

C. A. KELLER.
ELECTRIC FURNACE.
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941,419.

Patented Nov. 30, 1909.

Fig. 1.

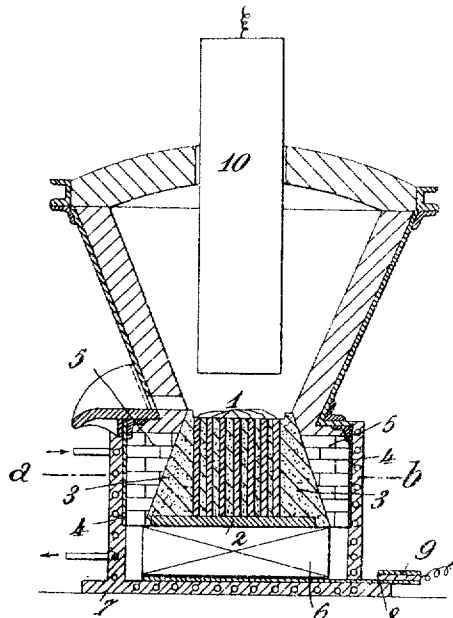
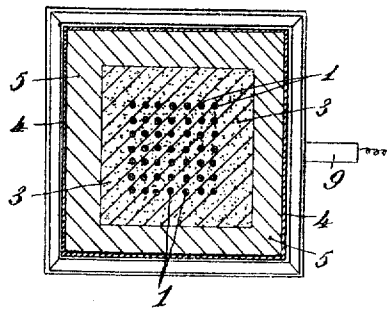


Fig. 2.



Witnesses:-

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UNITED STATES PATENT OFFICE.

CHARLES ALBERT KELLER, OF PARIS, FRANCE.

ELECTRIC FURNACE.

941,419.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES ALBERT KELLER, citizen of the Republic of France, residing at Paris, in France, have invented new and useful Improvements in or Relating to Electric Furnaces, of which the following is a specification.

This invention relates to improvements in electric furnaces and has particular reference to a special construction of current conducting base or sole intended to be used in electric furnaces in which the supply of current takes place through one or more vertical electrodes, generally movable and arranged above the sole, the current passing out through the conductor sole which forms or is connected to the other electrode.

In such furnaces the passage of current through the sole is generally brought about either by means of a carbon conductor, or by making the said sole of a metal plate cooled by circulation of water, or else by the use of metal blocks more or less separated from the furnace or protected against the heating action of the latter by some artificial means, and cooled by water circulation.

A current-conducting sole according to this invention has the great advantage of not carbonating the product to be manufactured, as is done by soles with a carbon conductor, nor of necessitating for its cooling a direct action of the cooling medium on the conductor itself which moreover need not be separated from the bottom of the furnace chamber by any intermediate part.

In order to make the invention better understood, the specification is accompanied, merely by way of example, by a drawing in which—

Figure 1 is a sectional longitudinal elevation of a furnace provided with a construction of sole according to this invention. Fig. 2 is a sectional plan on line *a-b* of Fig. 1.

Like numerals indicate like parts in each figure.

In the said drawing, 1 is a bundle of iron or other metal bars arranged in a vertical position and electrically connected to a conducting plate 2 arranged under their bottom ends. The current therefore passes in parallel through the bars to or from the bottom of the furnace. Between the bars 1 and around the bundle which they form, is strongly rammed in a refractory earth preferably magnesium earth 3. The sole thus formed is contained in a metal frame 4 from

which it is separated by a refractory brick lining 5. The said sole, the conducting section of which is half metal and half fire-proof material, is thus made so as to resist the very high temperature of the material contained in the furnace, with which it is in contact. Nevertheless, it is a good conductor of current on account of the iron parts, which it contains and also of the earth in which they are embedded the latter becoming a conductor at a high temperature.

Thus the sole according to this invention may be regarded as formed of a kind of fire-proof reinforced earth which is a conductor of electric current when cold, owing to its iron frame, and when hot is more or less a conductor owing to the said frame and also to the fact that the earth rammed in around the frame is itself a partial conductor at high temperatures. The said sole, owing to its qualities, is specially intended for the treatment of metals, for instance, for the manufacture of cast iron and steel. It has also the advantage, owing to its being fire-proof against the heating action of the furnace, and also owing to the metallic armature which it contains, of not bending or sagging under the weight of the metal forming the charge which it supports.

It will be understood that the outer metal walls 4 which contain the portion of the furnace in which the sole is arranged, are sufficiently far away from the furnace, in order to be protected against excessive heat. Nevertheless, they can be cooled by circulating water, so as to insure the preservation of the sole.

The plate 2 which connects together the bars 1, is arranged on a layer 6 of several electrodes or conductors carbon or other material, arranged flat on a rigid metal bottom 7 through which water can circulate and copper bars arranged between the electrodes connect the latter to the terminal 9 for discharging the current from the furnace.

It goes without saying that the arrangement of the layer of electrodes 6 and of the copper conductors 8 may be varied and is given merely by way of example.

The number of vertical electrodes 10 can be varied, the sole can contain one or more bundles or bars 1, and the number of bundles can be different from that of the vertical electrodes.

It must also be pointed out that the material of which the sole is made, can be

varied to suit the material treated in the furnace.

Finally, to the fire-proof material constituting the earth 3 can be added small quantities of suitable rare earths, for the purpose of increasing its conductivity when hot.

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 an electric furnace a hearth serving as electrode and comprising a metal plate, a plurality of metallic elements in connection with said metal plate and projecting therefrom, a refractory body in the interspaces between said metal elements and surrounding the same, and a second refractory body inclosing said first named refractory body.

2. In an electric furnace a hearth serving as electrode and comprising a metal plate, a plurality of metallic elements in connection with said plate and projecting therefrom, a refractory body in the interspace between said elements and surrounding the same, said refractory body increasing in conductivity with increasing temperature, and a second refractory body inclosing said first named refractory body.

3. In an electric furnace a hearth serving as electrode and comprising a metal plate, a plurality of metallic elements in connection with said plate and projecting therefrom toward the furnace chamber, a refractory body filling the interspaces between said elements, a second refractory body inclosing said first named refractory body and a metal frame surrounding said second refractory body.

4. In an electric furnace a hearth serving as electrode and comprising a metal plate, a plurality of elements in connection with said plate and projecting therefrom toward the interior of the furnace, a refractory body filling the interspace between said elements and containing minerals from the group of the rare earths, a second refractory body surrounding said first named one, a metal frame inclosing the hearth and a plurality of cooling pipes surrounding said metal frame.

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

CHARLES ALBERT KELLER.

Witnesses:

JULIAN EAVERN,
H. C. COXE.