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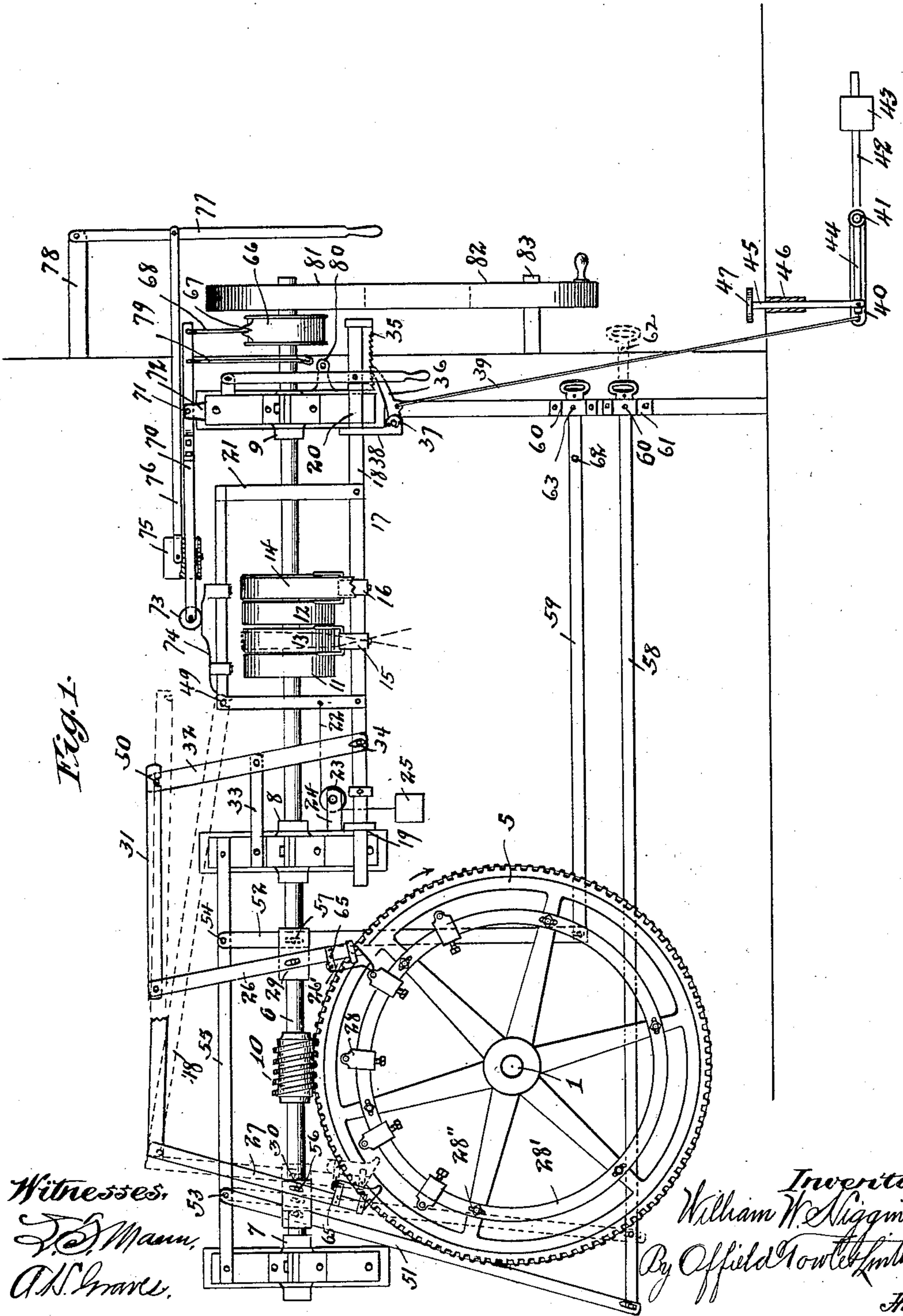
PATENTED FEB. 2, 1904.

W. W. HIGGINS.  
REEL OVEN.

APPLICATION FILED JAN. 30, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



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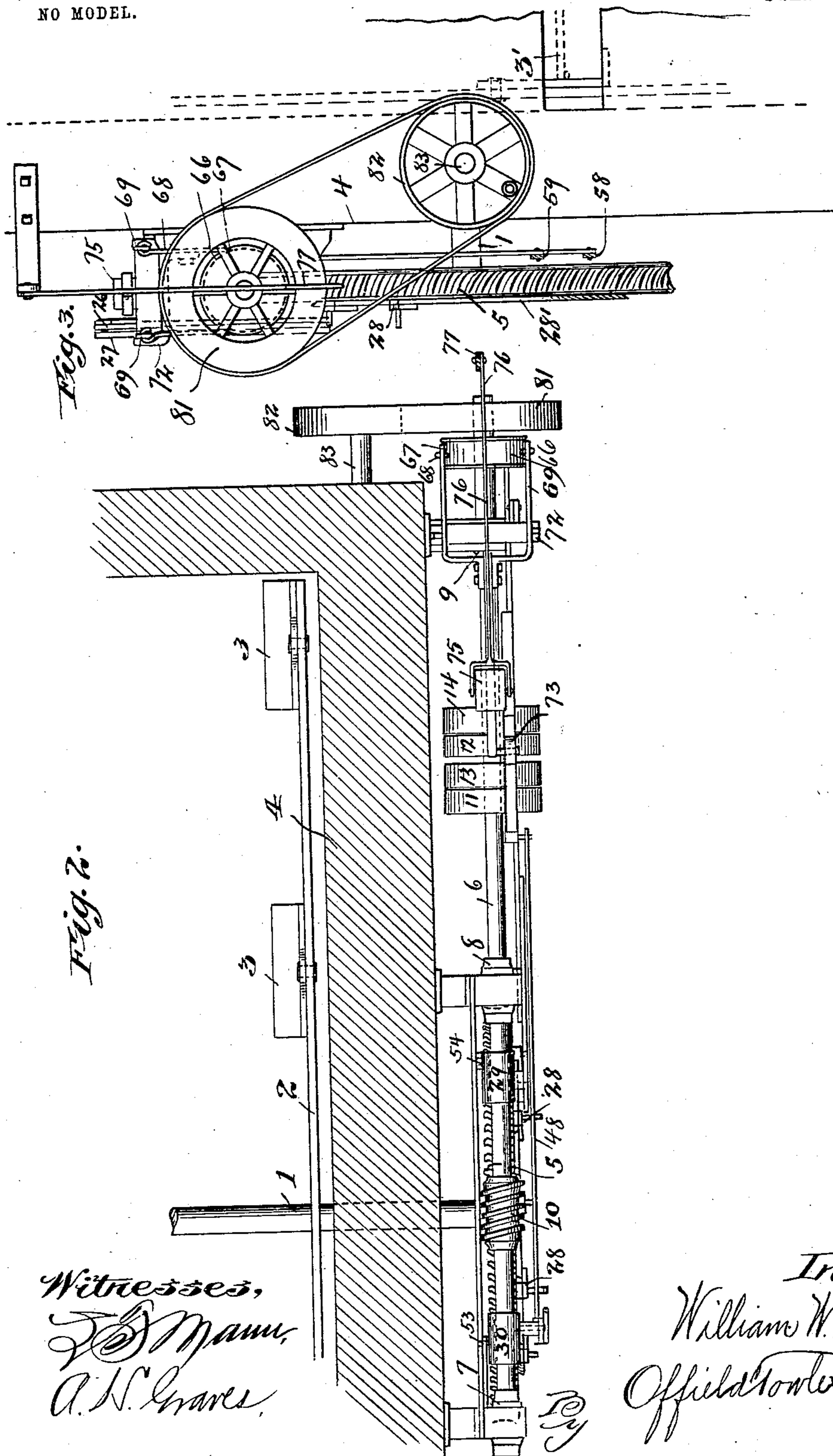
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## UNITED STATES PATENT OFFICE.

WILLIAM W. HIGGINS, OF CHICAGO, ILLINOIS.

## REEL-OVEN.

SPECIFICATION forming part of Letters Patent No. 751,169, dated February 2, 1904.

Application filed January 30, 1903. Serial No. 141,184. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. HIGGINS, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reel-Ovens, of which the following is a specification.

This invention relates to improvements in reel-ovens, and refers more specifically to an improved mechanism for operating ovens of this type.

Among the salient objects of the invention are to provide improved means for automatically arresting the oven at predetermined points in its revolution, to provide improved mechanism for effecting a reversal of the rotation of the oven and at the same time effecting such changes in the automatic arresting mechanism that the latter remains operative, to provide improvements in the arresting mechanism which relieves the supporting and driving structure from abnormal stress during the retarding and arresting movement of the oven, to provide means for radially varying the brake-power which results in checking the movement of the oven, to provide means for radially adjusting the entire set of stops relatively to the oven, so that the positions of the oven-pans relatively to the oven-door may be varied at will and a single adjustment will serve to effect the adjustment of the entire set of pans, and, in general, to provide an improved mechanism of the character referred to.

The invention consists in the matters hereinafter described and more particularly set forth in the appended claims.

In the drawings forming a part of the description, Figure 1 is a side elevation of the portion of the oven equipped with my improved mechanism, the latter being also shown in side elevation. Fig. 2 is a plan view of the parts shown in Fig. 1. Fig. 3 is a front or right-hand end elevation of the parts shown in Fig. 1.

The invention is of the same general character as that set forth in my prior patent, No. 528,877, granted to me November 6, 1894, and embodies improvements upon the construction therein shown and described.

Referring to said drawings, 1 designates the main shaft of an oven-reel, and 2 the reel

mounted thereon and carrying a series of swinging pans 3, said main shaft being arranged to extend laterally through the wall 4 of the oven and being provided at a point immediately outside of said wall with a worm-gear 5, which actuates and controls the oven-reel. Immediately above the periphery of the worm-gear is mounted a main drive-shaft 6, conveniently journaled in suitable bearings 7, 8, and 9, mounted upon the side wall of the oven, and provided with a worm 10, rigidly mounted upon the shaft and operatively engaging the worm-gear 5. Upon the shaft 6 are mounted four pulleys, two of which (respectively designated 11 and 12) are rigidly connected and constitute drive-pulleys, while the other two (designated, respectively, 13 and 14) are loosely journaled and constitute idlers. The two pairs of pulleys 11 and 13 and 12 and 14, respectively, are driven by means of any suitable belting connections, (not shown,) one of which drive-belts will be crossed, so as to actuate the main shaft 6 in a direction the reverse of that in which it is driven by the other belt. Belt-shifters 15 and 16, mounted upon a shiftable frame, (designated as a whole 17,) serve to confine and shift the belts into or out of driving engagement with the drive-pulleys, as will hereinafter appear.

The belt-shifter frame 17 comprises a lower horizontal bar 18, mounted to slide through suitable bearings 19 and 20, and a yoke-frame 21, the lower ends of which are rigidly united with the horizontal bar 18 and the upper portion of which extends above and around the pairs of pulleys hereinbefore described. With that side of the yoke-frame 21 toward the worm-gear is connected a cable 22, which extends thence over the guide-pulley 23, mounted upon a fixed bracket 24, and is provided at its lower end with a weight 25, heavy enough to effect the automatic shifting of the frame when the frame is released. At this point it may be noted that in operation only one of the drive-belts will be used, the other being meantime thrown off from its drive-pulley on the counter-shaft from which it is actuated.

In order to automatically shift the belt-shifting frame into position to rotate the oven-reel, tappet-levers 26 and 27 are provided,



which are so arranged as to be engaged by tappets 28, mounted upon the worm-gear 5, during the rotation of the latter, a tappet 28 being provided for each pan of the oven-reel and severally arranged in proper angular relation to arrest the respective oven-pans opposite the main door of the oven. For a purpose which will hereinafter appear each tappet-lever is fulcrumed upon a sleeve, as 29 and 30, mounted to slide upon the main drive-shaft 6, the lower end of each lever being adapted to be oscillated into or out of the path of the tappets 28, while the upper end of each lever is connected to move the belt-shifting frame.

Describing first the connections with the tappet-lever 26, 31 designates a link forming a connection between the upper end of the tappet-lever and a vertical oscillatory lever 32, which is fulcrumed between its ends upon a bracket 33 and has slot-and-pin connections with the lower bar 18 of the belt-shifter frame, as indicated at 34. Assuming the drive-shaft to be rotating in a direction to turn the worm-gear in the direction indicated by the arrow in Fig. 1, the engagement of each tappet 28 with the toe-like projection 26' of the tappet-lever will oscillate the latter in a direction to move the belt-shifter frame to the right and to thus shift the drive-belt from the drive-pulley to the idler. When thus thrown out of gear against the action of the weight 25, the belt-shifter frame is retained in its position by means of an automatically-engaging latch mechanism, which is constructed and arranged as follows: Upon the lower side of the right-hand end of the bar 18 is provided a ratchet 35, with which coöperates a latch or pawl 36, pivoted at 37 upon a stationary bracket 38. With the lower side of the pawl 36 is connected an actuating-rod 39, which extends downwardly to and is connected with a crank-arm 40, rigidly mounted upon a rock-shaft 41 and arranged to project in a substantially horizontal direction from the latter. The rock-shaft 41 is provided with an oppositely-extending arm 42, which is provided with an adjustable weight 43. Said rock-shaft 41 is also provided with a plurality of actuating-arms 44, which are preferably arranged to extend parallel with the actuating-arm 40 and are spaced at intervals apart across the front of the oven, as fully shown and described in my previous patent, one only of said arms being shown in the present instance. With each of these arms is connected a pedal-rod 45, which extends upwardly through a suitable guide 46 in the working floor and is provided at a point immediately above the working floor with a pedal 47, whereby the pedal-rod may be depressed. It will be obvious from the foregoing description that when the pedal 47 is depressed the rock-shaft 41 will be oscillated in a direction to draw down and disengage the pawl 36 against the action of the weighted

lever 42 and that when the operator removes his foot the weighted arm 42 will cause the pawl or latch 36 to automatically engage the ratchet 35.

The tappet-lever 27 is connected with the belt-shifter frame by means of a simple ratchet-link 48, and it is to be noted that the link is detachably connected with the shifter-frame by a hook-and-pin engagement, as indicated at 49, so that it may be readily disengaged when the lever 27 is not in use. For the same purpose the link 31 is likewise made detachable from the oscillatory lever 32, as indicated by the hook-and-pin connection at 50.

In order to shift either one of the tappet-levers 26 or 27 out of operative position at will, shifting-levers 51 and 52, respectively, are provided, each of which is pivotally connected, as indicated at 53 and 54, with a bar 55 and is operatively connected with the corresponding sleeve 29 or 30 by means of a slot-and-pin connection, as indicated at 56 and 57, respectively, these slot-and-pin connections constituting the fulcrums of the respective levers. With the lower end of each shifting-lever is connected an actuating-rod, as 58 and 59, which rods extend horizontally to the front of the oven and there extend through guide-supports 60 and 61. The end of each lever is provided with a suitable handle, and each lever is also provided with a series of apertures 62, which may respectively be brought into register with corresponding pin-holes, as 63 and 64, formed in the guide-supports, thereby enabling the other actuating-lever to be detachably secured in two or more positions of adjustment. When the actuating-lever 59 is drawn forwardly or outward, the front of the oven or sleeve 29 is shifted along the main shaft, thereby carrying the tappet-lever 26 out of range of the tappets. Similarly when the actuating-lever 58 is thrust inwardly it serves to carry the tappet-lever 27 out of range of the tappets.

It is sometimes desirable to rotate the worm-gear backwardly a short distance, and means are therefore provided for permitting the tappets to pass the respective tappet-levers notwithstanding the latter are in operative position. To this end the toe or engaging portion of each tappet-lever is pivotally connected with the lever-body by means of a strap-and-pin connection, as indicated at 65, located some distance above the end of the lever, and the toe member is arranged to depend alongside of and in bearing with the body of the lever in such manner that it is rigidly supported by the latter against the advance movement of the tappets, but is free to swing outwardly away from the lever and out of the path of the tappets when the gear is moved in a reverse direction.

Mechanism is provided for automatically applying a brake to arrest the rotation of the main shaft immediately following the shifting



of the belt out of driving engagement therewith, which mechanism is constructed and arranged as follows: 66 designates a friction brake-wheel rigidly mounted upon the main shaft 6 conveniently near the forward end of the latter, and 67 designates a brake-band arranged to encircle said brake-wheel; the respective ends thereof being connected, by means of suitable links 68, with a two-armed yoke 69, which is rigidly connected to and extends in alinement with a bar 70, pivotally supported between its ends, as indicated at 71, upon a bracket-support 72. The opposite end of said bar 70 is provided with a cam-roller 73, which is arranged to travel upon a cam 74, which is mounted upon the upper side of the yoke 21, forming part of the pulley-shifter frame. The cam 74 is so shaped that as the pulley-shifter frame is moved to the right to throw the belt onto the idle pulley the cam-roller 73 and the arm upon which the latter is mounted are permitted to descend, so as to raise the opposite end of the lever and apply the brake. A weight 75 is slidably mounted upon the brake-lever 70, so as to actuate said lever, and in order that the weight may be shifted to regulate the force with which the brake is applied a link 76 is connected through and extends thence forwardly to and is connected with a hand-lever 77, pivoted at its upper end to a suitable bracket 78 and depending within easy reach of the operator. The brake-lever 70 is provided with a link 79, which may be engaged with a suitable stud 80 to hold the brake-pan free from frictional engagement with the brake-wheel when desired, notwithstanding the pulley-shifter frame be shifted into that position which permits the cam-roller to descend. In order to hold the weight 75 frictionally in adjusting position upon the brake-lever, the aperture therethrough is made sufficiently large to accommodate a bent plate-spring 75', which is interposed between the wall of the aperture and the under side of the brake-lever and serves to bind the parts together. The tension of this spring may be adjusted by a set-screw 75".

In the actual operation of an apparatus of this character it is found that the momentum of the heavy oven-reel, acting through the worm-gear upon the worm engaged therewith, and thus upon the main shaft, brings an enormous stress upon the mechanism when the rotation of the main shaft is checked too rapidly. This stress is so great that in some instances serious breakages have occurred. I have discovered that this difficulty may be entirely obviated by the use of a balance-wheel, which insures a gradual stopping of the main shaft and a corresponding gradual but nevertheless positive arresting of the worm-gear and connected oven-reel. Accordingly I mount upon the main shaft at any convenient point a balance-wheel 81, which, as best shown in Fig. 3, is relatively large

and heavy, so that when the brake is applied the checking of the main shaft is rendered gradual and uniform. The balance-wheel is also conveniently made to serve the purpose of a pulley by means of which the main shaft 70 may be turned in either direction manually, and to this end a hand-wheel 82 is mounted upon a suitable stub-shaft 83 in practical alinement with the balance-wheel 81 and a belt trained around the two.

In practice it is usual to employ at times skeleton pans which are supported a short distance above the main pans of the oven-reel, as indicated in dotted lines at 3' in Fig. 3. When these pans are used, the reel should obviously be arrested at different points, so as to bring the skeleton pans in proper relation to the door of the oven, and accordingly the several tappets 28 are mounted upon the ring 28', which is adjustably secured to the main body of the gear 5 by means of circumferentially-disposed slot-and-bolt connections, as indicated at 28". By loosening these bolts the ring may be rotated bodily and adjusted in proper relation to the main gear to effect the necessary adjustment of the entire set of stops. The stops are also made independently adjustable in order that they may be adjusted to compensate for variations in structure of the reel.

The operation of the mechanism constructed and arranged as described has been substantially described in connection with the description of the several parts, but may be briefly recapitulated as follows: Assuming that the worm-gear is to be rotated in the direction indicated by the arrow applied to the periphery thereof and with the parts in the position shown in the drawings, as the first tappet-block 28 of the series engages the tappet-lever 26 the latter is oscillated and through the connections described shifts the belt-shifter in a direction away from the worm-gear and in such direction as to carry the driving-belt from the drive-pulley to the idler. At the limit of movement thus imparted to the shifter-frame the latch or pawl 36 engages that tooth of the ratchet 35 which happens to be opposite, and thus prevents any substantial return of the belt-shifter frame. In this connection it is to be noted that the provision of the series of ratchet-teeth spaced at relatively small intervals apart is important, for the reason that it was found in operation that where a single notch or shoulder was provided, as in my prior construction, the belt-shifter frame was bound to have considerable backlash or lost motion, because of the impossibility of keeping the tappets and operating connections so adjusted that the belt-shifter frame would be shifted just far enough to become latched without sometimes missing. As the belt-shifter frame is thus moved to the right the cam-roller of the brake-lever, descending the inclined cam-surface 74, lowers said lever



and applies the brake to the main shaft; but because of the balance or fly wheel connected with said main shaft the retardation is gradual and uniform. By adjusting the weight 75  
 5 along the brake-lever the braking power may be so adjusted as to bring the oven-reel to a stop in proper relation to the oven-door and with great uniformity. This feature  
 10 of being able to adjust the braking power is of the utmost importance, because not only do the working conditions of the mechanism which determine the frictional resistance vary, but also because it is frequently found desirable to employ the pans which are supported  
 15 in varying relations to the arms of the reel. For the same reason that feature of the construction which provides for the adjustment of the ring 28", which carries the tappets, is of great importance, because when, as is some-  
 20 times the case, skeleton pans are employed in connection with the regular pans of the oven-reel the set of tappets may be adjusted relatively to the reel by simply adjusting the ring as a whole, thereby insuring that each pan  
 25 will be arrested at the proper point and without separately adjusting the several stops.

After the operator has discharged and loaded the pan which was stopped opposite the oven-door he brings the mechanism in operation  
 30 again by simply depressing any one of the pedals 47 most accessible to him, thereby withdrawing the pawl 36 and allowing the weight 25 to return the belt-shifter and in so returning throw the driving-belt from the idler to  
 35 the drive-pulley. As the belt-shifter returns the brake-lever is raised and the brake thrown off. In case it be desired to run the oven-reel in the opposite direction the operator disengages the connecting-link 31, shifts the actu-  
 40 ating-lever 59 so as to draw the tappet-lever 26 out of range of the tappets, shifts the actuating-lever 58 into position to bring the tappet-lever 25 into operative relation with the tappets, and connects the link 48 with the belt-  
 45 shifter frame, whereupon the operation will be precisely the same as hereinbefore described, when the oven-reel is rotated in the opposite direction. In this connection it will be understood, of course, that when the oper-  
 50 ator wishes to reverse the direction of rotation of the main shaft he does so by throwing off the straight driving-belt and throwing on the crossed driving-belt.

While I have herein described the preferred  
 55 embodiment of my invention, yet it will be understood that the details thereof may be modified to some extent without departing from the spirit of the invention as indicated by the claims.

60 I claim as my invention—

1. A mechanism for operating oven-reels, comprising an oven-reel shaft, a worm-gear mounted thereon, a main drive-shaft provided with a worm engaging said worm-gear, a series  
 65 of tappets upon said gear, two oscillatory tap-

pet-levers arranged contiguous to the gear, means for bodily shifting said levers to bring them into and out of operative relation to the tappets upon the gear, a belt-shifter frame provided with two belt-shifters, two pairs of idle and drive pulleys mounted upon the main shaft in operative relation to said respective belt-shifters, operative connections between said belt-shifter frame and each tappet-lever, adapted to be alternatively brought into use and whereby the movement of either tappet-lever under the action of the tappets upon the gear serves to shift one of the driving-belts from a drive-pulley to an idler, means for automatically engaging and holding the belt-shifter frame substantially at the limit of its throw in one direction, and means for automatically returning the belt-shifter when released.

2. A mechanism for operating oven-reels, comprising an oven-reel shaft, a worm-gear mounted thereon, a main driving-shaft provided with a worm engaging said worm-gear, a series of tappets upon said gear, two oscillatory tappet-levers arranged contiguous to the gear and fulcrumed between their ends, means for bodily shifting the fulcrum-supports of said levers to bring them into and out of operative relation to the tappets upon the gear, a belt-shifter frame provided with two belt-shifters, two pairs of idle and drive pulleys mounted upon the main shaft in operative relation to the respective belt-shifters, operative connections between said belt-shifter frame and each tappet-lever adapted to be alternatively disengaged, said tappet-levers being arranged in oppositely-disposed relation so as to be respectively operative when the worm-gear is rotated in opposite directions and the connections between one of the tappet-levers the belt-shifter frame including a change-motion device whereby the belt-shifter is shifted in the same direction by both tappet-levers, means for automatically engaging and holding the belt-shifter frame substantially at the limit of its throw in one direction and a continuously-acting return mechanism operating to automatically return the belt-shifter when released.

3. In combination with the main shaft of an oven-reel, a driving-gear mounted thereon, a tappet-ring mounted upon said driving-gear concentric with the axis thereof, and a series of tappets upon said ring, said ring being adjustably secured to the gear by means of circumferentially-disposed slot-and-bolt connections, for the purpose set forth.

4. In combination with the main shaft of an oven-reel, a driving-gear adjustably mounted thereon, a tappet-ring mounted upon said driving-gear concentric with the axis thereof, and a series of tappets upon said ring, said ring being secured to the gear by means of circumferentially-disposed slot-and-bolt connections, and the several tappets being adjustably



mounted upon said ring, for the purpose set forth.

5. In a mechanism for operating oven-reels, the combination with a rotative reel, of a worm-gear connected to rotate positively with the reel, a drive-shaft provided with a worm engaging said worm-gear, driving connections for actuating said main shaft, ungearing mechanism, and a balance-wheel operatively connected with the drive-shaft and operating to effect a gradual retardation of the rotation thereof when thrown out of gear.

6. In a mechanism for operating oven-reels, the combination with a rotative reel, of a worm-gear connected to rotate positively with the reel, a drive-shaft provided with a worm engaging said worm-gear, driving connections for actuating said main shaft, ungearing mechanism, a friction-brake arranged to act upon said drive-shaft, and a balance-wheel operatively connected with the drive-shaft and operating to effect a gradual retardation of the rotation thereof when thrown out of gear.

7. In a mechanism for operating oven-reels, the combination with the reel-shaft and oven-reel thereon, of a gear upon said reel-shaft, a main drive-shaft, driving connections between said drive-shaft and gear, comprising means for driving said main shaft in opposite directions, and a friction-brake arranged to act upon said main shaft comprising a brake-wheel, a brake-band encircling said brake-wheel, and a weighted lever pivoted upon an axis extending substantially at right angles to the brake-wheel shaft and provided with two

arms with which the respective ends of said brake-band are connected, whereby the application of the brake to the brake-wheel is uniform, regardless of which direction the brake-wheel is rotating.

8. In combination with an oven-reel, the main shaft thereof, and a driving-gear mounted upon said shaft, a drive-shaft and driving connections between said drive-shaft and the gear of the reel-shaft, driving connections for operating the drive-shaft, means for throwing the drive-shaft out of gear, an automatically-operating friction-brake mechanism arranged to act upon said drive-shaft when the latter is thrown out of gear, comprising a weighted lever, a brake-wheel and a brake-band connected with said weighted lever engaging said brake-wheel, and means for shifting the weight along said weighted lever, comprising a hand-lever, and a rigid link connecting the hand-lever and weight, substantially as described.

9. In combination with an oven-reel, and the driving mechanism thereof, a belt-shifter frame, mechanism for automatically shifting said frame in one direction, a continuously-acting weight arranged to return said belt-shifter, and a pawl-and-ratchet mechanism arranged to automatically engage and hold said belt-shifter frame at the limit of its movements against the action of the weight.

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