

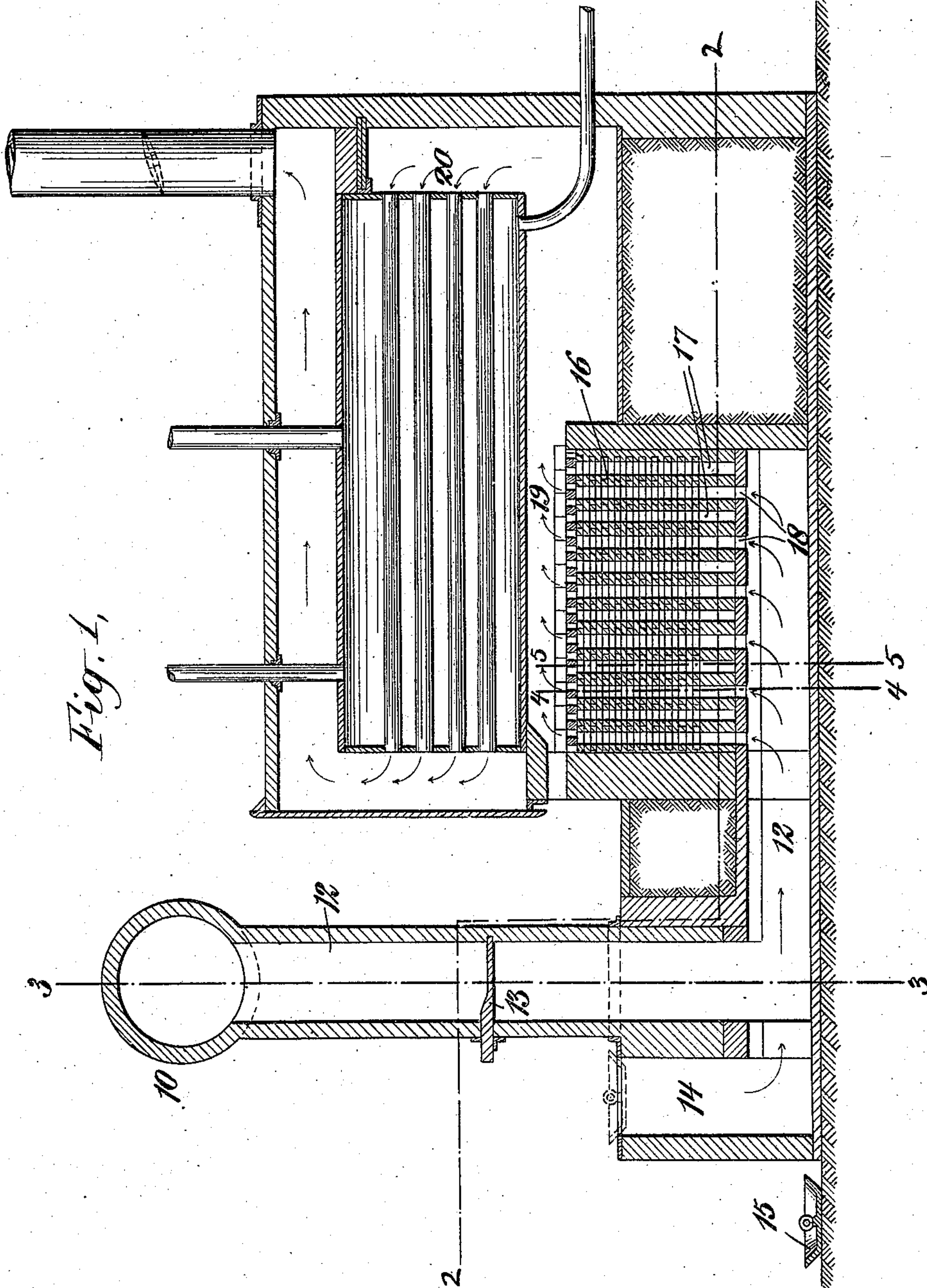
No. 854,851.

PATENTED MAY 28, 1907.

M. VAN-B. SMITH.
FURNACE.

APPLICATION FILED FEB. 28, 1906.

3 SHEETS—SHEET 1.



WITNESSES:

Howard B. Ayres.
Lyman S. Andrews, Jr.

INVENTOR

Martin Van Buren Smith
BY
Chapin & Haymond
his ATTORNEYS

No. 854,851.

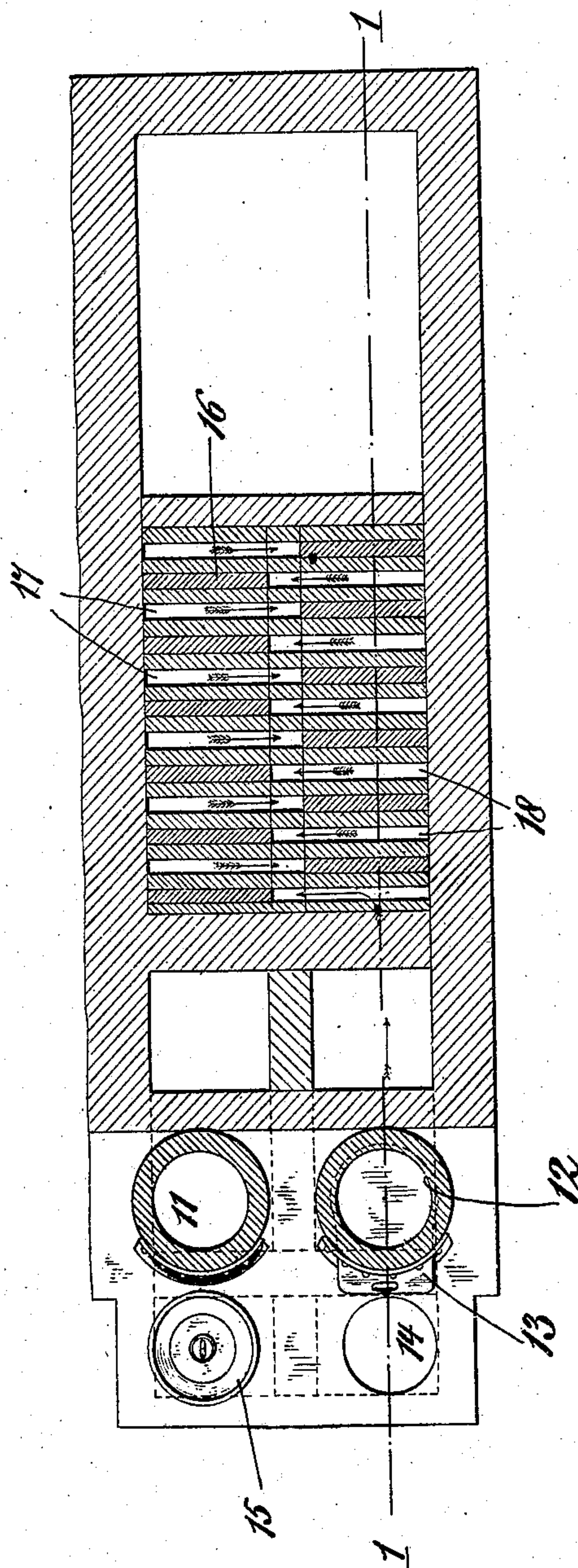
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3 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

Merwood B. Ayers.
Lyman S. Andrews Jr.

INVENTOR

Martin Van Buren Smith

BY

Chapin & Haywood
ATTORNEYS

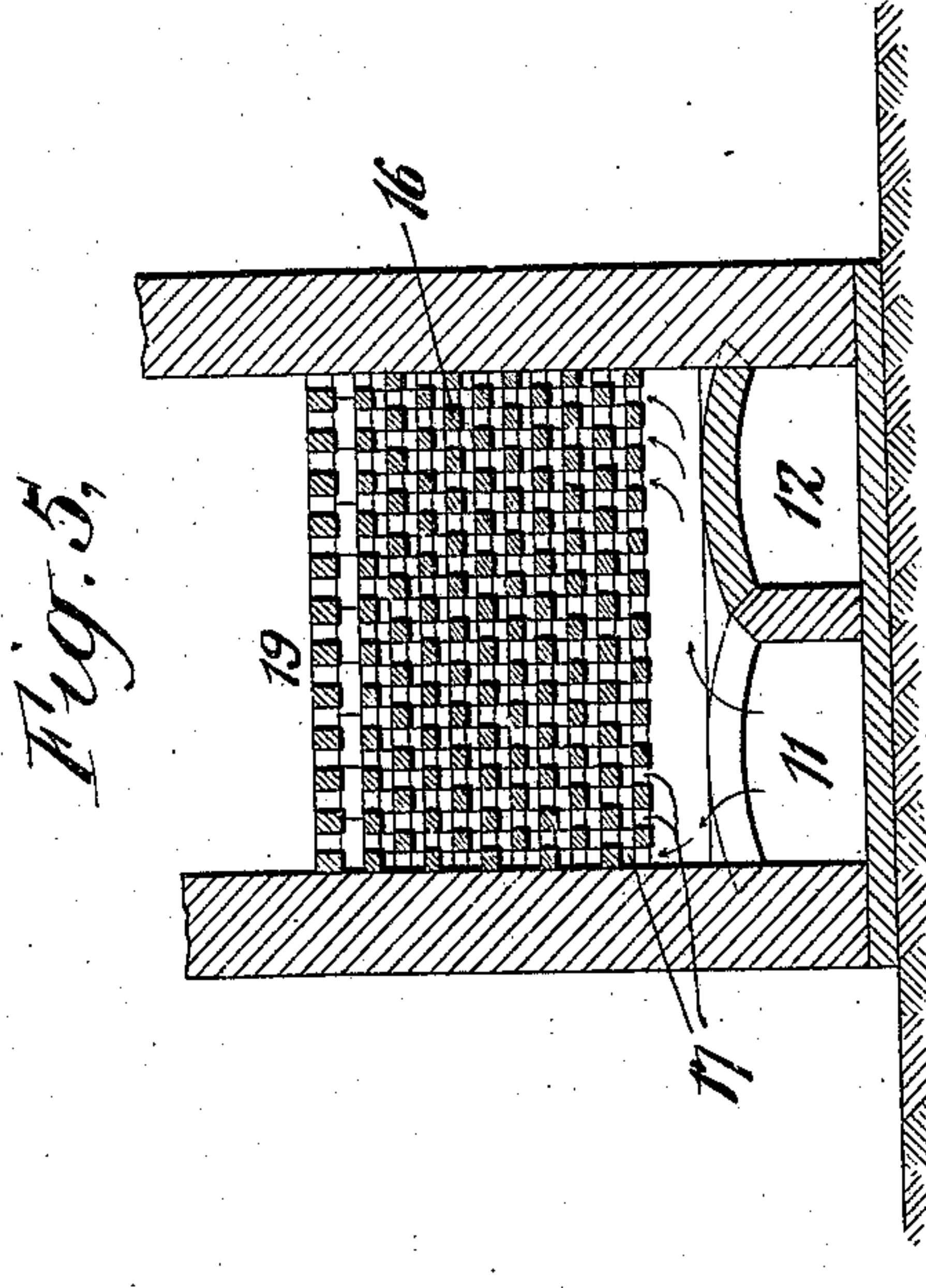
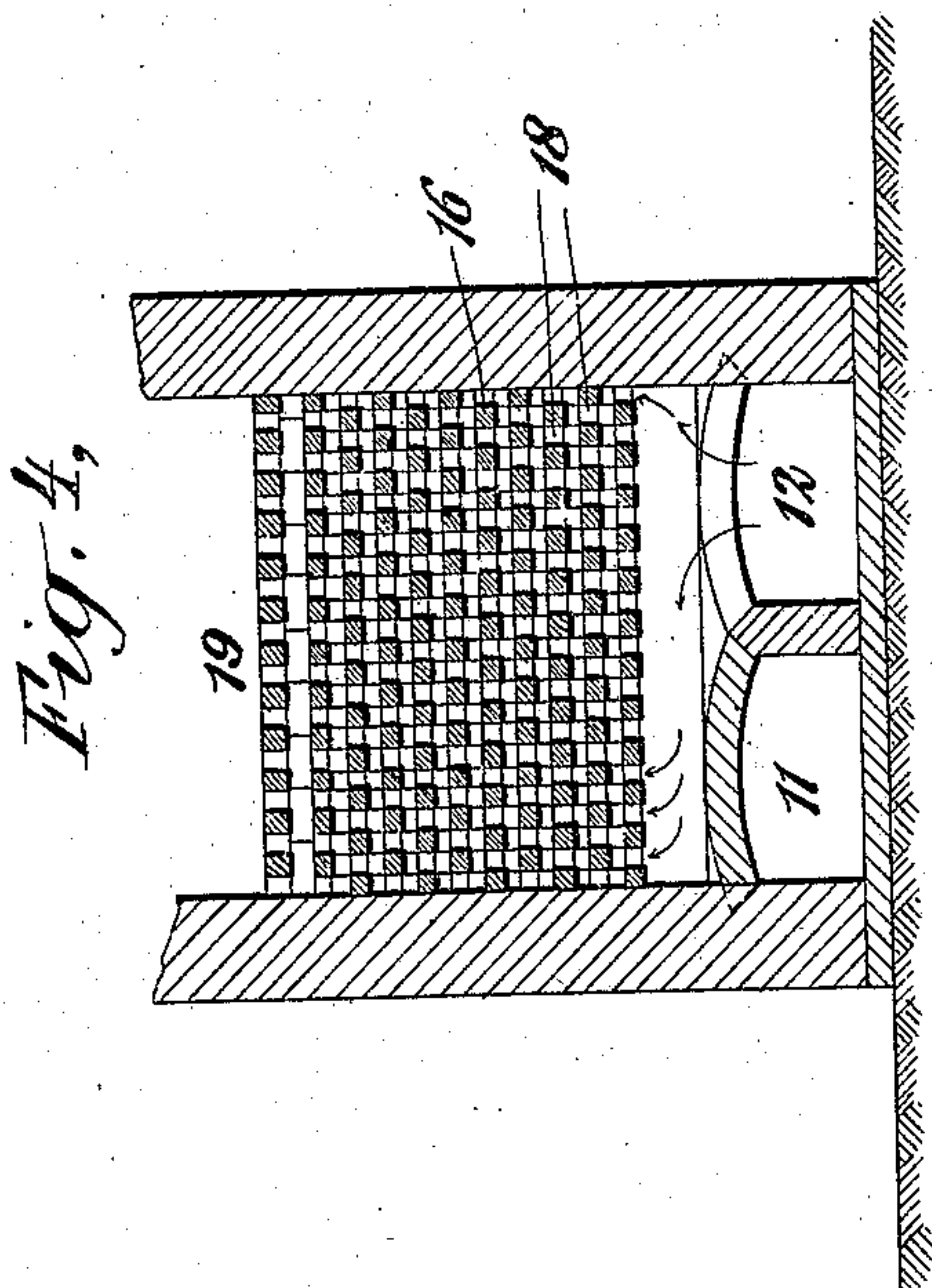
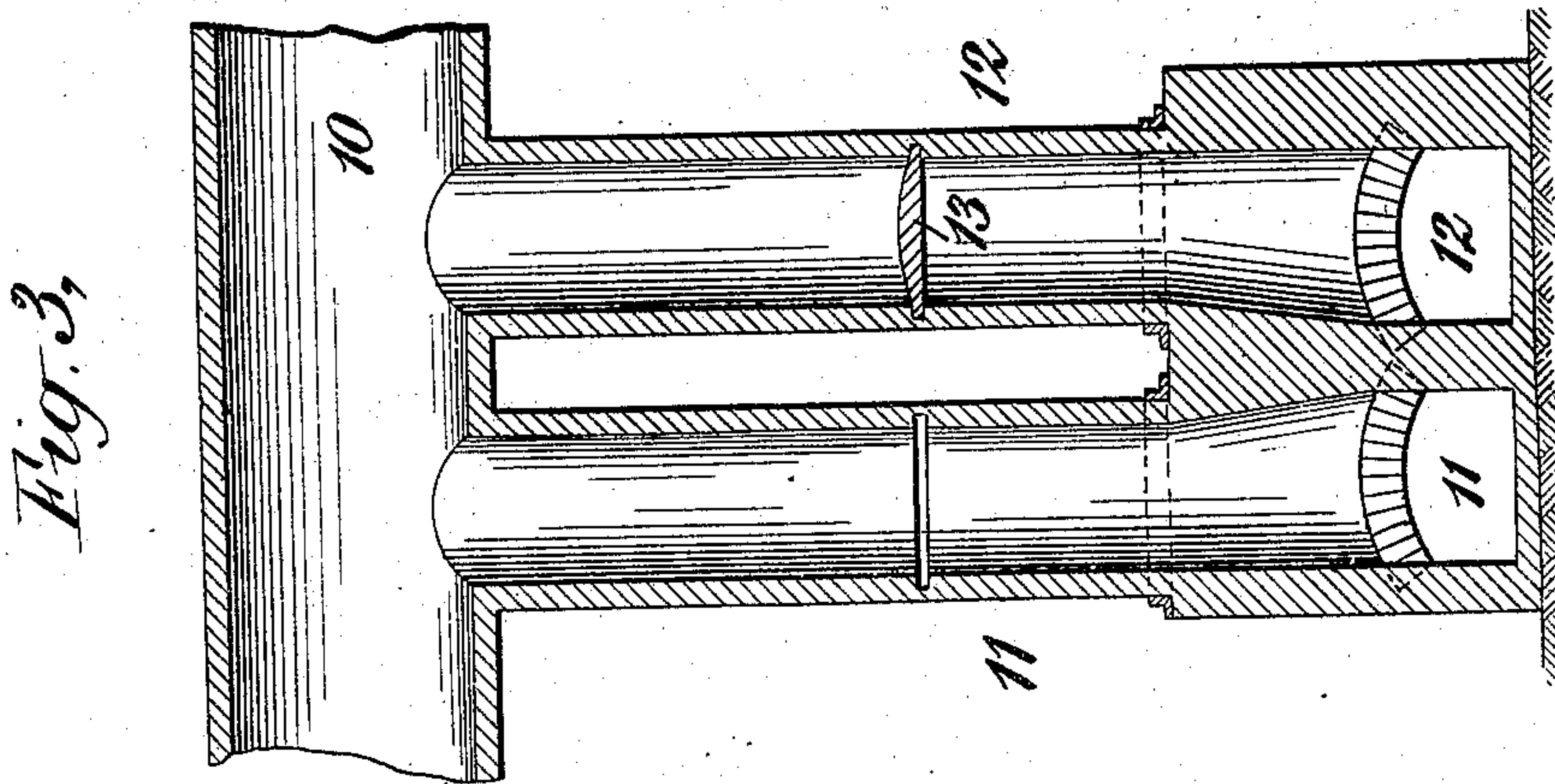
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FURNACE.

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3 SHEETS—SHEET 3.



WITNESSES:

Woodward B. Ayers.
Lyman S. Andrews Jr.

INVENTOR

Martin Van Buren Smith

BY

Chapin & Raymond
his ATTORNEYS

UNITED STATES PATENT OFFICE.

MARTIN VAN-BUREN SMITH, OF NEW YORK, N. Y.

FURNACE.

No. 854,851.

Specification of Letters Patent.

Patented May 28, 1907.

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To all whom it may concern:

Be it known that I, MARTIN VAN-BUREN SMITH, a citizen of the United States of America, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Furnaces, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in furnaces, and particularly to improvements in furnaces in which producer gas is employed for the purpose of generating steam in boilers.

The main objects of my invention are to economically employ producer gas for this purpose; to so construct and arrange the air and gas channels as to avoid exposing the hot gases to metallic parts, such as metal valves and the like; to provide means whereby the air and gas currents may be easily and readily alternated at will; and to provide for effective interchange of heat between the incoming air and gases before they are permitted to unite for combustion purposes, all as will be more fully set forth hereinafter.

To these ends my invention consists in certain novel details of construction and combination of parts as will be fully pointed out in the annexed specification.

In order that my invention may be fully understood, I will now proceed to describe an embodiment thereof with reference to the accompanying drawings illustrating same, and will then point out the novel features in claims.

In the drawings: Figure 1 is a view in vertical longitudinal section through a furnace and boiler embodying my invention, the plane of section being taken upon the plane of the line 1—1 of Fig. 2. Fig. 2 is a view in horizontal section through the same, the plane of the section being upon the line 2—2 of Fig. 1. Fig. 3 is a detail transverse sectional view upon the line 3—3 of Fig. 1. Figs. 4 and 5 are detail transverse sectional views upon the lines 4—4 and 5—5 of Fig. 1.

10 designates a header constituting a source of supply of producer gas. This header may conveniently connect with a gas producer of any suitable or approved kind (not shown). Connecting with the said header are a plurality of channels 11 12, the said channels comprising a vertical member and a horizontal member. Each channel 12 is controlled by means of a loose gate 13, which, when inserted in position across the

channel 12, serves to entirely close same, but may be entirely removed so as to permit unimpeded movement of gases through the said channel. When the gate 13 is removed, the opening through the side wall of the said channel is preferably filled with clay or sand to prevent the escape of gases or the in-taking of air at this point. In Fig. 2 the channel 11 is shown with the gate 13 removed and the opening closed by means of sand, clay, or the like, while the gate 13 is shown in position in the channel 12, said gate closing passage therethrough.

In direct communication with each channel 11 12 &c is a branch 14, said branch serving as an air inlet, so that, when passage of gas is closed through one of the channels, air may be admitted thereto through said branch inlet 14. The branch inlets 14 are each controlled by means of a valve of suitable form, such, for instance, as a saucer valve 15. In Fig. 1 the saucer valve is shown as removed from the branch 14 and placed on the ground by the side thereof, while the position the valve occupies when closing the said passage is shown by dotted lines.

Horizontal members of the various channels 11 12 &c connect with checker work 16. This checker work has a plurality of paths therethrough, one path being provided for each channel in communication therewith. Two channels 11 and 12 being shown in the present instance, there are two paths provided in the checker work, one being designated by the reference character 17, and the other by the reference character 18. The path 17 connects with the channel 11, while the path 18 connects with the channel 12. All of the paths of the checker work discharge into a mixing combustion chamber 19, at which point the air and gases which pass through the checker work will unite for the purposes of combustion. The checker work 16 is arranged immediately beneath the boiler 20, the combustion chamber 19 being disposed between the boiler and the checker work. The products of combustion pass, in the present instance, from the combustion chamber through the tubes of the boiler, thence around the shell thereof, and thence to the up-take.

When the furnace is operating, one of the gates 13 and one of the valves 14 will be removed, the gate and valve connected with alternate passages, being the ones that are removed at the one time. In the drawings,

the furnace is shown with the channel 12 closed by its gate 13, but having the valve 15 in connection with the air branch 14 removed. The gate 13 of the channel 11 is removed, so as to permit free passage of gases through the said channel, the saucer valve 15 being in position upon the branch 14 of this passage. Under this arrangement, gases from the supply will pour down and through the channel 11 into the checker work, heating the same, passing therethrough through the path 17, to the combustion chamber 19. Air is brought into the branch 14 of the channel 12 by induction, the said air passing through the horizontal portion of the channel 12 up into the checker work through the pathway 18, where its temperature will be raised by radiation of the heat imparted to the checker work by the gases to be finally received in the combustion chamber 19. The air, when it is received in the combustion chamber 19, will be at a sufficiently high temperature to properly part with its oxygen, whereby the same may unite with the producer gas (carbon monoxid), and heat units may be liberated in the formation of carbon dioxid, as will be well understood. The products of complete combustion will pass through and around the boiler for the purpose of generating steam.

It will be noticed that, in their passage through the furnace, the gases have not impinged upon any metallic structure at all, and thereby a considerable difficulty in this class of work has been overcome. In the past there has been great trouble in the burning out of metal valves employed, by the hot gases passing them, but it will be noted that I have so arranged the passages in my present construction, and have so constructed the gates, as to permit of the complete removal of the latter when the gases are pouring through the channels.

At any time the manner in which the channels are used may be reversed, the gate 13 of the channel 11 being placed in position, and the gate 13 of the channel 12 being removed. At this time the valve 15 will be placed in position upon the branch 14 in connection with a channel 12, while the valve connected with the branch of the channel 11 will be removed. When this happens the channel 12 will be used as an inlet for gases, which will then pass through the path 18 of the checker work, while the horizontal portion of the inlet channel 11 may be employed with its branch 14 as an air channel, the air passing up through the path 17 in the checker work. This change may be effected as often as may be desired or found necessary in order to preserve a more even balance of heat throughout the structure.

It will be noticed by the foregoing that I have provided a very simple form of apparatus for this purpose, and have provided but

a single bank of checker work through which, however, changes may be easily made in the disposition of the gas and air. It will also be understood that my improved construction is very inexpensive to build, easy to repair, and, having no moving or mechanically operated parts, is but little likely to get out of repair.

What I claim is:

1. In a furnace, the combination with two inlet channels, of checker work having two paths therethrough, one opening into one said channel and the other opening into the other said channel, means for connecting said channels the one with air supply and the other with gas supply and vice versa, and a mixing and combustion chamber for the gas and air as they discharge from the checker work.

2. In a furnace, the combination with two separate inlet channels, of checker work having two paths therethrough, one opening into one said inlet channel, and the other opening into the other said inlet channel, gas and air connections for both and each of the said inlet channels, valves or gates controlling said connections, and a mixing and combustion chamber for the gas and air as they discharge from the checker work.

3. In a furnace in which producer gas is to be employed, the combination with a plurality of separate and independent channels connecting with a source of gas supply, loose gates employed therein for controlling passage therethrough, said gates adapted to be entirely removed when passage of gas through said channels is desired, air inlets and means for controlling them, of checker work having independent contiguous paths therethrough connecting respectively with said channels, and a mixing and combustion chamber into which the said checker work discharges.

4. In a furnace in which producer gas is to be employed, the combination with a plurality of channels connecting with a source of gas supply, loose gates employed therein for controlling passage therethrough, said gates adapted to be entirely removed when passage of gas through said channels is desired, air inlets and means for controlling them, of checker work having separate paths connecting with said channels, and a mixing and combustion chamber into which all the paths through said checker work discharge.

5. In a furnace in which producer gas is to be employed, the combination with a plurality of channels each having branches connecting with both gas supply and air supply, and means for controlling each said supply, whereby gas or air may be admitted to each of them, of checker work having a plurality of separate and independent paths therethrough, one for each said channel, and a combustion chamber into which all the paths through said checker work discharge.

6. In a boiler furnace, the combination
with a boiler, of checker work arranged lon-
gitudinally beneath same, and having a com-
bustion chamber between it and the boiler,
5 into which the checker work discharges, said
checker work having a plurality of inde-
pendent paths therethrough, of independent

air and gas channels connecting, respectively,
with said paths, and means for controlling
said channels, substantially as set forth.

MARTIN VAN-BUREN SMITH.

Witnesses:

NORWOOD B. AYERS.

D. HOWARD HAYWOOD.