No. 827,166. PATENTED JULY 31, 1906.

J. V. MARTIN.

FURNACE.

APPLICATION FILED OCT. 26, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

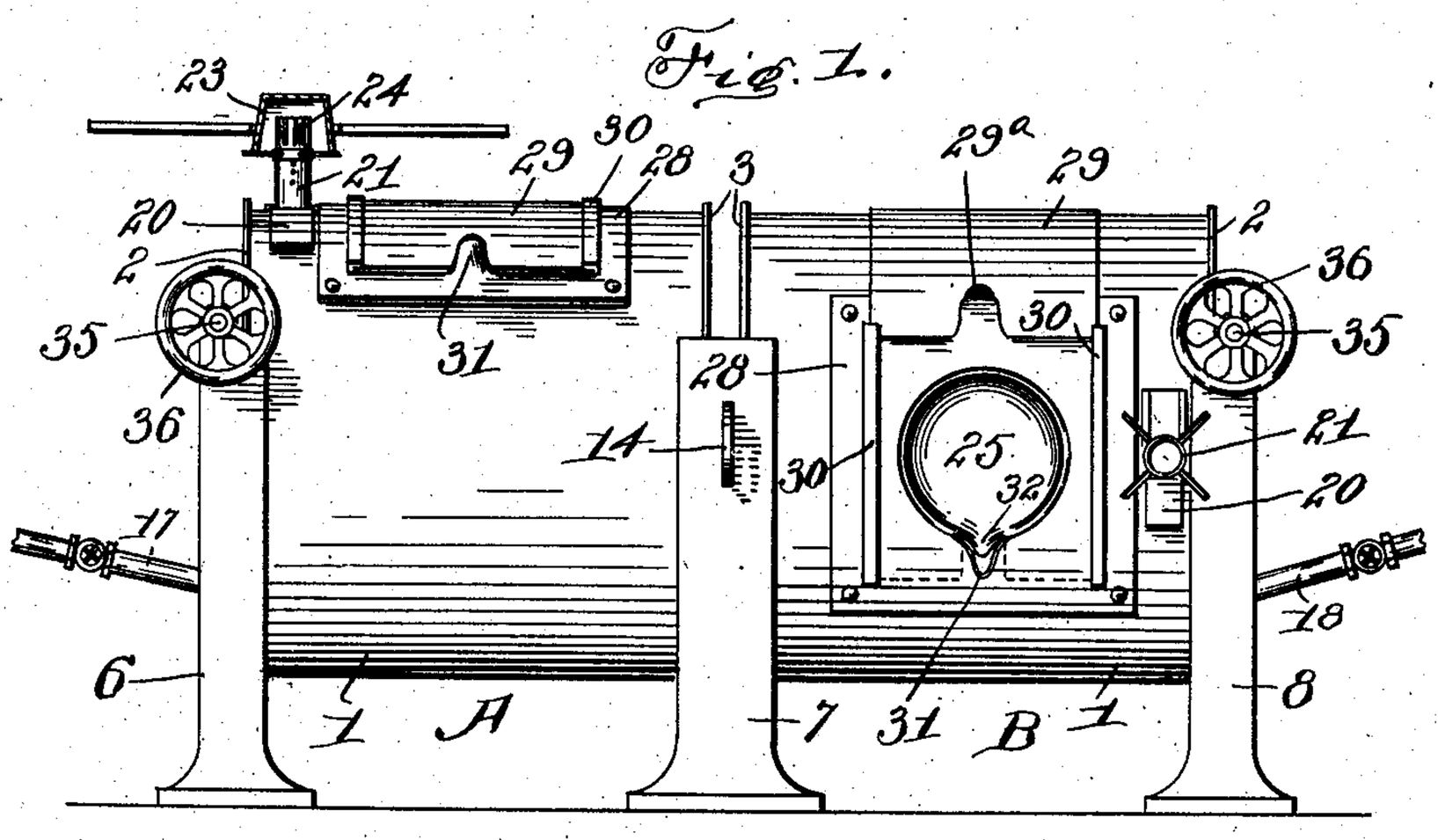
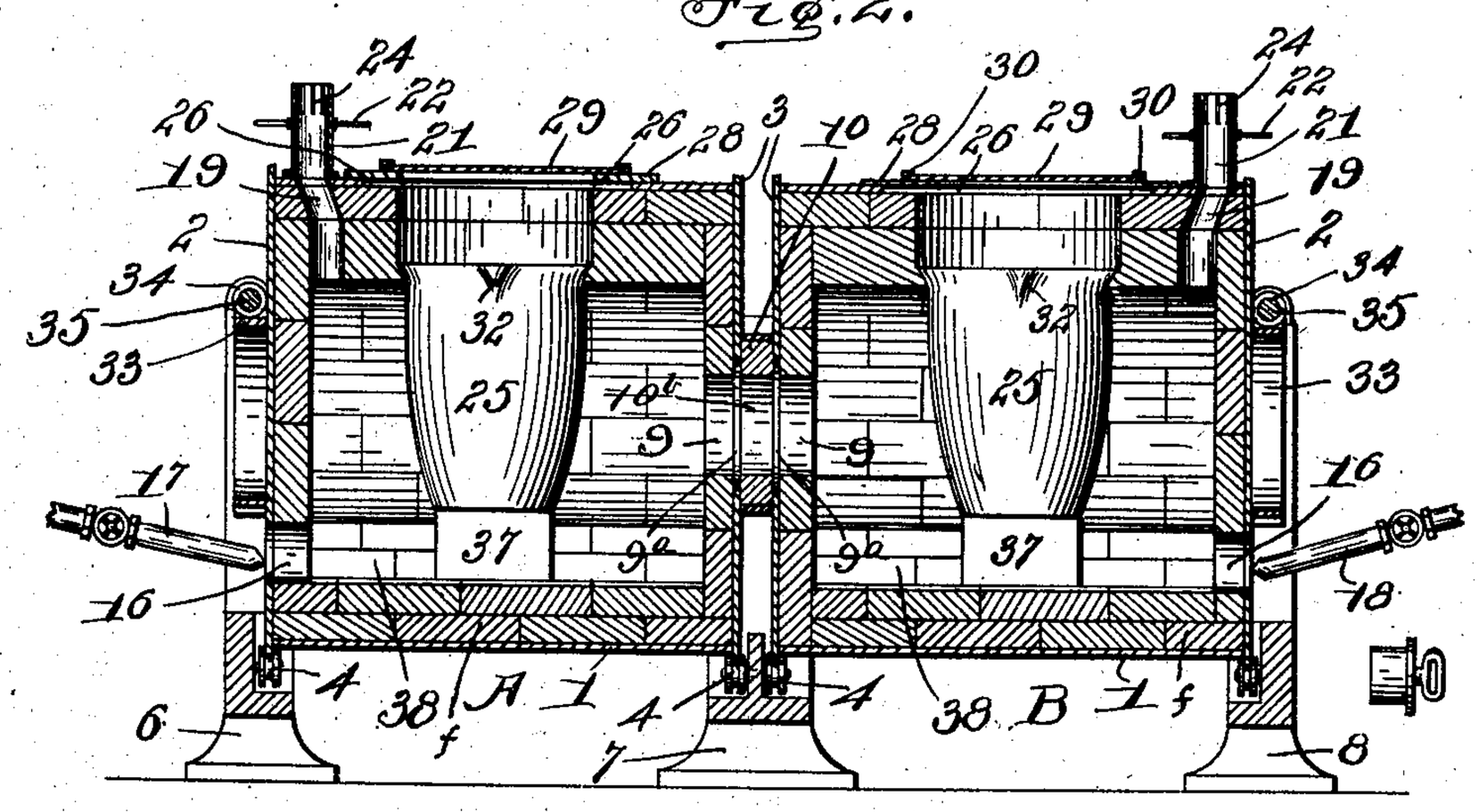


Fig. 2.



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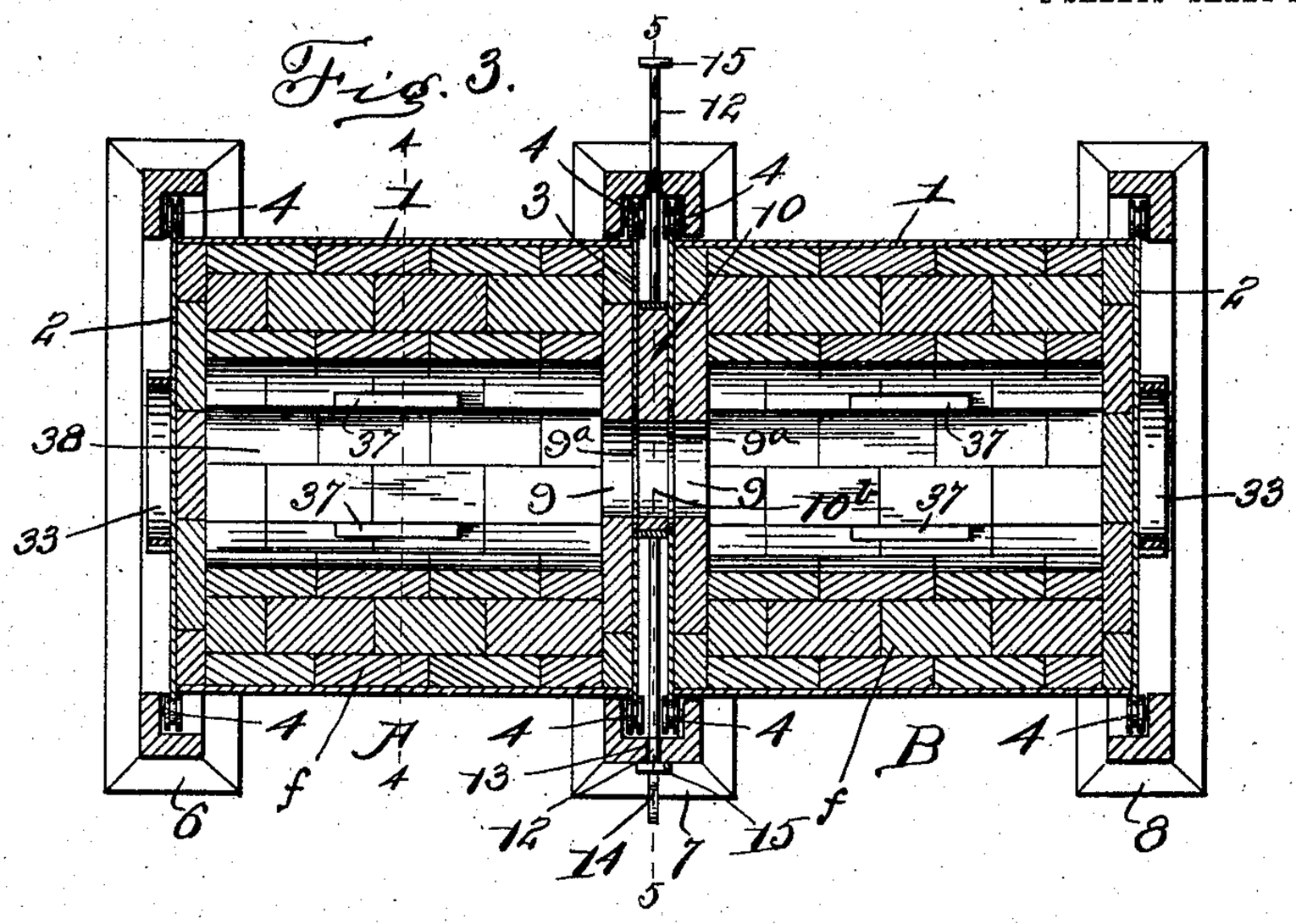
2 SHEETS—SHEET 2.

Fig. 3.



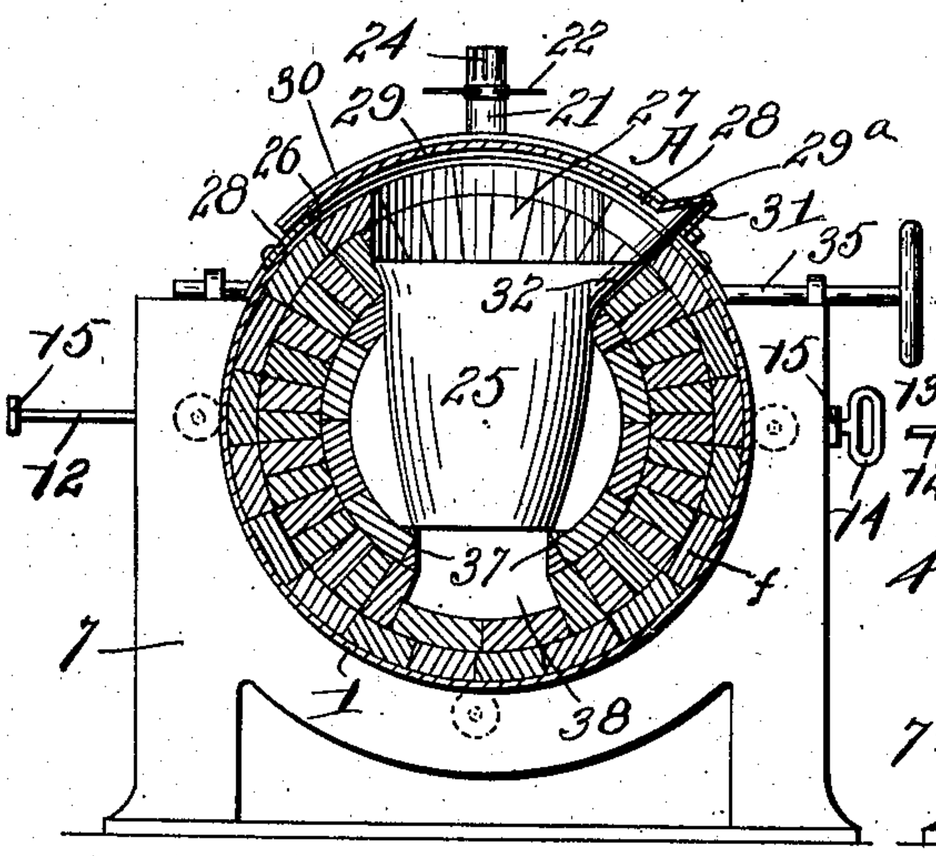


Fig. 4.

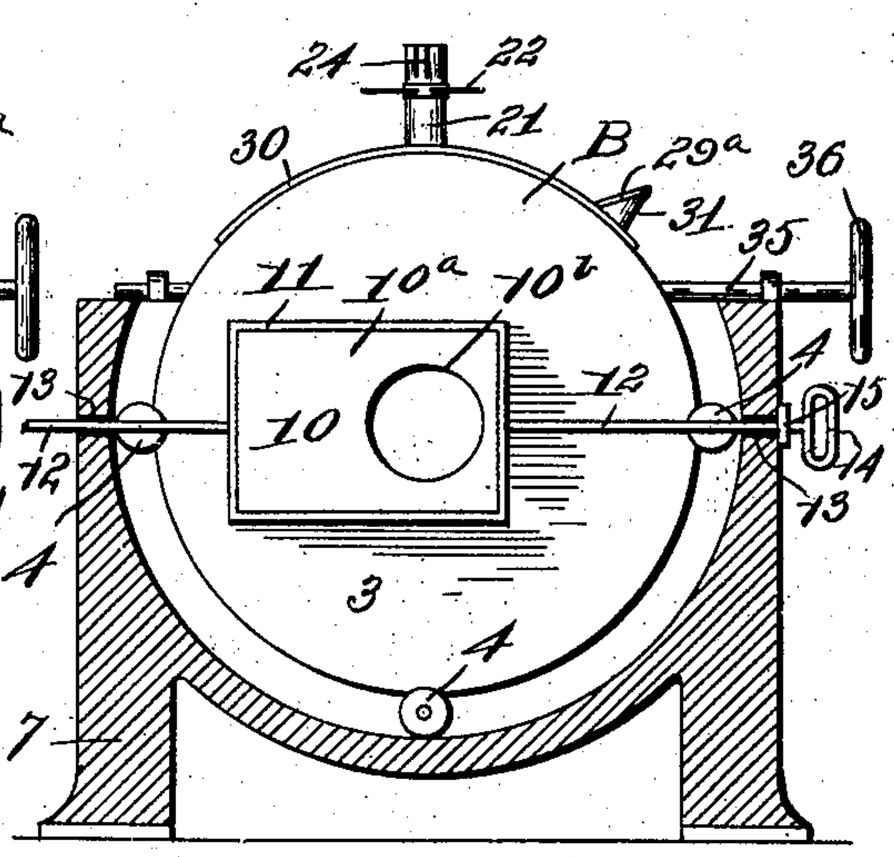


Fig. 5.

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FURNACE.

No. 827,166. Specification of Letters Patent. Patented July 31, 1906.

Application filed October 26, 1905. Serial No. 284,548.

To all whom it may concern:

Be it known that I, JAMES V. MARTIN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

The object of this invention is to provide a furnace for melting metal in crucibles by means of which the heat supplied to the furnace may be utilized to the greatest extent and time and labor may be saved in melting and handling the metal.

The invention comprises a furnace in several independently-rotatable sections, the details of which will be pointed out in the following specification, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a furnace in two sections, one of the sections being turned into the position for pouring metal from the crucible within it. Fig. 2 is a longitudinal vertical section through the furnace, both crucibles being in upright position. Fig. 3 is a central horizontal section through the furnace with the crucible removed. Fig. 4 is a section on the line 4 4 of Fig. 3, and Fig. 5 is a section on the line 5 5 of Fig. 3.

Referring to the drawings, A and B indicate two similar furnaces, arranged end to end and independently rotatable about a common axis. As the furnaces are each alike in construction, a description of one will apply to both. Each furnace comprises a cylindrical metal shell 1, having metal heads 2 and 3 and an interior lining of fire-brick or other refractory material *f*. The heads 2 and 3 are of slighly-greater diameter than the cylindrical wall 1, and the peripheries of these heads form circular guides or tracks which fit within grooves in a suitable number of roller-bearings 4, the latter being suitably journaled upon yokes or standards 6, 7, and 8, arranged at the ends of the sections A and B of the furnaces. The yoke 7, as shown, has guide-rollers for each furnace-section. Central openings 9 are arranged in the adjacent ends of the furnaces in line with one another, and a gate 10 is provided between the furnaces for opening and cutting off communication between the two furnace-sections. This gate, as shown in Fig. 5, consists of a plate 10^a of refractory material having a circular opening 10^b of the same diameter as the openings 9, and this plate is surrounded by a metal band 11, to the ends of which are attached the guide-rods 12, which extend through suitable bearings 13 in the yoke 7. One of these guide-rods is provided with a handle 14, by means of which the gate or valve may be opened or closed. In Figs. 2, 3, and 5 the gate is shown with the opening 10^b registering with the openings 9. By pulling the gate to the right in Fig. 5 it will be evident that the gate will cut off communication between the furnace-sections. Stops 15 on the ends of the rods 12 limit the movements of the gate. The gate slides in contact with the metal heads 3, and the metal band 11 upon the gate does not come in contact with the flames passing through the opening 9. The circular openings 9^a in the heads 3 are also larger than the openings in the brick, so that the metal of the heads does not come in direct contact with the flame.

Fuel-inlet openings 16 are provided in the lower parts of the outer ends 2 of the furnace-sections, through which oil or other fuel may be fed by suitable means, (indicated by the reference-numerals 17 and 18.) Each furnace-section is also provided with an outlet-opening 19 at the top adjacent to the head 2, and these openings may be closed by suitable sliding dampers 20. Each damper 20 has a pipe 21 connected thereto, so that when the damper is moved to uncover the opening 19 the pipe 21 will register with the opening. Each pipe is provided with a vertically-adjustable support 22, upon which the ladle 23 for carrying the molten metal may be supported, as shown in Fig. 1, in order to heat the ladle prior to pouring the molten metal into it. Preferably vertical slots 24 are made in the pipe, so as to permit the flames to flow out freely and against the inner wall of the ladle.

Each furnace-section has a crucible 25 arranged diametrically therein and suitably held in place by the brickwork. The shell 1 has a large opening 26 extending around a smaller opening 27 in the brick lining. A removable plate 28 is secured to the shell 1 and partly covers the opening 26, and a sliding cover 29 is arranged within guides 30 on the removable plate and is adapted to close the opening in said plate.

The purpose in providing the large opening

26 in the shell is to facilitate access to the brick lining for the purpose of repairs when necessary, and the purpose of the sliding cover 29 is to permit the crucible to be charged with metal through the opening 26 in the shell and the opening 27 in the brick lining. A lip 31 upon the removable plate 28 projects outwardly in line with the pouring-spout 32 of the crucible, so as to carry the molten metal beyond the side of the furnace when the latter is tilted into the pouring position. (Indicated at the right side of Fig. 1.) The projection 29[a] on the cover 29 extends over this lip or spout 31 and closes the same when said cover is in closed position. The upper flaring edge of the crucible fits closely within the opening 27 of the furnace-lining and prevents the escape of heat and flame past the end of the crucible. Each furnace-section has a worm-wheel 33 at its outer end, which is engaged by a worm 34 upon a worm-shaft 35, the latter being rotatable by means of a hand-wheel 36. The worm-wheel shafts are suitably mounted in the end supports 6 and 8, respectively. The furnace-sections are independently rotatable by means of these worm-gears and worms.

The bottoms of the crucibles are supported at the sides upon brickwork projections 37, and channels 38 are provided in the brickwork, so that the flames and heat may pass below the crucibles.

Each furnace-section is in itself a complete furnace. As will be evident, if the gate 10 is closed and fuel injected through the burner in one of the sections the flames passing first beneath the crucible will flow up around its sides and, returning through the upper portion of the furnace, will pass out through the opening 19. During the heating of the metal the ladle 23 is placed upon the support 22 and the heat passing from the furnace heats the ladle, so that it may be used without chilling the metal when the molten metal is poured from the crucible. In order to pour the metal from the crucible, it is only necessary to slide the cover 29 back and then operate the worm-wheel 36 until the furnace is rotated into the desired position for pouring, as indicated at the right in Fig. 1. While pouring, a suitable shield may be placed over the pipe 21 to deflect the flames from the operator, if the fuel is constantly injected into the furnace during the pouring operation.

When it is desired to melt more than one charge of metal or charges of different kinds of metal, the two furnaces are used together. When this is done, the valve or gate 10 is opened and the damper 20 is closed on the furnace into which the fuel is directly injected and the corresponding damper of the other furnace is opened, so that the flames and heat from one furnace will pass through and out of the other furnace. For instance, when fuel is injected through the burner 17 into the furnace-section A the damper 20 on said section is closed and the pipe 21 on section B is brought into register with the opening 19. The intense heat in the furnace-section A will melt the metal within the crucible in said section, and the heat flowing from the section A into the section B will heat a fresh charge of material in the crucible in section B before passing out through the discharge-opening 19 and pipe 21 of said section. The heat in passing out through said pipe heats the ladle, which is then supported upon the pipe. When the metal in the crucible of section A is ready for pouring, the fuel-supply may be cut off from the supply-nozzle 17, and the nozzle 18 may then be opened to admit fuel to the section B. Before opening the nozzle 18 the valve 20 of section B is closed and the pipe 21 of section A is brought into register with the opening 19, so that the flames and heat then flow in the reverse direction through the section B and then through the section A, and the charge of metal in the crucible of section B, which had been previously heated, is quickly melted. After the molten metal has been poured from the crucible in section A said crucible is then recharged, and thus while the metal in section B is melting the metal in section A becomes heated, and the ladle, which is then placed over the pipe 21 of section A, also becomes heated for the next pouring operation.

When fuel is being injected through one of the openings 16, the other opening will of course be closed by a suitable cap or block P. (Shown at the right of Fig. 2.)

The liquid fuel is injected downwardly against the hearth which forms the base of the channel 38, extending beneath the crucible. It will be seen that the greater portion of the bottom of the crucible is exposed to the intense heat, owing to the fact that it is supported only at the sides and bridges over the channel 38. The flames also pass in close contact with the sides of the crucible.

Any suitable form of supply-nozzle may be used for feeding fuel to the furnace, and any suitable fuel may be employed.

It is obvious that more than two furnace-sections may be connected and operated together, if desired.

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

1. A furnace for melting metals, comprising a horizontally-arranged cylindrical metal casing having metal heads and an interior lining of refractory material, said casing and lining having an opening, for the insertion of a crucible, through its cylindrical wall, and said lining having a channel therein opposite said opening and extending longitudinally of the cylinder; a crucible having its upper end fitting within and closing said opening and having its lower end extending over the chan-

nel and supported by the lining at opposite sides of the channel, said furnace having a fuel-inlet opening at one end of said channel and having an outlet-opening above the inlet-opening and at the same end of the furnace, and means for rotating said furnace about its horizontal axis.

2. A sectional furnace for melting metals comprising two horizontally-arranged and independently-rotatable cylindrical metal casings having communicating passage-ways in their adjacent ends, each of said casings having an interior lining of refractory material and having an opening, for the insertion of a crucible, through its cylindrical wall, each section also having a channel in its lining opposite said opening, said channels extending longitudinally of the cylinders; crucibles arranged diametrically within the sections and having their upper ends fitting within and closing said openings and their lower ends extending over the channels, the bottoms of the crucibles being supported by the linings at opposite sides of the channels, each section having also, at one end of the channel in its lining, a fuel-inlet opening, and having at the same end of the section, a fuel-outlet opening above said inlet-opening, and means for cutting off communication between said sections.

3. A furnace for melting metal comprising a cylindrical metal casing having metal heads and a suitable interior lining of refractory material, said casing having in its lower portion a fuel-inlet opening and in its upper portion an outlet-opening, a pipe or tube adapted to register with said outlet-opening and means connected with said pipe for supporting a ladle.

4. A furnace for melting metal comprising a cylindrical metal casing having metal heads and a suitable interior lining of refractory material, said casing having in its lower portion a fuel-inlet opening and in its upper portion an outlet-opening, a damper adapted to close said outlet-opening and a pipe or tube connected to said damper and adapted to register with said outlet-opening when the damper is opened.

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

JAMES V. MARTIN.

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JNO. WATSON, Jr.