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F. THARALDSEN

PROCESS FOR THE ELECTROTHERMIC PRODUCTION OF ZINC

Filed May 25, 1922

Fig. 1.

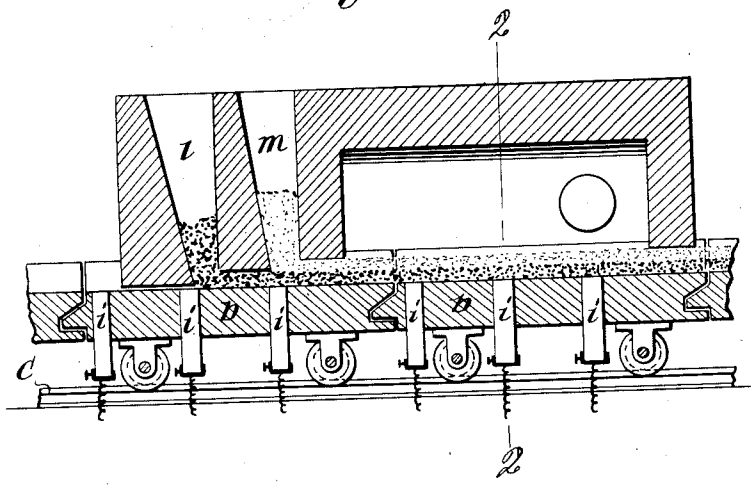
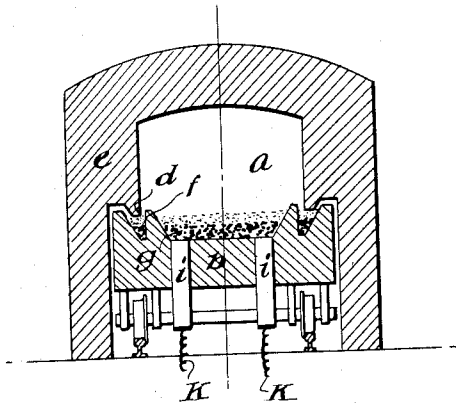


Fig. 2



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UNITED STATES PATENT OFFICE.

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PROCESS FOR THE ELECTROTHERMIC PRODUCTION OF ZINC.

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The electrothermic production of zinc has hitherto in most cases been carried out in electric radiation furnaces. This process, which after the newest improvements works very well from a metallurgical point of view, has the disadvantage, that the electric heat is relatively imperfectly utilized. In this respect resistance furnaces are more favorable. In the electrothermic zinc process by means of resistance furnaces a bath of molten slag has been used as resistance. This has however some disadvantages as the molten slag will corrode the furnace walls and cause rapid deterioration of certain parts of them. By the present invention this disadvantage is overcome by using a layer of solid material, for instance coke, as resistance. According to my improved process the charge is spread out as a very thin horizontal layer over a stratum of coke serving as heating resistance by which means the transfer of heat to the charge is greatly facilitated.

By arranging the charge in this manner, I also secure the advantage that the zinc vapour and the carbon oxide gas have to traverse only a very short way to reach the free space above the charge and hence the vapours and gases escape readily without disturbing the charge and without causing formation of dust in the furnace chamber. The nuisance accompanying such phenomena as to the condensation of the metal and the purity of the condensed zinc is thus avoided.

The invention is more fully described in the following specification, reference being made to the accompanying drawing, in which:—

Fig. 1 is a longitudinal section of a furnace adapted for carrying out of my improved process, taken on the plane indicated by the line 1—1 of Figure 2.

Fig. 2 a cross section on the line 2—2 of Fig. 1. The furnace chamber —*a*— is confined underneath by the hearth —*b*— preferably consisting of a number of trucks, the ends of which close tightly against one another and running on the track —*c*— through the whole length of the furnace chamber. Between the hearth-trucks and the furnace wall a tight closure is effected by projections —*d*— from the furnace wall —*e*— which extend into grooves *f* along the side edges of the trucks, these grooves being filled with a pulverulent material such as crushed coke. On the hearth trucks an even layer of non-fusible heating material —*g*—, for instance coke, is placed and above this layer the charge of zinc oxide is placed likewise as an even horizontal stratum of very slight thickness. The heating is effected by means of electrodes —*i*, —*i*— carried by the hearth trucks and the current connections of which are made movable in any convenient manner and are for instance detachable flexible cables. The number of electrodes on each truck will vary according to the kind of current used. In Fig. 1 three pairs are suggested. When a pair of electrodes approaches the outlet of the furnace chamber, the connections of this pair are detached and the pair of electrodes on the next truck now just entering the furnace chamber is connected and so on.

Any suitable means may be employed for effecting such connection and disconnection. When a truck has left the furnace chamber, it is cleared of remaining residues, if necessary, and then on a special track outside the furnace conveyed back to the entrance of the furnace and so on. In this way the furnace may be operated continuously. The supply of charge and of resistance material may be effected by the means shown in Fig. 1. Here —*l*— and —*m*— are charging funnels the lower openings, of which transverse to the movement of the hearth-trucks are of the same extension as the portion of the hearth that is to be charged. Between the lower opening of the funnel and surface of the truck there is a distance corresponding to the decided thickness of the stratum of material to be charged. During the movement of the truck the surplus of material will be stricken off by the lower edge of the funnel. The resistance material is supplied through the funnel —*l*— and its thickness is determined by the distance between the edge of this funnel and the hearth. The zinc charge is supplied through the funnel —*m*—. The lower edge of the funnel —*m*— is situated somewhat higher than that of funnel —*l*— and this difference of height determines the depth of the zinc charge layer.

When the furnace has worked for some time, there may occur some burning of or smelting at the edge of —*m*—, or a portion of heated material may clog at this edge. The surface of the charge will not then be quite horizontal but somewhat concave or convex.

Having now particularly described my invention I hereby declare that what I claim is:—

The process of electrothermically producing zinc in an electric resistance furnace consisting in continuously introducing simultaneously into the furnace chamber and directly on the hearth an even layer of coke to serve as heating resistance and upon said layer of coke a correspondingly even layer of zinc charge, subjecting the zinc charge to electric heating by supplying electric current to said layer of coke, and continuously discharging the zinc charge thus heated.

In testimony whereof I affix my signature.

FILIP THARALDSEN.