Jan. 24, 1961 J. H. HOLMES 2,968,899

METHOD OF AND APPARATUS FOR PACKING ARTICLES ON TRAYS

Filed March 17, 1959 8 Sheets-Sheet 1

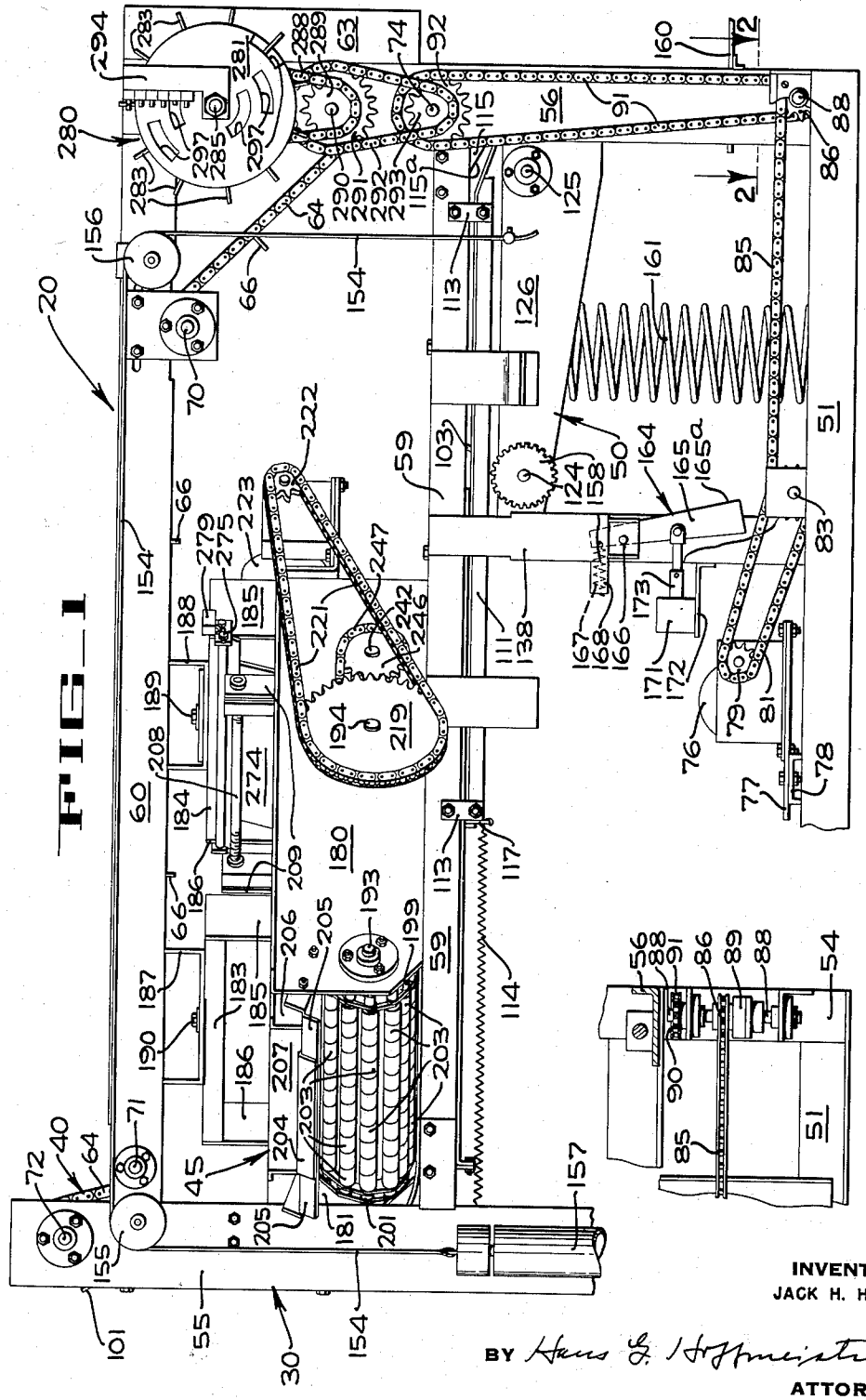


FIG. 1

FIG. 2

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METHOD OF AND APPARATUS FOR PACKING ARTICLES ON TRAYS

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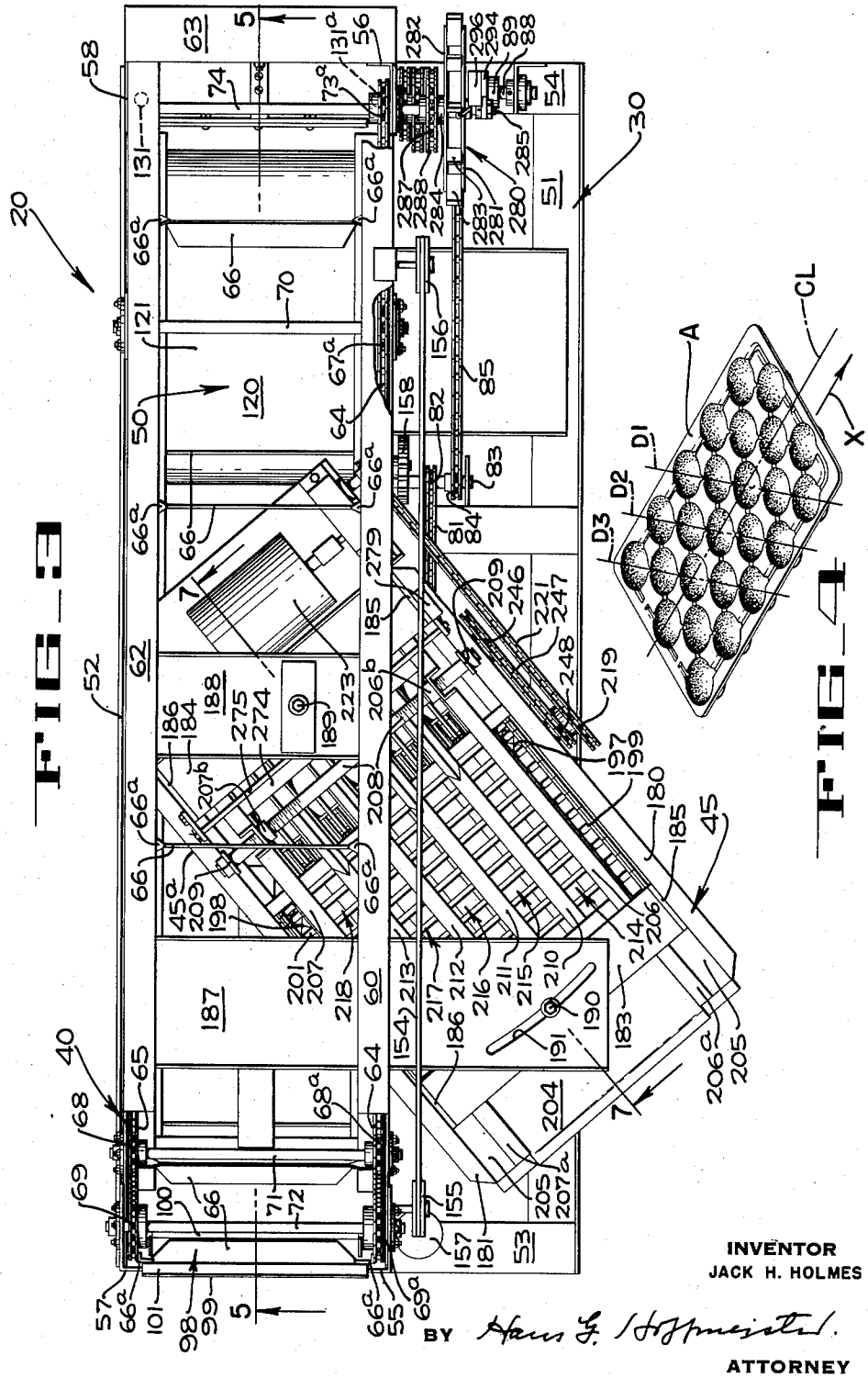


FIG. 3

FIG. 4

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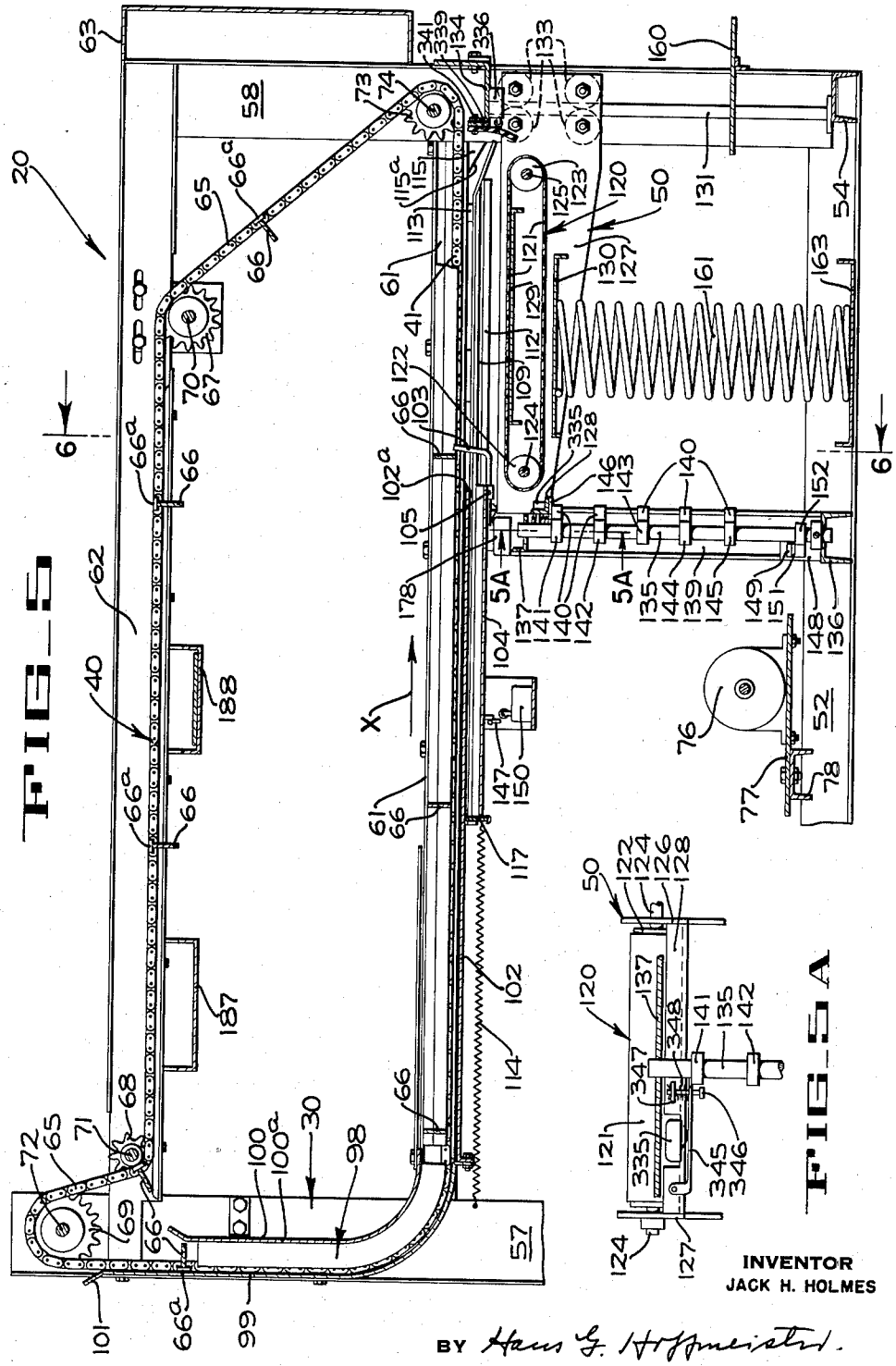


FIG. 5

FIG. 5A

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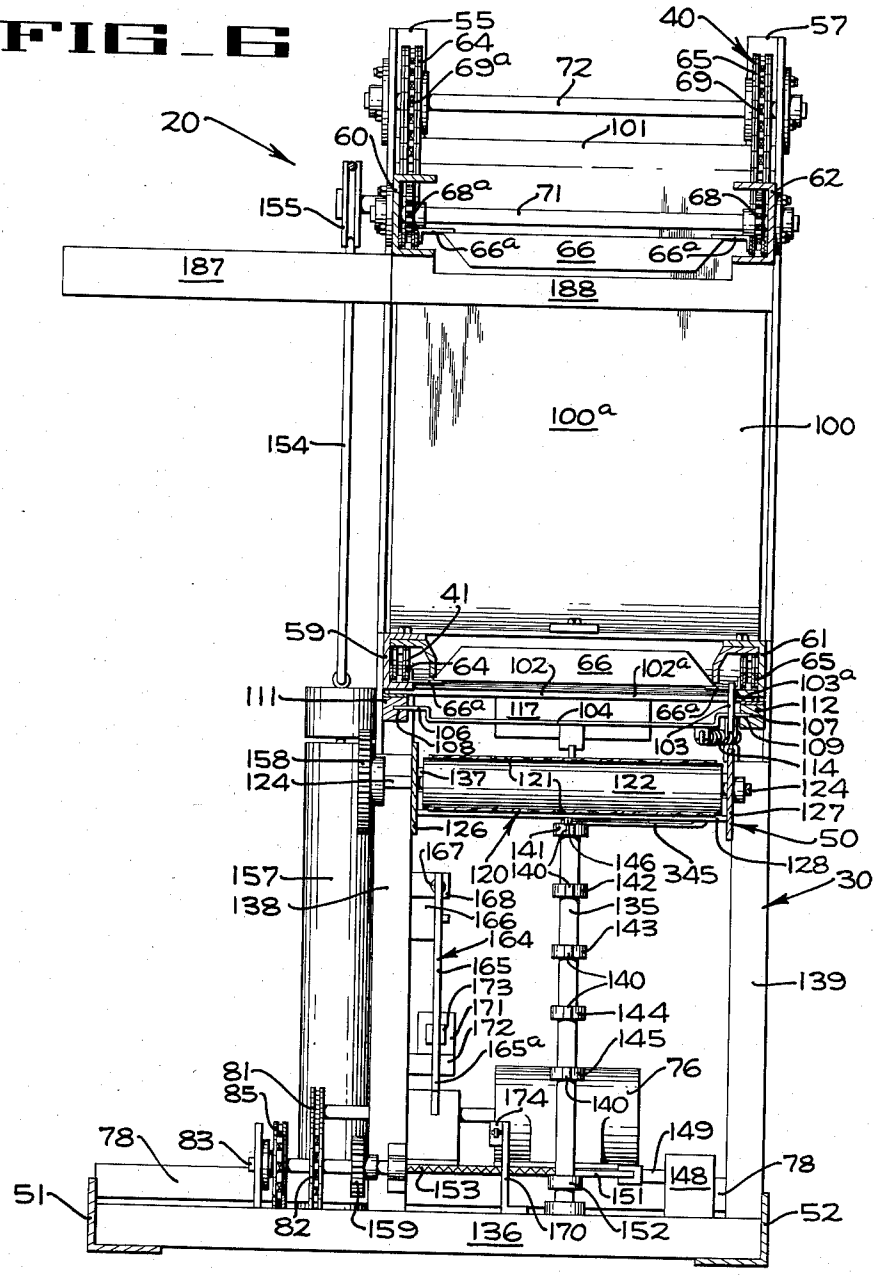
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METHOD OF AND APPARATUS FOR PACKING ARTICLES ON TRAYS

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FIG_6



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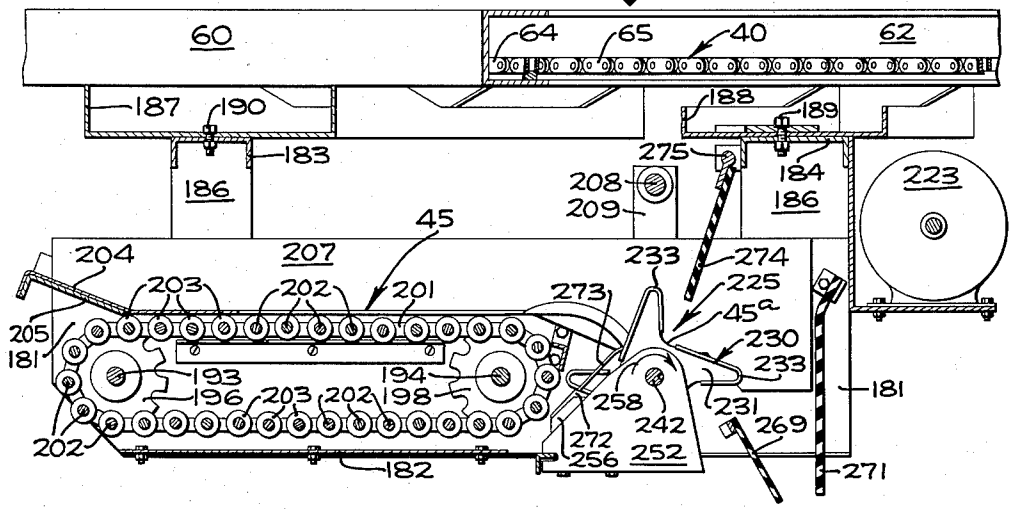
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METHOD OF AND APPARATUS FOR PACKING ARTICLES ON TRAYS

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FIG_7



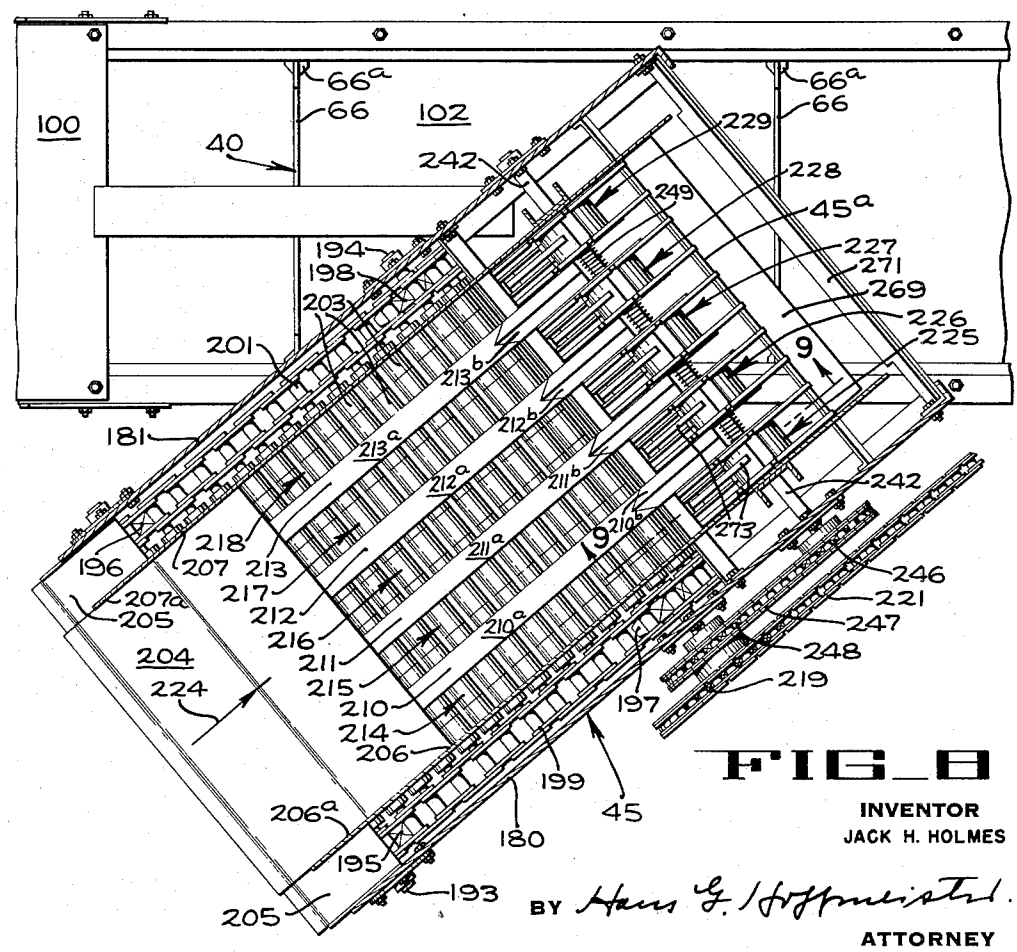


FIG_8

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METHOD OF AND APPARATUS FOR PACKING ARTICLES ON TRAYS

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FIG. 9

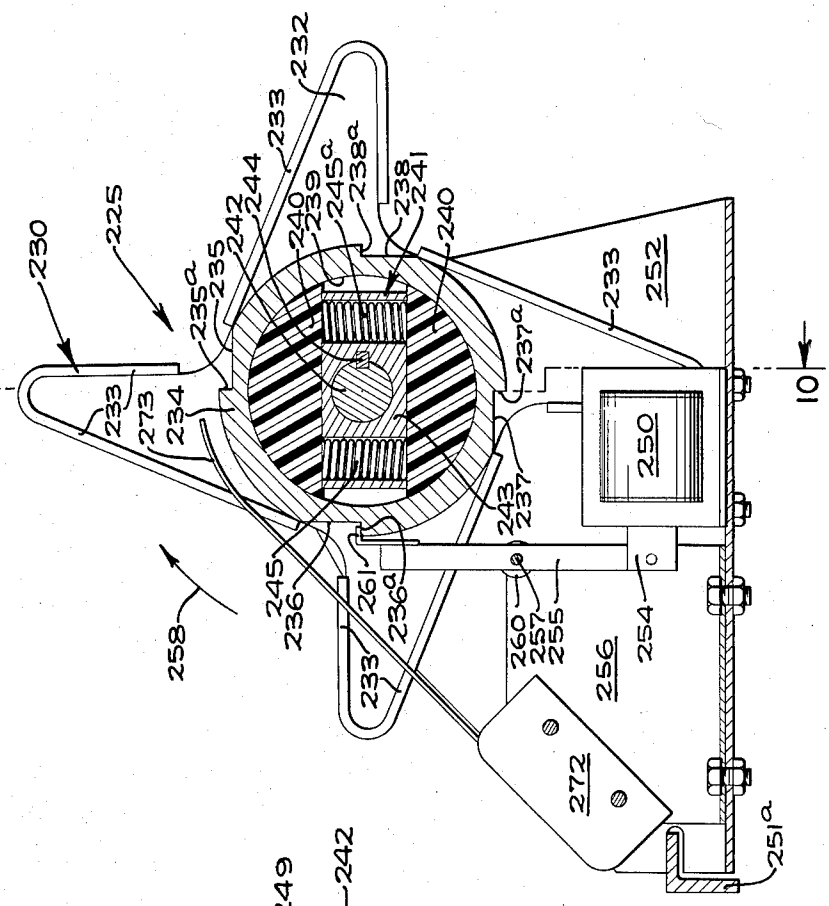
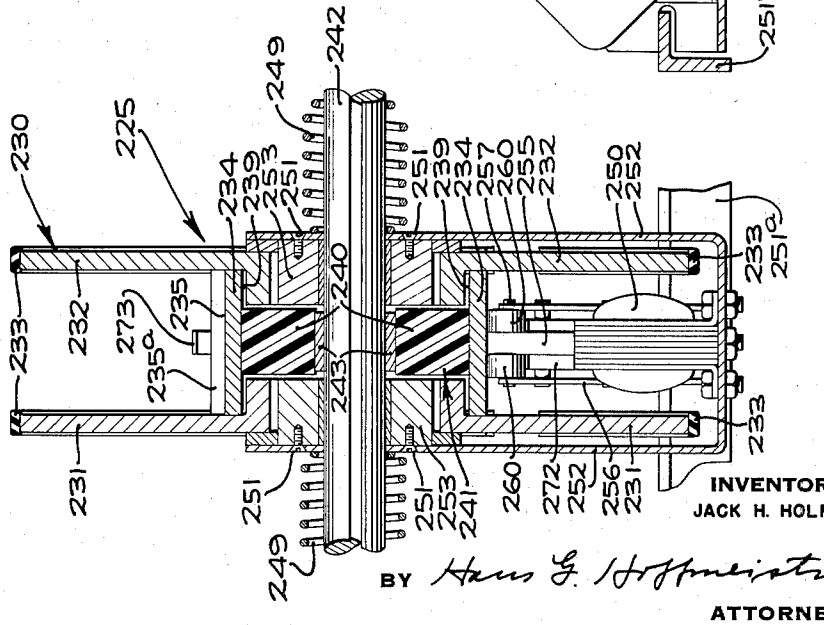


FIG. 10



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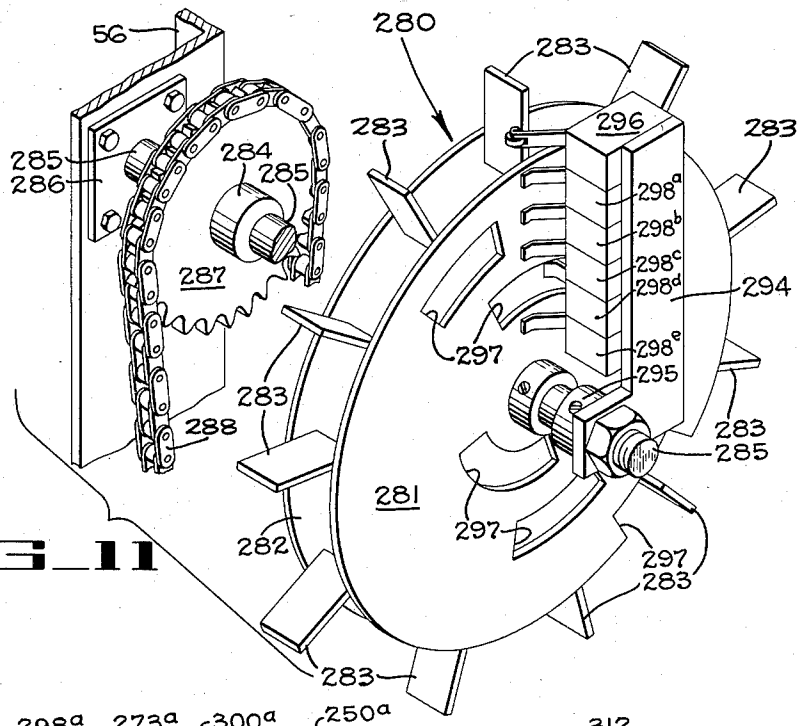


FIG_11

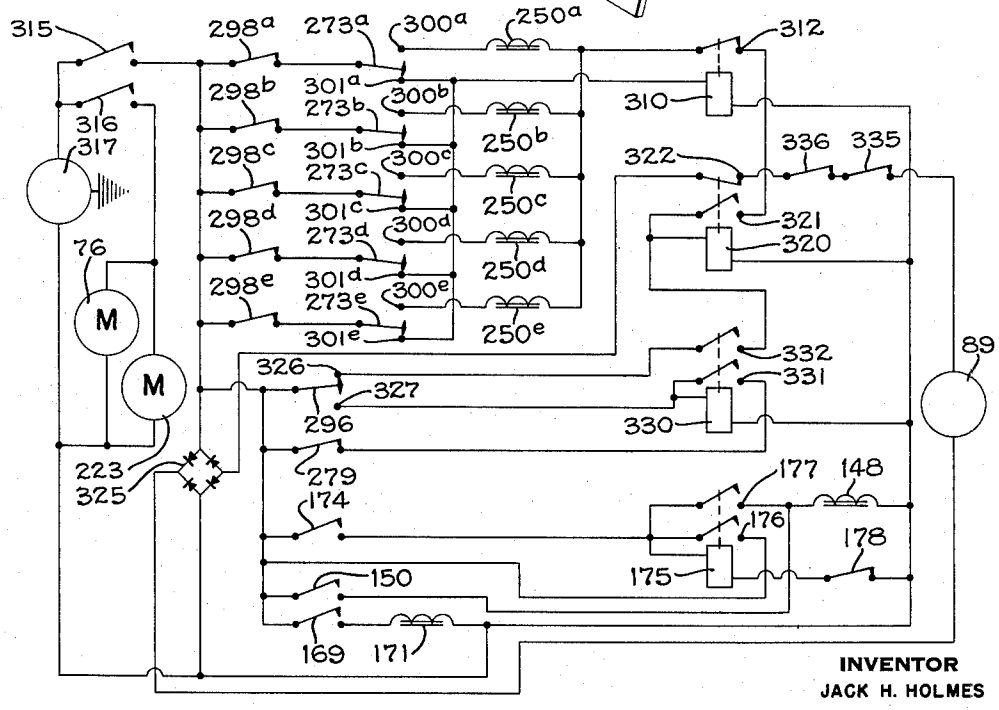


FIG_12

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METHOD OF AND APPARATUS FOR PACKING ARTICLES ON TRAYS

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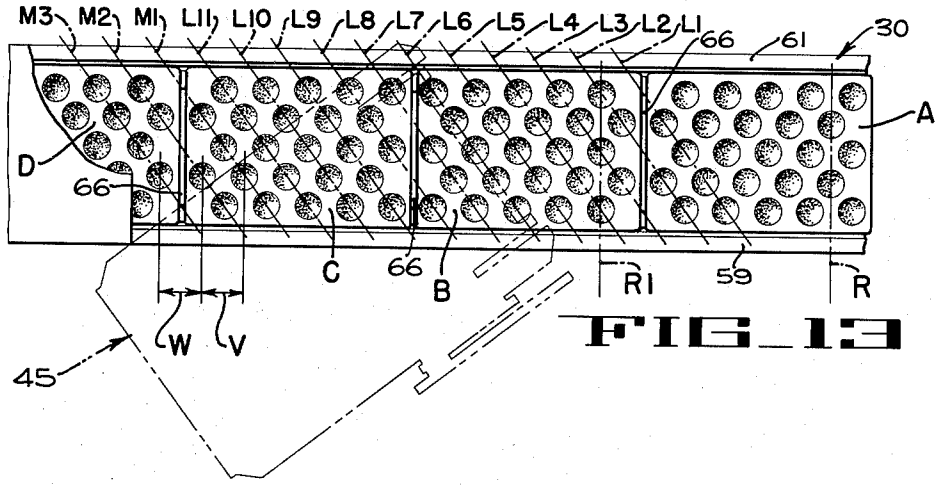


FIG_13

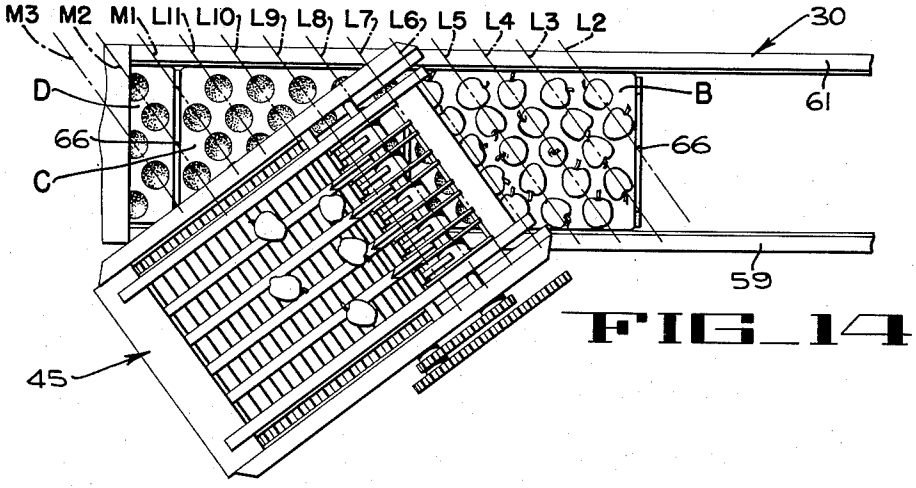


FIG_14

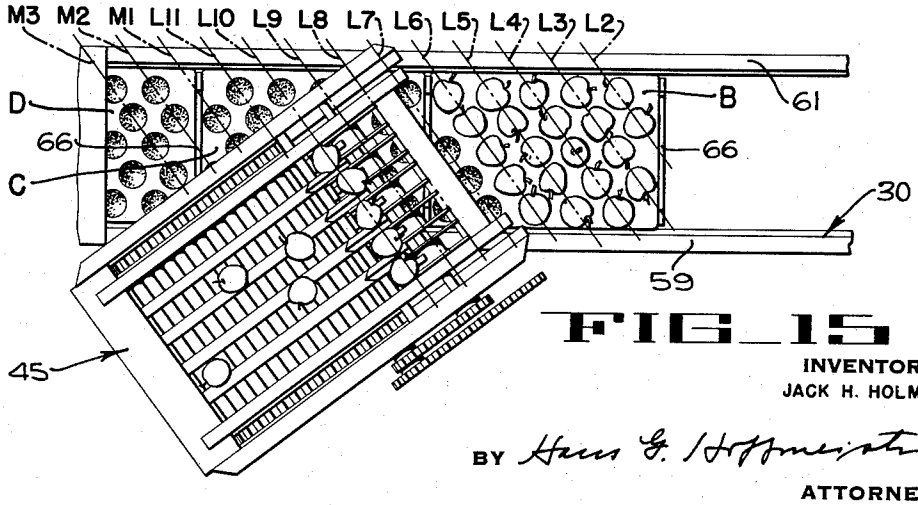


FIG_15

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United States Patent Office 2,968,899 Patented Jan. 24, 1961

2,968,899

METHOD OF AND APPARATUS FOR PACKING ARTICLES ON TRAYS

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Filed Mar. 17, 1959, Ser. No. 799,985

29 Claims. (Cl. 53—35)

The present invention appertains to a method of delivering articles to containers, and more particularly to a method of and apparatus for packing articles in trays having rows of article-receiving pockets.

Moulded pulp fiber trays are commonly employed to pack articles, such as fruit or eggs, and they are constructed with spaced pockets for nesting the articles individually. The pockets are arranged in transverse rows with the pockets of each row staggered relative to the pockets of adjacent rows to enable a particular size tray to accommodate the greatest number of articles of a certain size. When an overhead feed mechanism is used to deposit a transverse row of articles into each successive transverse row of pockets as the row of pockets is positioned thereunder, the feed mechanism must be shifted back and forth transversely of the tray to adapt the feed mechanism to the staggered relation of the pockets in successive rows. Such repeated movement of the feed mechanism is undesirable, since it slows down the speed of operation of the machine, causes wear of moving parts and inaccurate positioning of articles in the pockets.

Accordingly, an object of the present invention is to provide a method of packing articles on trays having transverse rows of pockets with the pockets of each row staggered relative to the pockets of adjacent rows wherein complete rows of pockets are filled with articles during successive feeding cycles without the above-mentioned objectionable intermittent shifting of the position of the feeding mechanism.

Another object is to provide a method of packing articles on trays having transverse rows of pockets in which pockets of adjacent trays are filled during a single feeding cycle.

Another object is to provide an improved apparatus for packing articles in trays.

Another object of the present invention is to provide an apparatus for packing articles on trays wherein the feed mechanisms thereof are operated during a feeding cycle in accordance with the number and location of pockets in register therewith.

Another object is to provide an apparatus for packing articles on trays in which the simultaneous operation of the feed mechanisms is controlled by the presence or absence of an article in each of the feeding mechanisms.

Another object is to provide an apparatus for packing articles on a tray in which the advancement of the tray is controlled by the depositing of articles on the tray.

Another object is to provide an apparatus for packing articles on trays in which the trays are advanced during each feeding cycle a distance commensurate with the distance between rows.

Other objects and advantages will become apparent from the following description and drawings in which:

Fig. 1 is a side elevation of the article packing apparatus of the present invention.

Fig. 2 is a fragmentary horizontal section taken along line 2—2 of Fig. 1.

Fig. 3 is a plan view of the article packing apparatus, particularly illustrating an adjustable mounting arrangement for an article conveyor and feeder.

Fig. 4 is a perspective of a tray of the type used in the article feeding apparatus of the present invention.

Fig. 5 is a vertical section taken along line 5—5 of Fig. 3, with the article conveyor and feeder removed to show a tray conveyor for said article packing apparatus.

Fig. 5A is a vertical section taken along line 5A—5A of Fig. 5.

Fig. 6 is a vertical section taken along line 6—6 of of Fig. 5.

Fig. 7 is a vertical section taken along line 7—7 of Fig. 3 to further illustrate the article conveyor and feeder of Fig. 3.

Fig. 8 is a plan view of the article conveyor and feeder.

Fig. 9 is a vertical section taken along line 9—9 of Fig. 8 to show a portion of the article feed mechanism of the present invention.

Fig. 10 is a section taken along line 10—10 of Fig. 9 to further show the construction of the article feed mechanism.

Fig. 11 is an exploded perspective of a selector unit for the article packing apparatus.

Fig. 12 is a schematic diagram of the electrical circuits employed in the article packing apparatus.

Fig. 13 is a plan of three aligned trays disposed adjacent the feed mechanism and particularly showing the relationship of the pockets of successive trays.

Figs. 14 and 15 are diagrammatic illustrations showing the article feeding sequence during successive feeding cycles.

In the article feeding mechanism of the present invention an article holder, such as a moulded pulp fiber tray A (Fig. 4) is advanced in the direction, indicated by arrow X, which is parallel to the longitudinal centerline CL of the tray. Each tray includes spaced recesses or pockets suitable for nesting articles, such as apples. The pockets are arranged in transverse rows and the pockets of each row are staggered relative to the pockets of adjacent rows. Articles, such as apples, are arranged to be deposited into successive diagonal rows of pockets, indicated by lines D1, D2 and D3 during successive feeding cycles. The method of the present invention wherein articles are fed into rows of pockets angularly disposed relative to the direction of travel of a tray is equally applicable when the tray has a square or an elongated rectangular configuration.

The article feeding apparatus 20 (Figs. 1 and 5) employed in carrying out the method of the present invention comprises a frame support structure 30. Mounted on the frame support structure 30 is an endless chain tray conveyor 40 having a lower run 41 (Fig. 5) on which trays are intermittently moved in the direction of arrow X (Fig. 5). Also mounted on the frame support structure 30 is an article conveyor and feeder 45 which has a discharge end 45a (Fig. 3) disposed above the lower run of the tray conveyor 40 and at an angle relative to the path of movement of the advancing tray. When a diagonal row of pockets is positioned below the discharge end of the feeder 45, the feeder is actuated to discharge a row of apples into the diagonal row of pockets. When the tray is completely filled it is removed from the machine by a vertically movable discharge conveyor 50 (Fig. 5).

The frame support structure 30 (Figs. 1, 3, 5 and 6) includes a rectangular base formed by longitudinal angle

iron members 51, 52 and transverse support members 53, 54. Four upright corner posts 55, 56, 57 and 58 (Figs. 1 and 3) are fixedly secured to the rectangular base. Parallel horizontal channel members 59 and 60 (Fig. 1) are secured between the upright members 55 and 56 and similar parallel horizontal channel members 61 and 62 (Fig. 5) are secured between the upright members 57 and 58. The vertical distance between the channel members 59 and 60 (Fig. 1) is sufficient to accommodate the article conveyor and feeder 45. A suitable housing 63 (Fig. 5) is mounted on one end of the frame for electrical components.

As best shown in Figs. 3, 5 and 6, the tray conveyor 40 comprises two endless chains 64 and 65, which are spaced apart a distance slightly greater than the transverse width of the trays to be filled. The parallel upper runs of the chains 64 and 65 are movable within the channel members 60 and 62, respectively, while the lower parallel runs of chains 64 and 65 are movable within the channel members 59 and 61, respectively. A plurality of pusher bars 66 are carried in spaced relation on the chains, each bar having each of its end portions secured, as by welding, to a mounting tab 66*a* (Fig. 6) provided on certain links of the chains. The chain 65 (Fig. 5) is trained around guide sprockets 67, 68 and 69, which are rotatably mounted on stub shafts 70, 71 and 72, respectively, and around a drive sprocket 73 keyed to a drive shaft 74 that is journalled in bearing plates (not shown) secured to the upright corner posts 56 and 58. Similarly, the chain 64 (Fig. 3) is trained around rotatable guide sprockets 67*a*, 68*a*, 69*a* and around a drive sprocket 73*a* keyed to shaft 74.

To drive the endless conveyor chains 64 and 65, a motor 76 (Fig. 1) is mounted on a support plate 77 carried by a transverse member 78 of the frame. Connected to the drive shaft of the motor 76 through a gear reduction box is a drive sprocket 79. An endless chain 81 is trained around the drive sprocket 79, and around a sprocket 82 (Fig. 3). The driven sprocket 82 is keyed to a stub shaft 83, which is journalled for rotation in mounting brackets carried by a transverse frame member. Also keyed to the shaft 83 is a sprocket 84, which drives a horizontally disposed endless chain 85. Driven by the endless chain 85 is a sprocket 86 (Fig. 2) which is connected in driving engagement with a shaft 88 through an electrically controlled clutch 89. A sprocket 90 is keyed on shaft 88 and is arranged to drive a vertically disposed endless chain 91 (Fig. 1) which is trained around a sprocket 92 keyed to the drive shaft 74 (Fig. 3) on which the drive sprockets 73 and 73*a* are keyed.

The trays are fed into a tray receiving chamber 98 (Fig. 5), which is disposed adjacent vertical runs of the conveyor chains 64 and 65. The chamber 98 is formed by a tray guide plate 99 (Figs. 3 and 5) and the transverse bottom member 100*a* of a vertical channel plate 100. The tray guide plate 99 and the channel plate 100 are secured between the upright corner posts 55 and 57. An upturned lip portion 101 is provided at the upper end of the guide plate 99 to facilitate the placing of each tray in the chamber 98. The lower portion of the guide plate 99 and the lower portion of the channel plate 100 are curved to guide the tray from a vertical to a horizontal position.

Trays are placed successively in the tray receiving chamber 98 (Fig. 5) with the tray in a substantially vertical position and with its lower end supported on one of the pusher bars 66. Subsequently, a pusher bar 66 engages the upper or rear end of the tray to move the tray downwardly and advance the tray in the direction shown by the arrow X (Fig. 5). The pusher bars 66 are so spaced that the adjacent ends of successive trays are close to each other.

It will be noted that, when the trays are placed into the tray receiving chamber 98, successive trays are positioned in reversed order or in an alternate pattern with respect to their pocket sequence as indicated in Fig. 13. The distance W in Fig. 13, which includes the thickness of a pusher 66, is substantially equal to the distance V between two rows of pockets. Accordingly, a diagonal row M2 of pockets is formed by the ends of adjacent trays. However, this row is not a full, five pocket row since the middle pocket is missing. Similarly, incomplete rows M1 and M3 are formed at the ends of trays C and D. As will be explained presently, means is provided in the present invention to prevent the feeding of an apple when a particular pocket of a row is missing.

As the trays leave the chamber 98, they are transferred to a stationary support plate 102 (Figs. 5 and 6), which is disposed below and is secured to the parallel channel members 59 and 61. The tray support plate 102 extends forwardly from the lower end of the guide plate 99 for a distance equal to approximately two-thirds of the length of the machine. The trays are intermittently advanced along the support plate 102 to bring one diagonal row of pockets at a time under the discharge end of the feeder 45 to receive a line of apples therefrom. When a leading edge of a tray, that has received apples from the feeder, advances beyond the discharge end of the feeder, the pusher bar 66 associated with the tray next ahead engages an upwardly extending finger 103 (Fig. 5). The finger 103 is pivotally mounted on a movable stripper plate 104 through a bracket and pin arrangement 105, so that, as the pusher bar 66 intermittently advances the finger 103, the movable stripper plate moves along under the tray next behind. The movable stripper plate 104 is disposed a suitable distance below the stationary plate 102 and includes a pair of side flanges 106 and 107 (Fig. 6) that are received in grooves 108 and 109, respectively, of guide rails 111 and 112, respectively. Each of the guide rails 111 and 112 is secured in fixed relation to the channel members 59 or 61 by suitable straps 113 (Fig. 1). A tension spring 114 (Fig. 5) is secured at one end to the movable support plate 104 and, at the other end, is fixed to the upright corner post 57 (Fig. 5).

Each tray is supported by the stationary plate 102 during the filling thereof and the filling of the tray takes place while the tray is in a relatively stable horizontal position. As the advancement of the tray is continued, the tray reaches a position wherein it is overhanging the edge of the plate 102 by an amount such that the forward end of the filled tray will move down onto the stripper plate 104 that is being advanced therebelow. As the trailing edge of the tray leaves the stationary plate 102, the tray is supported in its further advancement by the movable plate 104 and a clean transfer is effected from the stationary plate 102 to the movable plate 104 by the weight of the tray as it drops away from the pusher bar 66 associated with the trailing edge thereof.

When the stripper plate 104 reaches a position wherein the filled tray thereon is disposed directly above the discharge conveyor 50, a pin 103*a* (Fig. 6) engages a downwardly slanted camming edge 115*a* (Fig. 5) of a plate 115 that is secured to the horizontal channel member 61. As the pin 103*a* rides down the camming edge 115*a*, the upper edge of the finger 103 is moved to a position below the pusher plate 66, permitting the spring 114 to move the stripper plate 104 with the finger 103 mounted thereon to its original rearward position wherein the rear edge of plate 104 abuts a stop plate 117 that projects downwardly from the fixed support plate 102. Since the stripper plate moves rearwardly very rapidly, the filled tray drops directly downwardly onto a carriage 120 of the vertically movable discharge conveyor 50.

The carriage 120 (Fig. 5) includes a platform conveyor which comprises an endless belt 121 trained around two spaced rollers 122 and 123 that are keyed to transverse shafts 124 and 125, respectively. The shafts are journalled for rotation in side plates 126 and 127 (Fig. 6) which are rigidly secured together to form a rigid struc-

ture by an angle bar 128 and two shallow channels 129 and 130.

To guide the carriage of the discharge conveyor 50 during its vertical movement two vertical posts 131 and 131*a* (Fig. 3) are mounted in spaced relation at the right hand end of the main frame. As seen in Fig. 5 the vertical post 131 is secured between the base channel 54 and a transverse frame member 134, and is arranged to receive four guide rollers 133 which are mounted on the outer face of side plate 127 and are arranged in vertically spaced pairs. The vertical post 131*a* is similarly mounted and is arranged to guide similar rollers (not shown) that are rotatably mounted on the outer face of side plate 126.

The carriage is lowered step by step by means of a mechanism which includes a vertical post 135 that is disposed midway between the opposite sides of the machine and has an upper end adjacent the angle bar 128 of the carriage. The post 135 is journalled for rotary movement within vertically spaced, transverse members 136 and 137 of the rigid frame of the machine. The channel member 136 is secured to the longitudinal angle members 51 and 52, and the support member 137 is fixed to upright members 138 and 139 (Fig. 6) which are supported by the channel member 136. Vertically spaced collars 141, 142, 143, 144 and 145 are secured to the post 135, each collar being arranged to be moved, by oscillation of the post 135, between a position in which a projection 140 of the collar is disposed in supporting relation under an abutment plate 146 secured to the transverse angle bar 128 of the carriage 120 and a position out of supporting contact with the bar.

Prior to receiving any packed tray, the carriage 120 is in its uppermost position and the abutment plate 146 is seated on the uppermost collar 141. As the first packed tray is dropped on the carriage 120, the post 135 is rotated a sufficient angular distance to permit the collar 141 to slide from under the abutment plate 146. This is accomplished through an actuator 147 (Fig. 5) that is rigid with the lower side of the stripper plate 104. Disposed in the path of rearward movement of the actuator 147 is a switch 150 (Figs. 5 and 12) which has a lever that closes contacts in the switch only when contacted by the actuator as the stripper plate 104 approaches the rearward position of Fig. 5. The switch 150 controls the operation of a solenoid 148 (Fig. 6). A plunger 149 of the solenoid 148 is pivotally connected to a rod 151, which in turn is pivotally connected to a collar 152 fixed to the lower end of post 135. When the solenoid 148 is energized a rotary movement is imparted to the post 135. The solenoid 148 is energized for only a relatively short time. Accordingly, a restoring spring 153 is secured between the collar 152 and the upright frame member 138 and is arranged to return the post 135 to its initial position, after the solenoid 148 is deenergized. The quick action of the spring returns the next lower collar 142 to position under the abutment plate 146 so that the carriage is lowered only one step. As each succeeding packed tray is received by the carriage 120, the post 135 is rotated in the manner above described, thereby causing the collar supporting the abutment plate 146 to slide away from the abutment plate 146 and enabling the abutment plate 146 to successively seat on the next lower collar until the abutment plate 146 seats on the lowest collar 145. At this time, a predetermined number of packed trays are stacked on the carriage 120.

In order to absorb the shock caused by the successive dropping of the carriage 120 to the next lower collar, a cable 154 (Fig. 1) is secured at one end to the side plate 126 and, at the other end to the dampening element of a dash pot 157 which carries a suitable viscous liquid, such as oil. Intermediate its ends, the cable 154 is trained around guide rollers 155 and 156, which are rotatably carried by the channel member 60.

When the abutment plate 146 leaves the lowermost collar 145, the carriage is in its lowermost position and a gear 158 (Fig. 6), which is secured to the shaft 124 of the carriage 120, moves into mesh with a gear 159 that is fixed to the continuously rotating shaft 83. As a consequence thereof, the roller 122 is rotated in a clockwise direction (as viewed in Fig. 5) to cause the conveyor belt 121 to advance the stacked trays out of the machine through the open end of the frame and onto a receiving platform 160. A compression spring 161, which is disposed between the transverse plate 130 of the carriage and a transverse plate 163 of the frame, is arranged to elevate the carriage 120 for seating the abutment plate 146 once again on the uppermost collar 141, after the packed trays are moved off the carriage.

A locking arrangement 164 (Figs. 1 and 6) is provided to hold the carriage 120 in its lower, tray discharge position against the action of spring 161 until the stacked trays have been removed from the carriage. The locking arrangement 164 includes a carriage holding member 165 having an inwardly and downwardly directed edge 165*a*. The holding member 165 is pivotally supported by the upright member 138 through a bracket 166 and the inclined surface 165*a* of the member 165 is disposed in the path of downward movement of the angle bar 128 of the carriage. As the carriage 120 is lowered, the bar 128 engages the surface 165*a* of the holding member 165 and, when the carriage 120 reaches the tray discharge position, the bar 128 is disposed below the lower free end of the holding member 165. A spring 167 is mounted on a bracket 168, that is carried by the upright member 138, and is connected to the holding arm 165 to constantly urge the holding arm 165 in a counterclockwise direction (Fig. 1) to move the lower end of the holding arm to a position above the bar 128 and thereby prevent upward movement of the carriage during the tray discharging operation. As the trays are moved out of the machine, a switch 169 (only shown in Fig. 12) is closed temporarily to energize a solenoid 171 (Fig. 1). The solenoid 171 is mounted on a plate 172, which is secured to the upright frame member 138, and includes a plunger 173, which is pivotally connected to the holding member 165. When the solenoid 171 is energized, the plunger 173 swings the holding member 165 clockwise to remove the same from the locking position.

As previously described, each time a packed tray is received by the carriage 120, the post 135 is rotated a sufficient angular distance to permit the carriage to drop and is then quickly returned to a position in the path of movement of the carriage by restore spring 153. To return the platform conveyor 120 to its uppermost position under the action of the compression spring 161, the collars 141, 142, 143, 144 and 145 on the post must be moved from the path of travel of the platform conveyor 120. For this purpose, a switch 174 (Fig. 6) is mounted on the transverse frame member 136 by a bracket 170 and is actuated after the abutment plate 146 leaves the lowermost collar 145. The actuation of switch 174 completes an operating circuit for a holding relay 175 (Fig. 12). When the relay 175 is energized, a holding circuit for the solenoid 148 is completed, thereby maintaining the solenoid 148 energized. As previously described, the energization of solenoid 148 causes the post 135 to rotate, thereby clearing the collars 141 to 145, inclusive, from the path of the platform conveyor 120 and permitting the platform conveyor 120 to be elevated under the action of the compression spring 161. When the platform conveyor 120 reaches its uppermost position, a normally closed switch 178 (Fig. 5) is actuated to deenergize the relay 175. The deenergization of the relay 175 opens the contacts of the relay 175 to deenergize the solenoid 148, thus enabling the restoring spring 153 to return the post 135 to its initial position for supporting the platform conveyor 120.

The article conveyor and feeder unit 45 has a support structure consisting of two spaced vertical side plates 180 and 181 (Figs. 1 and 8) connected together in fixed

relation by a bottom plate 182 and two spaced inverted channel members 183 and 184 which have depending arms 185 and 186 secured to the vertical side plates 180 and 181, respectively.

The article conveyor and feeder 45 is adjustably mounted on the frame support structure 30 and, according to the present invention, is arranged so that a vertical plane passing through the longitudinal center of the feeder intersects the tray conveyor at an angle relative to the longitudinal centerline of the tray conveyor. The angular setting is determined by the angle between the diagonal rows of pockets of the tray on the conveyor and the longitudinal centerline of the tray (Fig. 4). To mount the unit 45 in the selected position spaced, U-shaped mounting plates 187 and 188 (Figs. 1, 3 and 7) are secured to the undersurface of the channel mounting members 60 and 62 of the frame of the machine. The inverted channel 184 of the feeder 45 is secured to the plate 188 by a bolt 189, and the inverted channel 183 is adjustably secured to the plate 187 by a bolt 190 which extends through an arcuate slot 191 (Fig. 3) in the plate 187. With this arrangement, the feeder unit 45 may be pivoted on bolt 189 to vary its angular position relative to the path of movement of the trays.

Journalled within the side walls 180 and 181 of the unit 45 are shafts 193 and 194 (Figs. 7 and 8). The shaft 193 has a pair of spaced sprockets 195 and 196 (Fig. 8) keyed thereto, while a pair of spaced sprockets 197 and 198 are keyed to shaft 194. Trained around the sprockets 195 and 197 is an endless conveyor chain 199, and trained around the sprockets 196 and 198 is an endless conveyor chain 201. Carried by the conveyor chains 199 and 201 are a plurality of parallel rods 202 (Figs. 7 and 8), each of which has a plurality of short rollers 203 mounted for free rotation thereon.

A downwardly sloping article receiving ramp 204 (Fig. 7) is mounted on an inclined support plate 205, which is secured between the side walls 180 and 181. The ramp 204 is disposed between said walls at a higher elevation than the upper runs of the conveying surface of the rollers 203. Parallel side walls 206 and 207 (Figs. 3 and 8) have free ends 206*a* and 207*a*, respectively, that rest on the support plate 205, said walls being disposed inwardly of the upper runs of the chains 199 and 201, respectively, to prevent the articles from being bruised by the chains 199 and 201. At the opposite ends, the walls 206 and 207 are adjustably supported for movement relative to one another by a threaded shaft 208 (Figs. 1, 3 and 7) that is journalled for rotation by brackets 209. The brackets 209 are respectively fixed to the side walls 180 and 181. The walls 206 and 207 have internally threaded collars 206*b* and 207*b*, respectively, that receive right and left hand threaded portions of the shaft 208. Longitudinal baffles 210 to 213 (Fig. 8), inclusive, are secured to support plate 205 and extend in parallel spaced relation with the side walls 206 and 207 to form therewith article advancing lanes 214 to 218, inclusive. The baffles 210—213 include thin portions 210*a*—213*a*, respectively, that permit articles to change lanes until the articles reach positive raised portions 210*b*—213*b* of the baffles 210—213, respectively.

To drive the chains 199 and 201 for advancing the articles in lanes 214 to 218, inclusive, a driven sprocket 219 (Fig. 1) is keyed to the shaft 194 and has an endless chain 221 trained therearound. The chain 221 is also trained around a drive sprocket 222 which is connected to a drive shaft of a motor 223 through a gear reduction box.

Articles, such as apples, are deposited on the ramp 204 in a random, unarranged manner and tumble downwardly into the lanes 214 to 218, inclusive. The apples are advanced by the rollers 203 in the direction shown by an arrow 224 (Fig. 8) toward the discharge end of the article conveyor and feeder 45.

At the discharge end of the lanes 214 to 218, inclusive, are disposed article feed mechanisms 225 to 229, respectively (Fig. 8), which deposit the apples into a diagonal row of tray pockets during each feeding cycle. Each article feed mechanism comprises a star wheel 230 (Fig. 7) having two spaced star-shaped end members 231 and 232 (Fig. 10) which have generally radially projecting arms defining four apple receiving pockets (Fig. 9). The outer surfaces of the star wheel arms 231 and 232 are lined with suitable resilient pads 233 so as to prevent bruising of the apples. Each of the star wheel end members 231 and 232 is secured to a tubular hub 234, which has formed on the peripheral surface thereof four equally spaced notches 235, 236, 237 and 238 providing shoulders 235*a*, 236*a*, 237*a* and 238*a*. The hub 234 has a bore 239 adapted to receive two fragmentary cylindrical elements 240 of a clutch 241, said elements being disposed in frictional engagement with the inner wall of the bore 239. A drive member 243, which has flat faces in abutment with flat faces of the elements 240, is keyed to a continuously rotating shaft 242 through a key 244 (Fig. 9). Springs 245 and 245*a* are disposed in guide apertures of the drive member 243 and engage the clutch elements 240 to urge the faces of the clutch elements into frictional engagement with the inner wall of the bore. The shaft 242 (Fig. 8) is journalled for rotation in the side plates 180 and 181 of the feeder unit and has a sprocket 246 keyed to one end. An endless chain 247 is trained around the sprocket 246 and around a drive sprocket 248, which is secured to the conveyor drive shaft 194. Spacers in the form of springs 249 are disposed between adjacent star wheels. If desired a spring, having half the length of a spring 249, may be positioned between each of the feed mechanisms 225 and 229 and the adjacent wall 206 or 207. With this arrangement, when the shaft 208 is rotated to adjust the position of walls 206 and 207 for accommodating different size trays, the springs 249 will automatically adjust the positions of the feed mechanisms.

Associated with each article feed mechanism 225, 226, 227, 228 and 229 is a feed mechanism release solenoid 250 (Figs. 9 and 10), which is mounted on a U-shaped support plate 252. As seen in Fig. 10, each of the arms of the plate 252 is secured by screws 251 to a short tubular member 253 that journals the shaft 242 for rotation. The plate 252 is prevented from rotating by an angle member 251*a* (Fig. 9). A plunger 254 (Fig. 9) of the solenoid 250 is pivotally connected to a release arm 255, which is pivotally supported on a pin 257 which is secured between the upwardly projecting arms of a U-shaped plate 256 that is bolted to the base of the U-shaped plate 252. Spacers 260 are disposed around pin 257 between each arm of the U-shaped plate 256 and the release arm 255. Carried by the release arm 255 is a flange 261 that is adapted to seat on each of the shoulders 235*a*, 236*a*, 237*a* and 238*a* of the hub 234 to prevent rotation of its associated article feed mechanism.

The shaft 242 rotates continuously in the direction shown by the arrow 258 (Fig. 7). When the solenoid 250 is energized, the plunger 254 is drawn into the solenoid housing and pivots the release arm 255 counterclockwise (Fig. 9) to cause the flange 261 to release the feed mechanism, thereby enabling the continuously operated shaft 242 to advance the associated feed mechanism through engagement of the clutch 241. The solenoid 250 is energized for a short time duration and when it is deenergized, a spring mechanism (not shown) in the solenoid housing moves the plunger 254 out of the housing, returning the arm 255 to its stop position so that flange 261 engages the succeeding shoulder on the star wheel hub. During this interval of time, the released star wheel advances a quarter revolution and an apple is deposited into tray pockets. To guide each apple in its drop from the pocket of the associated star wheel to the tray pocket, a resilient inclined guide member 269 (Fig. 7) is mounted between the side plates 180 and 181

forward of the star wheels. A flexible depending drape 271 is mounted between the side plates 180 and 181 forward of the guide member 269 and cooperates therewith to define a guide chute.

Associated with each star wheel is an apple sensing switch 272 (Figs. 7 and 9), which is mounted between the arms of the associated U-shaped plate 256 rearwardly of the associated star wheel. A flexible sensing finger 273 projects from the switch 272 into the pocket area formed by the spaced star wheel arms 231 and 232. The sensing finger 273 is engaged by an apple advancing into a pocket to actuate the associated switch 272 to indicate the presence of an apple in the pocket. Mounted between the side plates 180 and 181 forward of the star wheels is an inclined resilient drape 274 (Fig. 7) that is pivotally carried by a rod 275. The drape 274 is disposed in the path of the apples deposited by the star wheels and when engaged by dropping apples, the drape rotates rod 275 and actuates a cycle control switch 279 (Figs. 1 and 3) which is mounted on the depending arm 185 of inverted channel member 184.

As shown in Figs. 13, 14 and 15, apples are deposited into a diagonal row of tray pockets during each feeding cycle. As previously mentioned, diagonal lines of the pockets formed by the adjacent ends of two successive trays may have only four pockets rather than five pockets. According to the present invention, a selector unit 280 (Figs. 1 and 11) is provided to selectively control the operation of each of the star wheel solenoids 250*a*—250*e* in accordance with the presence or absence of a pocket to receive an apple from the associated star wheels 230. In addition, the selector unit 280 controls the advancement of the tray conveyor 40 in accordance with the distance required to bring successive diagonal tray rows into position below the star wheels.

The selector unit 280 includes a wheel comprising spaced discs 281 and 282 (Fig. 11) rigidly connected together by eleven radially directed cam plates 283. A hub 284, which is welded to disc 282, is freely rotatable on a stub shaft 285 that is supported from the cornerpost 56 of the frame by a plate 286. A sprocket 287 is formed on the hub 284 to receive an endless chain 288 which is trained around a sprocket 289 (Fig. 1). The sprocket 289 is secured to a stub shaft 290 that is journalled for rotation in the frame member 56. A second sprocket 291, which is also keyed to shaft 290, receives a chain 292 that is also trained around a sprocket 293 keyed to drive shaft 74. Thus, rotation of the shaft 74 to advance the conveyor chains 64 and 65 causes rotation of the wheel of the selector unit 280.

The radially projecting cam plates 283 divide the interior of the selector wheel into a plurality of row segments. Mounted on a stationary bracket 294, which is supported by the shaft 285 through a hub 295, is a row spacer or indexing switch 296 (Figs. 11 and 12). The row spacer switch 296 is disposed in the path of movement of the row cams 283 to be actuated thereby. The cams 283 are spaced from each other a distance such that the time it takes for the selector unit 280 to advance successive row cams 283 to switch actuating position is equal to the time it takes for the tray conveyor 40 to advance a tray the linear distance necessary to position succeeding diagonal rows under the discharge portion of the feed mechanism.

As previously mentioned, in order that each tray will nest in the filled tray immediately below it on the discharge conveyor carriage 120, it is necessary that each tray be fed into the machine in a reversed position relative to the tray preceding it. It is apparent that other tray patterns may be employed, in which case it may not be necessary or desirable to feed each tray into the machine in a reversed position relative to the preceding tray. As shown in Fig. 13, if the second transverse row R of tray A has 2 pockets, the second transverse row R1 of tray B will have 3 pockets. Then, when tray B is deposited on tray A, the two apples in row R will nest in the spaces between the undersurface of the pockets of row R1 thereabove. Such a reversed arrangement of the trays causes certain diagonal lines to have less than five pockets but results in an arrangement wherein the pattern of full and partially full lines repeats itself after eleven diagonal lines of pockets have received apples from the feed mechanism. For example, in Fig. 13, diagonal lines L1, L2 and L3 will have four pockets, lines L4, L5 and L6 will have five pockets, lines L7 and L8 will have four pockets, and lines L9, L10 and L11 will have five pockets. The pattern will then repeat itself with line M1 having four pockets.

In referring to the following control circuit description, it should be kept in mind that the tray conveyor is stopped and the star wheels are actuated to discharge apples when a cam plate 283 actuates switch 296. As soon as the diagonal row of pockets has been filled, the tray conveyor and the selector wheel are again rotated. When the next diagonal row reaches a position under the discharge end of the feed mechanism, the next cam plate 283 actuates the switch 296 to stop the tray conveyor and rotate the star wheels to deposit apples in the tray.

As shown in Figs. 1 and 11, the disc 281 of the selector unit 280 is coded by apertures 297. Each aperture 297 represents the absence of a tray pocket below one of the star wheels during a particular feeding cycle, and the apertures 297 are arranged to indicate that an end pocket is missing in line L1 (Fig. 13), a center pocket is missing in line L2, an end pocket is missing in line L3, and so on throughout the feeding cycle of eleven diagonal lines. Mounted on the stationary bracket 294 adjacent the disc 281 and in vertical alignment are actuator arms of normally closed selector switches 298*a* to 298*e*, inclusive (Fig. 11). Each selector is connected in series with one of the star wheel actuating solenoids 250*a* to 250*e*, respectively (Fig. 12). When a star wheel is to remain idle during a particular feeding cycle, because of the absence of a tray pocket to receive an apple therefrom, the corresponding aperture 297 will be aligned horizontally with one of the selector switches, thereby permitting the selector switch to move to open position. As a result, the solenoid associated with the opened selector switch will remain deenergized and the associated star wheel will remain idle.

Referring to the circuit diagram illustrated in Fig. 12, the star wheel release solenoids 250*a* to 250*e*, inclusive, operatively control the star wheels 230 in the manner previously described. The apple sensing switches 273*a* to 273*e*, inclusive, which are mounted at the discharge end of lanes 214—218, respectively, and in the path of movement of the apples as they are received by the pockets of the star wheels 230 have their normally opened upper contacts 300*a* to 300*e*, inclusive, connected in series with the star wheel release solenoids 250*a*—250*e*, respectively. The normally closed lower contacts 301*a* to 301*e*, inclusive, of the apple sensing switches are connected in common to a normally energized feed unification relay 310. When the apple sensing switches 273*a* to 273*e* are actuated by apples being deposited individually in the star wheel pockets, the upper contacts 300*a* to 300*e*, inclusive, close for preparing operating circuits for the associated star wheel release solenoids 250*a* to 250*e*, respectively, and the lower contacts 301*a* to 301*e*, inclusive, open to deenergize the normally energized relay 310. After the apples are discharged from the star wheels 230, the apple sensing switches 273*a* to 273*e* are disengaged and return to their normal position.

The selector switches 298*a* to 298*e*, inclusive, are normally closed and are connected in series with the star wheel release solenoids 250*a*—250*e*, respectively, through the apple sensing switches 273*a*—273*e*, respectively, to prepare operating circuits for the star wheel release solenoids 250*a*—250*e*, respectively. When the actuator arm of a selector switch drops into an aperture of the coded plate 281 of the selector unit 280, in a manner previously

described, its associated star wheel release solenoid will remain deenergized during the feeding cycle.

It is to be observed from the foregoing, that the feed unification relay **310** will remain energized, holding relay contacts **312** open until all the apple sensing switches **273***a*—**273***e*, inclusive, are actuated by the advancement of apples into the pockets of the feeding mechanisms **225**—**229**, inclusive, during a feeding cycle. When all the apple sensing switches **273***a*—**273***e*, inclusive, are actuated, the feed unfication relay **310** is deenergized. Contacts **312** of the feed unification relay **310** are connected in common with the release solenoids **250***a* to **250***e*, inclusive, and when closed further prepare the operating circuits for the feed release solenoids associated with the selector switches having closed contacts. With this arrangement, all of the star wheel pockets that are in article-receiving position must be filled before a feeding movement of the star wheels can take place.

Initially, main switch **315** and motor control switch **316** are closed. Therefore, the tray conveyor motor **76** and the star wheel drive motor **223** are energized through a suitable source **317** of alternating current. As previously described, the rotation of the selector unit **280** is synchronized with the operation of the tray conveyor **40**, since both are driven through a common shaft **74**. The time it takes for the selector unit **280** to advance successive row cams **283** to switch actuating position is equal to the time it takes for the tray conveyor **40** to advance a tray the linear distance necessary to bring successive diagonal rows of the trays under the discharge end of the feed unit. The rotation of the shaft **74** is controlled through the previously mentioned electrically controlled clutch **89** and the engagement of the clutch **89** for rotating the shaft **74** is controlled by a relay **320**. Relay **320** is normally deenergized with contacts **322** thereof normally closed to complete a control circuit through a rectifier **325** to engage the clutch **89** for the rotation of shaft **74**. Contacts **321** of relay **320** are normally opened and, when these contacts **321** are closed, they complete the energizing circuits for the star wheel release solenoids **250***a* to **250***e*, inclusive. Thus, relay **320** optionally completes either the clutch control circuit or the operating circuits for the star wheel release solenoids **250***a* to **250***e*. Therefore, the star wheels **230** are selectively and simultaneously operated. It is to be observed that the tray conveyor **40** is not operated when the star wheels **230** are operated.

At the beginning of each feeding cycle, the row indexing cam **283** of the selector unit **280** is in engagement with the row spacer switch **296**. Consequently, the upper contacts **326** are closed and the lower contacts **327** are opened. Since the clutch **89** is in engagement for rotating the shaft **74**, the selector unit **280** begins to rotate, and the trays on tray conveyor **40** begin to advance. In so doing, the indexing cam **283** disengages the row spacer switch **296**. Therefore, contacts **326** open and contacts **327** close. The closing of contacts **327** completes an operating circuit for a row indexing relay **330**. Thereupon, contacts **331** of relay **330** close to complete a holding circuit for relay **330** through the cycling switch **279**, and contacts **332** of relay **330** close to prepare an energizing circuit for the relay **320**.

Since the clutch **89** is still engaged, the tray conveyor **40** continues to advance the trays thereon and the selector unit **280** continues to rotate. As a consequence thereof, the succeeding row cam **283** actuates the row spacer switch **296** causing the contacts **326** to close and the contacts **327** to open. The row indexing relay **330** remains energized through the aforementioned holding circuit, and the relay **320** is now energized through the contacts **326** of the row spacer switch **296** and contacts **332** of the row indexing relay **330**. When relay **320** is energized, contacts **322** open to break the clutch control circuit and disengage the clutch **89**, thereby stopping the rotation of shaft **74**. At this time, contacts **321** close to complete the energizing circuits for the star wheel solenoids **250***a* to **250***e*. The selective operation of the release solenoids enables the associated star wheels to be selectively operated for depositing apples into a diagonal row of tray pockets. As the apples are dropped into the tray pockets, the cycle control switch **279** is actuated temporarily to open the contacts thereof, thereby deenergizing relay **330** by breaking the holding circuit thereof. The deenergization of relay **330** causes contacts **332** to break for deenergizing relay **320**. Hence, contacts **322** of relay **320** close to complete the control circuit for engaging clutch **89** and the feeding cycle repeats itself.

During the time the carriage **120** of the discharge conveyor **50** is descending with one or more packed trays thereon from one collar onto the succeeding collar of the collars **142**—**145**, a switch **335** (Figs. 5 and 12), which is carried by the angle bar **128** of the carriage, is actuated to open the circuit controlling the energization of the clutch **89** to effect the disengagement of the clutch, thereby preventing the tray conveyor **40** and the selector unit **280** from operating during each period of time that the carriage **120** is descending in its step-by-step lowering movement.

For this purpose an arm **345** (Fig. 5A) is pivotally mounted on the angle bar **128** below the contacts of the switch **335**. The arm **345** is of sufficient length so that its free end extends to a point in vertical alignment with the projections **140** of the collars **141**—**145** adjacent the abutment plate **146** of the carriage **120**. A suitable opening in the arm **345** receives a guide pin **346**, which is carried by a bracket **347** that is supported by the angle bar **128**. Surrounding the pin **346** between the arm **345** and the bracket **347** is a compression spring **348**, which continuously urges the arm **345** to pivot downwardly in a clockwise direction as viewed in Fig. 5A.

When the abutment plate **146** of the carriage **120** is resting on the projection **140** of the collar **141**, the arm **345** is in engagement with the projection to close the contacts of the switch **335**, which are in the energizing circuit for the clutch **89**. When the projection is swung from beneath the plate **146** and while the carriage **120** is descending from the collar **141** to the collar **142**, the arm **345** is pivoted under the action of the spring **348** to an extended position limited by the head of the guide pin **346**. During the time the arm **345** is extended, the contacts of the switch **335** are opened to open the circuit controlling the energization of the clutch **89** to disengage the clutch. At the time the abutment plate **146** of the carriage **120** comes to rest on the collar **142**, the arm **345** engages the projection **140** of the collar **142** to once again close the contacts of the switch **335**. These operations are repeated in the step-by-step lowering of the carriage **120** onto the remaining collars **143**—**145**.

After the abutment plate **146** of the carriage **120** leaves the lowermost collar **145** and while the carriage **120** is in its discharge position for advancing stacked trays onto the receiving platform **120**, the arm **345** is pivoted down by the spring **348** and the contacts of the switch **335** are opened. Hence the circuit for energizing the clutch **89** is opened and the clutch **89** is disengaged to prevent the tray conveyor **40** and the selector unit **280** from operating during this period of time. The contacts of the switch **335** remain open and are not closed until the abutment plate **146** of the carriage **120** is once again seated on the uppermost collar **141**.

A switch **336** (Figs. 5 and 12) is carried by the transverse member **134** disposed between the upright members **56** and **58** and is connected in series with the clutch control circuit. The switch **336** is actuated by a transvere drape **339** pivotally carried by a plate **341** disposed between the upright members **56** and **58**. In the event a packed tray fails to drop properly and is pushed past its normal dropping position, it will engage the drape **339** and pivot it in a direction to cause the switch **336** to open, thereby opening the clutch control circuit to prevent further advancement of the tray conveyor **40**.

In the operation of the article packing apparatus 20 of the present invention, pulp fiber trays, such as trays B, C and D (Figs. 13, 14 and 15), are placed by an operator into the tray receiving chamber 98 (Fig. 3). The trays are placed successively in the chamber 98 with their longitudinal axes extending in the direction of travel of the tray conveyor 40, as shown by the arrow X (Fig. 5) and successive trays are positioned in reverse order or in alternate pattern with respect to their pocket sequence. Successive trays are adjacent one another and are separated by the pusher bars or flights 66. Thus, the tray conveyor 40 advances trays B, C and D (Figs. 13, 14 and 15) and the succeeding trays, which are carried by the tray conveyor 40 as far rearward as the tray receiving chamber 98.

When the article packing apparatus 20 is first put into operation, tray B (Figs. 13, 14 and 15) is disposed relative to the article feeding mechanisms 225 to 229, inclusive, so that the diagonal row of pockets L4 (Figs. 13, 14 and 15) is in position to receive apples. The first two diagonal rows L2 and L3 of tray B are filled with apples by hand. This is only necessary when the article packing apparatus 20 is first put into operation. After the article packing apparatus 20 is in operation, it will be observed that the feeding mechanisms 225 to 229, inclusive, deposit apples into diagonally aligned pockets of adjacent trays, thus eliminating the hand feeding operation. Tray B at this time is supported by the stationary tray support plate 102 and the pusher bar 66 adjacent its leading edge is now in position to engage the finger 103 (Fig. 5), which is pivotally connected to the movable tray stripper plate 104. The article conveyor and feeder 45 is adjustably positioned so that the feeding mechanisms 225 to 229, inclusive, are arranged to deposit apples into successive diagonal rows, such as L4, L5 and L6 during successive feeding cycles.

Main switch 315 (Figs. 12) and motor control switch 316 are closed. The conveyor motor 76 and the article conveyor and feeder motor 223 are now operating. Articles, such as apples, are deposited on the ramp 204 in an unarranged manner and slide downwardly into the lanes 214 to 218, inclusive. The apples are advanced by the rollers 203 toward the star wheels 230.

A typical article feeding sequence during successive feeding cycles can best be described by commencing with the time that apples have been deposited into the diagonal row L5, since the sequence of operation is substantially alike for all feeding cycles. At this time, the uppermost row indexing cam 283 of the selector unit 280 is in engagement with the row spacer switch 296 (Fig. 11). Therefore, contacts 326 of switch 296 are closed and contacts 327 of switch 296 are opened. Relay 320 is deenergized and contacts 322 are closed to complete a control circuit for engaging clutch 89 to drive the shaft 74. Thereupon, the trays on the tray conveyor 40 are advancing and the selector unit 280 is rotating. The uppermost indexing cam 283, therefore, disengages the row spacer switch 296 to open contacts 326 and to close contacts 327. The closing of contacts 327 completes an operating circuit for the row indexing relay 330. In so doing, contacts 331 of relay 330 close to complete a holding circuit for relay 330 through the cycling switch 279 and contacts 332 of relay 330 close to prepare an energizing circuit for the relay 320.

The tray conveyor 40 continues to advance the trays thereon and the selector unit 280 continues to rotate. Consequently, the succeeding row cam 283 actuates the row spacer switch 296 causing the contacts 326 to close and contacts 327 to open. The row indexing relay 330 remains energized through the aforementioned holding circuit. Relay 320 is now energized through the contacts 332 of relay 330 and contacts 326 of switch 296. When relay 320 is energized, contacts 322 break to open the control circuit for engaging clutch 89, thereby stopping the rotation of the selector unit 280 and arresting further movement of the tray conveyor 40. Therefore, the diagonal row of pockets L6 is in register with the star wheels 230 as shown in Fig. 13.

During this time, apples have advanced into the pockets of the star wheels 230. As a result thereof, apple sensing switches 273*a* to 273*e*, inclusive, have been actuated to cause the contacts 300*a* to 300*e*, inclusive, to close. Thereupon, the normally operated feed unification relay 310 is deenergized. Since five pockets are present in the diagonal row L6, the selector switches 298*a* to 298*e*, inclusive, are closed. The deenergization of relay 310 causes contacts 312 to close, thereby completing operating circuits for the release solenoids 250*a* to 250*e*, inclusive, through contacts 321 of the feed unification relay 320.

The energization of the star wheel release solenoids 250*a* to 250*e*, inclusive, causes the associated release arms 255 (Fig. 9) to release the associated star wheels, thereby enabling the continuously operated shaft 242 to rotate the feed mechanisms 225 to 229, inclusive. Thereupon, the star wheels 230 deposite the apples into all the pockets of the diagonal row L6, as shown in Fig. 14.

As the apples are dropped into the diagonal row L6 of tray pockets, the drape 274 (Figs. 1 and 7) is engaged to actuate the cycle control switch 279 (Fig. 12) for breaking the contacts thereof. The opening of the contacts of switch 279 breaks the holding circuit of the row index 330. The deenergization of relay 330 causes contacts 332 to open for deenergizing relay 320. When relay 320 deenergizes, contacts 321 open for deenergizing the release solenoids 250*a* to 250*e*, inclusive. As a result, the release arm 255 returns to a stop position and the star wheels 230 have advanced a quarter revolution. Relay 320 has also closed contacts 322 to complete the control circuit for the engagement of the clutch 89. The tray conveyor 40 once again advances the trays thereon and the selector unit 280 once again rotates.

The above-described feeding cycle is repeated for each diagonal row of tray pockets. In Fig. 15, it is to be observed that there are only four pockets in the diagonal row L7, which includes both trays B and C. Therefore, selector switch 298*b* is aligned with an aperture 297 of coded disc 281 (Fig. 11). As a result, the selector switch 298*b* is released to open the contacts thereof and the feed mechanism release solenoid 250*b* (Fig. 12) will not operate. Consequently, the feed mechanism 228 will remain idle during this feeding cycle. In all other respects the operation is similar to the one above-described. It is to be noted that the feed mechanisms 225 to 229, inclusive, are adaptable for depositing apples into two adjacent trays, providing the diagonal rows thereof are aligned, as shown for rows L2, L7 and L8 in Fig. 13.

As tray B advances during the feeding cycles, the pusher bar 66 adjacent its leading edge engages the finger 103. This causes the movable tray support 104 to advance with the conveyor 40 and tray B. The movable plate 104 supports tray B after it makes a clean transfer from the stationary plate 102 and as it advances over the carriage 120. After tray B has been transferred to the movable plate 104, the pin 103*a* carried by the finger 103 engages the cam plate 115 (Fig. 5), causing the finger 103 to trip and to release itself from engagement with the leading pusher bar 66. Thereupon, the movable plate 104 is retracted under the action of the tension spring 114. As a result thereof, the tray B drops onto the carriage 120 under the force of gravity.

When the stripper plate 104 approached the rearward position of Fig. 5, the switch 150 (Figs. 5 and 12) was actuated to energize the solenoid 148 (Fig. 6). The energization of the solenoid 148 causes rod 151 (Fig. 6) to impart a rotary movement to post 135 (Figs. 5 and 6). Post 135 is rotated a sufficient angular distance to permit the collar 141 to slide away from the abutment plate 146, thus lowering the carriage 120. The restoring spring 153 returns the post 135 to its initial position, after the solenoid 148 is deenergized, to enable the abutment plate 146

to seat on the next lower collar 142. As each succeeding packed tray is received by the carriage 120, the post 135 is rotated in the manner above-described, thereby enabling the collar supporting the abutment plate 146 to slide away from the abutment plate 146 and enabling the abutment plate 146 to successively seat on the next lower collar until the abutment plate 146 seats on the lowest collar 145. At this time, a predetermined number of packed trays are stacked on the platform conveyor 120.

After the abutment plate 146 leaves the collar 145, the gear 158 (Fig. 6) meshes with the gear 159, thereby rotating the roller 122 of the carriage 120 to cause the conveyor belt 121 (Fig. 5) to advance the stacked trays onto the receiving platform 160. While the carriage 120 is in the tray discharge position, it is held by the locking arrangement 164 until the stacked trays are on the receiving platform 160. In addition, the switch 335 (Fig. 12) is actuated to open the clutch control circuit. While the platform conveyor 120 is in its discharge position, switch 174 (Fig. 12) is closed to operate the relay 175. The energization of relay 175 causes contacts 176 to close to provide a holding circuit therefor and causes contacts 177 to close for maintaining the solenoid 148 energized to hold the collars 141 to 145 out of the path of upward movement of the carriage 120. After the stacked trays are advanced to the receiving platform 160, the stacked trays engage the switch 169 (Fig. 12) on the receiving platform 120 for energizing the solenoid 171, which releases the carriage 120. The carriage 120 is then elevated under the action of the compression spring 161. As the carriage 120 reaches its uppermost position, switch 178 is actuated to deenergize the relay 175. The deenergization of the relay 175 opens the contacts 177 to deenergize the solenoid 148. Thereupon, the restoring spring 153 returns the post 135 to its initial position, whereby the abutment plate 146 is once again seated on the collar 141.

It will be understood that modifications and variations of the embodiments of the invention disclosed herein may be resorted to without departing from the spirit of the invention and the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A method of packing articles on a tray having parallel rows of article-receiving recesses with the recesses of adjacent rows forming diagonal lines of recesses, said method comprising the steps of positioning a first line of articles above the tray at an angle relative to the parallel rows of recesses and in registry with recesses of one of said diagonal lines of recesses, depositing the line of articles into the recesses of said one diagonal line in registry therewith, positioning a new line of articles in the positions formerly occupied by said first line of articles, moving said tray in a direction perpendicular to said parallel rows and for a distance sufficient to bring the next adjacent diagonal line of recesses beneath said new line of articles, and depositing said new line of articles therein.

2. A method of packing articles on a rectangular tray having transverse rows of pockets with the pockets of adjacent rows forming diagonal lines of pockets, said method comprising the steps of advancing the tray along a path generally parallel to the longitudinal center line of the tray, positioning a first line of articles above the tray at an angle relative to the longitudinal center line of said tray and in registry with pockets of one of said diagonal lines of pockets, depositing the line of articles into the pockets of said one diagonal line in registry therewith, positioning a new line of articles in the positions formerly occupied by said first line of articles, moving said tray for a distance sufficient to bring the next adjacent diagonal line of recesses beneath said new line of articles, and depositing said new line of articles therein.

3. A method of packing articles on trays having parallel rows of pockets, said method comprising the steps of positioning successive trays adjacent one another in end to end relation with pockets at the adjacent end portions of the trays cooperating to form a diagonal line of pockets, positioning a line of articles above the adjacent trays in registry with the pockets of the diagonal line of pockets, and depositing the line of articles into the pockets of the diagonal line in registry therewith.

4. A method of packing articles on trays having parallel rows of pockets with the pockets of adjacent rows forming diagonal lines of pockets in each tray, said method comprising the steps of positioning successive trays adjacent one another with a diagonal line of pockets of one of the trays aligned with a diagonal line of pockets of the adjacent tray, positioning a line of articles above the adjacent trays at an angle relative to the parallel rows of pockets and in registry with pockets of the aligned diagonal lines of pockets, and depositing the line of articles into the pockets of the aligned diagonal lines of pockets in registry therewith.

5. A method of packing articles on trays having parallel rows of pockets with the recesses of each row staggered relative to the pockets of adjacent rows, said method comprising the steps of positioning successive trays adjacent one another in reverse pocket sequence so that pockets at the adjacent end portions of the trays cooperate to form a diagonal line of pockets, positioning a line of articles above the adjacent trays in registry with the pockets of the diagonal line of pockets, and depositing the line of articles into the pockets in registry therewith.

6. An apparatus for packing articles on a tray having parallel rows of pockets with the pockets of adjacent rows forming diagonal lines of pockets, said apparatus comprising a tray conveyor for advancing the tray in a direction perpendicular to said parallel rows of pockets, a plurality of aligned feed mechanisms for depositing articles on the tray, means mounting said aligned feed mechanisms above said conveyor at an angle relative to the direction of travel of the tray and in parallel relation with said diagonal lines of pockets for registering said aligned feed mechanisms with one of said diagonal lines of pockets, whereby articles may be transferred from said feed mechanisms into the pockets in registry therewith, and means for controlling the advance of said tray conveyor to bring successive diagonal lines of pockets into register with said feed mechanisms between cycles thereof.

7. An apparatus for packing articles on a tray having a row of pockets disposed at a predetermined acute angle relative to the centerline of the tray, said apparatus comprising means for supporting the tray, a plurality of aligned feed mechanisms for depositing articles into the pockets of the tray, and means adjustably mounting said aligned feed mechanism above said tray support means at an acute angle relative to the centerline of the tray equal to said predetermined acute angle.

8. An apparatus for packing articles on a tray having rows of pockets, said apparatus comprising a row of article feed mechanisms, a tray conveyor for advancing the tray to position a row of pockets in register with said feed mechanisms during each feeding cycle, means associated with each of said feed mechanisms to control the activation thereof for depositing an article into a pocket of the tray, and means operative in accordance with the number and location of the pockets in the row in register with said feed mechanisms during a feeding cycle for selectively operating said feed mechanism control means to selectively activate the feed mechanisms having tray pockets in register therewith during the feeding cycle.

9. An apparatus for packing articles on a tray having rows of pockets, said apparatus comprising a row of article feed mechanisms, a tray conveyor for advancing the tray to position a row of pockets in register with said feed mechanisms during each feeding cycle, means associated with each of said feed mechanisms to control the activation thereof for depositing an article into a pocket of the tray, a selector unit coded in accordance with the number and location of the pockets in the row in register

with said feed mechanisms during a feeding cycle, and means responsive to the coding of said selector unit for selectively operating said feed mechanism control means to selectively activate the feed mechanisms having tray pockets in register therewith during the feeding cycle.

10. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a row of article feed mechanisms, a conveyor for advancing the tray to position successive rows of pockets thereof in register with said feed mechanisms during successive feeding cycles, means associated with each of said feed mechanisms to control the activation thereof for depositing an article into a pocket of the tray, a rotatably mounted selector unit divided into row segments, each of said row segments being coded to correspond with the number and location of pockets in a predetermined row of tray pockets, means for rotating said selector unit in synchronism with the advancement of said tray conveyor, and means responsive to the coding of said selector unit for selectively operating said feed mechanism control means during each feeding cycle to selectively activate the feed mechanisms having tray pockets in register therewith.

11. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of article feed mechanisms disposed above said tray conveyor for depositing articles into the tray pockets, a rotatably mounted selector unit having row indexing means to divide the selector unit into row segments, each of said row segments being coded to correspond with the number and location of pockets in a predetermined row of tray pockets, means for rotating said selector unit in synchronism with the advancement of said tray conveyor, and means responsive to the row indexing means of said selector unit and the coding of the selector unit for controlling said conveyor to position successive rows of tray pockets in register with said feed mechanisms during successive feeding cycles and to selectively operate the feed mechanisms having tray pockets in register therewith.

12. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of article feed mechanisms disposed above the tray conveyor for depositing articles into successive rows of tray pockets during successive feeding cycles, a selector unit including row indexing means, and means responsive to the row indexing means of said selector unit for controlling said conveyor to position successive rows of tray pockets in registry with said feed mechanisms during successive feeding cycle.

13. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of article feed mechanisms disposed above the tray conveyor for depositing articles into successive rows of tray pockets during successive feeding cycles, a rotatably mounted selector unit having equally spaced radially projecting row indexing means, means for rotating said selector unit in synchronism with the advancement of said tray conveyor so that the time it takes for said selector unit to travel an angular distance equal to the angular distance between successive row indexing means is equal to the time it takes for said tray conveyor to advance the tray the linear distance required to bring successive rows of tray pockets into position below said feed mechanisms, and means responsive to the row indexing means of said selector unit for controlling said conveyor to position successive rows of tray pockets in register with said feed mechanisms during successive feeding cycles.

14. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of article feed mechanisms disposed above the tray conveyor for depositing articles into successive rows of tray pockets during successive feeding cycles, means for controlling said tray conveyor to position successive rows of tray pockets in register with said feed mechanisms during successive feeding cycle, and means actuated by the articles moving into a row of tray pockets during a feeding cycle for activating said conveyor control means for the succeeding feeding cycle.

15. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of article feed mechanisms disposed above said tray conveyor for depositing articles into successive rows of tray pockets during successive feeding cycles, a rotatably mounted selector unit having equally spaced radially projecting row indexing means, means for rotating said selector unit in synchronism with the advancement of said tray conveyor so that the time it takes for said selector unit to travel the annular distance between successive row indexing means is equal to the time it takes for said tray conveyor to advance the tray the linear distance required to bring successive rows of tray pockets into position below said feed mechanisms, means responsive to the row indexing means of said selector unit for controlling said tray conveyor to position successive rows of tray pockets in register with said feeding mechanisms during successive feeding cycles, and means actuated by the depositing of articles into a row of tray pockets during a feeding cycle for activating said conveyor control means for the succeeding feeding cycle.

16. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of article feed mechanisms disposed above said tray conveyor for depositing articles into the tray pockets, a rotatably mounted selector unit having row indexing means to divide the selector unit into row segments, each of said row segments being coded to correspond with the number and location of pockets in a predetermined row of tray pockets, means for rotating said selector unit in synchronism with the advancement of said tray conveyor, means responsive to the row indexing means of said selector unit and the coding of the selector unit for controlling said conveyor to position successive rows of tray pockets in register with said feed mechanisms during successive feeding cycles and to selectively operate the feed mechanisms having tray pockets in register therewith, and means actuated by the depositing of articles from said feed mechanisms during a feeding cycle to activate said conveyor control means for the succeeding feeding cycle.

17. An apparatus for packing articles on a tray having rows of pockets, said apparatus comprising a row of article feed mechanisms, a tray conveyor for advancing the tray to position a row of pockets in register with said feed mechanisms during each feeding cycle, means associated with each of said feed mechanisms to control the activation thereof for depositing an article into a pocket of the tray, an article sensing switch associated with each of said feed mechanisms and actuated by the presence of an article in its associated feed mechanisms, and means responsive to the actuation of said article sensing switches for simultaneously operating said feed mechanism control means to activate said feed mechanisms when each of said feed mechanisms has received an article.

18. An apparatus for packing articles on a tray having rows of pockets, said apparatus comprising a plurality of article feed mechanisms, a tray conveyor for advancing the tray to position a row of pockets in register with said feed mechanisms during each feeding cycle, means associated with each of said feed mechanisms to control the activation thereof for depositing an article into a pocket of the tray, an article sensing switch associated with each of said feed mechanisms and actuated by the presence of an article in its associated feed mechanism, a selector unit coded in accordance with the number and location of the pockets in the row in register

with said feed mechanisms during a feeding cycle, and means responsive to the coding of said selector unit and responsive to the actuation of said article sensing switches for selectively and simultaneously operating said feed mechanism control means to selectively activate the feed mechanisms having tray pockets in register therewith during the feeding cycle when each of said feed mechanisms has received an article.

19. An apparatus for packing articles on a tray having successive rows of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of feed mechanisms disposed above the tray for depositing articles into a row of tray pockets, means associated with each of said feed mechanisms for controlling the activation thereof to deposit an article into a tray pocket, a selector unit having row indexing means to divide the selector unit into row segments, each of said row segments being coded to correspond with the number and location of pockets in a predetermined row of tray pockets, article sensing switches associated with each of said feed mechanisms and actuated by the presence of an article in its associated feed mechanism, a cycling switch actuated by the passage of articles from said feed mechanisms into tray pockets, means responsive to said row indexing means of said selector unit and responsive to said cycling switch to position successive rows of tray pockets in register with said feed mechanisms during successive feeding cycles, and means responsive to the coding of said selector unit and responsive to the actuation of said article sensing switches for selectively and simultaneously operating said feed mechanism control means to selectively activate the feed mechanisms having tray pockets in register therewith during the feeding cycle when each of said feed mechanisms has received an article.

20. An apparatus for packing articles on a tray having row of pockets with the pockets of adjacent rows forming diagonal lines of pockets, said apparatus comprising a conveyor for advancing the tray, a plurality of feed mechanisms disposed above the tray for depositing articles into a row of tray pockets, means for controlling the operation of said conveyor to effect step-by-step movement thereof between cycles of said feed mechanism, each step being equal to the distance between said successive diagonal lines of pockets measured along the path of movement of the trays, means for controlling said feed mechanisms to deposit articles into a row of tray pockets, and means alternately activating either said conveyor control means or said feed mechanism control means, whereby said conveyor and said feed mechanisms are alternately operated.

21. An apparatus for packing articles on trays comprising a conveyor having flights for advancing successive trays along a predetermined path, a plurality of feed mechanisms disposed above said conveyor for packing articles on the trays advanced by said conveyor, a stationary support plate disposed below said conveyor for supporting the trays advanced by said conveyor, a movable support plate disposed below said stationary support plate, means supporting said movable plate for sliding movement in a direction parallel to said predetermined path, a member pivotally mounted on said movable plate and arranged to be engaged by a flight adjacent the leading edge of a leading tray on said conveyor for advancing said movable plate as said conveyor advances the leading tray, said leading tray being transferred to said movable plate as it is advanced beyond said stationary plate, a platform disposed below said movable plate and spaced from said stationary plate in the direction of travel of the trays, means for actuating said pivotal member when the leading tray is advanced over said platform to release said pivotal member from engagement with said engaging flight, and means for urging said movable plate toward said stationary plate for dropping the leading tray onto said platform.

22. An apparatus for packing articles on trays comprising a conveyor having flights for advancing successive trays along a predetermined path, a plurality of feed mechanisms disposed above said conveyor for packing articles on the trays successively advanced by said conveyor, a stationary support plate disposed below said conveyor for supporting the trays advanced by said conveyor, a movable support plate disposed below said stationary support plate, means supporting said movable plate for sliding movement in a direction parallel to said predetermined path, a member pivotally mounted on said movable plate and arranged to be engaged by a flight adjacent the leading edge of a leading tray on said conveyor for advancing said movable plate as said conveyor advances the leading tray, said leading tray being transferred to said movable plate as it is advanced beyond said stationary plate, a platform disposed below said movable plate and spaced from said stationary plate in the direction of travel of the trays, means for actuating said pivotal member when the leading tray is disposed over said platform to release said pivotal member from engagement with said engaging flight, means for urging said movable plate toward said stationary plate for dropping the leading tray onto said platform and returning the movable plate for supporting the succeeding tray, a vertical post associated with said platform, a plurality of vertically spaced collars fixed to said post, each of said collars being arranged to seat said platform thereon, and means responsive to the movement of said movable plate for imparting rotatable movement to said post for successively seating said platform on the next lower collar, whereby trays are stacked on said platform.

23. An apparatus for packing articles on trays comprising a conveyor having flights for advancing successive trays along a predetermined path, a plurality of feed mechanisms disposed above said conveyor for packing articles on trays successively advanced by said conveyor, a stationary support plate disposed below said conveyor for supporting the trays advanced by said conveyor, a movable support plate disposed below said stationary support plate, means supporting said movable plate for sliding movement in a direction parallel to said predetermined path, a member pivotally mounted on said movable plate and arranged to be engaged by a flight adjacent the leading edge of a leading tray on said conveyor for advancing said movable plate as said conveyor advances the leading tray, said leading tray being transferred to said movable plate as it is advanced beyond said stationary plate, a platform conveyor disposed below said movable plate and spaced from said stationary plate in the direction of travel of the trays, means for actuating said pivotal member when the leading tray member is disposed over said platform conveyor to release said pivotal member from engagement with said engaging flight, means for urging said movable plate toward said stationary plate for dropping the leading tray onto said platform and returning the movable plate for supporting the succeeding tray, a vertical post associated with said platform conveyor, a plurality of vertically spaced collars fixed to said post, each of said collars being arranged to seat said platform conveyor thereon, means responsive to the movement of said movable plate for imparting rotatable movement to said post for successively seating said platform conveyor on the next lower collar, whereby trays are stacked on said platform conveyor, and means for driving said platform conveyor for discharging the trays stacked thereon after a predetermined number of stacked trays are carried by said platform conveyor.

24. An apparatus for packing articles on trays comprising a conveyor having flights for advancing successive trays along a predetermined path, a plurality of feed mechanisms disposed above said conveyor for packing articles on trays successively advanced by said conveyor,

a stationary support plate disposed below said conveyor for supporting the trays advanced by said conveyor, a movable support plate disposed below said stationary support plate, means supporting said movable plate for sliding movement in a direction parallel to said predetermined path, a member pivotally mounted on said movable plate and arranged to be engaged by a flight adjacent the leading edge of a leading tray on said conveyor for advancing said movable plate as said conveyor advances the leading tray, said leading tray being transferred to said movable plate as it is advanced beyond said stationary plate, a platform conveyor disposed below said movable plate and spaced from said stationary plate in the direction of travel of the trays, means for actuating said pivotal member when the leading tray is disposed over said platform conveyor to release said pivotal member from engagement with said engaging flight, means for urging said movable plate toward said stationary plate for dropping the leading tray onto said platform and returning the movable plate for supporting the succeeding tray, a vertical post associated with said platform conveyor, a plurality of vertically spaced collars fixed to said post, each of said collars being arranged to seat said platform conveyor thereon, means responsive to the movement of said movable plate for imparting rotatable movement to said post for successively seating said platform conveyor on the next lower collar, whereby trays are stacked on said platform conveyor, means for driving said platform conveyor for discharging the trays stacked thereon, and means for locking said platform conveyor in the tray discharge position until the stacked trays are discharged therefrom.

25. An apparatus for packing articles on trays comprising a conveyor having flights for advancing successive trays along a predetermined path, a plurality of feed mechanisms disposed above said conveyor for packing articles on trays successively advanced by said conveyor, a stationary support plate disposed below said conveyor for supporting the trays advanced by said conveyor, a movable support plate disposed below said stationary support plate, means supporting said movable plate for sliding movement in a direction parallel to said predetermined path, a member pivotally mounted on said movable plate and arranged to be engaged by a flight adjacent the leading edge of a leading tray on said conveyor for advancing said movable plate as said conveyor advances the leading tray, said leading tray being transferred to said movable plate as it is advanced beyond said stationary plate, a platform conveyor disposed below said movable plate and spaced from said stationary plate in the direction of travel of the trays, means for actuating said pivotal member when the leading tray is disposed over the platform conveyor to release said pivotal member from engagement with said engaging flight, means for urging said movable plate toward said stationary plate for dropping the leading tray onto said platform and returning the movable plate for supporting the succeeding tray, a vertical post associated with said platform conveyor, a plurality of vertically spaced collars fixed to said post, each of said collars being arranged to seat said platform conveyor thereon, means responsive to the movement of said movable plate for imparting rotatable movement to said post for successively seating said platform conveyor on the next lower collar, whereby trays are stacked on said platform conveyor, means for driving said platform conveyor for discharging the trays stacked thereon, and means responsive to said platform conveyor being in the tray discharge position for arresting the advancement of said tray conveyor.

26. An apparatus for packing articles on trays comprising a conveyor having flights for advancing successive trays along a predetermined path, a plurality of feed mechanisms disposed above said conveyor for packing articles on trays successively advanced by said conveyor, a stationary support plate disposed below said conveyor for supporting the trays advanced by said conveyor, a movable support plate disposed below said stationary support plate, means supporting said movable plate for sliding movement in a direction parallel to said predetermined path, a member pivotally mounted on said movable plate and arranged to be engaged by a flight adjacent the leading edge of a leading tray on said conveyor for advancing said movable plate as said conveyor advances the leading tray, said leading tray being transferred to said movable plate as it is advanced beyond said stationary plate, a platform conveyor disposed below said movable plate and spaced from said stationary plate in the direction of travel of the trays, means for actuating said pivotal member when the leading tray is disposed over the platform conveyor to release said pivotal member from engagement with said engaging flight, means for urging said movable plate toward said stationary plate for dropping the leading tray onto said platform and returning the movable plate for supporting the succeeding tray, a vertical post associated with said platform conveyor, a plurailty of vertically spaced collars fixed to said post, each of said collars being arranged to seat said platform conveyor thereon, means responsive to the movement of said movable plate for imparting rotatable movement to said post for successively seating said platform conveyor on the next lower collar, whereby trays are stacked on said platform conveyor, means for driving said conveyor platform for discharging the trays stacked thereon, and means for locking said platform conveyor in the tray discharge position until the stacked trays are discharged therefrom, means for elevating said platform conveyor after the stacked trays are discharged therefrom, and means responsive to said platform conveyor being in the tray discharge position for imparting rotatable movement to said post enabling said platform conveyor elevating means to lift said platform conveyor.

27. An apparatus for packing articles on a tray comprising a conveyor having flights for advancing successive trays along a predetermined path, a plurality of feed mechanisms disposed above said conveyor for packing articles on trays advanced by said conveyor, a stationary support plate disposed below said conveyor for supporting the trays advanced by said conveyor, a movable support plate disposed below said stationary plate, means for supporting said movable plate for sliding movement in a direction parallel to said predetermined path, and a member mounted on said movable plate and arranged to be engaged by a flight adjacent the leading edge of a leading tray on said conveyor for advancing said movable plate as said conveyor advances the leading tray, whereby said leading tray is transferred to said movable plate by its own weight as it is advanced beyond said stationary plate.

28. In an apparatus for handling trays, a support plate, means for advancing trays in a predetermined direction onto said support plate, means supporting said movable plate for sliding movement in a direction parallel to said predetermined direction, a platform conveyor disposed below said movable support plate, means for sliding said movable plate from under said tray to drop said tray onto said platform conveyor, a vertical post associated with said platform conveyor, a plurality of vertically spaced collars fixed to said post, each of said collars being arranged to seat said platform conveyor thereon, means responsive to the movement of said movable plate for imparting rotatable movement to said post for successively seating said platform conveyor on the next lower collar, whereby trays are stacked on said platform conveyor, and means for driving said platform conveyor for discharging the trays stacked thereon after a predetermined number of stacked trays are carried by said platform conveyor.

29. An apparatus for packing articles on a tray comprising a tray conveyor for advancing a tray along a predetermined path, a line of feed mechanisms for de-

positing articles on the tray, means mounting said line of feed mechanisms above said predetermined path and at an acute angle relative to said predetermined path, whereby articles are fed to the tray at an acute angle relative to its path of travel, and means for advancing articles along paths perpendicular to said line of feed mechanisms into said feed mechanisms.

References Cited in the file of this patent

UNITED STATES PATENTS

2,713,446	Vaughan	July 19, 1955
2,833,095	Stuart	May 6, 1958
2,834,169	Stuart	May 13, 1958
2,847,809	Lindeman et al.	Aug. 19, 1958