

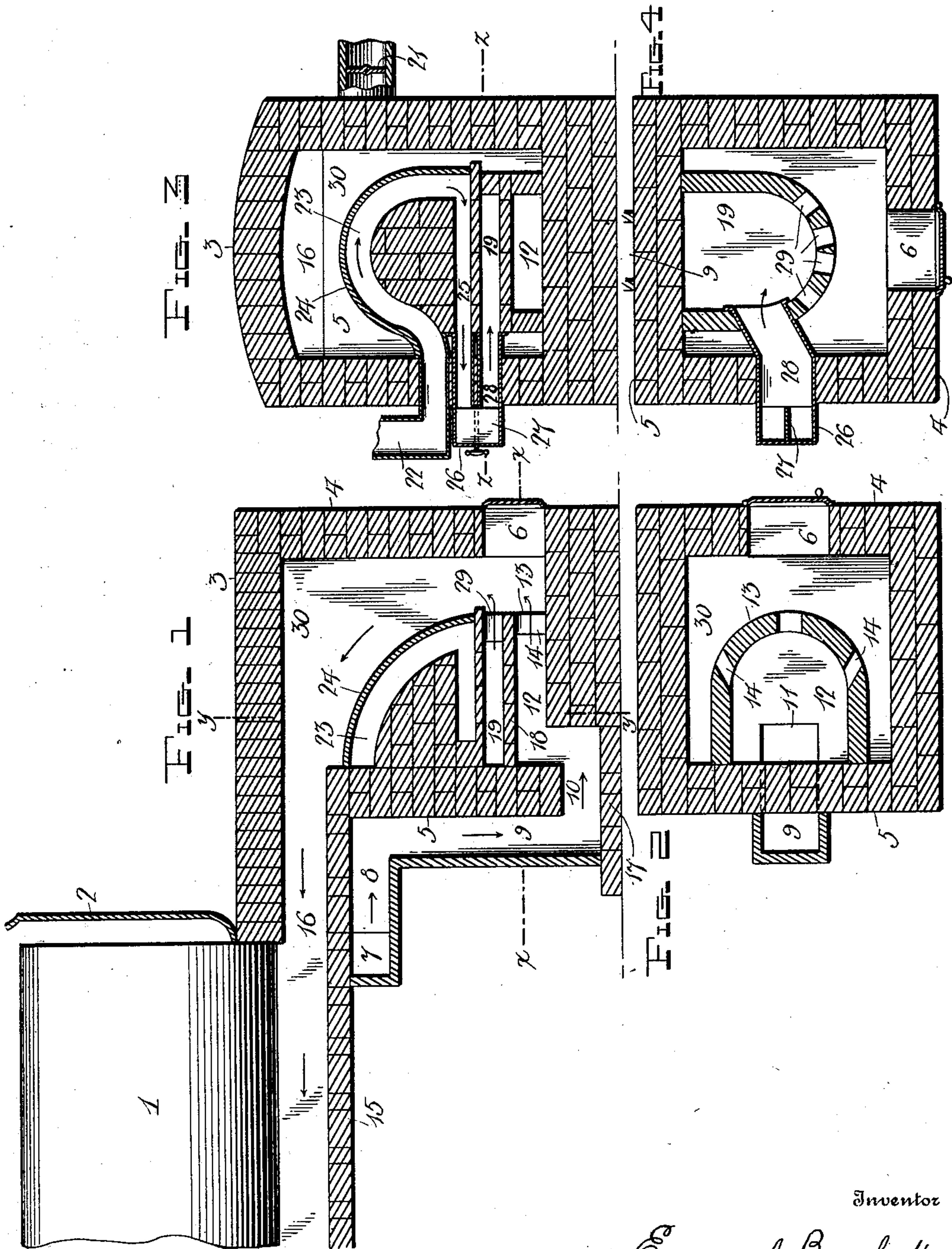
No. 747,533.

PATENTED DEC. 22, 1903.

E. BUMFORD.
GAS BURNING FURNACE.

APPLICATION FILED JAN. 31, 1903.

NO MODEL.



Witnesses

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UNITED STATES PATENT OFFICE.

EMANUEL BUMFORD, OF BIRMINGHAM, ALABAMA.

GAS-BURNING FURNACE.

SPECIFICATION forming part of Letters Patent No. 747,533, dated December 22, 1903.

Application filed January 31, 1903. Serial No. 141,356. (No model.)

To all whom it may concern:

Be it known that I, EMANUEL BUMFORD, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Gas-Burning 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 gas-burning furnaces for steam-boilers; and the object of my invention is the production of a furnace wherein the entering air is preheated in the passages provided for it and the gas is similarly heated before burning in a gas receiving and heating chamber located in the furnace itself and subjected to the heat of the combustion-chamber.

My invention has also for its object a particular arrangement of air-passages and gas-ducts, the gas-heating chamber, the combustion-chamber, and the flue to conduct the heated products of combustion to the boiler shell and tubes, whereby complete mixing of air and gas in regulated proportions is effected and an intense yet exceedingly even heat created and maintained.

I accomplish the stated objects by means of the various parts and their association illustrated in the accompanying drawings, of which—

Figure 1 is a vertical sectional view lengthwise of the furnace, showing one end of the boiler. Fig. 2 is a horizontal section on line $x x$ of the first figure. Fig. 3 is a vertical cross-section on line $y y$ of the first figure, and Fig. 4 represents a horizontal section on line $z z$ of the third figure.

Like numbers refer to like parts throughout the views.

Considering the drawings, numeral 1 marks a boiler, and 2 the stack; 3, the top of the furnace; 4, the front wall, and 5 the bridge-wall. In the front wall I usually provide a door 6, giving access to the interior. Toward the rear of the furnace the air-inlet

7 is situated, projecting laterally, and from the inlet the air flows through a horizontal passage 8 and down a vertical passage 9 by way of the horizontal passages 10 and 11 into the distributing-chamber 12. Chamber 12 has a curved wall 13, pierced by ports 14, through which the air is distributed to the combustion-chamber in different streams and directions. From the time the air leaves the air-inlet until it finally flows into the combustion-chamber it meets heated walls—first, the bottom wall 15 of the main flue 16, then the bridge-wall 5, next the floor 17 of the furnace and the bottom 18 of the gas-distributing chamber 19. All these surfaces are highly heated when the furnace is in operation, and the entering air is correspondingly raised in temperature before it is mixed with gas in the combustion-chamber. A valve 21 in the air-inlet regulates the amount of entering air.

Number 22 marks the gas-inlet connected with any suitable source of supply. It delivers the gas into a curved gas-heating chamber 23, the top of which 24 is made of fire-brick and curves downwardly from the top of bridge-wall 5 toward the front of the furnace. The top of the heating-chamber may be made of metal; but usually metal will not long withstand the heat. From the gas-heating chamber the heated gas passes beneath the chamber by way of a passage 25 and out through the wall of the furnace, where its path is turned back upon itself through the connection 26, which includes a valve 27, and leads to the passage 28 directly beneath the passage 25 and delivers the heated gas into the gas-distributing chamber 19, from which it emerges in separate streams through ports 29 in the curving wall of the chamber and mixes with the proper supply entering the combustion-chamber 30 and is ignited and flows thence by main flue 16 to heat the boiler. The flame resulting from the combustion does not impinge directly against the boiler-shell; but the intensely hot gases spread gently upward and around it after passing through the main flue 16. Thus while the boiler is subjected to great heat it is not injured, and steam is most economically generated.

I am aware that furnaces have been con-

structed in which the entering air and gas-supply are heated prior to ignition, and I do not claim those features broadly.

What I claim, and desire to secure by Letters Patent, is—

1. In a gas-burning furnace, the combustion-chamber provided with a bridge-wall, a gas-inlet, a gas-heating chamber situated in the furnace and connected with said inlet, the top of said gas-heating chamber curving downwardly from the upper part of the bridge-wall toward the front of the furnace and forming the back of the combustion-chamber, a gas-distributing chamber provided with ports opening into said combustion-chamber, a passage leading from the gas-heating chamber to the gas-distributing chamber, a valve located in said passage and adapted to control the flow of heated gas, an air-inlet, an air-distributing chamber provided with ports opening into the said combustion-chamber, an air-valve arranged to control the flow of air in said air-inlet, and passages connecting the air-distributing chamber and air-inlet, substantially as described.

2. In a gas-burning furnace, the combustion-chamber provided with a bridge-wall, a gas-inlet, a gas-heating chamber situated in

the furnace and connected with said inlet, the top of said gas-heating chamber curving downwardly from the upper part of the bridge-wall toward the front of the furnace and forming the back of the combustion-chamber, a gas-distributing chamber provided with ports opening into said combustion-chamber, passages leading to the said gas-heating chamber and to the gas-distributing chamber, a connection projecting without the furnace and joining the said gas-passages, a valve operating in said connection and adapted to control the flow of heated gas, an air-passage extending downwardly and passing beneath the said bridge-wall, an air-distributing chamber beneath the said gas-distributing chamber opening into said air-passage and having ports opening into the combustion-chamber, and an air-valve controlling the inflow of air in said air-passage, substantially as described.

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

EMANUEL BUMFORD.

Witnesses:

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A. E. BEESLEY.