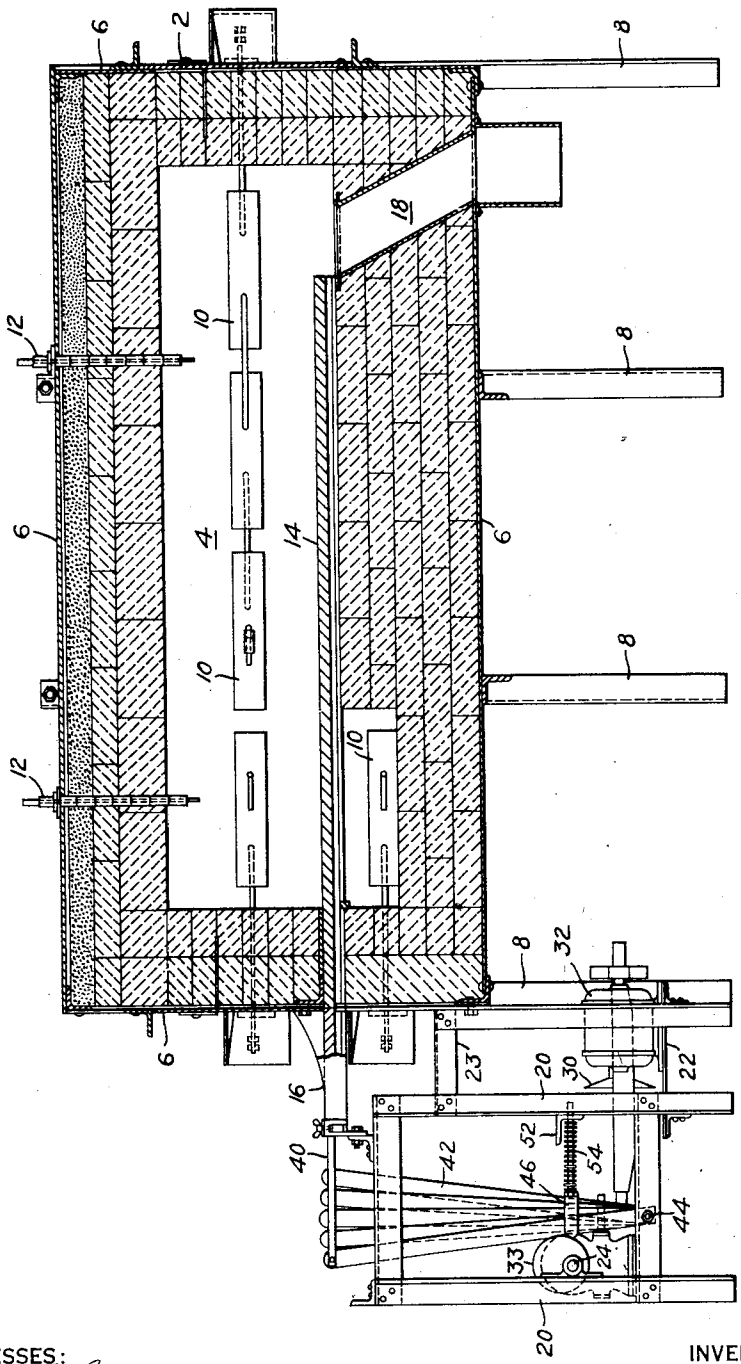
Nov. 27, 1928. 1,693,370

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FURNACE

Filed May 11, 1927 3 Sheets-Sheet 1

Fig. 1.



WITNESSES:

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Filed May 11, 1927 3 Sheets-Sheet 2

Fig. 2.

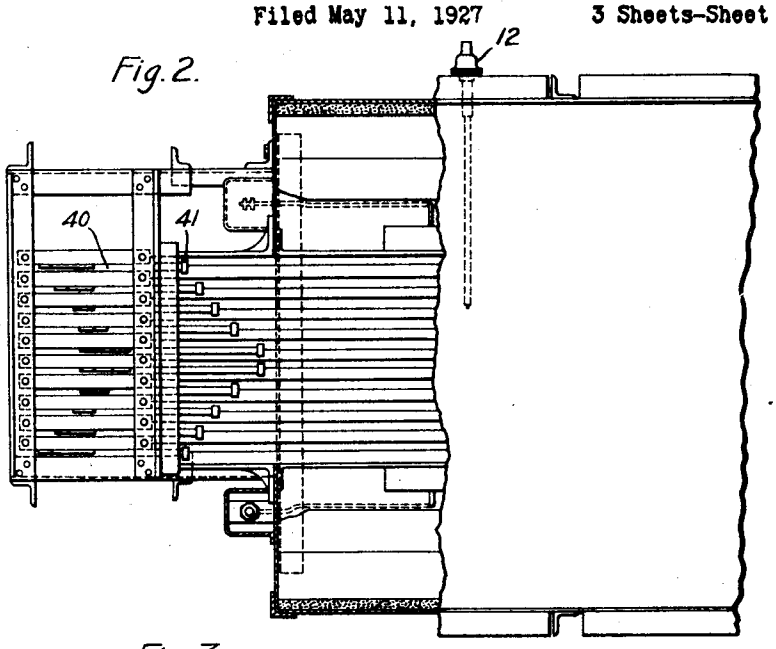
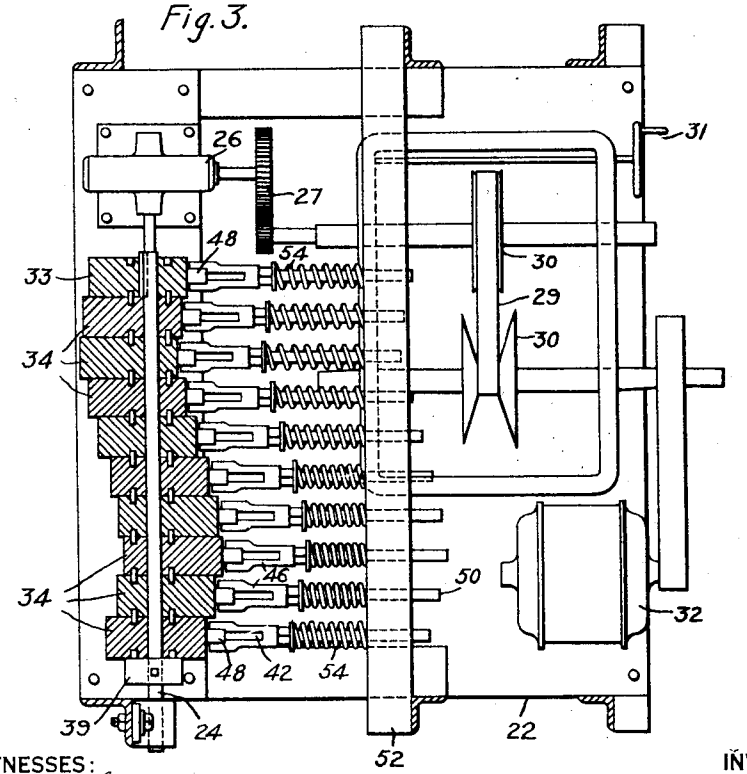


Fig. 3.



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Filed May 11, 1927 3 Sheets-Sheet 3

Fig. 4.

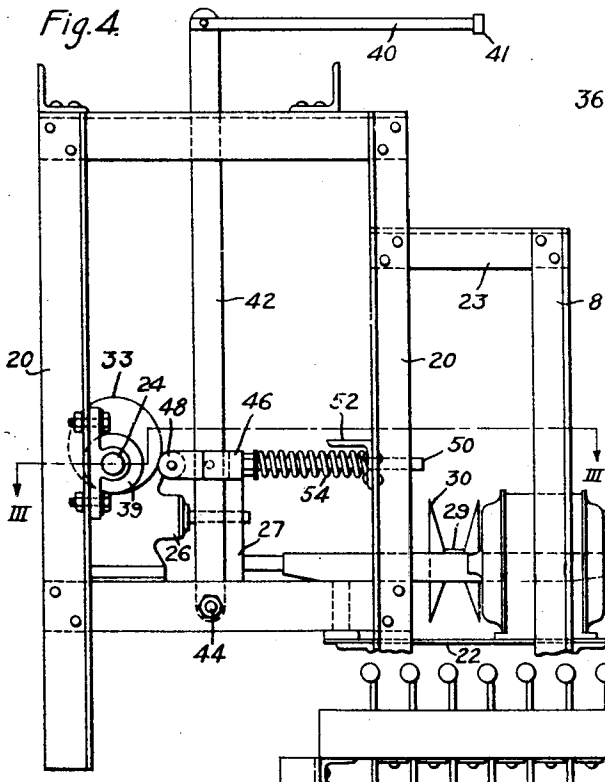


Fig. 6.

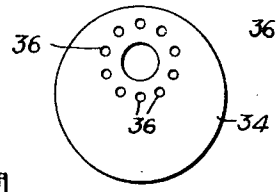


Fig. 7.

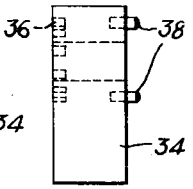


Fig. 8.

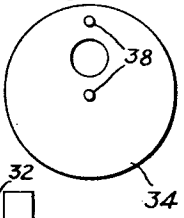


Fig. 9.

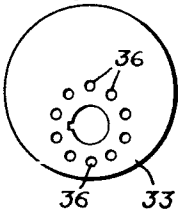


Fig. 5.

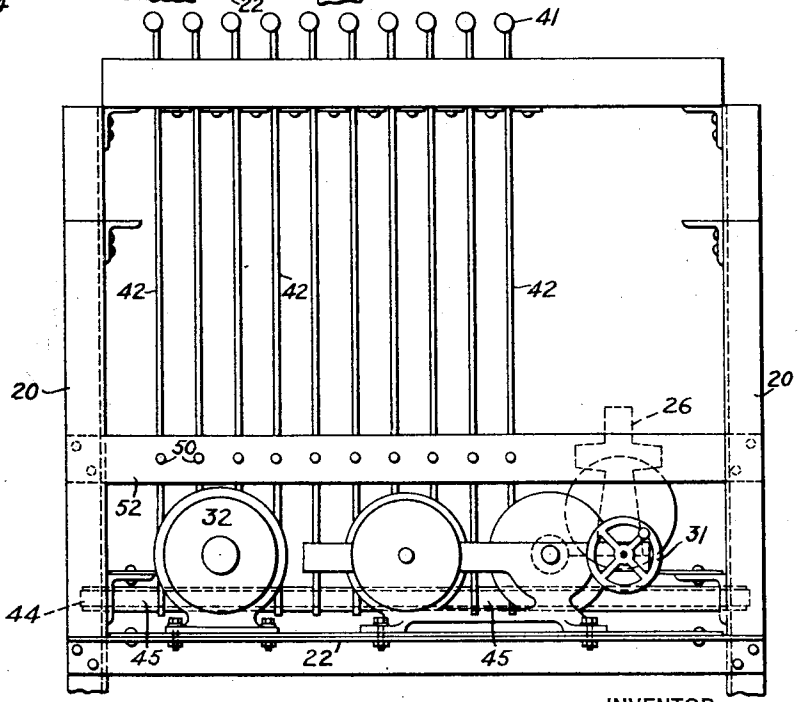


Fig. 10.



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UNITED STATES PATENT OFFICE.

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FURNACE.

Application filed May 11, 1927. Serial No. 190,552.

My invention relates to heat-treating furnaces and more particularly to a means for moving articles therethrough.

An object of my invention is to provide an improved article-moving means for a heat-treating furnace, whereby continuous parallel streams of articles to be heated are moved into, through and out of said furnace, said streams being moved intermittently and in a predetermined sequence with respect to each other to facilitate the feeding of unheated articles to the moving means.

In practicing my invention, I provide, in a furnace chamber, an article-supporting hearth grooved to provide a plurality of parallel paths along which the articles to be heated may be moved. Cooperating with each groove is a push rod actuated by a rotatable cam to force an article in said groove into said furnace chamber. A cam is provided for each push rod and is secured to adjacent cams to permit radial adjustment thereof so that said push rods are actuated in a predetermined sequence. One of said cams is keyed to a power-driven shaft and, because of the adjustable securing means between adjacent cams, all of the cams are rotated thereby.

In the drawings,

Figure 1 is a vertical longitudinal section through a furnace embodying my invention,

Fig. 2 is a partial plan view of the furnace shown in Fig. 1, the roof being partially broken away,

Fig. 3 is a view in section on the line IV—IV of Fig. 4,

Fig. 4 is a view in side elevation of the article-moving mechanism,

Fig. 5 is a view in front elevation of the mechanism shown in Fig. 3,

Figs. 6 through 9 are details of the cam-actuating means, and

Fig. 10 is a lateral section of the article-supporting hearth.

Referring more particularly to Fig. 1, the furnace proper comprises walls, roof and bottom, of suitable built-up refractory members 2, defining a furnace chamber 4. A metallic casing 6 surrounds the refractory structure and is supported upon angles 8 secured thereto and projecting below the bottom thereof. Suitable sources of heat 10, in the present instance electrical resistor units, are mounted upon the side walls and in a suitable recess in the floor of the furnace beneath the hearth. Thermo-couples 12 are inserted through the roof and side walls of the furnace for indicating the temperature thereof.

The hearth of the furnace comprises a corrugated refractory plate 14 (see Fig. 10) which extends substantially the length of the furnace chamber and projects through the front wall thereof to form an article-receiving shelf 16. Within the furnace chamber, and adjacent to the rear wall thereof, the hearth 14 communicates with a discharge chute 18 extending through the bottom of the furnace so that the heated articles on said hearth may be discharged therethrough.

The article-moving means comprises a supporting frame 20 secured to the furnace structure by plates 22, 23 maintaining the frame in fixed relation to the furnace structure.

A shaft 24 is rotatably journalled upon an upright of the frame 20 on the side farthest removed from the furnace structure, and rotation thereof is effected through a reduction gearing 26, gears 27, and a variable-ratio transmission device 29, 30 driven by a belt operatively connected to an electric motor 32. The variable-ratio transmission 29, 30 is adjustable by a hand wheel 31 operatively connected thereto, and since it is of the usual type of ratio changing transmission, further description thereof is not deemed necessary.

Keyed to shaft 24 and rotatable therewith is an eccentrically apertured cylindrical block 33 constituting a cam for actuating a push rod, as hereinafter described.

A plurality of cams 34 similar in shape to cam 33 are loosely mounted on shaft 24 and means are provided to adjustably secure each cam 34 to an adjacent cam and to secure one of them to cam 33, whereby rotation of all of the cams is effected.

On one of the lateral faces of each cam are drilled a plurality of holes 36 arranged in a circle about the aperture in the cam and

concentric therewith, the number of holes 36 in each cam corresponding to the number of cams employed.

On the opposite lateral face of each cam and extending parallel with the axis thereof are secured two pins 38 of a diameter of the proper size to permit the insertion thereof into holes 36.

With the pins selectively inserted into the holes 36 and the number of holes corresponding to the number of cams employed, (ten in the present embodiment) each cam may assume ten different radial positions with respect to shaft 24, so that by properly mounting the cams each may be in a different radial position with respect to the others.

The cams are maintained in operative position upon shaft 24 by a collar 39 adjustably clamped to said shaft. By loosening collar 39 and moving it along shaft 24 away from the cams, sufficient clearance is provided to permit the relative adjustment of the cams, after which adjustment the collar 37 is moved to clamping position.

The article-moving mechanism comprises a plurality of push rods 40 corresponding to the number of cams employed. The operative end 41 of each push rod rests upon the article-receiving shelf 16 and is adapted to be reciprocated in one of the grooves formed therein. The outer ends of push rods 40 are pivotally secured to the upper ends of levers 42 which extend substantially vertically down through the frame 20 adjacent the surfaces of cams 33, 34 and are pivotally mounted upon a rod 44 between suitable spacing sleeves 45 thereon (see Fig. 5). The rod 44 is secured to a cross piece of frame 20 below the horizontal axis of the cam shaft 24.

Upon each of the levers 42 is pivotally mounted a yoke 46 with the arms thereof on either side the lever 42 and terminating adjacent the cam surfaces. A roller 48 or other suitable friction-reducing means is carried by the arms of the yoke and is adapted to engage the peripheral surface of the corresponding cam. A guide rod 50 is secured to the yoke 46 and extends horizontally through a guide hole formed in a cross piece 52 of the frame 20.

The rollers are maintained in engagement with the surfaces of cams 33, 34 during the complete rotation thereof by compression springs 54 which surround the guide rods 50 and bear at one end against the yoke 46 and at the other end against the cross pieces 52.

In the operation of the device, as each rod 40 is moved away from the furnace to its fully retracted position, an article to be heated is placed in the corresponding groove in the hearth 14 at the portion 16 thereof. Upon continued rotation of the cam, the rod 40 is moved toward the furnace and pushes the article along the groove into the furnace chamber. Upon each retraction of the rod 40, a new article to be heated is placed in the groove so that continued operation of the device forces the articles along the hearth 14, during which time they are properly heat-treated, and discharges them one at a time through the discharge-chute 18. This operation is common to all of the push rods and by the proper adjustment of the cams 26, 28 with respect to each other, the operations may take place in a definite sequence to facilitate the feeding of articles to be heated into the grooves in the article-receiving portion 16 of hearth 14.

By my invention, I have provided an improved article-moving means for a heat-treating furnace, whereby a plurality of streams of articles to be heated may be moved through the furnace intermittently and in a predetermined sequence to facilitate the feeding of untreated articles thereto.

It is obvious that the form of the furnace employed, and particularly the article-supporting hearth 14, may be varied to accommodate different types of articles to be heated, and different heat-treating operations, and still be within the scope of my invention.

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, a plurality of pushers for moving a plurality of articles through said furnace, and means for operating said pushers in a predetermined sequence, said means comprising a motor-driven cam cooperating with one of said pushers, and a plurality of cams adjustable radially with respect to said first cam and driven thereby.

2. In an article-moving means, a plurality of push rods for engaging a plurality of articles to move said articles in parallel paths, means for actuating said push rods in predetermined sequence, said means comprising a plurality of cylinders mounted eccentrically to form peripheral cam surfaces to actuate said push rods, means for rotating one of said cylinders, and means for adjustably securing the remaining cylinders together to be driven by said first cylinder.

3. In a furnace, the combination with a furnace chamber, of a skeleton frame at the charging end of the furnace, a plurality of levers pivotally mounted at their lower ends in said frame, a plurality of revoluble cams supported in said frame for actuating said levers, resilient means for yieldingly pressing said respective levers against the cooperating cams, and push rods pivotally connected to the respective upper ends of the levers for pushing material through the furnace chamber.

4. In a furnace having a corrugated hearth plate in the chamber thereof, in com-

bination, a frame at the receiving end thereof, a plurality of levers pivotally supported at their lower ends in said frame, a plurality of revoluble cams supported in said frame for actuating said levers, spring means for yieldingly pressing the levers against the cam surfaces, and push rods having their outer ends pivotally connected to the upper ends of the levers and their inner ends resting in the grooves of the hearth plate.

In testimony whereof, I have hereunto subscribed my name this 29 day of April, 1927.

ORA A. COLBY.