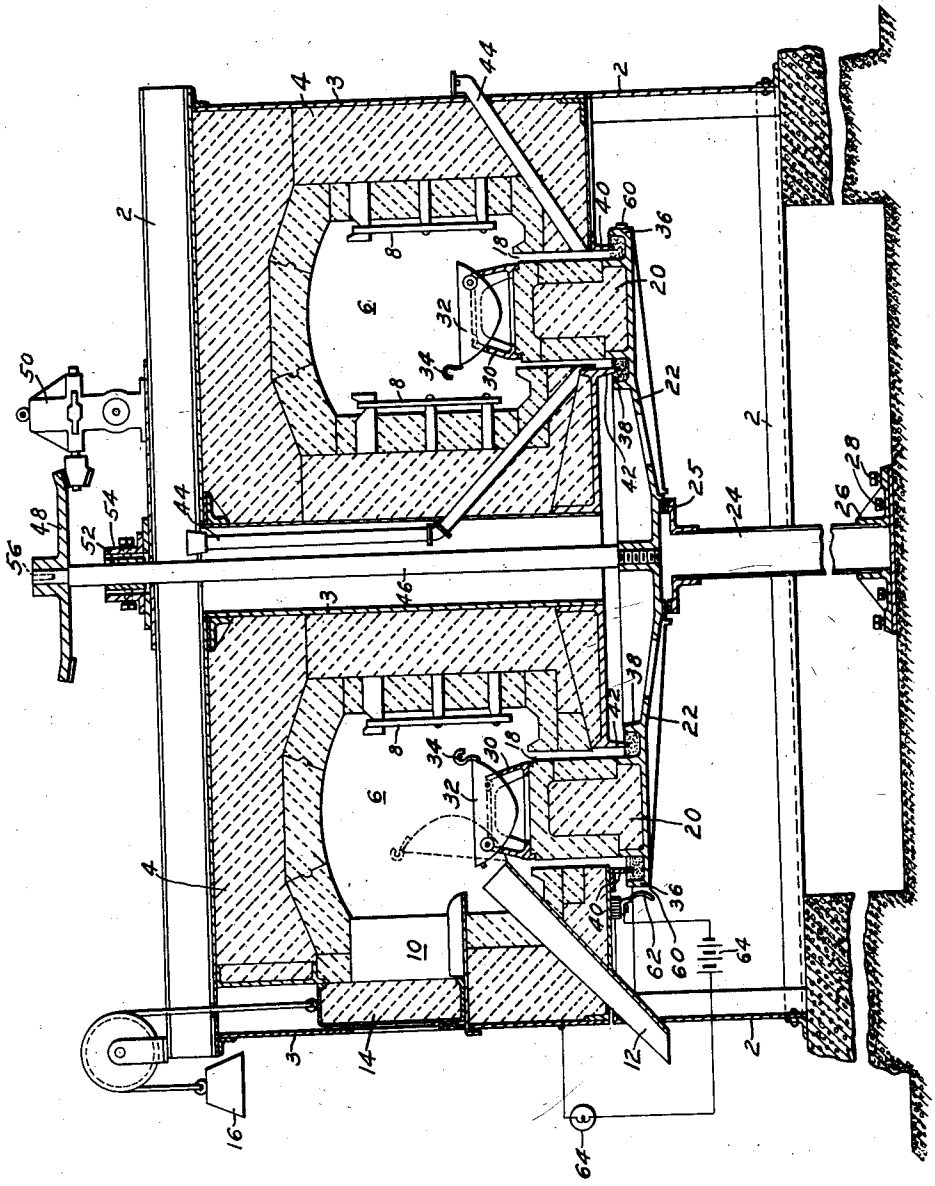
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ROTARY HEARTH FURNACE

Filed June 18, 1927



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UNITED STATES PATENT OFFICE.

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ROTARY-HEARTH FURNACE.

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My invention relates to electric furnaces and more particularly to rotary-hearth furnaces.

In furnaces of the above-mentioned type, in the event of a failure of the refractory furnace chamber lining, electrical resistance elements or article-carrying members, it has been necessary to tear out portions of the furnace wall or roof to permit the repair or replacement thereof. Such operation necessarily involves a complete shut-down of the furnace and a consequent loss of production and operating efficiency.

It is an object of my invention, therefore, to provide a rotary-hearth furnace embodying means for permitting the removal of said hearth to provide access to the furnace chamber, thereby obviating the necessity of tearing out portions of the furnace structure.

In practicing my invention, I provide a furnace structure defining an annular heating chamber having an annular opening formed in the lower wall thereof. A hearth structure, comprising a substantially circular mounting plate and an annular refractory hearth mounted peripherally thereon, is rotatably supported in operative position, with the refractory hearth portion substantially filling the annular opening in the bottom wall of the furnace.

When access to the furnace chamber is desired, the mounting plate and hearth carried thereby are lifted a short distance to permit the removal of the supporting means, and the hearth structure is then lowered out of engagement with the furnace structure.

Referring more particularly to the drawing, the furnace structure comprises a frame work 2, of angle iron and I-beams, supporting an annular sheet-metal shell 3 which is lined with suitable ceramic refractory and heat-insulating material 4, defining an annular furnace chamber 6. An electrical-resistance element 8 is supported upon the side walls of the furnace chamber to effect the desired chamber temperature. Since the particular structure of the furnace body forms no part of the present invention, more detailed description thereof is deemed unnecessary.

The charging of material into the furnace chamber is effected, as hereinafter described, through a charging opening 10 formed in the outer peripheral wall of the furnace, and the discharge of material is through a discharge chute 12 located below said charging opening. A vertically movable door 14, counterweighted by a suitable weight 16 in a well-known manner, closes the charging opening 10 during the operation of the furnace.

An annular opening, or slot 18 is formed in the bottom wall of the furnace for the reception of a rotatable hearth which substantially fills said opening.

The hearth structure comprises an annular refractory hearth 20 mounted adjacent the periphery of a supporting plate or spider 22, and coaxial therewith. The plate 22 is supported in operative position, with the hearth 20 in slot 18, by a vertical standard 24 coaxial therewith. Cooperating ball-bearing raceways 25 are formed on the plate 22 and the enlarged upper face of standard 24 to facilitate the relative movement therebetween. The standard 24 is provided with a base 26 and suitable securing and leveling screws 28 cooperating therewith.

Upon the upper face of hearth 20, and within the furnace chamber when the hearth is in operative position, are secured a plurality of supports 30 upon each of which is pivotally mounted a tray 32 to permit the trays to be tilted to discharge heated material therefrom. Tilting of the tray is facilitated by a hook 34 secured to the rear edge thereof which may be manually engaged by the furnace operator.

Annular vertical flanges 36 and 38 are formed on plate 22, on both sides of the hearth 20, and cooperate with flanges 40 and 42, respectively, depending from the bottom of the furnace adjacent to the peripheral edges of slot 18, to form a sand seal of the usual type. Sand may be supplied to the channels formed by the cooperating conduit 44 extending through the furnace side walls into communication with the slot 18.

Rotation of the hearth is effected by means of a shaft 46, extending down through an axial opening in the furnace structure, secured at the lower end thereof to a screw threaded extension on plate 22 and provided, at the upper end thereof, above the roof of the furnace, with a bevel gear 48 keyed thereto. The bevel gear 48 is rotated, through a suitable reduction gearing 50, by an electric motor (not shown), in the usual manner.

The shaft 46 is maintained in vertical alignment by a sleeve 52 surrounding said shaft and mounted for lateral adjustment in a col-

lar 54 secured to a cross-beam of the furnace frame 2.

A screw threaded socket 56 is formed in the upper end of shaft 46, longitudinally thereof, for the reception of the threaded portion of a screw-eye (not shown), for a purpose to be hereinafter described.

A plurality of strip contacts 60, corresponding in number to the number of article-carrying trays employed, are secured to the outer face of flange 36 and cooperate successively, upon rotation of the hearth, with a resilient contact 62 mounted upon the bottom of the furnace structure to close a circuit through a suitable source of electrical energy and a signal lamp 64. The contact 62 is so positioned that, as the article-carrying trays are moved into discharge position, the lamp 66 will be energized, apprising the furnace operator of the fact.

In operation, the hearth-rotating motor is manually deenergized as each tray 32 comes into position adjacent the discharge chute 12, as indicated by the energization of the signal lamp 64. The door 14 is then raised to permit the operator to insert into the furnace chamber a suitable hook to engage the hook 34 on tray 32 to effect the tilting thereof and the consequent discharge of material thereon into the discharge chute. The tray is then moved back to its normal horizontal position, and additional material is added thereto through the opening 10.

In the event that it becomes necessary to have access to the furnace chamber, the bevel gear 48 is removed and the sleeve 52 released from the collar 54. The screw-eye is then secured in the socket 56 in shaft 46, and by means of a crane hook, or other appropriate means, engaging the screw-eye, the plate 22, and, consequently, the hearth 20, is raised a slight amount to free it from the bearings 25, thereby permitting the removal of the supporting standard 24. The hearth structure may then be lowered out of engagement with the furnace and, if necessary, removed laterally. Sufficient clearance between the cooperating elements of the sand seal is provided to permit the initial upward movement of the hearth structure to free it from the bearings 25.

By my invention, I have provided a simple and effective means for lowering the hearth of a rotary furnace out of engagement with the furnace structure, thereby permitting a ready access to the furnace chamber without involving the otherwise necessary destruction of the furnace walls.

While I have shown and described a particular furnace structure, quite obviously variations in the structural details thereof may be made within the scope of my invention. For example, my invention is not limited to the particular hearth structure and supporting means shown, or to the use of an electrical resistor as a source of heat.

Modifications may be made in my invention without departing from the spirit and scope thereof and I desire, therefore, that only such limitations 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 rotary-hearth furnace, the combination with an annular furnace chamber and an annular hearth projecting through the bottom wall thereof, of means for rotatably supporting said hearth in operative position, and means permitting the lowering of said hearth out of engagement with the furnace, thereby affording ready access to said furnace chamber.

2. In a rotary-hearth furnace, the combination with an annular furnace chamber and an annular hearth therefor, of means outside said furnace for rotatably supporting said hearth in operative position, and means permitting said hearth to be lowered out of cooperation with said furnace chamber.

3. In a rotary-hearth furnace, the combination with an annular furnace chamber and an annular hearth therefor, of means outside said furnace chamber for rotatably supporting said hearth in operative position within said chamber, and means for permitting the removal of said hearth as a unit from said furnace chamber.

4. In a rotary-hearth furnace, the combination with an annular furnace chamber having an annular slot through the bottom wall thereof and coaxial therewith, of an annular hearth, and means for rotatably supporting said hearth in operative position within said slot, said supporting means including means for permitting the removal of said hearth from said slot as a unit.

5. In a rotary-hearth furnace, in combination with a bottom-slotted furnace chamber, of a hearth structure comprising an annular hearth substantially filling said slot, a plate below said slot, upon which said annular hearth is mounted, and removable means for rotatably supporting said plate.

6. In a rotary-hearth furnace, the combination with a bottom-slotted annular furnace chamber and an annular hearth, of means for rotatably supporting said hearth in operative position within said slot, and means whereby said hearth may be raised to permit the removal of a portion of said supporting means and the subsequent lowering of said hearth out of cooperation with said slot.

In testimony whereof, I have hereunto subscribed my name this 2 day of June 1927.

JOHN F. BAKER.