July 28, 1925. 1,547,872

C. E. HAWKE

CRUCIBLE MELTING FURNACE

Filed March 25, 1925

Fig. 1.

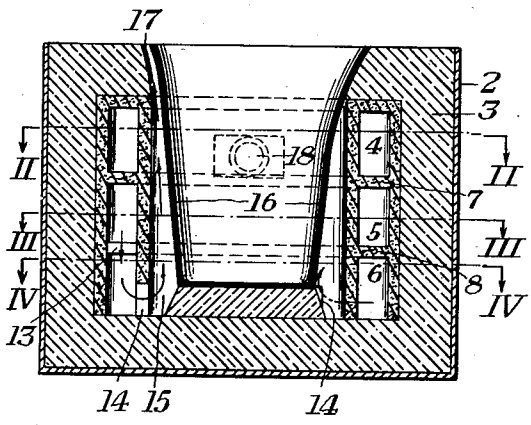


Fig. 2.

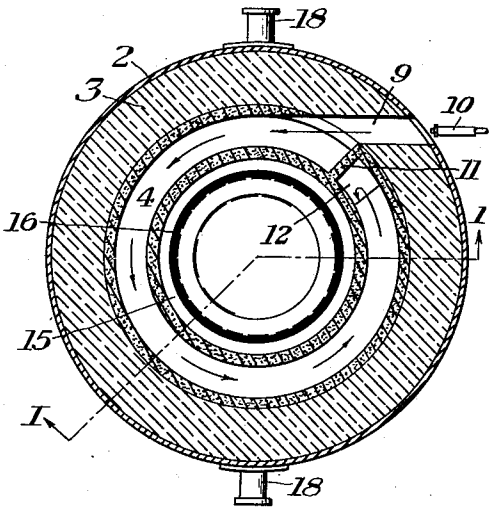


Fig. 3.

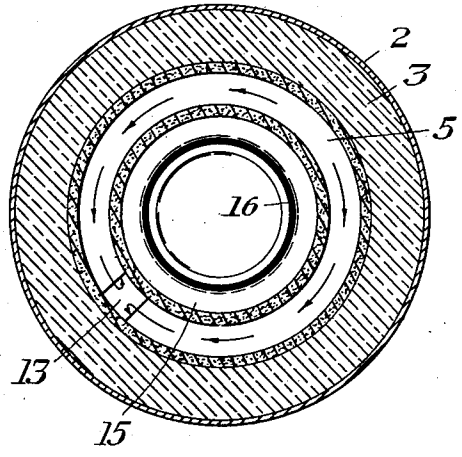
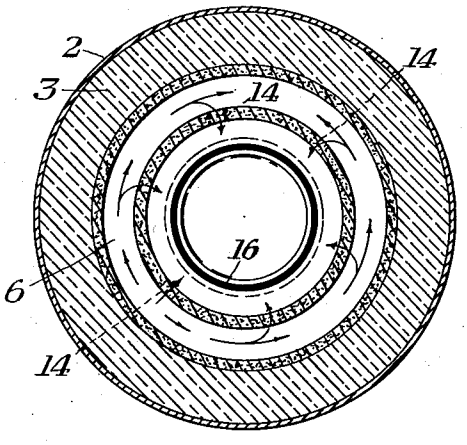


Fig. 4.



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UNITED STATES PATENT OFFICE.

CLARENCE E. HAWKE, OF METUCHEN, NEW JERSEY, ASSIGNOR TO THE CARBORUNDUM COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF PENNSYLVANIA.

CRUCIBLE MELTING FURNACE.

Application filed March 25, 1925. Serial No. 18,154.

To all whom it may concern:

Be it known that I, CLARENCE E. HAWKE, a citizen of the United States, residing at Metuchen, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Crucible Melting Furnaces, of which the following is a full, clear, and exact description.

The present invention relates to furnaces for melting metal, and more particularly to crucible melting furnaces. The object of the invention is to provide an efficient furnace of the latter type wherein the principle of radiation for heating the crucible is employed and wherein direct flame impingement on the crucible is prevented.

A preferred embodiment of the invention is shown in the accompanying drawings wherein—

Figure 1 is a central vertical section of a crucible melting furnace, the section being taken on the line I—I of Figure 2, and

Figures 2, 3 and 4 are sectional plan views of the furnace, the sections being respectively taken on the lines II—II, III—III and IV—IV of Figure 1.

The furnace shown in the illustrated embodiment of the invention comprises an outer shell 2 of steel having a lining 3 of refractory and heat insulating material, such as fire clay. Within this outer lining is placed a system of horizontal circular flues 4, 5 and 6 the walls of which are constructed of highly refractory material capable of radiating heat freely. I prefer to use for this purpose silicon carbide refractory material. The flues are separated from each other by horizontal partitions 7 and 8. A port 9 extends through the wall of the furnace for the admission of the burning gases into the upper flue 4, a burner 10 being arranged opposite this port. It will be seen that the partition 7 constitutes a plate upon which the burning gases impinge upon entering the flue 4. Silicon carbide is particularly adapted for the construction of this plate as this material is highly refractory and has high mechanical strength.

A vertical partition 11 in the flue 4 adjacent the admission port 9 compels the burning gases to travel in one direction through said flue, as indicated by the arrows in Figure 2, until they reach a port 12 in the partition 7 adjacent the partition 11. This port admits the gases to the flue 5, through which they travel in opposite directions, as indicated by the arrows in Figure 3, until they reach a port 13 in the partition 8. The port 13 admits the gases to the flue 6 through which they travel in opposite directions, as indicated by the arrows in Figure 4. The gases pass from the flue 6 through ports 14 into the inner chamber 15 of the furnace, in which is located the crucible or melting pot 16.

The gases, by the time they reach the inner chamber 15 of the furnace, have been completely burned and thus flame impingement on the crucible itself is prevented. These hot gases, however, pass up through the space between the crucible and the radiating surface of the combustion flue construction and are discharged at the top through suitable openings around the top of the crucible, one of said openings being shown in Figure 1 and designated by the reference numeral 17.

The furnace is provided with trunnions 18 whereby it is adapted to be mounted to tilt for the discharge of the metal melted within the crucible so that the pot or crucible is not taken from the furnace, said pot or crucible being firmly built into place within the heating chamber of the furnace.

It will be seen that I have provided a crucible melting furnace wherein the crucible is heated both by radiation and by direct contact of the hot gases therewith. The flue construction compels the burning gases to make several passes about the heating chamber before they are admitted to the lower end of the latter so that the gases are completely burned before they come into contact with the crucible. Flame impingement on the crucible is thus prevented whereby the life of the crucible is increased an appreciable amount. This method of heating also effects a better utilization of the heat of the fuel employed and a more uniform heating of the crucible.

While I have shown and described a preferred embodiment of my invention, it will be understood that the invention is not limited to its illustrated embodiment but that it may be otherwise embodied within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. A crucible melting furnace having a refractory lining, a flue system within said lining, certain of the walls of which are formed of refractory material adapted to radiate heat freely and which constitute the side walls of a chamber for receiving the crucible, and a crucible within said chamber, said flue system communicating with said chamber adjacent its lower end and having an admission port for burning gases adjacent the upper end of said chamber, substantially as described.

2. A crucible melting furnace having a refractory lining, a flue system within said lining, certain of the walls of which are formed of refractory material adapted to radiate heat freely and which constitute the side walls of a chamber for receiving the crucible, and a crucible within said chamber, said flue system communicating with said chamber adjacent its lower end and having an admission port for burning gases adjacent the upper end of said chamber, said flue system comprising a plurality of intercommunicating flues each extending substantially completely around said chamber, whereby the gases are compelled to travel a plurality of times about said chamber before being admitted thereto, substantially as described.

3. A crucible melting furnace having a refractory lining, a flue system within said lining, certain of the walls of which are formed of refractory material adapted to radiate heat freely and which constitute the side walls of a chamber for receiving the crucible, and a crucible held within said chamber, said flue system communicating with said chamber adjacent its lower end and having an admission port for burning gases adjacent the upper end of said chamber, said furnace having means whereby it is adapted to be mounted to tilt for the discharge of the metal melted within the crucible, substantially as described.

4. A crucible melting furnace having a refractory lining, a flue system within said lining, certain of the walls of which are formed of silicon carbide and which constitute side walls of a chamber for receiving the crucible, and a crucible within said chamber, said flue system communicating with said chamber adjacent its lower end and having an admission port for burning gases adjacent the upper end of said chamber, substantially as described.

5. A crucible melting furnace having a refractory lining, a silicon carbide flue system within said lining, certain of the walls of which constitute side walls of a chamber for receiving the crucible, and a crucible within said chamber, said flue system comprising a plurality of superposed intercommunicating horizontal flues each extending substantially completely around said chamber, the upper flue having an admission port for burning gases and the lower flue communicating with said chamber at the lower end thereof, whereby the gases are compelled to travel a plurality of times about said chamber before being admitted thereto, substantially as described.

6. A crucible melting furnace, comprising a cylindrical outer metal shell having trunnions whereby the furnace is adapted to be mounted to tilt for the discharge of the metal melted within the crucible, a refractory lining within said shell, a silicon carbide flue system within said lining, certain of the walls of which constitute the side walls of a chamber for receiving the crucible, and a crucible fixed within said chamber, said flue system comprising a plurality of superposed intercommunicating horizontal circular flues each extending substantially completely around said chamber, the upper flue having an admission port for burning gases and the lower flue communicating with said chamber at the lower end thereof, whereby the gases are compelled to travel a plurality of times about said chamber before being admitted thereto, substantially as described.

In testimony whereof I have hereunto set my hand.

CLARENCE E. HAWKE.