

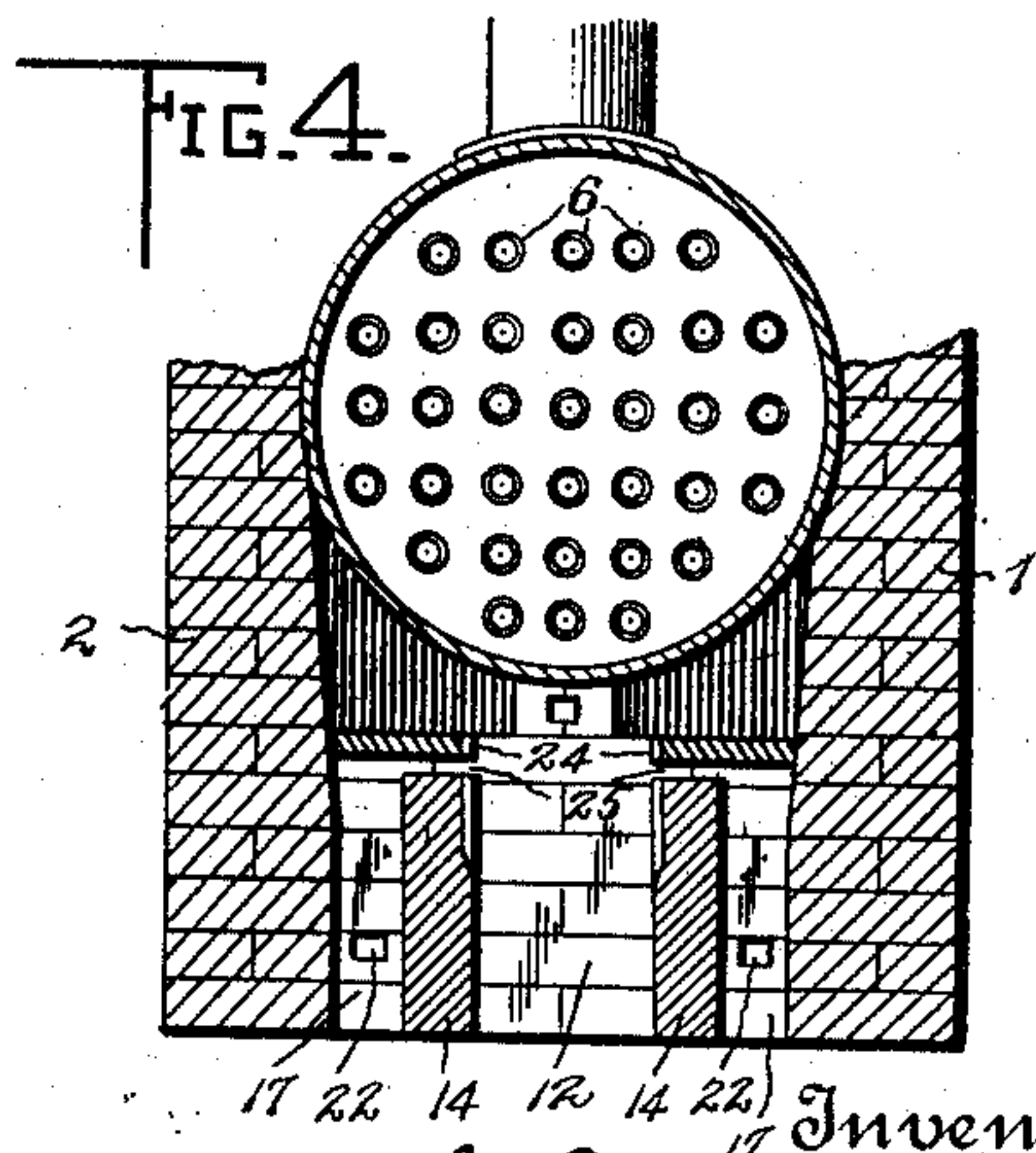
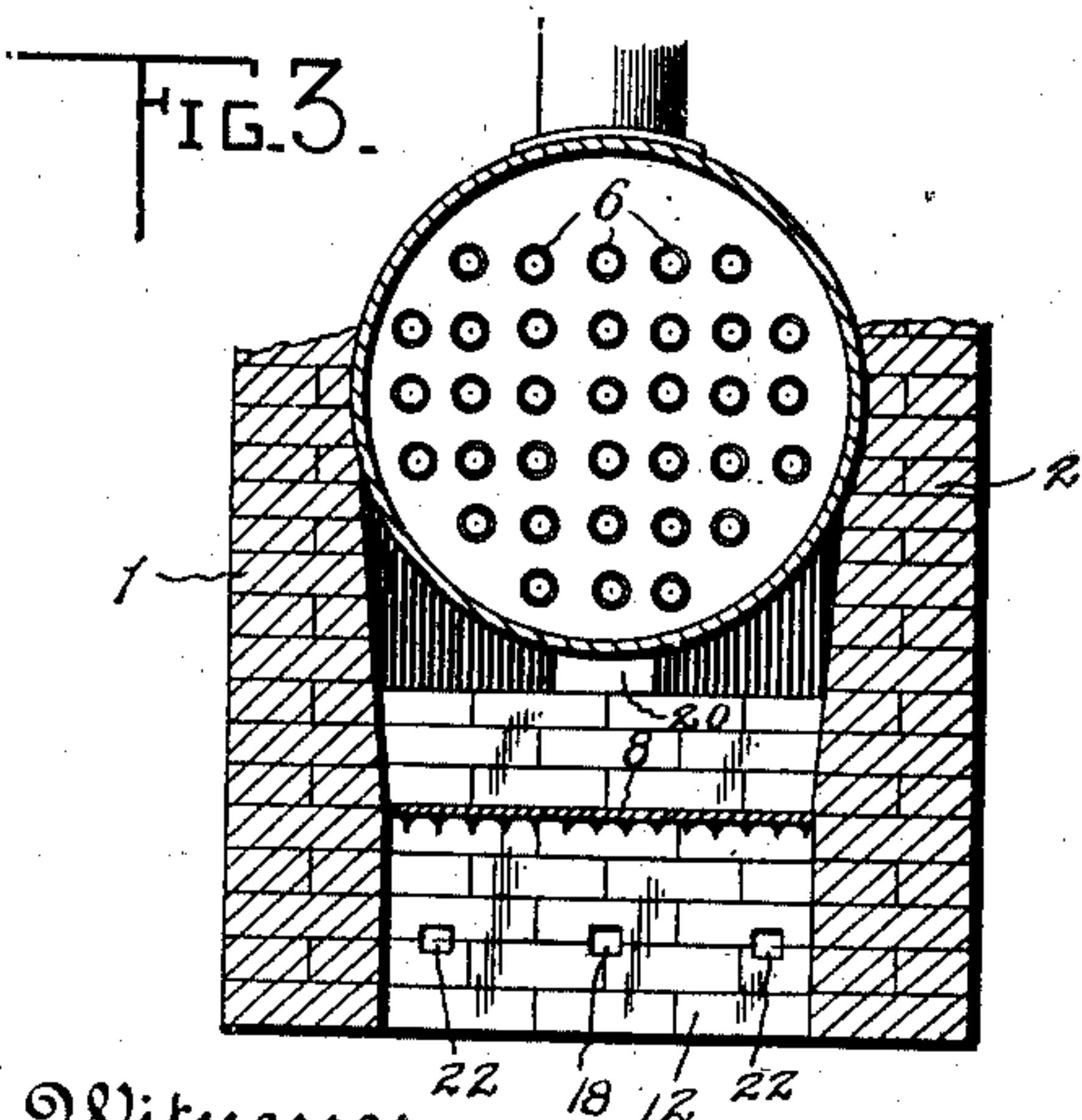
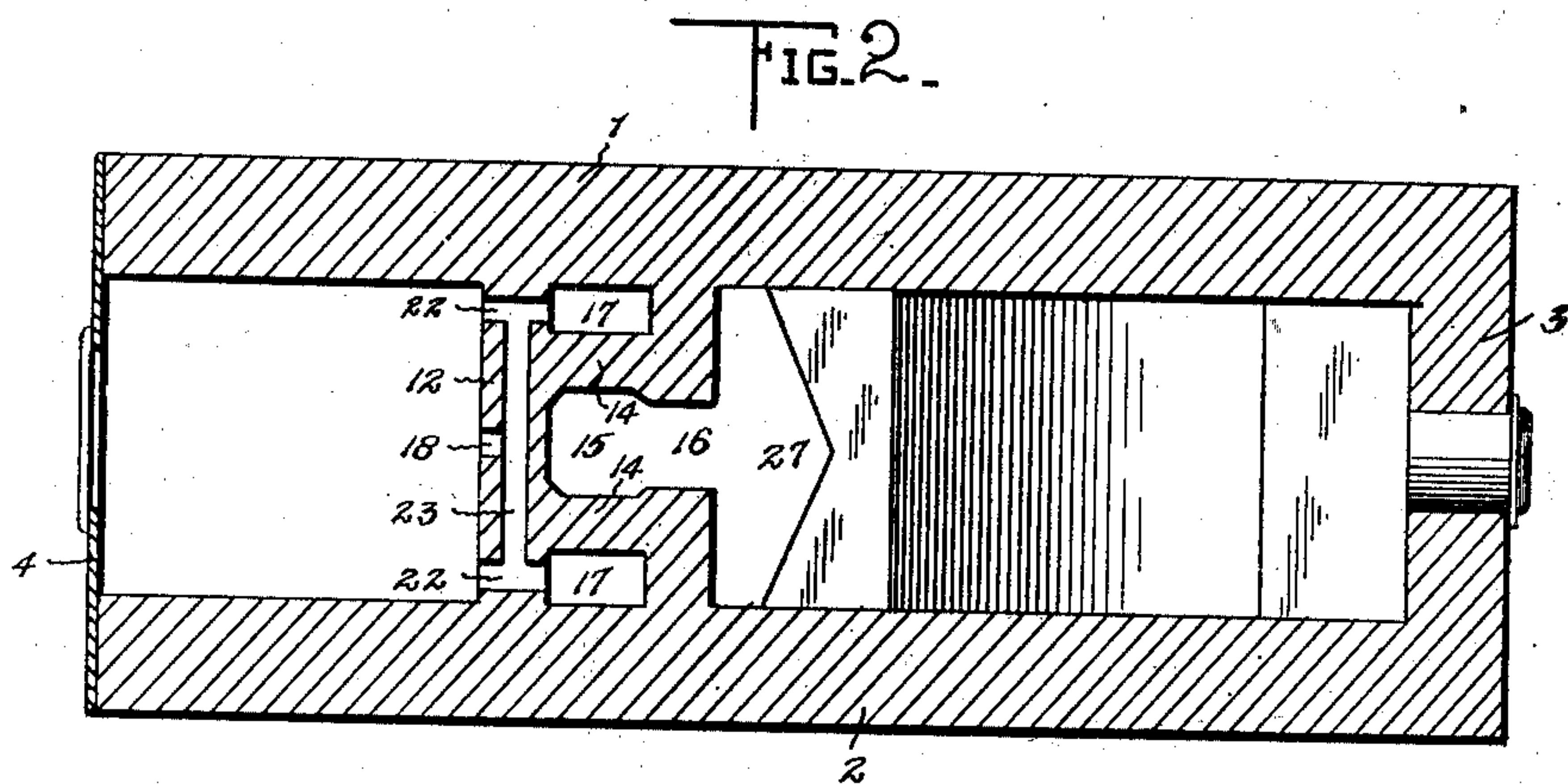
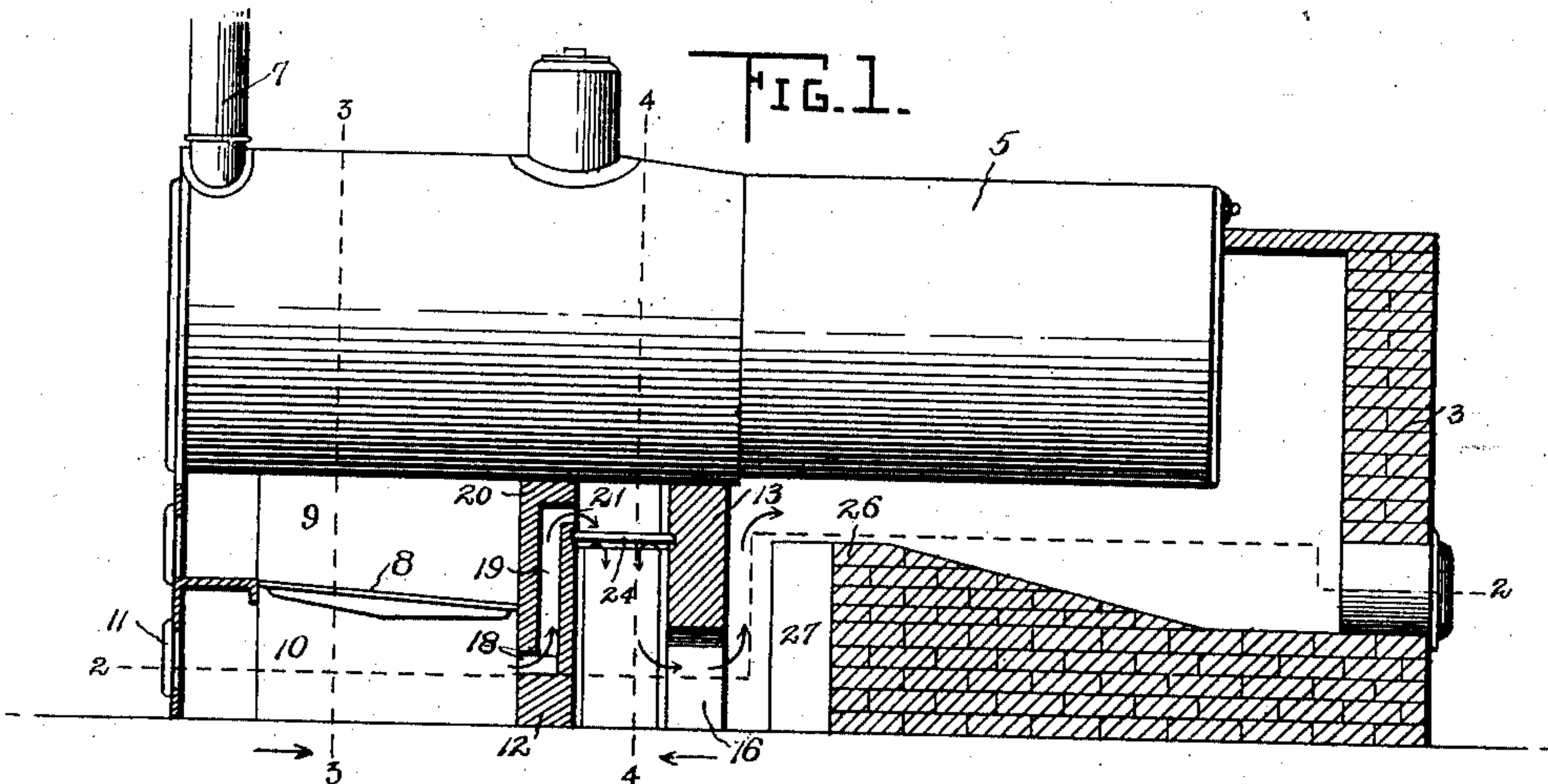
No. 736,746.

PATENTED AUG. 18, 1903.

J. E. LANGFORD.
FURNACE.

APPLICATION FILED JAN. 10, 1903.

NO MODEL.



Witnesses

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UNITED STATES PATENT OFFICE.

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FURNACE.

SPECIFICATION forming part of Letters Patent No. 736,746, dated August 18, 1903.

Application filed January 10, 1903. Serial No. 138,533. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH E. LANGFORD, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to furnaces, and is designed to provide an improved furnace which is particularly adapted for use in connection with steam-boilers of the stationary type. It is furthermore designed to provide an improved arrangement for feeding air to the combustion-chamber, so as to commingle the air with the products of combustion, and thereby materially promote combustion in said combustion-chamber. In this connection it is an important feature of the invention to take air from the ash-pit of the furnace and conduct the same to the combustion-chamber at different levels therein in order that such portions of the products of combustion which do not effectually unite chemically with the supply of air at the uppermost level may have a chance to unite with air at one or more lower levels.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is a longitudinal sectional view of a furnace embodying the features of the present invention and shown in connection with a steam-boiler. Fig. 2 is a horizontal sectional view taken on the line 2 2 of Fig. 1. Fig. 3 is a cross-sectional view taken on the line 3 3 of Fig. 1, and Fig. 4 is a cross-sectional view on the line 4 4 of Fig. 1.

Like characters of reference designate corresponding parts in all of the figures of the drawings.

To adequately illustrate the application and operation of the present invention, there have been shown in the drawings the opposite longitudinal side walls 1 and 2, the back wall 3, and the front 4 of an ordinary furnace, within which is supported in the usual manner a steam-boiler 5, having the usual fire tubes or flues 6 and provided at its front end with an ordinary smoke pipe or stack 7, the rear end

of the boiler being terminated short of the rear wall of the furnace, as clearly indicated in Fig. 1 of the drawings, to permit of the flames and products of combustion passing through said flues in the common and well-known manner. Beneath the front portion of the boiler is the usual grate 8, above which is the fire-box 9 and below which is the ash-pit 10. The front of the ash-pit is provided with a damper-door 11 to admit air to the ash-pit, as well as to give access thereto for removing ashes therefrom.

The foregoing-described parts are common and well known, and as they form no essential part of the present invention they may be varied in form and construction without effecting the operation of the invention.

In carrying out my invention I provide what may be termed a "composite bridge-wall," consisting of a front member or partition 12 and a rear member or partition 13, which is separated from the front member to form an interspace which constitutes a combustion-chamber, as will be hereinafter described. As best indicated in Figs. 3 and 4, it will be seen that the front bridge-wall member 12 is terminated short of the bottom of the steam-boiler in order that the flames from the fire-box may pass over the top of said wall and thence downwardly into the space or combustion-chamber between the two walls 12 and 13.

The space between the walls 12 and 13 is divided into three chambers or compartments by means of two upright partitions 14, which terminate below the top of the front bridge-wall. It will of course be understood that the rear bridge-wall 13 fits snugly the bottom of the boiler-shell, so as to prevent the flames from passing rearwardly between the top of said wall and the boiler. As plainly indicated in Fig. 2, it will be seen that the space or compartment 15 between the partitions 14 forms a combustion-chamber, which is open at its top for communication with the fire-box and has an outlet at the bottom of its back wall in the nature of an arched opening 16. Between each partition 14 and the adjacent side wall of the furnace there is a vertical passage 17 for the reception of air, as will be hereinafter described.

Near the bottom of the front wall 12 there

is formed an intermediate opening 18, which communicates from the ash-pit to a central vertical passage 19, leading upwardly through said wall and into a central extension 20 thereof, which snugly fits the under side of the boiler-shell. In the back of this extension there is an outlet-opening 21, which communicates from the top of the passage 19 to the space or combustion-chamber between the walls 12 and 13. At opposite sides of the opening 18 in the front of the wall 12 and in the same horizontal plane therewith are other openings 22, which, as best shown in Fig. 2, extend entirely through the wall and communicate with the respective chambers or passages 17. There is also a horizontal passage 23 connecting the openings 18 and 22, and therefore intersecting the bottom of the upright passage 19. By this arrangement of openings and passages it will be seen that air is fed from the ash-pit through the passage 19 to the top of the combustion-chamber, and air is also fed through the openings 22 to the lower portions of the passages 17 at opposite sides of the combustion-chamber 15.

As hereinbefore set forth, each passage or chamber 17 is terminated short of the front of the top wall 12, as best indicated in Fig. 4 of the drawings, and across the top of each of these chambers is a closure-plate 24, preferably a tile, which is set into the front and rear walls 12 and 13 and also into the adjacent side wall of the furnace, said tile being disposed somewhat above the adjacent partition 14, whereby a lateral passage or opening 25 is provided between the tile and the top of the partition, so as to permit of the passage of air from the compartment 17 to the combustion-chamber. A very important feature of the present invention will be noted at this point, which is that air is supplied through the opening 21 to the combustion-chamber at the uppermost portion thereof, and air is also admitted to the combustion-chamber through the openings 25 at a level below the opening 21, wherefore it will be understood that air is fed to the combustion-chamber at different levels. By thus feeding air to the combustion-chamber at different levels such products of combustion as fail to unite chemically with the air-supply at the upper level have a chance to unite with an additional supply of air at a lower level while passing through the combustion-chamber. After passing downwardly through the combustion-chamber the products of combustion escape therefrom through the exit-opening 16 and come in contact with the vertical baffle-wall 26, which extends entirely across the interior of the furnace in rear of the composite bridge-wall and is terminated short of the bottom of the boiler-shell in order that the products of combustion may rise over the top of said wall and pass rearwardly beneath the boiler and thence forwardly through the boiler

flues or tubes. It will here be noted that the baffle-wall 26 has a reëntrant front face preferably by having said face inclined inwardly and rearwardly from opposite sides, thereby to increase the central depth of the chamber 27 between the composite bridge-wall and the baffle, whereby the heated air and products of combustion may have a chance to expand as they pass from the opening 16, and thereby prevent back pressure through said opening 16. Furthermore, the top of the baffle-wall extends to the rear of the boiler, so as to confine the heated products of combustion as close as possible to the boiler throughout its length, and is also inclined downwardly and rearwardly to permit of expansion of the heated products of combustion.

From the foregoing description it will be seen that the device of the present invention provides an exceedingly simple and effective manner of feeding air to the combustion-chamber of a furnace and that the present improvements may be conveniently applied to any ordinary steam-boiler furnace without materially altering the latter beyond replacing the bridge-wall thereof with the improved composite bridge-wall of the present invention.

It will of course be understood that changes in the form, proportion, size, and minor details may be made within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the present invention.

What is claimed is—

1. In a furnace, the combination with a fire-box, of spaced bridge-wall members at the back thereof, spaced partitions extending from one bridge-wall member to the other and forming a combustion-chamber between the partitions and air-chambers at opposite sides of the combustion-chamber and between the partitions and the respective sides of the fire-box, and means for admitting air through the front bridge-wall member to the top of the combustion-chamber, each air-chamber being provided with an air-passage communicating from the upper portion thereof to the combustion-chamber below the point where air is admitted through the front bridge-wall member.

2. In a furnace, the combination with a fire-box, of spaced bridge-wall members at the back thereof, spaced partitions extending from one bridge-wall member to the other and terminated short of the tops of said members and forming a combustion-chamber between the partitions and air-chambers at opposite sides of the combustion-chamber and between the partitions and the respective sides of the fire-box, means for admitting air through the front bridge-wall member to the top of the combustion-chamber, and closure members disposed across the tops of the air-chambers and spaced above the partitions to form outlets from the air-chambers to the combustion-

chamber at points below the top of said combustion-chamber.

3. In a furnace, the combination of spaced bridge-wall members, partitions extending between said members and terminated short of the tops thereof, the space between the partitions forming a combustion-chamber, and the spaces at the outer sides of said partitions forming air-chambers having inlets, means for admitting air through the front bridge-wall member to the combustion-chamber at a point above the tops of the partitions, and closure-plates closing the tops of the air-chambers, located below the point where air is supplied from the front bridge-wall member to the combustion-chamber, and spaced above the tops of the partitions to form exit-openings from the air-chambers to the combustion-chambers.

4. In a furnace, the combination of front and rear spaced bridge-wall members, partitions extending between said members, the space between the partitions forming a combustion-chamber, the spaces at the outer sides of the partitions forming air-chambers which have their closed tops located below the top of the combustion-chamber, the front bridge-wall having an air-passage piercing the lower portion of the front thereof, leading upwardly therethrough and thence piercing the back of said wall and in communication with the combustion-chamber at a point above the tops of the air-chambers, other air-passages extending through the front bridge-wall and communicating with the air-chambers, and the latter having exit-openings communicating with the combustion-chamber.

5. In a furnace, the combination with a combustion-chamber having communication at its top with a fire-box and an exit at the lower portion of its back, of a baffle located

in rear of said exit and having a reëntrant front face.

6. In a furnace, the combination of front and rear spaced bridge-walls, a boiler disposed above the bridge-walls, the rear bridge-wall fitting snugly the bottom of the boiler and the front bridge-wall terminating short of the boiler, the rear bridge-wall also having an exit-opening near the bottom thereof, a baffle disposed in rear of the exit and terminated short of the boiler, partitions extending between the bridge-walls and forming an intermediate combustion-chamber and opposite air-chambers, the partitions being terminated short of the top of the front bridge-wall, plates closing the tops of the air-chambers and spaced above the partitions to form lateral passages leading from the air-chambers to the combustion-chamber, a grate disposed in front of the front bridge-wall, passages extending through the front bridge-wall to the air-chambers and below the grate, and another passage extending vertically through the front bridge-wall with its lower end piercing the front of said wall at a point below the grate and its upper end piercing the back of the front bridge-wall and communicating with the combustion-chamber at a point above the tops of the partitions.

7. The combination with a steam-boiler, of a combustion-chamber having a rear outlet, and a baffle-wall located in rear of the outlet and provided with a reëntrant front face, the top of the baffle-wall being extended to the rear of the boiler and inclined downwardly and rearwardly.

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

JEREMIAH E. LANGFORD.

Witnesses:

WILHELM H. E. REINECKE,
HENRY J. GROSS.