

No. 706,579.

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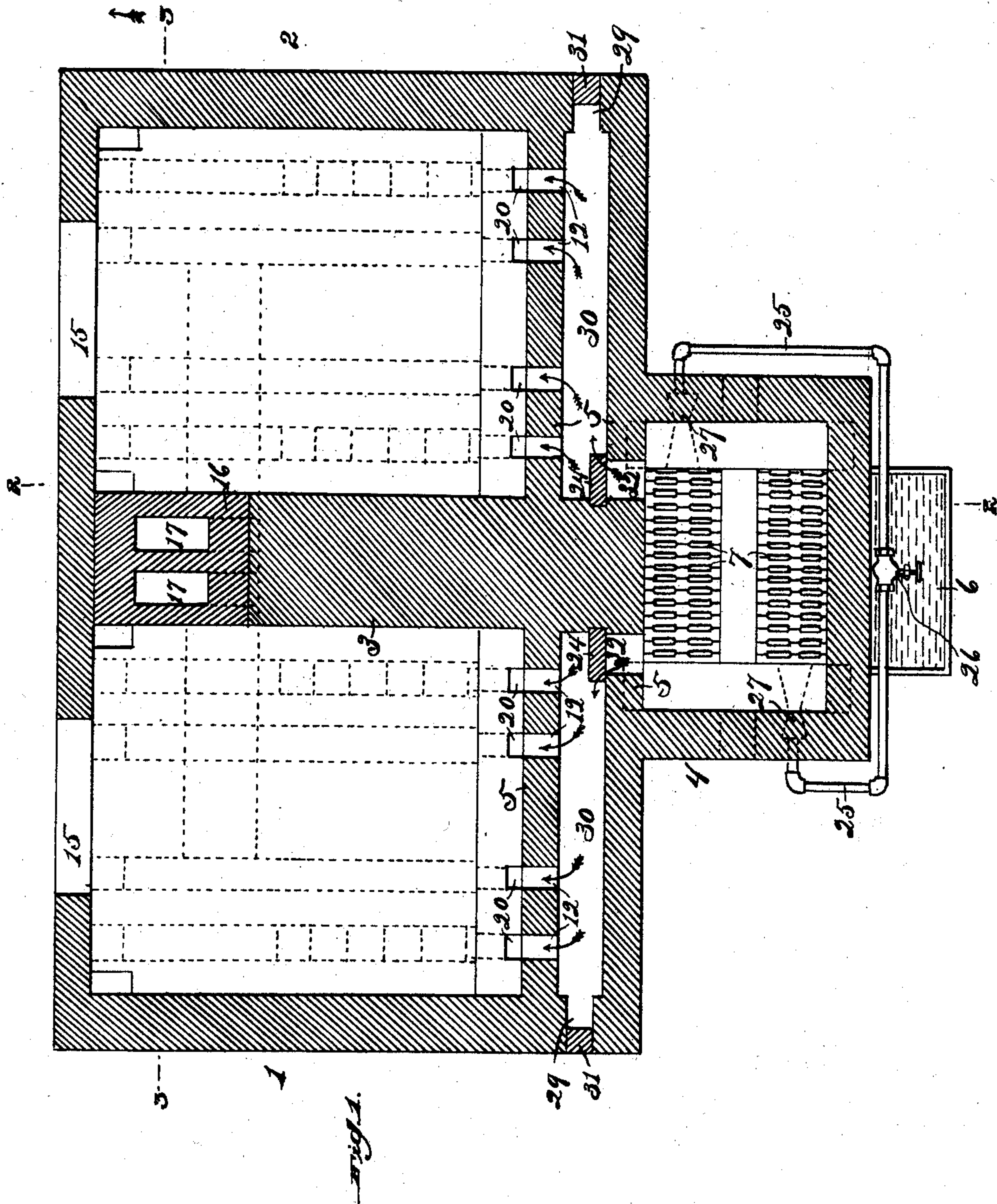
A. J. MASKREY.

COMBINED GAS PRODUCER AND RECUPERATIVE FURNACE.

(Application filed May 21, 1902.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:

*J. D. Appleman,
J. M. Harris.*

Inventor
G. F. Maskrey,
By
H. E. Dunlap,
Atty.

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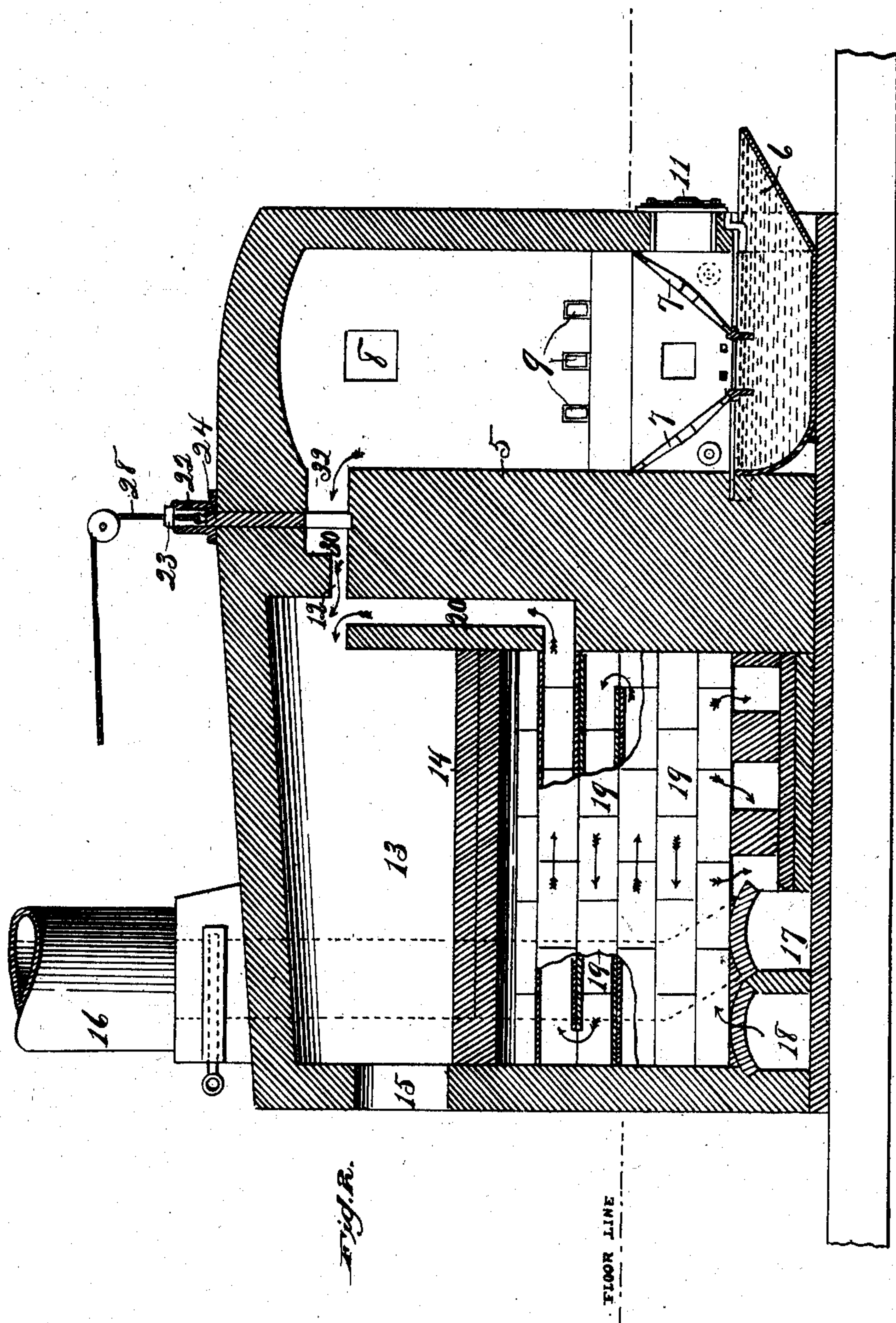
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Witnesses:

J. P. Appleman
J. Wm. Harris

Inventor
A. J. Maskrey.
By
H. E. Dunlap
Atty.

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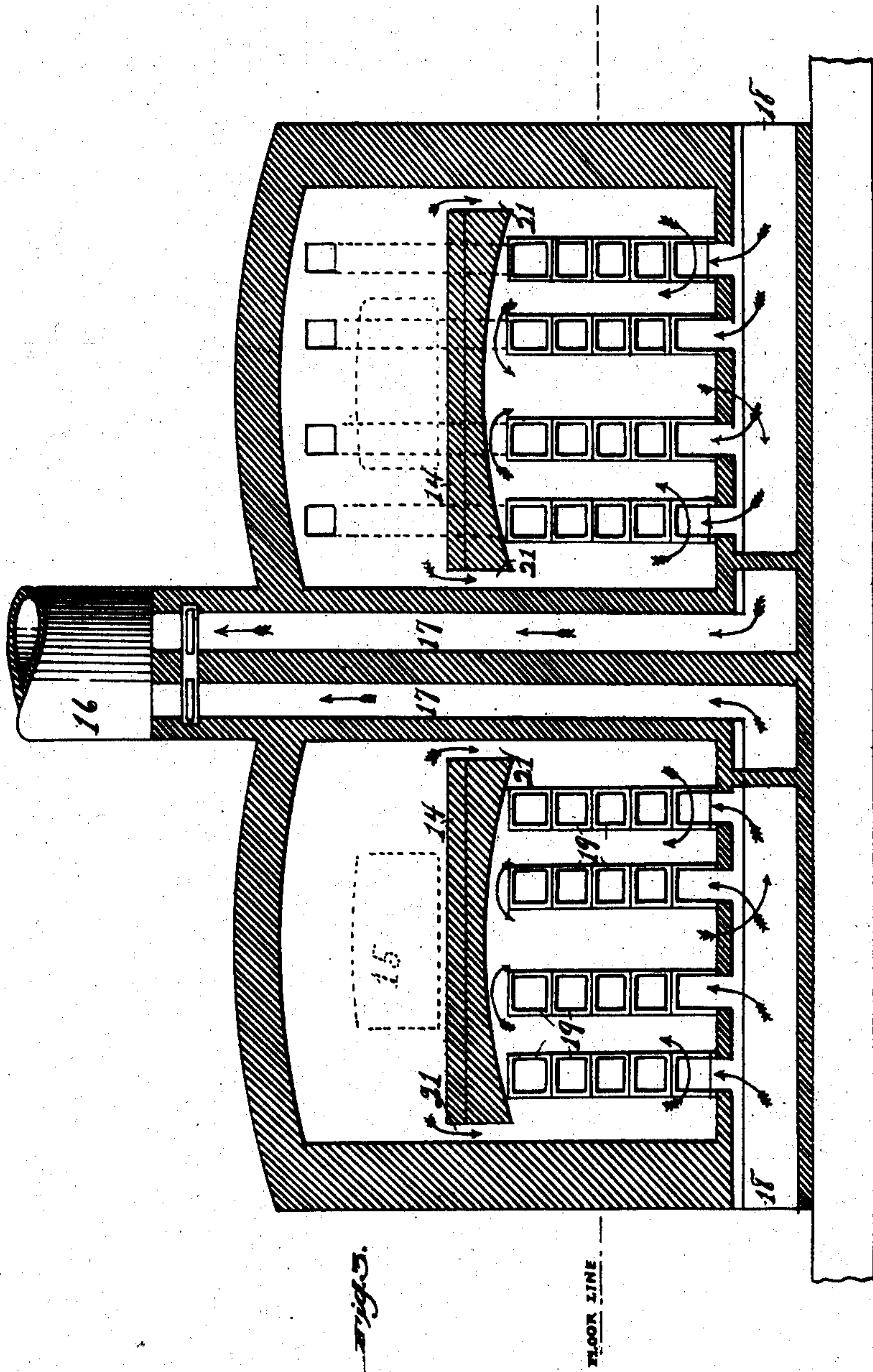
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J. P. Appleman,
J. W. Harris.

Inventor
A. J. Maskrey
By
H. E. Dunlap,
Att'y.

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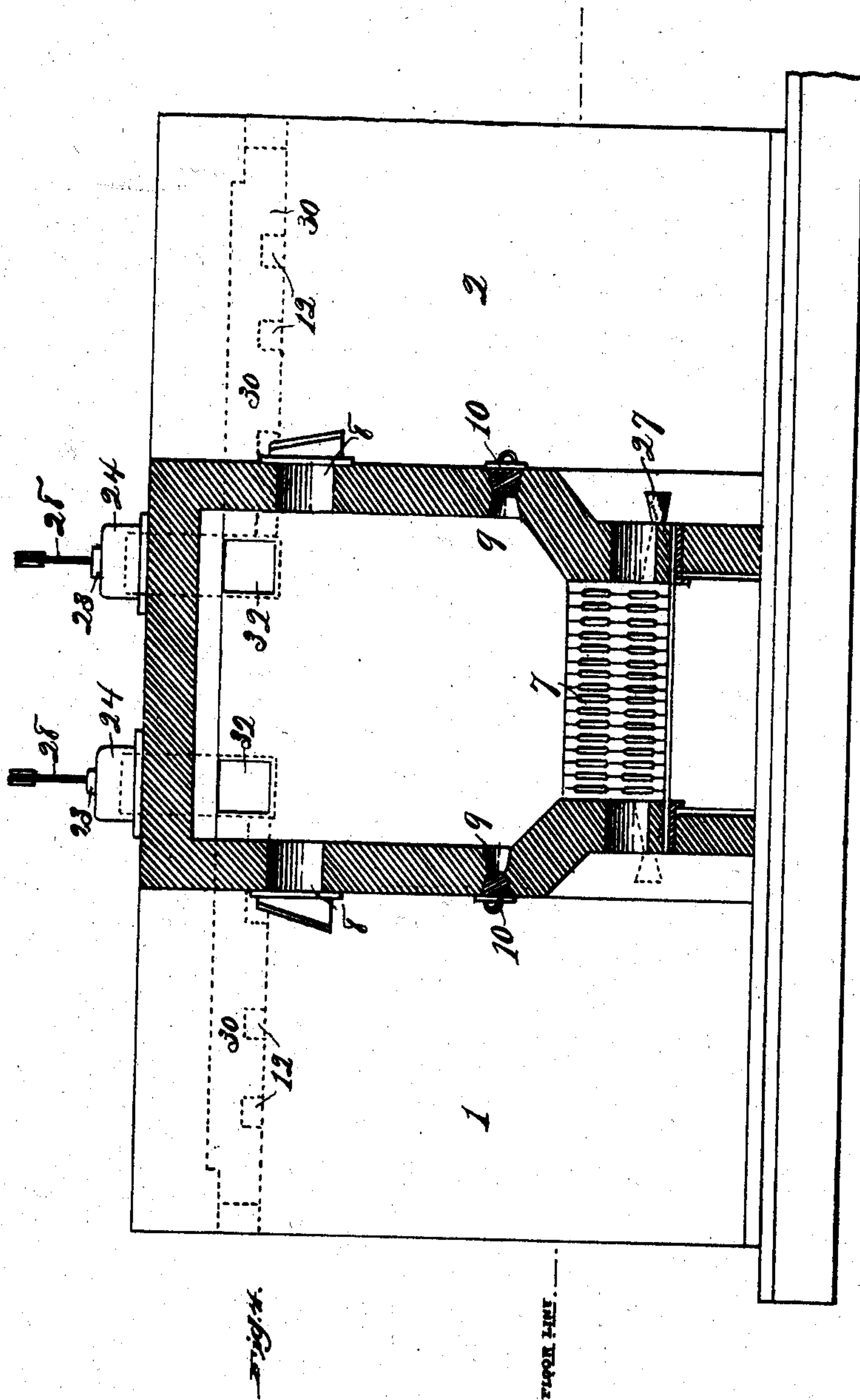
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4 Sheets—Sheet 4.



Witnesses:

J. P. Appleman,
J. M. Harris

Inventor
A. J. Maskrey.

H. E. Dunlap,
Att'y.

UNITED STATES PATENT OFFICE.

ARTHUR JAMES MASKREY, OF MARTINS FERRY, OHIO.

COMBINED GAS-PRODUCER AND RECUPERATIVE FURNACE.

SPECIFICATION forming part of Letters Patent No. 706,579, dated August 12, 1902.

Application filed May 21, 1902. Serial No. 108,301. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR JAMES MASKREY, a subject of the King of Great Britain, and a resident of Martins Ferry, county of Belmont, and State of Ohio, have invented certain new and useful Improvements in a Combined Gas-Producer and Recuperative Furnace, of which the following is a specification.

10 My invention relates to a combined gas-producer and finishing-furnace, and more particularly to a combined gas-producer and a double recuperative finishing-furnace for tin and sheet mills.

15 The object of my invention is to construct a double finishing-furnace, or, rather, a pair and finishing furnace having a stack in common and a gas-producer in connection therewith which will furnish the gases resulting from the decomposition of the fuel therein directly to both furnaces.

20 A further object of my invention is to provide a furnace of the above-referred-to class the arrangement of which insures perfect and complete combustion, thereby securing a material saving in fuel.

25 A further object of my invention is to provide a gas-producer which is provided with stoke-holes through which it may be fired, as in an ordinary furnace, this construction making it possible to dispense with the services of the men ordinarily required for operating separate gas-producers, as the producer can conveniently be fired by the men who 35 operate the furnaces.

40 A still further object of my invention is to provide a combined gas-producer and finishing-furnace which is extremely simply in its construction and which may be constructed at much less than the usual cost of separate pair and finishing furnaces and a separate gas-producer; furthermore, which occupies much less floor-space than is necessary for separate pair and finishing furnaces and a gas-producer.

45 Other objects of my invention will become apparent as further progress is made in this specification.

50 My invention consists in certain novel features of construction and arrangement, which will hereinafter be fully described, and spe-

cifically pointed out in the claims hereto appended.

In describing my invention in detail reference is had to the accompanying drawings, 55 forming a part of this specification, wherein similar reference-numerals designate like parts throughout the several views.

Figure 1 is a horizontal section of my combined gas-producer and pair and finishing 60 furnaces. Fig. 2 is a longitudinal section of the same, taken on the line 2 2, Fig. 1. Fig. 3 is a cross-section of the pair and finishing furnaces, taken on the line 3 3, Fig. 1. Fig. 4 is a cross-section of the producer, taken on 65 the line 4 4, Fig. 1, showing the rear ends of the pair and finishing furnaces.

In the drawings, 1 and 2 indicate the two furnaces, which are separated by a dividing-wall 3, and 4 indicates the gas-producer, located at the rear of the double furnace and 70 separated therefrom by a wall 5.

6 indicates the water-bosh underneath the fire-box in the producer, into which the ashes from the fire drop.

7 indicates the grate-bars, on which the fuel rests while being consumed.

The producer is fired, preferably, through stoke-holes 8, provided on opposite sides thereof. In the sides of the producer are 80 provided openings or ports 9, with suitable removable plugs 10. A bar may be inserted through these ports 9 to raise the fuel to permit it to drop back in a solid mass productive of volatile gases.

11 is a door which opens into the producer from the rear.

Now the gases generated from the burning fuel or resulting from the decomposition thereof in the producer rise and pass through 90 openings 32, provided in the wall 5 next the producer, said openings communicating with longitudinal main gas-supply chambers or distributing-chambers 30, provided in the wall 5, and in said chambers the gases are 95 distributed throughout their entire length. From said distributing-chambers 30 the gases pass through openings or ports 12 in the opposite side of the wall 5 into the combustion-chambers 13 of the said furnaces. As 100 said gases pass through said ports 12 into the combustion-chambers 13 they meet and mix

with the heated air from below in said furnaces as said air is discharged from the air-courses 20, and perfect combustion is secured for heating the metal plates or sheets, which are placed on the bed 14, said plates having been inserted through the usual openings or doors 15.

16 indicates the stack, and 17 is the flue leading thereto.

18 is the cold-air inlet or entrance.

The cold air passes in through the inlet 18 in each furnace and circulates back and forth through the horizontal passages or intake-flues in the lower parts thereof, as indicated by arrows in Fig. 2. Each of said passages or intake flues is formed by placing tiling 19 end to end in rows some distance apart, each row consisting of a number of tiers of the tiling, joined as before mentioned, said tiling being preferably right parallelopipedons in shape. Said intake-flues terminate in air-courses 20, through which the air takes an upward course and meets and mixes with the gases from the producer at the top of the bridge 33 of the furnace as the said gases pass through the ports 12, this arrangement being intended to facilitate the commingling of the air and gases at or near the top of the combustion-chambers. The air-courses 20 open into said combustion-chambers 13 at substantially the same points at which the gases are discharged into the combustion-chambers through the ports 12. The intake-flues being separated and running parallel from passages or flues therebetween for the escape of the products of combustion from the combustion-chambers. The products of combustion pass downward through the escape-flues 21 at each side of the furnace and coursing upward and downward through the passages or flues between the rows of tiling or between the intake-flues, as shown by arrows in Fig. 3, pass into and upward through the flue 17 to the stack. In so escaping the heated products of combustion heat the cold air passing through the intake-flues and prepare it for mixing with the gases to facilitate the combustion thereof in the combustion-chambers 13.

Provided at the top of the combined gas-producer and furnace at points directly over each of the communicating openings 32 is a cap 22, with a close-fitting collar 23 on its top, through which passes a cable 28, supporting a cut-off plate or damper 24. Said damper is supported in such a position that by manipulation thereof the size of the communicating opening 32 may be changed, and consequently by its manipulation or operation the supply of gases to the combustion-chamber 13 may be regulated, or, if desired, may be entirely cut off.

Referring to Fig. 1, 25 is a steam-pipe having a regulating-valve 26 thereon, said steam-pipe entering the producer on opposite sides thereof through funnel-shaped ports 27, one port being located, preferably, below each set of grate-bars. Said steam-pipes are adapted

for furnishing air to the producer to facilitate the combustion of the fuel therein.

29 indicates openings or holes through which the distributing-chambers 30 may be cleaned, said openings being closed with plugs or similar suitable devices 31.

It will be seen that the arrangement of the intake-flues and the escape-flues with relation to each other is such that the ingoing air in the intake-flues for assisting in the combustion of the gases is heated in its passage by the outgoing heated products of combustion, thus forming what is termed a "recuperative" furnace.

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

1. The combination with a producer, of recuperative furnaces arranged at each side of the rear end thereof, combustion-chambers in each furnace, separate passages leading from said producer to said combustion-chambers for conveying the gases generated in the producer, and intake-flues for admitting heated air to said combustion-chambers at substantially the same points in which the gases are admitted, substantially as described.

2. The combination with a combined pair and finishing furnace, of a producer, combustion-chambers in each furnace, distributing-chambers intermediate the producer and the furnaces, dampers for regulating the supply of gases to the distributing-chambers, intake-flues for supplying heated air to the combustion-chambers, and escape-flues leading from said combustion-chambers and arranged intermediate the intake-flues to heat the air as it passes through said intake-flues, substantially as described.

3. The combination with a producer in which combustion of the fuel takes place slowly, of a longitudinal chamber 30 for receiving the combustible gases resulting from the decomposition of the fuel in the producer and adapted for distributing the said gases throughout its length, a combustion-chamber into which the combustible gases are directed through communicating ports, and passages for admitting heated air to the combustion-chamber, the said communicating gas-ports and the said air-passages converging at or near the top of the combustion-chamber so as to commingle the air and gases as they enter the combustion-chamber, substantially as described.

4. The combination with a producer for containing a bed of fuel and having stoke-holes through which said producer is fed, of longitudinal distributing-chambers arranged at the rear of the producer for receiving and distributing the combustible gases from said producer to different points along their lengths, combustion-chambers arranged at the rear of each distributing-chamber for receiving the gases therefrom through ports provided therein, escape-flues for the products of combustion leading from the combus-

tion-chambers, and intake-flues arranged intermediate said escape-flues for admitting heated air to the combustion-chambers, the points of admission for said heated air being in juxtaposition to the gas-discharge ports so as to permit the air and gases to commingle as they enter the combustion-chambers, substantially as described.

5. The combination with a producer for driving off volatile gases from the fuel, of a pair and finishing furnace, a combustion-chamber in each furnace, communicating passages between the producer and said combustion-chambers, means for regulating and controlling the supply of gases from the producer to the combustion-chambers, a plurality of intake-flues for supplying heated air to said combustion-chambers, which intake-flues are arranged in parallel rows some distance apart, each row consisting of a number of tiers of fire-brick tiling, escape-flues leading from said combustion-chambers to the stack, said escape-flues being intermediate the intake-flues and adapted to heat the air as it passes through said intake-flues, substantially as set forth and described.

6. In a combined gas-producer and pair and finishing furnaces, the combination with the producer for driving off volatile gases from the fuel, of communicating chambers extending the entire lengths of the pair and finishing furnaces and adapted for distributing the gases throughout their lengths, combustion-chambers communicating with said first-mentioned chambers through a plurality of ports, and a plurality of passages for supplying heated air to the combustion-chambers, said air-passages opening into said combustion-chambers directly underneath the said communicating gas-ports so as to commingle the air and gases as they enter the combustion-chambers, substantially as described.

7. The combination with a recuperative pair and finishing furnace, of a producer arranged in connection therewith at the rear thereof, combustion-chambers in each furnace, distributing-chambers arranged intermediate the combustion-chambers and the producer, dampers between the producer and the distributing-chambers for regulating the supply of gases from the producer, intake-flues in said furnaces for supplying heated air to the combustion-chambers, and escape-flues for the products of combustion leading from the

combustion-chambers and arranged intermediate said intake-flues, whereby the air passing through the intake-flues is heated in its passage, substantially as described.

8. The combination with a producer for generating combustible gases, and having means for regulating and controlling the admission of air to support combustion therein, of said producer having openings therein through which the fuel may be solidified to secure slow combustion, a combustion-chamber, a distributing-chamber for receiving the combustible gases resulting from the decomposition of fuel in the producer, said distributing-chambers being located between said producer and combustion-chamber and provided with ports adapted for discharging the gases from the producer to the combustion-chamber at different points along its rear side, intake-flues for supplying heated air to the combustion-chamber, the intake-flues and the gas-ports discharging their contents together so as to commingle the air and gases as they enter the combustion-chamber, substantially as described.

9. The combination with two separate furnaces having a common dividing-wall, and a stack in common between them, of a gas-producer arranged in connection therewith and adapted for supplying combustible gases resulting from the decomposition of fuel therein to both furnaces; a longitudinal chamber located at the rear of each of said furnaces and communicating with said producer, said longitudinal chamber adapted for distributing the gases supplied thereto throughout its entire length; a combustion-chamber in each of said furnaces, into which the combustible gases are discharged through a plurality of ports from the distributing-chamber; and intake-flues in each furnace for supplying heated air to the combustion-chamber, said intake-flues discharging the heated air directly underneath the ports for the entrance of the gases so as to mix the air and gases as they enter said combustion-chamber, substantially as shown and described.

Signed by me at Martins Ferry, Ohio, this 16th day of May, 1902.

ARTHUR JAMES MASKREY.

Witnesses:

H. E. DUNLAP,
ROSS B. HEATON.