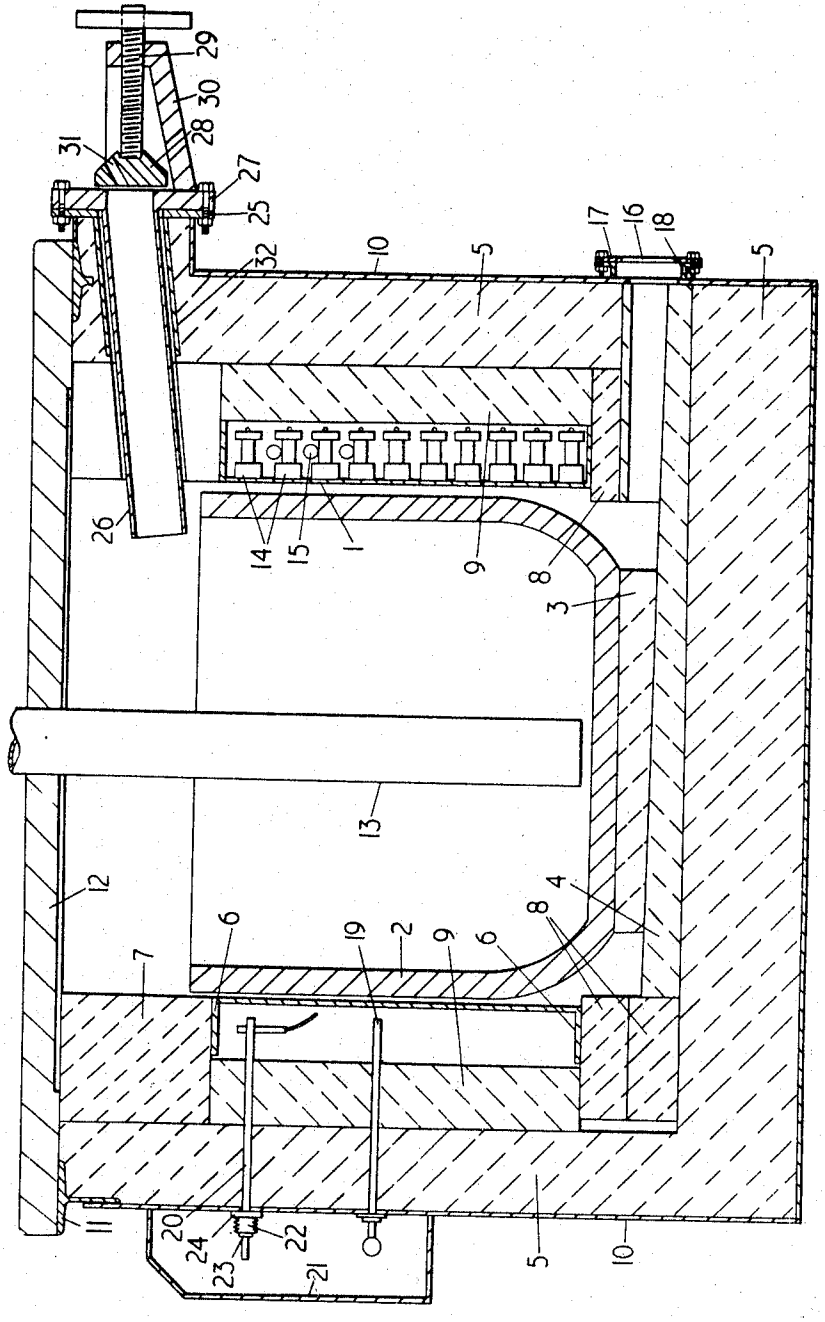
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ELECTRICAL RESISTANCE FURNACES

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ELECTRICAL RESISTANCE FURNACES

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ABSTRACT OF THE DISCLOSURE

An electrical resistance furnace of the type which includes a crucible for molten metal contained within a sealed enclosure so that the molten metal may be extracted, when required for use, from the crucible under the influence of pressure or vacuum, wherein a portion of a side wall defining the sealed enclosure is provided with a removable charging tube extending downwardly and inwardly therein to a point above and in communication with the crucible, and means for closing the charging tube and allowing pressurizing of the enclosure.

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 molten metal may be extracted, when required for use, 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.

The present invention consists in an electrical resistance furnace of the type set forth, wherein a portion of a side wall defining the sealed enclosure is provided with a charging tube extending downwardly and inwardly to a point over the crucible, and means are provided for closing the charging tube allowing pressurizing of the enclosure.

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

A crucible **2**, preferably composed of silicon carbide, is supported within the shield **1** upon a bolster **3** of refractory material which rests upon a bed **4** of refractory material laid upon a bottom portion of an outer casing **5** of refractory material.

The shield **1** is provided at top and bottom with flanges **6** which engage refractory bricks **7** and **8** and further refractory bricks **9** are provided within the outer refractory casing **5**.

The outer refractory casing **5** is enclosed by an outer steel casing **10** joined to a ring **11** secured to a top closure **12** so as to form a sealed enclosure containing the crucible, shield and refractory material.

An output tube **13** passing through the closure **12** is provided for extracting molten metal from the crucible **2** when pressure is introduced into the enclosure as hereinafter described.

The outside of the shield **1** is provided with a number of insulated supports **14** which carry heating elements **15** for heating the crucible through the shield **1**.

The outer steel casing **10** is provided at the side with an emergency outlet in the form of zinc foil **16** clamped between an apertured plate **17** and flanges **18** adjacent an opening in the steel casing **10**.

The foil **16** is sufficiently strong to withstand the pressure in the enclosure during casting (say 10–15 p.s.i.) but will melt should the crucible break or crack and discharge molten metal over the sloping surface of the bed **4** of refractory material onto the foil. This emerency outlet is of great advantage since in the event of a crucible failure the bottom of the enclosure would otherwise retain the molten metal which, on solidifying, would be difficult to remove.

A thermocouple **19** is provided for monitoring the operating temperature in the region of the shield **1**, with electrical connection to the heating elements being achieved by means of a terminal which passes from a protective cover **21** outside the steel casing **10**, through the casing **10** a refractory material **5** and **9** to adjacent the heating elements **15**. In order to achieve appropriate sealing of the casing **10** at this point, the terminal consists of an electrically conducting rod **20** upon which is mounted an insulator **22** having a metallic cap **23**. The cap **23** is brazed to the rod **20** and the insulator **22** is bonded to a bush **24** mounted upon an insulated sleeve and screwed into the casing **10**.

It is intended that the furnace described above should be charged with molten metal, for example from a sustaining furnace, and then the metal discharged as and when required in a pressure casting process, under pressure through the tube **13**.

To permit charging and pressurization of the furnace, the outer steel casing **10** is provided in its side wall above the level of the top of the crucible with an apertured steel plate **25**, through which is passed a cast iron charging tube **26** extending downwardly towards the crucible, and having an integral flange **27** bolted to the plate **25**, with the tube **26** extending inwardly through the refractory material **5** so that its inner end overlies the crucible **2**.

To achieve sealing of the enclosure, the tube **26** is closed by means of a closure member **28** carried on a screw-threaded clamp **29** mounted on a bracket **30**. The closure **28** is provided with a passageway **31** through which the interior of the enclosure may be pressurized.

To effect charging of the crucible, the closure member **28** is withdrawn by undoing clamp **29** and a funnel (not shown) is rested in the bracket **30** to facilitate pouring of the molten metal through the tube **26** into the crucible **2**.

It is a feature of the furnace described above that should it be necessary to remove either the crucible **2** or the shield **1** for servicing purposes, then this may be done without removing the other component.

However, before this can be done it is necessary to withdraw the cast iron tube **26** and in order to prevent wear and tear upon the refractory material **5** during this step it is lined with a tube **32** composed of steel, such as one containing 25% nickel and 20% chromium.

This invention is not to be confined to any strict conformity to the showings in the drawings but changes or modifications may be made therein so long as such changes or modifications mark no material departure from the spirit and scope of the appended claims.

We claim:

1. An electrical resistance furnace, including a wall means and cover defining a sealed enclosure, a crucible for molten metal supported within said sealed enclosure, means extending into the crucible for extracting the molten metal, when required for use, from the crucible under the influence of pressure or vacuum introduced into the sealed enclosure, a charging tube having inner and outer ends, said tube being positioned in an aperture in said wall means and said tube extending downwardly and inwardly into the enclosure to a point where the inner end of the tube is above and in communication with

the interior of the crucible, a closure member operably connected to said wall means for closing the outer end of the charging tube and said closure member having a passageway extending therethrough and by means of which said passageway interior of the enclosure may be pressurized.

2. The furnace according to claim 1, wherein said closure member operative connection comprises a clamp and a bracket for receiving and positioning a funnel to facilitate charging of the crucible when the closure member has been from the outer end of the tube.

3. The furnace according to claim 1, wherein the aperture in the wall means is lined with a tube.

4. The furnace according to claim 3 wherein the outer end of the charging tube is provided with a flange secured to the exterior of the enclosure around said aperture.

5. The furnace according to claim 1, wherein the charging tube is cast iron.

References Cited

UNITED STATES PATENTS

1,933,851	11/1933	Granzer	219—424 XR
2,937,789	5/1960	Tama	13—33 XR

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