

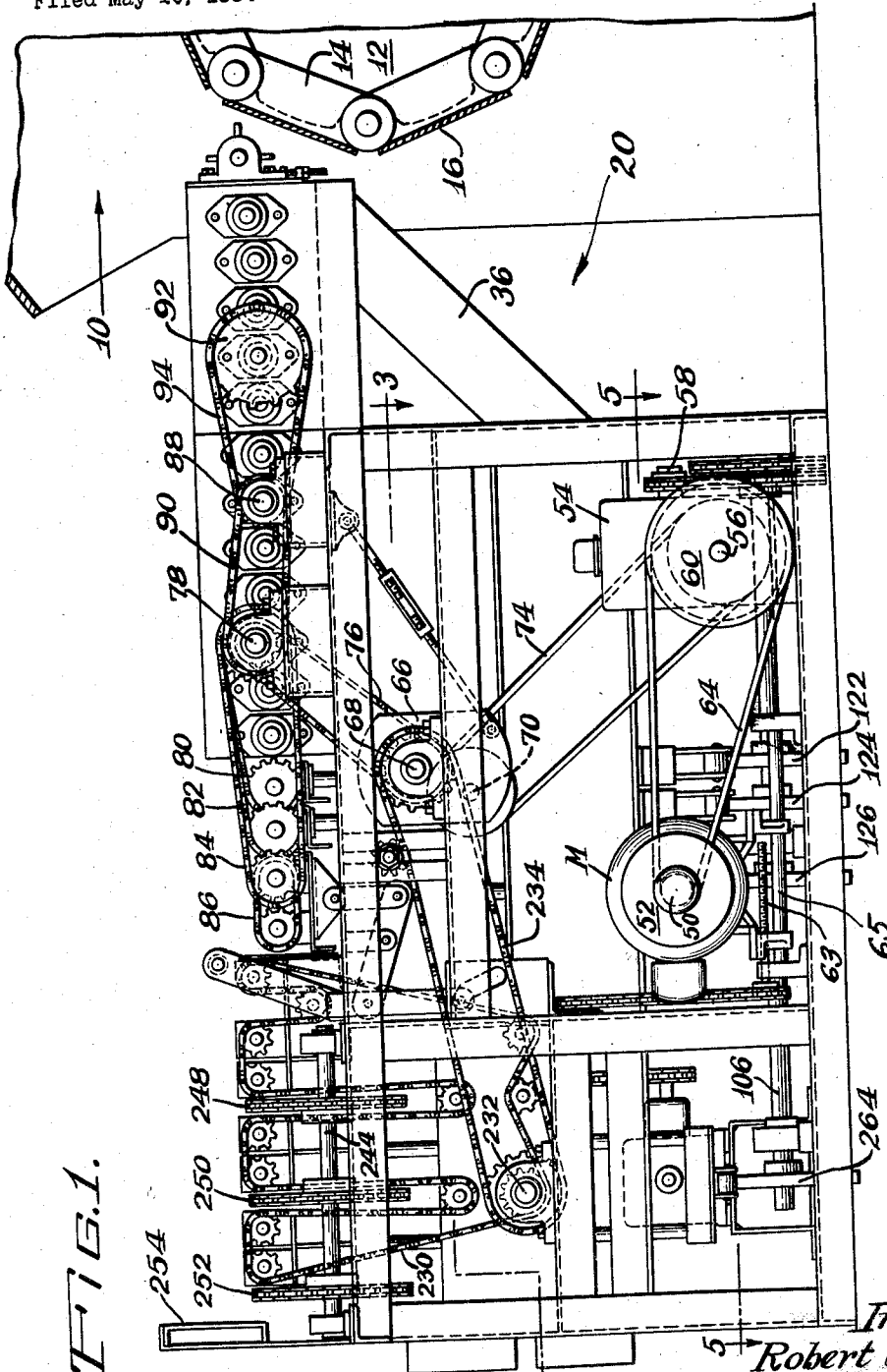
Oct. 14, 1958

R. MOSS ET AL
TUNNEL OVEN UNLOADER

2,856,055

Filed May 10, 1954

9 Sheets-Sheet 1



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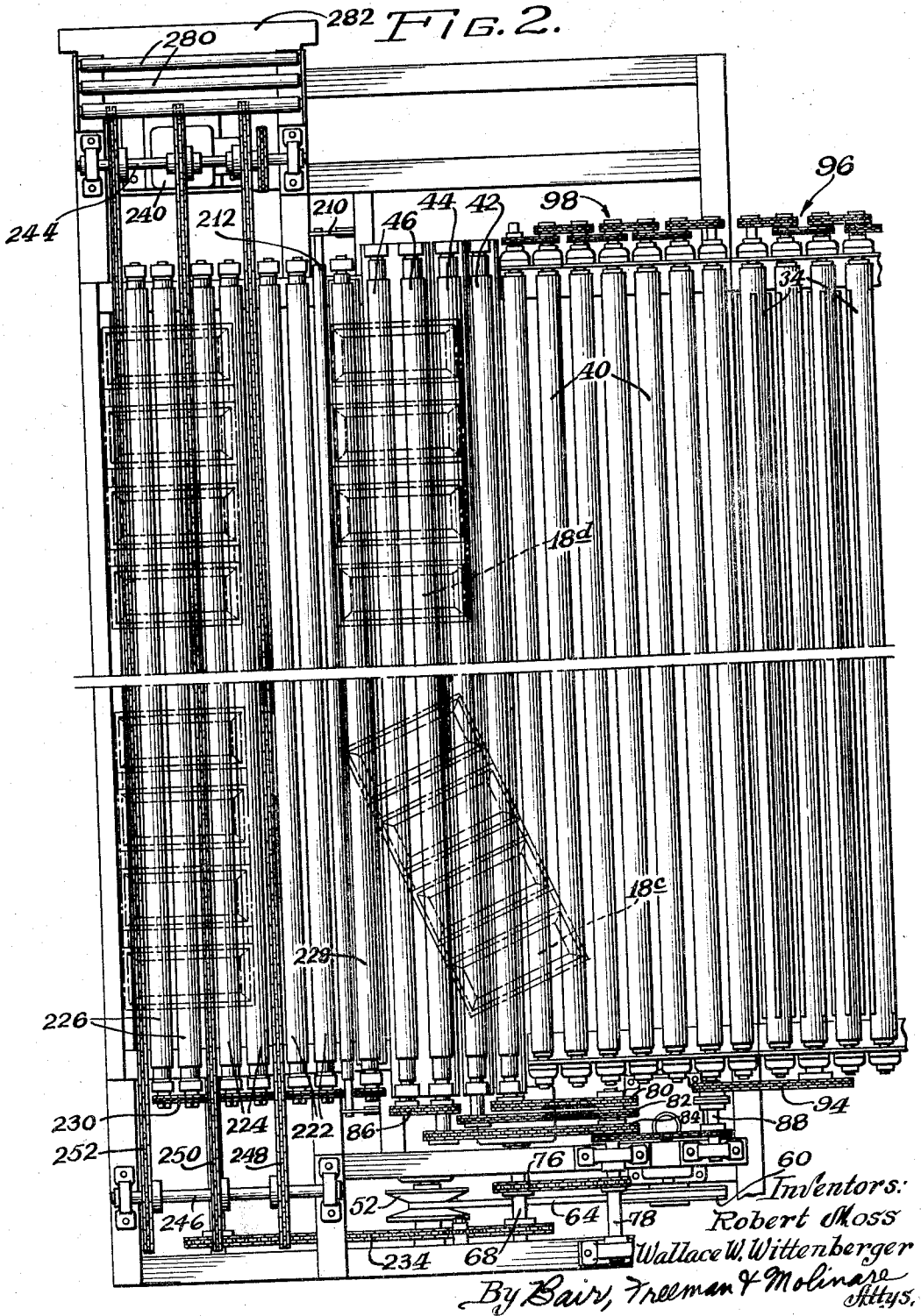
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9 Sheets-Sheet 2



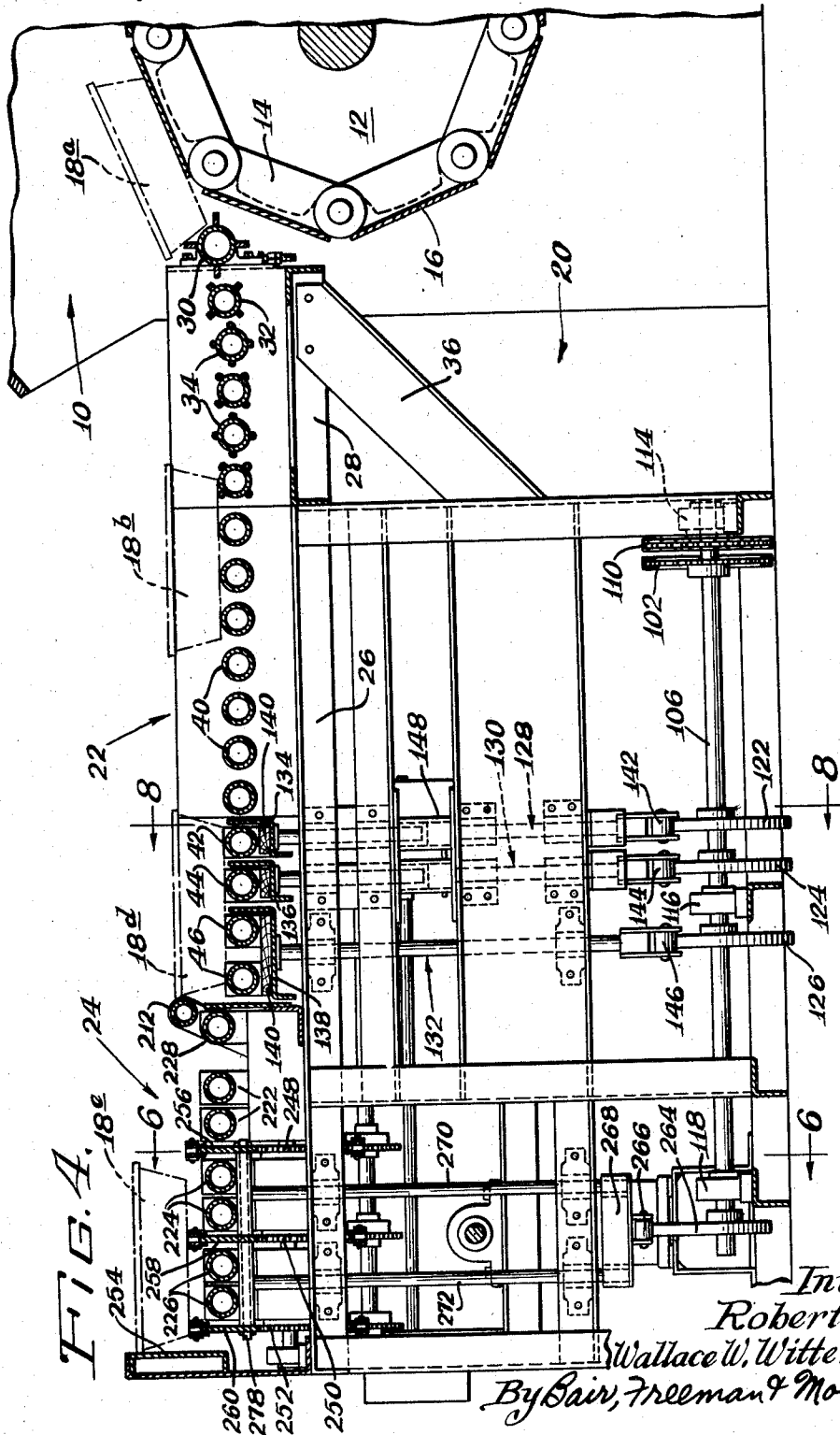
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9 Sheets-Sheet 4



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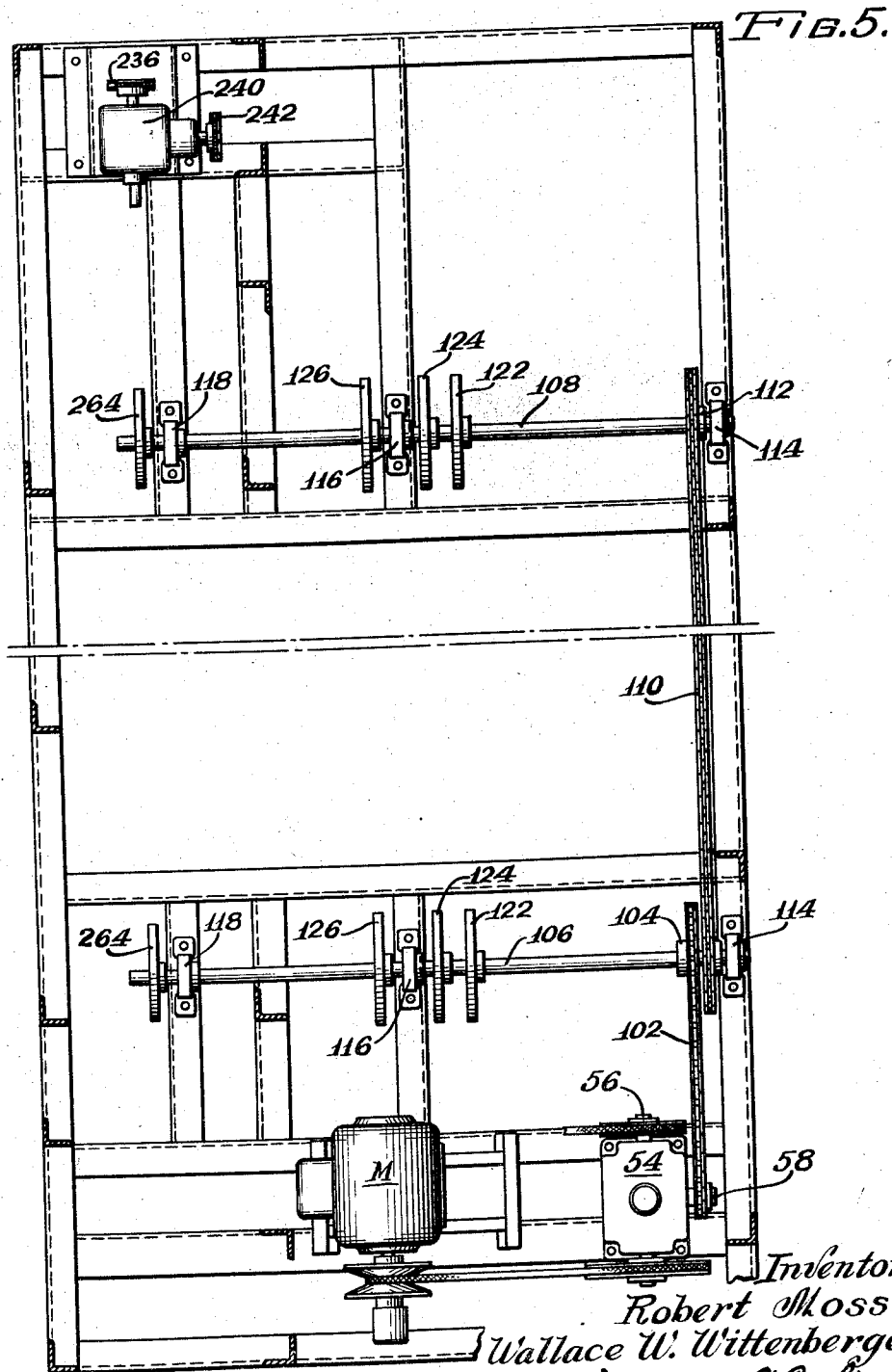
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9 Sheets-Sheet 5



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FIG. 6.

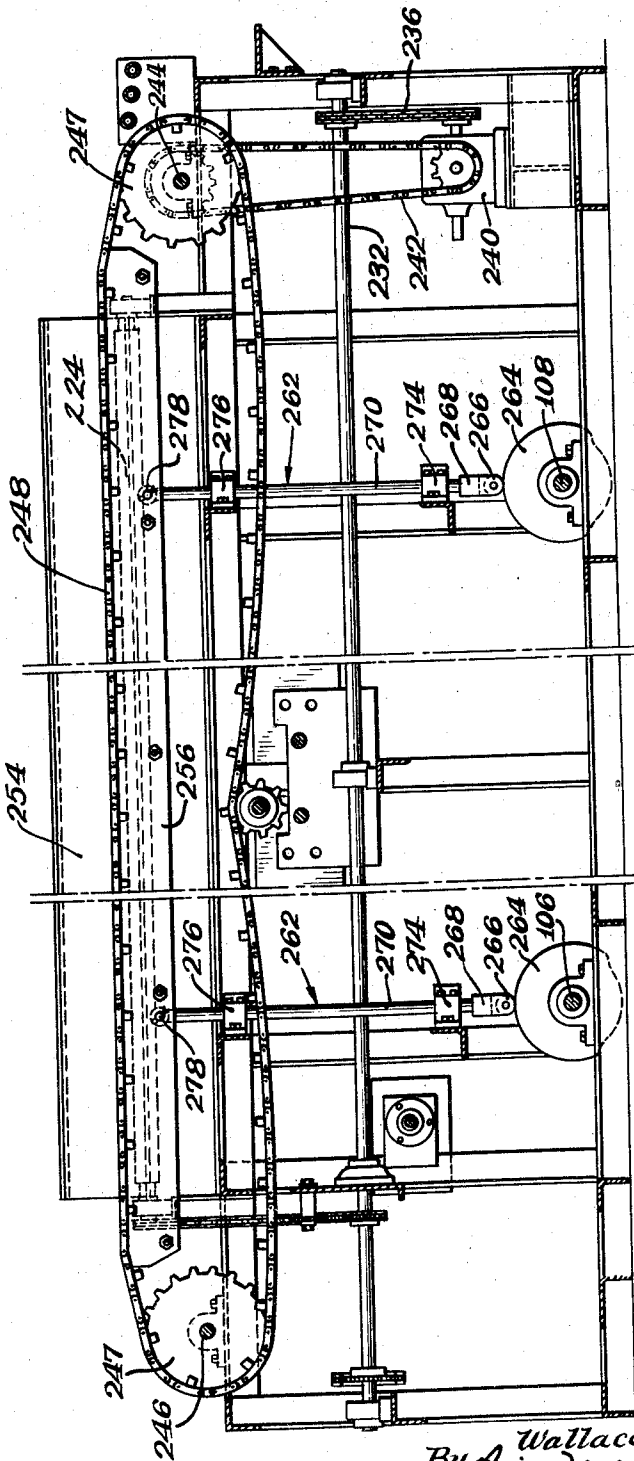
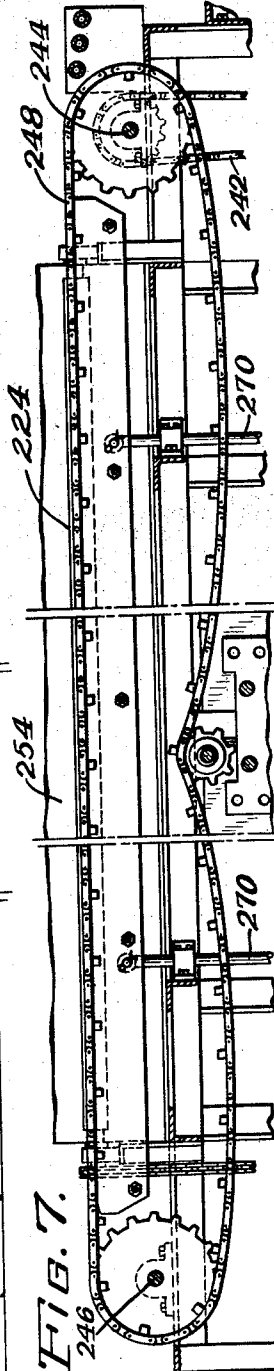


FIG. 7.



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TUNNEL OVEN UNLOADER

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FIG. 10.

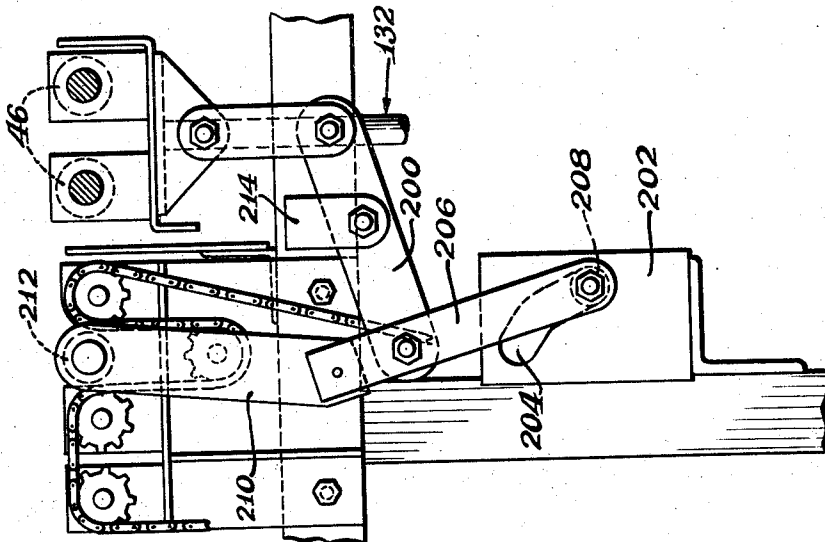
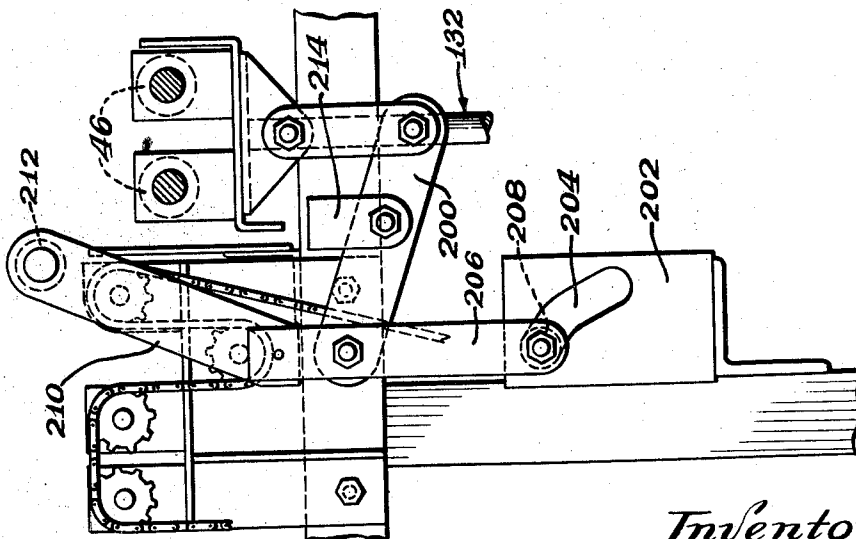


FIG. 9.



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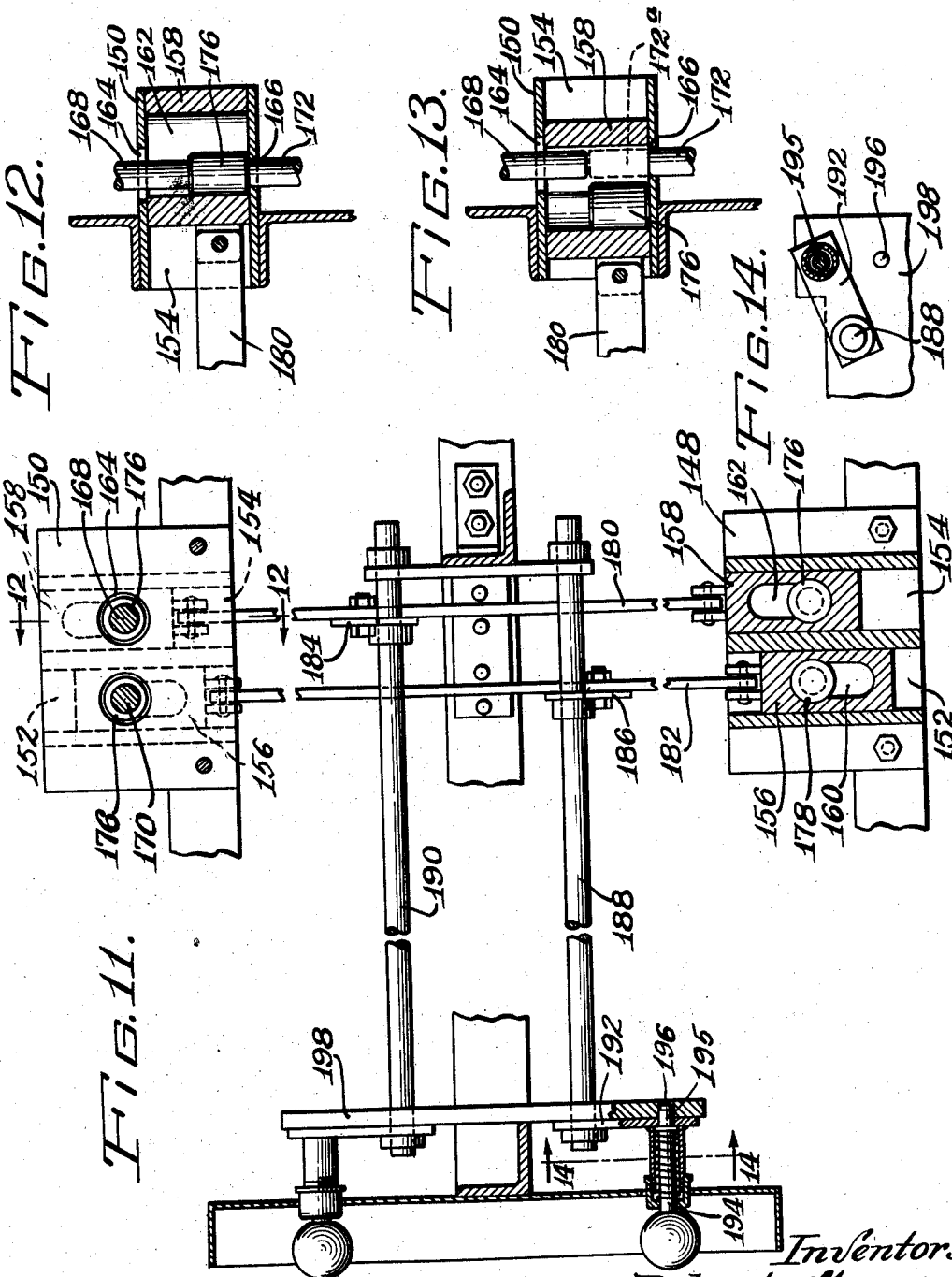
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9 Sheets-Sheet 9



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2,856,055

TUNNEL OVEN UNLOADER

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Application May 10, 1954, Serial No. 428,494

15 Claims. (Cl. 198—20)

This invention relates generally to a tunnel oven unloader, and more particularly to an unloader construction providing means for aligning baking pans following discharge from the oven, preparatory to feeding onto a cross conveyor.

In the operation of tunnel ovens of the type used for baking bread and the like in individual pans, a plurality of pans or groups of pans are simultaneously discharged from the mouth of the oven. Since such ovens are provided with a continuously travelling conveyor, a plurality of groups of pans are disposed in relatively close consecutive order, and it is necessary to transfer such pans quickly from the oven to a cross conveyor for transfer to a de-panning station. In the past, such transfer of the pans from the oven to a cross conveyor in the main has been performed manually. Mechanical devices for performing this operation, although known, have been slow and inefficient due to the problem of properly aligning the pans on the cross conveyor so as to prevent jamming and tumbling of the pans against each other and possible damage to the pans and the baked food stuff.

It is a primary object of the present invention, therefore, to provide a mechanical tunnel oven unloader having automatic means to insure that baking pans, as discharged from the oven, are aligned in proper relation preparatory to transfer to a take-away or cross conveyor, and that such alignment is maintained throughout the transfer operation.

It is another object of this invention to provide a mechanical oven unloader which is fully automatic in its operation and which will: rapidly and efficiently remove baking pans, as received from the hearth of the baking oven, over a series of driven rollers to an elevating section; align the pans against a stop means; elevate the pans in proper alignment for discharge over the stop means onto a cross conveyor; cause any pans which are not in proper alignment to remain on the elevating section until properly positioned; and convey the discharged pans on a cross conveyor to either side away from the oven.

It is a further object of this invention to provide an oven unloader having a conveyor including an elevating section designed and controlled to elevate properly aligned pans for discharge onto a cross conveyor, the portion of the elevating section which lifts the aligned pans being adjustable for various pan widths so that only about 80% of the pan bottom is supported, thereby giving necessary stability for elevation only to properly aligned pans.

It is still another object of this invention to provide an elevating mechanism for the conveyor of an oven unloader which will elevate pans in proper alignment over an aligning stop means, wherein the elevating mechanism comprises a plurality of rollers which may be selectively actuated to permit adjustment of the operative size of the elevating mechanism for accommodating pans of various widths.

It is still a further object of this invention to provide an oven unloader, having mechanical conveyor means

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and an elevatable stop means, wherein the stop means cooperates with the positive driving effect of the conveyor to provide uniform alignment of pans carried thereon.

It is another object of this invention to provide an oven unloader of the conveyor type having an elevating mechanism and an elevatable stop means, the stop means when in a raised position serving to align pans driven along a conveyor, the elevating mechanism when in a lowered position providing a driving portion of the conveyor, and the stop means being automatically lowered out of engagement with the pans as the elevating mechanism raises the properly aligned pans for discharge thereover onto a cross conveyor, said elevating mechanism and stop means being mechanically interconnected for automatic operation.

It is still another object of this invention to provide an oven unloader including a two-directional conveyor arrangement having a primary travelling level driven in a first direction and stop means for cooperation therewith to effect uniform alignment of pans carried thereon, and transverse conveying means driven in a second direction and disposed below the primary travelling level, said transverse conveying means having elevating means associated therewith for elevation thereof above the primary travelling level for supportingly engaging and elevating pans positioned on said primary travelling level, whereby pans received on the cross conveyor are first aligned on the primary travelling level and then elevated for conveyance in a transverse direction.

With these and other objects in view, our invention consists in the construction, arrangement and combination of the various parts of our mechanical tunnel oven unloader, whereby the objects contemplated are obtained as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view of the novel oven unloader of the present invention, shown in cooperative relation with the hearth of a baking oven.

Figure 2 is a top plan view of the oven unloader, partly broken away.

Figure 3 is a horizontal cross-sectional view taken substantially as indicated at line 3—3 on Figure 1.

Figure 4 is a vertical cross-sectional view taken substantially as indicated at line 4—4 on Figure 3.

Figure 5 is a horizontal cross-sectional view taken substantially as indicated at line 5—5 on Figure 1.

Figure 6 is a vertical cross-sectional view taken substantially as indicated at line 6—6 on Figure 4, showing the transverse link chains of the cross conveyor in a raised position.

Figure 7 is a view similar to Figure 6, showing the link chains of the cross conveyor in a lowered position.

Figure 8 is a vertical cross-sectional view taken substantially as indicated at line 8—8 on Figure 4.

Figure 9 is an enlarged, fragmentary view of one of the elevating roller assemblies and the cooperating stop assembly showing the stop roller in raised position.

Figure 10 is a view similar to Figure 9, showing the stop roller assembly in a lowered position, with the upper supporting level of the elevating roller assembly approximately in the same plane as the supporting level of the cross conveyor rollers.

Figure 11 is an enlarged, fragmentary view of the shifting block assemblies for the two single elevating roller assemblies.

Figure 12 is a fragmentary sectional view taken substantially as indicated at line 12—12 on Figure 11, showing the upper and lower portions of the elevating shaft in coupled relation.

Figure 13 is a view similar to Figure 12 showing the

upper and lower portions of the elevating shaft in uncoupled relation.

Figure 14 is a fragmentary sectional view taken substantially as indicated at line 14—14 on Figure 11, showing the manual control means for effecting selective actuation of one of the elevating rollers.

Referring now more particularly to Figures 1 and 4 of the drawing, I have shown the discharge end of a conventional baking oven, indicated generally at 10. The oven 10 includes a travelling hearth 12 of the well known type comprising a plurality of pivotally interconnected conveyor links 14 which carry a continuous series of hearth plates 16 for supporting baking pans or a plurality of pans interconnected and generally referred to as pan-straps.

The oven unloader of the present invention is indicated generally at 20, and comprises a main carry-off and aligning conveyor 22, and a take-away or cross conveyor 24 (see Figure 4).

The carry-off and aligning conveyor 22 includes a main section 26 and an extension section 28. The extension section 28 provides a multiplicity of adjacent positive-drive rollers, arranged with their axes of rotation at right angles to the direction of travel of the baking pans as they emerge from the oven 10. The extension section 28 may vary in size and number of rollers for each particular oven installation. We have illustrated a typical arrangement, wherein we provide a first large fluted roller 30, which is arranged for vertical adjustability relative to the frame of the unloader for accommodating different heights of over hearth discharge ends. A second medium fluted roller 32 is provided immediately adjacent the first roller 30, and slightly displaced vertically therebelow. A plurality of small fluted rollers 34 are positioned immediately adjacent the second roller 32, and provide a uniform conveyor level slightly displaced vertically below the medium fluted roller 32.

The extension section 28 is suitably integrally secured to the main section 26 in extending relation therefrom as a cantilever. The section 28 is rigidly supported by means of brace members 36 to the frame of the main section 26.

The main conveyor section 26 includes a level section of adjacent rollers 40. Immediately adjacent and forward of the level section 40 we provide first and second elevating rollers 42 and 44. Immediately adjacent and forward of the first and second elevating rollers, we provide an interconnected pair of elevating rollers 46. The operation of the elevating rollers will hereinafter be described in detail.

As best seen in Figure 1, we provide a motor M having a shaft 50 which carries an adjustable cone pulley 52. A gear box 54, having an axial shaft 56 and a transverse shaft 58, is positioned adjacent the motor M. The axial shaft 56 carries differential pulleys 60 and 62 at its opposite ends (see Figure 3). A continuous belt 64 interconnects the pulleys 50 and 60 to transmit power from the motor M to the shafts 56 and 58.

Conventional adjustment means are provided for varying the driving speed of the motor M. Manual means 59, indicated on Figure 3, are connected by means of a continuous link chain 61 (see Figure 8) to an adjusting screw shaft 63 extending through the supporting base portion of the motor M. It will be apparent that manual adjustment of the means 59 serves to shift the motor M along a pair of supporting slide shafts 65 relative to the shaft 56 and pulley 60. Such shifting of the motor M will effect variations in its output driving speed in the well known manner.

A second gear box 66 (see Figure 1) is positioned above gear box 54. The gear box 66 provides an upper shaft 68 and a lower shaft 70. The lower shaft 70 carries a pulley 72 which is interconnected by means of a continuous belt 74 with the pulley 62 of gear box 54. In this manner, power is transmitted from the motor M

to the gear box 66. The upper shaft 68 of the gear box 66 drives a link chain 76 which is in cooperative engagement with a jack shaft 78 (see Figures 1 and 2).

As best seen in Figure 2 of the drawing, a plurality of sprocket wheels which are driven by link chains 80, 82, 84—86, are provided for transmitting driving power from the shaft 78 to the rollers 42, 44 and 46, respectively. A second shaft 88 forms an extension of one of the rollers 40, and is operatively connected to the shaft 78 by means of a link chain 90. In this manner, power is transmitted from the shaft 78 to the shaft 88 to effect rotation of one of the rollers 40. A sprocket wheel 92 is carried by one of the small fluted rollers 34, and is operatively connected to the shaft 88 by means of a link chain 94. In this manner, driving rotation is transmitted from the shaft 88 to one of the small fluted rollers 34.

A link chain and sprocket wheel assembly 96 serves to interengage the fluted rollers 34, 32, 30, whereby driving rotation of one of the small fluted rollers 34 by means of the link chain 94, serves to drivingly rotate all of the fluted rollers simultaneously.

A second link chain and sprocket wheel assembly 98 serves to operatively interconnect all the plain rollers 40, whereby driving rotation of one of the rollers 40 by means of shaft 88 serves to drivingly rotate all of the rollers 40 simultaneously.

By suitably selecting the relative sizes of the various sprocket wheels carried by the various conveyor rollers, it will be apparent that speed differentials may be obtained so as to rotate certain of the rollers more rapidly than others. In particular, it is desirable to rotate the uppermost fluted rollers 30 and 32 somewhat slower than the next four fluted rollers 34 in order to insure positive drive of the pans as they are received from the oven hearth. The speed of the rollers 40 is preferably about two times the speed of forward travel of the oven conveyor 12 in order to effectively insure proper pan alignment against the first operable elevating roller, in a manner to be hereinafter described in detail.

Referring now more particularly to Figure 5 of the drawing, the transverse shaft 58 of the gear box 54 transmits power to a link chain 102 which meshes with a sprocket wheel 104 carried by a cam shaft 106. In this manner, the motor M effects driving rotation of the shaft 106. A second cam shaft, identical with shaft 106 and arranged in parallel relation thereto, is indicated at 108. A link chain 110 meshes with a sprocket wheel 112 carried by the shaft 108 for effecting simultaneous driving rotation of the shafts 106 and 108. Bearing mountings 114, 116 and 118 are secured to frame portions of the unloader and serve to support the shafts 106 and 108 for free rotation.

Each of the shafts 106 and 108 carries a plurality of cams 122, 124 and 126. The cams 122, 124 and 126 are positioned substantially midway along the length of each of the shafts 106 and 108, adjacent the bearing mountings 116.

As best seen in Figure 4 of the drawings, we provide pairs of vertical elevating shaft assemblies, indicated generally at 128, 130 and 132, for single elevating rollers 42 and 44 and for the dual set of elevating rollers 46, respectively. The upper ends of each of the shaft assemblies engage elongated angle members 134, 136 and 138, which serve as stop members for facilitating alignment of baking pan-straps in a manner to be hereinafter described in detail. As clearly shown in Figures 4 and 8, wooden cushion blocks 140 are positioned centrally of the length of each of the rollers 42, 44 and 46 to absorb shocks and to prevent extreme bending of the rollers.

The lower ends of each of the elevating shaft assemblies include cam follower rollers 142, 144 and 146. It will be apparent that rotation of the shafts 106 and 108 serves to carry the pairs of cams 122, 124, and 126

in cooperative engagement with the cam follower rollers 142, 144 and 146 for effecting vertical reciprocation of the respective elevating shaft assemblies 128, 130 and 132. In this manner, the elevating rollers 42, 44 and 46 when operably adjusted for actuation as hereinafter referred to, will be cyclically raised and lowered as the shafts 106 and 108 are rotated.

A pair of shifting blocks or coupling assemblies 148 and 150 are provided centrally of the shaft assemblies 128 and 130. Referring now more particularly to Figures 11 through 14 of the drawing, the shifting blocks 148 and 150 each provide walls forming a pair of side-by-side horizontal guide channels 152 and 154. Piston members 156 and 158 are slidable in a horizontal plane within the guide channels 152 and 154, respectively. The piston members are apertured at 160 and 162, respectively. Each of the shifting blocks 148 and 150 is provided with a pair of top wall apertures 164 and a pair of bottom wall apertures 166 to provide communication with both of the guide channels 152 and 154. The apertures 164 and 166 receive the upper and lower portions of the shaft assemblies 128 and 130. Shifting block 148 receives upper shaft portions 168 and 170, and shifting block 150 similarly receives a corresponding pair of upper shaft portions. The shifting blocks 148 and 150 each also receiving a corresponding pair of lower shaft portions 172 of the shaft assemblies 128 and 130, respectively.

The pair of piston members 158, corresponding to the elevating shaft assemblies 128, each carry a connecting plug 176. The corresponding pair of piston members 156 of shaft assemblies 130 carry a like pair of connecting plugs 178. The respective pairs of piston members 156 and 158 are interconnected by means of actuator rods 180 and 182. The rods 180 and 182 are secured by means of pivot links 184 and 186, respectively, to a pair of parallel control shafts 188 and 190.

As best seen in Figures 11 and 14 of the drawings, the shaft 188 is connected by means of a lever arm 192 to a spring-biased control handle 194. The control handle 194 carries a detent pin 195 at its one end for selective locking engagement with either of a pair of arcuately displaced holes 196 in a supporting plate 198. The arrangement of control shaft 190 is identical with that of control shaft 188.

In this manner, the control shafts 188 and 190 may be manually turned to and secured in one of two positions of rotative adjustment. Such rotation is transmitted by means of the links 184 and 186 to the connecting rods 180 and 182 for slidably reciprocating the pairs of piston members 158 and 156 in each of the shifting blocks 148 and 150. One position of rotation of the shaft 190 effects a positioning of the connector rod 180 so as to move the pair of pistons 158 to the position shown, whereby the elements 168, 176 and 172 are in contacting axial alignment (see Figure 12). Similar axial alignment is effected for the like elements of shifting block 148.

It will be apparent that rotation of the cams 122 to bring the high surfaces into engagement with the cam follower rollers 142 serves to shift the shaft assemblies 128 upwardly. When the parts are in the position shown in Figure 12, upward movement of the bottom shaft portion 172 will be transmitted through the connecting plug 176 to the upper shaft portion 168, and therefrom to the elevating roller 42. A like positioning of parts with respect to the shaft assemblies 130 will, of course, serve in the same way to elevate the roller 44.

If either of the control shafts 188 and 190 are rotated to the other position of adjustment, a shifting of the connector rods 180 and 182 will serve to displace the connecting plugs 176 and 178 out of vertical alignment with the upper and lower portions of the elevating shaft assemblies. As clearly seen in Figure 13, such a position of adjustment of the rod 180 permits the lower shaft portion 172 of the elevating assembly 128 to be raised

upwardly in response to rotation of the cams 122, as shown in dotted lines at 172a, without effecting any contacting engagement with the upper shaft portions 168. In this manner, the elevating roller 42 will remain fixed in its lowered position of adjustment. In the same way, of course, the roller 44 may be adjusted to prevent reciprocation in response to rotation of the cams 124.

The elevating shaft assemblies 132, for the dual set of elevating rollers 46, are mechanically interconnected to a novel combination stop roller and aligning means assembly which is automatically raised and lowered in a timed sequence relative to the elevating assemblies 132. Referring more particularly to Figures 9 and 10 of the drawing, the upper ends of the vertical shafts of the elevating assemblies 132 are each pivotally connected by means of a lever arm 200 to a support lift assembly. The support lift assembly comprises a guide support means 202 which is rigidly secured to a fixed portion of the unloader frame. The guide support means 202 is provided with an arcuate slot 204 which cooperatively receives a bearing pin 208 of a link member 206. The link member 206 is pivotally connected intermediate its ends to the lever arm 200. A support arm 210 is connected to and extends from the upper end of the link member 206, and provides at its upper end a rotatable bearing support for one end of a stop roller 212. The lever arm 200 is pivotally secured intermediate its ends to a fixed portion of the unloader frame by means of a mounting bracket 214. It is to be understood that a pair of support lift assemblies are provided, one at each side of the unloader, for supporting the ends of the stop roller 212.

It will be apparent that reciprocation of the elevating assemblies 132 will effect a corresponding reciprocation of the stop roller 212, whereby elevation of the assemblies 132 to raise the rollers 46 will automatically lower the stop roller 212 to an inoperative position, as seen in Figure 10. Conversely, lowering of the elevating assemblies 132 will serve to elevate the stop roller 212 to an operative raised position, as seen in Figure 9, for effecting alignment and temporary arresting of the pans carried by the main conveyor.

The cross conveyor 24 comprises a primary travelling level formed by three spaced pairs of driving rollers 222, 224 and 226, and a single driving roller 228 (see Figures 2 and 4). The single roller 228 is spaced from the first pair of rollers 222 a sufficient distance to provide a receiving recess for the stop roller 212 in its retracted or lowered position, as seen in Figure 10. Each of the rollers 222 to 228 carries a sprocket wheel at one end for meshing engagement with a continuous link chain 230 (see Figure 1). A drive shaft 232 is suitably supported within bearing mountings 233 by fixed portions of the unloader frame (see Figure 3). The shaft 232 is drivably rotated by means of a continuous link chain 234 which is connected to the shaft 68, and by means of the gear boxes 66 and 54 to the motor M.

A continuous link chain 236 is connected to a sprocket wheel carried by the shaft 232 at its end opposite the link chain 234 (see Figures 3 and 8). The link chain 236 engages a sprocket wheel carried by a shaft 238 of a gear box 240. A continuous link chain 242 meshes with a sprocket wheel carried by a shaft 244 which is rotatably supported by a bearing 245 carried by a fixed portion of the unloader frame (see Figure 8). A corresponding shaft 246 is similarly supported in parallel relation to the shaft 244 at the other side of the unloader (see Figure 2).

Three pairs of large sprocket wheels 247 are carried by the shafts 244 and 246 for driving three continuous link chains 248, 250, and 252 (see Figures 1 and 4). The sprocket wheels 247 and the link chains 248, 250 and 252 are suitably positioned along the shafts 244 and 246 so as to locate the chains respectively between the pairs of rollers 222, 224 and 226, as best shown in Figures 1 and 4.

A stop plate 254 is positioned adjacent the last pair of rollers 226 for temporarily arresting and maintaining alignment of the pans on the cross conveyor 24. As best seen in Figures 6 and 7, the link chains carried by the shafts 244 and 246 are provided with substantial excess length or slack so as to permit raising and lowering of the upper stretches of chain. Elevating plates 256, 258 and 260 (see Figure 4) engage the upper lengths of the respective link chains 248, 250 and 252. A pair of elevating assemblies 262, as seen in Figure 6, are connected at their upper ends to the elevating plates by means of cross rods 278. The lower ends of the elevating assemblies 262 cooperate with cams 264 carried by the shafts 106 and 108. Cam follower rollers 266 are secured to the elevating assemblies 262 for cooperation with the cams 264. Each of the rollers 266 is connected to a supporting yoke 268 which receives the lower ends of the elevating shafts 270 and 272 of the assemblies 262. Upper and lower fixed bearing supports 274 and 276 provide supporting guide means for vertical reciprocation of the elevating shafts 270 and 272. In this manner, engagement of the high surfaces of the cams 264 with the cam follower rollers 266 of the elevating assemblies 262 will serve to elevate the link chains 248, 250 and 252 to the raised position shown in Figure 6. Upon rotation of the shafts 106 and 108, the low surfaces of the cams 264 will cooperate with the rollers 266 to lower the link chains 248, 250 and 252, to a position below the primary traveling or top level of the respective sets of rollers, 222, 224 and 226, as seen in Figure 7. As clearly shown in Figure 4, the high surfaces of the cams 264 are positioned with respect to the elevating roller assembly cams 122, 124 and 126 so as to effect a raising of the chain elevating assemblies 262 when the roller elevating assemblies 128, 130 and 132 are in their lowered positions.

As best seen in Figure 2 of the drawing, the cross conveyor 24 includes a plurality of free rollers 280 at the take-off end 282. Conventionally, the pans will be discharged from the take-off end 282 onto a suitable conveyor (not shown), for transfer to a depanning station.

Operation

The path of movement of a plurality of pans, or pan-straps, will now be described to more clearly illustrate the continuous operation of the present invention and the operative inter-relation of the various mechanical parts.

In Figures 2 and 4 of the drawing we have shown a plurality of multiple pan-straps in various positions on our unloader apparatus. In Figure 4 we have shown a pan-strap 18a emerging from the discharge end of the oven 10. The hearth plates 16 of the travelling hearth 12 tilt downwardly at the terminal end of the hearth 12, and cause the pans 18a to move forwardly and downwardly into engagement with the large fluted roller 30 of the unloader. The roller 30 lifts the front bottom edge of the pan-strap to assist it onto the medium fluted roller 32, and therefrom onto the level section of small fluted rollers 34. The small fluted rollers 34 continue to lift the front bottom edge of the pan-strap until it is completely clear of the oven hearth and riding evenly on the level section of plain rollers 40, as indicated by the pan-strap 18b.

The driving rotation of the various rollers of the main conveyor 22 serves to carry the pans forwardly toward the stop roller 212 for abutting engagement therewith. When so positioned, the pans will be supported upon the elevating rollers 42, 44 and 46, or some of them, depending upon the size of the pans. Continuing rotation of the elevating rollers 42 to 46 will operate to effect alignment of the pans against the stop roller 212. As best seen in Figure 2, an initially misaligned or askew pan-strap 18c will be driven by the conveyor rollers into aligned, abutting engagement with the stop roller 212, as indicated by pan-strap 18d.

Selective adjustment of the elevating roller assemblies

128 to 130 is made to accommodate the bottom width of the pan-straps being conveyed so that only those rollers which are necessary for supporting about 80% of the pan width will be actuated for upward elevation of the pan-straps. For the particular pan size shown at 18d, elevating assemblies 128 will be adjusted in the manner illustrated in Figure 13 so that roller 42 will remain in its lowered position at all times. Rotation of the cams 124 and 126 will serve to effect a raising of the elevating assemblies 130 and 132 to raise the pan-straps positioned upon rollers 44 and 46 to the level of the cross conveyor 24. By supporting only about 80% of the pan width, the necessary stability for elevating the pans upon the rollers will only be achieved by those pans which are properly aligned, as shown at 18d. If the pans are not substantially fully positioned in aligned, abutting relation against the stop roller 212, they will tip back off of the elevating rollers as the elevating assemblies are raised. On the next cycle of operation of the elevating rollers 44 and 46, the misaligned pan-straps will be caused to assume another position and become aligned against the stop roller 212. In this way, only properly aligned pans will be raised for discharge onto the cross conveyor 24.

The stop roller 212 will be in the raised position shown in Figure 4 when the elevating roller assemblies are in their lowered positions to receive the pans from the level section of rollers 40. When the elevating assemblies are raised, the mechanical linkage between assemblies 132 and the lift supporting assemblies of the roller 212 will serve to withdraw the roller 212 into its lowered position between the rollers 228 and 222 (see Figure 4). In this way, the elevated and properly aligned pans are free to be driven by the elevating rollers onto the cross conveyor rollers, and carried by the latter rollers toward the stop plate 254.

It will be apparent that as the elevating rollers are raised, the upright portion of the angle member associated with the actuated elevating roller nearest the oven will act as a stop means for those pans which are moving toward the elevated rollers. It will also be apparent that as the elevating rollers are lowered to receive another group of pans from the oven, those pans which were improperly aligned and tipped back from the elevating rollers will now move forwardly into properly aligned position against the raised stop roller 212. Such formerly misaligned pans will be discharged onto cross conveyor 24, before the next group of pans from the oven arrive at the elevating roller assemblies.

When the elevating assemblies 128 to 132, which are operative, are in their raised positions for discharging properly-aligned pans onto the cross conveyor 24, the link chain elevating assemblies 262 will be in their lowered positions. In this way, pans received on the cross conveyor will be carried by the driven rollers 222 to 226 into abutting engagement with the stop plate 254, which serves to maintain the alignment of the pans on the cross conveyor. As the operative elevating roller assemblies are lowered, and the stop roller 212 is automatically raised to its operative position to effect alignment of pans on the main conveyor 22, the link chain elevating assemblies 262 will be raised to elevate the link chains 248 to 252 upwardly through the rollers 222 to 226. In this way, the pans which are aligned on the cross conveyor will be supported and raised by the link chains and driven transversely thereby toward the take-off end 282. The spacing of the link chains 248 to 252 is predetermined so as to accommodate an adequate supporting portion of the pans, and thereby provide a stable conveying means for carrying the properly aligned pans transversely away from the main conveyor and oven.

Changes may be made in the construction and arrangement of the parts of our oven unloader without departing from the real spirit and purpose of our invention,

and it is our intention to cover by our claims any modified forms of structure or use of mechanical improvements which may be reasonably included within their scope.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, said elevating means when in a lowered position constituting a forward portion of the travelling level of said main conveyor, and when in an elevated position providing a positive drive for discharging pans supported thereon onto said cross conveyor, and stop means movable between operative and inoperative positions in accordance with lowering and elevating movement of said elevating means and cooperating with said elevating means to effect alignment of pans thereon.
2. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, said elevating means constituting a forward portion of the travelling level of said main conveyor, and stop means at the forward end of said elevating means operative to effect alignment of pans moving along said travelling level of the main conveyor when the elevating portion of said main conveyor is in a lowered position, and said stop means being actuated to an inoperative position to permit the pans supported on said elevating means to be discharged thereby over said stop means onto said cross conveyor when the elevating means is in a raised position.
3. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, said elevating means constituting a portion of the travelling level of said main conveyor, the travelling level of said main conveyor and said elevating means being made up of a plurality of driven rollers, and adjusting means operative to selectively elevate certain of the rollers of said elevating means for providing an elevating supporting surface of predetermined width.
4. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, said elevating means constituting a portion of the travelling level of said main conveyor, the travelling level of said main conveyor and said elevating means being made up of a plurality of driven rollers, adjusting means operative to selectively elevate certain of the rollers of said elevating means for providing an elevating supporting surface of predetermined width, and means for aligning pans on said elevating means preparatory to discharge onto said cross conveyor.
5. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged

from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, said elevating means constituting a portion of the travelling level of said main conveyor, the travelling level of said main conveyor and said elevating means being made up of a plurality of driven rollers, adjusting means operative to selectively elevate certain of the rollers of said elevating means for providing an elevating supporting surface of predetermined width, means for aligning pans on said elevating means, preparatory to discharge onto said cross conveyor, and stop means carried by each of said elevating rollers to act as a barrier for pans moving along said main conveyor when said rollers are in a raised position.

6. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, said elevating means being adjustable in the direction of movement of the main conveyor to provide a supporting surface having a predetermined width in the range of 80% of the width of the pans to be supported thereon, thereby providing stable support for elevation and discharge of the pans onto said conveyor, and means for aligning pans on said elevating means, preparatory to discharge onto said cross conveyor.

7. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, means for cyclically raising and lowering said elevating means, stop means for aligning pans on said elevating means, and linkage means inter-connecting said stop means and said elevating means, whereby said stop means is elevated to an operative position for aligning pans on said elevating means when the latter is in a lowered position in registration with said main conveyor, and is moved to an inoperative position to permit pans to be discharged onto said cross conveyor when said elevating means is in a raised position in registration with said cross conveyor.

8. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, cam means inter-connecting said elevating means and said power means for cyclically raising and lowering said elevating means, stop means for aligning pans on said elevating means, and linkage means inter-connecting said stop means and said elevating means, whereby said stop means is elevated to an operative position for aligning pans on said elevating means when the latter is in a lowered position in registration with said main conveyor, and is lowered to permit pans to be discharged onto said cross conveyor when said elevating means is in a raised position in registration with said cross conveyor.

9. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent the discharge end of said main conveyor

and having a primary travelling level above the travelling level of said main conveyor, power means for driving said main and cross conveyors, the travelling level of said main conveyor and the primary travelling level of said cross conveyor both moving in substantially the same direction, elevating means for raising pans carried by said main conveyor to the primary travelling level of said cross conveyor, said cross conveyor having transverse conveying means disposed below the said primary travelling level thereof, elevating means for raising said transverse conveying means above the said primary travelling level to supportingly engage pans positioned on said primary travelling level and elevate them to a secondary travelling level, said elevating means when in a lowered position constituting a forward portion of the travelling level of said main conveyor, stop means movable between operative and inoperative positions in accordance with lowering and elevating movement of said elevating means and cooperating with said elevating means to effect alignment of pans thereon, and power means for driving said transverse conveying means to convey pans supported thereon in a transverse direction relative to the direction of movement of said main conveyor.

10. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent the discharge end of said main conveyor and having a primary travelling level above the travelling level of said main conveyor, power means for driving said main and cross conveyors, the travelling level of said main conveyor and the primary level of said cross conveyor both moving in substantially the same direction, elevating means for raising pans carried by said main conveyor to the primary travelling level of said cross conveyor, first stop means for aligning pans on said elevating means, preparatory to discharge onto said cross conveyor, said elevating means when in a lowered position constituting a forward portion of the travelling level of said main conveyor, said first stop means being movable between operative and inoperative positions in accordance with lowering and elevating movement of said elevating means and cooperating with said elevating means to effect alignment of pans thereon, second stop means for aligning the pans carried by said cross conveyor, said cross conveyor having transverse conveying means disposed below the travelling level thereof, and elevating means for raising said transverse conveying means above the said primary travelling level of said cross conveyor to supportingly engage pans positioned thereon and elevate them above the said primary travelling level, and power means for driving said transverse conveying means to convey pans supported thereon in a transverse direction relative to the direction of movement of said main conveyor.

11. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent the discharge end of said main conveyor and having a primary travelling level above the travelling level of said main conveyor, power means for driving said main and cross conveyors, the travelling level of said main conveyor and the primary level of said cross conveyor both moving in substantially the same direction, elevating means for raising pans carried by said main conveyor to the primary travelling level of said cross conveyor, said cross conveyor having transverse conveying means disposed below the said primary travelling level thereof, elevating means for raising said transverse conveying means above the said primary travelling level of said cross conveyor for supportingly engaging and elevating pans positioned thereon, said elevating means when in a lowered position constituting a forward portion of the travelling level of said main conveyor, stop means movable between operative and inoperative positions in

accordance with lowering and elevating movement of said elevating means and cooperating with said elevating means to effect alignment of pans thereon, said transverse conveying means being driven by said power means and operating to convey pans in a transverse direction relative to the direction of movement of said main conveyor, said first and second elevating means being driven so that when one is in an elevated position the other is in a lowered position.

12. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent the discharge end of said main conveyor and having a primary travelling level above the travelling level of said main conveyor, power means for driving said main and cross conveyors, the travelling level of said main conveyor and the primary level of said cross conveyor both moving in substantially the same direction, elevating means for raising pans carried by said main conveyor to the primary travelling level of said cross conveyor, transverse conveying means driven by said power means and disposed below the primary travelling level of said cross conveyor, elevating means for raising said transverse conveying means above the primary travelling level of said cross conveyor for engaging and elevating pans positioned thereon above the said primary travelling level thereof and conveying them in a transverse direction relative to the direction of movement of said main conveyor, said elevating means when in a lowered position constituting a forward portion of the travelling level of said main conveyor, stop means movable between operative and inoperative positions in accordance with lowering and elevating movement of said elevating means and cooperating with said elevating means to effect alignment of pans thereon, said second elevating means being cyclically raised and lowered in synchronization with said first elevating means, whereby said second elevating means is lowered to an inoperative position when said first elevating means is raised for discharging pans onto said cross conveyor.

13. In an oven unloader of the conveyor type, a cross conveyor having a primary travelling level adapted to receive pans thereon, stop means for regulating the receipt of pans carried on said travelling level, transverse conveying means disposed below said primary travelling level, said transverse conveying means comprising a plurality of substantially parallel, spaced apart, continuous link chains, elevating means for raising said transverse conveying means above said primary travelling level for supportingly engaging and elevating pans positioned on said level, power means for driving said primary travelling level and said transverse conveying means and for actuating said elevating means, and cam means inter-connecting said elevating means and said power means for cyclically raising and lowering said elevating means, and cam means connecting said stop means to said power means for cyclically moving said stop means between operative and inoperative positions, whereby when said elevating means is raised said stop means is moved to its operative position.

14. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, said elevating means when in a lowered position constituting a forward portion of the travelling level of said main conveyor, and when in an elevated position providing a positive drive for discharging pans supported thereon onto said cross conveyor, and stop means movable between operative and inoperative positions in accordance with lowering and elevating movement of said elevating means and cooperating with said

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elevating means to effect alignment of pans thereon, said stop means comprising a reciprocable roller extending substantially the entire width of said main conveyor.

15. An oven unloader comprising a main conveyor having a travelling level adapted to receive pans discharged from the hearth of a baking oven, a cross conveyor closely adjacent said main conveyor and providing a travelling level above the level of said main conveyor, power means for driving said main and cross conveyors, elevating means for raising pans carried by said main conveyor to the level of said cross conveyor, adjusting means operative to vary the effective size of said elevating means for providing a supporting surface of predetermined selected width, said elevating means when in a lowered position constituting a forward portion of the travelling level of said main conveyor, and when in an elevated position providing a

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positive drive for discharging pans supported thereon onto said cross conveyor, and stop means movable between operative and inoperative positions in accordance with lowering and elevating movement of said elevating means and cooperating with said elevating means to effect alignment of pans thereon.

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