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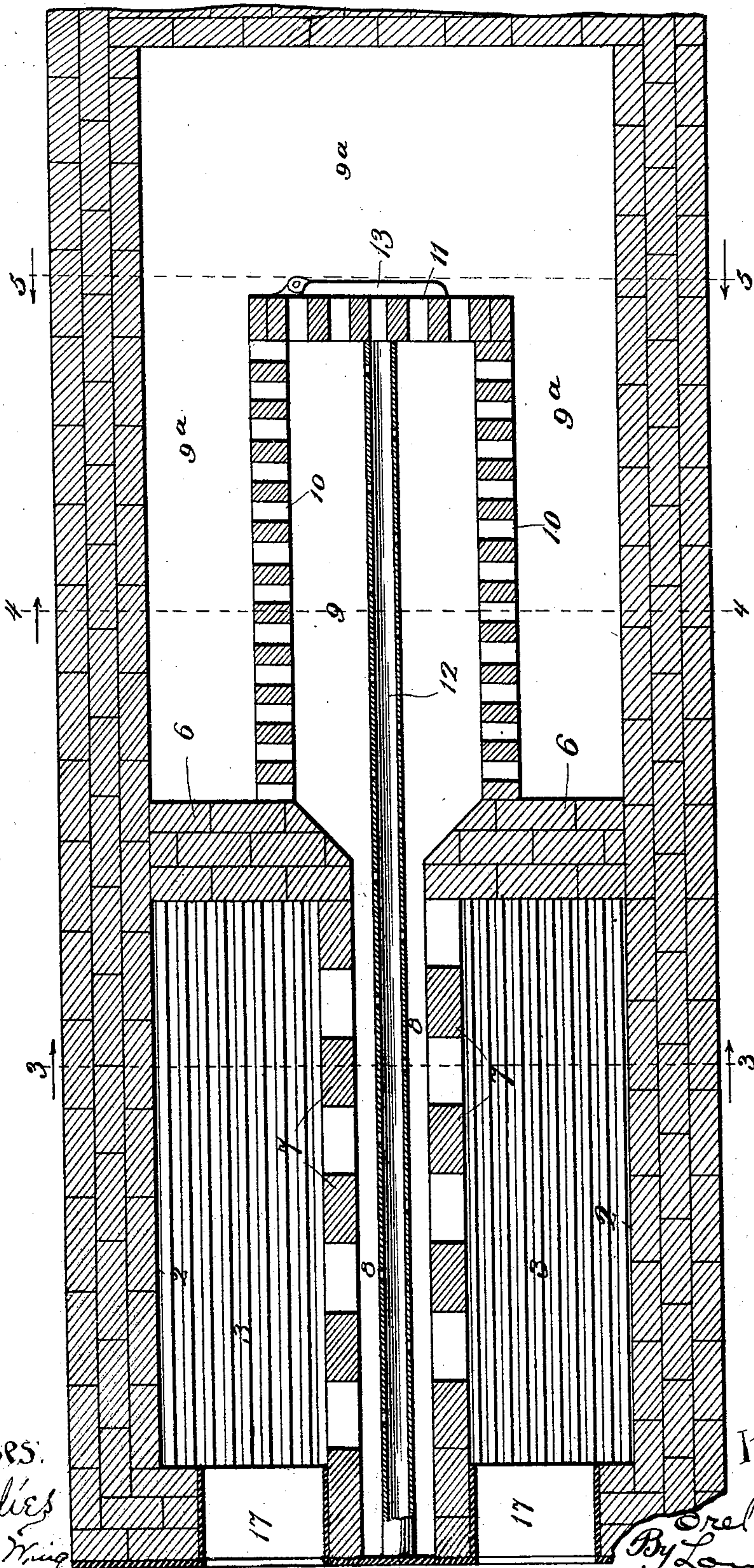
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O. D. ORVIS.
STEAM BOILER FURNACE.

No. 521,475.

Patented June 19, 1894.

Fig. 1



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(No Model.)

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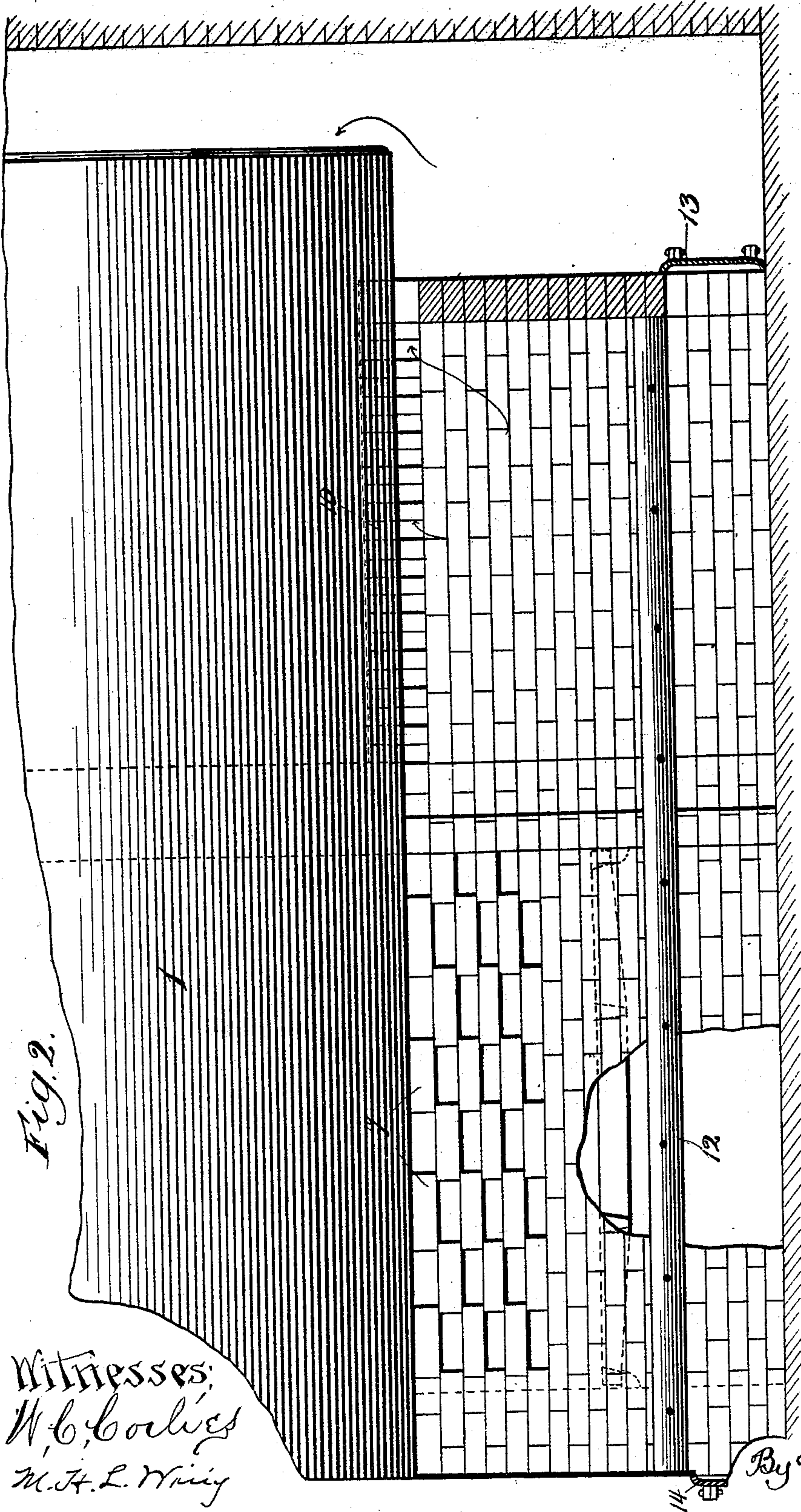


Fig. 2.

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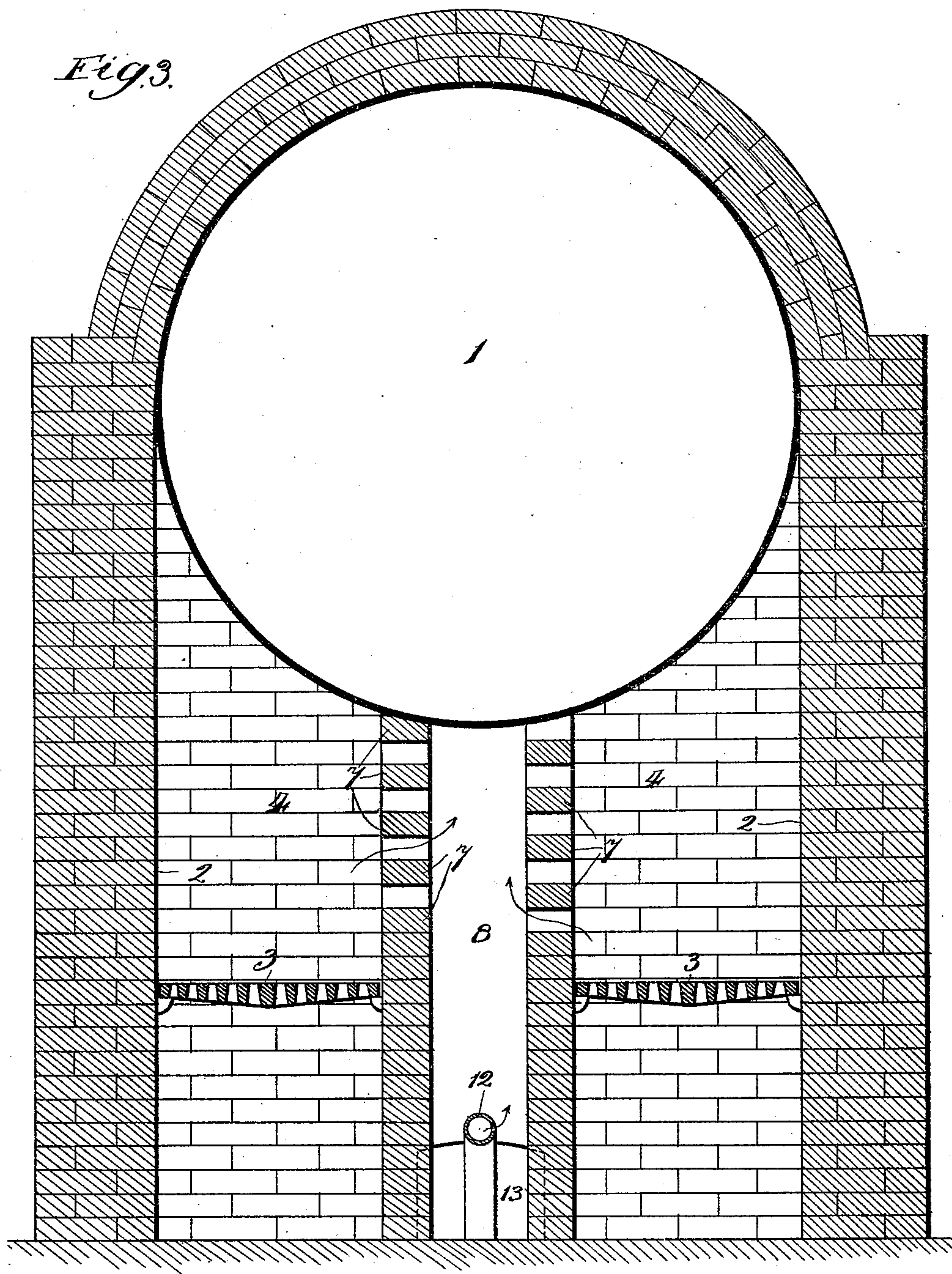
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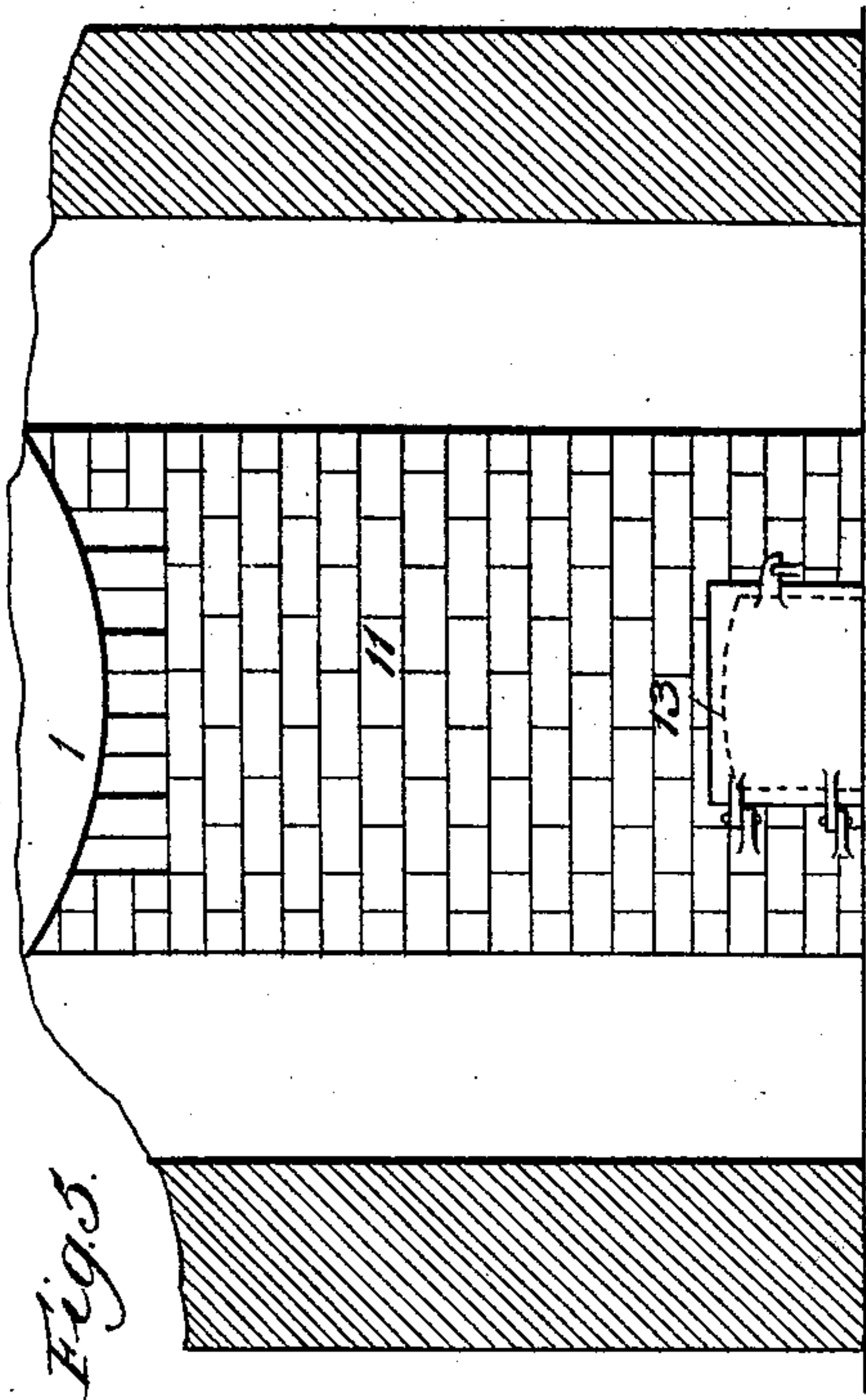


Fig. 5.

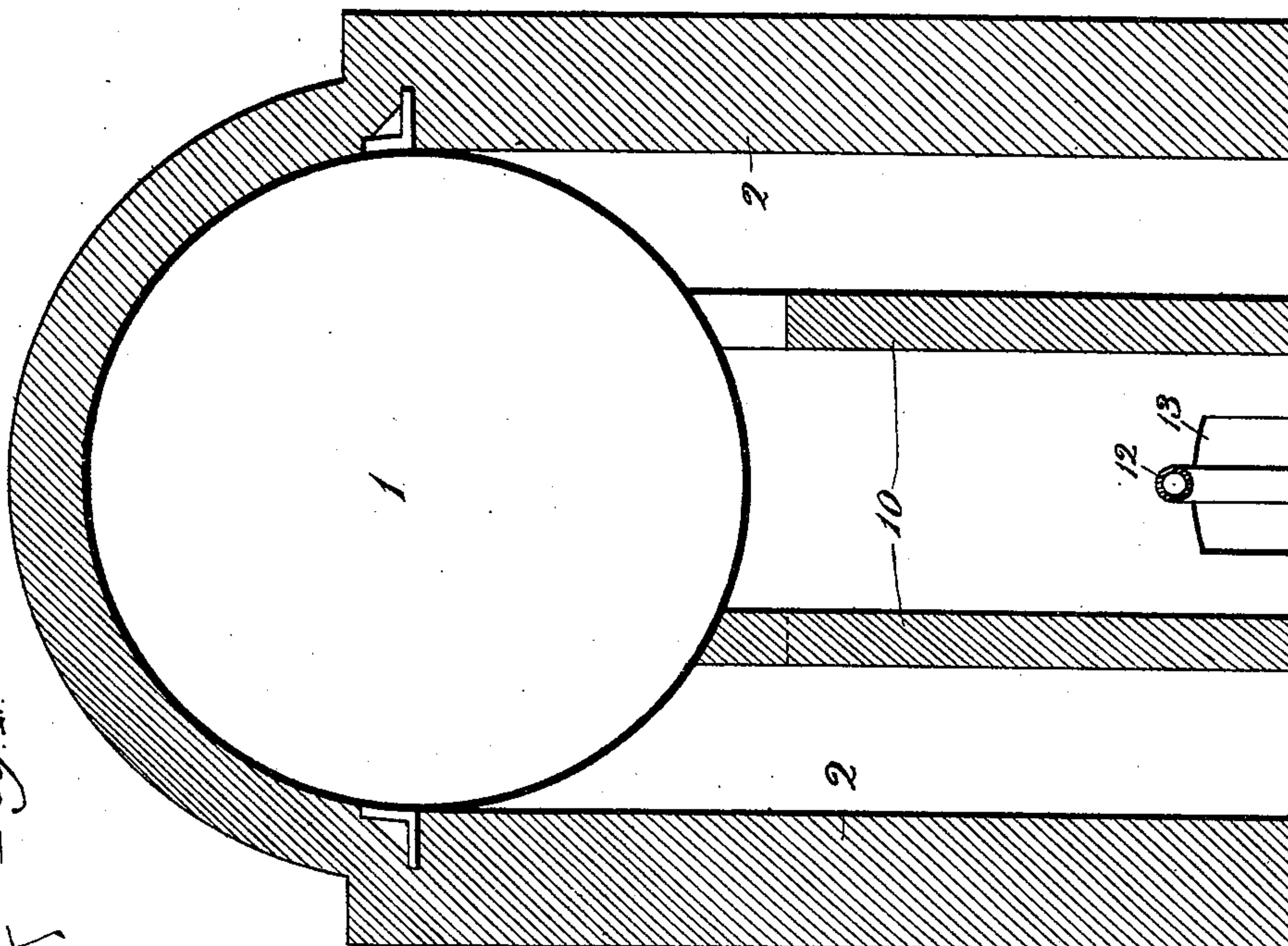
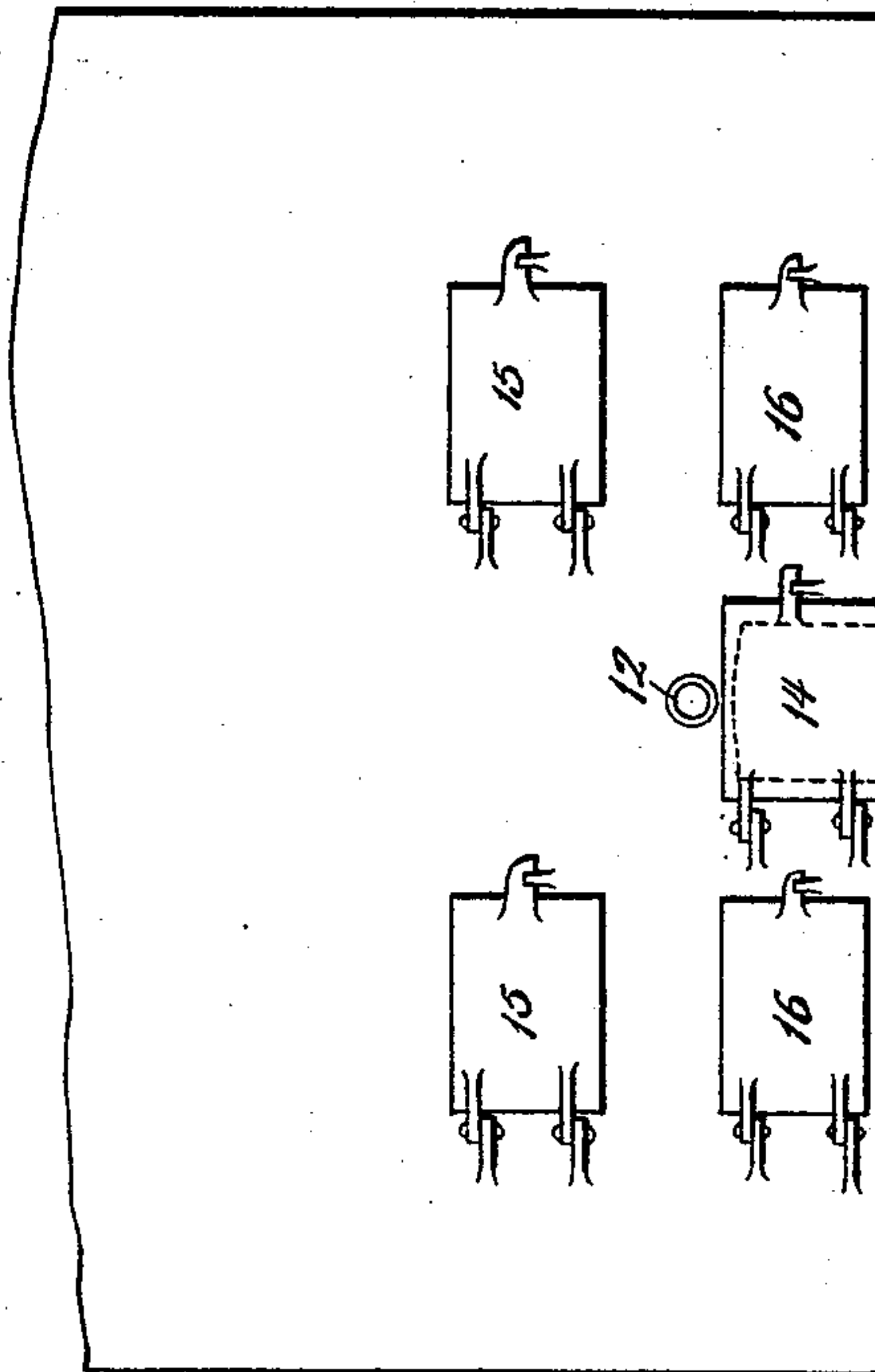


Fig. 4.

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UNITED STATES PATENT OFFICE.

OREL D. ORVIS, OF CHICAGO, ILLINOIS.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 521,475, dated June 19, 1894.

Application filed July 21 1893. Serial No. 481,107. (No model.)

To all whom it may concern:

Be it known that I, OREL D. ORVIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Boiler Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to steam boiler furnaces.

Its object is to increase the efficiency of the furnace by securing complete combustion of the gases and bringing the flame directly to bear upon the boiler.

The invention consists of a sectional furnace having two fire-boxes with a flue between them leading to an under combustion chamber.

It consists further of such other parts and arrangements of parts as are hereinafter set forth.

In the drawings, Figure 1, is a plan section of the furnace immediately below the boiler. Fig. 2, is a vertical longitudinal section on the line 2—2 of Fig. 1. Fig. 3, is a transverse vertical section on the lines 3—3 of Fig. 1. Figs. 4 and 5, are similar views on the lines 4—4 and 5—5 respectively of Fig. 1. Fig. 6, is an elevation of a portion of the front of the furnace.

The boiler is represented at 1, and is supported in the usual manner by the walls 2, 2, which form the sides of the furnace. Two sets of grate bars are shown at 3, 3, extending from the dead plates 17, 17, to the wall 6, 6, thrown across the back of the furnace and reaching to the boiler, entirely closing the rearward end of the fire-boxes 4, 4. Two parallel walls of fire brick 7, 7, separate the two sets of grate bars and reach to the bottom of the boiler. The walls 7, 7, are set a sufficient distance apart to form between them a flue 8, of sufficient capacity to convey the entire products of combustion from both sections of the furnace. These walls are perforated by lay-

ing the bricks open as much as may be necessary to provide proper draft, the arrangement of the bricks being preferably such that the open spaces in the one wall do not coincide with those in the other wall, so that the heat currents do not conflict and thus retard the draft, but shoot across and strike the heated surface of the opposite wall, thereby utilizing this surface to promote combustion. Flue 8 is continued through the wall 6 into an inner combustion chamber 9, inclosed within the walls 10, 10, extending backwardly from the wall 6 nearly to the end of the boiler, and wall 11, joining the rearward ends of the walls 10, 10. The walls 10, 11, reach to the boiler and the upper row or rows of bricks in these walls are set open so as to form a large number of passages for the escape of the products of combustion. The walls 10, 10, 11, are surrounded by an outer combustion chamber 9^a.

An air flue 12, enters the furnace front and extends through the flue 8, and combustion chamber 9, its walls being freely perforated for the escape of the air so as to supply oxygen to the burning gases. This air flue is preferably elevated some distance from the bottom of the flue 8, for the purpose of heating the air as it enters and also that it may be in no danger of being buried in the ashes which will accumulate to some extent within this flue and the combustion chamber. The door 14, is placed in the front of the furnace and a door 13, in the wall 11, for the convenient removal of these ashes.

The feed doors and ash-pit doors are shown respectively at 15, 15 and 16, 16.

In practice the products of combustion from both sections of the furnace are carried through the perforations in the walls 7, 7, into the flue 8, where they become thoroughly mixed, and at which point a very high temperature is attained. Sufficient oxygen is mixed with these gases, being drawn in through the flue 12, to insure at this high temperature, complete combustion of the carbon. The draft is backwardly into the combustion chamber 9, and through the many apertures in the walls 10, 10, and 11, all of which apertures are contiguous to the boiler. It will be seen therefore that the most intense heat developed by the

furnace is brought into close proximity to the boiler throughout the greater portion of its length, and the rearward portion of the boiler is enveloped in flame as the burning gases escape from the combustion chamber.

The precise manner of perforating the walls 10, 11, is immaterial. In the drawings I show the simple method of omitting each alternate brick. It is obvious that the same result could be secured were these walls solid but of slightly less height than the boiler so as to leave a continuous open space between the top of the wall and the boiler. I prefer the form of construction shown as being the most substantial.

While the walls 7, 7, are shown as of brick it is obvious that other material and form of construction may be used. I do not therefore limit myself to the precise construction shown, the essence of the invention being the use of the two fire-boxes, a central flue between them, openings through the walls separating the boxes from this flue, so that the burning gases from the boxes are intermingled, one effect being to make of the fire-boxes practically a pair of retorts, yet without retarding the draft.

In a furnace constructed as herein described two kinds of fuel may be used, one in each fire-box if desired. The firing may be alternate, and one section may be used while the other is being cleared. The advantage of being able to maintain a fire in one section while the other is being cleared is very great, for while the heat is less intense it is continuous, and the flow of burning gases from one fire-box prevents the cold air currents which enter the central flue from the other from coming into contact with the boiler, and the steam pressure is consequently but slightly reduced.

I secure ample area of grate surface by lengthening the fire-boxes as may be necessary. The increased length of the boxes secures a very desirable distribution of the burning gases.

I claim as my invention—

1. In a steam boiler furnace the combination with two fire-boxes, of a central flue having perforated walls opening to both boxes, a combustion chamber whose walls reach to the boiler and have their upper portions perforated for the escape of the products of com-

bustion, substantially as described and for the purpose specified.

2. In a steam boiler furnace the combination with a boiler and with side walls of a transverse wall 6 closing the back of the fire-boxes, a pair of parallel perforated walls longitudinally through the furnace forming a central flue leading through the wall 6, walls 10, 10, 11, back of the wall 6 and forming therewith a combustion chamber, said walls 10, 10, 11, having apertures adjacent to the boiler for the passage of the products of combustion.

3. In a steam boiler furnace the combination with a pair of fire-boxes and with a combustion chamber, of a flue for conveying the products of combustion from both fire-boxes to the combustion chamber and an air flue for delivering atmospheric air to the flue and chamber, substantially as described and for the purpose specified.

4. In a steam boiler furnace the combination with an inner and an outer combustion chamber, the walls separating the two extending to the boiler and being apertured adjacent thereto for the passage of the products of combustion, of a fire box opening to the inner combustion chamber, substantially as described.

5. The combination, in a steam boiler furnace, with the fire box, and a chamber, 9^a, located back of the fire-box and formed by the outer walls of the furnace and the boiler, of a combustion chamber, 9, inclosed within the chamber 9^a, and having the upper portion of its walls perforated, substantially as described and for the purpose specified.

6. The combination, in a steam boiler furnace; with the fire-box, and a chamber, 9^a, located back of the fire-box and formed by the outer walls of the furnace and the boiler, of a combustion chamber, 9, inclosed within the chamber, 9^a, and an air flue leading to the combustion chamber, 9, substantially as described and for the purpose specified.

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

OREL D. ORVIS.

Witnesses:

L. K. GILLSON,
M. H. L. WING.