A. HELFENSTEIN.

ELECTRIC FURNACE.

APPLICATION FILED JUNE 5, 1912.

1,069,252.

Patented Aug. 5, 1913.

FIG. 2

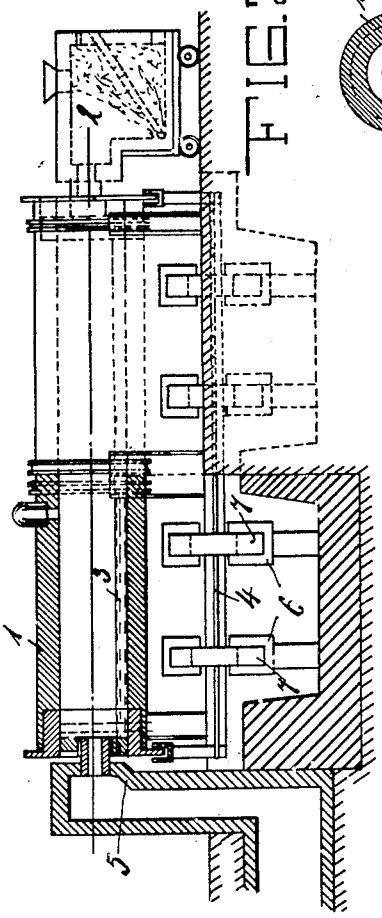


FIG. 5

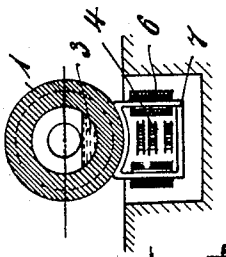


FIG. 3

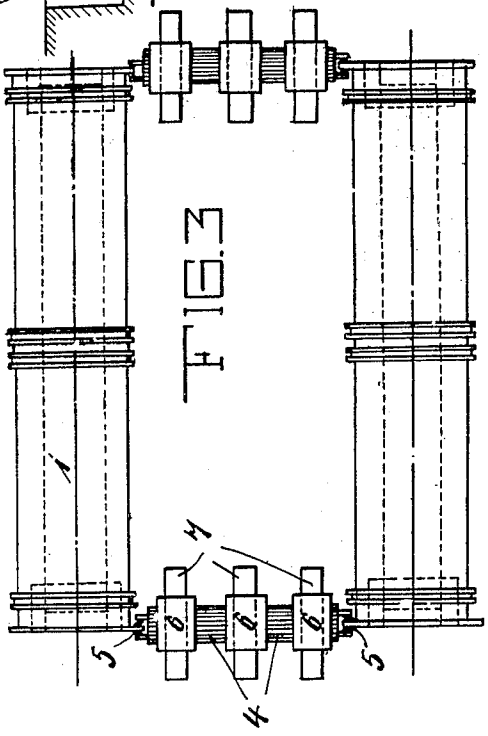


FIG. 1

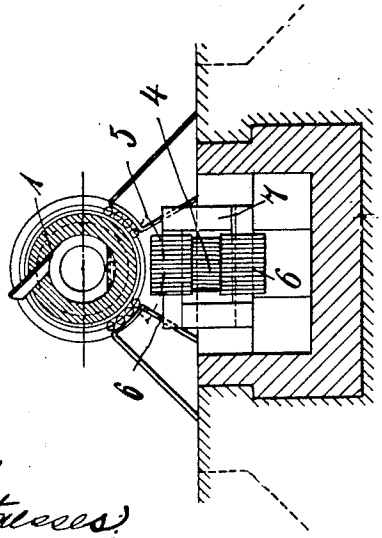
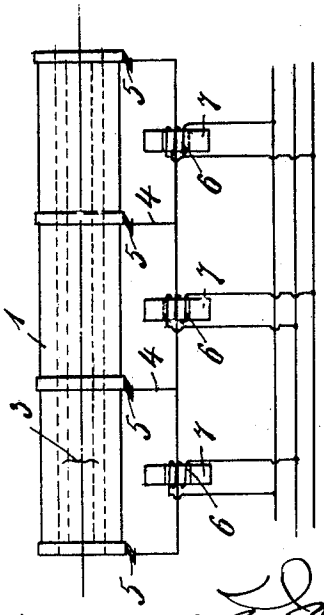


FIG. 4



Witnesses:

M. E. Roche

Lovell Lancaster.

Inventor

Alois Helfenstein

by B. Singer Atty

UNITED STATES PATENT OFFICE.

ALOIS HELFENSTEIN, OF VIENNA, AUSTRIA-HUNGARY.

ELECTRIC FURNACE.

1,069,252. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed June 5, 1912. Serial No. 701,892.

To all whom it may concern:

Be it known that I, ALOIS HELFENSTEIN, a citizen of Switzerland, and a resident of Vienna, Austria-Hungary, have invented new and useful Improvements in Electric Furnaces, of which the following is a specification.

The present invention consists in the secondary circuit formed as in the Kjellin heaters of the single winding type, but as distinguished from these the induced secondary is placed outside the metal bath suitably also outside the heater.

For the purpose of avoiding excessive self induction the secondary winding according to the present invention is made as flat as possible and the fixed part which forms the induced current conductor is put as near as possible to the metal bath.

The length of the secondary winding that is to be heated and the furnace belonging thereto may have any preferred form, rectilineal for example. Hereby the heater is made very largely independent of the rest of the transformer elements.

The furnace may be constructed as a tube accessible throughout, so that the heating process can be easily overlooked and controlled. In consequence of the simple straight form of the furnace cold charges can be easily melted down. The furnace-chamber is of such dimensions that heating with fuel, can be effected together with that by induction. These dimensions, particularly in the case of tubular furnaces, present the further advantage that the furnace-lining is better utilized as by the simple turning of the tube a fresh length of lining can be introduced as bed for the bath. For this purpose the furnace is of course constructed so that it will turn, whereby the bath can be moved mechanically, during the working without disturbing or moving the other parts of the transformer arrangement.

The strain on the furnace lining in the present heater is uniform, the furnace lining itself is cooled from outside on all sides by the natural movement of the air. The surface of the metal bath, on which if necessary purifying additional substances are caused to act, may be large, while the depth of the bed should be suitably slight, whereby a quicker and more intense action of the refining substances is effected.

In the drawing the invention is illustrated as employed with single and multiple phase current, Figure 1 being a transverse section, Fig. 2 a longitudinal section partly in elevation of a single-phase induction furnace. Fig. 3 an induction furnace in the secondary circuit of which two lengths or sections are formed. Fig. 4 is a diagrammatic representation of a triphase induction furnace, in which the three metal bands of the different phases form one band, and Fig. 5 a specially favorable arrangement of the fixed secondary winding part and of the primary winding in relation to the bath.

In the embodiment of the invention here illustrated there is provided a tubular container 1 which is surrounded by bearing rings 1^a which are supported on wing bearings 1^b so that the tube may be revolved about its axis in any of the well known manners. This tube forms the furnace proper and will be hereinafter referred to as the container. The tube 1 is lined with suitable non-conducting refractory material 1^c and at its ends is provided with trunnions 1^d having suitable openings therethrough for the passage of the charge, fuel gases, and the like. One of these trunnions is located at the charging end of the furnace and may, where desired, be placed in communication with a suitable fuel burner 1^e. The other trunnion communicates with a flue 1^f in order to provide for the escape of the waste gases.

The whole device is supported over a pit 8 provided with suitable walls 9 forming the foundation and whereon rests the bearings 1^b. Forming a part of the inner wall of the container at each end and at such intermediate points as may be found advisable, are conductor rings 10 provided with flanges 11 which extend annularly around the tube 1. In the pit 1 are a plurality of buttresses 12 whereon are mounted the transformer cores 7 around which runs the primary winding 6 supplied from any suitable source of electricity as, for instance, the line wires 6^a. Extending from end to end beneath the container and between the upper and lower windings 6 is a copper band 4 which forms the exterior portion of the secondary circuit. At each of the flanges 11 this band branches upward as at 4^a and on the extremity of each of these upturned portions is provided a pair of brushes 4^b which embrace the respective flange and form elec-

trical connection therewith. The secondary circuit is completed from one of the rings 10 to the other by means of the metal bath 3, which owing to its high resistance becomes intensely heated on passage of the current.

It will be noted that while different arrangements of the transformers and connections are shown in Figs. 2 and 3 and 4 the principle remains the same in each case. It is further pointed out that these induction furnaces through the employment of a large number of primary coils facilitate the regulating of the secondary circuit, which is very difficult with other induction furnaces in the course of working.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a furnace of the kind described; a container consisting of a furnace provided with a metal receiving chamber, a transformer core located entirely beneath said container, a primary winding surrounding said core, and a secondary winding passing adjacent said primary winding and arranged for connection with the interior of said container, said secondary winding lying wholly beneath said container.

2. In an electric furnace; a container consisting of a furnace provided with a metal receiving chamber provided with spaced conductor rings arranged in contact with a metallic bath when the container is charged, exteriorly extending flanges on said rings, a transformer core located entirely beneath said container, a primary winding surrounding said core, a secondary winding passing adjacent said primary winding, and brushes on the ends of said secondary winding in contact with said flanges.

3. In an electric furnace, a revolubly mounted tubular container consisting of a furnace provided with a metal receiving chamber, spaced conductor rings carried by said container and forming part of the interior wall thereof, a flange on each of said rings projecting annularly from the exterior of said container, a transformer core adjacent said container, a primary winding on said core, a secondary winding for said core, and brushes on the secondary winding and engaging said flanges whereby electrical contact is maintained at all times between said secondary winding and the conductor rings.

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

ALOIS HELFENSTEIN.

Witnesses:
AUGUST FUGGER,
IGNAZ KNORSCHMACHER.