

Nov. 23, 1965

C. E. KERR

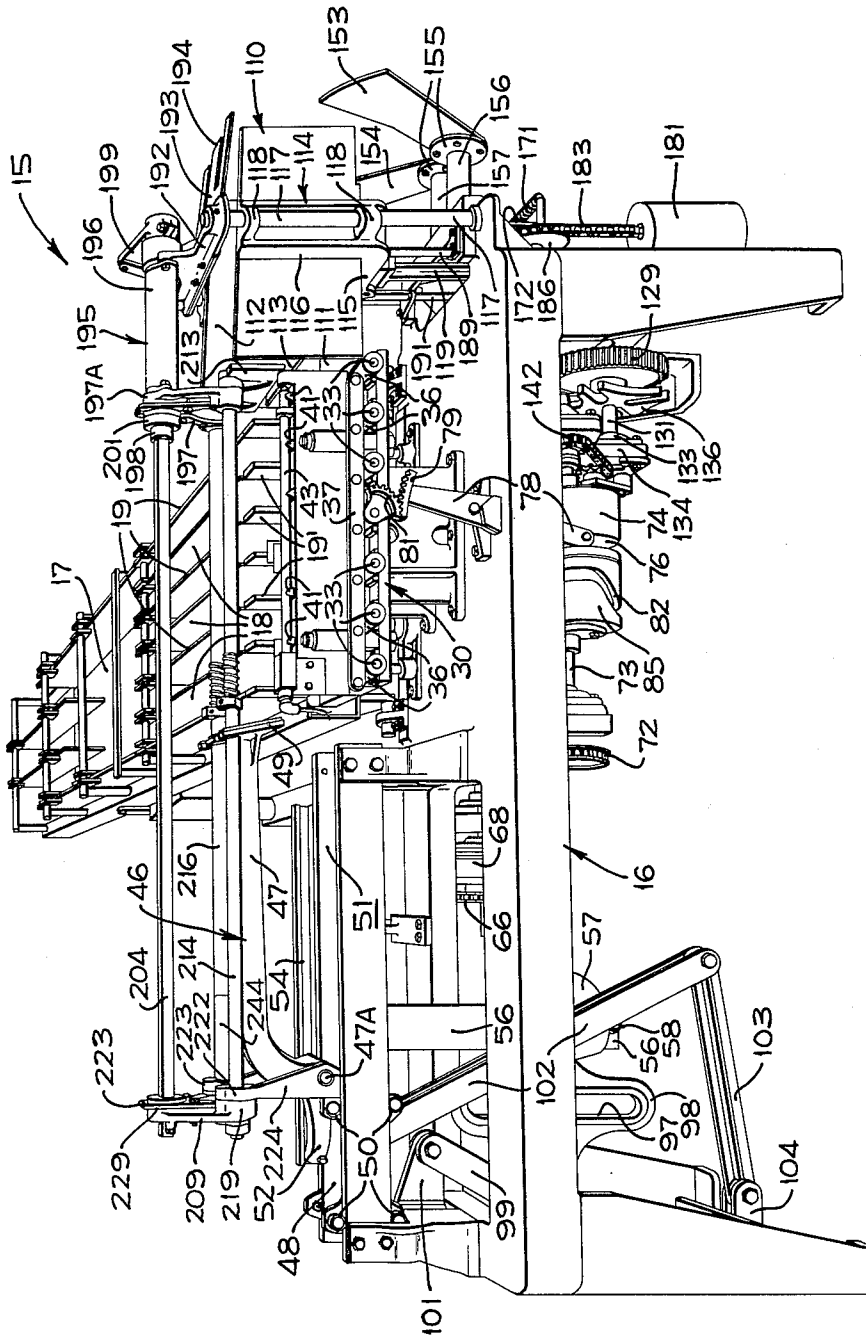
3,218,780

CONTAINER HANDLING MACHINE

Filed Dec. 13, 1961

9 Sheets-Sheet 1

FIG. 1



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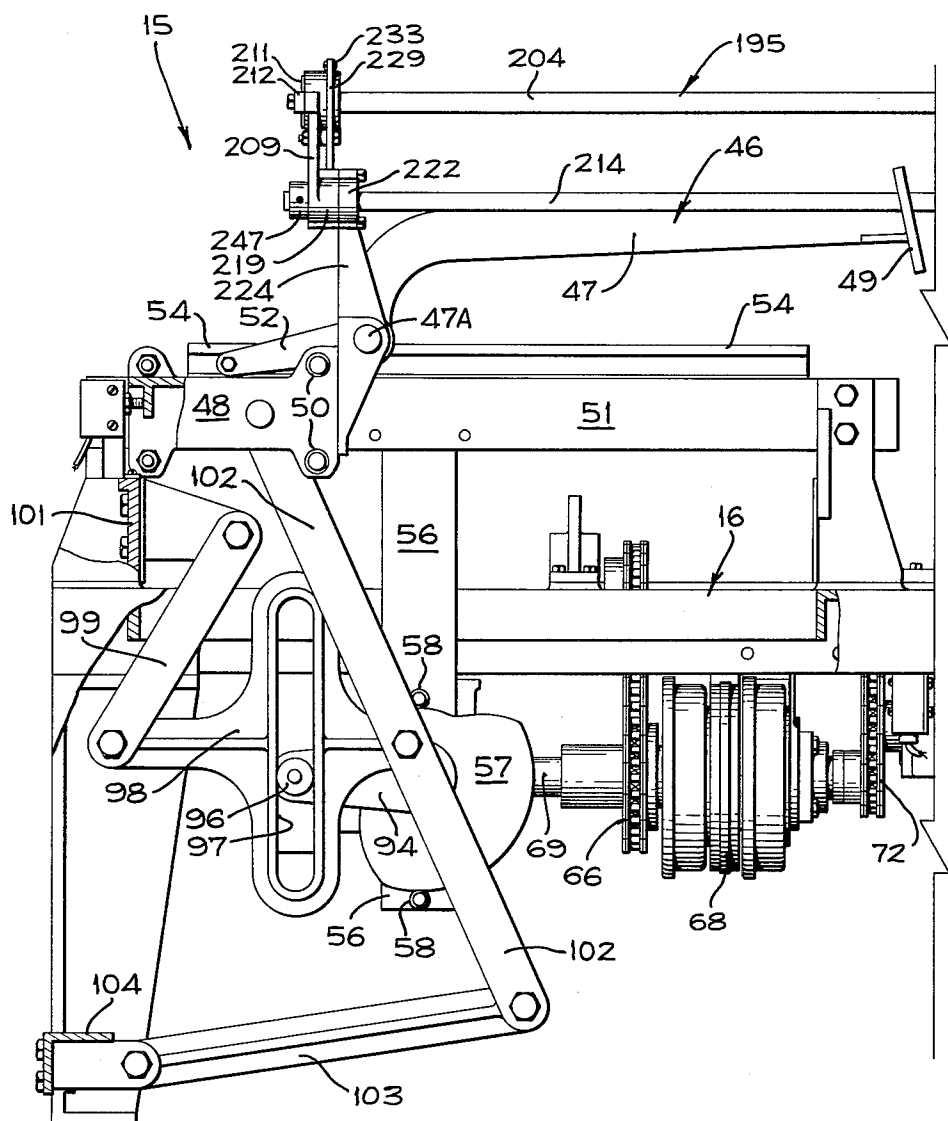
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9 Sheets-Sheet 2



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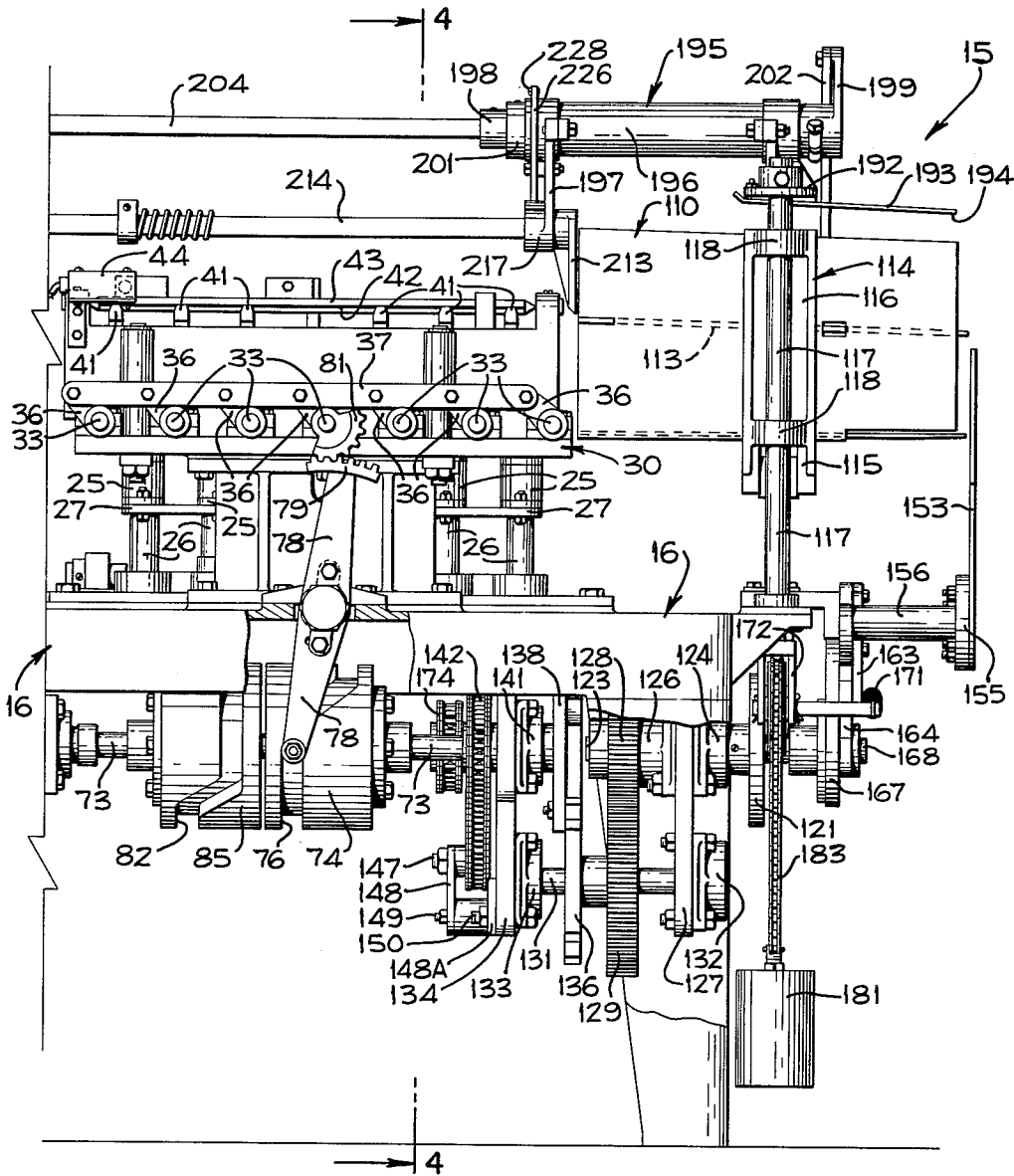


FIG. 2B

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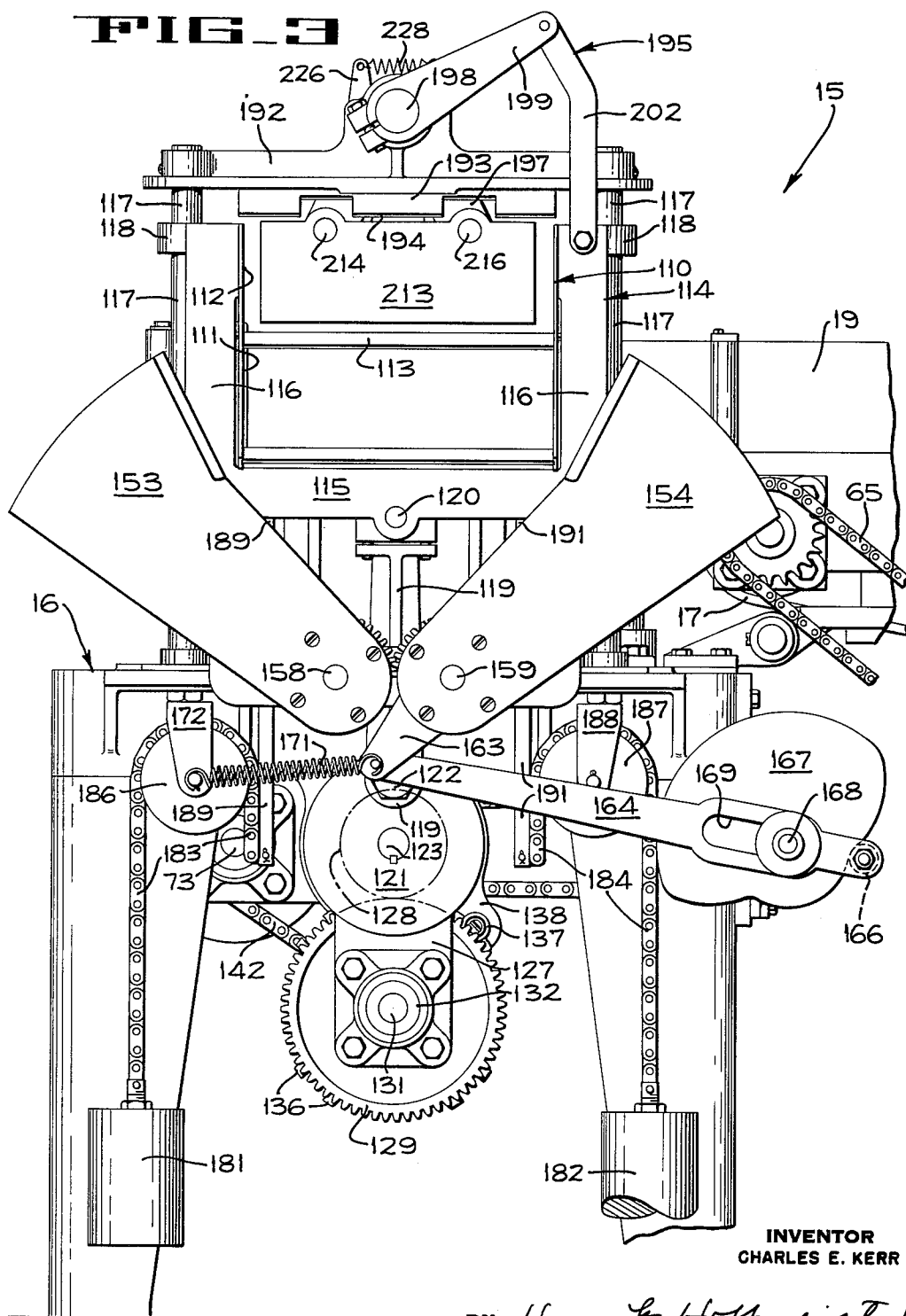
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CONTAINER HANDLING MACHINE

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9 Sheets-Sheet 4



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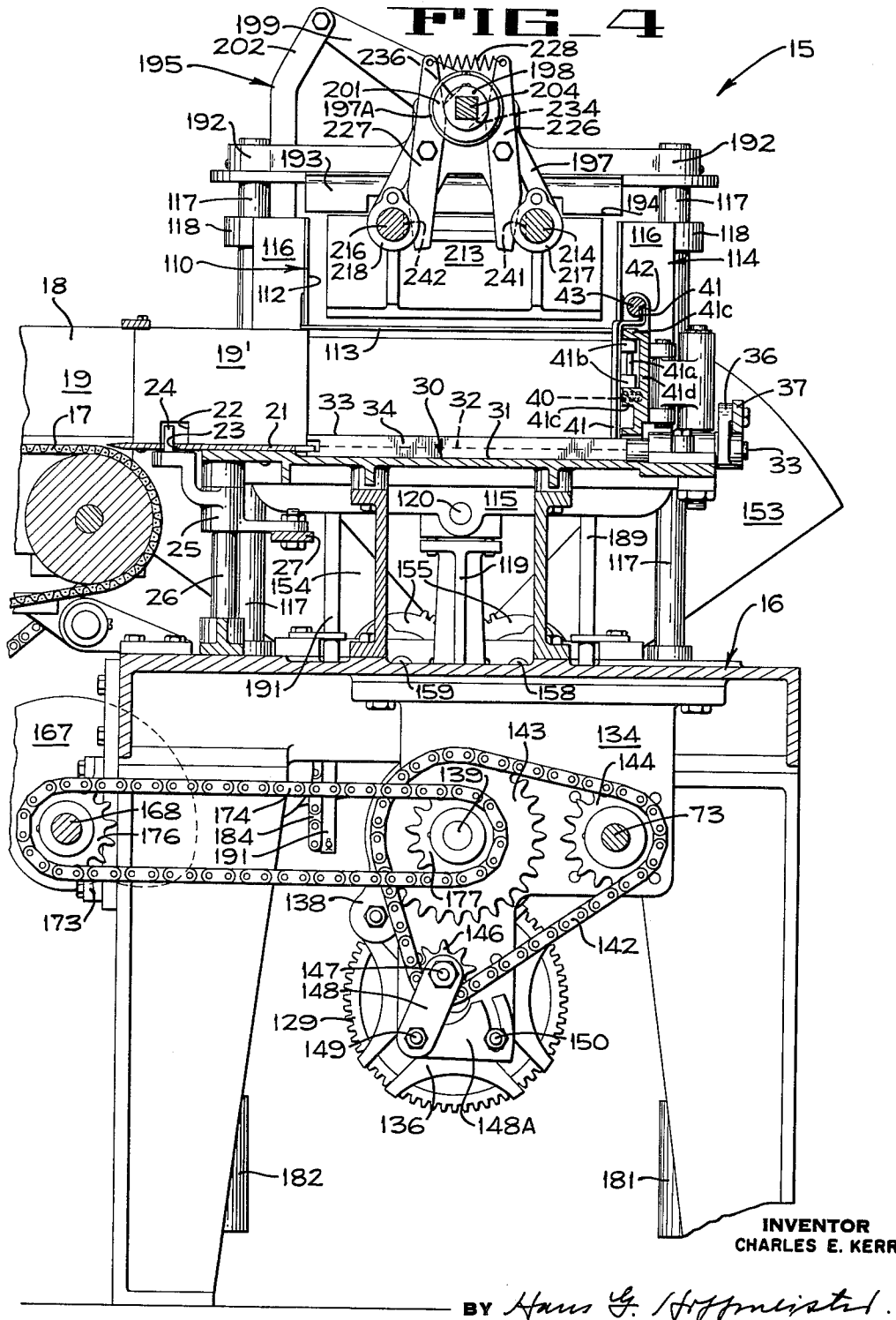
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CONTAINER HANDLING MACHINE

Filed Dec. 13, 1961

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Nov. 23, 1965

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CONTAINER HANDLING MACHINE

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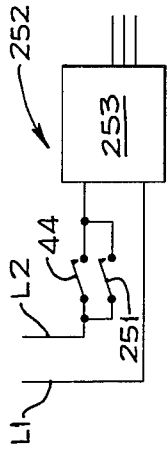


FIG. 7

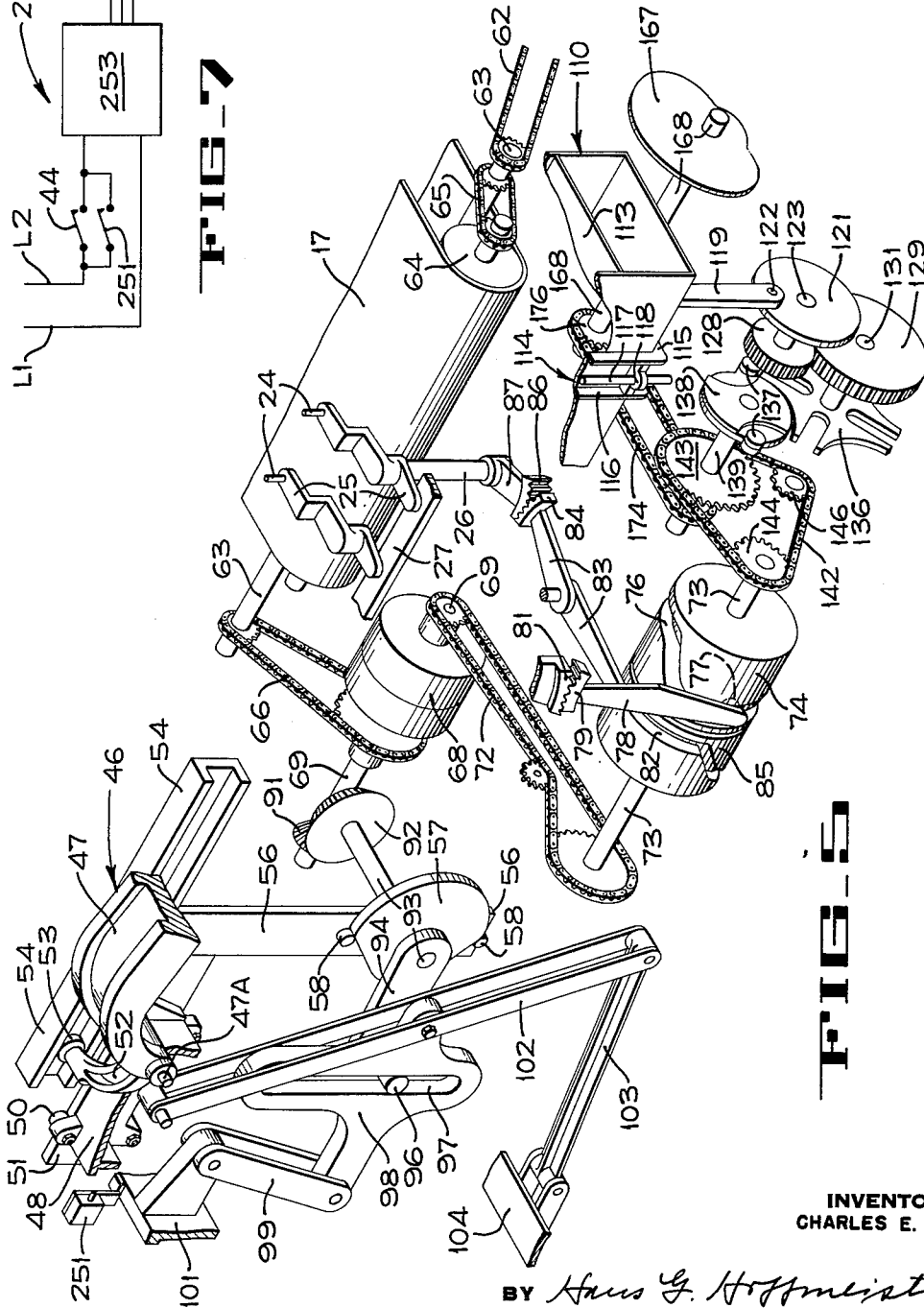


FIG. 5

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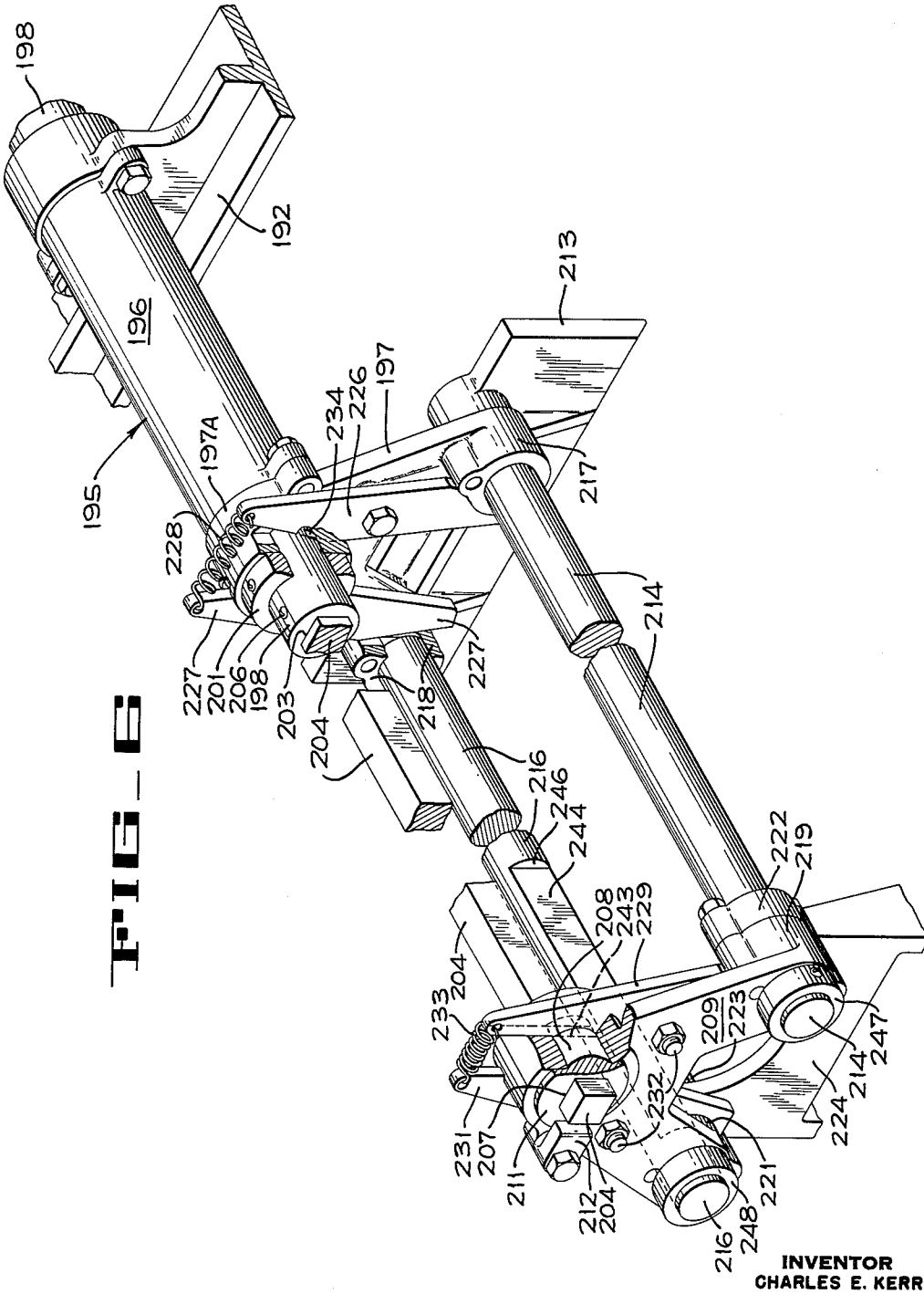
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3,218,780

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9 Sheets-Sheet 7



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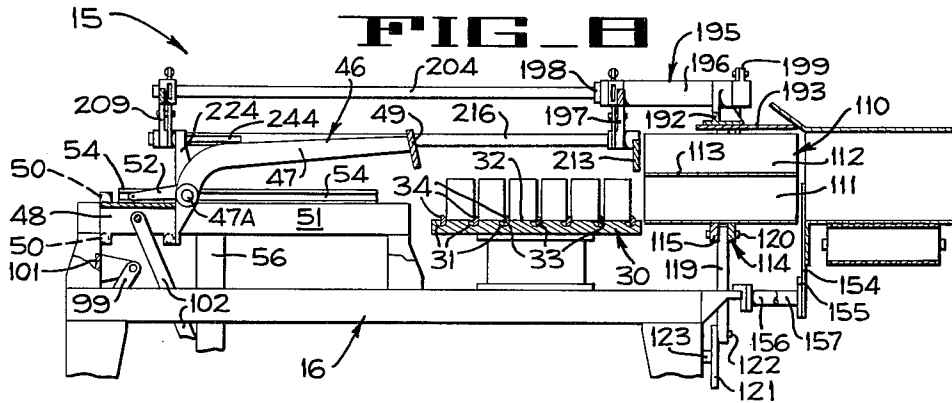
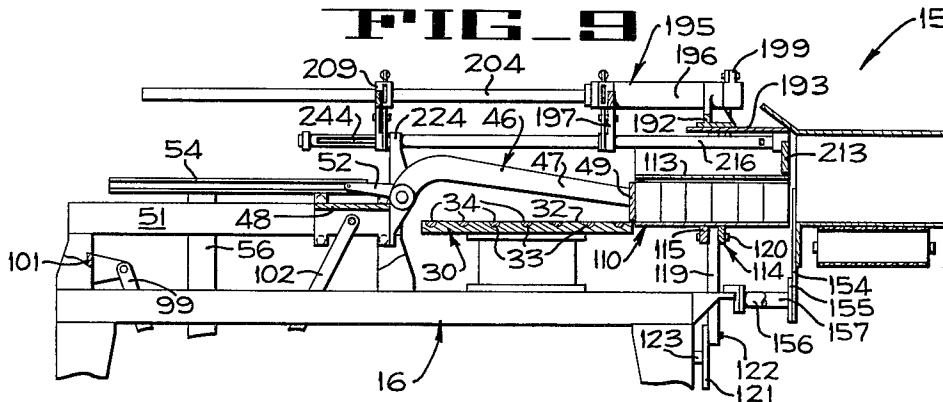
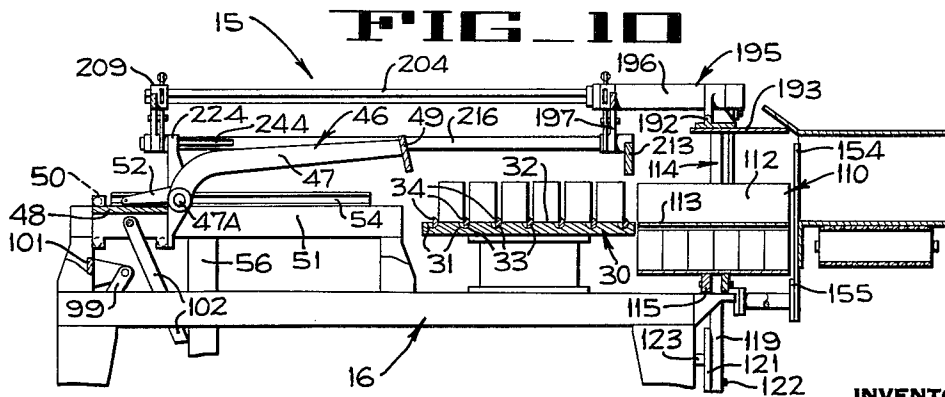
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3,218,780

CONTAINER HANDLING MACHINE

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9 Sheets-Sheet 8



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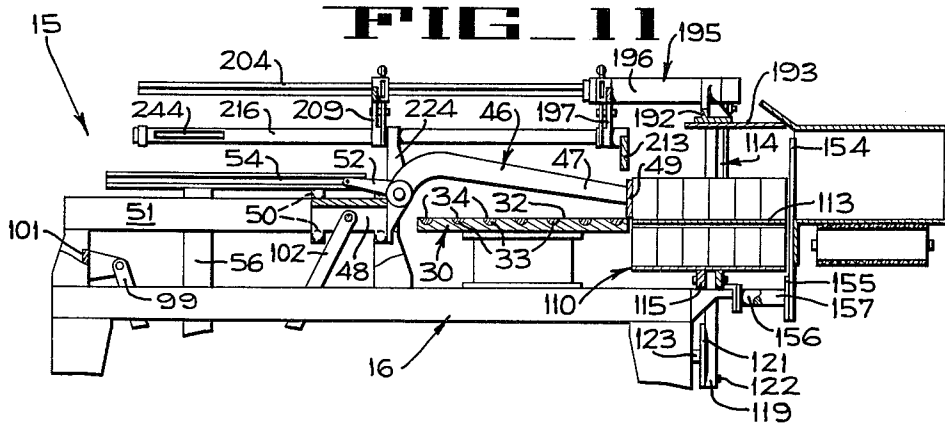
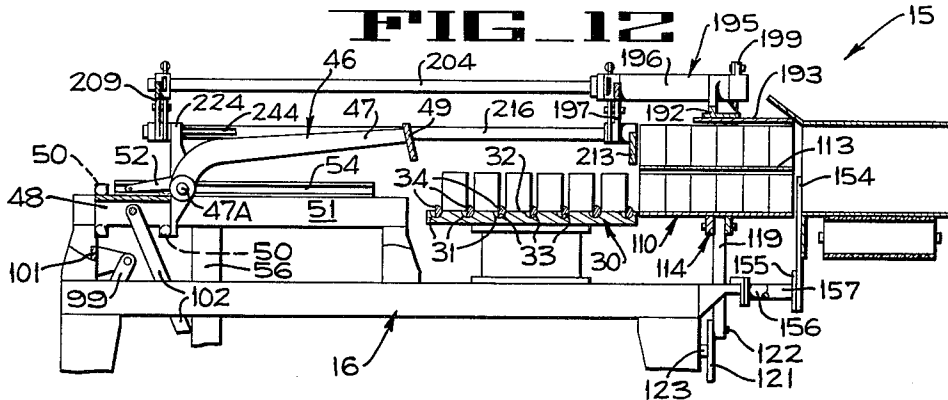
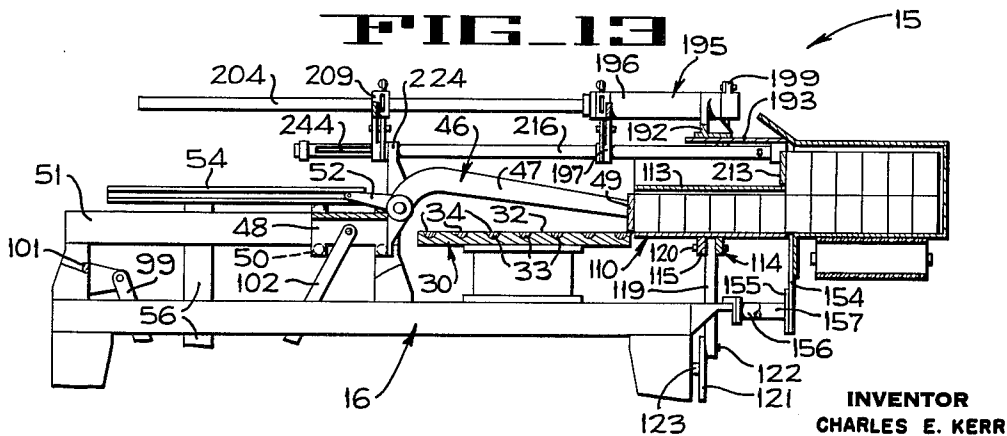
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CONTAINER HANDLING MACHINE

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9 Sheets-Sheet 9



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1

2

3,218,780

CONTAINER HANDLING MACHINE

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Filed Dec. 13, 1961, Ser. No. 158,976
8 Claims. (Cl. 53—164)

The present invention appertains to container handling machines and more particularly relates to a machine for packing two tiers of articles such as containers into a case, crate or the like.

An object of the present invention is to provide an improved double tier case packing machine.

Another object is to provide improved apparatus for arranging groups of containers into two tiers.

Another object is to provide improved apparatus for simultaneously pushing two tiers of containers into a case.

Another object is to provide an improved loading chute for a double tier case packing machine.

These and other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings, in which:

FIGURE 1 is a perspective of the double tier case packing machine of the present invention.

FIGURES 2A and 2B are left and right portions, respectively, of an enlarged side elevation of the case packing machine partly broken away.

FIGURE 3 is an enlarged end elevation of the machine of FIG. 1 viewed toward the discharge end of the machine.

FIGURE 4 is a section taken along lines 4—4 of FIG. 2B.

FIGURE 5 is a diagrammatic perspective of the power train employed in the machine of the present invention.

FIGURE 6 is a fragmentary perspective of a portion of the apparatus for pushing the upper tier of containers into the case.

FIGURE 7 is a diagrammatic illustration of the control circuit employed in the case packing machine.

FIGURES 8 to 13 are operational views showing successive phases of the sequence of operations of the double tier case packing machine of the present invention.

The double tier case packing machine 15 (FIG. 1) of the present invention is an improvement of the case packing machine disclosed in the United States Letters Patent of Charles E. Kerr, No. 2,993,316 which issued on July 25, 1961. This patent discloses a case packing machine for packing a single tier of containers in a case. Since many of the parts of the double tier casing machine 15 of the present invention are similar to parts disclosed in the above mentioned patent, these similar parts and their operation will only briefly be described. If a more complete description of these parts is desired, reference should be had to said patent.

The double tier case packing machine 15 (FIGS. 1 to 4) includes an elongate supporting table 16 which is disposed at right angles to a continuously driven endless belt-type feed conveyor 17 (FIG. 1) that is divided into a plurality of lanes 18 by guide plates 19. The containers are advanced by the conveyor 17 onto a ramp 21 (FIG. 4) which is likewise divided to form continuations of the lanes 18 by guide plates 19' which define extensions of their associated plates 19. A slot 22 in each guide plate 19' cooperates with one of several arcuate slots 23 in the ramp 21 to receive one of several stop pins 24, each of which is movable from a container-arresting position in its associated lane 18 to a withdrawn position within the slot 22 in the wall 19' to permit containers to advance past the associated pin 24. One stop pin 24 is provided for each lane 18. Each stop pin 24 is secured to one of several bell cranks 25, and each bell crank 25 is secured to a rotatable shaft 26. The bell cranks 25 are pivotally

interconnected by a common link 27 that is reciprocated by structure which will be described presently.

A line of abutting containers in each lane 18 are pushed past the associated stop pin 24, when it is in its withdrawn position, by following containers resting on and driven by the continuously moving feed conveyor 17. Certain of these containers are moved onto a collecting platform 30 (FIG. 4) which collects a tier of containers in the tier pattern which they are to occupy after being filled into a case.

The collecting platform 30 has several semi-cylindrical grooves 31 (FIG. 8) in its container supporting surface 32, each groove 31 being aligned with one of the guide plates 19'. A semicylindrical guide bar 33 is received for rotation in each of the grooves 31, and each bar 33 is movable from a position wherein its flat surface 34 is vertical and extends above the supporting surface 32 to guide the containers onto the surface 32, to a position where its flat surface 34 is flush with the surface 32 to allow the containers to be moved laterally over the bars 33 and off the platform 30 as indicated in FIG. 9.

As shown in FIG. 2B, an actuating lever 36 is secured to each guide bar 33 and the levers 36 are pivotally interconnected to a link 37 so that all bars 33 will be actuated simultaneously.

Since it is important that a complete tier pattern of containers be formed on the collecting platform 30 before the containers are moved laterally off the platform 30, a plurality of sensing fingers 41 (FIG. 2B) are provided at the far right (FIG. 4) of the machine 15. Each finger 41 is disposed in one of the lanes 18 and is pivotally mounted by means of a laterally offset pin 41a, which is journaled in collars 41b secured to the finger and is press fitted into hubs 41c of a support plate 41d. A spring 40 normally tends to swing the finger 41 about the pin 41a to a position in the path of containers being advanced in the lanes. When all of the fingers 41 are contacted by the leading container in their associated lanes 18, the upper ends of the fingers 41 are released from a shoulder 42 in a shaft 43 that is rotatably mounted. With all the fingers released from the shaft 43, the shaft 43 is caused to rotate in a clockwise direction (FIG. 4) by a spring (not shown) which rotation causes a normally open switch 44 (FIG. 2B) to close. If the foremost container in any of the lanes 18 does not contact its associated sensing finger 41, it is apparent that this finger will prevent rotation of the shaft 43 and thereby prevent closing of the switch 44. As will be explained hereinafter, the switch 44 must be closed before the containers can be pushed laterally off the collecting platform 30.

A pusher mechanism 46 (FIGS. 1 and 2A) is provided to push the tier load of containers laterally off the collecting platform 30. The pusher mechanism 46 includes an arm 47 that is pivotally mounted at 47a on a carriage 48 and carries a container contacting shoe 49 on the other end. The carriage 48 is mounted by means of eight rollers 50 on stationary tracks 51 for reciprocatory movement laterally of the conveyor 17 and laterally of the collecting platform 30. An arm 52 (FIG. 5) is rigid with the arm 47 and has a cam follower 53 thereon which rides in a horizontally disposed channel cam track 54. The track 54 is mounted on a vertical bar 56 which is reciprocated vertically by a cam 57 acting against two cam followers 58 carried by the vertical leg 56. Accordingly, when bar 56 is raised the arm 47 is swung clockwise, pivoting about point 47a, to lower the pusher shoe 49.

The portion of the power train 61 (FIG. 5) that continuously drives the conveyor 17, and intermittently actuates the pins 24, the semicylindrical guide bars 33 (FIG. 8) and the pusher mechanism 46 in timed relation will now be described.

3

A motor (not shown) is connected by a chain drive 62 (FIG. 5) to one end of a shaft 63 to continuously drive the shaft 63. The shaft 63 in turn, is connected to the drive roller 64 of the feed conveyor 17 by a chain drive 65, and continuously drives the conveyor 17 to advance containers into the machine. A chain drive 66 connects the other end of the shaft 63 to a clutch-brake 68 so that the drive 66 may be selectively engaged with or disengaged from a shaft 69. The energization of the clutch-brake is controlled by the switch 44 (FIG. 2B) or another switch which will be described hereinafter. One end of the shaft 69 is connected by a chain drive 72 to a cam shaft 73 which has a cylindrical cam 74 keyed thereon. A groove 76 in the cylindrical surface of the cam 74 receives a cam follower 77 journaled on one end of a pivotally mounted rocker arm 78. A gear segment 79 on the other end of the rocker arm 78 meshes with a gear segment 81 on one of the actuating levers 36 (FIG. 2B) of the rotatable guide bars 33. The configuration of the groove 76 on the surface of the cam 74 is such that during one revolution of the cam 74, the rocker arm 78 will swing from a position wherein all the guide bars 33 have portions projecting above the container supporting surface 32 to a position wherein flat surfaces 34 (FIG. 8) of the bars 33 are flush with the surface 32.

A groove 82 (FIG. 5) in the cylindrical surface of a second cam 85 receives a cam follower (not shown) journaled on one end of a horizontal rocker arm 83. A gear segment 84 on the other end of the rocker arm 83 meshes with a gear segment 86 secured to an arm 87 that is secured to one of the shafts 26 which carry the line-divider stop pins 24. The configuration of the groove 82 is such that the pins 24 are moved, once for each revolution, from a container arresting position in their associated lanes 18 to a withdrawn position wherein the containers are allowed to pass the pins 24 and move onto the platform 30.

For driving the pusher mechanism 46, a bevel gear 91 keyed on the shaft 69 meshes with a gear 92 keyed on a shaft 93. The previously mentioned cam 57 and a crank arm 94 are also keyed to the shaft 93. A cam follower 96 journaled on the distal end of the crank arm 94 rides in a groove 97 in a yoke 98. One end of the yoke 98 is rockably connected by a linkage 99 to a portion 101 of the table 16. The other end of the yoke 98 is pivotally connected to a linkage 102 which is pivotally connected at one end to the carriage 48. At its lower end, the linkage 102 is pivotally connected to an arm 103 which is, in turn, pivotally connected to a portion 104 of the table 16. Thus, when the shaft 93 rotates through one revolution, the crank arm 94 will cause the cam follower 96 to move in the groove 97 thereby moving the yoke 98 and the several linkages connected thereto in such a way that the pusher mechanism 46 is reciprocated laterally of the conveyor 17. The peripheral surface of the cam 57 is formed so as to raise the channel cam track 54 to pivot pusher arm 47 clockwise (FIG. 2A) and thence lower the shoe 49 shortly after the pusher mechanism 46 starts to move to the right as viewed in FIG. 2A. Similarly, immediately after the pusher mechanism 46 begins its return stroke, the cam 57 causes the cam track 54 to lower thereby raising the shoe 49.

The above described portion of the machine 15 is substantially the same as the case packing machine disclosed in the herein mentioned Kerr patent. If a more detailed description of this portion of the machine is desired, reference should be had to the Kerr patent.

The case packing machine 15 of the present invention includes a movable chute 110 (FIGS. 2B and 3) which is in the form of a horizontal U-shaped channel that is open at both ends. The chute 110 is divided into a lower chute compartment 111 and an upper chute compartment 112 by a portion 113 that is secured, as by welding, to the vertical side walls of the chute 110. The chute 110 is secured to and is supported by a U-shaped carrier 114

4

which includes a horizontal lower section 115 and two upwardly projecting vertical legs 116, one on each end of the section 115. Two spaced, vertically extending guide rods 117 are secured to the table 16, each rod projecting upwardly therefrom through two apertured ears 118 in an associated one of the legs 116 of the carrier 114. The bars 117 guide the chute 110 for vertical movement.

In order to intermittently reciprocate the chute 110, one end of a crank arm 119 (FIG. 3) is pivotally connected to a central portion of the lower horizontal section 115 of the carrier 114 by a pin 120. The other end of the crank arm 119 is connected eccentrically to a disc 121 by a pivot bolt 122. The disc 121 is keyed to a shaft 123 which is journaled in bearings 124 and 126 (FIG. 2B) that are bolted to a vertical plate 127 secured to and projecting downwardly from the table 16. A gear 128 keyed to the shaft 123 meshes with a gear 129 that is keyed on a shaft 131. The shaft 131 is journaled in a bearing 132 bolted to the plate 127 and in a bearing 133 bolted to a plate 134 that is secured to and projects downwardly from the table 16.

A Geneva gear 136 (FIG. 5) keyed on the shaft 131 is intermittently driven by two rollers 137 of a driver 138. The Geneva driver 138 is secured to a shaft 139 which is journaled in a bearing 141 (FIG. 2B) bolted to the vertical plate 134 and in another bearing (not shown). The shaft 139 is driven by a chain 142 (FIG. 4) which is trained around a sprocket 143 secured to the shaft 139, a sprocket 144 secured to the shaft 73, and a take-up sprocket 146. The take-up sprocket 146 is journaled on a bolt 147 (FIGS. 2B and 4) that is connected to a bell crank 148 which is pivoted about a bolt 149 and has an arm 148A locked in pivoted position to the vertical plate 134 by a bolt 150.

In order to prevent containers from inadvertently falling out of the open discharge end of the chute 110 and to prevent interference between the case and the chute, a pair of cooperating gates 153 and 154 (FIGS. 1 and 3) are provided. The gates 153 and 154 are secured by cap screws to hubs 155 formed on sleeves 156 and 157, respectively, which are mounted for rotation on parallel stationary shafts 158 and 159, respectively. Meshing gear segments are formed on the hubs 155 and cause the gates 153 and 154 to simultaneously move to an open position and to simultaneously move into a closed position. A crank arm 163 (FIG. 3) is rigidly secured to the sleeve 157 and is pivotally connected to one end of a connecting rod 164. A cam follower 166 is journaled on the other end of the connecting rod 164 and rides against the periphery of a cam 167. The cam 167 is keyed to a shaft 168 which extends through a slot 169 in the rod 164. A spring 171, connected between the crank arm 163 and a stationary bracket 172 rigid with the table 16, urges the gates 153 and 154 toward the open position and holds the cam follower 166 firmly against the periphery of the cam 167. The shaft 168 is journaled in bearings 173 (only one being shown in FIG. 4) which are bolted to the table 16. A chain 174 is trained around a sprocket 176 keyed to the shaft 168 and around a sprocket 177 keyed to the shaft 139.

The different sprockets and gears are selected so that one complete revolution of the shaft 73 (FIG. 5) will drive the disc 121 one half revolution and will also drive the shaft 168 one half revolution. The movement of the gates 153 and 154 (FIG. 3) are timed relative to the position of the chute 110 so that the gates 153 and 154 will be in the open position when the chute is in its upper position.

Since the chute 110 is relatively heavy, counterweights 181 and 182 are connected to chains 183 and 184, respectively. The chains 183 and 184 are trained around wheels 186 and 187, respectively. The wheel 186 is mounted for rotation on the bracket 172, and the wheel 187 is mounted for rotation on a similar bracket 188 which is supported by the table 16. The other ends of

5

the chains 183 and 184 are connected to vertically extending rods 189 and 191, respectively. The rods 189 and 191 project through openings in the table 16 and are rigidly secured to the horizontal section 115 of the U-shaped carrier 114. In this way the counterweights 181 and 182 substantially balance the weight of the chute 110 and provide for much smoother operation of the machine.

As shown in FIG. 3, a bridge 192 extends across and is rigidly secured to the upper ends of the vertical guide bars 117. A stationary cover 193 (FIG. 1) is secured, as by bolting, to the bridge 192 and has its discharge end 194 bent downwardly to provide an upwardly inclined wall for guiding the upper end flap of the case upwardly when the case is placed thereon preparatory to receiving a charge of containers advanced by the pushers.

An upper tier pusher mechanism 195 is provided for pushing the upper tier of containers out of the chute 110 into a case. The mechanism 195 includes a horizontally extending tubular housing 196 (FIGS. 1, 2B and 6) which is bolted to the bridge 192 and to an inverted V-shaped pusher supporting bracket 197. A cam shaft 198 is journaled in the housing 196 and projects outwardly from the bridge 192 and from the bracket 197. A crank arm 199 is rigidly clamped on the end of the shaft 198 which projects out of the bracket 197. The collar 201 and the crank arm 199 cooperate to prevent longitudinal movement of the shaft 198. A link 202 (FIG. 3) is pivotally connected between the crank arm 199 and one leg 116 of the U-shaped chute carrier 114.

A socket 203 (FIG. 6), in the end of the shaft 198 adjacent the bracket 197, receives one end of a square rod 204 which is locked therein by a set screw 206. The other end of the square rod 204 is slidably received in a square opening 207 in a bushing 208 which is rotatable in an inverted V-shaped bracket 209 that is similar to the bracket 197. The bushing 208 is provided with a flange 211 which engages one face of the bracket 209 and prevents axial movement of the bushing 208 in one direction relative to the bracket 209. Fingers 212 (only one being shown in FIG. 6) are bolted to the bracket 209 and project over the flange 211 to prevent movement of the bushing 208 axially in the other direction relative to the bracket 209.

In order to push an upper tier of containers into a case, an upper pusher shoe 213 is fixed to the ends of a pair of pusher rods 214 and 216. The pusher rods 214 and 216 are slidably received in hubs 217 and 218 respectively of the bracket 197. The other ends of the pusher rods 214 and 216 are slidably received in hubs 219 and 221 respectively in the bracket 209, and in hubs 222 and 223 (FIG. 1) respectively, in an upwardly projecting portion 224 of the carriage 48. The hub 219 is bolted to the hub 222 and the hub 221 is bolted to the hub 223.

As will be described in more detail later, the lower pusher mechanism 46 must make two strokes for each stroke of the upper pusher shoe 213 of the upper tier pusher mechanism 195. It will also become apparent that the upper pusher shoe 213 is actuated only when the chute 110 is in its upper portion.

Referring to FIG. 8, it will now be evident that the machine has a lower pusher member 49 and an upper pusher 213 carried on rod 216. The lower pusher 49 always moves with the carriage 48; however, the upper pusher moves with the carriage 48 only at certain times when it is locked to the carriage. In a typical case-filling cycle, the lower pusher is advanced first to push a lower tier of cans onto the elevator 110. After it is retracted and the elevator is lowered, the lower pusher is again advanced to push a second tier of cans onto the first tier. Then the elevator is raised, the upper pusher is locked to the carriage, and both pushers are advanced to push both tiers into a case.

6

The mechanism for selectively locking the upper pusher to the carriage 48 comprises a pair of pusher locking blades 226 and 227 which are pivotally connected to the bracket 197 by bolts, and have a spring 228 connected to the upper ends of the blades 226 and 227 to urge the upper ends towards each other. Likewise, a pair of keys or pusher driving blades 229 and 231 (FIG. 6) are pivotally connected to the bracket 209 by bolts 232. A spring 233 is connected to the upper ends of the driving blades 229 and 231 and urge their upper ends towards each other. As indicated in FIG. 4, the boss 197A of the bracket 197 is slotted to allow the blades 226 and 227 to rest in sliding engagement against the cylindrical surface of the shaft 198 when the crank arm 199 is in its raised position, and to contact camming flats 234 and 236, respectively, machined on the shaft 198 when the crank arm 199 is in its lower position. When the arm 199 is in its lower position, the lower end portions of the blades 226 and 227, which are disposed in slots in the hubs 217 and 218, respectively, enter slots 241 and 242 in the rods 214 and 216, respectively, of the upper pusher, thereby positively locking the rods and the pusher from movement. When the crank arm 199 moves to its upper position, the upper ends of the blades 226 and 227 are moved away from the flats 234 and 236 and the lower ends of the blades are swung out of their respective slots 241 and 242, permitting the pusher rods 214 and 216 to be axially moved relative to the associated hubs 217 and 218.

Referring to the rear bracket 209 (FIG. 6), it will be noted that, when the crank arm 199 is moved to the upper position, mentioned above, the upper portion of the pusher driving blades 229 and 231, which are disposed in slots in the bracket 209, enter slots 243 (only one being shown) in the bushing 208. At the same time, the lower ends of the blades 229 and 231 move into engagement with the flat faces of elongate recesses 244 (only one being shown) in their associated push rods 214 and 216. When the blades 229 and 231 are in the above position, movement of the carrier 48 to the right (FIG. 1) will cause the bracket 209 to move a short distance relative to the square shaft 204 and relative to the rods 214 and 216. When the arms 229 and 231 engage lateral end surfaces 246 (only one being shown in FIG. 6) of the elongated recesses 244 in the rods 214 and 216, the rods 214 and 216 move with the carrier 48 and cause the pusher shoe 213 to push the upper tier of containers out of the chute 110 at the same time as the shoe 49 (FIG. 1) pushes the lower tier of containers out of the chute 110. Thus, there is no relative motion between the containers in the upper and lower tiers as they are moved out of the chute 110.

When the arm 199 is moved to its lower position, the driving blades 229 and 231 (FIG. 6) are cammed out of the slots 243 and out of the elongated recesses 244 by the cylindrical surface of the bushing 208. Collars 247 and 248 locked on the ends of the pusher rods 214 and 216, respectively, are engaged by the bracket 209 on its return stroke and serve to return the shoe 213 to its starting position shown in FIG. 6.

In general, when the crank arm 199 is moved to its raised position as the loading chute 110 is raised to receive the first tier of cases, the upper pusher is locked to the lower pusher, and when the chute is lowered the upper pusher is disconnected from the lower pusher.

When the carriage 48 (FIG. 5) moves to its rearmost position, it engages and opens a normally closed switch 251 (FIGS. 5 and 7). The aforementioned clutch-brake 68, which establishes a driving connection to all of the intermittently driven parts of the machine 15, is controlled by the circuit 252 shown in FIG. 7. Power is supplied to a clutch-brake control circuit 253 of standard design by main lines L1 and L2 upon closing of either the switch 44 or the switch 251. The aforementioned normally open switch 44 is connected in series in the line L2, and the switch 251 is connected in paral-

7

lel across the switch 44. Thus, when a tier pattern of containers is completed on the collecting platform 30, the switch 44 will be closed and power will be transmitted through the circuit 252 causing the clutch-brake 68 (FIG. 5) to become engaged thereby actuating the several intermittently driven parts of the machine 15. When the pusher mechanism 46 is actuated, the carriage 48 moves away from the switch 251 allowing the switch 251 to close thereby establishing a holding circuit which maintains the clutch-brake 68 in engagement after the switch 44 opens and until the carrier 48 returns to its rearmost position which opens the switch 251. When the switch 44 is again closed by the formation of a complete tier pattern on the platform 30, the clutch-brake 68 is again engaged to actuate the several intermittently driven parts.

The operation of the double tier case packing machine 15 of the present invention will be described in connection with FIGURES 5, 7 and 8 to 13, inclusive. With the conveyor 17 (FIG. 5) being continuously driven by a motor (not shown), and the different parts of the machine being positioned as shown in FIGURE 8, containers are moved onto the collecting platform 30 to form a tier pattern of containers thereon which close the switch 44 (FIG. 7). Closing of the switch 44 actuates the clutch-brake 68 which rotates the cam 74 causing the stop pins 24 to move into position to temporarily prevent other containers from entering the collecting platform 30. Initial rotation of the cam 74 also causes the semi-cylindrical bars 33 to move from the container guiding position shown in FIG. 8 to a position wherein the flat surface 34 of the bars 33 are in planar alignment with the container supporting surface 32 of the platform 30 as shown in FIG. 9.

Shortly after the surfaces 34 have been moved into alignment with the surface 32 of the platform 30, the pusher mechanism 46 is actuated thereby closing the switch 251 and causing the shoe 49 to contact containers on the platform 30 and move the tier pattern of containers into the lower chute compartment 111 of the chute 110. Simultaneously with the movement of the shoe 49, the upper pusher shoe 213 is moved through the upper chute compartment 112, which during the first cycle of operation of the machine 15 is empty. As the shoes 49 and 213 begin their return stroke, one of the rollers 137 (FIG. 5) of the Geneva drive 138 engages the Geneva gear 136 which rotates the disc 121 through one half revolution thereby moving the chute to its lower position (FIG. 10) and closing the gates 153 and 154 (FIG. 3). During this return movement, the cam 74 (FIG. 5) causes the guide bars 33 to move to the guiding position shown in FIG. 10, and likewise, causes the pins 24 to move to positions wherein containers are allowed to enter the platform 30. When the shoes 49 and 213 reach their rearmost position, the carrier 48 (FIG. 5) contacts and opens the switch 251 thereby disengaging the clutch-brake 68 if a new tier pattern has not been completed on the platform and closed the switch 44 (FIG. 7).

When the switch 44 is closed, the second half of the cycle of operation begins. This second half-cycle is identical to the above described first half-cycle with the following exceptions. The chute 110 (FIG. 11) is in its lower position during the forward stroke of the pusher mechanism 46, thus the tier of containers is pushed into the upper chute compartment 112 of the chute 110. During this movement the upper pusher shoe 213 is locked in its rearmost position by the blades 226 and 227 (FIG. 6) which enter slots 241 and 242 in the shafts 214 and 216. During the return stroke of the pusher mechanism 46, one of the rollers 137 (FIG. 5) rotates the Geneva gear one-quarter revolution causing the gates 153 and 154 to be moved to the open position as shown in FIG. 3. Upon completion of the second half-cycle of operation of the machine 15, both the

8

lower compartment 111 and the upper compartment 112 of the chute 110 are filled with containers as illustrated in FIG. 12.

The next cycle of operation is the same as the first described cycle of operation except that the lower pusher shoe 49 (FIG. 13) moves a tier of containers off the platform 30 and into the lower compartment 111 of the chute 110 thereby moving the tier of containers which had been in the compartment 111 into a case. Simultaneously therewith, the upper pusher shoe 213 moves the upper tier of containers into the case.

From the foregoing description it is apparent that the double tier case packing machine of the present invention provides a simple mechanism for collecting two tiers of containers and for moving both tiers simultaneously into a case. The machine includes simple means for driving the upper pusher once for every two strokes of the lower pusher mechanism and for controlling the actuation of the upper pusher so that there is no relative motion between the containers in the upper and lower tiers as they are moved into the case.

While one embodiment of the present invention has been shown and described, it will be understood that various changes and modifications may be made without departing from the spirit of the invention or the scope of the appended claims.

The invention having thus been described, what is believed to be new and desired to be protected by Letters Patent is:

1. In a machine for packing a double tier of articles into a case, a platform for supporting the articles, a chute movable between an upper and a lower position and divided into an upper compartment and a lower compartment alternately movable into alignment with said platform to receive articles pushed from said platform, a lower pusher arranged to sweep across said platform to push articles collected thereon alternately into said upper and said lower compartments, drive means connected to said chute and to said lower pusher and arranged to actuate said chute and said lower pusher in timed relation, an upper pusher disposed in alignment with said upper compartment when said lower compartment is in alignment with said platform, a drive key movable into driving position to connect said upper and said lower pushers in driving engagement, and a linkage connected to said chute and to said drive key for moving said key into driving position when said chute is moved to its upper position.

2. In a machine for packing a double tier of articles into a case, a platform for supporting the articles, a chute movable between an upper and a lower position and divided into an upper compartment and a lower compartment alternately movable into alignment with said platform to receive articles pushed from said platform, a lower pusher arranged to sweep across said platform to push articles collected thereon alternately into said upper and said lower compartments, drive means connected to said chute and to said lower pusher and arranged to actuate said chute and said lower pusher in timed relation, an upper pusher disposed in alignment with said upper compartment when said lower compartment is in alignment with said lower pusher, means actuated by the movement of said chute for immobilizing said upper pusher when said chute is in its lower position, and a driving key arranged to be moved into a position to connect said upper pusher with said lower pusher when said chute is moved to its upper position for driving said upper pusher through said upper compartment.

3. A machine for packing a double tier of articles into a case comprising a collecting platform for receiving articles and for positioning the articles in a predetermined tier pattern, a lower pusher for discharging the collected articles from said platform, a movable chute mounted in position to receive articles discharged from said platform, a partition secured in said chute for di-

viding said chute into an upper compartment and a lower compartment, means for vertically reciprocating said chute to alternately place the upper compartment and the lower compartment in position to receive a tier pattern of articles from said platform, an upper pusher in alignment with said upper compartment when said chute is positioned to receive articles in its lower compartment, means for supporting a case in position to receive the articles from said chute, and a drive key operatively connected to said pushers and arranged to connect said upper pusher to said lower pusher during selected actuations of said lower pusher.

4. A machine for packing a double tier of articles into a case comprising a collecting platform for receiving articles and for positioning the articles in a predetermined tier pattern, a lower pusher for discharging the collected articles from said platform, a movable chute mounted in position to receive articles discharged from said platform, a partition secured in said chute for dividing said chute into an upper compartment and a lower compartment, means for vertically reciprocating said chute to alternately place the upper compartment or the lower compartment in position to receive a tier pattern of articles from said platform, an upper pusher in alignment with said upper compartment when said chute is positioned to receive articles in its lower compartment, means for supporting a case in position to receive the articles from said chute, and drive means operatively connected to said pushers for actuating said lower pusher each time said upper compartment and said lower compartment is in position to receive articles from said platform, said drive means including a drive key operatively connected to said chute for establishing a driving connection between said pushers when said chute is in its upper position.

5. A machine for packing a double tier of articles into a case comprising a collecting platform for receiving articles advanced along a path and for positioning the articles in a predetermined tier pattern, a lower pusher for discharging the collected articles from said platform transversely of said path, a chute adjacent said collecting means in position to receive articles discharged from said platform, a partition secured in said chute for dividing said chute into an upper compartment and a lower compartment, means for vertically reciprocating said chute to alternately place the upper compartment or the lower compartment in position to receive tier patterns of articles from said platform, an upper pusher disposed in alignment with said upper compartment when said chute is positioned to receive articles in its lower compartment, means for supporting a case in position to receive the articles from said chute, and drive means operatively connected to said upper pusher and to said lower pusher, said drive means being arranged to actuate the lower pusher for moving a tier pattern of articles from said platform into said chute and from said chute into the case each time said upper compartment and said lower compartment are moved into position to receive articles from said platform, said drive means being arranged to actuate said upper pusher each time said upper compartment is moved into alignment therewith.

6. In a machine for packing a double tier of articles into a case, a platform for receiving and supporting tier patterns of articles, a chute having an upper compartment and a lower compartment movable into alignment with said platform and disposed in position to receive articles from said platform, means for alternately moving said upper compartment or said lower compartment into alignment with said platform, a lower pusher operable to push tier patterns of articles alternately into said upper compartment and into said lower compartment, an upper pusher disposed in alignment with said upper compartment when said chute is in its upper position, means for locking said upper pusher in fixed position when said

chute is in its lower position, driving means for connecting said upper pusher in driving engagement with said lower pusher when said chute is in its upper position for causing said upper pusher to sweep through said upper compartment, and means connecting said chute to said locking means and to said driving means and arranged upon movement of said chute to its upper position to simultaneously disconnect said locking means from said upper pusher and actuate said driving means into position to connect in driving engagement said upper pusher with said lower pusher.

7. In a machine for packing a double tier of articles into a case, a stationary bracket, a movable bracket spaced from said stationary bracket, means connected to said movable bracket to reciprocate said movable bracket toward and away from said stationary bracket, a pusher shaft slidably supported by said brackets, a pusher plate rigidly secured on one end of said shaft, a cam shaft mounted for rotation in said stationary bracket, a bushing mounted for rotation in said movable bracket, a square rod slidably received in said bushing and rigidly secured to said cam shaft, a locking key pivotally mounted on said stationary bracket, a driving key pivotally mounted on said movable bracket, said pusher shaft having a locking slot disposed at times in position to receive said locking key, said pusher shaft having an elongated driving slot disposed at times in position to receive said driving key, resilient means for pivoting said locking key into engagement in said locking slot when aligned therewith and when said cam shaft is rotated to a first position to lock said pusher shaft in fixed position, cam means on said cam shaft for contacting said locking key and pivoting the same out of said locking slot upon rotary movement of said cam shaft to a second position, resilient means for pivoting said driving key into said driving slot when said cam shaft is in said second position to connect said movable bracket into driving engagement with said pusher shaft, cam means on said bushing for contacting said driving key and for pivoting the same out of said driving slot upon rotary movement of said cam shaft to said first position, and means for rotating said cam shaft between said first and said second positions.

8. In a machine for packing a double tier of articles into a case, a platform for supporting a layer of articles, compartmented means defining a pair of vertically spaced compartments for receiving and supporting two spaced layers of superposed articles for independent sliding movement relative to each other, drive means for selectively moving said compartmented means into positions aligned with said platform to receive a layer of articles in each compartment, a first pusher for sweeping across said platform to independently push a layer of articles into each of said compartments, means for actuating said pusher in timed relation with said drive means, a second pusher disposed in alignment with one of said compartments when said first pusher is in alignment with the other compartment, and means for interconnecting said second pusher to said first pusher in response to the positioning of said compartments in alignment with said pushers for engaging each layer of articles and simultaneously pushing said layers of articles out of their spaced position on said support means to a superposed abutting position in the case.

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