Jan. 13, 1953 A. C. HOWARD 2,625,385

DRIVE FOR FORGING FURNACES

Filed March 5, 1951 2 SHEETS—SHEET 1

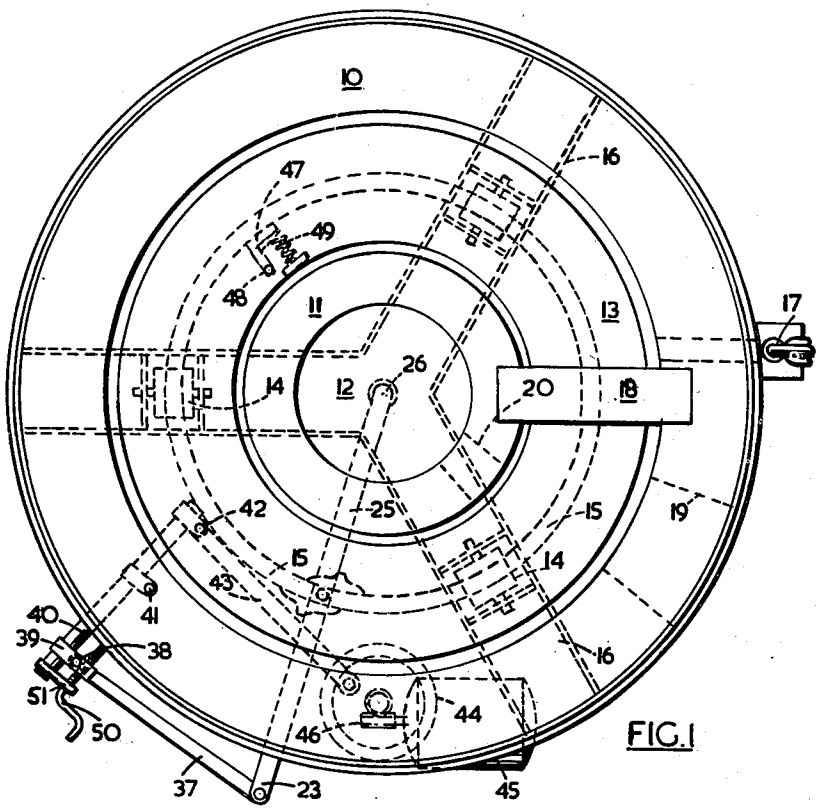


FIG. 1

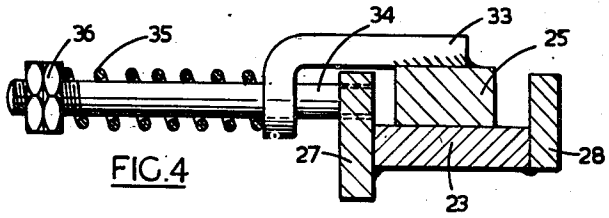


FIG. 4

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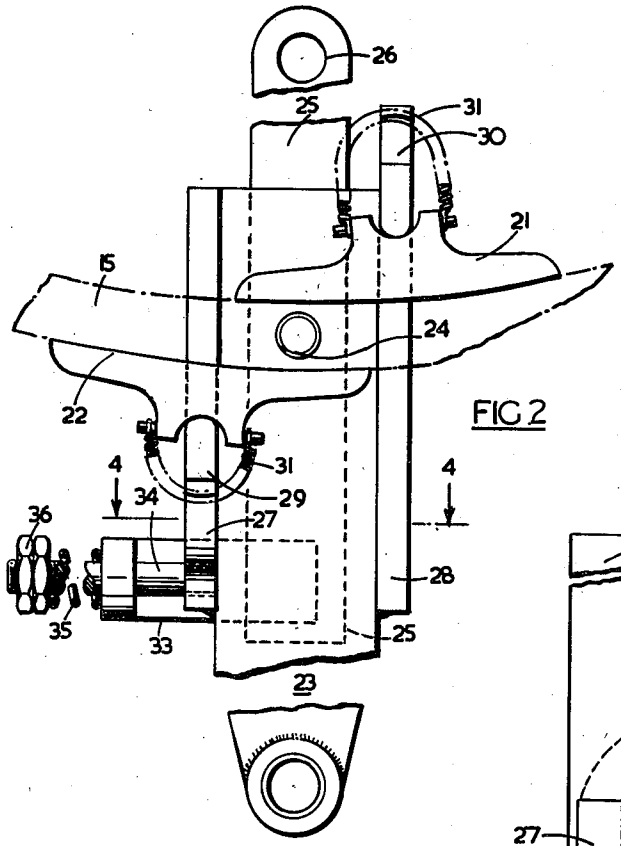


FIG 2

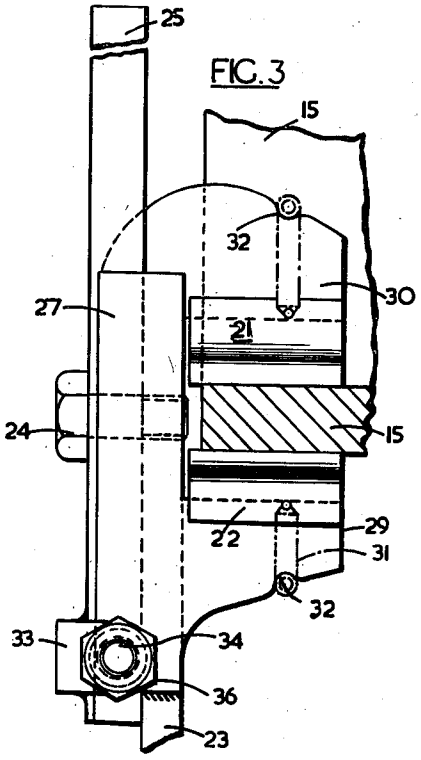


FIG. 3

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UNITED STATES PATENT OFFICE

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DRIVE FOR FORGING FURNACES

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Application March 5, 1951, Serial No. 213,842
In Great Britain March 10, 1950

4 Claims. (Cl. 263—7)

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The invention relates to a furnace, for use in heating articles (e. g., in preparation for a forging operation), of the kind in which an annular hearth, forming a floor of an annular heating chamber, is rotated for passing the objects through the chamber. The main object of the invention is to enable the heating time to be adjusted, in a simple manner, to suit individual conditions.

According to the invention, the hearth can have a downwardly-directed concentric annular flange on the underside serving both for rotatively supporting the hearth from rollers journalled in a stationary frame and for receiving the drive. The hearth is preferably rotated, step-by-step, by a pair of friction members, which, when moved in one direction through an arc which is concentric with the hearth, grip the opposite sides of the flange to advance the hearth, and which, during a corresponding return arcuate movement, release the flange, there being a one-way-acting brake acting on the flange for preventing reverse rotation of the hearth but allowing the latter to be advanced by the friction members.

In the accompanying drawings—

Figure 1 is a diagrammatic plan view of a furnace with the roof removed and with a rotary annular hearth driven by one means according to the invention;

Figure 2 is a plan view of a part of the hearth-driving means shown in Figure 1 and drawn to a larger scale, the parts being shown in the driving position;

Figure 3 is a side view of Figure 2 looking from the left; and

Figure 4 is a section on the line 4—4 of Figure 2.

In the drawings is illustrated a furnace having spaced concentric annular walls 10, 11 defining a central flue 12 and also an annular heating chamber having its floor formed by a rotary annular hearth 13. The hearth has, at the underside, a downwardly-directed annular flange 15 which extends below the furnace and rests on the peripheries of rollers 14 (three in the example shown) which are journalled in arms 16 of a supporting frame for the furnace, the axes of the rollers being radial with respect to the furnace. The flange 15 thus supports the hearth rotatively from the rollers and, according to the invention, also receives a suitable drive for the hearth.

The furnace shown, which is in accordance with our specification No. 213,841, has an oil

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firing arrangement 17 on one side of a baffle 18 at the top of the heating chamber and an opening 19 through which articles can be placed on the hearth and taken therefrom. In operation the baffle causes the flame to circulate in the counter-clockwise direction in Figure 1 until it reaches an outlet 20 leading to the central flue, and the hearth is rotated clockwise. Obviously, the speed of rotation of the hearth will determine the temperature attained by the articles when a steady flame is used.

The form of drive shown for the hearth includes two friction shoes 21, 22 freely supported on an arm 23 at equal distances from the median axis of the latter and on opposite sides of the flange 15. The arm 23, on a vertical axis in the median plane of the flange 15, is pivoted at 24 to a lever 25 of which the remote end has a bearing 26 by which it is pivoted on a vertical axis at the centre of the furnace. The arm 23 has side plates 27, 28 with upstanding portions 29, 30, respectively on opposite sides of the flange 15, to which the shoes are held by garter-like springs 31 in a manner to allow them to rock laterally, the springs being located in notches 32 of the said upstanding portions. The lever 25 extends beyond the pivot 24 to between the side plates 27, 28 (which latter thereby limit relative hinging of the lever and arm) and the extending end of the lever has fast therewith a bracket 33 through which freely passes a bolt 34 having a threaded connection with the side plate 27. A spring 35 is compressed between the bracket 33 and a pair of lock nuts 36 on the bolt whereby controllably to bias the arm 23 and lever 25 about the pivot 24 for urging the shoes 21 and 22 onto the flange 15.

The outer end of the arm 23 has a pivotal connection to a connecting rod 37 of which the other end is pivoted at 38 to a sleeve 39. This sleeve is slidable on a rocking lever 40 pivoted intermediate its ends at 41 to the frame. The other end of the rocking lever is pivoted at 42 to a connecting rod 43 driven from a crank disc 44 which, in turn, is driven from an electric motor 45 through worm gearing 46.

A brake shoe 47, pivoted to the frame at 48, is biassed by a spring 49 into contact with the flange 15 for resisting counter-clockwise rotation (i. e., in Figure 1) of the latter.

In operation the rocking lever 40 is oscillated from the crank disc 44 and oscillates the arm 23 and lever 25 about the axis of the bearing 26. When the arm 23 moves counter-clockwise in Figure 2 the brake shoe 47 grips the flange 15

and the arm 23 and lever 25 hinge about the pivot 24 for compressing the spring 35 to relieve the pressure of the shoes 21 and 22 on the flange 15. The hearth is thus rotated step-by-step. When the arm 23 starts to move clockwise (i. e., the position shown in Figure 2) the spring 35 is permitted to extend for hinging the arm 23, in a clockwise direction relatively to the lever 25, for bringing both shoes 21 and 22 into gripping relationship with the flange 15. Still further clockwise movement of the arm 23 (i. e., for completing the half-oscillation) rotates the hearth a step forward, the brake shoe 47 riding on the flange 15.

The sleeve 39 is fast with a nut on a manually rotatable screw 50 which is rotatively carried, with endwise location, by a bracket 51 fast with the rocking lever 40. By turning the screw 50 the sleeve 39 is moved longitudinally of the rocking lever and thus varies the amplitude of the oscillation of the arm 23 and thus of the shoes 21 and 22 when gripping the flange 15. In this way the time of rotation of the hearth can be controlled for bringing the articles to a desired temperature when a steady flame is being used.

What I claim as my invention and desire to secure by Letters Patent of the United States is:

1. A furnace comprising an annular rotary hearth forming the floor of an annular heating chamber, a downwardly-directed concentric annular flange on the underside of said hearth, a stationary support, rollers journalled on said support with their axes of rotation directed radially of the axis of rotation of said hearth, said flange engaging said rollers for the rotative support of said hearth, friction members at opposite sides of said flange and rockably supported from a radial lever pivoted concentrically with said hearth, means for oscillating said lever about its pivot, means for rocking said friction members to grip said flange during a forward half oscillation of said lever for advancing said hearth, means for reversely rocking said friction members clear of said flange during a return half oscillation of said lever, and a brake acting to hold said flange during said return half oscillation.

2. A furnace comprising an annular rotary hearth forming the floor of an annular heating chamber, a downwardly-directed concentric annular flange on the underside of said hearth, a stationary support, rollers journalled on said support with their axes of rotation directed radially of the axis of rotation of said hearth, said flange engaging said rollers for the rotative support of said hearth, a radial lever pivoted concentrically with said hearth, a radial arm pivoted for limited hinging to the outer end of said lever coincidentally with the median circumference of said flange, two friction members pivoted to said arm in laterally off-set positions on opposite sides of said flange, means biassing said arm and lever about their common pivot for holding said friction members clear of said flange, means for oscillating said arm and lever about the center of said hearth so as, during a forward half oscillation to hinge said arm about said common pivot against said biassing means for moving said friction members into gripping relationship with said flange whereby to advance the hearth, and a brake acting to hold said flange during a return half oscillation of said arm and lever.

3. A furnace comprising an annular rotary hearth forming the floor of an annular heating chamber, a downwardly-directed concentric annular flange on the underside of said hearth, a stationary support, rollers journalled on said support with their axes of rotation directed radially of the axis of rotation of said hearth, said flange engaging said rollers for the rotative support of said hearth, a radial lever pivoted concentrically with said hearth, a radial arm pivoted for limited hinging to the outer end of said lever coincidentally with the median circumference of said flange, two friction members pivoted to said arm in laterally off-set positions on opposite sides of said flange, means biassing said arm and lever about their common pivot for holding said friction members clear of said flange, a rocking lever pivoted intermediate its ends to said support, a crank pin pivoted in said support, means for driving said crank pin, a connecting rod extending between said crank pin and one end of said rocking lever, a second connecting rod extending between the other end of said rocking lever and the outer end of said arm whereby to oscillate the latter together with the first-mentioned lever about the centre of said hearth, said arm being hinged about said common pivot against said biassing means during a forward half oscillation for moving said friction members into gripping relationship with said flange whereby to advance the hearth, and a brake acting to hold said flange during a return half oscillation of said arm and lever.

4. A furnace, according to claim 3, of which said second connecting rod, for connecting it to the said other end of said rocking lever, has a pivotal connection to a sleeve which is slidable longitudinally of said rocking lever, and means are provided for holding said sleeve in an adjusted position whereby to vary the arc through which said hearth is moved at each oscillation of said arm and lever.

ARTHUR CLIFFORD HOWARD.

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