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ELECTRIC FURNACE FOR FUSING METALS CONTAINED IN CRUCIBLES.

APPLICATION FILED NOV. 30, 1918.

1,308,880.

Patented July 8, 1919.

2 SHEETS—SHEET 1.

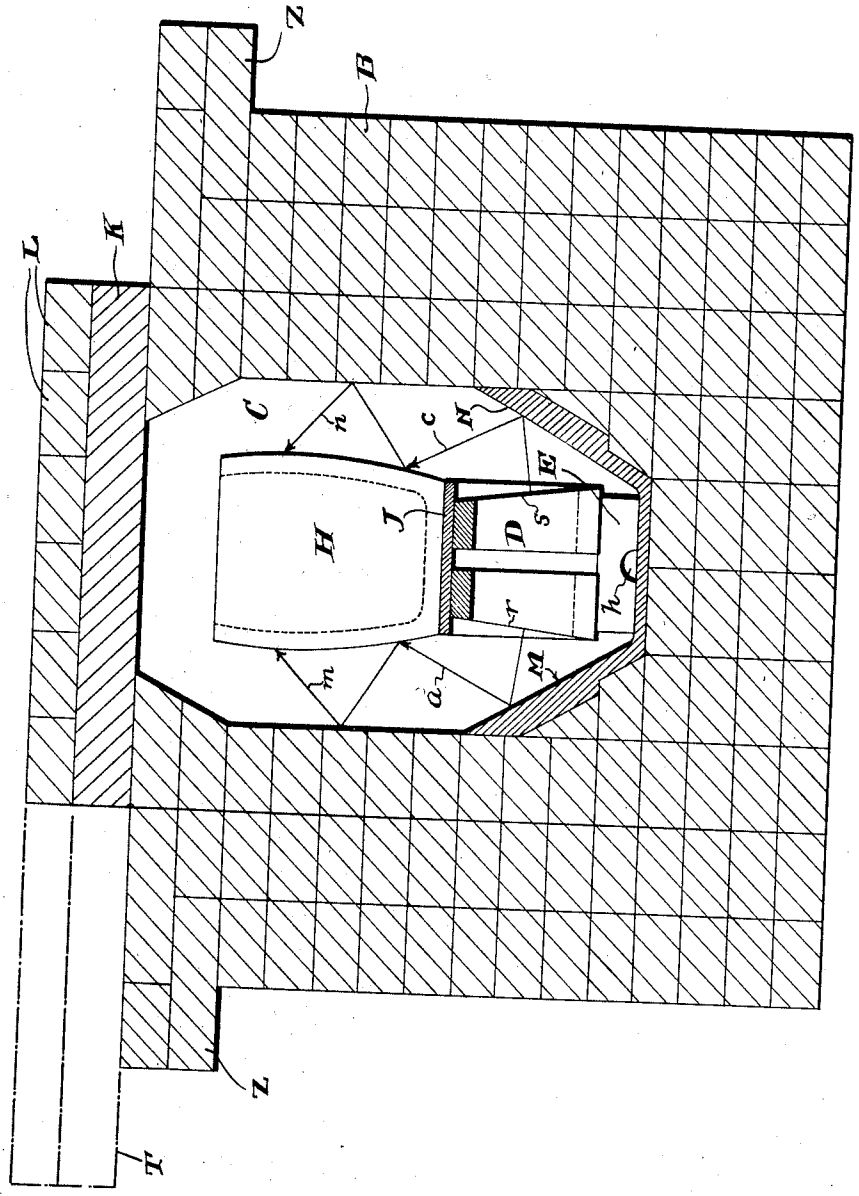


Fig. 1.

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BY

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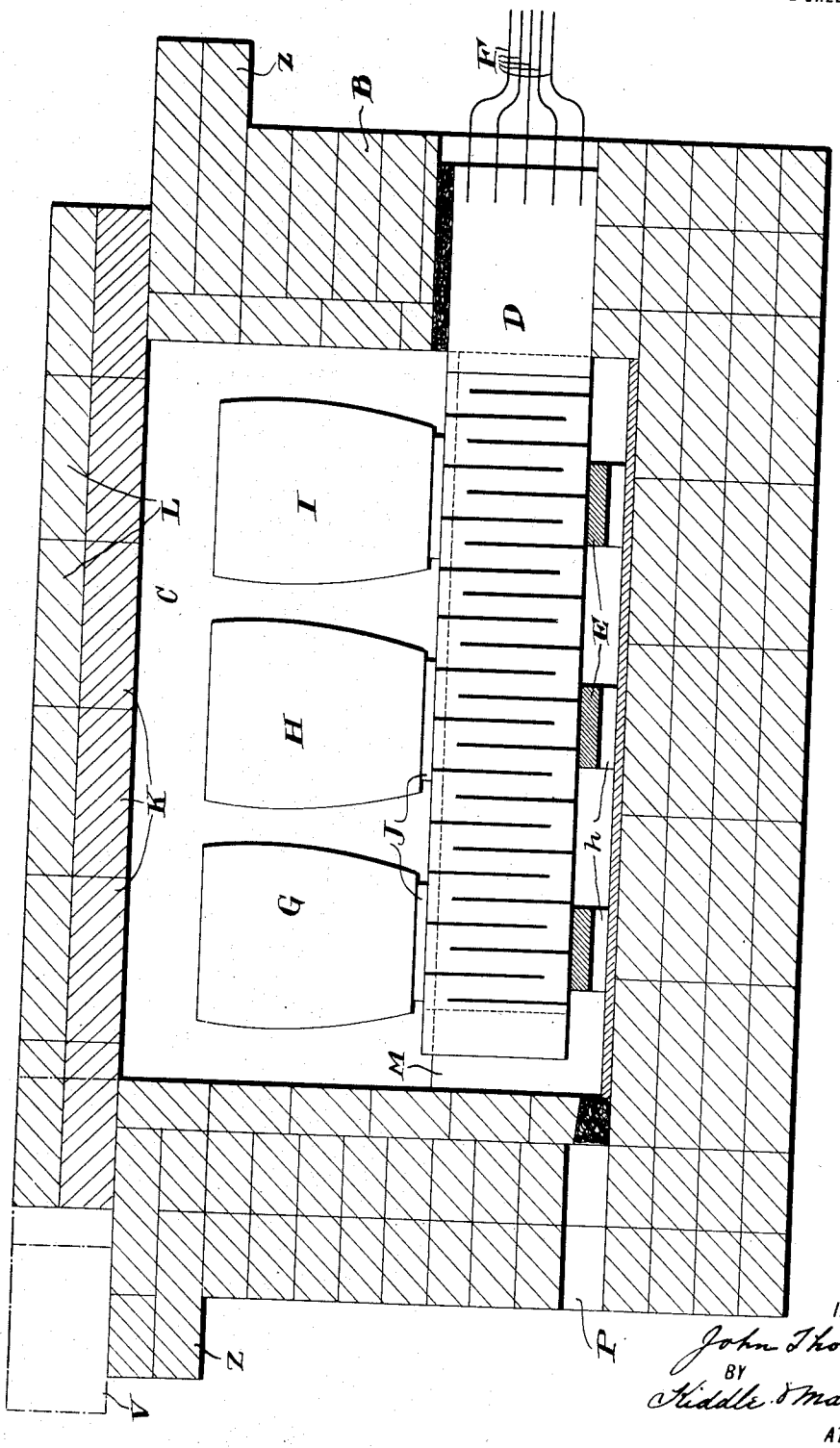


Fig. 2.

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JOHN THOMSON, OF NEW YORK, N. Y.

ELECTRIC FURNACE FOR FUSING METALS CONTAINED IN CRUCIBLES.

1,308,880. Specification of Letters Patent. Patented July 8, 1919.

Application filed November 30, 1918. Serial No. 264,771.

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, and a resident of the borough of Manhattan, city of New York, county and State of New York, have invented certain new and useful Improvements in Electric Furnaces for Fusing Metals Contained in Crucibles, of which the following is a specification.

This is an invention in electric furnaces for fusing metals contained in crucibles.

The thermal element of the furnace is a carbon resistor of the zig-zag type, and among the objects to be attained the following may especially be mentioned: high thermal efficiency; the utmost simplicity; low cost of construction; increased endurance in the crucibles relative to those employed in fuel fired chambers and maintenance of the modes of manipulation usual in established foundry practice.

An effective embodiment of the invention is depicted in the accompanying drawings, constituting a part of this specification, in which—

Figure 1 is a transverse center section of the furnace and

Fig. 2 is a longitudinal center section thereof.

In the furnace, B, is a rectangular chamber, C, and disposed along the bottom thereof is a carbon, zig-zag resistor, D, preferably supported on blocks, E, whose terminals, as F, are connected in the usual manner to a power-circuit, which it has not been deemed necessary to here illustrate.

An ordinary crucible, or a plurality thereof, as G, H, I, are set upon the resistor, either in direct, physical contact therewith or upon interposed refractory plates, as J. The top of the chamber is inclosed in any suitable manner as by means of slabs, K, upon which bricks, as L, may be stacked to obtain an adequate heat insulation.

The distinctly preferable design of resistor for the present mode of functioning is that in which one of its faces has a higher current-density than the opposite face, whereby the connecting sides are vertically inclined, as *r*, *s*. Thus, in the present mode of use, the surface of higher density is at the top, upon which the crucibles either directly or indirectly rest. As a consequence thereof, that portion of the resistor in which the highest temperature is developed impinges upon the bottoms of the crucibles.

The lower sides of the chamber are sloped, as M, N, the determining angle thereof being such as to upwardly and inwardly refract the heat which flows from the sloped sides of the resistor, as denoted by the arrows *a*, *c* and *m*, *n*.

It might well be supposed, at first thought, that when the so-called graphite crucibles of commerce are set upon the resistor various of its zig-zag limbs would be short-circuited; but such is not the case, to any objectionable extent, the reason being that normal "graphite" crucibles contain such a considerable portion of clay that their electric resistance is much greater than the practically pure carbon resistor. Yet, when the short-circuiting, or shuntage, might be detrimental, as when employing crucibles machined from blocks of graphetized carbon, the interposed plates, J, would then be formed from refractory material non-conductive to electricity. As these plates may be quite thin, they interpose but nominal obstruction to transfer of heat; they also serve to protect the resistor from abrasive action, when inserting or removing the crucibles.

Should a crucible fracture, whereby its charge would escape, provision is made to quickly evacuate it, without injuring the resistor, by forming openings, as *h*, in the supporting blocks, E, and providing an emergency tap, as P, in an end-wall of the chamber.

Inspection of Fig. 1 will clearly denote that the transfer of heat to the crucibles is highly effective, by direct conduction to the bottoms thereof and by various refractions to their sides and the upper reaches of the chamber.

In many alloys, such as brass, it is desirable to plunge the zinc-content into a crucible after the copper has been fused; and it may also be desirable to "pole", or mix, the composite charge prior to removing the crucible from the furnace. Both of the foregoing features can readily be realized, according to time-honored practice, by simply sliding one or more of the cover slabs, K, to one side or the other, as denoted in the broken lines T and V.

To conserve the heat stored in the inner surfaces of the slabs, when thus slid to one side, the upper portion of the furnace is provided with an over-hanging brick platform, as Z, whereby the said inner hot surfaces will not be exposed to atmosphere.

Claims:

1. An electric furnace for fusing metals contained in a crucible, comprising a chamber, a zig-zag carbon resistor disposed along the bottom of said chamber to sustain the crucible, whereby heat may be transferred to the crucible by direct conduction.

2. An electric furnace for fusing metals contained in a crucible, comprising a chamber, a zig-zag carbon resistor disposed along the bottom of said chamber to sustain the crucible, the upper surface of said carbon resistor having a greater current-density characteristic than its lower surface, said resistor transferring heat to the bottom of the crucible by direct conduction.

3. An electric furnace for fusing metals contained in a crucible, comprising a chamber, a zig-zag carbon resistor disposed along the bottom of said chamber, the upper surface of said resistor sustaining the crucible, and said resistor having vertically inclined sides for the transfer of heat therefrom by refraction to the crucible and the upper portion of the chamber.

4. An electric furnace for fusing metals contained in a crucible, comprising a chamber, a zig-zag carbon resistor disposed along the bottom of said chamber to sustain the crucible, whereby heat is transferred to the bottom thereof by direct conduction, said resistor having vertically inclined sides whereby heat is transferred therefrom by refraction to the crucible and the upper portion of the chamber.

This specification signed and witnessed this 29th day of November, A. D., 1918.

JOHN THOMSON.

Signed in the presence of—
J. R. AGNEW,
H. O. WEED.