Dec. 22, 1942. C. A. FURGASON 2,305,586

ROTARY FURNACE

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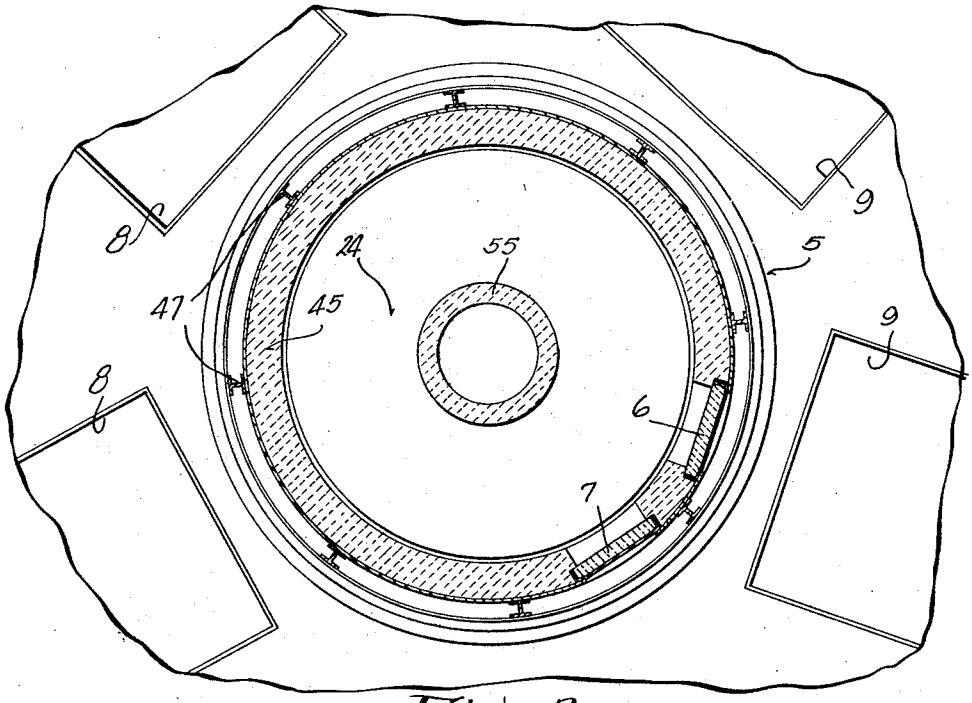


Fig. 2.

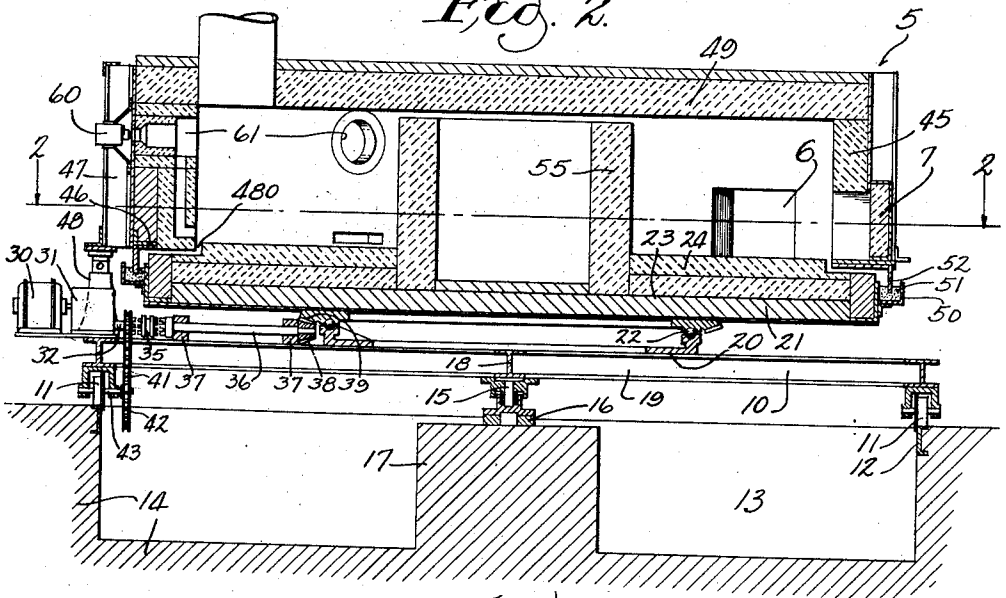


Fig. 1.

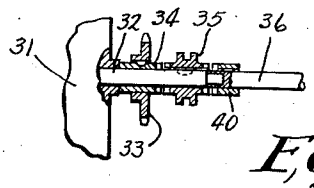


Fig. 3.

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ROTARY FURNACE

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7 Claims. (Cl. 263—7)

This invention relates to rotary furnaces.

It is an important object of the invention to provide a furnace which is rotatable as a unit and which is, therefore, adapted to face alternatively a number of loading and unloading stations.

Another object is to provide a furnace which is rotatable and which is provided with a hearth independently rotatable in respect to the remainder of the furnace structure.

A further object of my invention is to so shape the interengaging and adjacent parts of the furnace and the hearth so that the furnace itself may be elevated to separate the furnace and hearth for cleaning and repair purposes.

Another object of the invention is to provide a furnace mounted in its entirety upon a turntable and provided with a hearth in turn supported for rotation on said turntable with power means adapted for selective engagement with either the hearth or the turntable for the power rotation of the turntable and all that it supports or the hearth alone.

Other objects and advantages of the invention will become apparent to those skilled in the art upon examination of the following description.

In the drawing:

Figure 1 is a vertical section through the furnace, the supporting structure therefor, and the mechanism for rotating the respective parts.

Figure 2 is a horizontal section, on reduced scale, on line 2—2 of Fig. 1.

Figure 3 is an enlarged fragmentary view, partially in section, of the selective drive mechanism shown in Fig. 1.

Like parts are identified by the same reference characters throughout the several views.

Furnaces used in the metal arts must, of course, have doors for the reception and discharge of material to be treated and in the furnaces heretofore known in this art, the discharge door is faced in one direction, either opposite a particular quench tank or opposite a discharge floor, thus forcing the operators of the furnace to adapt their furnace feeding and discharge operations to the limited zone immediately in front of the doors. My furnace 5, however, is mounted for turntable rotation to present its charging door 6 and its discharge door 7 opposite any one of a large number of loading or discharge platforms, pits or tanks, such for instance, as oil or water quench tanks 8, or 9, as diagrammatically shown in Fig. 2, it being understood that other types of equipment may be disposed about the furnace 5 in any convenient arrangement, since my furnace is mounted for rotation upon structure now to be described.

An examination of the drawing will show how I have mounted my furnace 5 upon a turntable 10 which is supported upon flanged wheels 11 carried by a circular track 12 formed at the margins of a circular pit 13, the walls and bottom 14 of which are of concrete or other suitable material. The turntable 10 is centered upon king pin 15 supported in suitable bearings upon a pedestal 16 placed upon a pier 17 in the center of the pit 13.

Crossbeams 18 and 19 forming part of the turntable 10 provide support for hearth turntable 20 upon which rotatable hearth 21 is supported for rotation independently of the furnace structure mounted upon turntable 10. Suitable bearings at 22 provide for easy rotation of the hearth, which includes the usual bed 23 and work-receiving floor 24, onto which work is placed for treatment.

Thus I provide upon a solid turntable foundation provision for support and rotation of the furnace structure 5 and for independent rotation of the hearth while the furnace itself remains stationary.

Mounted at a point upon the turntable 10, I provide a motor 30 and a gear reducer set 31 having output shaft 32 for power application to mechanism for simultaneously rotating the furnace and hearth or for rotating the hearth alone. Upon the output shaft 32 of the gear reducer set, I provide a sprocket 33 for free rotation, its hub 34 being notched for engagement with a dog clutch 35 keyed to the shaft 32 as indicated in Fig. 3. A hearth shaft 36 extends axially of the shaft 32 through suitable bearings 37 to a point adjacent the hearth turntable 20 where I provide a pinion 38 for engagement with a ring gear 39 forming part of the rotatable hearth structure. A sleeve 40 upon the shaft 36 notched similarly to the hub 34 of sprocket 33, and parts as shown in Figure 3 are spaced so that dog clutch 35 may be slidably adjusted on shaft 32 to provide power connection alternatively to the sprocket 33 or to the shaft 36 and to the hearth turntable.

Upon sprocket 33 I provide a chain 41 extending to a sprocket 42 upon the axle 43 for one of the wheels 11. Thus, when the dog clutch 35 is engaged with the hub 34 of sprocket 33, power to rotate furnace supporting wheel 11 is transmitted to the wheel for rotation of the entire furnace 5 with its hearth.

The construction of the furnace 5 may be of

any type approved for the general duties to which industrial heating furnaces may be adapted, but I construct my furnace with the usual refractory walls 45. These walls are supported upon a flange 46 structurally integral with a "stockade" of vertical I-beams 47 which in turn are supported above the turntable 10 upon screw jacks 48. Thus, the walls of my furnace and the top 49 thereof, are rotated with the turntable 10 as a unit.

The hearth 21 is provided with a channel margin 50 to receive sand or other suitable easy "flowing" material 51 capable of withstanding heat. A depending rim 52 below the wall of the furnace extends into the channel and into the material 51 to provide a seal against convection currents.

A central annular wall 55 extending up from the hearth 21 defines the limits of the working area of the hearth floor 24 and serves to baffle and thermally zone the furnace.

The usual oil burner "guns" 60 working through ports 61 in the walls of the furnace provide the heating means to carry on the functional heating operations.

The screw jacks 48, in addition to their function of supporting the walls and dome of the furnace, provide for easy elevation of said walls and dome so that repairs to the floor of the hearth may be accomplished easily and, in the event that material to be treated is accidentally jammed in the space 480 between the wall and the hearth, the walls may be elevated to release the troublesome product.

From the above description it will be seen that I have provided a furnace for industrial heating which is particularly suited to a business in which job loads of various types of products are handled from time to time. For instance, if the production of gears for automotive products is the predominant work to be performed, the furnace will be rotated so that the discharge door 7 will be positioned opposite an oil quench tank 8, but if a job load of work calling for slow cooling of heat treated material is presented for treatment in the furnace, the operator will merely clear the furnace of its load of gears and then engage the clutch 35 with the sprocket 33 for rotation of the entire furnace so that the discharge door will be opposite a soaking pit and after the job load has been completed, the furnace may again be readily positioned for gear handling operations, thus avoiding loss of time.

It will also be observed from the above description that my furnace, even though versatile, will occupy, with its soaking pits and quenching tanks, a minimum of factory space. In fact, the saving in this respect is surprising, even when compared with the most effeciently organized furnace installations heretofore known.

I claim:

1. A revoluble hearth furnace having a turntable for the support of the furnace and hearth, said turntable being supported revolubly above a foundation and the foundation being depressed in areas exterior of the zone beneath the furnace whereby to provide pits for reception of furnace heated material at spaced points circumferentially of the furnace.

2. A furnace mounted on a turntable for unitary revolubility, a hearth for the furnace mounted for rotation on said turntable, power connections alternatively connectible to the turntable or to the hearth for rotation of either.

3. A furnace mounted on a turntable for unitary revolubility, a hearth for the furnace mounted for rotation on said turntable, power connections alternatively connectible to the turntable or to the hearth for rotation of either, the furnace having a ported device for charging the furnace rotatable therewith to expose the hearth at any one of a plurality of hearth charging or discharging stations.

4. A hearth-type furnace comprising the combination with a foundation provided with service pits, of a turntable movable respecting said pits, a furnace including a wall and a hearth mounted on said turntable for indexing movement thereon and having a door registerable with said pits in the course of turntable rotation, and means for rotating the turntable.

5. The combination recited in claim 4 in which a second turntable is mounted upon the first and the hearth is mounted on the second turntable for independent rotation respecting the wall.

6. The combination recited in claim 4 in which a second turntable is mounted upon the first and the hearth is mounted on the second turntable for independent rotation respecting the wall, and power means mounted upon the first mentioned turntable including connections to each of said turntables for selective power rotation thereof.

7. A furnace construction including two concentric turntables of differential diameter, a hearth built upon the inner turntable and a furnace wall and furnace wall-supported top supported upon the outer turntable.

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