This invention relates to electrical resistance furnaces, and is concerned, more particularly, with such furnaces of the type which includes a crucible for molten metal contained within a sealed enclosure so that the metal may be extracted from the crucible under the influence of pressure or vacuum.

It is an object of the present invention to provide an improved furnace of this type which is relatively simple in construction.

The present invention consists in an electrical resistance furnace which includes a crucible, a shield of a heat resisting steel located around the crucible, electrical heating elements mounted outside the shield, a refractory material located around and beneath the shield, and an outer casing forming a sealed enclosure containing the crucible, shield, heating elements, and refractory material.

It is preferred that the electrical heating elements should be mounted on the outside surface of the shield arranged so that when the shield is removed from the refractory casing, the elements are removed with it and are exposed for servicing, although the electrical heating elements may, if desired, be mounted upon the refractory casing instead of the shield.

In carrying the invention into effect according to one convenient mode by way of example as shown in the accompanying drawing, an electrical resistance furnace includes a tubular shield 1 composed of a heat resisting steel, such as a non-corrosive nickel-chrome alloy capable of working in the range of 800° to 1250° C.

A crucible 3, preferably composed of silicon carbide is mounted within the shield 1, and is of such dimensions that it may be withdrawn upwardly without disturbing the shield 1. The crucible 3 is supported upon a bed 4 of refractory material which in turn is supported by the bottom portion of a casing 5 of refractory material.

The upper end of the shield has an outward flange as at 2, upon which segmental bricks 6 sit, and an annular member 7 is joined by bolts 8 to an outer steel casing 9 and is sealed by a closure 10 so as to form a sealed enclosure containing the crucible, shield and refractory material.

Suitable means (not shown) are provided for extracting molten metal from the crucible under the influence of pressure or vacuum, an opening 11 being provided in the closure 10 for this purpose.

The outside of the shield 1 is provided with a plurality of insulated supports 12 which carry heating elements 13 for heating the crucible through the shield 1. A thermostat or pyrometer 17 is used to control the temperature of the furnace.

The refractory casing 5 is also provided with an inner refractory layer 14.

The bottom of the furnace is provided with a fusible diaphragm 15 connected to a tube 16 passing the bottom of the refractory casing 5 and the casing 9 so that should the crucible 3 break the diaphragm 15 will fuse and its contents be discharged from the casing. Alternatively, but not shown, the floor formed by the bottom of the casing 5 may slope to one side, the tube 16 with a diaphragm being positioned to extend through the side of the furnace instead of the bottom.

This diaphragm is of great advantage since the bottom of the furnace would otherwise receive and contain the contents of the crucible in the event of a crucible failure, necessitating the difficult operation of cleaning out the furnace before replacing the crucible.

Electrical connection to the heating elements is achieved by means of a terminal 18 which passes from the outside of the furnace, through steel casing 9 and refractory material 5 and 14 to adjacent the heating elements 13. In order to achieve appropriate scaling of the casing 9 at this point, the terminal 18 consists of an electrically conducting rod 19 upon which is mounted an insulator 20 having a metallic cap 21. The cap 21 is brazed to the rod 19 and the insulator 20 is bonded to a bush 22 mounted on an insulating sleeve and screwed into the casing 9.

1. An electrical resistance furnace comprising a crucible adapted to hold the material to be heated; a shield of heat resisting steel juxtaposed to and surrounding said crucible; a series of heating elements surrounding said shield on the opposite-to-the-crucible side thereof; refractory material enclosing said heating elements and shield and forming a base upon which said crucible and shield rest; and an upper closure which in conjunction with an outer casing forms a sealed enclosure about said crucible, shield, heating elements and refractory material said shield preventing injury to said heating elements should said crucible break.

2. An electrical furnace as claimed in claim 1 wherein the said shield is composed of non-corrosive nickel-chrome alloy steel.

3. An electrical furnace as claimed in claim 1 wherein said shield is composed of a steel capable of operating in a temperature range of 800° to 1250° C., and said furnace is capable of extracting molten metal from said crucible by pressure.

4. An electrical furnace as claimed in claim 1 wherein said material to be heated is metal and when molten said furnace is capable of extracting said metal from said crucible by vacuum.

5. An electrical furnace as claimed in claim 1 wherein a conduit having a fusible diaphragm passes through said refractory material base and outer casing so that if said crucible breaks the molten material therein contained will fuse said diaphragm and be discharged through said conduit from said furnace.

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BENARD A. GILHEANY, Primary Examiner.
HIRAM B. GILSON, Assistant Examiner.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,440,322 Dated April 22, 1969
Inventor(s) Stuart Gerald Young

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Assignee: HEATLOCK LIMITED

SIGNED AND SEALED
DEC. 30 1969

William E. Schuyler, Jr.
Commissioner of Patents

M. Fletcher, Jr.
Attesting Officer