W. N. BEST.

FURNACE FOR UNIFORMLY HEATING METALS.

APPLICATION FILED NOV. 27, 1908.

936,856.

Patented Oct. 12, 1909.

2 SHEETS—SHEET 1.

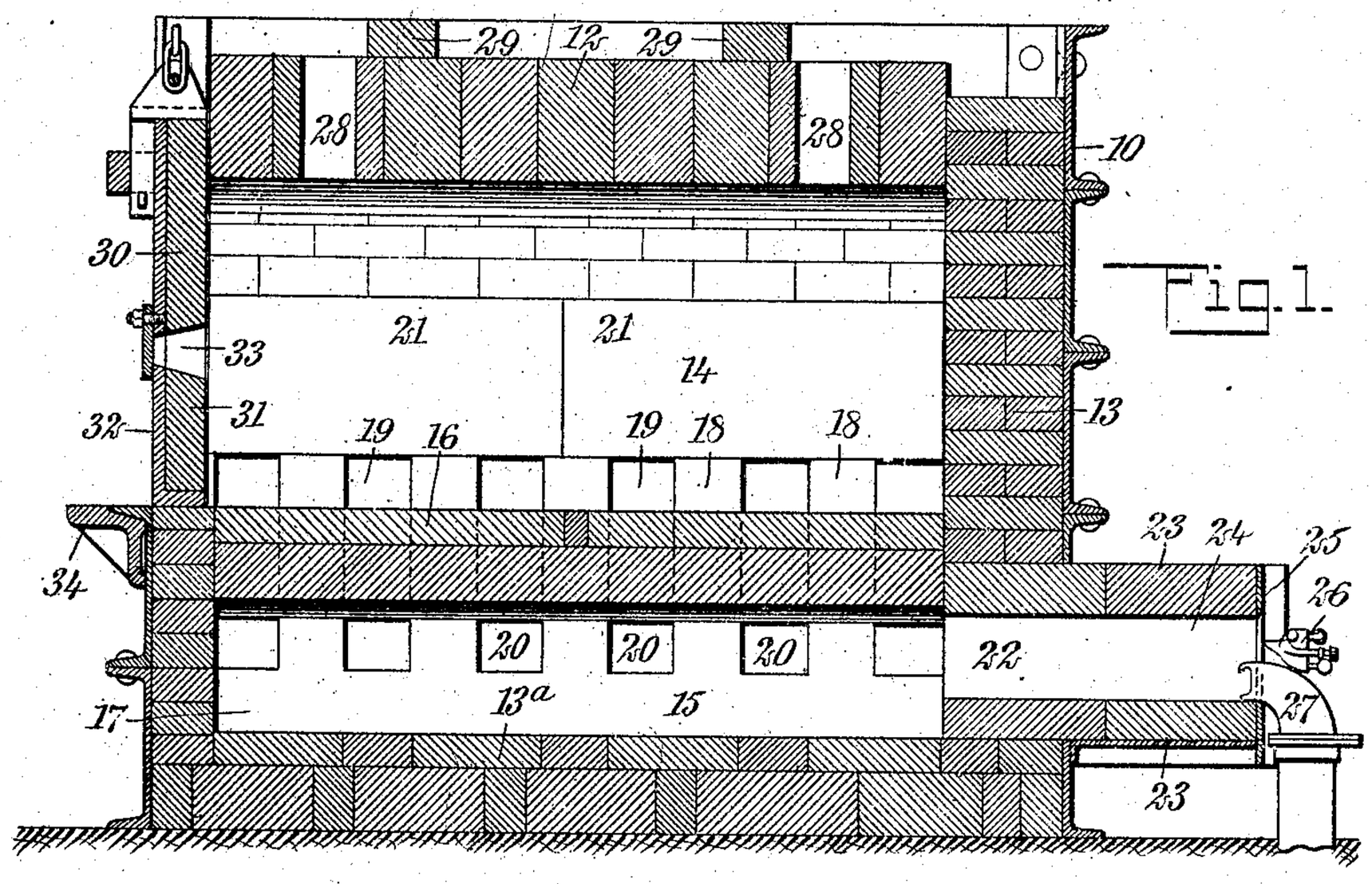

Fig. 1.

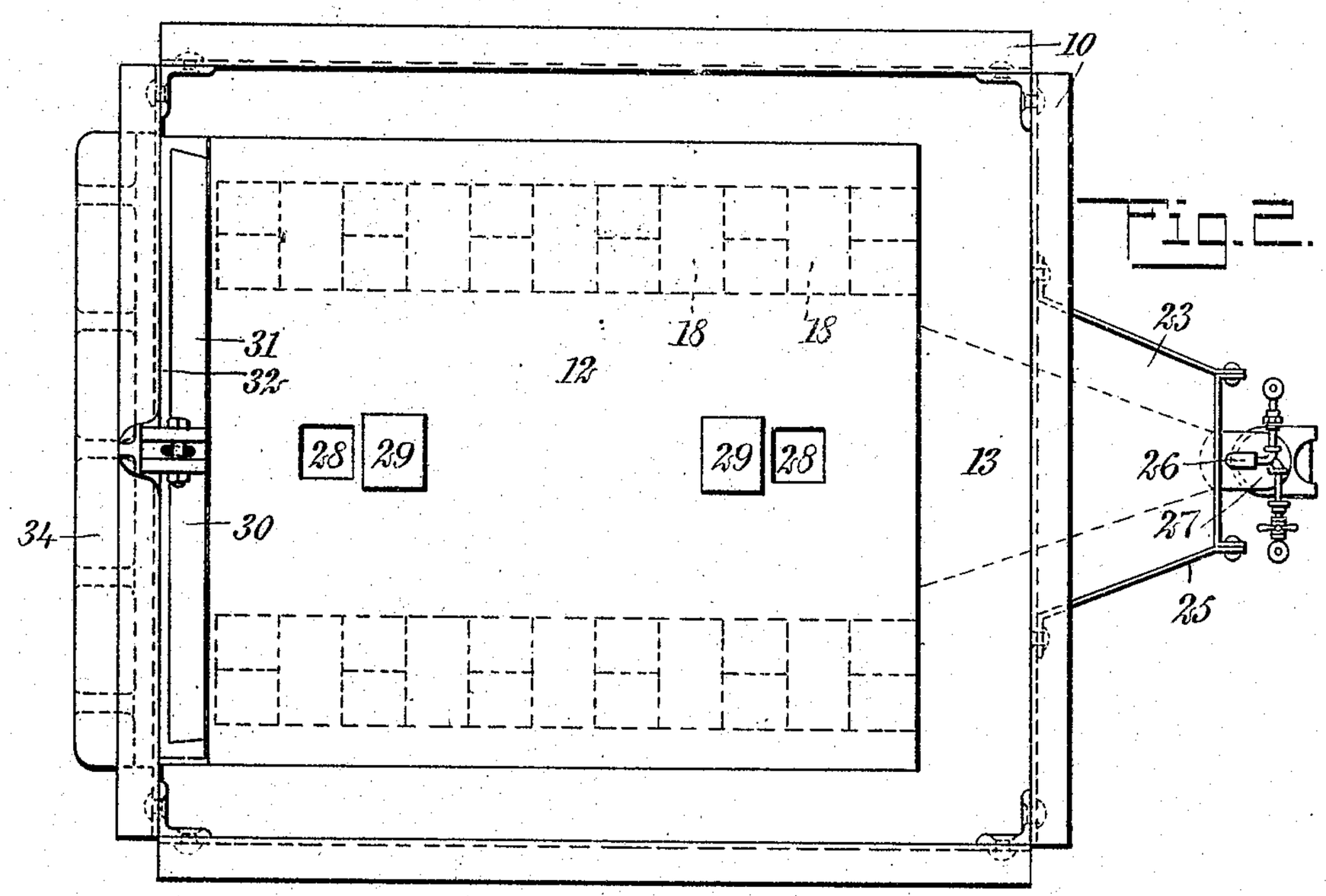

Fig. 2.

WITNESSES

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Fig. 3.

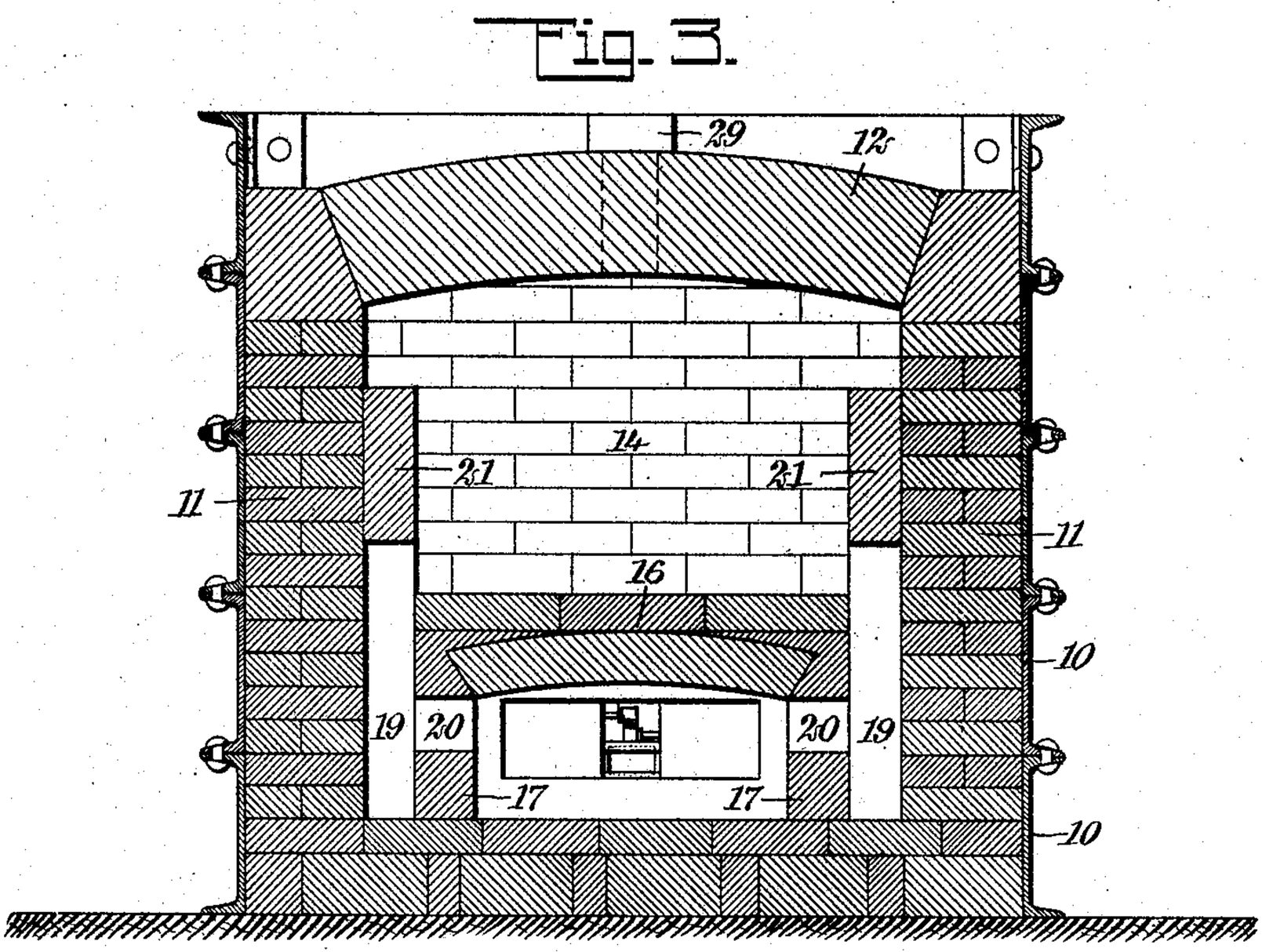
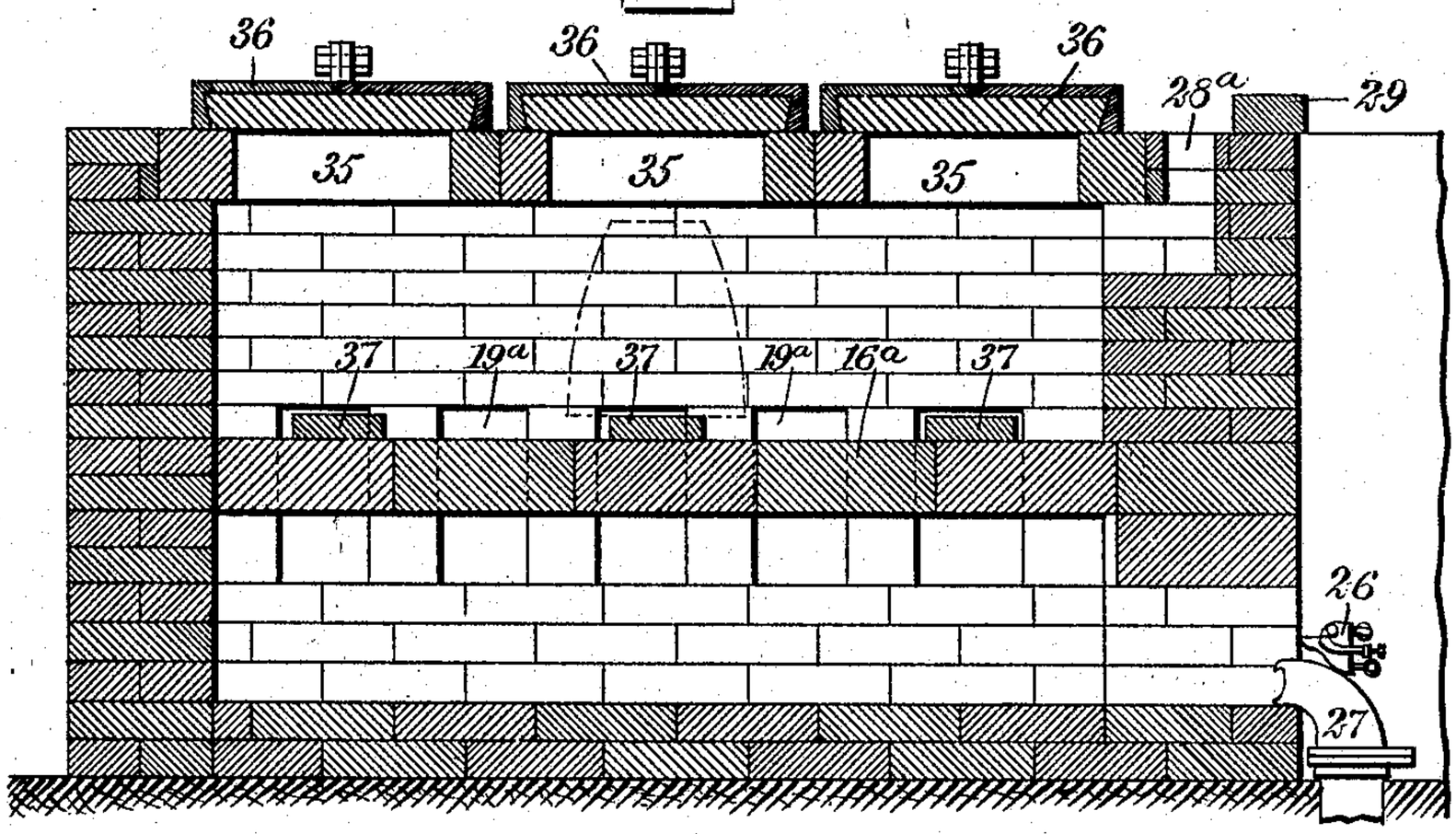


Fig. 4.



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FURNACE FOR UNIFORMLY HEATING METALS.

936,856. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed November 27, 1908. Serial No. 464,529.

To all whom it may concern:

Be it known that I, WILLIAM NEWTON BEST, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Furnace for Uniformly Heating Metals, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in furnaces adapted for use in heating forgings, castings, or in the melting of metals, and the object of the invention is to so construct the furnace that the temperature of all the parts of the heating chamber will be the same. In my improved furnace it is entirely immaterial whether a piece of metal be placed in one end of the furnace or the other, as the temperature is uniform throughout the heating space. I accomplish this object by delivering the gases of combustion to the furnace beneath the supporting floor thereof and admit them to the heating space above the floor through a plurality of separate entrance openings.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a vertical longitudinal section through a furnace constructed in accordance with my invention; Fig. 2 is a top plan view thereof; Fig. 3 is a vertical transverse section; and Fig. 4 is a vertical longitudinal section showing a slightly modified form of furnace.

The exterior walls of my improved furnace may be constructed in any suitable manner, so as to withstand the extremely high temperatures and to prevent the radiation of an excessive amount of heat. In the specific form illustrated, I provide an outer shell or casing formed of channel irons 10 having their flanges bolted or riveted together, and inside of this casing I provide thick side walls 11 of highly refractory material. The side walls support an arched roof 12 which terminates adjacent an end wall 13, and between the side walls at the bottom is a floor 13ª. The interior of the furnace is subdivided into a heating chamber 14 adapted to receive the articles to be heated, and a heat-distributing chamber 15 directly below the same. The two chambers are separted by a horizontal partition or floor 16 which directly supports the articles to be heated and is itself heated by the exposure of the under side to the heat-distributing chamber below. The floor 16 is supported upon inner side walls 17 substantially parallel to the main side walls 11 but spaced therefrom. This space is subdivided by vertically-extending blocks 18, so as to leave vertical passageways 19 extending upwardly between the edge of the floor 16 and the side walls. These passageways 19 communicate with the heating chamber through openings 20 in the walls 17 but above the lower edges of the latter. The passageways 19 communicate at their upper ends with the interior of the heating chamber 14 and the gases are deflected outwardly from the passageways 19 by lining blocks 21 resting upon the tops of the spacing blocks 18.

At one end of the furnace there is provided a combustion chamber 22, substantially triangular or fan-shaped in horizontal section and having its inner end of nearly the same width as the distributing chamber 15 and communicating therewith. The combustion chamber may be formed by parallel top and bottom walls 23 and converging side walls 24 extending out beyond the outer surface of the end wall 13 and held in place by a metal reinforcing casing 25. At the outer end of the combustion chamber there is disposed a burner from which the flame and gases of combustion enter the combustion chamber and spread out or diverge to the entire width of the distributing chamber. The combustion chamber is centrally located and as the gases emerge therefrom they pass along the several entrance openings 20 in the inner side walls 17 and thence upwardly through the passages 19 to the main heating chamber. The floor 16 is heated from the under surface and the interior of the furnace is heated by the large number of streams of flame or gases of combustion entering laterally along the sides. Any suitable form of burner or fuel may be employed at the outer end of the combustion chamber, but I preferably employ a burner 26 of the type shown in my previous patent No. 752,195, granted February 16, 1904, and in which a liquid fuel is vaporized by a stream of compressed air or steam, and the combustion facilitated by the admission of a further supporter of combustion delivered through a lower pipe 27. The liquid fuel is vaporized and spread out in substantially a fan-shaped stream

nearly filling the combustion chamber, and the oxygen or oxygen-bearing gas admitted through the pipe 27 converts the vapor into a sheet of flame which travels along the distributing chamber and through the various openings into the heating chamber.

The arched roof 12 may be provided with suitable outlet openings or ports 28, through which the inert gases may escape from the furnace, and the size of these openings may be readily controlled by closures in the form of blocks 29 of refractory material which may be slid over the corresponding openings. In delivering air through the conduit 27 to support combustion, it is necessary that the ports 28 be opened to a considerable extent as only approximately twenty per cent. of the air has any value in facilitating the combustion, the remaining eighty per cent. being nitrogen, an inert gas.

My improved furnace is especially adapted for the use of oxygen gas, one-fifth as much of which need be employed as is required of air. When oxygen is used, the ports 28 may be partially closed. The articles to be heated may be admitted to the furnace in any suitable manner, but, as shown, I provide a charging door 30 of a width substantially equal to the width of the heating chamber and adapted to fit between the side walls 11 at one end of the arched roof. The closure may have a lining 31 of refractory material and an outer metal casing 32. The closure is preferably provided with a peep-hole 33, and at the outer surface of the furnace and substantially in alinement with the upper surface of the floor 16, there is preferably provided a shelf or ledge 34 upon which articles may be supported prior to insertion in the furnace.

In using my improved furnace the atomizing agent passing through the burner and the auxiliary air or oxygen blast, are increased or decreased until an adjustment is secured whereby an even distribution of heat in the furnace is attained and maintained. In case steam is used as a vaporizing agent, it is necessary to admit a greater quantity of air or oxygen through the conduit 27 than is required in case compressed air is used as an atomizer. I do not wish to be limited to the particular burner shown or even to the use of liquid fuel, as it is evident that a gaseous fuel or pulverized coal may be used and good results obtained.

The furnace may be used for heating ladles used in brass and foundry practice, or for the melting of metals with low melting points, such as lead, zinc, solder and the like. When the furnace is to be used for this purpose I preferably admit the ladles to be heated through openings in the top of the furnace rather than through an end charging door. In Fig. 4 I have shown a furnace very similar in most respects to the furnace shown in Figs. 1, 2 and 3, but the top or roof is provided with charging openings 35 through which the ladles may be admitted and each charging opening has its own closure 36. The outlet port 28ª for the inert gases is preferably formed in one end of the furnace and preferably the same end that has the combustion chamber and gas nozzles. The partition or floor 16ª which separates the heating chamber from the distributing chamber, is preferably provided with blocks 37 upon which the ladles or crucibles may be placed so that they will be uniformly heated. The passages 19ª, through which the gases are admitted from beneath the floor 16ª, are preferably elongated rather than square, so that the heat will be distributed more evenly against the lower portions of the ladles.

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

1. A furnace for heating metals having a heating chamber, a distributing chamber beneath the same and separated therefrom by a horizontally-disposed floor or partition, a row of passages extending vertically and disposed along opposite edges of the partition, baffles within said heating chamber and directly above said passages for deflecting the gas from said passages across the upper surface of said partition, and means for delivering flame and gases of combustion lengthwise of the distributing chamber and along the lower ends of said vertical passages.

2. A furnace for heating metals having a heating chamber, a distributing chamber beneath the same and separated therefrom by a horizontally-disposed floor or partition, a row of passages extending vertically and disposed along opposite edges of the partition, baffles within said heating chamber and directly above said passages for deflecting the gas from said passages across the upper surface of said partition, means for delivering flame and gases of combustion lengthwise of the distributing chamber and along the lower ends of said vertical passages, a burner disposed adjacent one end of said distributing chamber, and means for delivering oxygen to said combustion chamber below said burner.

3. A furnace for heating metals having walls inclosing a heating chamber, auxiliary walls within said first-mentioned walls, a floor or partition supported by the inner walls and forming therewith a heat distributing chamber, vertically-disposed blocks for sub-dividing the space between the main walls and the auxiliary walls into a plurality of vertically-disposed passages communicating at their lower ends with the distributing chamber, and baffle blocks within the heating chamber above the plane of

said partition and resting upon the upper ends of said vertically-disposed blocks and serving to deflect the gases, rising through said passages, across the floor or partition, and means adjacent one end of the distributing chamber for delivering flame and gases of combustion longitudinally thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM NEWTON BEST.

Witnesses:

EVERARD B. MARSHALL,

CLAIR W. FAIRBANK.