May 12, 1931. W. V. BAKER 1,805,029

CORE OVEN

Filed June 15, 1927 4 Sheets-Sheet 1

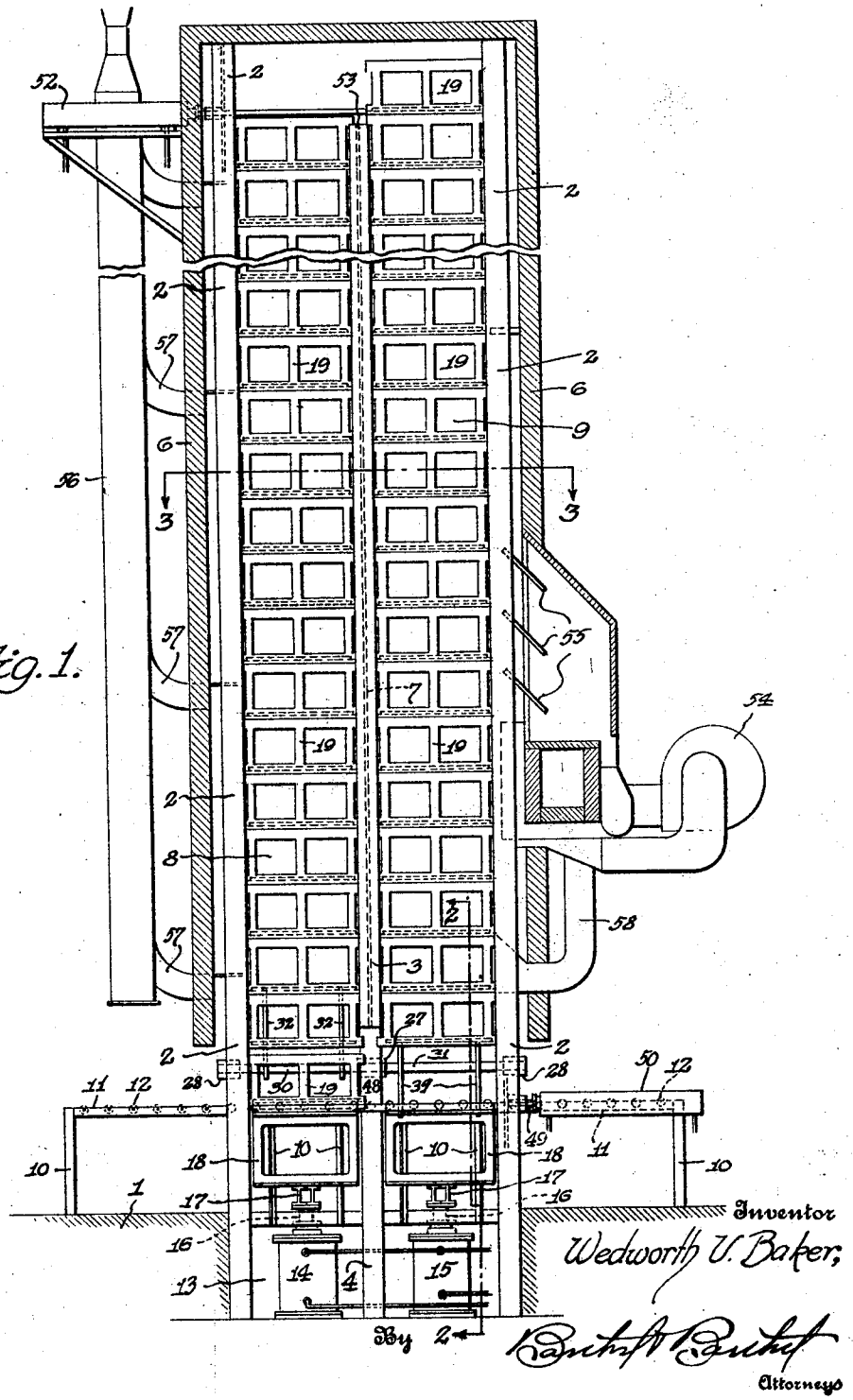


Fig. 1.

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May 12, 1931. W. V. BAKER 1,805,029

CORE OVEN

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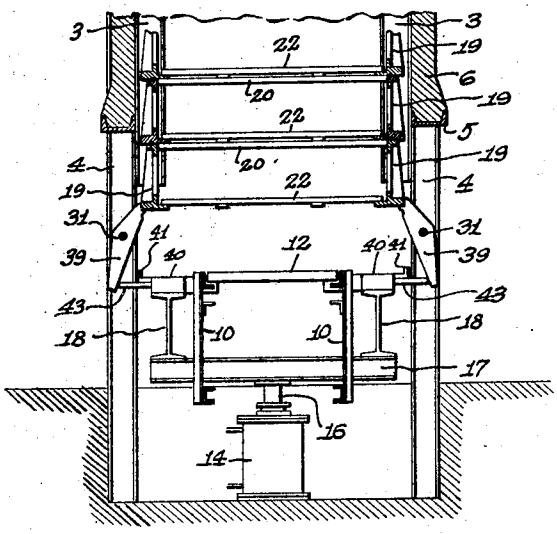



Fig. 2.

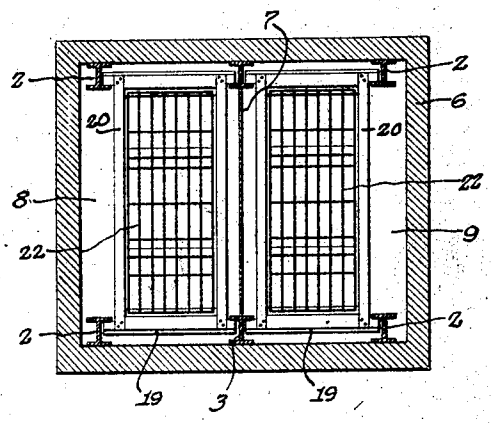



Fig. 3.

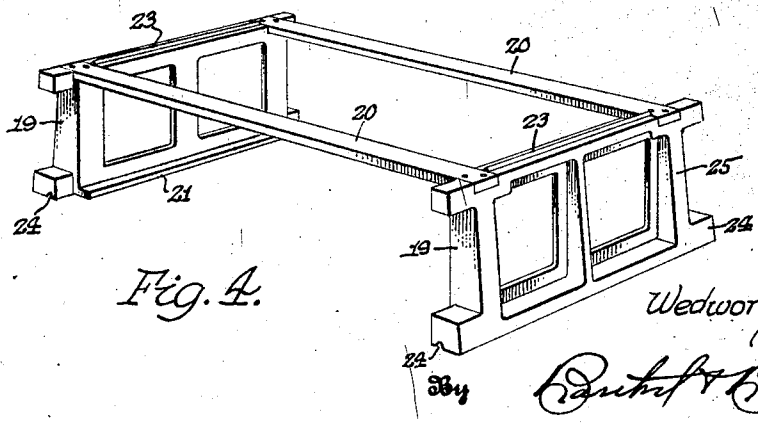



Fig. 4.

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May 12, 1931. W. V. BAKER 1,805,029

CORE OVEN

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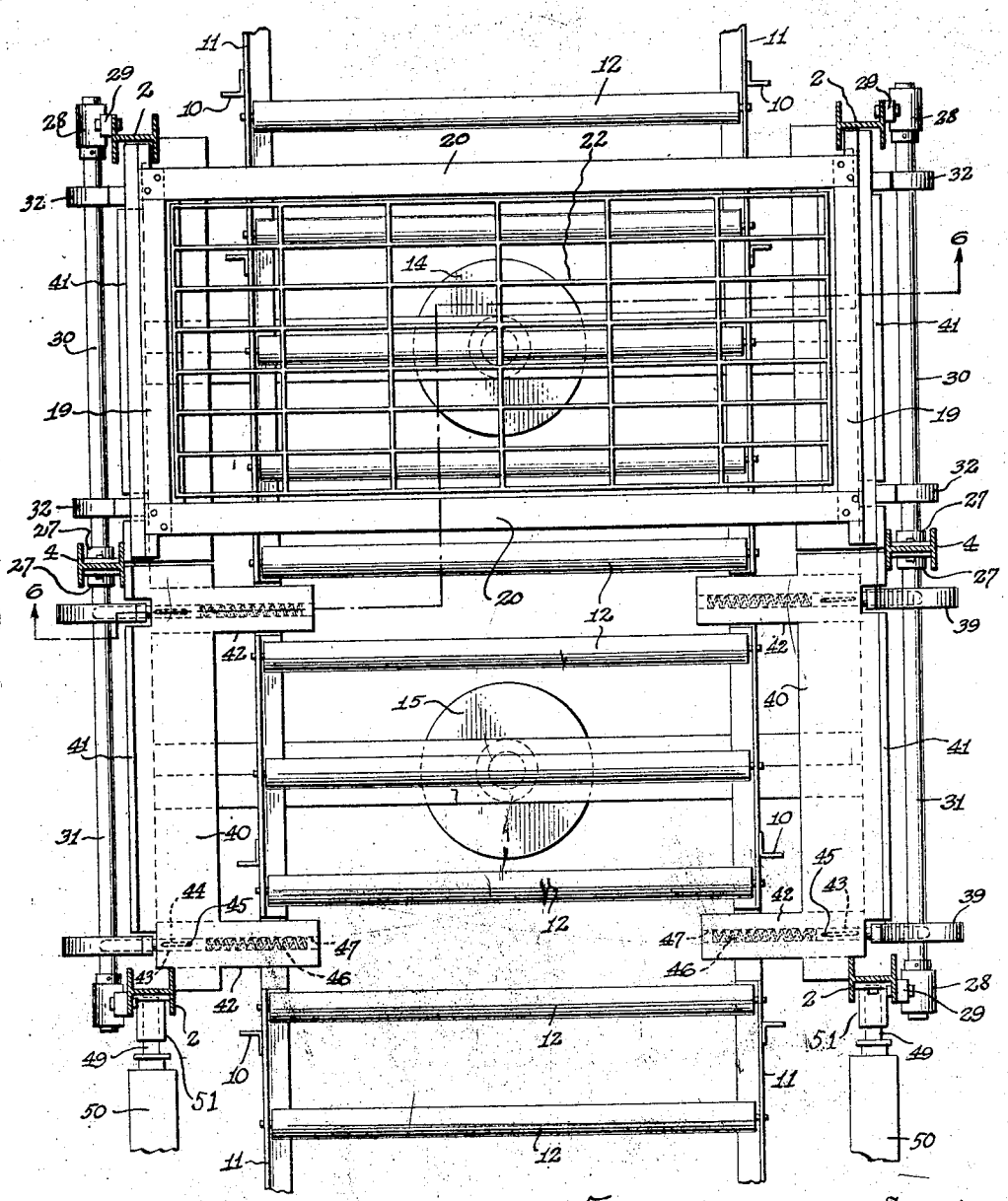



Fig. 5.

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May 12, 1931. W. V. BAKER 1,805,029

CORE OVEN

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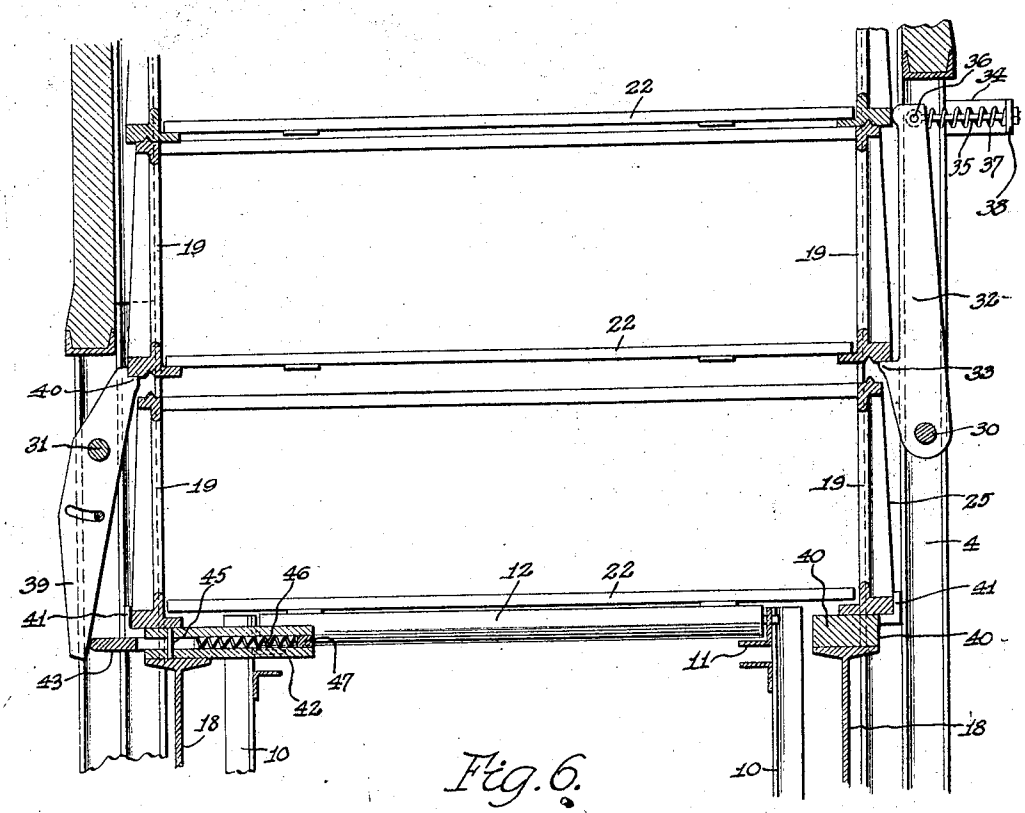



Fig. 6.

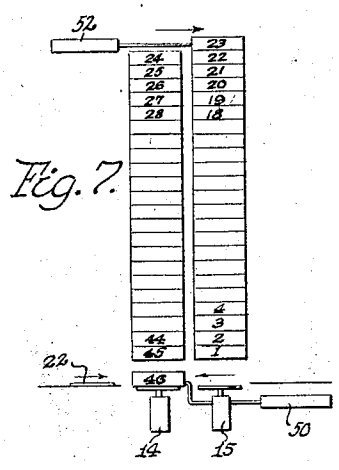



Fig. 7.

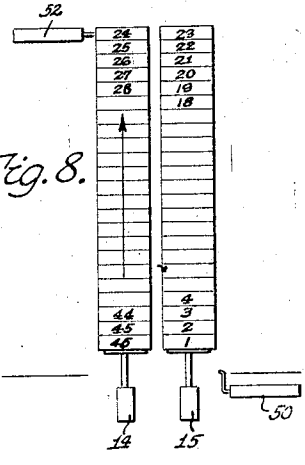



Fig. 8.

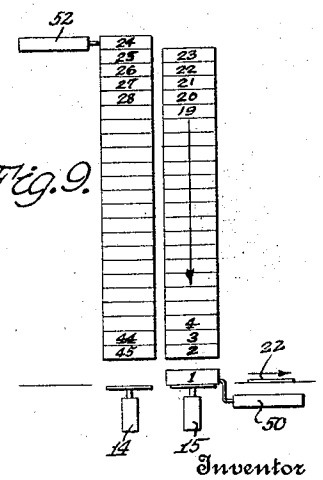



Fig. 9.

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Patented May 12, 1931 1,805,029

# UNITED STATES PATENT OFFICE

WEDWORTH V. BAKER, OF DETROIT, MICHIGAN

## CORE OVEN

Application filed June 15, 1927. Serial No. 198,909.

The present invention pertains to a novel oven designed particularly for baking cores to be used in casting operations.

The principal object of the invention is to provide a device of this character in which the cores may be circulated up and down the oven until the baking operation is completed. Obviously, the same construction is suitable for use in connection with other articles requiring a similar heat treatment and is not necessarily limited to the baking of cores.

The device of the invention comprises essentially a vertical core oven in which are mounted an ascending and a descending column of carriers adapted to support the grids on which are placed the articles to be baked. Elevators are mounted beneath the columns and are operated to move together in the same direction. Column supporting elements actuated by the movement of the carriers and elevators retain the ascending column and release the descending column when the elevators descend. Thus, the descending column drops to a level below that of the ascending column and a carrier is shifted from the bottom of the descending column to the bottom of the ascending column while at the same time a carrier is transferred from the top of the ascending column to the top of the descending column. Automatic rams are provided for transferring the uppermost and lowermost carriers in the manner stated and are preferably synchronized with the elevators. Thus, the articles to be baked are moved in a continuous cycle up and down the furnace. They are removed from the furnace after having been retained therein for the proper interval and are replaced by fresh articles which are to receive the same treatment.

The invention is fully disclosed by way of example in the following description and in the accompanying drawings, in which—

Figure 1 is a vertical section of the device;

Fig. 2 is a detail vertical section of the lower end of the device taken at right angles to Figure 1 on the line 2—2 of Figure 1;

Fig. 3 is a horizontal section on the line 3—3 of Figure 1;

Fig. 4 is a perspective view of one of the carriers;

Fig. 5 is a plane section;

Fig. 6 is a section on the line 6—6 of Figure 5; and

Figs. 7, 8 and 9 are diagrammatic views showing the movement of the carriers.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

On a suitable foundation 1 are erected four I-girders 2 in the corners of a rectangle and two intermediate similar members 3. At the bottom of the structure are provided two more of such I-girders 4 located outwardly of the members 3 as may be seen more clearly in Figures 5 and 6. Horizontal channel members 5 are supported in suitable fashion upon the members 1, and the channels 5 in conjunction with the required additional frame structure, support a furnace wall 6 forming a vertical enclosure over the girders 2 and 3.

A baffle 7 is mounted between the intermediate girders 3 and forms two vertical compartments or chambers 8 and 9. A series of legs 10 are arranged in parallel lines running through both chambers 8 and 9, and these legs support a roller table consisting of rails 11 mounted upon the upper ends of the legs and having roller members 12 journaled therebetween. Thus, a continuous roller table extends through both compartments.

In the foundation 1 is formed a well 13 containing elevators 14 and 15 beneath the compartments 8 and 9 respectively. The ram of each elevator comprises a vertically sliding rod 16 over which are laid a pair of contiguous I-beams 17 supporting another pair of I-members 18 at the ends thereof. The latter members however are disposed at opposite sides of the roller table in order that they may be moved upwardly beyond the height of the table, and the members 17 are permitted to move between the legs 10.

Each of the chambers 8 and 9 supports a

vertical series of carriers of the type shown in Figure 4. Each carrier consists of a pair of spaced side members 19 having their upper corners joined by parallel bars 20. Ledges 21 are formed inwardly of the lower longitudinal edges of the side members for the purpose of supporting trays or gratings 22. The tops of the side members are formed with longitudinal ridges 23, and the bottoms of these members are formed with corresponding grooves 24 for the purpose described below. Further, the outer faces of the lateral members are sloped upwardly and inwardly as indicated by the numeral 25 in Figures 4 and 6.

Bearings 27 are fixed to opposite sides of the members 4, and similar bearings 28 are supported in alignment therewith by suitable clamping devices 29 securing them to the corner girders 2. Between these pairs of bearings are journaled shafts 30 and 31 adjacent both ends of the compartments 8 and 9 respectively. Detents 32 mounted on the shafts 30 near the ends of the latter are formed each with a tooth 33 on which one of the corners of a carrier may rest. Near the upper end of each detent, a bracket 34 is fixed to the girder 4 and is equipped with a slidable rod 35 having one end pivotally attached as at 36 to the upper end of the detent. The rod is surrounded by a compressed spring 37 bearing against this other end and a flange 38 on the bracket, whereby to push the detent inwardly of the compartment.

The shafts 31 support intermediately pivoted dogs 39 near the ends thereof. The upper end of each dog is notched as at 40 for receiving one of the lower edges of a carrier. It will be seen in Figure 6 that the sets of retaining members 32 and 39, although differently mounted on their shafts 30 and 31 engage the carriers in the same plane.

The members 18 support longitudinal bars 40 on the upper edges thereof, and these bars are provided each with a longitudinal angle iron 41 as shown in Figures 5 and 6. The distance between parallel angle members is equal to the length of the base of a carrier so that a carrier is closely fitted and guided therein as shown in Figure 5. The bars 40 in line with the chamber 8 are formed with transverse guide members 42. In each guide member is slidably mounted a plunger 43 having a longitudinal slot 44 permitting movement past a pin 45 in the guide member. The plunger is normally moved outwardly along the inner edge of the corresponding dog 39 by a spring 46 bearing against the inner end of the plunger and against a plug 47 in the inner end of the guide member.

The carriers are arranged in vertical series in the compartments 8 and 9, and these series are guided vertically in the I-members 2 and 3 as may be seen by reference to Figure 3. The carriers are maintained in proper lateral alignment by means of their cooperating ridges 23 and grooves 24.

For the purpose of describing the operation, let it be assumed that the columns of carriers are arranged as in Figure 1 wherein the elevator 14 supports the lowermost carrier in the compartment 8 while the elevator 15 has no load. The lowermost carrier in the compartment 9 rests on the upper ends of the dogs 39. Both elevators now rise together. The slidable plungers 43 which are moved upwardly by the elevator 14 tend to hold the dogs 39 in engagement with the superposed carrier until passing the pivot shaft 31 thereof. Even when these dogs pass upwardly beyond the pivot shaft, the weight of the column of carriers on the dogs is sufficient to hold the latter against movement to release position. Therefore, the elevators are caused to lift the columns slightly, whereupon the plungers 43 move the dogs 31 from beneath the carriers in the chamber 9.

During this upward movement of the elevators, a carrier is raised by the elevator 14, and consequently the entire column in the chamber 8 is raised. This column may therefore be designated as the ascending column, and the other as the descending column. The said lowermost rising carrier on the elevator 14 has its inclined end faces 25 in engagement with the teeth 33 of the detents 32, whereby these teeth are withdrawn from the bottom of the column. The ascending column as well as the descending column is lifted slightly beyond its plane of support on the dogs, and this increment of travel permits the detents 32 to be moved inwardly by the springs 35 to take the lowermost carrier in chamber 8 from the elevator and thus support the entire ascending column.

Both elevators now descend together. The elevator 14 drops without a load since the ascending column is supported by the detents 32. The elevator 15 however now supports the descending column since the dogs 39 have been moved away as already described. As the descending column is lowered, the plungers 43 engage the dogs 39 which are also permitted to swing inwardly at their upper ends because of the inclined faces at the ends of the carriers. When the plungers pass beneath the pivot shafts 31, the dogs 39 commence to return to locking position in order to support the descending column after it has dropped the height of one carrier. When the elevator 15 has reached its lowermost position, the carrier thereon is rolled into the space beneath the ascending column. The lower ends of the intermediate girders 3 and baffle 7 are cut away as at 48 to permit this movement, and

the angle irons 41 confine the horizontally moving carrier to a straight line path.

The sliding movement is preferably accomplished by plunger rods 49 suitably mounted in cylinders 50 at the end of the chamber 9 as shown in Figures 1 and 5. The rods are guided in bushings 51 secured to the girders 2 and are adapted to pass through these girders in order to engage the carrier under movement. The relative position of the columns after a carrier has been moved from compartment 9 to compartment 8 is illustrated in Figure 7.

Both elevators now rise, as already described, and their upper position is shown in Figure 8. The descending column is dropped while the ascending column is supported, as also described above, and at the end of this movement, the upper member of the ascending column is transferred to the top of the descending column by another ram assembly 52 supported at the proper level. To permit this movement of the upper carrier, the intermediate girders 3 and baffle 7 are shortened as at 53 with respect to the corner girders 2.

It will be apparent that a continuous cycle of the carriers up and down the oven is thus established. The grids 22 may be permitted to rise and descend as many times as necessary for the proper treatment of the articles carried thereby. At the end of the treatment the grid is removed from the bottom of the descending column as show in Figure 9, and a grid of fresh material is entered at the bottom of the ascending column as shown in Figure 7.

The movement of the transferring rams must be synchronized with the operation of the elevators, and these elements may be controlled by suitable automatic devices such as clock-controlled switches. Since the construction and arrangement of such devices are within the skill of a mechanic confronted with a problem as stated here, it is not deemed necessary to describe or illustrate them specifically.

The furnace 6 is heated in any suitable manner, as, for example, by a blower 54 which delivers hot air through dampers 55. A flue pipe 56 is substantially co-extensive of the furnace wall in the vertical direction and communicates with the furnace at several points through pipes 57. A by-pass 58 leading from the bottom of the furnace to the blower permits recirculation of the hot gases. Obviously any other suitable means for heating the furnace may be provided.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What I claim is:—

1. A device for raising and lowering material in a furnace comprising ascending and descending columns of carriers mounted therein, independent elevators mounted under each of said columns, pivoted detents mounted adjacent said ascending columns, springs holding said detents in a position where they engage said columns in a manner permitting the same to be elevated and for holding said column against downward movement when the elevator thereunder has been lowered, dogs pivoted intermediate their ends adjacent said descending columns, spring pressed plungers mounted upon the elevator beneath said descending column engaging said dogs beneath their pivots and holding the upper ends thereof into the path of the lowermost carrier in said descending column, said plungers being adapted to engage said dogs above their pivots when said elevator moves upwardly to cause the upper ends of said dogs to move outwardly when the elevator raises the weight of said column of carriers from said dogs and thereby permit the lowermost carrier in said column to be lowered away from said dogs.

2. A device for raising and lowering material in a furnace comprising ascending and descending columns of carriers mounted therein, elevating means mounted under each of said columns, detents mounted adjacent said ascending column and adapted to engage the lowermost carrier carried by said elevator to support said carrier when said elevator is lowered, dogs pivoted intermediate their ends adjacent said descending column, spring pressed plungers mounted upon the elevator beneath said descending column engaging said dogs beneath their pivots and holding the upper ends thereof into the path of the lowermost carrier in said descending column, said plungers being adapted to engage said dogs above their pivots when said elevator moves upwardly to cause the upper ends of said dogs to move outwardly when the elevator raises the weight of said column of carriers from said dogs and thereby permit the lowermost carrier in said column to be lowered away from said dogs.

3. A device for raising and lowering material in a furnace comprising ascending and descending columns of carriers mounted therein, elevating means mounted under each of said columns, detents mounted adjacent said ascending column and adapted to engage the lowermost carrier carried by said elevator to support said carrier when said elevator is lowered, dogs pivoted intermediate their ends adjacent said descending columns, spring pressed plungers mounted upon the elevator beneath said descending column engaging said dogs beneath their pivots and holding the upper ends thereof into the path of the lowermost carrier in

said descending column, said plungers being adapted to engage said dogs above their pivots when said elevator moves upwardly to cause the upper ends of said dogs to move outwardly from said dogs and thereby permit the lowermost carrier in said column to be lowered away from said dogs.

4. A device for raising and lowering material in a furnace comprising ascending and descending columns of carriers mounted therein, independent elevating means mounted under each of said columns, detents mounted adjacent said ascending column and adapted to engage the lowermost carrier in said column in a manner permitting additional carriers to be added to said column, dogs pivoted intermediate their ends adjacent said descending columns, spring pressed plungers mounted upon the elevator beneath said descending column engaging said dogs beneath their pivots and holding the upper ends thereof into the path of the lowermost carrier in said descending column, said plungers being adapted to engage said dogs above their pivots when said elevator moves upwardly to cause the upper ends of said dogs to move outwardly when the elevator raises the weight of said column of carriers from said dogs and thereby permit the lowermost carrier in said column to be lowered away from said dogs, and a ram adapted to move said disengaged carrier from said elevator to the elevator beneath said ascending column.

5. A device for raising and lowering material in a furnace comprising ascending and descending columns of carriers mounted therein, independent elevating means mounted under each of said columns, detents mounted adjacent said ascending column and adapted to engage the lowermost carrier in said column in a manner permitting additional carriers to be added to said column, dogs pivoted intermediate their ends adjacent said descending columns, spring pressed plungers mounted upon the elevator beneath said descending column engaging said dogs beneath their pivots and holding the upper ends thereof into the path of the lowermost carrier in said descending column, said plungers being adapted to engage said dogs above their pivots when said elevator moves upwardly to cause the upper ends of said dogs to move outwardly when the elevator raises the weight of said column of carriers from said dogs and thereby permit the lowermost carrier in said column to be lowered away from said dogs, and a ram adapted to move the topmost carrier from said ascending column to the top of said descending column.

In testimony whereof I affix my signature.

WEDWORTH V. BAKER.