

March 3, 1942.

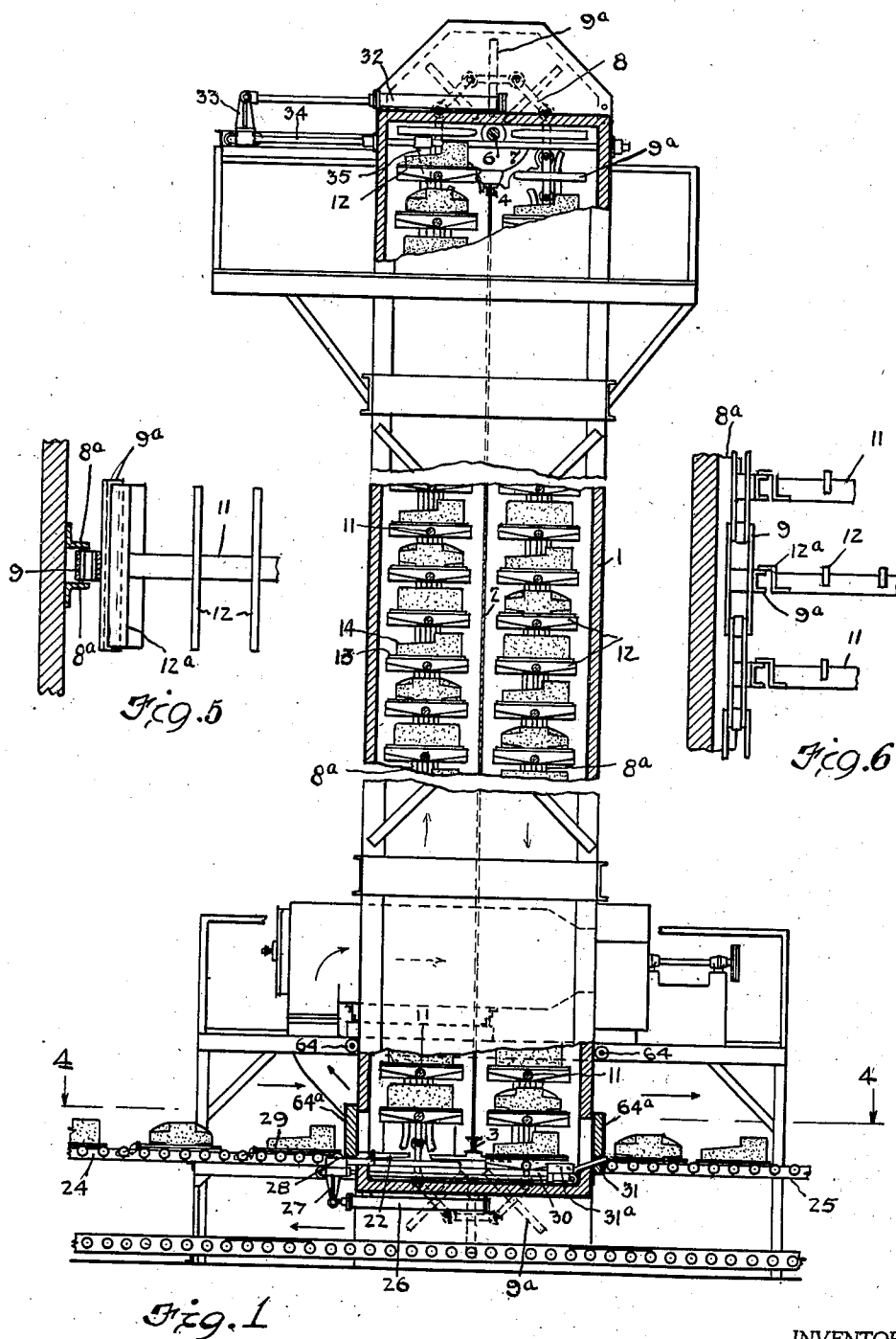
H. P. McCANN

2,274,842

MATERIAL HANDLING APPARATUS

Filed Aug. 20, 1938

5 Sheets-Sheet 1



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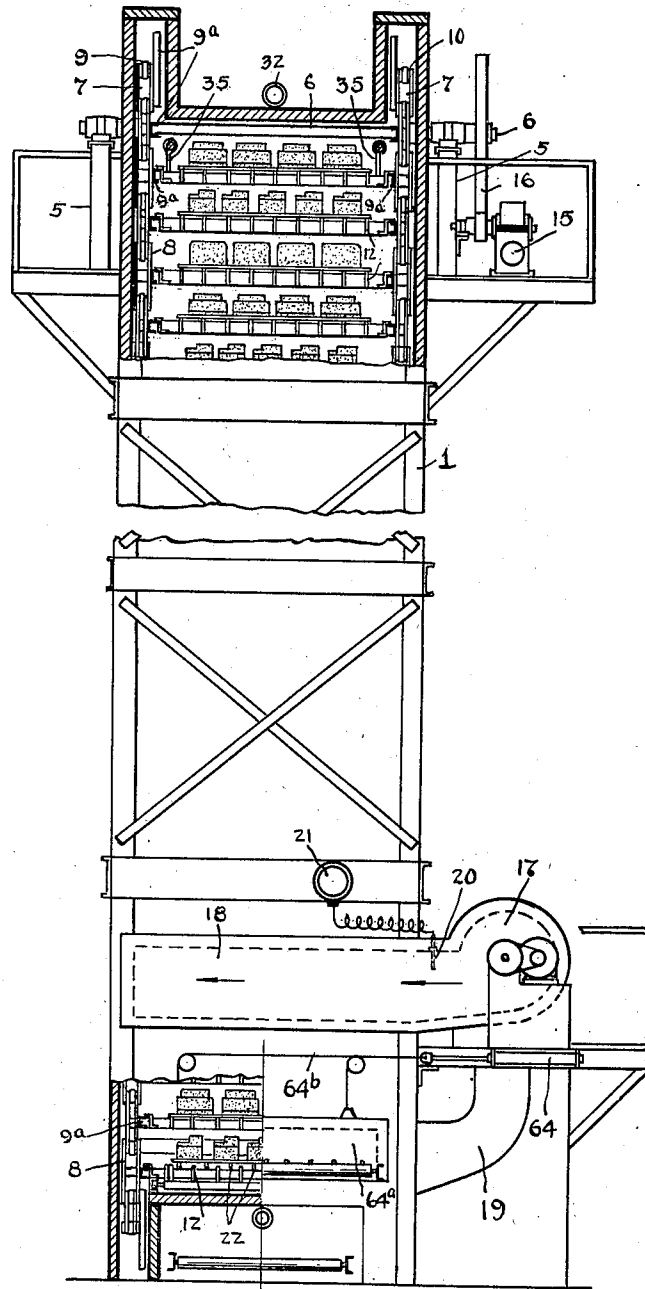


Fig. 2

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Fig. 3

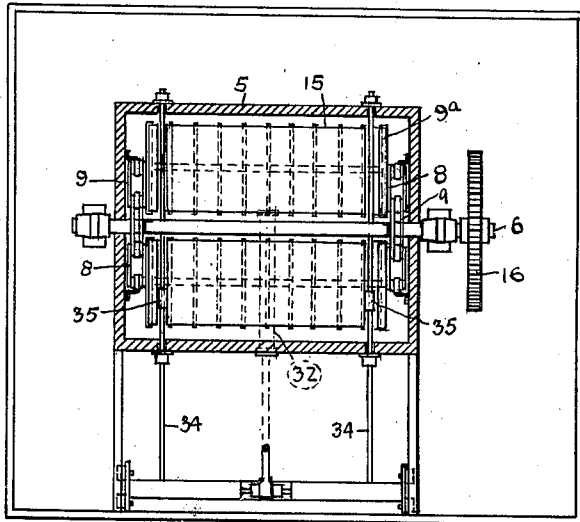
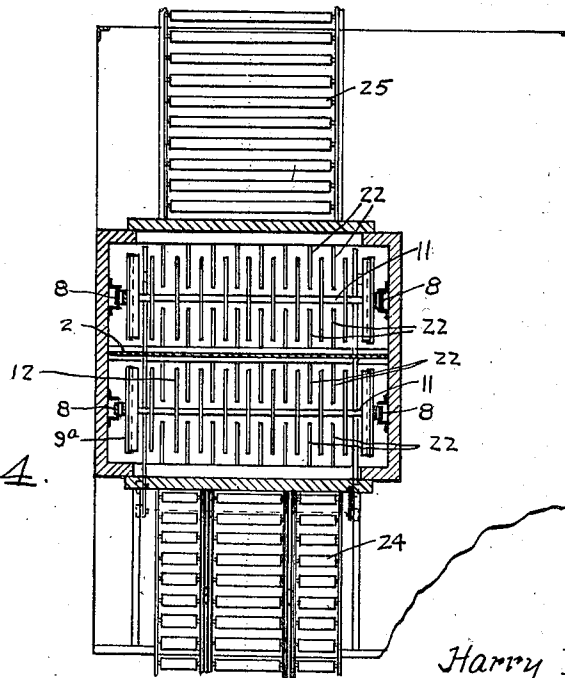


Fig. 4.



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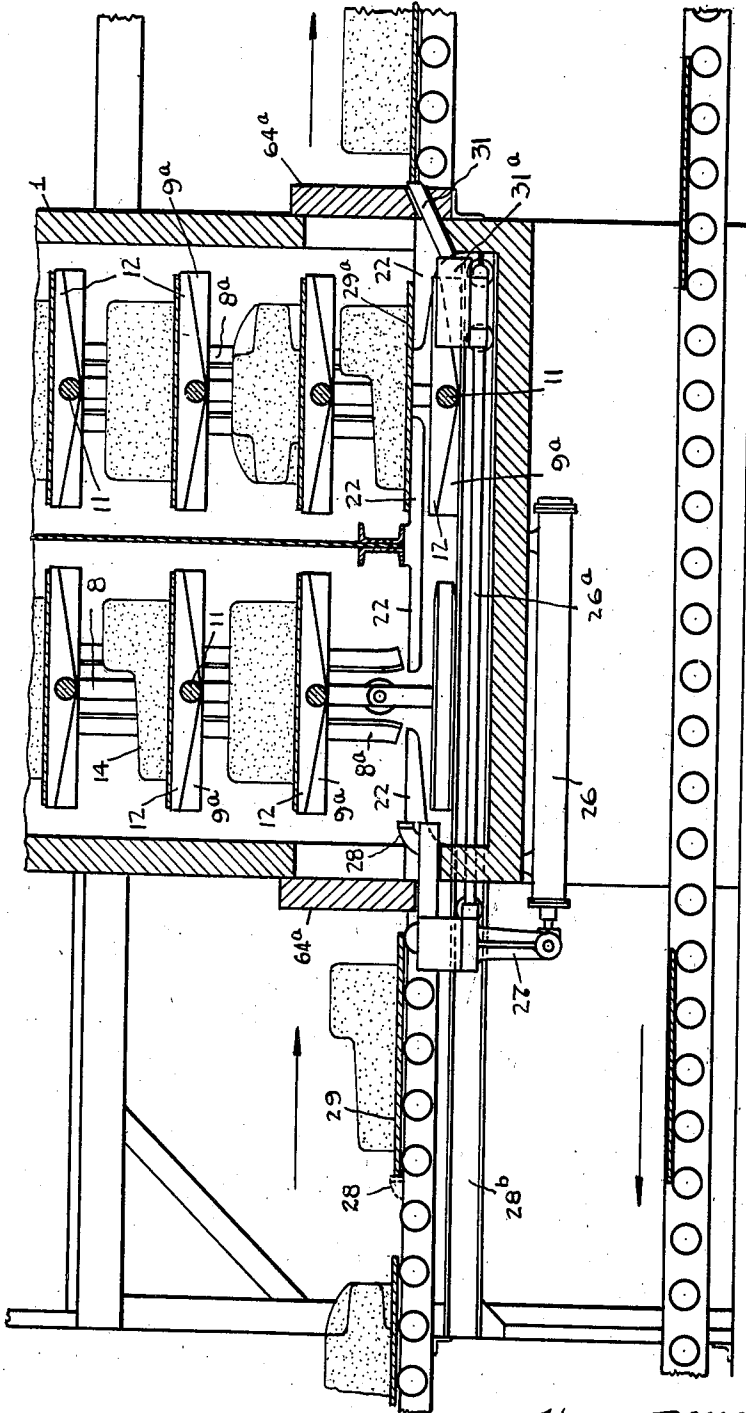


Fig. 7

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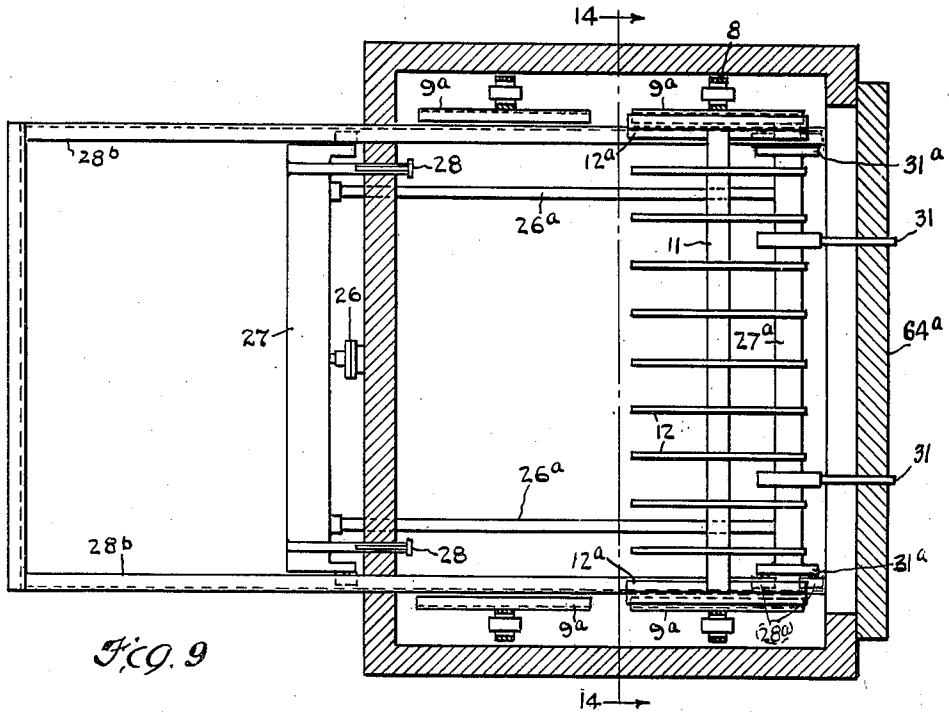


Fig. 9

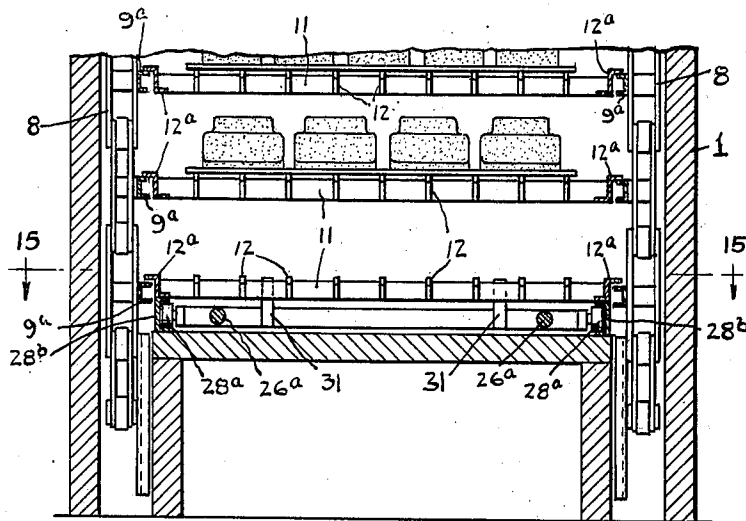


Fig. 8

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UNITED STATES PATENT OFFICE

2,274,842

MATERIAL HANDLING APPARATUS

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Application August 20, 1938, Serial No. 225,922

6 Claims. (Cl. 198—24)

This invention relates, as indicated, to material handling and treating apparatus and more particularly to apparatus for the handling of materials such as cores used in foundries.

A principal object of my invention is to provide apparatus in the nature of a core-drying oven which is provided with a novel arrangement of apparatus for handling the cores during their passage through the oven.

Other objects of my invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating, however, but one of various ways in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a side elevational view, partially in section, of core oven constructed in accordance with the principles of my invention; Fig. 2 is a side elevational view, partially in section, of the structure illustrated in Fig. 1 taken at right angles to said last-named figure and from the left side thereof; Fig. 3 is a plan view, partially in section, of the apparatus illustrated in the previous figures; Fig. 4 is a transverse sectional view of the apparatus illustrated in Fig. 1, for example, taken on a plane substantially indicated by the line 4—4; Figs. 5 and 6 are fragmentary views of the apparatus illustrated in Fig. 1, showing particularly the construction of the elevating chain and its associated trays or cradles; and Figs. 7, 8 and 9 are fragmentary views drawn to an enlarged scale of the lower end of the oven showing more particularly the means for charging and unloading the oven and for shifting the trays from one side of the oven to the other.

The oven comprises a substantially vertical housing generally indicated at 1, which may be fabricated of suitable material, such as structural steel, and provided with a central partition member 2 extending from adjacent the bottom thereof, as at 3, to adjacent the top thereof, as at 4, dividing the substantially rectangular chamber 1 into two vertically extending compartments. The upper structure 5 of the frame 1 carries a suitable cross-shaft 6 on which are mounted sprocket wheels 7.

An endless conveyor 8 is trained about sprockets 7, such conveyor consisting of side runs 9 and

10, provided with rollers at their points of articulation and operating in vertically disposed tracks 8a. The tracks 8a are joined at their bottom ends by a circular section, thus making it unnecessary to provide sprockets similar to 7 at the lower end of the oven. The chains or more particularly, runs 9 and 10 of the conveyor 8, are in the construction illustrated in Figs. 1, 5 and 6, provided with attached channel-shaped carrier members 9a, which extend generally transversely of the direction of the chain. The two runs 9 and 10 are so positioned on the sprockets 7 that the members 9a of the two runs 9 and 10 lie in the same plane as the two runs are caused to travel through the oven 1 by the sprockets 7.

The members 9a serve as supporting means for the trays which carry the work through the oven. These trays consist of transversely extending bars 11 which are provided with transversely extending arms 12 intermediately of their ends and end members 12a by which the trays are supported on the members 9a carried by the runs 9 and 10 of the conveyor.

The work to be cured is supported on core plates 13 and the work in the illustration is shown as cores 14.

The chain 8 is driven by means of a motor 15, most clearly illustrated in Fig. 2, operating through a gear reduction 16, which includes a gear mounted on the upper shaft 6, which carries the sprockets 7 about which the chain is trained at the upper end of the oven.

The oven is provided adjacent its lower end with a fan generally indicated at 17 for the purpose of circulating preferably heated air through the oven, the fan housing 18 being so arranged to introduce the heated air into one side of the oven and to discharge the same through the outlet duct 19 connected with the other side of the oven. A suitable thermostat element conventionally illustrated at 20 may be employed along with a conventional temperature-controlling device 21 for the purpose of controlling and regulating the temperature of the air introduced to the oven.

As most clearly illustrated in Fig. 4, there are provided in each section of the oven adjacent its bottom, a plurality of oppositely directed stationary fingers 22 so spaced with respect to each other and the central part of the oven that the rods 11, which are also provided with laterally extending fingers 12 on which the core-carrying plates are supported, may pass through the stationary fingers 22. Thus if a plate and its associated core is positioned on these stationary fingers

22 and the rod 11, with its associated fingers 12, passes upwardly through the stationary fingers 22, the core plates will be picked off from the stationary fingers 22 and carried upwardly in the left-hand compartment of the oven as illustrated in Fig. 1.

Similarly, when the chain descends in the right-hand portion of the oven, as illustrated in Fig. 1, the core plates will be deposited by the chain on the stationary fingers 22 in this section of the oven.

Positioned on opposite sides of the oven are feeder and discharge conveyors 24 and 25 respectively. Thus, the uncured cores are moved to the oven by the conveyor 24 and the cured cores moved away from the oven by the conveyor 25. The general mode of operation of these conveyors will be hereinafter more fully described. Suffice it to say at this point that the general control apparatus for the entire system is so arranged that the movement of the cores through the drying oven 1 by means of the chain 8 and the movement of the cured cores on the charging and discharge conveyors 25 is synchronized.

The passage of the cores through the oven may be briefly described in the following manner:

The uncured cores are moved over onto the stationary fingers 22 in the lefthand side of the core oven where they are picked up by the chain 8 elevated to near the top of the oven where instead of passing around the axis of the shaft 6 with the chain 8, they are slid across to the descending run of the chain by apparatus hereinafter more particularly described. They, thereupon, descend on the righthand run of the chain until they are deposited on the stationary fingers 22 in the righthand portion of the oven where they are moved by means, likewise hereinafter more particularly described, over onto the discharge conveyor 25.

On opposite sides of the oven are provided door openings, normally closed by doors 64a through which the work is introduced to and withdrawn from the oven. These doors are controlled by a ram 64 operating through cables 64b. Two sets of cables such as 64b are connected to the head of the ram 64 so that actuation of the ram 64 results in an opening and closing of both doors.

The uncured cores, on their supporting core plates are moved into the oven and the cured cores, on their supporting core plates, moved out of the oven by the apparatus particularly illustrated in Figs. 7, 8 and 9, to which reference may be had in connection with the following description of such apparatus:—

The actuating device for this shifting apparatus is a fluid ram 26 carrying a head 27. The head 27 comprises one end of a carriage which includes the rods 26a and a rear cross head 27a. This carriage is mounted on rollers 28a, which operate in the channels 28b. These spaced channels 28b extend across the bottom of the oven at opposite sides and outwardly therefrom at the left side as most clearly illustrated in Fig. 7.

The head 27 carries dogs 28 which may be either spring-loaded or gravity-actuated and so arranged that they resist counterclockwise rotation, as viewed in Fig. 7, but may be freely moved in a clockwise direction about their supporting axis when, for example, the dogs move rearwardly under the supporting core plate 29 which carries the core about to be fed to the oven.

The rear head 27a carries projections 31 and

31a for the purpose hereinafter more fully explained.

Assuming now that the parts are in the position illustrated in Fig. 7, i. e., the conveyor has moved for one step lifting the uncured core from the stationary fingers 22 in the lefthand compartment of the oven and has deposited a cured core on the stationary fingers 22 in the righthand compartment of the oven so that the apparatus is in a position to discharge a cured core and to receive an uncured core. The ram 26 will be energized, moving the carriage which includes the heads 27 and 27a and the rods 26a from the position illustrated in full lines in Fig. 7 to the left until the dog 28 occupies the position illustrated in dotted lines. In thus passing under the core plate 29, the dog 28 has been depressed but after having passed out from under the rear edge of such core plate, its spring or counterweight has raised the same to the dotted line position.

The conveyor in depositing the core plate 29a on the stationary fingers 22 in the righthand compartment of the oven has moved the tray, including the cross-bar 11 and arms 12, downwardly through the stationary fingers 22 in the righthand compartment until such tray or more particularly, the side flange members 12a thereof, rest on the upper surface of the channel members 28b.

As the carriage moves to the left upon actuation of the ram 26, the projections 31a on the righthand end of such carriage will engage the cross-bars 11 of the tray and move the same over into position under the stationary fingers 22 in the left compartment of the oven.

After the carriage has thus moved to the extreme left position, as indicated by the dotted line position of the dog 28, the ram 26 is energized to move the carriage to the right. With the carriage in the extreme left position, the fingers 31 will have moved to the left of the core plate 29a and as previously indicated, the dog 28 will be to the left of the core plate 29. As the carriage is, therefore, moved to the right, the dog 28 will move the core plate 29 to the right and the fingers 31 will move the core plate 29a to the right, thus charging the core plate 29 onto the stationary fingers 22 in the lefthand side of the oven and the fingers 31 move the core plate 29a from the stationary fingers in the righthand side of the oven over onto the discharge conveyor. The fingers 31 are spring-loaded or counterweighted similarly to the dogs 28 so that they may function in a like manner.

The lifting conveyor in the oven is now in position to be energized and as the bar 9a attached to the chain rises, it first picks up the tray and then elevates the tray upwardly through the stationary fingers 22 where the core plate is picked up and elevated to the position substantially occupied by the lowermost core plate and its supported core in the lefthand compartment of the oven as shown in Fig. 7. Simultaneously, the descending run of the conveyor deposits a core plate and the baked core carried thereby onto the stationary fingers 22 in the righthand side of the oven.

For the next cycle of operation, the above described procedure will, of course, be merely repeated.

From the foregoing, it will be observed that for each cycle of movement of the ram 26, i. e., a complete movement to the left and a return movement to the right, will move one core plate

and its associated core into the lefthand side of the oven and deposit the same on the stationary fingers 22 therein and move a plate with its cured core from the stationary fingers 22 in the right-hand side of the core oven onto the discharge conveyor 25.

A similar ram 32 is provided at the upper end of the oven and to its head 33 are connected rods 34 and actuating fingers 35 which extend into the oven into such a position as to engage the tray at the upper station, illustrated at 35, on the lefthand run of the chain and move the same transversely of the oven across the top of the partition 2, over onto the carrier members 9a carried by the chain 8. The rods 34 carry depending brackets 35 for engagement with the trays in the manner described and as most clearly illustrated in Fig. 2. Thus, when the head 33 of the ram 32 is moved to the right, a tray with its associated partially cured core and plate is moved from the lefthand or elevating run of the conveyor chain to the righthand or descending run of the conveyor chain.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means and the steps herein disclosed, provided those stated by any of the following claims or their equivalent be employed.

I, therefore, particularly point out and distinctly claim as my invention:

1. In apparatus of the character described, a substantially vertically arranged endless conveyor comprising parallel runs of chain, carrier members attached thereto, work-carrying trays supported by said members, a loading platform near the lower end of the elevating run of said conveyor, an unloading platform near the lower end of the descending run of said conveyor, means for moving the work into and out of the path of movement of said trays at said loading and unloading platforms, means near the upper end of said conveyor for removing one of said work-carrying trays from its carrier members on the elevating run of said conveyor and transferring said tray directly to carrier members on the descending run of said conveyor, and means below said loading and unloading platforms for removing the empty trays from the descending run and transferring them to the ascending run of said conveyor.

2. In apparatus of the character described, a substantially vertically arranged endless conveyor comprising parallel runs of chain, carrier members attached thereto, work-carrying trays supported by said members, means adjacent the lower end of said conveyor for moving the work into the path of movement of the trays on the ascending run and out of the path of movement of the trays on the descending run, means near the upper end of said conveyor for removing one of said work-carrying trays from its carrier members on the elevating run and transferring said tray directly to carrier members on the descending run of said conveyor, and means adjacent the bottom of said conveyor for removing the empty trays from the descending run and transferring them directly to the ascending run of said conveyor.

3. In apparatus of the character described, a substantially vertically arranged endless conveyor comprising parallel runs of chain, carrier members attached thereto, work-carrying trays supported by said members, means adjacent the lower end of said conveyor for moving the work into the path of movement of the trays on the ascending run and out of the path of movement of the trays on the descending run, said means being also operable to remove an empty tray from the descending run and transfer the same directly to the ascending run, and means near the upper end of said conveyor for removing one of said work-carrying trays from its carrier members on the ascending run and transferring said tray directly to carrier members on the descending run of said conveyor.

4. In apparatus of the character described, a substantially vertically arranged endless conveyor comprising parallel runs of chain, carrier members attached thereto, work-carrying trays supported by said members, a loading platform near the lower end of the elevating run of said conveyor, an unloading platform near the lower end of the descending run of said conveyor, means for moving the work into and out of the path of movement of said trays at said loading and unloading platforms, and means below said loading and unloading platforms for removing the empty trays from the descending run and transferring them to the ascending run of said conveyor.

5. In apparatus of the character described, a substantially vertically arranged endless conveyor comprising parallel runs of chain, carrier members attached thereto, work-carrying trays supported by said members, a grille adjacent the bottom of each of said runs adapted to support work thereon and to permit the passage therethrough of said trays whereby the trays on said ascending run may pick up the work from said grille and the trays on said descending run may deposit the work on said grille, and means below said grille for removing an empty tray from the descending run and transferring it to the ascending run of the conveyor.

6. In apparatus of the character described, a substantially vertically arranged endless conveyor comprising parallel runs of chain, carrier members attached thereto, work-carrying trays supported by said members, a grille adjacent the bottom of each of said runs adapted to support work thereon and to permit the passage therethrough of said trays whereby the trays on said ascending run may pick up the work from said grille and the trays on said descending run may deposit the work on said grille, and a reciprocal carriage adjacent the bottom of said conveyor operable upon movement thereon in one direction to charge work onto said grille in the path of the trays on the ascending run and to discharge work deposited on said grille out of the path of trays on the descending run, said carriage being operable upon movement in the opposite direction to move an empty tray from the descending run and transfer it to the ascending run of the conveyor.

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