I. R. VALENTINE.
ELECTRIC FURNACE.
APPLICATION FILED MAY 12, 1917.

1,242,275. Patented Oct. 9, 1917.

Fig. 1.

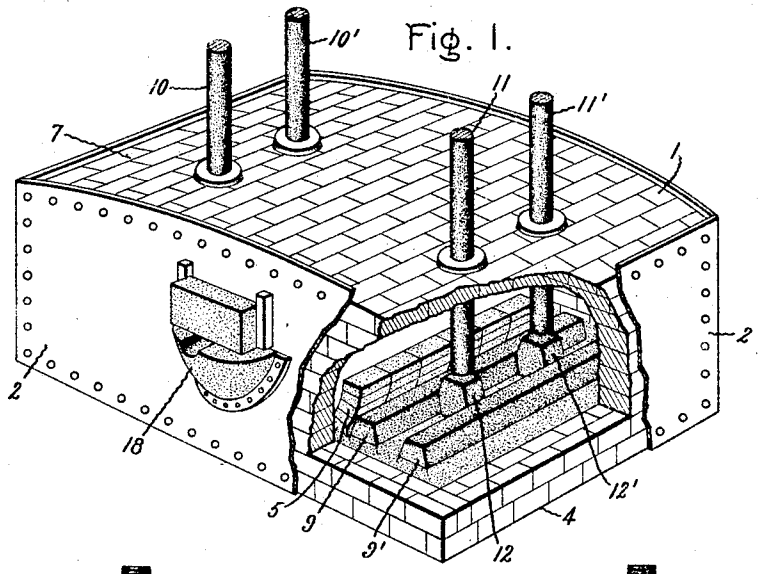
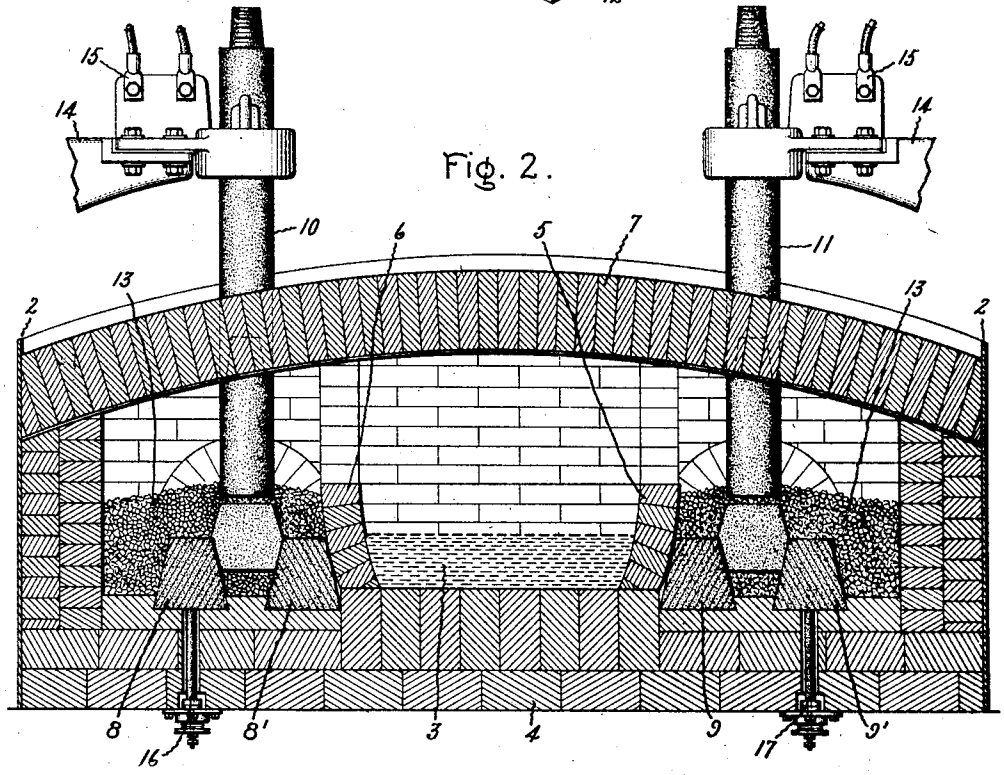


Fig. 2.



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UNITED STATES PATENT OFFICE.

IRVING R. VALENTINE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC FURNACE.

1,242,275. Specification of Letters Patent. Patented Oct. 9, 1917.

Application filed May 12, 1917. Serial No. 168,254.

To all whom it may concern:

Be it known that I, IRVING R. VALENTINE, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Furnaces, of which the following is a specification.

The present invention comprises an apparatus for the heating of metals and other materials which is particularly useful in industrial applications requiring that excessively high temperatures should be avoided, for example, the melting of brass, the annealing and tempering of steel, and the heating of metals for the purpose of forging.

In accordance with my invention, heat is generated by means of an electric arc in an inclosed space in which the materials to be heated are located but said articles are shielded from the direct heat radiation from said arc.

My invention will be set forth with greater particularity in the appended claims and a complete understanding of my invention may be had from the following description taken in connection with the accompanying drawings of which Figure 1 is a perspective view of the furnace with one end partly broken away, and Fig. 2 is a longitudinal sectional view.

As shown in both these figures, the furnace comprises a container 1 consisting of refractory material, such as fire-brick and reinforced by steel plates 2. As shown in Fig. 2, the material to be heated, such as the charge 3, is contained within a crucible constituted by the base 4 of the furnace and refractory walls 5, 6 extending upwardly from the base part way to the arched roof 7. The walls 5, 6 preferably consist of suitable heat conductive refractory material, such as carborundum brick. Upon opposite sides of the crucible and closely adjacent are paired prismatic rods 8, 8′ and 9, 9′, respectively, consisting of carbon, graphite or other suitable conductive material. Coöperating with the rods 8, 8′ and 9, 9′, respectively, are carbon or graphite electrodes 10, 10′ and 11, 11′, projecting through the roof 7 of the furnace, so that on each side of the crucible containing the charge two arcs may be maintained in series. The current passes, for example, from the electrode 11 to the rods 9, 9′, and returns by way of electrode 11′. To prolong the life of the horizontal conductor renewable blocks 12, 12′ are provided to which the arc plays. As illustrated, the blocks may have a hexagonal cross-section, the tapering sides being fitted to make a good electrical contact with the diverging sides of the rods 9, 9′, the cross-section of which is a trapezoid. When one side of a contact block becomes hollowed out or worn by the arc, it may be reversed to prolong its life. This electrode construction is not part of my invention and is described and claimed in an application Serial No. 168,270 filed May 12, 1917, by Edgar F. Collins.

To prevent the arc injuring the furnace, as well as the charge which is being heated, the arc preferably is partially smothered by surrounding the arcing electrodes with granular carbon 13. The supports 14, for the electrode and the electrical connections 15 have been indicated as broken away for the sake of simplicity. Although the furnace has been illustrated with two sets of paired electrodes located on opposite sides of the baffle walls 5, 6, it is obvious that one of the sets may be omitted if desired, likewise others may be added if desired without departing from my invention.

The voltage across the arcing electrodes may be measured by connecting suitable instruments across the respective upright electrodes, and the electrodes 16, 17, passing through the base of the furnace making electrical contact with the horizontal conductors. The charge in the furnace may be removed through a spout 18 and by tilting the furnace with suitable tilting apparatus, which is well known, and which therefore, has not been shown in the drawing.

By means of the construction shown a charge of brass, or any other material, within the central heating space is protected from the direct heat radiations from the arcs. Heat is conveyed to the charge both by conduction through the supporting walls and as the walls do not extend materially above said arcs heat is conveyed to the charge by reflection from the walls of the furnace, particularly by the arched roof. Convection currents of the gas within the furnace also assist in distributing the heat. I have found that in this way the temperature may be maintained below a value which would endanger the charge, for example, in the case of brass by volatilizing

zinc. On the other hand the use of arcs for heating possesess the advantage of flexibility and ease of control and enables currents of lower amperage and higher voltage to be used than in a resistance furnace.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electric furnace comprising a container providing a support for materials to be heated, a stationary electrode resting on the base of said container, one or more movable arc-supporting electrodes coöperating therewith, shielding means between materials to be heated and an arc between said electrodes.

2. An electric furnace comprising a container providing a centrally located hearth for materials to be heated and having an arched roof, means for operating electric arcs on opposite sides of said hearth, refractory walls located between said hearth and said arcs but not extending materially above said arcs to cut off direct heat radiation only from said arcs to the material to be heated but permitting a maximum radiation from the arcs to the sides and roof of said container.

3. An electric furnace comprising a container, providing a hearth for materials to be heated, an electrical conductor located closely adjacent said hearth, one or more movable electrodes projecting through said container and operating in arcing relation to said conductor and shielding means located between materials to be heated and an arc or arcs between said conductor and said electrodes.

4. An electric furnace comprising the combination of a container, a wall consisting of heat conductive refractory material in part dividing the space inclosed by said container, coöperating arc electrodes located on one side of said wall, materials to be heated located on the opposite side of said wall being shielded by said wall from the direct heating action of an arc between said electrodes, and a mass of granular conductive material surrounding an arcing space between said electrodes.

5. An electric furnace comprising the combination of a container, a refractory wall extending upward from the base of said container part way to the upper wall of said container a conductor located on the base of said container adjacent one side of said wall, one or more electrodes projecting through the upper wall of said container and coöperating with said base conductor to produce an arc or arcs shielded by said wall from directly radiating heat to a space on the opposite side of said wall adapted to receive material to be heated.

In witness whereof, I have hereunto set my hand this 11th day of May 1917.

IRVING R. VALENTINE.