for consuming the smoke and gases generated from freshly-supplied fuel and for conserving and making effective the heat of such smoke and gases.

To that end my invention consists in the features of construction, combination, and arrangement of parts hereinafter particularly described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a horizontal section of a furnace embodying my invention, taken on line *vv* of Fig. 2. Fig. 2 is a longitudinal section thereof, taken on line *ww* of Fig. 1. Fig. 3 is a transverse section taken on line *xx* of Fig. 2, and Fig. 4 is a transverse section on line *yy* of Fig. 5, and Fig. 5 is a longitudinal section taken through the dividing-wall on line *zz* of Fig. 1.

In the drawings, 2 represents the front wall, 3 the rear wall, 4 the bridge-wall, and 5 the said walls of a boiler-furnace of usual construction. Between the side walls is supported in any appropriate manner a boiler 6.

Running longitudinally through the middle of the furnace from the front wall back to the rear end of the boiler is a dividing-wall or partition 7, extending from the bottom of the furnace up to the crown-sheet of the boiler, so as completely to prevent the passage of smoke or gases from one side of the furnace to the other between the top of the wall and the boiler. The dividing-wall thus divides the furnace, so that there is on either side of it an independent ash-pit 8, fire-box 9, and combustion-chamber 10. In each fire-box is a grate 11.

Back of the bridge-wall and near the rear end of the boiler are arranged on each side of the dividing-wall two interspaced transverse walls 12 and 13, having between them a flue 14, communicating with the corresponding flue

on the other side of the dividing-wall through a passage 15 in the lower part of the wall. One of these flues thus opens into the combustion-chamber on one side of the dividing-wall and the other flue into the combustion-chamber on the other side of the dividing-wall. It is one of the purposes of this invention to lead the smoke and gases from the combustion-chamber on one side of the dividing-wall back to the fire on the other side of the dividing-wall in such way that the heat of the smoke and gases shall not be wasted and diffused through the walls of the furnace, but shall be utilized and made effective in heating water in or on its way to the boiler. To this end I provide a closed drum or pipe 16, which communicates with the boiler by means of one or more connecting-pipes 17 and which may be fed through an inlet-pipe 18 leading from any suitable source of water-supply. (Not shown.) The drum preferably extends longitudinally through the dividing-wall from the flues 14 forwardly to the bridge-wall. Extending longitudinally through the drum 16 from the communicating flues 14 at the rear end of the combustion-chamber to the forward end of the drum is an open-ended flue 19. This flue communicates at its forward end with a connecting flue or passage 20, which extends forwardly through the interior of the dividing-wall to the forward part of the furnace, where it communicates with the ash-pits on both sides of the dividing-wall through lateral openings or passages 21 in the wall. These openings are provided with doors 22 to open or close the passages on either side of the wall, as may be desired, and thus control the passage of the smoke and gases into either ash-pit, as may be desired. Where the drum is connected with the boiler by two pipes, as shown in the drawings, the water from the boiler will circulate through the drum and connecting-pipes around the central flue 19, and the drum will become, in effect, part of the heating-surface of the boiler. It will be observed that the flue 19 communicates with both flues 14 on the two sides of the dividing-wall, and thus constitutes a common return-flue for the smoke and gases from both combustion-chambers. The passage of

the smoke and gases through the flues 14 is controlled by means of dampers 23, secured to rock-shafts 24, rotatably mounted in the side wall and dividing-wall and operated by handles 25, outside the side walls. The rock-shafts rest upon the transverse wall 13 at the rear of the flues 14. The dampers are curved at their outer edges to fit the crown-sheet of the boiler and are of sufficient length to reach the portions 26 of the side walls contiguous to the boiler, so that when they are swung up into the position shown at the left in Figs. 1, 3, and 4 they will completely close the rear end of the combustion-chamber and prevent the smoke and gases from passing beyond the boiler into the communicating common chamber 27, extending across the rear end of the boiler and through the boiler-flues 28 to the smoke-stack 29. The dampers thus serve the double purpose of opening or closing the flues 14 and at the same time closing or opening the passage through the combustion-chamber to the smoke-stack, each damper opening a passage as it closes a flue, and vice versa. To clear out the flues 19 and 20, steam may be injected into them through the pipe 30, leading from the dome 32.

In use when the fuel upon the grate upon one side of the dividing-wall has been so far coked that little smoke arises therefrom the damper on that side of the dividing-wall will stand in down-turned position, as shown at the right in Figs. 3 and 4, closing the flue 14 and opening the passage at the rear of the combustion-chamber, so as to permit the heated air and gases to pass into the common chamber 27 and out through the boiler-flues in the usual way. When a fire is started upon the grate upon the other side of the dividing-wall or when fresh fuel is supplied to a fire already started, the damper 23 upon that side of the dividing-wall is turned up into the position shown at the left in Figs. 1, 3, and 4, closing the passage to the common chamber at the rear of the boiler and uncovering the mouth of the adjacent flue 14, thus preventing the smoke and gases from passing out through the boiler-flues to the smoke-stack. All other avenues of escape being thus closed the smoke and gases will pass downwardly through the opened flue 14 and the communicating flues 19 and 20 in the drum and dividing-wall, respectively, and thence through the opening 21 in the opposite side of the dividing-wall to the ash-pit on the other side of the wall from the freshly-charged fire, the door 22 on that side being opened to permit the smoke and gases to pass therethrough, while the door 22 upon the other side of the dividing-wall is closed. The smoke and gases thus pass up through the well-coked fuel and are consumed. The dampers 23 and forward doors 22 are permitted to remain in these positions until the fuel upon the grate just charged has been well coked, when the damper 23 at the rear on that

side of the dividing-wall may be turned down to permit the heated air and gases to pass out through the boiler-flues. By this arrangement the smoke and gases are prevented from escaping through the stack while the furnace is being charged and are saved and carried to the ash-pit on the other side of the dividing-wall, whence they pass up through the coked fuel upon the grate and are consumed. Furthermore, by returning the smoke and gases through a pipe or flue in contact with water in or on its way to the boiler I am enabled to make effective all of the heat of the smoke and gases in heating the water in the boiler.

In the drawings I have shown a blow-off pipe 31, which may be of any usual or desired construction.

It will be evident that modifications may be made in the details of the construction and arrangement without departing from the principle of the invention, the scope of which is defined in the claims.

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

1. In a furnace, the combination, with the side walls, of a boiler supported between the side walls, an intermediate dividing-wall extending longitudinally through the furnace, an ash-pit and combustion-chamber on each side of the dividing-wall, a water-pipe communicating with the boiler, a flue within the water-pipe leading from the combustion-chamber on one side of the dividing-wall to the ash-pit on the other side of the dividing-wall, and means to control the passage of products of combustion through the flue.

2. In a furnace, the combination, with the side walls, of a boiler supported between the side walls, an intermediate dividing-wall extending longitudinally through the furnace, an ash-pit and combustion-chamber on each side of the dividing-wall, communicating flues at the rear end of the combustion-chambers, a water-pipe communicating with the boiler, a flue passing longitudinally through the water-pipe and dividing-wall and leading from said communicating flues to the forward part of the furnace, and dampers to control the entrance of products of combustion into said communicating flues and the discharge thereof from said longitudinal flue into either of the ash-pits.

3. In a furnace, the combination, with the side walls, of a boiler supported between the side walls, an intermediate dividing-wall extending longitudinally through the furnace, an ash-pit and combustion-chamber on each side of the dividing-wall, a water-pipe communicating with the boiler, a flue within the water-pipe leading from the combustion-chamber on each side of the dividing-wall to the ash-pit on each side of the dividing-wall, and means for controlling the passage of products of combustion through the flue.

4. In a furnace, the combination, with the side walls, of a boiler supported between the side walls, an intermediate dividing-wall extending longitudinally through the furnace, 5 an ash-pit and combustion-chamber on each side of the dividing-wall, a water-pipe arranged in the dividing-wall and communicating with the boiler, a flue within the water-pipe leading from the rear end of each combustion-chamber, a communicating flue within the dividing-wall leading from the flue in the water-pipe to the ash-pit on each side of the dividing-wall, and means for controlling the discharge of products of combustion into 15 one or other of the ash-pits.

5. In a furnace, the combination, with the side walls and bridge-wall, of a boiler supported between the side walls, an intermediate dividing-wall extending longitudinally

through the furnace, an ash-pit and combustion-chamber on each side of the dividing-wall, communicating flues at the rear end of the combustion-chambers, a water-pipe extending along the bottom of the furnace from said communicating flues to the bridge-wall, 25 a flue passing through the water-pipe and dividing-wall and leading from said communicating flues to the forward part of the furnace, and dampers to control the entrance of products of combustion into said communicating flues and the discharge thereof into either 30 of the ash-pits.

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

SIMEON F. PIERCE.

Witnesses:

ARTHUR P. LOTHROP,
EMILY F. OTIS.