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SEAL FOR CYANIDE POTS

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Fig. 1.

Fig. 2.

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My invention relates to furnaces, and more particularly to electrically heated heat-treating furnaces of the pot type.

In furnaces of the above type, the usual construction comprises a crucible suspended in an electrically heated chamber and adapted to contain a heat-treating medium, such as a fused salt bath. The bath is maintained at a desired temperature, and the tools or parts to be treated are immersed therein for a desired period of time. When the heat-treating bath comprises a fused salt, there is a tendency for the salt to creep, responsive to capillary attraction, over the rim of the crucible and into the heating chamber, and, at the relatively high temperature involved, injury to the adjacent refractory parts and the heating element results.

Further, incident to the charging and discharging of the work into and out of the bath, a considerable quantity of the bath material is splashed upon the top of the furnace adjacent to the crucible. This material is then apt to flow into the furnace chamber and injure the heating element and refractory parts.

In addition, particularly when the fused salt is a cyanide, corrosion of the crucible above the liquid level of the bath occurs, whereby the life of the crucible is materially shortened.

It is an object of the present invention, therefore, to provide, in a furnace of the above type, means for compensating for the corrosion of the crucible adjacent the level of the fused bath therein, and means for preventing the fused material from creeping over the outer surface of the crucible and into the heating chamber.

In practicing my invention, I provide, in a heat-treating furnace, a crucible having the upper peripheral wall area thereof of an increased thickness to compensate for the corrosive action of the fused salt, and an annular shield extending beyond the crucible rim and secured to the outer surface of the crucible in such manner that the creepage of fused material into the furnace chamber is prevented.

In the drawing:
Fig. 1 is a view, in vertical section, of a furnace embodying my invention, and
Fig. 2 is an enlarged view, in vertical section, of the structure embodying my invention, portions of the furnace structure being broken away.

Referring more particularly to the drawings, a furnace embodying my invention comprises walls 2 and 3, of suitable refractory and heat-insulating material, defining a substantially cylindrical furnace chamber. The walls are enclosed by a sheet-metal shell 4 to effect the structural reinforcement thereof.

An annular metallic plate 5, of heat-resistant material, is operatively supported upon the upper face of the wall portion 2 and is provided with a plurality of bolts 6, circumferentially spaced thereon and depending therefrom. A plurality of blocks 7 of electric insulating material, having aligned lateral apertures, are supported upon the bolts 6 in superposed relation. The blocks 7 are provided, in the lateral faces thereof, with cooperating grooves adapted to receive and space the convolutions of a helically wound electrical resistance heating element 8.

An annular block 9 of refractory material is supported upon the upper faces of the vertical wall portions 2 and 3, and cooperates with the annular plate 5 to maintain the latter in proper operative position.

An annular metallic plate 10, preferably of cast iron for the purpose of economy, is supported, at the outer peripheral edge thereof, upon the metallic shell 4 and at the inner peripheral edge, upon the refractory block 9.

A crucible 11 of suitable refractory material, is provided with an out-turned rim portion 12 which is adapted to cooperate with the block 9 to support the crucible within the heating chamber.

A bath of fused material, a cyanide salt, in the present embodiment, is disposed in the crucible and constitutes the heat-treating medium.

The portion 13 of the wall area of the crucible, above the level of the bath, is of an increased thickness to effect the reinforcement of the crucible and to compensate for the corrosion thereof by the material constituting the bath.

An annular sheet-metal plate, or shield 14, having a plurality of annular corrugations formed therein, rests, at the outer peripheral edge thereof, upon the inner peripheral edge of the cast plate 10, and is disposed to be supported upon the surface of block 9. A suit-
able refractory cement 15 may be interposed between the overlapping edges of the plates 10 and 14. One of the corrugations, adjacent to the inner peripheral edge of the plate 14, is adapted to receive the out-turned rim of the crucible in supporting relation. The inner peripheral edge of the plate is extended to constitute a depending annular skirt 16 which is secured to the portion of the crucible wall of increased thickness in such a manner as to constitute a leak-proof joint therebetween.

In view of the fact that it is substantially impossible to prevent the creepage of the fused salt through a mechanical joint, it is proposed, in the present embodiment, to weld the peripheral edge of the skirt 16 to the crucible wall, as indicated more clearly in Fig. 2.

With the construction described, during the operation of the furnace, the fused salt will creep over the rim 12, and upon the shield 14, responsive to capillary attraction, and, in addition, a small amount of the salt will be splashed upon the shield incident to the manipulation of the work. Although the grooves formed in the shield will receive the greater portion of the fused salt, there will be a tendency for some of it to flow under the crucible rim and into the space between the outer surface of the crucible and the depending skirt 16. Since the skirt is peripherally welded to the crucible wall the creeping salt is retained in said space and further creepage into the furnace chamber is prevented.

There will be a tendency, however, for the fused salt in the space between the crucible wall and depending skirt 16 to corrode the crucible, but since the skirt is welded to the crucible in the area of increased thickness, compensation for the effects of the corrosion is afforded and the life of the crucible is lengthened.

On the other hand, since the outer peripheral portion of the shield 14 is relatively remote from the crucible, any of the fused salt which may creep to that point is solidified, or crystalized, because of the relatively low operating temperature thereof, and further creepage is prevented.

Further, it is pointed out, the corrugations in the shield 14 not only serve to retain upon the plate the greater portion of the creeping or splashed bath material, but also effect a radial resiliency of the shield, to permit relative expansion between the crucible and shield.

By my invention, I have provided an improved heat-treating furnace structure whereby the life of the crucible is materially increased, and the creepage of the fused heat-treating medium into the furnace chamber is prevented.

While, for the purpose of illustration, I have shown an electrically heated furnace, obviously my invention is applicable to furnaces of this type, irrespective of the source of heat employed. Also, it is obvious within the scope of my invention to alter the structural details of the furnace described, to meet the requirements or exigencies of a particular installation.

Modifications may be made in my invention without departing from the spirit and scope thereof, and I desire, therefore, that only such modifications shall be placed thereon as are imposed by the prior art and set forth in the appended claims.

I claim as my invention:

1. In a heat-treating furnace, a crucible adapted to contain a liquid material, means for preventing the creepage of said liquid over the outer surface of said crucible comprising an annular shield having the inner peripheral edge thereof peripherally welded to the outer surface of said crucible.

2. In a heat-treating furnace, a crucible adapted to contain a molten heat-treating medium, means for preventing creepage of said medium over the outer surface of said crucible comprising an annular shield disposed adjacent the rim of said crucible and having the inner peripheral edge thereof welded to the outer surface of said crucible.

3. In a heat-treating furnace, a crucible adapted to contain a molten heat-treating medium, means for preventing the creepage of said medium over the outer surface of said crucible, comprising an annular shield having the inner periphery thereof peripherally welded to the outer surface of said crucible, and means permitting relative expansion between said crucible and shield.

4. In a heat-treating furnace, a crucible adapted to contain a fused salt bath, means for preventing creepage of said fused salt over the outer surface of said crucible comprising a sheet-metal shield having an annular corrugation therein for receiving the rim of said crucible, and an annular depending portion disposed adjacent to the outer surface of said crucible, and means constituting a liquid-tight joint between said portion and said crucible surface.

5. In a heat-treating furnace, the combination with a crucible having a peripheral wall area of increased thickness adjacent to the upper edge thereof, of an annular shield operatively associated with the rim of said crucible, an annular depending portion formed on the inner periphery thereof, and means constituting a leak-proof joint for securing said depending portion to the outer surface of the crucible in said area of increased thickness.

In testimony whereof, I have hereunto subscribed my name this 6 day of March, 1928.

JAMES C. WOODSON.