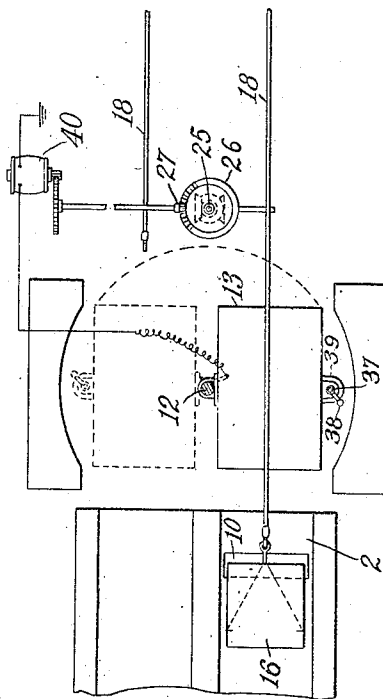
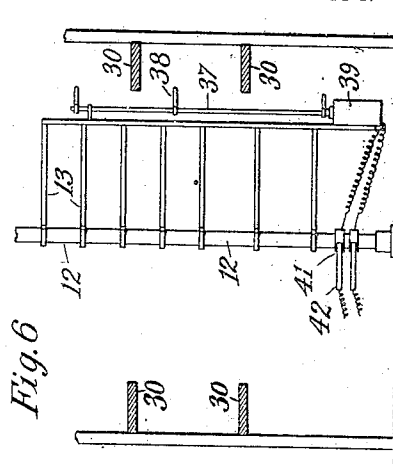
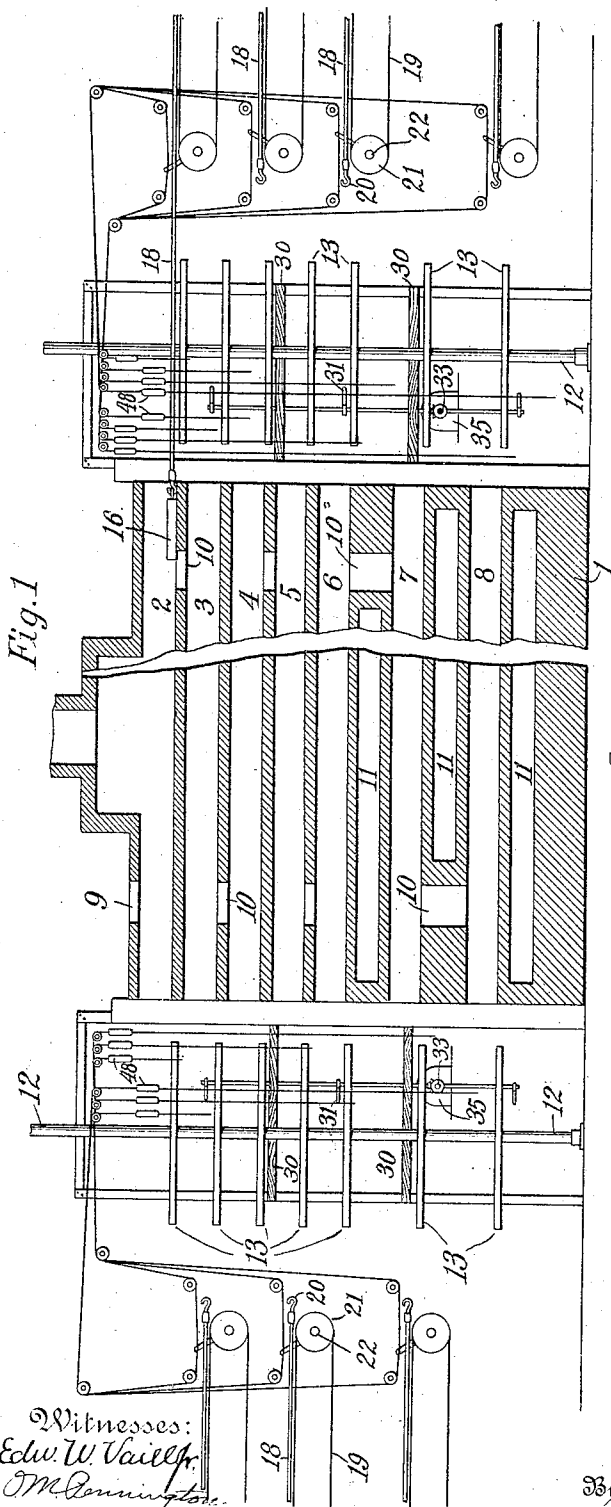


931,815.

Patented Aug. 24, 1909.

4 SHEETS—SHEET 1.



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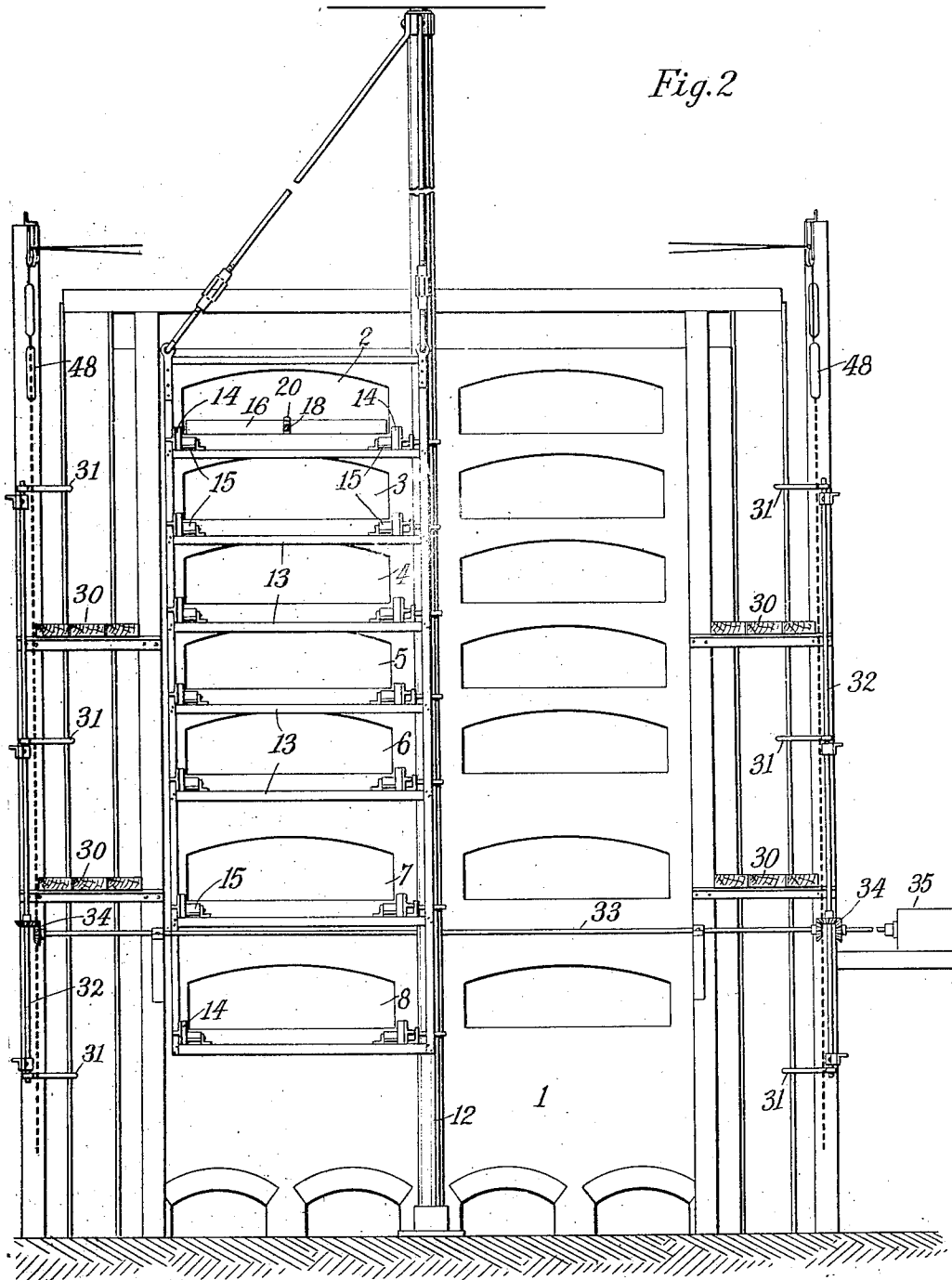
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A. TUCKER.
 BAKING MECHANISM FOR FURNACES.
 APPLICATION FILED MAY 21, 1908.

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 4 SHEETS—SHEET 2.

Fig. 2

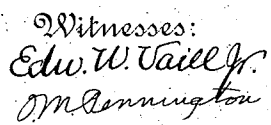


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4 SHEETS--SHEET 3.



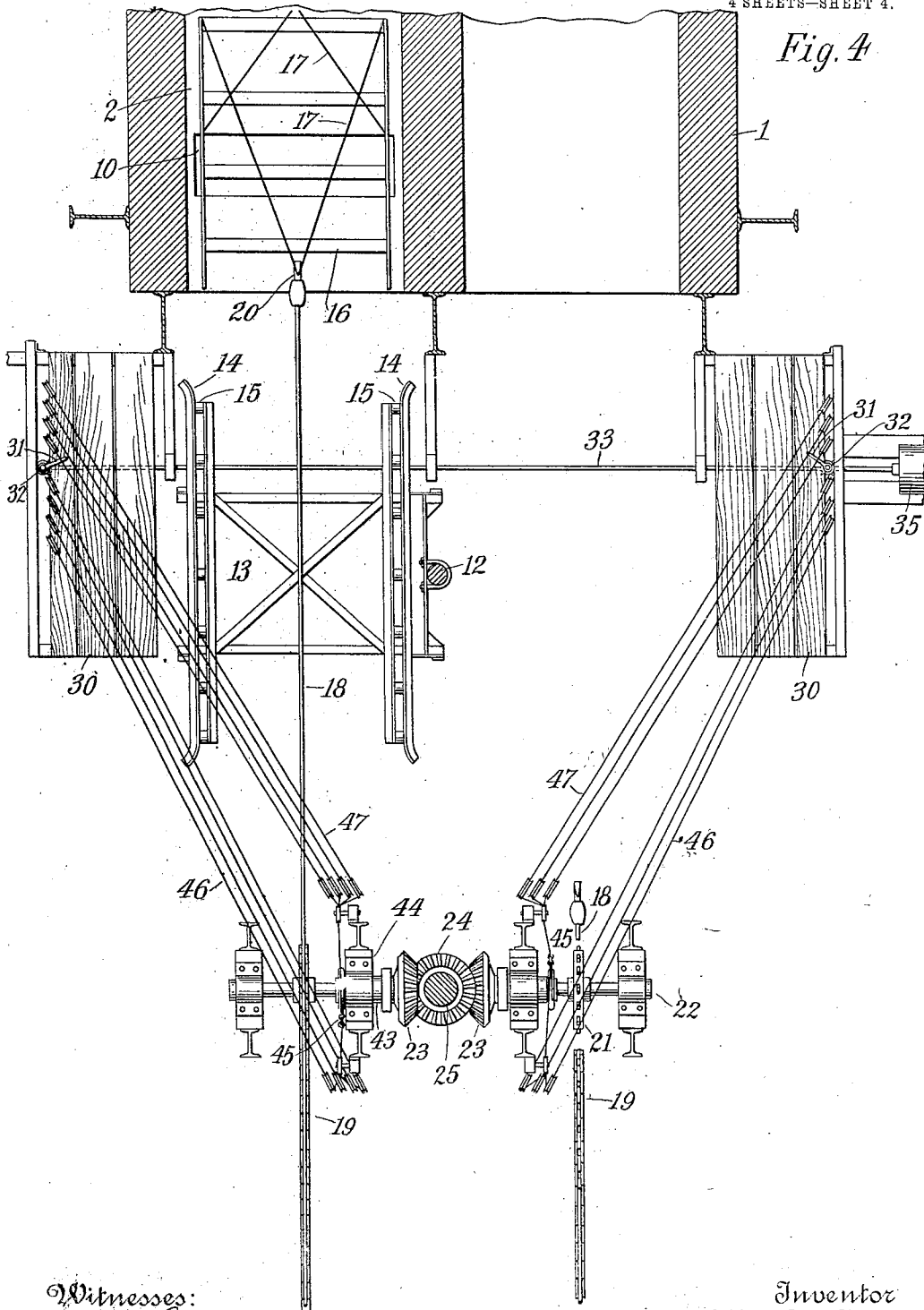
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UNITED STATES PATENT OFFICE.

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RAKING MECHANISM FOR FURNACES.

931,815.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed May 21, 1908. Serial No. 434,065.

To all whom it may concern.

Be it known that I, ALLEN TUCKER, a resident of Mineral Point, in the county of Iowa and State of Wisconsin, have invented certain new and useful Improvements in Raking Mechanism for Furnaces, of which the following is a full, clear, and complete disclosure.

This invention relates to furnaces in which a rake is reciprocated for the purpose of stirring the contents of the furnace, and is particularly applicable to that class of furnaces in which ore is roasted, such as zinc and other ores.

The invention resides in mechanism for operating the rakes of such furnaces so that the movement of the same will always be under easy and immediate control, and whereby the number of men necessary to operate such furnaces is reduced.

Further advantages and improvements will be hereinafter pointed out in the following specification and claims:

For a full, clear and detail description of one form of my invention, reference may be had to the following specification and to the accompanying drawings forming a part thereof, in which—

Figure 1 is a side elevation of the mechanism for operating the rakes, and also showing the ore roasting furnace in vertical section. Fig. 2 is an end elevation of the furnace showing the turn-table for transferring the rakes from one tier of roasting ovens to another, and showing the platforms for the operator located adjacent thereto. Fig. 3 is a side elevation of the platforms on which the operator stands, and also showing the ends of the rake operating mechanism. Fig. 4 is a plan view of the rake operating mechanism, showing the means for transmitting power thereto. Fig. 5 is a diagrammatic view of a turn-table at one end of the furnace, and on which are located the controller handles for controlling the rake operating mechanism, and Fig. 6 is an end elevation of the same parts.

Referring to the drawings, the numeral 1 indicates the ore roasting furnace containing a series of vertically arranged roasting ovens, 2, 3, 4, 5, 6, 7 and 8. The upper oven, 2, is provided with an opening, 9, for the introduction of the ore to be treated, and the alternate ends of each of the ovens have openings, 10, through which the ore may be

passed from one oven to the next lower oven in the same tier. The lower ovens or muffles are separated by fire flues, 11, through which the combustible gases for heating the ore may pass. It is to be understood, however, that I do not desire to be limited to this particular form of furnace, as the bottom of each oven or muffle may be made continuous throughout and the ore transferred from one oven to another exteriorly thereof.

Opposite each end of the furnace is located a vertical rotatable shaft, 12, on which are carried a series of platforms, 13, located at one side thereof, so that when the shaft 12 is rotated at 180 degrees, the platform may be brought opposite either of the two tiers of ovens shown. These platforms are preferably provided with guides, 14, shown in Figs. 2 and 4, and also with anti-friction rollers, 15. The rake, 16, is slightly narrower than the distance between the guides 14, and is constructed in any preferred or well known form, and operates to agitate or stir the ore in the oven in the well known way. This rake preferably consists of a rectangular frame having triangular cross-bars and vertical bars or projections for moving the ore laterally. The rake, 16, is also provided with two sets of angularly arranged rods, 17, to which the draw rods may be connected. The draw rods, 18, are set in pairs opposite each tier of ovens or muffles, and are preferably operated by endless chains, 19, to which they are attached at their outer ends. The draw rods, 18, are provided with hooks or similar devices, 20, at their inner ends by which they may be attached to the respective rods, 17, of the rakes, 16. Power is communicated to the sprocket chains, 19, by means of sprocket wheels, 21, fixed on transverse shafts, 22. The inner ends of these shafts, 22, are provided with bevel gears, 23, which mesh with corresponding bevel gears, 24, fixed on a vertical shaft, 25. These bevel gears 23 are so mounted on the shafts, 22, that they may be thrown into and out of mesh with the gears, 24, by a mechanism hereinafter to be described. The shaft 25 also carries a bevel gear, 26, which meshes with the bevel gear, 27, fixed to a shaft, 28, which may be driven in any suitable way such as by any well known connection with an electric motor, 29.

Adjacent each end of the furnace, and at each side of the turn-table of platforms 13,

are located a series of platforms, 30, on which the operator who has charge of that end of the furnace may stand. These platforms are preferably carried upon a suitable frame-work made of commercial angle iron or structural steel, and the space above each platform is provided with a controller handle, 31, and a similar controller handle is located between the lower platform and the ground on which the furnace rests. The controller handles, 31, are attached to vertical shafts, 32, which are in turn operatively connected with a transverse horizontal shaft, 33, by means of bevel gears or similar devices, 34. The shaft, 33, is connected with a controller, 35, which controls the motor connected with the main driving shaft for the rake operating mechanism. This controller is preferably constructed so that a movement of the controller handle in one direction from a median position will give one movement, say—a forward movement, to the draw rods, while a movement of the controller handle in the opposite direction from the median position will give a reverse or backward movement.

Instead of locating the controller handles on the fixed platforms on which the operators stand, the controller handles and the shafts on which they are mounted may be attached to the turn-table for transferring the rakes from one tier of ovens to the other. This modification is clearly illustrated in Figs. 5 and 6. In this arrangement of the apparatus, each platform, or stage of the turn-table 13, is provided with a bracket, 36, on which the vertical shaft 37, is carried. The controller handles, 38, are attached to this shaft and operate to revolve the shaft 37 so as to cause the controller, 39, also carried by the turn-table, to start, stop or reverse the motor, 40, for reciprocating the rake bars, 18. In this form of the apparatus, the leads of the motor are connected with the controller by suitable contact rings, 41, and contact strips, 42, the number of such rings and strips, of course, depending upon the number of leads required.

It will be apparent that any number of draw rods may be operated independently or simultaneously, and in order that one draw rod may be operated independently of the others at the end of the furnace, I provide means for throwing the driving mechanism for the draw rods into and out of operative connection therewith. For this purpose the gears, 23, are slidably mounted upon the shafts, 22, being splined thereto, so that the power from the shaft 22 will be communicated to the gears 23, while at the same time they are free to move longitudinally on said shaft. For the purpose of moving the gears 23 longitudinally on the shafts 22 are provided rotatably and longitudinally movable sleeves, 43, which, when

oscillated or rotated, will have a corresponding longitudinal movement such as by the use of a well-known pin and spiral slot operating in connection with the support or bearings, 44. The sleeves 43 are rotated by means of radially projecting levers 45. Each of these levers 45 is connected to the ends of a pair of ropes or cords, 46 and 47, which are carried by suitable sheaves supported on the framework of the apparatus, and the ropes are so located that their ends terminate adjacent the respective platforms, 30, on which the operator stands, and it should be noted that the ends of the ropes or cords for moving the transmission gears longitudinally extend to those platforms which correspond to the height of a particular rake bar to be operated. These cords or ropes, 46 and 47, are preferably provided with counter weights, 48, which not only keep the said cords taut, but also tend to counter-balance the weight of the parts in operating the transmission gears.

The details of operation of my improved mechanism will be apparent from the above description, but it may be said that when in use the turn-table, 13, is located opposite one vertical tier of ovens, and supposing the ore to have been distributed through the different ovens or muffles of the furnace, after having been inserted through the first opening, 9, the first rake of the corresponding oven, 2, is drawn through the said oven from one end to the other, say from the left hand toward the right, where it is then allowed to remain on the turn-table at that end of the furnace. The next lower oven is raked in a similar manner, but in the opposite direction, and so until all the rakes have been transferred to the turn-tables at the opposite ends of the apparatus. Both turn-tables are then rotated 180 degrees, thereby bringing the rakes opposite the other tier of ovens or muffles. The same operation is then repeated, except that the rakes are drawn through the ovens in the reverse direction, until they are all deposited on the turn-tables from which they started. The turn-tables are then rotated back to their original position and the cycle is then complete.

It will be obvious that the respective draw rods are thrown into and out of operation by pulling upon the ends of the respective cords, 46 and 47, while their movements forward or backward are regulated by means of the controller handles, 31.

From the above description, it will be seen that I not only produce an exceedingly simple and easily operated mechanism for reciprocating the rakes in furnaces of the class described, whereby the rakes are at all times under complete and instant control, whereby the rakes may be easily and quickly transferred from one tier of ovens to another

other, but also the arrangement described reduces the number of attendants necessary to efficiently maintain the action of the furnaces; since it is possible for one man at each end of a single furnace comprising two vertical tiers of ovens, to keep the furnace in continuous operation. Heretofore, it has been necessary to employ two men at each end of the furnace, one man having charge of attaching and detaching the rakes to the draw rods, while the other man has had to give his entire attention to the mechanism for reciprocating the rods.

Having thus described these forms of my invention, I do not wish to be understood as being limited to the exact details of construction and arrangement of parts shown and described, for obvious variations will occur to persons skilled in the art, and which may be embodied in the apparatus without departing from the spirit and scope of my invention. For instance, the platforms, 30, for the operators, instead of being fixed, may have substituted vertically moving platforms similar to elevators, so that the platforms may be located opposite any pair of ovens in each tier. In this case, the controller handle may be carried by the movable platform or elevator in any well-known manner familiar to those skilled in the art relating to such devices.

What I claim and desire to protect by Letters Patent is:

1. The combination with a furnace having a plurality of tiers of ovens, a pivoted transfer table located at each end of the furnace and adapted to move into position opposite the end of each tier, and having shelves located on a level with each oven, operators' platforms located adjacent said transfer tables at the end of each tier of ovens, a series of rakes adapted to pass through both tiers of ovens, mechanism for reciprocating said rakes, and controlling mechanism for said reciprocating mechanism having their ends located at said operators' platforms.

2. The combination with a furnace having two tiers of ovens, a turntable located at each end of the furnace, and pivoted centrally between the tiers so as to move into position opposite the end of each tier, shelves carried

by said turntable on a level with each oven, operators' platforms located at each side of said turntable adjacent the ends of each tier of ovens, a series of rakes adapted to pass through both tiers of ovens, mechanism for reciprocating said rakes, controlling means for starting and stopping said mechanism, means for controlling the direction of motion thereof, said controlling means having ends terminating at said operators' platforms.

3. The combination with a furnace having a plurality of tiers of ovens, of devices operating within said ovens and adapted to pass through the same, transfer tables at each end of said furnace, operators' platforms located adjacent said tables, means for reciprocating said device within said ovens, said means comprising rods located longitudinally of and at the ends of said ovens, means for reciprocating said rods, a source of power, means for connecting and disconnecting said source of power with each of said rods, said means comprising slidable gears, means for moving said gears longitudinally on their respective shafts and operating cords attached to said sliding means and having their ends located adjacent the respective operators' platforms.

4. The combination with a furnace having a plurality of tiers of ovens, of devices operating within said ovens and adapted to pass through the same, means for reciprocating said devices within said ovens, comprising rods located longitudinally of and adjacent the ends of said ovens, endless chains attached to said rods, sprocket wheels for driving said chains, shafts carrying said sprocket wheels, transmission gears slidably mounted on said shafts, means for sliding said gears, operating parts connected with said sliding means and having their ends located adjacent the ends of the furnace for operating said sliding means for said gears, a main driving shaft adapted to be connected with each of said slidable gears, and means for rotating said driving shaft in either direction.

Signed this 14th day of May, 1908.

ALLEN TUCKER.

Witnesses:

W. R. SMITH,
FRANK E. HANSCOM.