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MOLTEN BATH FURNACE

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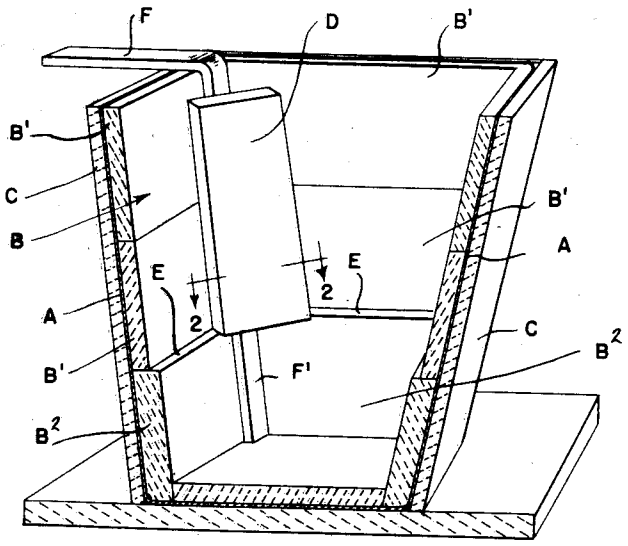


FIG. 1.

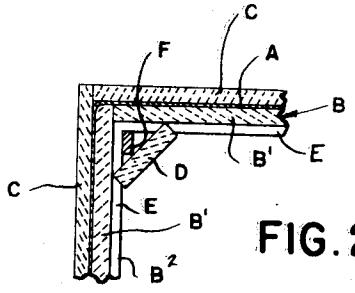


FIG. 2.

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MOLTEN BATH FURNACE

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4 Claims. (Cl. 13—23)

The invention relates to electric furnaces of that type employing a liquid bath, preferably of molten salt, which is heated by an electrical current passed therethrough between electrodes immersed therein. More particularly, the invention relates to furnaces of this type in which a metallic container having inclined walls is provided with a refractory lining against which the electrodes rest to be supported thereby. Inasmuch as the electrical conductivity of the molten material increases with temperature, there is a tendency for the current to shunt through the portions of the fluid bath, which are most highly heated, thereby still further increasing the heat in these portions and diminishing the heat supplied to the cooler portions. Again, there is a tendency for the current to pass through the fluid at the top of the bath as the portions of the electrodes therein are nearest the source of electrical energy, and where this occurs, it is difficult to heat the lower portion. Such defect is partially prevented by inclining the walls of the container outward from bottom to top, thereby increasing the distance between electrodes at the top and diminishing the space at the bottom. However, in designing furnaces for various types of work the vertical and horizontal dimensions must be altered so that it is difficult to obtain the proper slope to secure the best electrical and heating effects.

It is the object of the instant invention to obtain the proper distribution of current through the bath for the desired heating effect independent of the particular dimensions of the container and to this end the invention consists in the construction as hereinafter set forth.

In the drawing:

Figure 1 is a sectional perspective view of my improved furnace;

Figure 2 is a horizontal section taken substantially on line 2—2 of Figure 1.

A is a metallic container for the molten bath, which is provided with a refractory lining B and also preferably a refractory outer casing C. The walls of the container are inclined outward in an upward direction, thereby permitting of forming the lining B of separate refractory blocks or slabs B′ placed one above the other and held in position by gravity. Also, this construction permits of supporting the electrode F by resting it against the inclined refractory lining.

As has been previously stated, the inclined walls with the electrodes resting thereagainst, will space said electrodes a greater distance apart at the top than at the bottom, thereby partially preventing the shunting of the current through the fluid at the top of the bath. However, for particular types of work the dimensions of the bath may be such as to not provide the necessary differential. I have, therefore, designed a construction in which the upper portions of the electrodes are shielded from each other so as to compel the current to pass chiefly between the lower portions of said electrodes. As specifically illustrated, the electrodes F are shielded by refractory slabs D which extend upward above the surface of the bath, but terminate above the bottom so as to leave an exposed portion F′ of the electrode. Preferably, the electrode is placed in the corner of the container and the slab D is arranged diagonally across this corner being supported the proper height above the bottom by resting on a ledge E. This ledge is formed by making the lower blocks B^2 of the refractory lining of somewhat greater thickness than the upper blocks. The inclination of the walls serves to hold the slab D in stable equilibrium and without the necessity of attaching it to the sides of the lining.

With the construction as above described, the current supplied through the electrode F is compelled to pass through the fluid in the lower portion of the bath to heat the same, after which a thermal circulation is established: the heated fluid ascending, and the cooler fluid descending into the path of the current. This will produce the desired equalization of temperature throughout the bath. Also the height of the supporting ledge E may be varied to obtain the desired distribution of current irrespective of the particular dimensions of the bath.

What I claim as my invention is:

1. In a furnace of of the fluid bath type in which the conductivity of the fluid increases with temperature and provided with spaced electrodes immersed in said fluid, a container for the fluid having insulated walls inclining outward in an upward direction, and provided with a ledge a predetermined distance above the bottom of the container, an electrode extending down in said fluid and resting against said inclined wall and a shield for said electrode of refractory insulating material resting upon said ledge.

2. In a furnace of the fluid bath type in which the conductivity of the fluid increases with temperature and provided with spaced electrodes immersed in said fluid, a container for the fluid having walls inclining outward in an upward direction, a refractory insulator lining for said walls providing a ledge a predetermined distance

above the bottom of the container, an electrode located in the corner between adjacent walls and extending downward to the bottom of the container, and a shield of refractory insulator material extending diagonally across said corner and resting upon said ledge.

3. In a furnace of the fluid bath type in which the conductivity of the fluid increases with temperature and provided with spaced electrodes immersed in said fluid, a metallic container for the fluid having walls inclining outward in an upward direction, a refractory insulator lining for said container formed of separate blocks or slabs resting against said inclined walls one above another the lowermost blocks or slabs being of greater thickness than those above the same, an electrode extending downward into said bath and located in the corner between adjacent side walls, and a slab of refractory insulator material resting upon the ledge formed by the lower blocks or slabs of greater thickness and extending diagonally across said corner.

4. In a furnace of the fluid bath type in which the conductivity of the fluid increases with temperature and provided with spaced electrodes immersed in said fluid, a container for the fluid having insulated walls inclining outward in an upward direction, an electrode extending down in said fluid and resting against said inclined wall, and a shield for a portion of said electrode of refractory insulated material supported within said container and also resting against said wall.

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