

(No Model.)

H. H. GARRETT.

GAS FURNACE FOR MELTING METAL IN CRUCIBLES.

No. 343,122.

Patented June 1, 1886.

Fig. 1.

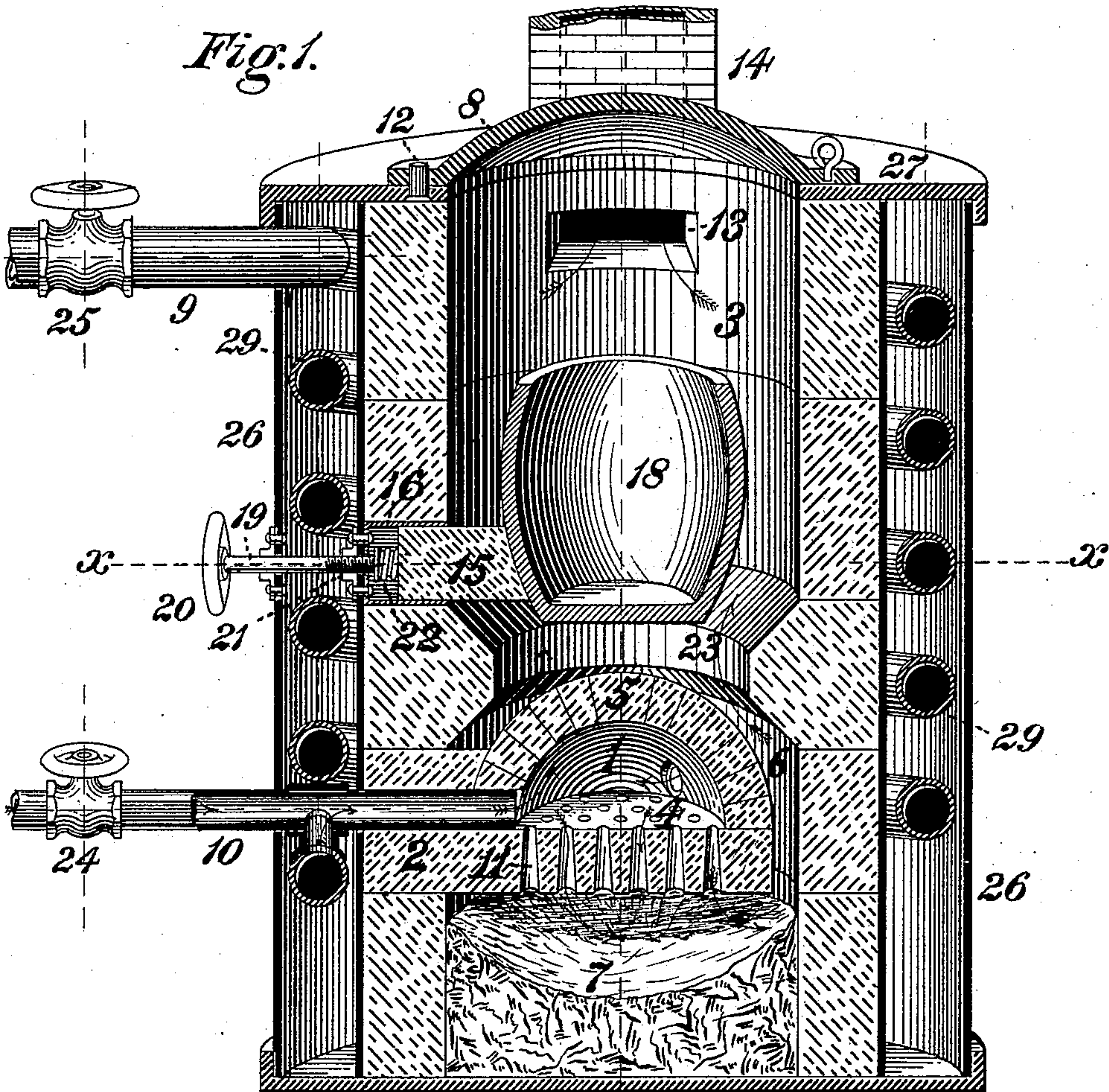


Fig. 2.

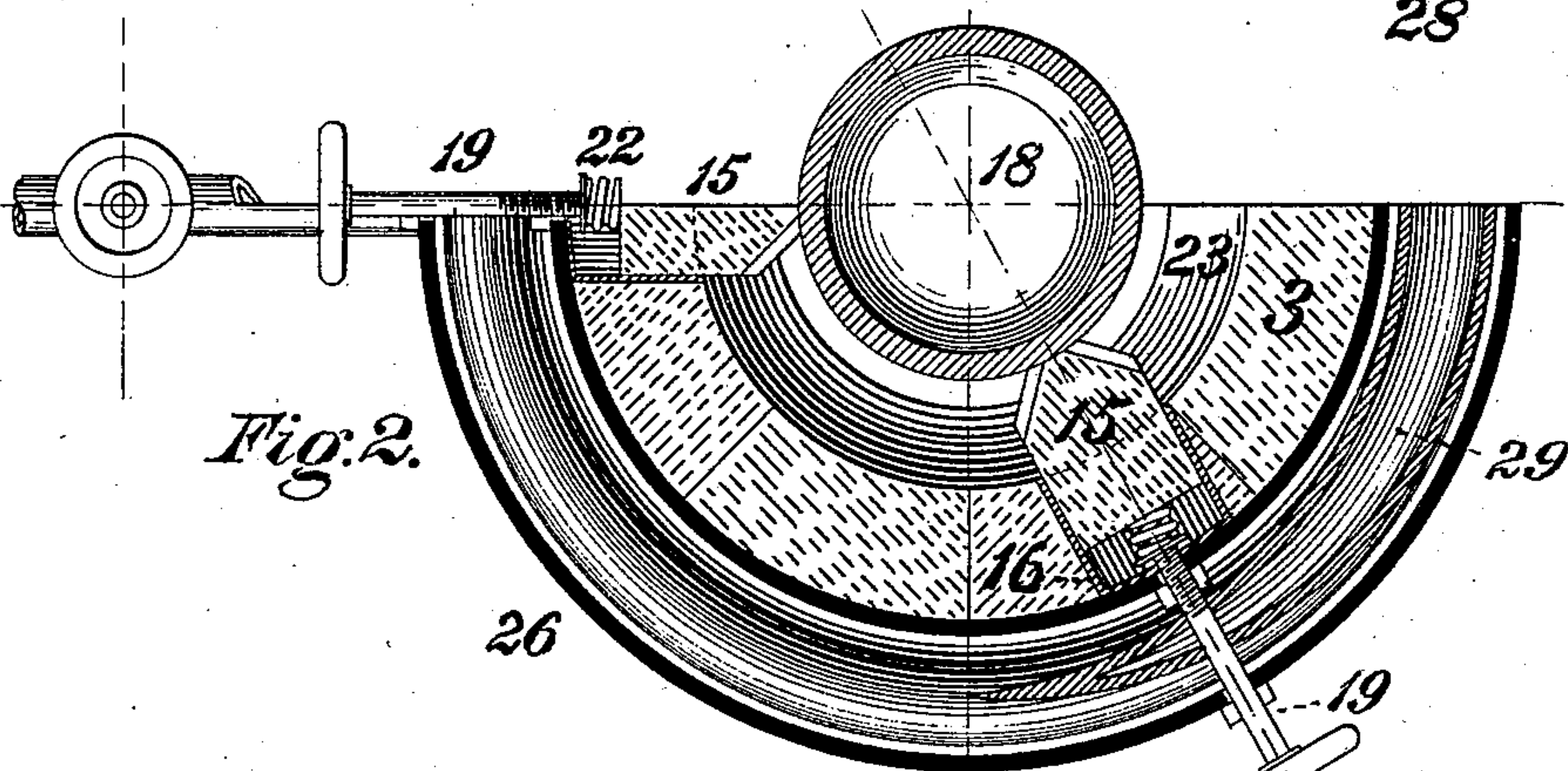
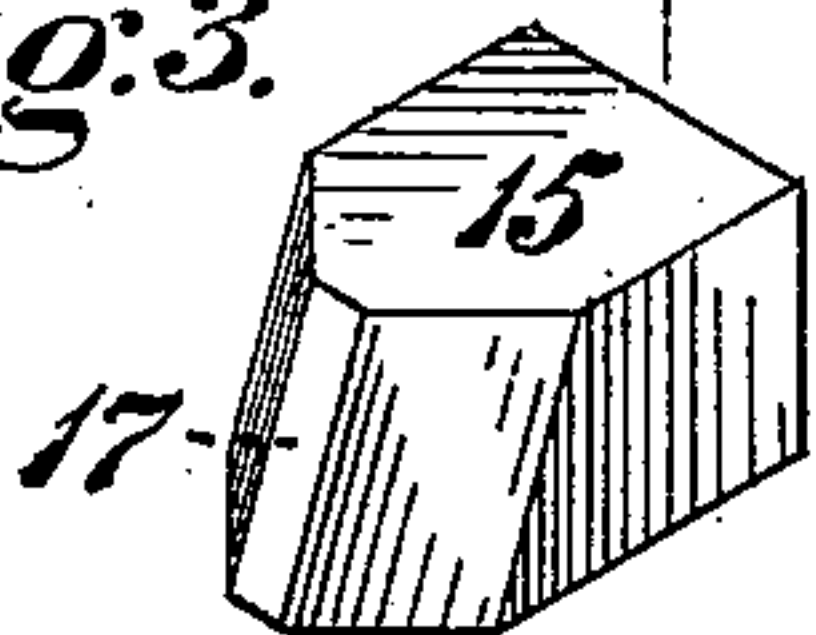


Fig. 3.



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GAS-FURNACE FOR MELTING METAL IN CRUCIBLES.

SPECIFICATION forming part of Letters Patent No. 343,122, dated June 1, 1886.

Application filed November 27, 1885. Serial No. 184,023. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. GARRETT, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Gas-Furnaces for Melting Metals in Crucibles, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a vertical central section in perspective through a furnace embodying my invention; Fig. 2, a horizontal section through the same at the line x of Fig. 1, and Fig. 3 a view in perspective of one of the crucible-supports.

The object of my invention is to provide a furnace of simple and inexpensive construction, designed more particularly for the use of gaseous fuel, in which the melting of brass or iron may be conveniently and desirably effected in pots or crucibles; to which end my invention, generally stated, consists in the combination, with a melting-chamber having a lower hearth and an upper discharge-flue, of a series of supports of refractory material, movable and adjustable radially to the axis of the furnace, and having narrow vertical faces or edges adapted to fit against the outside of a melting-pot or crucible and projecting into the melting-chamber above its hearth; also, in the combination of a melting-chamber, a perforated burner or combustion-chamber located in the lower portion thereof, a series of crucible-supports projecting into the melting-chamber above the combustion-chamber, one or more gas-supply pipes leading into the combustion-chamber, an air-heating jacket surrounding the melting-chamber, and an air-heating pipe passing through said jacket and communicating with the gas-supply pipe or pipes.

The improvements claimed are hereinafter more fully set forth.

In the practice of my invention I provide a vertical melting-chamber, 3, which is of substantially cylindrical form and is composed of plates of metal lined with a suitable thickness of fire-brick or other analogous refractory material. The melting-chamber is closed at its lower end by a hearth or bottom, 7, formed

of or covered with sand or fire-clay, and at top by a removable cap or door, 8, which is preferably journaled upon a pin or pivot, 12, so that it may be readily swung aside to afford a clear opening for the insertion and removal of the crucibles in which the charges of metal are melted, as from time to time required. A discharge flue or passage, 13, leads from the melting-chamber, near its top, into a chimney, 14.

As illustrated in the drawings, and as presently to be described, the furnace is designed for and provided with suitable appliances for the use of gaseous fuel; but, if desired, a grate may be placed above the bottom, and coke or other solid fuel be employed.

In furnaces of the ordinary construction for melting brass or iron in pots or crucibles the objection obtains, to a greater or less degree, that the means employed for supporting the crucibles are such as to prevent a thorough and effective application of heat thereto by reason of the heated gases being excluded by the supports from contact with the whole or a large portion of the bottoms of the crucibles. Under my invention I obviate this objection by the provision of a series of lateral crucible-supports, 15, formed, by preference, of blocks of fire-brick, which are fitted as guides or casings, 16, in the wall of the melting-chamber radially to its axis, and are provided upon their inner ends with narrow edges or faces 17, adapted to fit against the outside of the melting-pot or crucible 18, and curved or inclined in conformity therewith, the crucible resting in and being supported laterally by the downwardly curved or tapering seat formed by the inner edges or faces, 17, of the supports 15. Adjusting-screws 19, having hand-wheels 20 on their outer ends and engaging nuts 21 in the wall of the melting-chamber 3, bear against the outer ends of the supports 15, and thereby serve to hold the crucible firmly in position between the same, and to obviate risk of undue strain or breakage by reason of expansion under increase of temperature, relieving-springs 22 may be interposed between the outer ends of the supports and the adjacent ends of the adjusting-screws, the elasticity of said springs prevent-

ing injury to the crucible or supports that might otherwise result, either by one or more of the adjusting-screws having been brought to an unduly tight bearing or by expansion of the parts by the heat of the furnace.

In the utilization of gaseous fuel in the furnace, a mixing-chamber of any suitable description, provided with a series of burner-openings, is located in the melting-chamber below the crucible-supports, and is supplied with gas and air in proper relative proportions. I employ, by preference, as in the instance illustrated, a mixing and burner chamber, 1, substantially similar to that set forth in Letters Patent No. 329,827, granted and issued to me under date of November 3, 1885, said chamber being composed of fire-brick or other refractory material, and being supported upon a series of fire-brick piers, 2, in the lower portion of the furnace. The chamber 1 is, as in Letters Patent No. 329,827 aforesaid, included between a floor, 4, perforated by a series of burner or discharge passages, 11, and an arched roof or crown, 5, sprung upon said floor and rising from the periphery thereof, and the melting-chamber 3 is provided with a contracted or reduced throat above the chamber 1, formed by an inwardly-projecting ring or collar, 23, so as to deliver the heated products of combustion which rise through segmental passages 6 between the chamber 1 and the wall of the melting-chamber 3 directly against the bottom and sides of the crucible. One or more gas-supply pipes, 10, receiving gas from a well or main or other suitable source of supply, is led into the chamber 1, each of said pipes, which are provided with regulating-valves 24, passing through one of the piers 2, on which the chamber is supported, and having a free discharge into the chamber. A proper proportion of air under pressure is delivered from a fan or blower to the chamber 1 through an air-supply pipe, 9, provided with a regulating-valve, 25, and communicating with each of the gas-supply pipes 10.

In order to increase the intensity and effectiveness of the combustion of the gas, I provide for the utilization of heat radiated from the furnace in heating the supply of air prior to its admixture with the gas. To this end the melting-chamber is surrounded by a heater-jacket, 26, which is closed at top and bottom by the cap and base plates 27 28, and an air-heating pipe, 29, which, for the purpose of affording as large an amount of area of heating-surface as practicable, is made in the form of a series of coils or return-bends, is inclosed within the space between the jacket and the outside of the melting-chamber. The air-heating pipe 29 communicates at top with the air-supply pipe 9 and at bottom with each of the gas supply pipes 10, and the air is delivered to the latter at the materially increased temperature due to its exposure to the heat radiated from the melting chamber in its passage through the pipe 29.

My improvements present a furnace which

is desirably adapted to the melting of brass or of charges of iron less in quantity than those which can be cast economically from a cupola-furnace.

The means employed for supporting the melting-pots enable the heat to be effectively applied thereto, and a more perfect combustion of gaseous fuel is attained by the utilization of heat which would otherwise be entirely wasted.

I am aware that a series of fire-clay segments fitted to abut at their ends one against the other, and having arms which slide in vertical grooves in the wall of a laboratory-furnace, has been heretofore employed as a support for crucibles. Such construction, which is hereby disclaimed, differs from that included in my invention in the particulars, that the several segments are incapable of adjustment to accommodate crucibles of different dimensions, and that they continuously surround the crucible and prevent the direct access of heat to a corresponding portion of its surface.

I claim herein as my invention—

1. The combination, in a furnace, of a melting-chamber having a lower hearth or bottom and an upper discharge-flue, and a series of supports of refractory material, each fitted in a horizontal guideway or casing in the wall of the melting-chamber, and having a narrow vertically-inclined inner face or edge adapted to fit against a melting-pot or crucible, and projecting into the melting-chamber above the hearth thereof, substantially as set forth.

2. The combination, in a furnace, of a melting-chamber having a lower hearth or bottom and an upper discharge-flue, a series of supports of refractory material, each having an inner face or edge adapted to fit against a melting-pot, and fitting freely in horizontal guideways or passages in the wall of the melting-chamber, and a series of adjusting-screws, each bearing against the outer end of one of the crucible-supports, substantially as set forth.

3. The combination, in a furnace, of a melting-chamber, substantially as described, a series of lateral crucible-supports having narrow vertically-inclined faces or edges adapted to slide radially to the axis of the chamber, adjusting-screws for pressing said supports against the lateral surface of a melting-pot or crucible, and relieving-springs interposed between the crucible-supports and adjusting-screws, substantially as set forth.

4. The combination, in a furnace, of a melting-chamber, a gas-burner chamber located in the lower portion thereof, gas and air supply pipes leading into said chamber, and a series of lateral crucible-supports fitted to slide radially to the axis of the furnace, and projecting into the melting-chamber between the gas-burner chamber and an upper discharge-flue, substantially as set forth.

5. The combination, in a furnace, of a melting-chamber, a gas-burner chamber located

in the lower portion thereof, gas and air supply pipes leading into said chamber, a series of lateral crucible-supports fitted to slide radially to the axis of the furnace, and projecting into the melting-chamber between the gas-burner chamber and the upper discharge-flue, and a contracted throat or passage formed by a ring or collar projecting inwardly from the wall of the melting-chamber between the gas-burner chamber and the crucible - supports, substantially as set forth.

6. The combination, in a furnace, of a melting-chamber, a gas-burner chamber located therein, one or more gas-supply pipes leading

into said burner-chamber, a closed jacket surrounding the melting-chamber, and an air-heating pipe composed of a series of coils or bends inclosed in the space between the jacket and melting-chamber, and communicating at its ends with an air-supply pipe and with the gas-supply pipe or pipes, respectively, substantially as set forth.

In testimony whereof I have hereunto set my hand.

HENRY H. GARRETT.

Witnesses:

J. SNOWDEN BELL,
W. B. CORWIN.