M. A. TURTLE.

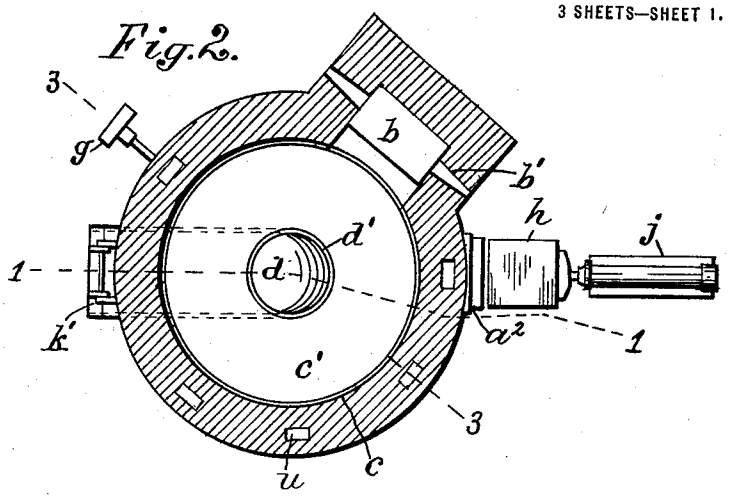
FURNACE WITH ROTATABLE HEARTH.

APPLICATION FILED FEB. 10, 1920.

1,385,480. **Patented July 26, 1921.**

3 SHEETS—SHEET 1.

Fig. 2.



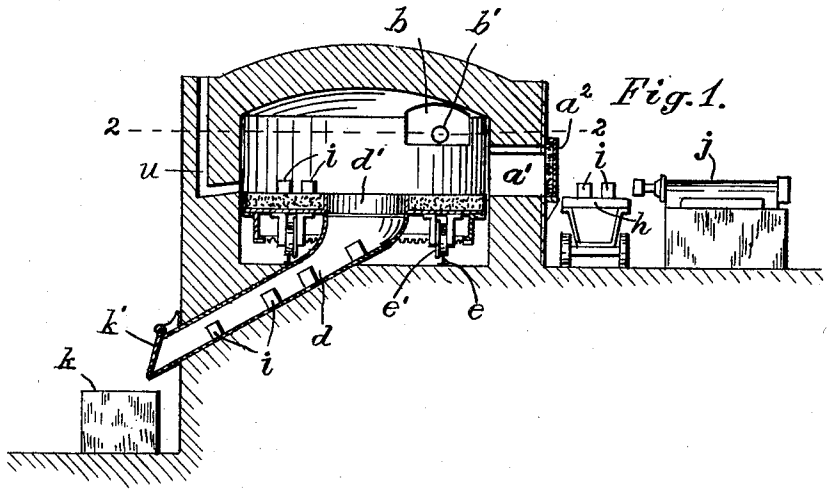


Fig. 1.

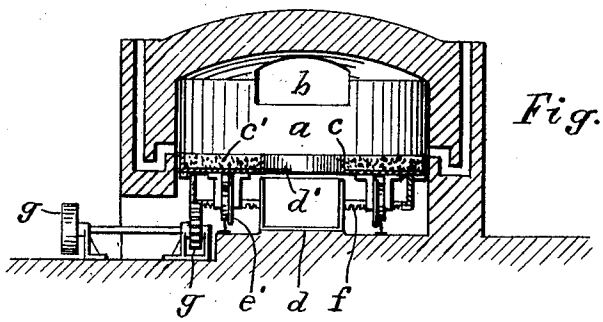


Fig. 3.

Inventor.

Morton A. Turtle, per

Thomas S. Crane, Atty.

M. A. TURTLE.

FURNACE WITH ROTATABLE HEARTH.

APPLICATION FILED FEB. 10, 1920.

1,385,480. Patented July 26, 1921.

3 SHEETS—SHEET 2.

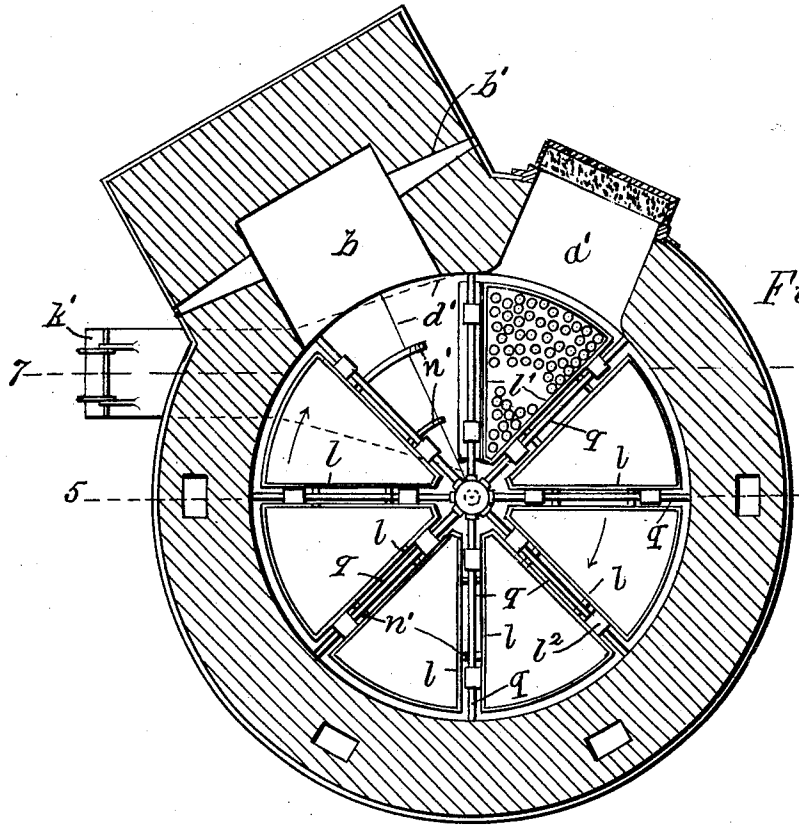
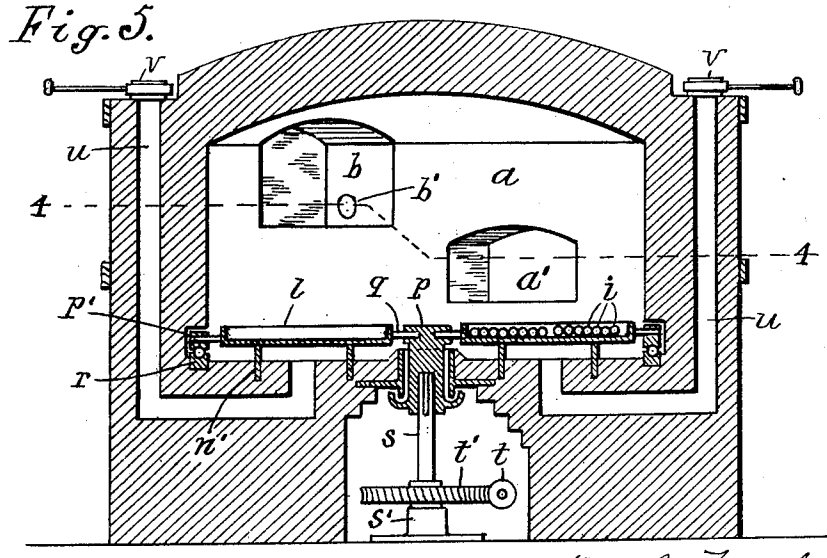


Fig. 4.

Fig. 5.



Inventor. Morton A. Turtle, per Thomas J. Crowe, atty.

M. A. TURTLE.

FURNACE WITH ROTATABLE HEARTH.

APPLICATION FILED FEB. 10, 1920.

1,385,480. Patented July 26, 1921.

3 SHEETS—SHEET 3.

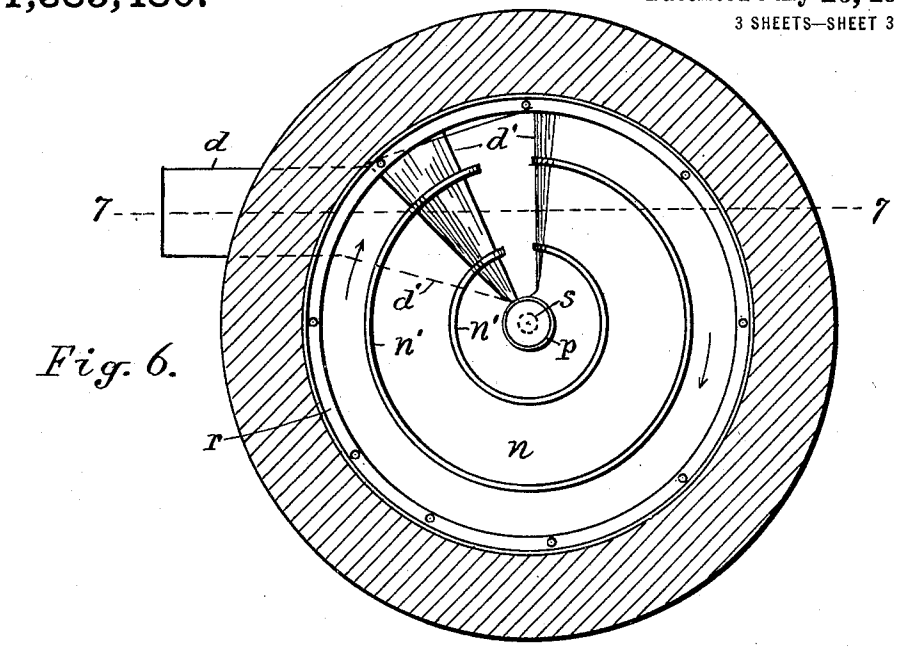


Fig. 6.

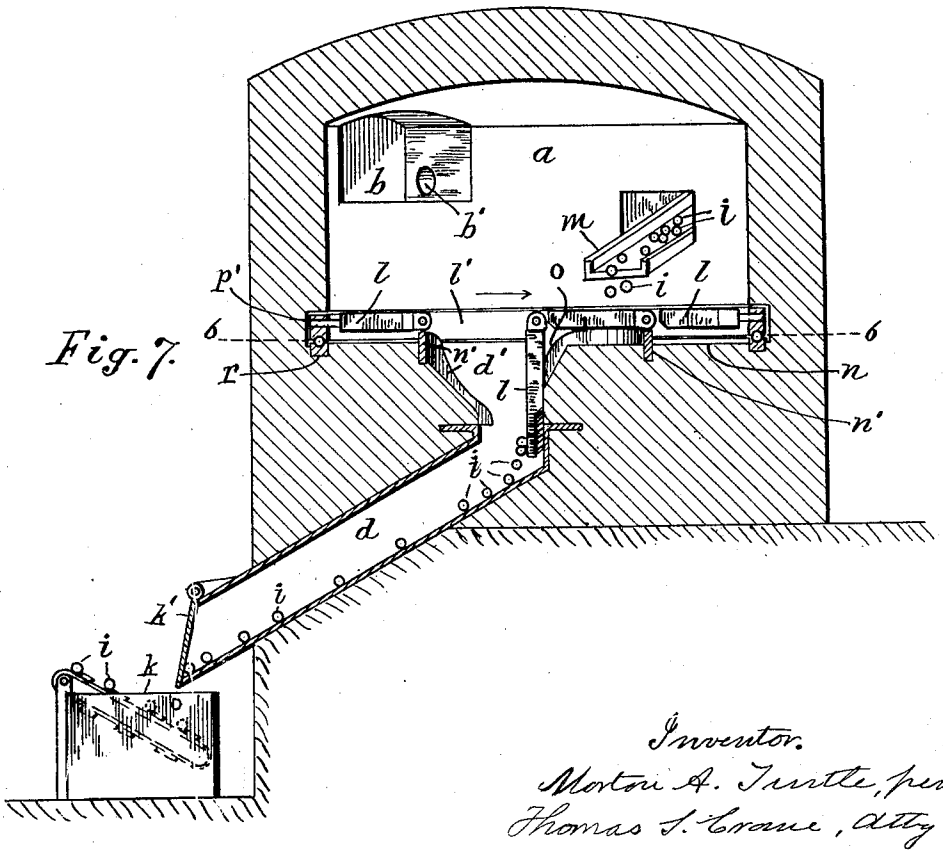


Fig. 7.

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

UNITED STATES PATENT OFFICE.

MORTON A. TURTLE, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO W. S. ROCKWELL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

FURNACE WITH ROTATABLE HEARTH.

1,385,480. Specification of Letters Patent. Patented July 26, 1921.

Application filed February 10, 1920. Serial No. 357,763.

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 Furnaces with Rotatable Hearths, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to furnish a furnace adapted for heating in succession a large number of relatively small articles which can be fed successively into the heating-chamber and discharged automatically therefrom when sufficiently heated.

The invention is particularly adapted for heat-treating such articles, and quenching them in a fluid bath before exposure to the atmosphere.

The objects of the invention are obtained by forming a furnace with a rotatable hearth having a discharge aperture therethrough and a chute or channel beneath the aperture to receive the discharged material. The chute may discharge the articles to a liquid bath if required.

The hearth is mounted to turn and forms the bottom of the heating-chamber, and is provided with gearing to rotate it at pleasure.

The aperture may be in the center of the hearth, and in such case the mouth of the chute or channel is located beneath the central aperture. The hearth may, however, be formed with a series of apertures extended therethrough at equal distances from its center, and in such case the mouth of the chute is arranged beneath the hearth upon a line with the path of the said apertures.

Means for discharging the material automatically to the chute is provided by hinging a carrier at one edge of each aperture and providing a rail fixed beneath the hearth to sustain the carriers in the plane of the hearth excepting over the mouth of the chute.

This construction causes each carrier in turn when it reaches such point to drop into the mouth of the chute and discharge its load to the chute. The carriers are preferably made of pan-shape to retain small articles safely until dumped into the chute.

Two embodiments of the invention are shown herein, Figure 1 representing a section of a furnace, having hearth with aperture in the center, on line 1—1 in Fig. 2; which figure is a plan in section on line 2—2 in Fig. 1. Fig. 3 is a vertical section on line 3—3 in Fig. 2; Fig. 4 is a plan of a furnace with pans hinged in the hearth, in section on line 4—4 in Fig. 5; Fig. 5 is a section on line 5—5 in Fig. 4; Fig. 6 is a plan in section on line 6—6 in Fig. 7; and Fig. 7 is a section on line 7—7 in Fig. 4.

Figs. 1 to 3 of the drawing show one form of the apparatus in which the rotatable hearth has its aperture located at the center, and the chute extended beneath such aperture to receive the articles discharged therefrom.

Figs. 4 to 7 inclusive show the rotatable hearth provided with eight pans pivoted to carry the material excepting over the mouth of the chute, at which point the pans are tipped downwardly to discharge their contents.

In Figs. 1 to 3 the heating chamber a is shown of circular form and has at one side a combustion-chamber b provided with burner-openings b'. This furnace is especially adapted for heat-treating metal articles which require a relatively high temperature.

The hearth is shown as an annular metal trough c having a floor of refractory material c'. The trough which constitutes the hearth is supported upon annular rails e by means of wheel e', and a chute d is mounted beneath the aperture d' in the center of the hearth. Gearing f and g is provided to rotate the hearth at pleasure.

A doorway a' is extended from the heating-chamber at the level of the hearth and provided with a door a^2, and a table h is shown in front of the doorway arranged to support the articles i for insertion in the furnace.

A hydraulic pusher j is shown to push the articles into the furnace upon the hearth.

Any equivalent means may be used to load the articles successively upon the annular surface of the hearth while different sections of its surface are turned adjacent to the doorway. In like manner a suitable pusher would be operated through the doorway to push the articles upon successive sections of the hearth into the aperture b', to be discharged by the chute d.

Outlet-flues u from the heating-chamber a are shown in Figs. 4 and 5 provided with

dampers v at their upper ends. These flues are extended downwardly beneath the rotating hearth to maintain the pressure of the gases in the heating-chamber until they are discharged therefrom.

In Figs. 1, 2 and 3 outlet-flues u' are shown extended from the heating-chamber just above the level of the rotating hearth but looped downwardly like a trap to maintain the pressure of gases in the heating-chamber until they are discharged.

A tank k is shown beneath the mouth of the chute which extends outside of the furnace.

A flap or hinge-leaf k' is applied to the outlet of the chute to exclude air, and articles discharged from the chute may thus be thrown into the bath in the tank without any material exposure to the air.

The constructions of Figs. 1, 2 and 3 requires the provision of a pusher j to push the articles into the furnace upon the hearth, and applicable to push the articles upon different portions of the hearth toward the center aperture for discharging them to the chute; but Figs. 4 to 7 inclusive show a hearth provided with pivoted pans l to discharge the material. The material to be treated can therefore be continuously fed upon the hearth and automatically discharged therefrom by the tipping or dropping of the pan over the mouth of a chute.

The hearth is shown provided with a central hub p and an annular rim p' connected to the hub by a series of spokes or rods q which form the hinge-pivots of a corresponding series of pans l.

A ball-race r is shown in Fig. 5 rotated in the wall of the heating-chamber with the balls supporting the rim p'.

The hub p is supported by a shaft s journaled in a step s' and turned by means of a worm t and worm-wheel t' upon the shaft. This gearing provides means to rotate the hearth at any desired speed.

With the construction of Figs. 1, 2 and 3, the discharge of the articles is necessarily intermittent, as the rotation of the hearth must be stopped to remove the charge upon the hearth before supplying another.

By providing means to support the pans when they are not over the mouth of the chute the operation of the furnace is uninterrupted and continuous. This is effected by hinging the series of pans l in a series of apertures l' upon the hearth with the mouth d' of the chute arranged beneath the path of the apertures and providing means for dumping the pans successively into the mouth of the chute.

The floor n of the heating-chamber is provided with two annular rails n' which contact with the under side of the pans, and hold them in the plane of the wheel excepting over the mouth b' of the chute.

These parts form a wheel-like skeleton, the sections between the spokes forming the apertures in which the pans are carried around in the heating-chamber.

The hinges l^2 of the pan turn freely upon the rods or spokes q and the pans rest loosely upon the rails n' which hold them level until they reach the mouth b' of the chute.

The pans may be successively charged with small articles by feeding them continuously through the wall of the heating-chamber by a spout m extended over the path of the pans, as indicated in Fig. 7.

With such arrangement the pans are filled immediately after they are dumped, as indicated in Fig. 7, and the hearth is turned at such rate that the articles are sufficiently heated when they are carried around one circuit to the dumping point d'.

In Fig. 7 one of the pans is shown dropped into said mouth and in contact with the convex surface of a cam o, which is attached to the floor in such position as to lift each pan in succession to the plane of the hearth as it is moved away from the mouth d' of the chute.

The rails n', as shown in Fig. 6, are interrupted over the mouth of the chute to permit the dropping of each pan into the said mouth.

The spout m is shown directed toward the pan adjoining the mouth of the chute, which pan would be emptied in passing such mouth and therefore in readiness to be filled again.

It is obviously immaterial how the heating-chamber is kept at the required temperature, to operate upon the articles which require treatment, without injury to the structure.

Figs. 4 and 5 show the same combustion-chamber b, burner-inlets b' and doorway a' as Figs. 1 and 2; but Fig. 7 shows the spout m inserted through the wall of the heating chamber in place of a doorway.

It is immaterial what means be employed to continuously supply the material or articles to the movable hearth, or to discharge such articles from the hearth downwardly into the chute.

It will be observed that the mouth of the chute is differently located and differently shaped with the construction of Figs. 1 and 7, but the mouth of the chute serves the same purpose in all the constructions shown, in furnishing a channel through which the heated material can be discharged from the rotatable hearth to a suitable receptacle for the further handling of the articles; and the shape and direction of the chute are therefore immaterial.

Where it is desired to quench such articles without exposure to the atmosphere the chute would terminate in a water-tank di-

rectly below the surface of the water and the articles would be removed from the tank by any suitable means after cooling.

The term chute is used herein to signify any channel through which the material passes when discharged from the rotating hearth.

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

1. A heat-treating furnace provided with a rotatable hearth having a discharge aperture therethrough, means for rotating the hearth and a chute beneath the aperture to receive the discharged material.

2. A heat-treating furnace provided with a rotatable hearth having a discharge aperture therethrough, means for rotating the hearth, means for charging the material to be treated upon the hearth, and a chute beneath the aperture to receive the discharged material.

3. A heat-treating furnace provided with a rotatable hearth having a discharge aperture therethrough, means for heating the chamber, an inlet for introducing the material to the hearth, a chute beneath the aperture to receive the discharged material, and means for rotating the hearth.

4. A heat-treating furnace provided with a rotatable hearth having a discharge aperture therethrough, means for heating the chamber above the hearth, an inlet for introducing the material to the hearth, mechanism for pushing the material through such inlet upon the hearth, a chute beneath the aperture to receive the discharged material, and means for rotating the hearth above the mouth of the chute.

5. A heat-treating furnace provided with a rotatable hearth having a plurality of apertures extended therethrough at equal distances from the axis of the hearth, a chute having its mouth arranged beneath the hearth upon a line with the path of the said apertures, and means for discharging the material through the apertures successively as each passes over the mouth of the chute.

6. A heat-treating furnace provided with a rotatable hearth having an aperture extended therethrough at one side of its center, a chute having its mouth arranged beneath the hearth upon a line with the path of the said aperture, a carrier hinged upon the hearth to swing in the said aperture, and means for supporting the carrier during the rotation of the hearth until the carrier passes over the mouth of the chute.

7. A heat-treating furnace provided with a rotatable hearth having a plurality of apertures extended therethrough at equal distances from the axis of the hearth, carriers hinged to the hearth to swing in the said apertures and means for supporting the carriers during the rotation of the hearth until each passes over the mouth of the chute.

8. A heat-treating furnace provided with a rotatable hearth having an aperture extended therethrough at one side of its center, a chute having its mouth arranged beneath the hearth upon a line with the path of the said aperture, a carrier hinged upon the hearth to swing in the said aperture, one or more rails fixed below the hearth to support the carrier excepting over the mouth of the chute, and the said mouth at one side being provided with a cam to restore the carriers to the level of the hearth.

9. A heat-treating furnace provided with a rotatable hearth having a plurality of apertures extended therethrough at equal distances from the axis of the hearth, carriers hinged upon the hearth to swing in the said apertures, one or more rails fixed below the hearth to support the carriers excepting over the mouth of the chute, and the said mouth at one side being provided with a cam to restore the carriers to the level of the hearth.

10. A heat-treating furnace provided with a rotatable hearth comprising a skeleton wheel with hub, rim and spokes, a chute having its mouth arranged beneath the spaces between the spokes at one side of the hub, carriers hinged upon the spokes to drop successively into the said mouth, and means for supporting the carriers at the plane of the wheel excepting over the mouth of the chute.

11. A heat-treating furnace provided with a rotatable hearth comprising a skeleton wheel with hub, rim and spokes, a ball-race supporting the rim of the wheel, a shaft and step supporting the hub of the wheel and connected with means for rotating the hearth at pleasure, a chute having its mouth arranged beneath the spaces between the spokes at one side of the hub, carriers hinged upon the spokes to drop successively into the said mouth, and means for supporting the carriers at the plane of the wheel excepting over the mouth of the chute.

12. A heat-treating furnace provided with a rotatable hearth having a discharge aperture therethrough, means for heating the chamber above the hearth, a chute beneath the aperture to receive the discharged material, and an outlet-flue disposed to draw the gases below the level of the hearth in their escape from the furnace chamber.

In testimony whereof I have hereunto set my hand.

MORTON A. TURTLE.