No. 662,161. Patented Nov. 20, 1900.

E. W. BALL, L. E. VACHERON & F. H. LUCE.

APPARATUS FOR SUPPORTING AND CARRYING INTO OR WITHDRAWING FROM OVENS ARTICLES TO BE FIRED OR BURNED.

(Application filed Feb. 20, 1900.)

(No Model.) 2 Sheets—Sheet 1.

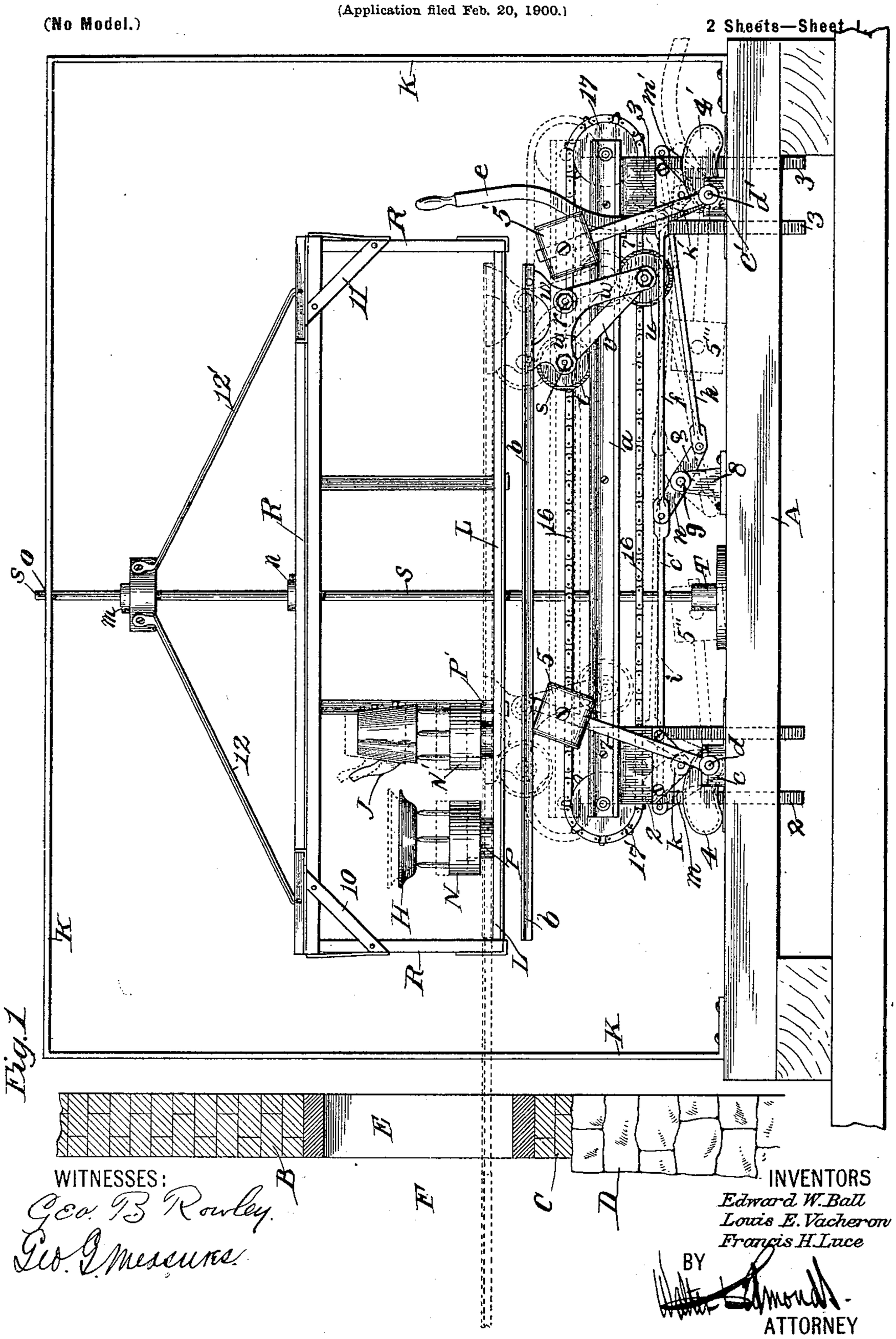

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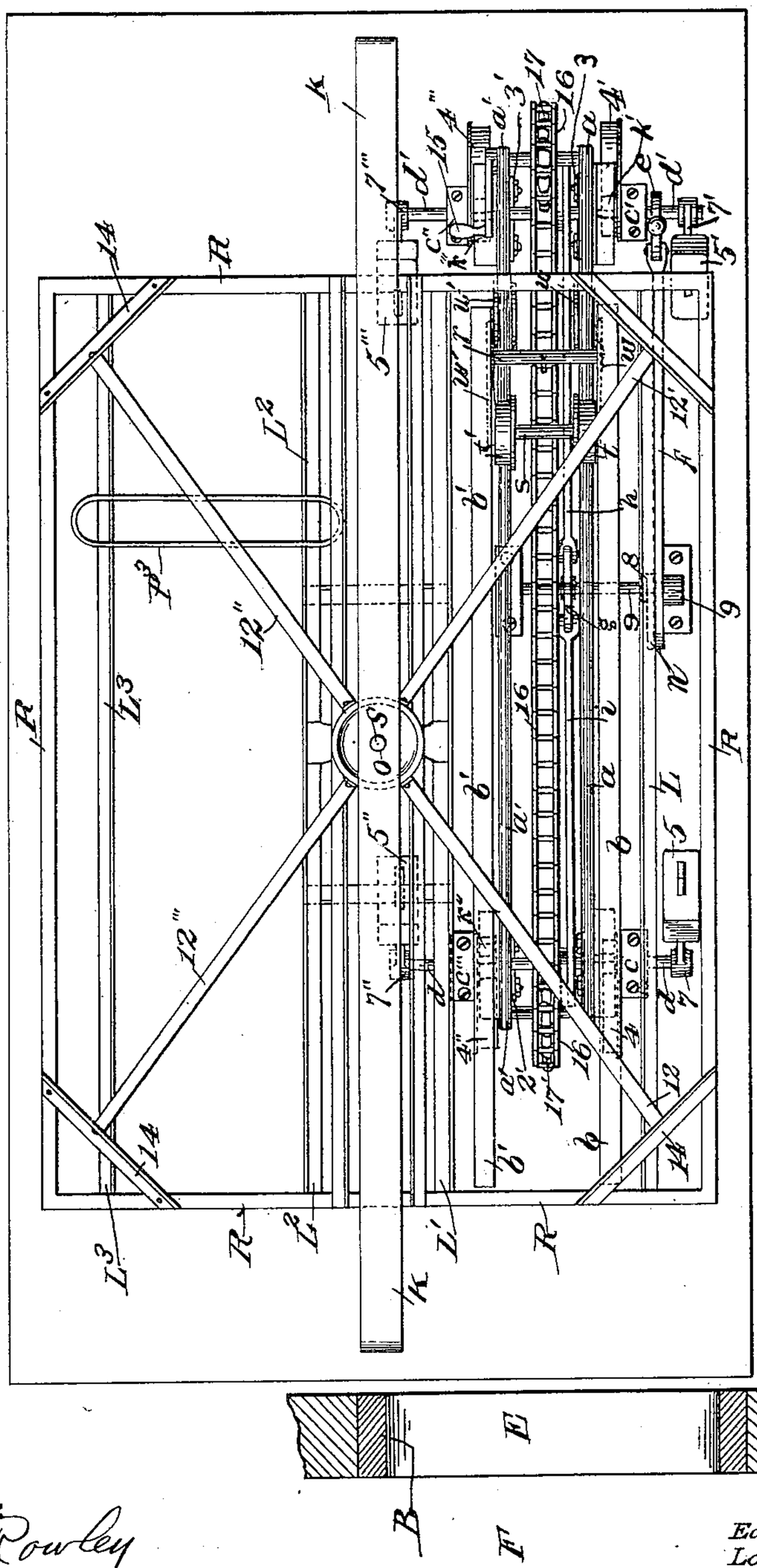
Fig. 2



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EDWARD W. BALL, LOUIS E. VACHERON, AND FRANCIS H. LUCE, OF NEW YORK, N. Y., ASSIGNORS TO THE LALANCE & GROSJEAN MANUFACTURING COMPANY, OF SAME PLACE.

APPARATUS FOR SUPPORTING AND CARRYING INTO OR WITHDRAWING FROM OVENS ARTICLES TO BE FIRED OR BURNED.

SPECIFICATION forming part of Letters Patent No. 662,161, dated November 20, 1900.

Application filed February 20, 1900. Serial No. 5,903. (No model.)

To all whom it may concern:

Be it known that we, EDWARD W. BALL, LOUIS E. VACHERON, and FRANCIS H. LUCE, citizens of the United States, and residents of New York, (Wood Haven,) borough of Queens, State of New York, have invented certain new and useful Improvements in Apparatus for Supporting and Carrying into or Withdrawing from Ovens Articles to be Fired or Burned, of which the following is a description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of our said apparatus, and Fig. 2 a top view thereof.

Similar letters and numerals designate similar parts in each of the two figures.

The object of our invention is, among others, to substitute mechanical for manual agencies in the support, movement, entry into, and withdrawal from ovens of articles inserted in the so-called "biscuit" condition and withdrawn after firing—as, for instance, steel or wrought-iron coated with enamel—and to that end provide in lieu of the carrier-forks hitherto uncomfortably, inconveniently, and uncertainly manipulated, lifted, inserted into, and withdrawn from the ovens by unassisted man-power an apparatus actuated at comparatively small expense of physical power with greatly enhanced convenience and comfort, accuracy, speed, and effectiveness, whereby not only is a better article more frequently and unfailingly produced, but the strength and efficiency of the operator are protected and preserved.

The aforesaid objects of our invention are secured by the apparatus which we will now describe.

F designates the interior of any ordinary burning or firing oven, such as will be well understood without being more fully depicted or described than by suggestions contained in Fig. 1—to wit, a foundation D of stone surmounted by a kiln or oven-wall of brick C B, within which is contained an opening E for the ingress and egress of the articles to be fired, such opening being usually provided with a door closing on the outside and not here shown and provided with the usual racks (not shown) for supporting the frames P P'.

R is a double-rack carrier-frame or carousel rigidly secured by set-screw *m n* to the vertical shaft or axis S, with which it revolves horizontally, the lower extremity of the shaft resting upon and supported by the suitably-supported fixed bearing-block T, within which the shaft rotates, and its upper part turning in the bearing *o* in the fixed supporting-frame K, by which it is maintained in upright position. The carousel is constructed out of any material possessing requisite rigidity and strength—say, for instance, iron or steel—and is preferably provided with vertical and horizontal braces 10 11 12 12' 12'' 12''' 14, &c., to further insure these desirable qualities. A characteristic feature of the carousel consists in its two pairs of suspended parallel supporter-bars L L' and L^2 L^3, all parallel with each other and one pair located on either side of the shaft. Across the space between each pair of these parallel supporter-bars and resting thereon at each end are laid the removable supporting-frames P P', Fig. 1, and a top view of another of which in a different location is illustrated by P^3, Fig. 2. As will be understood by those skilled in the art, the number of these frames used will depend upon the requirements of each occasion and is limited only by the space available upon the parallel supporter-bars. Upon these will be placed the articles to be fired, H J, Fig. 1, (not shown in Fig. 2,) either directly or upon intervening well-understood tripod-frames N N', Fig. 1. One side of the carousel—that is, one pair of the parallel supporter-bars, preferably that pair at the time being not opposite the door of the oven—may be thus loaded with a charge of articles for firing and when all is ready the carousel turned a one-half revolution, which will bring that pair of the parallel supporter-bars with their load opposite the door of the oven. The lifting of the articles, together with their supporting-tripods and frames, off of the parallel supporter-bars and their conveyance into the furnace, subsequent withdrawal therefrom

after firing, and restoration to their original position upon the parallel supporter-bars are effected by that portion of our apparatus which we will now describe.

b b' are a pair of vertically and horizontally movable parallel "fingers" adapted to be lifted up between and through each pair of the aforesaid parallel supporter-bars, thereby lifting off of the latter and charging upon themselves the latter's load of supporter-frames, tripods, articles, &c. Each of said fingers is at its rear end rigidly secured to the two upper arms of one of a pair of four-armed braces, a side view of one of which is shown by W, Fig. 1, and partial top views of that and its mate by dotted lines *w w'*, Fig. 2. These four-armed braces *w w'* are rigidly secured to each other by the transverse bolt *r*, provided with interior shoulders (not shown) to limit inward movement and with exterior washers and nuts operating upon the screw-threaded extremities of the bolt to limit outward motion, the said combination of the fingers *b b'*, braces *w w'*, and transverse bolt *r* constituting what is hereinafter referred to as the "fork." Between the upper arms of the four-armed braces *w w'* is secured an axle *s*, upon which rotates a pair of wheels or pulleys *t t'*. Upon each of the lowest arms of the four-armed braces *w w'* is mounted a wheel or pulley *u u'*.

v, Fig. 1, is a brace connected with each of the two lower arms of the four-armed brace *w*. A similar corresponding brace (not shown) likewise similarly connects and strengthens the two lowest arms of the four-armed brace *w'*. One pair of the wheels or pulleys *t t'* travel upon the upper surface of a pair of supporting-rails *a a'* and the under pair of pulleys *u u'* roll along against the under sides of said rails. Each pair of pulleys being so supported as to preclude the possibility of approaching each other, it will be observed that the weight of the load upon the fingers *b b'*, tending to force their front extremities downward, is counteracted by the grip of the under pulleys against the bottoms of the rails, and is thus transferred to four instead of two bearing-surfaces in such a manner as to secure enhanced steadiness of motion during horizontal movement backward or forward as required. This horizontal movement along the rails is conveyed to the fork-fingers and aforesaid parts connected therewith by turning by means of the crank 15, Fig. 2, a sprocket-wheel 17, rotating at one end of said track, which will cause the endless chain 16, engaging with said sprocket 17, and a corresponding sprocket-wheel 17', rotating at the opposite extremity of the track, to move backward or forward, according to the direction of rotation. The bolt *r* of the fork is connected with the endless chain and the fork with its load thus propelled forward into the oven or backward out of it by power applied, as aforesaid, to the sprocket-wheel 17.

It remains now to describe the mechanism whereby the fork with its load, track, and other connected parts, as aforesaid, are raised, so as to lift the load off of the parallel supporter-bars of the carousel or horizontally-revolving rack. The tracks *a a'* are mounted upon and rigidly secured to vertically-movable guiding and supporting frames or supporters 2 2' 3 3', terminating downward in guiding legs or extremities which pass through apertures in the floor A and by contacting with the inner edges of said apertures serve to guide the upward and downward movements of the tracks. Each of said guiding and supporting frames is provided with a roller *k k' k'' k'''* (the two latter indicated by dotted lines in Fig. 2) on a stud rigidly secured to a projection from the guiding-frame in such a position as to coact with a corresponding cam-lever 4 4' 4'' 4'''. These cam-levers are actuated as follows: They are each rigidly secured to a rock-shaft, 4 4'' to the rock-shaft *d*, 4' 4''' to the rock-shaft *d'*, and these rock-shafts are caused to rotate as follows: To the rock-shaft *d'* is rigidly secured the hand-lever *e*. Pivotally connected at one of its extremities with the lower part of said lever *e* is the link *f*, whose opposite extremity is pivotally connected with the end of a crank-arm *n*, rigidly secured to the rock-shaft 9. There is also upon said rock-shaft 9, rigidly secured thereto, a two-armed crank *g*, the lower arm only of which appears in Fig. 1, the upper arm being concealed by the crank-arm *n*. To one of the lower extremities of said double crank-arm *g* is pivotally connected one end of a link *h*, the other end of said link being hinged to the free extremity of a crank-arm *m'*, the opposite extremity of which is rigidly secured to the rock-shaft *d'*. The other or upper arm of the two-armed crank *g* is likewise pivotally connected with one end of a link *i*, the other end of which is hinged to one end of the crank-arm *m*, the opposite end of which is rigidly secured to the rock-shaft *d*.

5 5' 5'' 5''' are counterweights secured near the extremities of the compensating levers 7 7'', rigidly secured to the rock-shaft *d*, and 7' 7''', rigidly secured to the rock-shaft *d'*. As will be seen, the counterweights 5 5', &c., are strung upon their respective levers, so as to be movable up and down the same, and are secured in position wherever desired thereon by a set-screw, as will be well understood. In this way they may be adjusted so as to compensate exactly. They should be of sufficient weight to balance when at the extremity of either lever the greatest weight to be lifted by and with the tracks.

The operation of our invention is as follows: The articles having been charged upon one side of the revolving rack or carousel, as already described, the latter is swung around so as to bring that charge opposite to the oven-door. A slight exertion of power will then be sufficient to depress the lever *e*, when, by reason of the combination and functions of

the parts described, the tracks will be lifted, raising the fork with them until the parts affected attain their limit of upward vertical movement, when they will assume the respective positions suggested by the dotted lines in Fig. 1, (excepting only the dotted outlines of the fork and its connected parts, as shown by the dotted lines thereof at the left of the drawing.) As has been already explained, the raising of the fork causes its fingers to lift onto themselves and off of the parallel supporter-bars L L′ the load previously charged upon the latter. The door of the oven being open, rotation of the crank 15 will actuate the sprocket-wheel 17, move the endless chain, and so cause the fork with its load to advance horizontally into the oven until the articles to be fired are introduced therein. The tracks and fingers are then, by reversing lever *e*, depressed until the supporting-frames P P′ and their loads encounter and rest upon the fixed racks in the oven, (not shown,) and the fingers are retracted from the oven by rotating the crank 15. The door of the oven may be then closed, the articles allowed to remain within the oven as long as required, the door opened, the fingers again advanced into the oven and under the loads, lifted and retracted bearing the latter, the articles withdrawn by again rotating the crank in the opposite direction and restored, by again reversing the lever *e*, to their original positions upon the parallel supporter-bars of the carousel or horizontal swinging rack, and by rotating the latter brought again out of alinement with the entrance to the oven and into their original positions, whence they may be conveniently removed while the operations aforesaid are repeated on a fresh load, which was being charged meanwhile upon the other pair of supporter-bars.

It will be observed that our imposed apparatus affords facility in loading and unloading and steadiness in moving the articles to be fired, danger of undesirable jars being practically eliminated, and also that it reduces to a minimum the exertion and exposure to heat required of the operator.

It will be understood that without departing from our invention the number of supporting-bars may be increased, likewise the number of the lifting-fingers, also any mechanical equivalents substituted for the particular devices for imparting the required movements.

What we claim as new, and desire to secure by Letters Patent, is the following, viz:

1. For moving articles toward, in, out of, and away from ovens or furnaces, the combination of a set of movable parallel supporter-bars and means to horizontally rotate the same and their loads into and out of alinement with the door of the oven, a vertically and horizontally movable fork provided with a set of supporting-fingers to rise vertically past the said supporter-bars and lift their load, and movable horizontally into and out of the oven and downwardly to restore their load to said supporter-bars and means for producing such vertical and horizontal movements substantially as and for the purposes described.

2. For moving articles toward, in, out of, and away from ovens or furnaces a pair of parallel supporter-bars carrying such articles, means to swing said supporter-bars and their load horizontally into alinement with the door of such oven or furnace, a fork having a pair of fingers, means to elevate said fingers vertically past and above said supporter-bars, and so lift said load, and means to move said fork and fingers so loaded horizontally forward into the oven, and backward out of it, means to depress said fingers below said supporter-bars to restore said load to the latter and means to swing back said supporter-bars and their load to the point of beginning, substantially as and for the purposes described.

3. The combination of a horizontally-rotating rack or carrier having supporter-bars, with a vertically and horizontally movable fork having fingers, said bars and fingers being mutually interlocated, substantially as and for the purposes described.

4. The combination of a forked carrier having fingers *b b′* and means to move the same backward and forward horizontally and also means to move the same vertically, and a horizontal swinging rack having two pairs of supporter-bars L L′ and L^2 L^3, substantially as and for the purposes described.

5. The combination of a horizontally-rotating rack or carrier having a set of supporter-bars with a vertically and horizontally movable fork having a set of fingers, substantially as and for the purposes described.

6. The combination of a horizontally-rotating rack or carrier having parallel supporter-bars L L′ and L^2 L^3 with a vertically and horizontally movable fork having parallel fingers *b b′* substantially as and for the purposes described.

7. A horizontally and vertically movable fork consisting of a carriage *w r w′* and parallel horizontal supporting-fingers *b b′* said carriage being provided with upper wheels *t t′* and under wheels *u u′* in combination with tracks *a a′*, an endless chain 16, sprocket-wheels 17 and 17′ and a crank 15, substantially as and for the purposes described.

8. The combination of a horizontally-movable wheeled carriage *w r w′* carrying horizontal fingers *b b′* with bearing-rails *a a′* provided with guiding-frames 2 2′ 3 3′ cam-levers 4 4′ 4″ 4‴ and means for actuating said cams to raise and lower said guiding-frames and their connections, substantially as and for the purposes described.

9. The combination of a carrier-fork having carrier-fingers *b b′* and wheels *t t′ u u′* with rails *a a′* mounted on guiding and supporting frames 2 2′ 3 3′ cam-levers 4 4′ 4″ 4‴ rock-shafts *d d′* 9 an operating-lever *e*, crank-

arms *n m m' g* and links connecting the said crank-arms, substantially as and for the purposes described.

10. The combination of a carrier-fork having carrier-fingers *b b'* and wheels *t t' u u'* with rails *a a'* mounted on guiding and supporting frames 2 2' 3 3' cam-levers 4 4' 4'' 4''', rock-shafts *d d'* 9, an operating-lever *e*, crank-arms *n m m' g* and links connecting the said crank-arms and lever and also compensating levers 7 7' 7'' 7''' having movable counterweights 5 5' 5'' 5''' substantially as and for the purposes described.

11. The combination of a horizontally-movable carrier or carousel rotating around a shaft *s* and having parallel supporter-bars L L' L^2 L^3 with a vertically and horizontally movable fork consisting of a carriage composed of four-armed braces *w w'* connected by a bolt *r* provided with upper running wheels *u u'* and horizontal parallel fingers *b b'*, a pair of tracks *a a'* connected with guiding and supporting frames 2 2' 3 3', an endless chain 16, sprocket-wheels 17 17' cam-rollers *k k' k'' k'''* rock-shaft *d* provided with cam-levers 4 4'', crank-arm *m* rock-shaft *d'* having cam-levers 4' 4''' crank-arm *m'* actuating-lever *e*, rock-shaft 9 having crank-arms *n g* and links connecting the said crank-arms and actuating-lever, substantially as and for the purposes described.

12. The combination of a horizontally-movable carrier or carousel rotating around a shaft *s* and having parallel supporting-bars L L' L^2 L^3 with a vertically and horizontally movable fork consisting of a carriage composed of four-armed braces *w w'* connected by a bolt *r* provided with upper running wheels *t t'* and under running wheels *u u'* and horizontal parallel fingers *b b'*, a pair of tracks *a a'* connected with guiding and supporting frames 2 2' 3 3', an endless chain 16, sprocket-wheels 17 17' cam-rollers *k k' k'' k'''* rock-shaft *d* provided with cam-levers 4 4'' crank-arm *m*, compensating lever 7 having movable counterweight 5, rock-shaft *d'* having cam-levers 4' 4''' crank-arm *m'* actuating-lever *e* having compensating lever 7' and counterweight 5', crank-arm *m'*, actuating-lever *e*, rock-shaft 9 having crank-arms *m g* and links connecting the said crank-arms and actuating-lever, substantially as and for the purposes described.

13. The combination of a horizontally-movable carrier or carousel rotating around a shaft *s* and having parallel supporter-bars L L' L^2 L^3 with a vertically and horizontally movable fork consisting of horizontal parallel fingers and a body portion, the latter provided with a pair of overrunning wheels and also a pair of under running wheels, a pair of horizontal parallel tracks over and under which said pairs of wheels respectively travel, means to propel said fork backward and forward horizontally along said tracks and means to lift and depress said tracks vertically, substantially as and for the purposes described.

14. The combination of a horizontally-movable carrier or carousel rotating around the shaft *s* and having parallel supporter-bars L L' with a vertically and horizontally movable fork consisting of parallel horizontal fingers *b b'* and a body provided with upper running and under running wheels, tracks upon and under which said wheels respectively run, supports for said tracks provided with rollers *k k'* rock-shaft *d* provided with cam-lever 4 crank-arm *m* rock-shaft *d'* having cam-lever 4' crank-arm *m'* actuating-lever *e* rock-shaft 9 having crank-arms *m g* and links connecting the said crank-arms and actuating-lever, substantially as and for the purposes described.

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