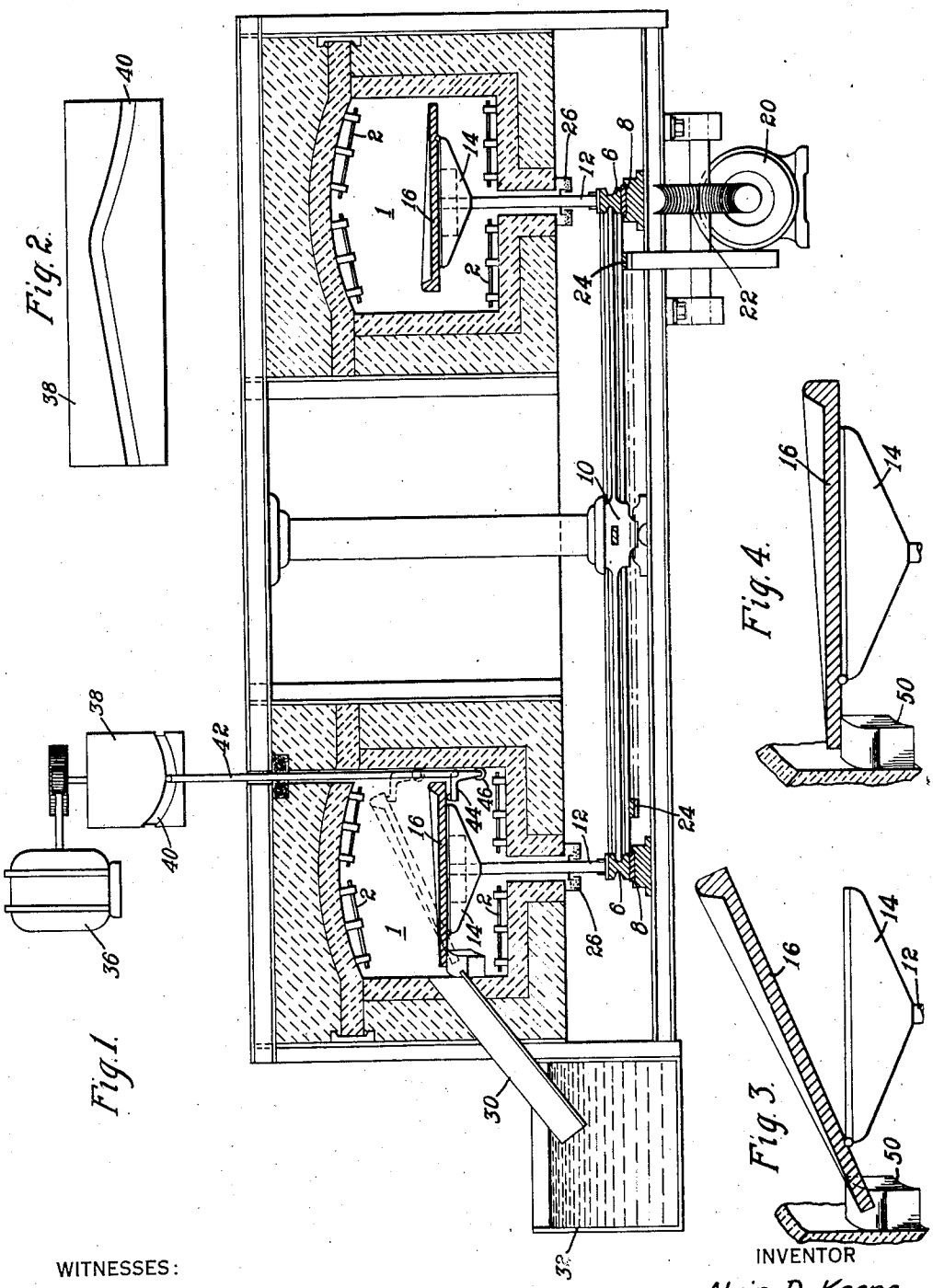
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A. D. KEENE

TILTING HEARTH TRAY FURNACE

Filed March 28, 1927



WITNESSES:

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UNITED STATES PATENT OFFICE.

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TILTING-HEARTH-TRAY FURNACE.

Application filed March 28, 1927. Serial No. 178,823.

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

In rotary-hearth furnaces wherein a plurality of pivotally mounted hearth trays are moved through a furnace chamber and successively tilted at a predetermined point to effect the discharge of heated material therefrom, difficulty has been experienced in returning the hearth trays to the normal non-tilted position thereof, because of expansion and corrosion of the pivot joints which are exposed to the relatively high furnace temperature.

An object of my invention, therefore, is to provide means positively engaging said tilting hearth trays to return the same to their normal position.

In practicing my invention, I provide an annular furnace chamber, a plurality of tiltably-mounted hearth trays adapted to be moved therethrough, and motor-controlled means for engaging said trays successively to tilt the same to effect the discharge of heated material therefrom into a discharge chute extending through a wall of the furnace.

An inclined surface is formed upon the wall of the furnace chamber, which is beyond the discharge chute, in the path of movement of the front edge of the hearth trays so that, upon rotation of the hearths subsequent to discharge, the front edge of the tilted hearth rides upon the inclined surface, and continued rotation forces the hearth edge up the incline to return the tray to a horizontal position.

In the drawings,

Figure 1 is a view, in vertical section, of a furnace embodying my invention.

Fig. 2 is a development of a portion of the tray-tilting mechanism, and

Figs. 3 and 4 are details, partly in section, of the hearth trays and the means for returning them to a horizontal position.

Referring to the drawings, an annular furnace, comprising top, bottom and side walls of suitable refractory material, defines an annular furnace chamber 1. The bottom wall of the chamber 1 is slotted along the center line thereof, for a purpose hereinafter described.

Electrical resistors 2 are carried by the walls of the furnace chamber to effect the heating thereof.

An annular frame 6, resting upon a bearing surface 8 and pivoted at 10 co-axial with the furnace chamber, carries, peripherally thereof, a plurality of vertical standards 12 which extend through the slot in the bottom wall of the furnace and terminate in hearth supports 14 within the furnace chamber. Hearth trays 16 are pivotally secured to the supports 14 adjacent the outer edges thereof, to permit tilting of the trays to discharge material therefrom.

Rotation of the annular frame 6, in a clockwise direction, and the consequent movement of the hearths through the furnace chamber is effected by a motor 20 cooperating, through suitable reduction gearing 22, shown diagrammatically, with an annular rack 24 secured to the annular frame 6.

A sand seal 26, one element of which is carried by the vertical standards, and co-operating elements secured to the bottom wall of the furnace at the sides of the slot, prevent the influx of air into the furnace chamber.

A discharge chute 30 extends through the side wall of the furnace and co-operates with a bin or quench tank 32 so positioned that, when a hearth tray is rotated into alignment with said discharge chute, the tray may be tilted and the material carried thereon be discharged into the tank.

Tilting of the trays 16 is accomplished by a motor 36 which rotates a drum 38, on the peripheral surface of which is a cam groove 40, shown more particularly in Figure 2. A rod 42 extends down through the furnace roof into the furnace chamber and adjacent a side wall thereof, with a lug or finger on the upper end of the rod engaging the groove in the drum 38 so that rotation of the drum causes a vertical movement of the rod 42.

An angle 44 is pivoted, intermediate the ends thereof, to the lower extremity of rod 42. The horizontal arm of angle 44 extends beneath the edge of the hearth tray, and the vertical arm, carrying a roller 46, or other friction-reducing means, bears against the side wall of the furnace chamber.

Since the particular tray-tilting means

and control thereof constitute no part of the present invention, further description thereof is deemed unnecessary.

Within the furnace chamber, upon the outer wall thereof and adjacent the discharge chute, is secured a block 50, the upper surface of which is inclined upwardly and away from the discharge chute, in the direction of movement of the hearths through the furnace chamber.

With the tray in a tilted position, the forward edge thereof is slightly higher than the lower portion of the cam surface, so that movement of the hearth causes the forward edge of the tray to ride upon the cam surface, thereby raising the forward edge of the tray and effecting the return thereof to a normal horizontal position.

In operation, the hearth-moving means is actuated to bring the hearths successively into alignment with the discharge chute, whereupon the tilting motor is energized. Energization of the tilting motor causes the rotation of drum 38 which raises rod 42 and angle 44 to tilt the tray to effect the discharge of material therefrom into the chute 30.

A complete rotation of drum 38 returns the angle 44 to its normal position, as shown in Fig. 1. The tray 16, however, may remain in its tilted position, due to corrosion or expansion at the hinge, in which event, upon further movement of the hearth, the lower edge of the tilted tray will ride upon the cam surface of block 50 and be raised thereby to return the tray to a horizontal position.

By my invention, I have provided an effective and automatic means for returning a hearth tray to its normal horizontal position, which overcomes the difficulties resulting from expansion and corrosion of the pivotal mounting of the hearth tray.

Various 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 furnace, the combination with an annular furnace chamber, and a plurality of hearth trays mounted for movement through said chamber, of means for tilting said trays to effect the discharge of material therefrom, and means carried by a wall of said furnace for returning said trays to a non-tilted position.

2. In a rotary hearth furnace comprising a plurality of hearths mounted for movement therethrough, means for tilting said hearths individually at a predetermined point to discharge material therefrom, and means carried by a wall of said furnace beyond said discharge point for returning said tilted trays to normal position.

3. In an electric furnace, a moving hearth in the chamber thereof, a discharge opening through a wall of said furnace, means for tilting said hearth to discharge heated material through said discharge opening, and means carried by a wall of said furnace for returning said hearth to normal position subsequent to the said discharging operation.

4. In a furnace, the combination with a furnace chamber, a plurality of hearths mounted for movement therethrough, and means for tilting said hearths to effect the discharge of material therefrom, of automatic means responsive to movement of said hearths through said furnace chamber for returning said hearths to normal, non-tilted position.

5. In an electric furnace, the combination with a furnace chamber, a plurality of movable hearths therein, a discharge chute extending through a wall of said furnace, and means for tilting said hearths in sequence to discharge material carried thereby into said discharge chute, of means carried by a wall of said furnace for engaging said trays when in tilted position to return them to normal position.

6. In a furnace comprising an annular furnace chamber and a plurality of hearths mounted for movement therethrough, material-carrying trays pivotally secured to said hearths, means for tilting said trays to effect the discharge of material therefrom, and means for returning said trays to normal position subsequent to the tilting thereof comprising an inclined surface carried by a wall of said chamber and in the path of movement of said tilted trays.

In testimony whereof, I have hereunto subscribed my name this 22 day of March, 1927.

ALVIN D. KEENE.