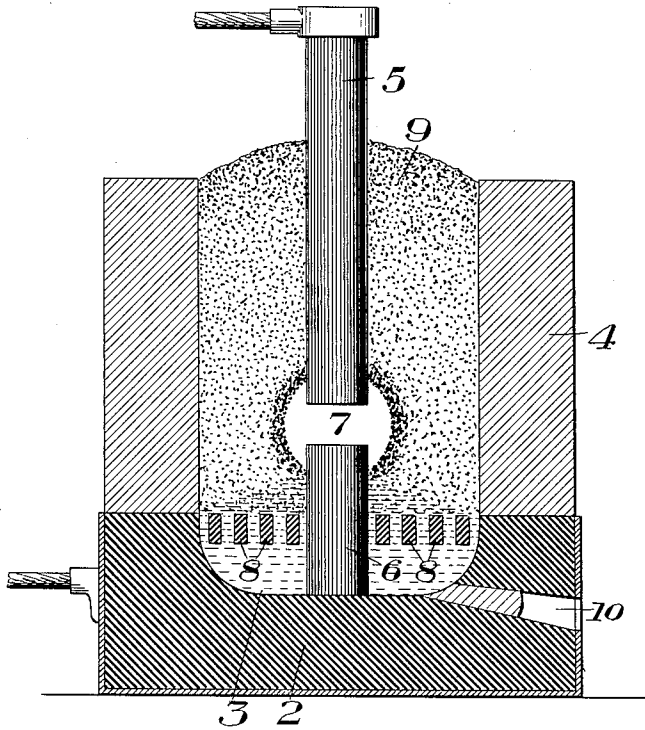


F. J. TONE.
ELECTRIC FURNACE.
APPLICATION FILED DEC. 12, 1907.

932,069.

Patented Aug. 24, 1909.



WITNESSES

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UNITED STATES PATENT OFFICE.

FRANK J. TONE, OF NIAGARA FALLS, NEW YORK.

ELECTRIC FURNACE.

932,069.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed December 12, 1907. Serial No. 406,158.

To all whom it may concern:

Be it known that I, FRANK J. TONE, of Niagara Falls, Niagara county, New York, have invented a new and useful Electric Furnace, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, in which the figure is a sectional side elevation showing one form of an electric furnace constructed in accordance with my invention.

My invention relates to the smelting of refractory ores or materials in an electric furnace and especially to the reduction of these highly unfusible ores where it is desirable to remove the products of reaction from the reduction zone to a point more remote from the arc. In the reduction of many ores, if the products of reaction are allowed to accumulate in the vicinity of the arc, its intense heat will tend to volatilize them, causing a considerable loss of the metal or product.

My invention provides an improved furnace which will more effectually support the charge and separate the products of reaction therefrom while taking the products out of the reduction zone or arc region.

To that end the invention consists in an electric furnace having a supporting hearth which is pervious to the products of reaction, with a collecting space or receptacle beneath this hearth.

It also consists in such a hearth which is substantially impervious to the charge.

In the drawings, in which I have shown one form of furnace constructed in accordance with my invention, 2 represents the base of the furnace which is shown as constituting one terminal. This is preferably composed of carbon or other conducting refractory material and is preferably hollowed out to form a receiving space 3 for the molten products of the furnace.

Side walls 4 of the furnace proper are preferably of non-conducting refractory material.

5 is the upper electrode which depends within the furnace and constitutes the other terminal, this preferably being of carbon.

6 is the lower electrode which rests upon the central part of the carbon base, the arc being maintained through the region 7 between the upper and lower electrodes. This electrode consists of a column of carbon or other conductive refractory material which

is so formed as to give resistance to the passage of the current, and therefore heat the reduced products after they leave the reduction zone.

The charge rests upon a hearth 8 which extends over the collecting receptacle within the terminal 2 and in the form shown is composed of horizontally extending carbon bars which are suitably supported in or on the side walls. These bars are spaced apart a proper distance to allow the molten products to drop between the hearth so formed, while this hearth supports the charge and is practically impervious thereto. The charge is indicated at 9 and preferably fills the space around the upper electrode. The intermediate hearth is placed between the reduction zone of the arc and the receiving space at the base, and is sufficiently elevated above the base to give a receptacle of the desired size. From this receptacle the product may be tapped out through the tap-hole 10.

In the operation of the furnace, the reducing operation may be carried out in the ordinary manner, the charge being supported upon the hearth, through which the products drop from the reduction zone into the receiving space. The products are thus not liable to be contaminated by the charge which is kept apart by the hearth which supports it. The products are removed from the reduction zone and the vicinity of the arc, and descend by gravity through the hearth into the collecting space, whence they are tapped as desired.

This hearth construction is applicable to either arc or resistance furnaces and to arc furnaces of different types, such as those having two depending electrodes, or two horizontally extending electrodes.

The shape and form of the supporting hearth and the size of its perforations may be varied without departing from my invention.

I claim:—

1. An electric furnace having an arc reduction zone, a receiving space below said zone for the collection of the molten products and a hearth located between the reduction zone and said receiving space, said hearth supporting and being substantially impervious to the charge but pervious to the molten products of reduction, and said arc having as a lower electrode a resistance column which is adapted to heat the reduced products after they leave the reduction zone.

2. An electric furnace having an arc reduction zone, a receiving space below said zone for the collection of the molten products and a hearth located between the reduction zone and said receiving space, said hearth supporting and being substantially impervious to the charge but pervious to the molten products of reduction, and said arc having as a lower electrode a resistance col-

umn extending through the receiving space 10 and adapted to heat the products of reduction.

In testimony whereof, I have hereunto set my hand.

FRANK J. TONE.

Witnesses:

CHARLES CHORMANN,
FRED I. PIERCE.