

M. A. TURTLE.
 MEANS FOR RETURNING SURPLUS BALLS IN METAL HEATING FURNACES.
 APPLICATION FILED NOV. 4, 1919.

1,330,223.

Patented Feb. 10, 1920.
 2 SHEETS—SHEET 1.

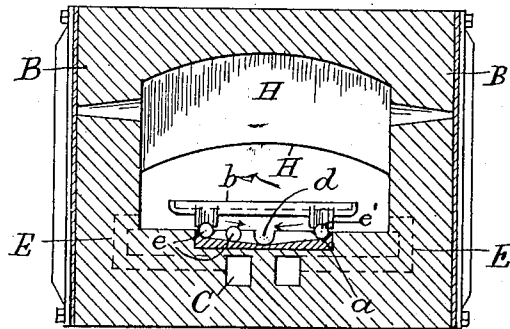
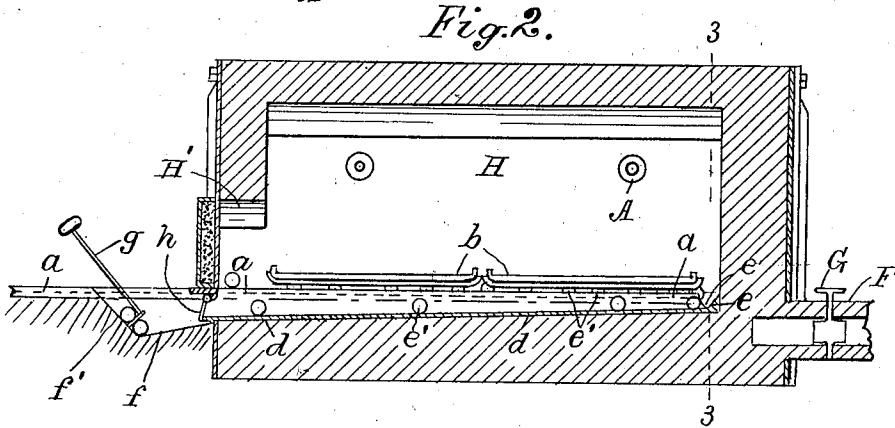
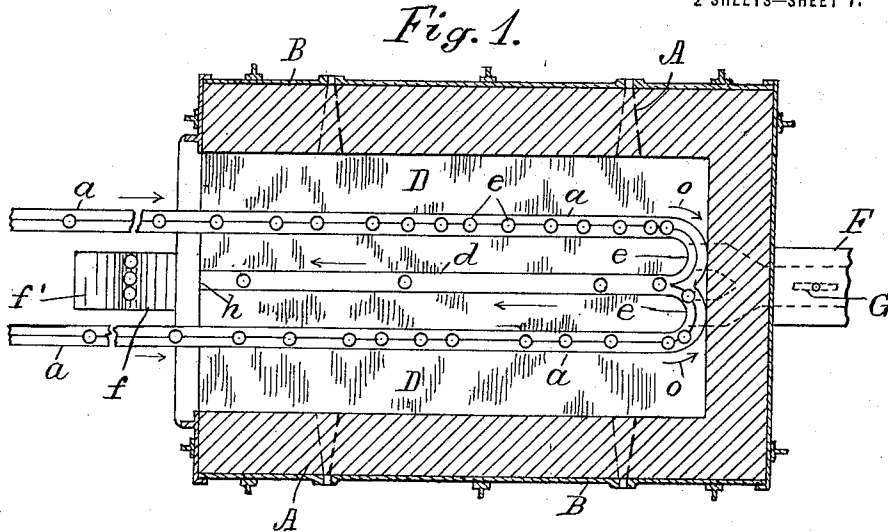


Fig. 3.

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 Morton A. Turtle.
 per Thomas S. Crane, Atty.

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Fig. 4.

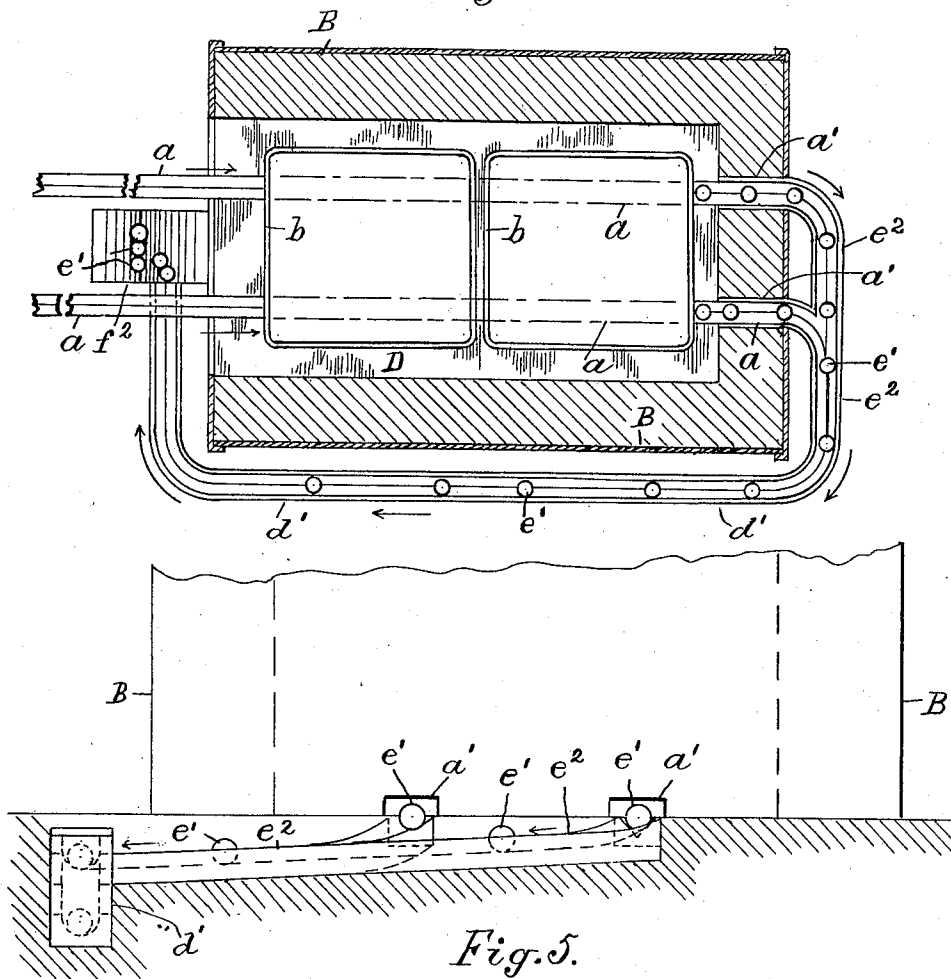


Fig. 5.

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UNITED STATES PATENT OFFICE.

MORTON A. TURTLE, OF EAST ORANGE, NEW JERSEY.

MEANS FOR RETURNING SURPLUS BALLS IN METAL-HEATING FURNACES.

1,330,223.

Specification of Letters Patent.

Patented Feb. 10, 1920.

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To all whom it may concern:

Be it known that I, MORTON A. TURTLE, a subject of the King of Great Britain, residing at 19 Dodd street, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Means for Returning Surplus Balls in Metal-Heating Furnaces, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to that class of furnaces having a metal-heating chamber into which a carriage with the material to be heated is moved, being supported in its movement upon balls moving in floor-runways beneath the edges of the carriage.

The under side of the carriage is provided with grooves or runways adapted to rest upon the balls, and it is necessary to place balls upon the runways in the direction to which the carriage is to be moved.

Such balls are successively engaged by the runways of the carriage as the carriage is moved toward them and they thus serve to support it in its forward movement; but if any excess of balls is arranged before the carriage it will not engage all of such balls, and they are therefore merely pushed in the direction that the carriage is moving and are thus liable to accumulate upon the runway at the inner end of the chamber.

Owing to the extreme heat within a furnace-chamber, it is difficult to remove such surplus balls from the inner end of the chamber; and the object of the present invention is to automatically return such surplus balls to the charging end of the furnace to a position where they are accessible to be restored again to the runway. This return is effected by forming a return channel extending from the inner end of the chamber to the front or charging end of the furnace, and connecting the runways to such channel by a cross-track so that the surplus balls will be forced into the return channel when the carriage is moved wholly into the chamber.

The runway is sloped downwardly toward the front end of the furnace, and a ball-pit is preferably formed at its terminal into which the balls may be automatically delivered from the channel. The ball-pit

is preferably formed with an incline to facilitate the drawing of the balls from the pit when returning them to the runways.

By this construction, the balls left behind the carriage in its withdrawal from the heating-chamber do not accumulate at the inner end of the chamber nor form any obstruction to the inward movement of the carriage.

The invention will be understood by reference to the annexed drawing, in which Figure 1 is a plan of a furnace provided with the improvements, the top of the chamber being omitted from the view and the return channel shown intermediate to the two runways; Fig. 2 is a longitudinal section at the center line of Fig. 1; Fig. 3 is a transverse section on line 3-3 in Fig. 2 looking toward the door of the furnace; Fig. 4 is a plan like Fig. 1, but having the return channel extended outside of the furnace-chamber from the rear to the front end of the furnace; and Fig. 5 is an enlarged elevation of the furnace viewed at the right-hand end of Fig. 4.

The invention is illustrated in a furnace having burner-openings A in the side-walls B, outlet-flues C being formed beneath the floor D of the chamber and connected with the side of the chamber by flue-passages E, and with an outlet-duct F by means of a damper G.

The furnace-chamber H has a doorway H' at the front end, and runways *a* are extended through the doorway along the floor of the furnace to the rear end of the chamber H.

Two carriages *b* are shown sustained in tandem relation upon the runways by balls *c*, and the runways are extended outside of the furnace-front sufficiently to accommodate the carriages outside of the furnace-door, where they may receive the desired charge.

The return channel *d* is shown formed in the floor of the chamber between the runways, and connected therewith at the rear or inner end by cross-tracks *e* which slope downwardly from each of the runways toward the return channel, so that any balls pushed to the rear ends of the runways will automatically roll into the said channel.

The channel is extended to a ball-pit *f*

formed between the runways outside the furnace-door, and is sloped to such pit so that all the balls entering the inner end of the channel will automatically roll into the pit.

The outer end of the pit is formed with an incline f' to facilitate the pulling of the balls out of the pit by a hoe-shaped tool g . The balls may then be rolled upon the mill-floor into the runways, to be disposed in front of the carriages upon their removal from the chamber.

The essential feature of the invention is the provision of a downwardly inclined return channel connecting the rear end of the furnace with the front end of the furnace so as to restore the surplus balls to the front.

It is immaterial where this return channel is located; and Fig. 4 illustrates the disposition of the channel d' at the outside of the furnace-wall, and the runways extended through openings a' to a cross-track e^2 sloped downwardly to the rear end of the return channel d' which is carried outside of the furnace-chamber to the front end of the furnace.

Fig. 5 shows the inclination of the runways at their rear end, and of the cross-track e^2 and channel d' .

Such return channel may be connected beneath the nearest runway with a ball-pit f^2 between the runways, as shown in Fig. 4, although the same convenience for retrieving the balls would be effected by connecting the return channel with a pit located at the outer side of the nearest runway.

With this construction, the runways may be made level upon the floor of the heating-chamber nearly to the rear end of the same, and sloped downward through the openings a' which carries the balls automatically to the cross-track e^2 .

Any accumulation of balls within the rear end of the chamber would obviously obstruct the movement of the carriage at that point, but the construction shown in both Figs. 1 and 4 permits the movement of the carriage to push any surplus balls into the cross-track or into the inclined part of the runways extending through the openings a' , and thus leave the runways clear for the inward movement of the carriage.

In Fig. 2, the balls supporting the carriage nearest the rear end of the chamber are shown pushing surplus balls into the cross-track e , and the movement of such balls toward the head of the return channel is indicated by arrows o . Where the return channel is in the bottom of the heating-chamber, it may be open throughout its length and a trap-door h applied to its outer end in the ball-pit, to prevent a current of cold air from entering the chamber.

Having thus set forth the nature of the invention what is claimed herein is:

1. An annealing furnace of the class described, having runways extended from the front of the furnace into the heating-chamber, a channel adapted to return the balls to the front of the furnace, and a cross-track connecting the runways with the channel, thus securing an automatic return of the surplus balls to the front of the furnace.

2. An annealing furnace of the class described having runways extended from the front of the furnace upon the floor of the heating-chamber, a channel formed in the floor of the chamber and sloped downwardly toward the front of the furnace, and a cross-track connecting the rear ends of the runways with the highest point of the channel to secure the automatic return of the balls to the front of the furnace.

3. An annealing furnace of the class described having runways extended from the front of the furnace into the heating-chamber, balls movable upon the runways and a carriage sustained upon the balls, a channel adapted to return the balls to the front of the furnace and a cross-track connecting the runways with the channel, thus securing an automatic return of the balls to the front of the furnace.

4. An annealing furnace of the class described having runways extended from the front of the furnace into the heating-chamber, balls movable upon the runways and a carriage sustained upon the balls, a channel sloped downwardly toward the front of the furnace and a cross-track connecting the runways with the channel to secure the automatic return of the balls.

5. An annealing furnace of the class described having a plurality of runways extended into the heating-chamber, balls movable upon the runways and a carriage sustained upon the balls, a return channel sloped downward toward the front end of the chamber, and a cross-track at the rear of the furnace-chamber connecting the plurality of runways with the return channel.

6. An annealing furnace of the class described having a doorway at the front of the heating-chamber, a plurality of runways extended through the doorway into the heating-chamber and extended also outside of the doorway, a ball-pit adjacent to such extensions of the runways, a return channel extended from the rear of the furnace-chamber to the ball-pit, and sloped downwardly toward the same, and a cross-track connecting the runways with the said return channel.

7. An annealing furnace of the class described having a doorway at the front of the heating-chamber, a plurality of runways extended through the doorway into the heat-

ing-chamber, ball-pits at the front of the furnace, a return channel extended from the rear of the furnace-chamber to the ball-pit and sloped downwardly toward the same, a
5 cross-track connecting the runways with the said return channel, a trap-door at the front of the return channel to normally close the same, and an inclined plane in one side of the ball-pit to facilitate the drawing of the balls therefrom. 10

In testimony whereof I have hereunto set my hand.

MORTON A. TURTLE.