

Sept. 23, 1969

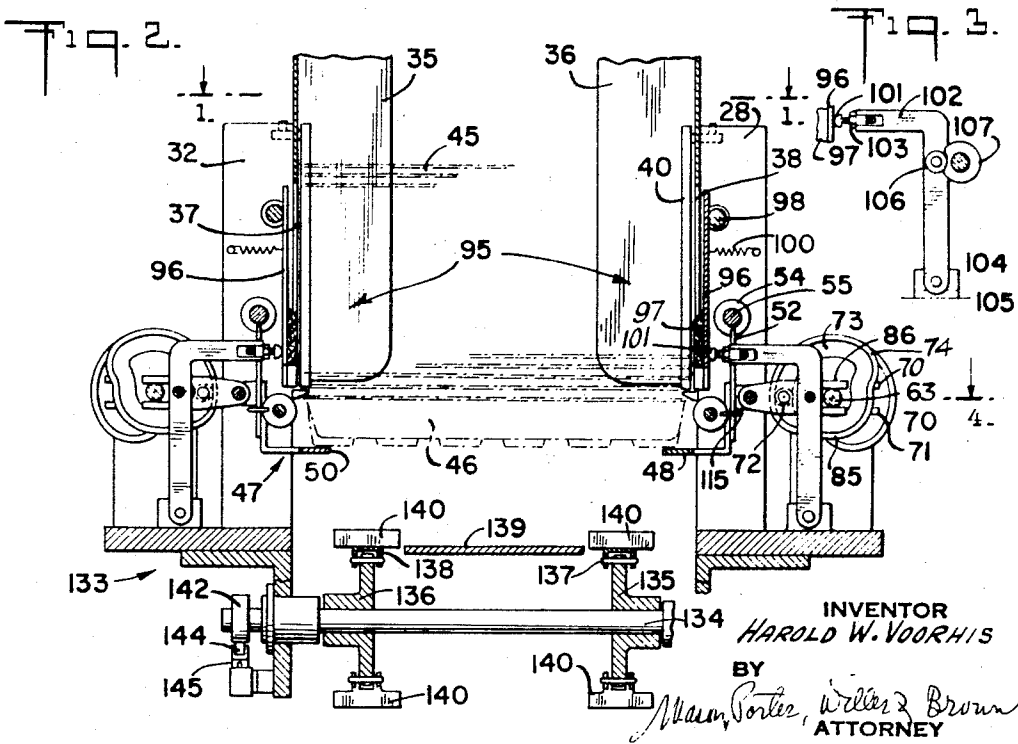
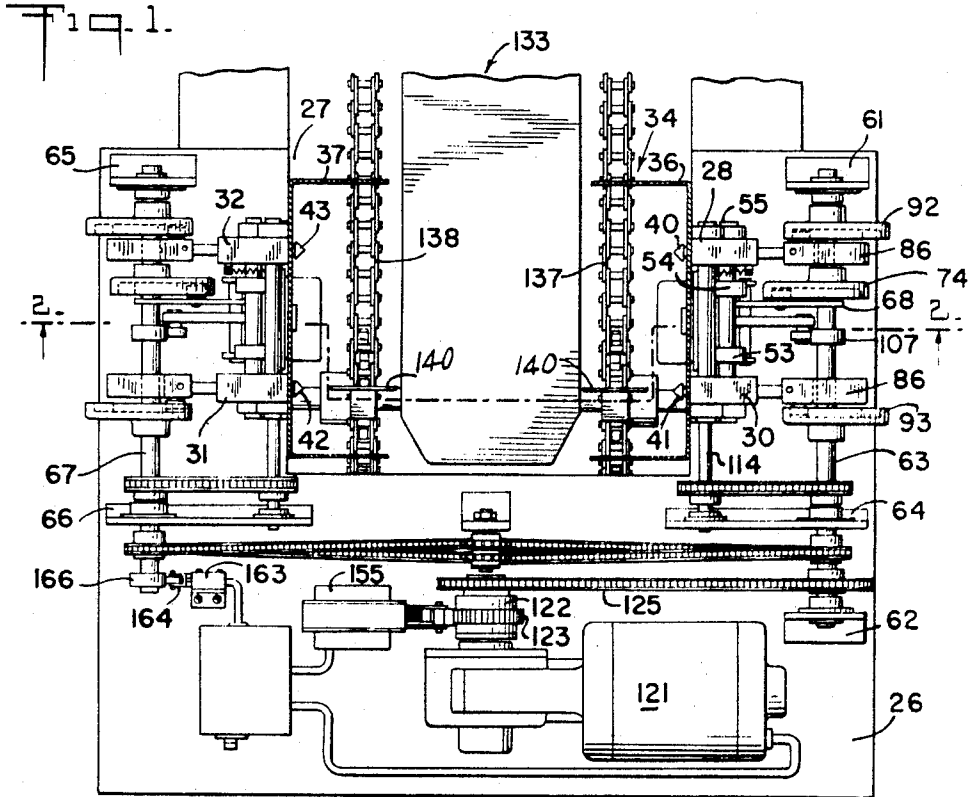
H. W. VOORHIS

3,468,455

CARTON DISPENSER MACHINE

Filed Nov. 14, 1967

6 Sheets-Sheet 1



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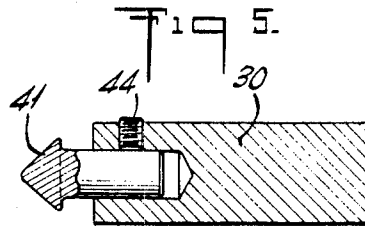
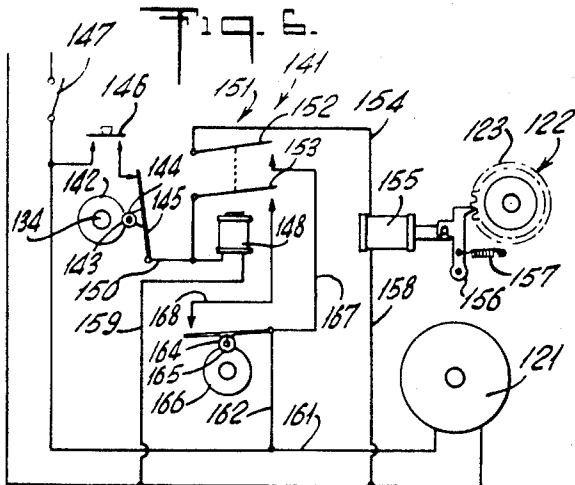
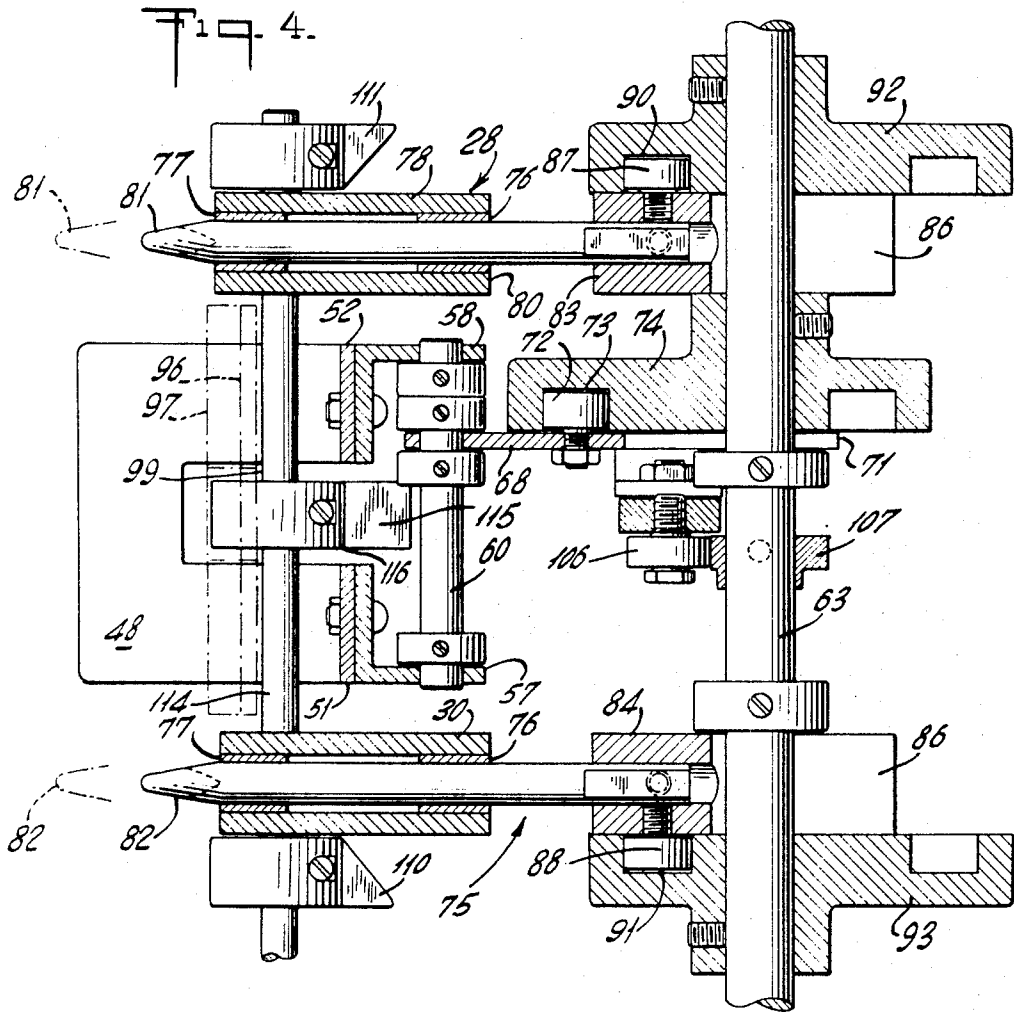
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6 Sheets-Sheet 2



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Fig. 7.

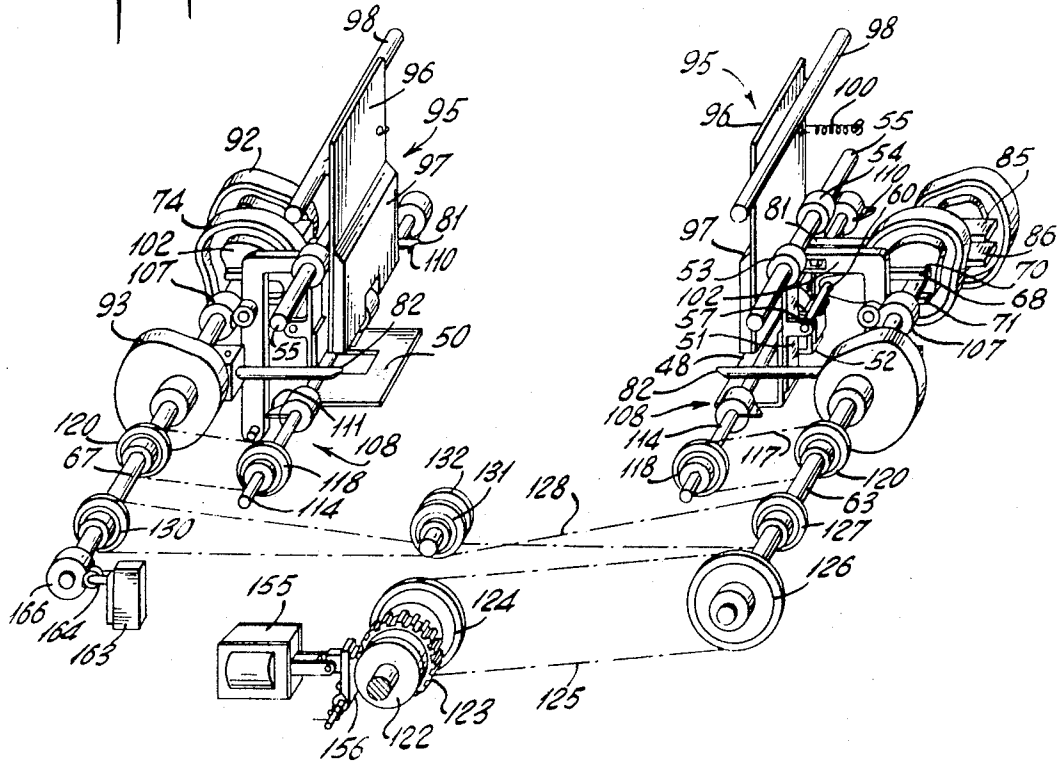
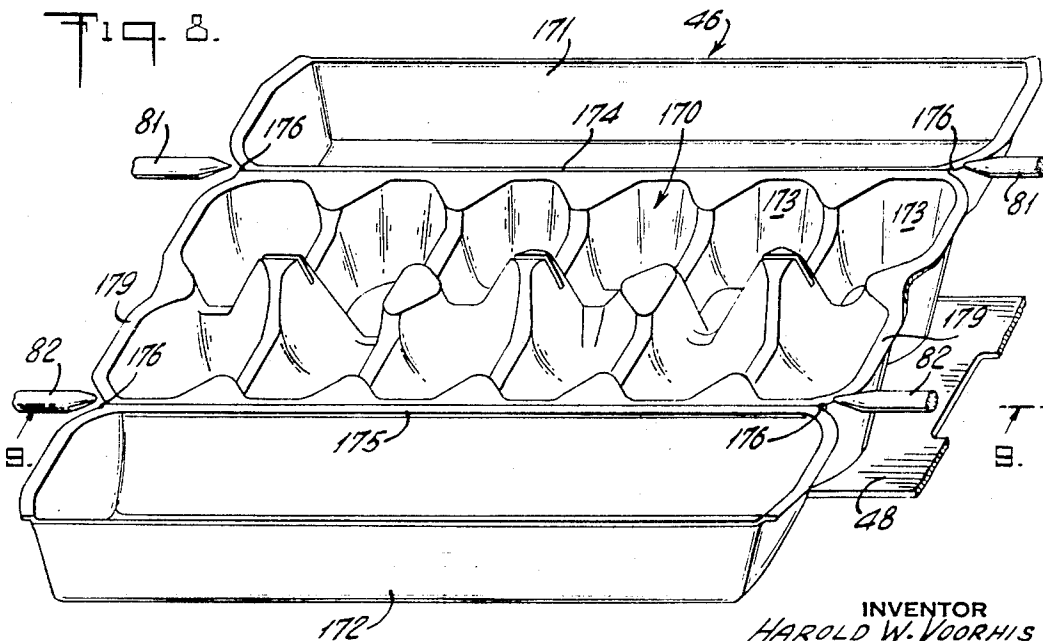


Fig. 8.



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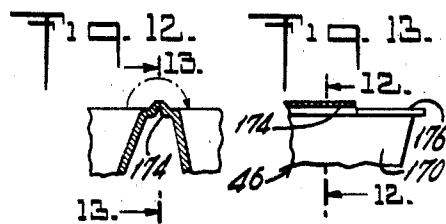
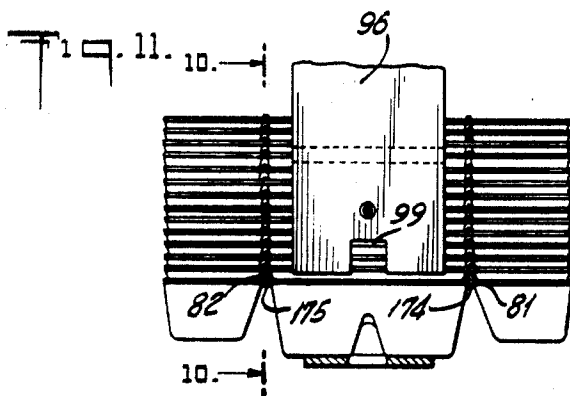
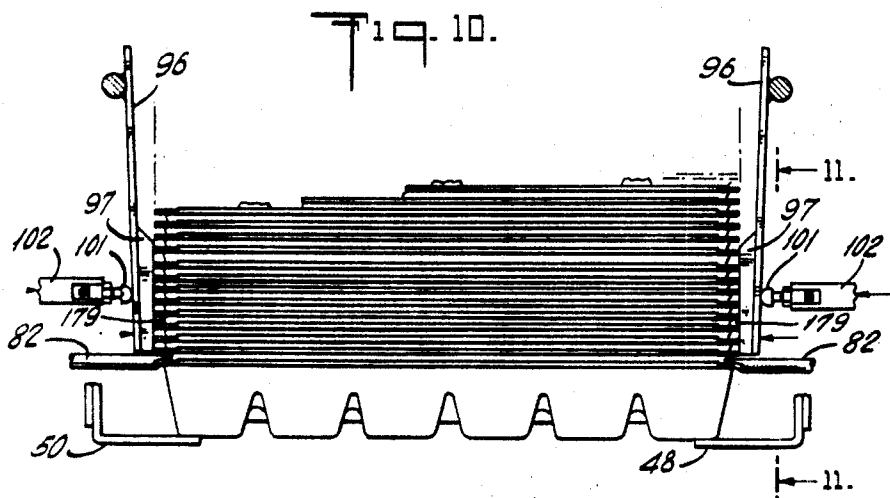
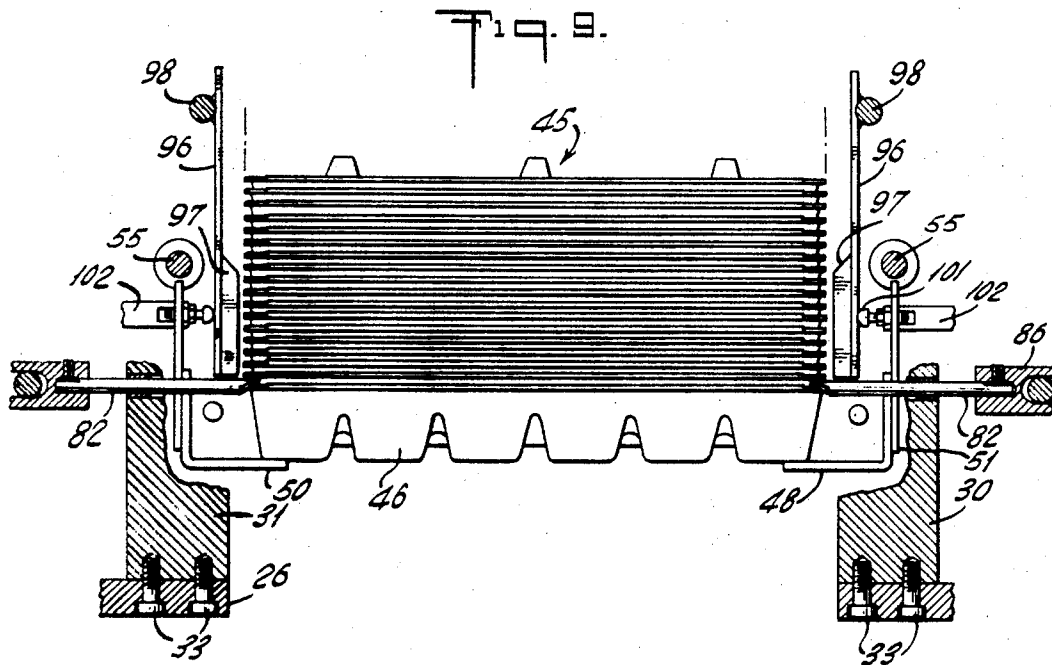
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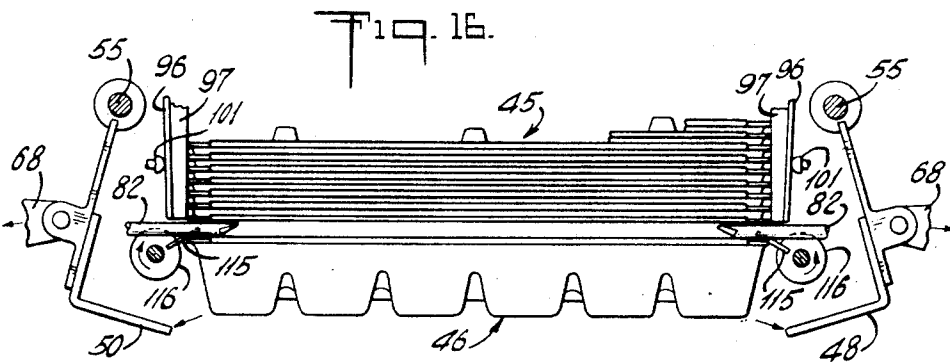
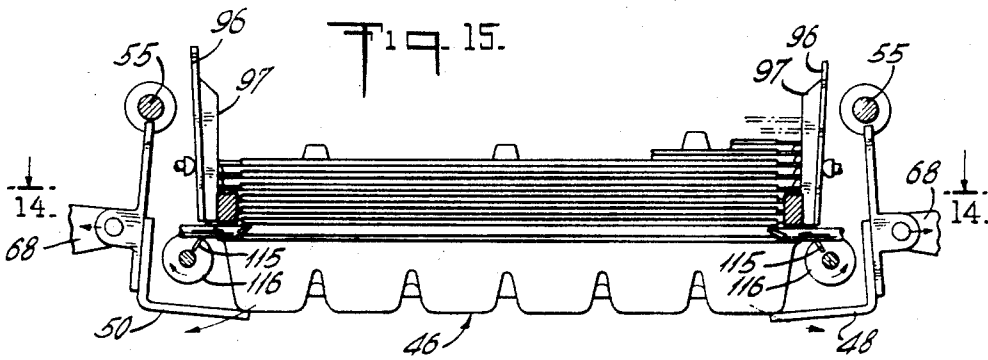
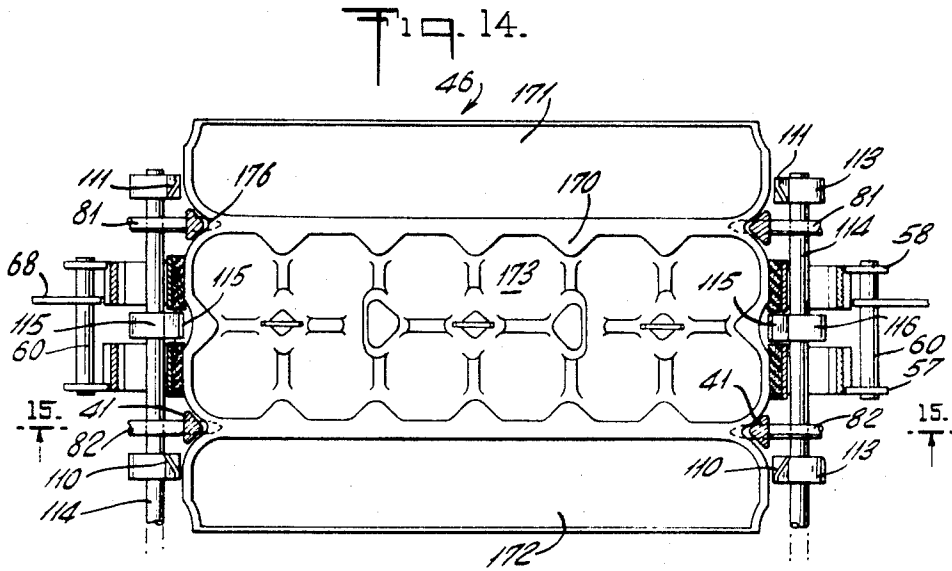
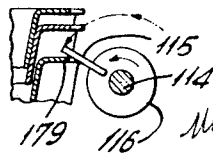


Fig. 17.



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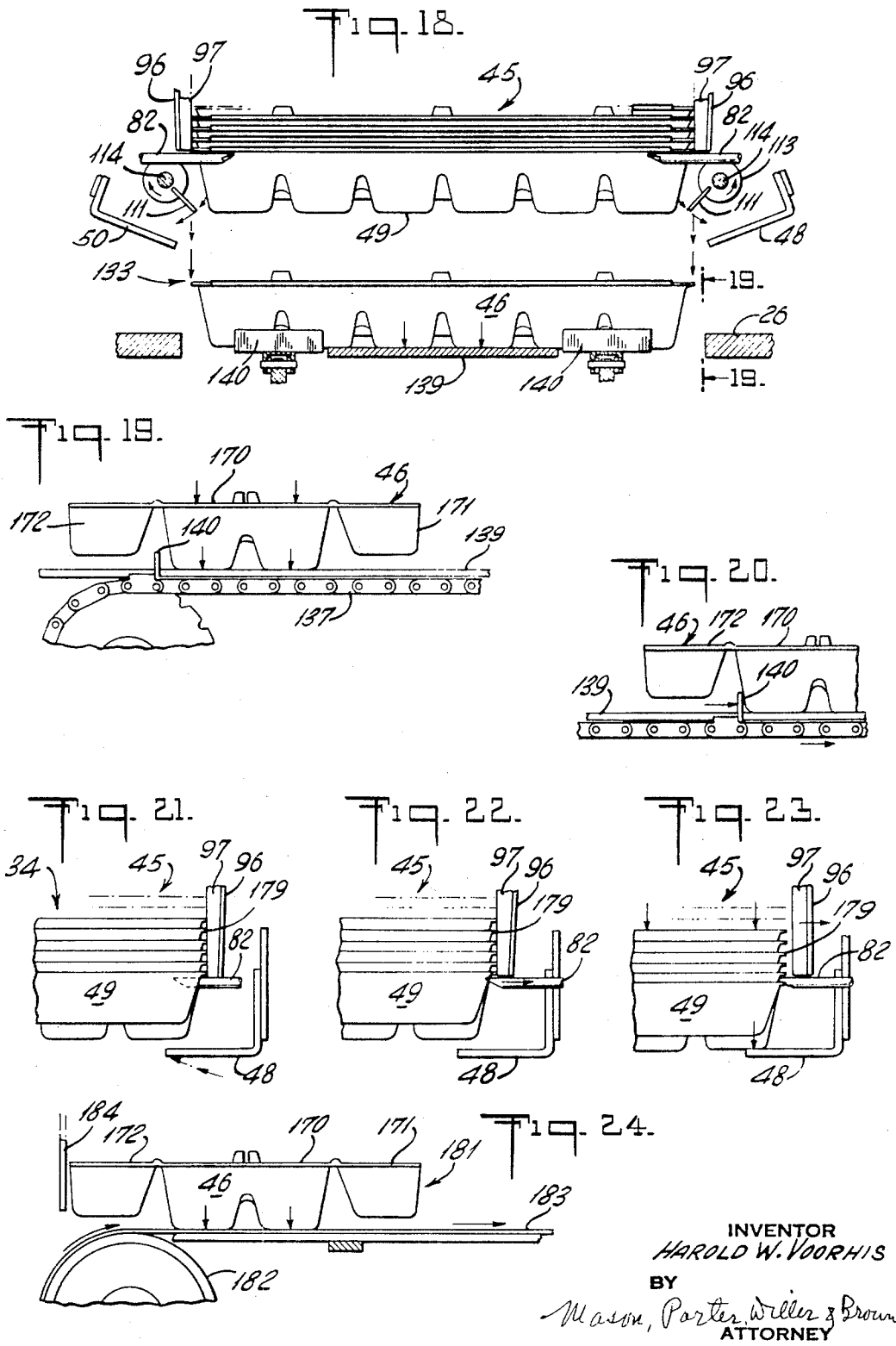
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6 Sheets-Sheet 6



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CARTON DISPENSER MACHINE

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21 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to an apparatus for dispensing nested cartons from a hopper. The apparatus includes finger-like plunger members which are movable transversely to a nested stack of cartons in a hopper and which wedgingly separate the bottom carton from the remainder of the stack so that paddles can propel it downward upon removal of support members from beneath the stack. Pivotaly mounted restraining means are brought into engagement with the sides of the stack of cartons upon removal of the lower support members so as to restrain the force of the stack from being applied to the finger-like plungers.

This application relates in general to new and useful improvements in the dispensing machine art, and in particular to an improved apparatus and methods for dispensing nested cartons from a hopper.

Accordingly, it is a primary object of this invention to provide a novel machine for dispensing articles from a stack of articles within a hopper, wherein an article at one end of the stack is disposed against shelf-like means for limiting movement of articles with respect to the hopper, including a means for moving a movement limiting means out of the path of travel of articles in the hopper, a means for separating an article from a stack of articles in the hopper, and a means for holding other articles in the hopper against movement during the separating operation.

It is another object of this invention to provide a novel dispensing machine wherein articles in a hopper are gravity-fed to a bottom portion of the hopper, and wherein a lowermost article in the hopper may be separated from an adjacent article in the hopper, and dispensed therefrom while other means restrain the remaining articles in the hopper against vertical movement.

It is a further object of this invention to provide a novel dispensing machine comprising a hopper defining a path of travel of articles received therein, a removable shelf-like floor for the hopper, separating means movable into and outwardly of the hopper for separating a lowermost article in a stack of articles from an adjacent article, and a means for holding remaining articles in the stack of articles against vertical movement, until removal of the separating means from the hopper, the holding means then being operable to permit the stack of articles in the hopper to drop onto the shelf-like floor portion of the hopper which has again been positioned beneath the hopper.

It is yet another object of this invention to provide a novel dispensing machine adapted to dispense nested articles from a hopper, wherein means are provided for separating an article from remaining articles in the stack and other means are provided for propelling a just-separated article away from the hopper.

It is a further object of this invention to provide a novel machine for dispensing articles from a hopper, wherein a removable floor is provided for the hopper, separating means are provided for movement into and out of the hopper for separating articles in the hopper, holding means

are provided for restraining the movement of articles within the hopper during the separating operation and while the floor is removed from the hopper, and wherein the operation of all of the means are sequentially controlled in predetermined timed relation.

It is yet another object of this invention to provide a novel machine for dispensing stacked articles from a hopper including a removable shelf-like floor for the hopper, movable separating means, intermittently operable holding means and propelling means, wherein the floor, the separating means, the holding means and the propelling means are commonly driven in sequentially timed relation.

It is another object of this invention to provide a novel machine for dispensing articles from a hopper onto a conveying means, wherein the machine includes movable floor means for the hopper, article separating means, means for holding other articles in the hopper and article propelling means, wherein all of said means are intermittently driven in sequentially timed relation, in response to the speed of the conveyor means.

It is a further object of this invention to provide a novel machine for dispensing stacked articles from a hopper, wherein a plurality of dispensing mechanisms are operable upon intermittent actuation of a clutch member, and wherein the clutch member is actuated through an electrical circuit, in response to the ability of the conveyor to receive articles dispensed from the hopper.

It is another object of this invention to provide a novel method of dispensing articles from a hopper by sequentially timing the operation of a removable hopper floor, a separating means, an article stack holding means and a propelling means.

It is a further object of this invention to provide a novel method for controlling the operation of an apparatus for dispensing articles from a hopper, by intermittently driving various article dispensing means in response to the ability of an article-receiving conveyor to receive the articles.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a top plan view of the dispensing machine and conveyor mechanism of this invention wherein all operative dispensing mechanisms are illustrated with drive means for operating the same.

FIGURE 2 is an elevational sectional view taken along the line 2-2 of FIGURE 1 and wherein nested cartons are illustrated in phantom as being disposed within a hopper on a removable hopper floor means of this invention.

FIGURE 3 is a fragmentary elevational view of a portion of the apparatus illustrated in FIGURE 2, and wherein there is shown a means for driving one of a pair of spring-retractable stack-holding plates of this invention.

FIGURE 4 is an enlarged sectional plan view of a portion of the machine of this invention, taken along the line 4-4 of FIGURE 2, and wherein there is illustrated the operational components of a separating means and hopper floor removing means of this invention.

FIGURE 5 is an enlarged fragmentary sectional view of a portion of the mechanism illustrated in FIGURE 3, wherein there is illustrated in detail the connection of a gib means and its holding member for contacting and aligning cartons in a stack as illustrated in FIGURE 14.

FIGURE 6 is a schematic illustration of the wiring diagram for an electrical circuit for controlling intermittent operation of a drive clutch in response to a cam

associated with the conveyor mechanism illustrated in FIGURE 2.

FIGURE 7 is a top perspective view of the major operating mechanisms of this invention, and wherein there is also illustrated the drive train and means for controlling the timed operating sequence of the various operating mechanisms of this invention.

FIGURE 8 is an enlarged top perspective view of a lowermost carton disposed on the removable floor means of the hopper, and wherein the separating fingers are fragmentally illustrated as being operable to engage above hinge portions connecting bottom and lid portions of the carton illustrated therein.

FIGURE 9 is an enlarged fragmentary elevational sectional view of a portion of the dispensing machine of this invention, taken along the line 9—9 of FIGURE 8 and wherein there is illustrated a stack of cartons positioned with a lowermost carton on the removable floor means of this invention, and wherein separating fingers are disposed for insertion between a lowermost carton and an adjacent carton, and wherein the stack holding plates are not in engagement with the stack of cartons.

FIGURE 10 is an elevational view similar to that of FIGURE 9, but wherein the stack-holding plates have been moved to a position in engagement with the stack of cartons.

FIGURE 11 is a fragmentary elevational view taken along the line 11—11 of FIGURE 10, and wherein the removable floor means, the separating fingers, and the stack holding means are illustrated in their relative positions with a stack of open molded egg cartons.

FIGURE 12 is an enlarged fragmentary elevational sectional view of a hinge construction of one of the molded cartons illustrated in FIGURE 11, and wherein there is illustrated the details of the hinge construction of the carton.

FIGURE 13 is an enlarged fragmentary elevational sectional view taken along the line 13—13 of FIGURE 12, and wherein there are illustrated further details of the hinge construction illustrated in FIGURE 12.

FIGURE 14 is a top plan sectional view through a portion of the machine of this invention taken along line 14—14 of FIGURE 15, and wherein there is illustrated a carton in the stack and wherein the holding plates of this invention are illustrated in engagement with end edges of the carton, and with the separating fingers in engagement with hinged portions of the lowermost carton.

FIGURE 15 is a fragmentary elevational view of a portion of the machine of this invention, taken along the line 15—15 of FIGURE 14, and wherein there is illustrated the removable floor means in a position of pivotal movement away from the lowermost carton in the stack.

FIGURE 16 is an elevational view similar to that of FIGURE 15, with the removable floor means completely withdrawn from engagement with a lowermost carton in the stack, with the separating fingers in a maximum engaged position between lowermost and adjacent cartons in the stack, and with a propelling means in engagement with opposite edge portions of a lowermost carton in the stack.

FIGURE 17 is an enlarged fragmentary sectional view of a portion of the mechanism illustrated in FIGURE 16, and wherein the propelling means are illustrated in greater detail in an engaged position with an outwardly projecting lip of a lowermost carton in the stack.

FIGURE 18 is an elevational sectional view of a portion of the machine of this invention, and wherein there are illustrated the mechanisms illustrated in FIGURE 16, with the lowermost carton in the stack being shown completely dispensed and disposed on a lower conveying means.

FIGURE 19 is a fragmentary elevational view taken along the line 19—19 of FIGURE 18, and wherein there is illustrated a dispensed carton disposed on a conveyor, with a conveyor lug means adapted to engage the carton.

FIGURE 20 is a fragmentary elevational view similar to that of FIGURE 19, but wherein the conveyor lug means is illustrated in transporting engagement with a wall of the carton.

FIGURES 21 through 23 are fragmentary elevational views of the article holding means, the removable floor means, and the finger-like separating means, and wherein there are illustrated sequential positions of each of these means, demonstrating their respective timed relation.

FIGURE 24 is a fragmentary elevational view, similar to that of FIGURE 19, but wherein a modified form of conveying means is demonstrated as having received a dispensed carton.

Referring now to the drawings in detail, reference is first made to FIGURE 1 wherein there is illustrated a base plate 26 of generally U-shaped configuration having a center portion 27 cut therefrom. Upstanding supporting legs 28, 30, 31 and 32 are carried by the base plate 26 and are secured thereto by means of suitable fasteners 33, with the supporting members 28, 30, 31 and 32 disposed on opposite sides of the cut-out 27 of the base plate 26.

A hopper 34 comprising opposing generally U-shaped members 35 and 36 of channel-like construction is disposed above the cut-out portion 27 of the base plate 26, with one of the U-shaped members 35, 36 carried by an associated pair of upstanding supporting members 28, 30, 31 and 32. Bottom central portions of each of the U-shaped hopper members 35, 36 are cut away on opposite sides of the hopper to define respective voids 37, 38, adapted to permit the passage of mechanisms later to be described therethrough. Vertically disposed guiding gibs 40, 41, 42 and 43 are mounted inwardly of opposing side-walls of the hopper 34, and are carried by respective upstanding supporting members 28, 30, 31 and 32. The gibs 40 through 43 are each of generally triangular cross-sectional configuration, and are secured to an upstanding supporting member such as that 30 by a suitable fastening means 44, as is clearly illustrated in FIGURE 5.

With reference to FIGURE 2, there are illustrated in phantom a plurality of cartons 45 disposed in nested relation in the hopper 34, with a lowermost carton 46 being prevented from movement outwardly of the hopper 34 by a movement limiting means generally designated by the numeral 47.

The movement limiting means 47 comprises two opposed shelf-like floor portions 48, 50 extending partially transversely of a lower end of the hopper 37. Each of the shelf-like floor portions 48, 50 is carried by a suitable pair of vertically disposed bracket members 51, 52, which in turn are carried by associated respective clamp elements 53, 54 mounted on a shaft 55 which is pivotally carried by associated ones of the upstanding supporting members 28, 30 or 31, 32. The vertically disposed bracket members 51, 52 have rearwardly extending lugs 57, 58 thereon, interconnected by a short shaft section 60.

The base plate member 26 also carries additional upstanding supporting members 61 and 62 at the right side thereof as viewed in FIGURE 1, spaced outwardly from the hopper 34, the supporting members 61, 62 carrying a main drive shaft 63 therebetween. An additional supporting member 64 is also carried by the base plate member 26 for facilitating the support of the shaft 63. On the left side of the base plate member 26 as viewed in FIGURE 1, upstanding supporting members 65 and 66 are shown carrying another main drive shaft 67 therebetween.

A driving link 68 is mounted on the short shaft section 60 at a left end thereof, as viewed in FIGURE 7, the right end of the driving link 68 having forked portions 70 and 71 thereof disposed on opposite sides of the main drive shaft 63. A roller 72 is carried by the link member 68, the roller 72 being disposed within a groove 73 of a cam means 74 carried by the shaft 63.

A separating means is provided, for separating the lowermost carton 46 from an adjacent carton in the stack

of cartons 45 within the hopper 34, the separating means being illustrated in FIGURE 4 and generally designated by the numeral 75. The separating means 75 is identical on each side of the hopper 34, and therefore only one side of the separating means need be described. The upstanding vertical supporting members 28, 30 are hollow, and each contain bushing members 76, 77 between opposite side plates 78, 80 thereof. The bushing members 76, 77 are adapted to receive associated spear-like separating fingers 81, 82, extending through respective upstanding supporting members 28, 30 and movable therethrough from the positions illustrated in solid lines in FIGURE 4 to the positions illustrated in phantom in FIGURE 4. The separating fingers 81, 82 are connected at their right ends as viewed in FIGURE 4 to associated fork-like driving links 83, 84 respectively. Each of the drive links 83, 84 terminate at their rearward ends in fork-like prongs 85, 86 slidably engaging the shaft 63. Each of the link members 83, 84 carries an associated roller 87, 88 respectively, received within respective groove means 90, 91 of associated cam means 92, 93 respectively. The separating fingers 81, 82 are thus adapted for reciprocating movement within the members 76, 77 upon rotation of the cam means 92, 93 with the shaft 63.

A carton stack holding or restraining means, generally designated by the numeral 95, is best illustrated in FIGURES 2 and 7. The holding means comprises identical mechanisms positioned on opposite sides of the hopper 34, each of which includes a holding plate 96 having a carton lip gripper or cushion 97 of sponge rubber or the like secured to an inner surface thereof. Each of the plates 96 has a rectangular portion 99 thereof at the lowermost end cut away to define a clearance hole. Each plate 96 is secured to a shaft 98 which is pivotally carried by associated ones of the upstanding supporting members 28, 30, 31 and 32. An extension spring 100 is secured to each of the plates 96 at one end and is secured at the other end to an upstanding supporting member such as 28, in order to tension each plate 96 for pivotal movement with the shaft in a counter-clockwise direction e.g., away from the hopper as is illustrated by the mechanism at the right of FIGURE 7. A pusher member 101 is provided to engage the rear of each plate 96, for moving the lower end of the plate towards the hopper 34. Each pusher 101 is adjustably secured at one end of an L-shaped link member 102 by means of a suitable adjustment nut 103 preferably secured to a shank of the pusher member 101. The terminal end 104 of the longer leg of the L-shaped member 102 is pivotally mounted on a supporting boss 105 carried by the base plate 26. The L-shaped link member 102 carries a roller 106 which is driven by a cam 107 carried by the rotating shaft 63 for oscillatory movement of the pusher member 101 toward and away from the hopper 34.

A propelling means 108 is provided for expelling a just-separated carton 46 of the stack of cartons 45 in the hopper 34, in a direction vertically downwardly as viewed in FIGURES 2 and 7. The propelling means 108 is identical on each side of the hopper 34 and includes paddles 110, 111 of triangular-shaped plate configuration, carried by associated respective cylindrical clamps 112, 113, each of which are rotatably carried by a shaft 114. Each shaft 114 is carried by associated ones of the upstanding supporting members 28, 30, 31, 32, 64 and 66, and in the mechanism viewed at the right end of FIGURE 1, the shaft 113 is carried by supporting members 28, 30 and 64. A centermost paddle 115, carried by clamp member 116 is provided intermediate of paddles 110, 111, also mounted on shaft 114, for a rotation with the shaft 114 through clearance hole 99 of plate member 96 of the carton holding means 95.

Each shaft 114 is driven by chains 117 and sprockets 118, 120 from its associated main drive shaft 63 or 67.

A motor 121 is provided mounted on the base plate 26, which is operative through a slip clutch 122 having

a spoked exterior 123, to drive a main sprocket 124. The sprocket 124 and its associated chain 125 drives a sprocket 126 on the shaft 63. Another sprocket 127 is provided on the shaft 63, which is connected by means of chain 128 to a sprocket 130 on drive shaft 67, through change-of-rotation-direction idler sprockets 131 and 132. Thus, upon driving the shaft 63 in a counter-clockwise direction as viewed in FIGURE 7, the shaft 67 will be driven in a clockwise direction.

A conveyor means, generally designated by the numeral 133 is provided positioned beneath the hopper 34 and includes a driving shaft 134 having sprockets 135 and 136 mounted thereon. A pair of endless conveying chains 137, 138 are provided between respective sprockets 135, 136 and respective mating sprockets at another end of the conveyor mechanism 133 not illustrated in these drawings. Each of the conveyor chains 137, 138 carries a plurality of pusher lugs 140 adapted to engage a dispensed carton 46 and to push the same along the conveyor 133 at the speed of the conveyor chains 137, 138.

The conveyor drive shaft 134 is independently driven of the rest of the mechanisms described above, and would not thereby normally be driven in timed relation with the speed of rotation of the main drive shaft 63, 67. In order to drive the mechanisms operable from the drive shaft 63, 67 in timed relation with the speed of removal of cartons along the conveyor means 133, an electrically operated machine control means generally designated by the numeral 141 is provided, best illustrated in FIGURE 6 of the drawings. A cam 142 is carried by the shaft 134 of the conveyor mechanism 133, having a dwell point 143 thereon, adapted to engage a roller 144 of a switch 145 therein. A manually controlled switch 146 is provided between the switch 145 and a conventional circuit breaker 147 for the circuit 141. The switch 145 is connected to a solenoid 148 through line 150. Also associated with the solenoid 148, and connected to the line 150 is a single throw double-pole switch 151, having poles 152 and 153 thereon. The pole 152 of the switch 151 is connected through line 154 to a solenoid 155 which is mechanically coupled to a pawl 156 and is operable to move the pawl 156 into and out of engagement with the spoked portion 123 of the clutch 122, against the force of an extension spring 157. The solenoid 155 is connected through line 158 to line 160 at one side of the motor 121. The other side of the motor 121 is connected by a line 161, through line 162 to a switch 163, which has a roller 164 thereon. The roller 164 of switch 163 is mounted for engagement within a dwell 165 of a cam 166 carried by the drive shaft 67. The switch 163 is connected at one end to a line 167 adapted to be contacted by the pole 152 of the switch 151. The other end of the switch 163 is adapted to contact the line 168 upon rotation of the cam 166 to a position where the roller 164 of the switch 163 is not within the dwell 165 of the cam 166. The line 168 is also adapted to be contacted by the pole 153 of the switch 151, upon energizing of the solenoid 148.

Each carton 46 in the stack of cartons 45 comprises a container portion 170 and a pair of lid portions 171 and 172. The container portion 170 is provided with a plurality of cells 173 adapted to receive eggs therein. The cartons are of molded pulp construction, and are dispensed through the hopper 34 in the open position illustrated best in FIGURES 11 and 14. The lid portions 171 and 172 of each carton 46 are connected to the container portion 170 of the carton by hinge portions 174 and 175 respectively. The hinge portions 174 and 175 extend throughout almost the entire length of the carton 46, except for portions in the area of V-shaped notches 176 at extreme ends of the hinge portions 174.

Operation

In dispensing cartons 46 through the hopper 34, the shelf-like floor means 48 and 50 are moved out of sup-

porting contact with the lowermost carton 46 in the hopper 34 during engagement of the separating fingers 81 and 82 between the lips of the lowermost carton 46 and an adjacent carton 49. Because of the rather soft consistency of molded pulp, it would be undesirable to have the substantial weight of a stack of cartons 45 being supported by the separating fingers 81 and 82 during the dispensing operation, in that such a weight bearing down on the separating fingers 81 and 82 disposed beneath hinged portions 174 and 175 of the carton 49 may tend to rip or tear the hinge portions 174 and 175. It is for this reason that the holding or restraining plates 96 are utilized to keep the weight of the stack of cartons 45 from bearing down on the separating fingers 81 and 82, on each side of the hopper 34.

The cartons 46 are thus supplied in a stack 45 to the hopper 34 and are aligned therein by engagement of the gibs 40 through 43 within the V-shaped notches 176 at the ends of the hinge portions 174 and 175 of each carton 46. Cartons are thus positioned within the hopper in the position illustrated in FIGURE 9. This is the normal holding position of the dispensing machine of this invention, prior to actuation of the clutch 122. Upon actuation of the clutch 122 by the circuit of FIGURE 6, the main drive shafts 63 and 67 are rotated toward each other in opposing directions, by the transmission of driving torque through the sprocket 124, through the sprocket 126 of the chain drive 125, whereby the shaft 63 is rotated in a counter-clockwise direction as viewed in FIGURE 7, and whereby the shaft 67 is rotated in a clockwise direction due to the transmission of driving torque from the shaft 63, through the sprocket 127, the driving chain 128 and the sprocket 130 on a shaft 67. Upon rotation of the shafts 63 and 67, each cam 74 mounted for rotation on the shafts 63 and 67 also rotates causing an associated follower 72 mounted within the groove 73 of each cam 74 to follow the contour of the groove 73, thereby causing the link member 68 attached to the follower 72 to be shifted to the right with the fork-like prongs 71 and 72 slidably guided by upper and lower circumferential portions of the shaft 63. In moving the linkage member 68 to the right, as viewed in FIGURE 4, the linkage member 68, in slidably engaging shaft 60 pivots the attached vertical supporting members 51 and 52 and their connected shelf-like floor means 48 and 50 of the movement limiting means away from the hopper 34 through the position illustrated in FIGURE 15, to the position illustrated in FIGURE 16, by pivoting on the shaft 55.

Prior to complete removal of the shelf-like hopper floor means 48, 50 from beneath the lowermost container 46 in the stack of containers 45, the separating fingers 81 and 82 are moved inwardly, into the stack of cartons 45 between hinge portions 174 and 175 of adjacent cartons 46 and 49, by means of the driving force supplied by the cams 92 and 93 rotating on the shafts 63 and 67, causing the followers 87 and 88 to be driven within the cam grooves 90 and 91.

Also prior to complete removal of the shelf-like means 48 and 50 from beneath the lowermost carton 46, and prior to insertion of the separating means 81 and 82 between hinges of adjacent cartons, each cam 107 rotates with its associated shaft 63 or 67, until its follower 106 is in a position other than the dwell position illustrated in FIGURE 4, whereby the L-shaped link member 102, to which the follower 106 is connected, is pivoted about member 105, until the pusher means 101 associated with each L-shaped link member 102 engages a rearward surface of an associated plate member 96, thereby pivoting plate member 96 with shaft 98 toward the hopper 34, against the force of the spring 100, and into a position whereby the cushion 97 is in engagement with outer lips of several of the lower cartons in the stack 45 within the hopper 34, thereby restraining all but a lowermost carton 46 from vertically downward movement and from

creating an excessive force on the separating fingers 81 and 82 when the shelf-like members 48 and 50 are completely withdrawn.

When the shelf-like members 48 and 50 are in their withdrawn position, illustrated in FIGURE 16, the paddles 110, 111 and 115 of the propelling means 108 are rotated on the shaft 114 to the position illustrated in FIGURE 17, in engagement with lip portions 179 of the lowermost container 46, within the hopper 34. The paddles 110, 111 and 115 are preset with respect to their positions on the shaft 114 to engage lips 179 of the container 46 when the shelf-like means 48 and 50 are in the withdrawn position illustrated in FIGURE 16. Upon engagement of the paddles 110, 111 and 115 with the lips 179 of the container 46, and upon rotation of the shaft 114 and consequent rotation of the paddles 110, 111 and 115, the container 46 is propelled vertically downwardly, as illustrated in FIGURE 18, to a position on the conveying means 133. Following the dispensing of the container 46 from the hopper 34, the shelf-like movement limiting means 48 and 50 are pivoted inwardly, in the direction illustrated by the arrow in FIGURE 21, to positions beneath the next lowermost carton 49 of the stack of cartons 45 within the hopper 34. As the shelf-like means are brought into a position spaced beneath the next lowermost carton 49, the separating fingers 81 and 82 are withdrawn from beneath the hinge 174 of the carton 49, in a direction away from the carton 49, as is illustrated by the arrow shown in FIGURE 22. In this position the grippers 97 attached to the holding plates 96, on opposite sides of the hopper 34, engage opposite lips 179 of the cartons in the stack 45, and restrain the cartons against vertical downward movement until complete withdrawal of the separating fingers 81 and 82 has been effected. The rollers 106 associated with the L-shaped member 102 then drop into the dwell on the cam 107, thereby permitting the pusher members 101 to move to the right of the position illustrated in FIGURE 3, and thereby allowing the springs 100 to bias the plates 96 in a direction outwardly of the stack of cartons 45 within the hopper 34. As the plates 96 and grippers 97 are moved away from the cartons, to positions similar to that illustrated in FIGURE 23, the stack of cartons 45 is then unrestrained against vertical downward movement, and is free to drop vertically downwardly, the movement being limited by contact of the next lowermost carton 49 with the shelf-like movement limiting means 48 and 50, as illustrated in FIGURE 23. At this point, a complete cycle of the dispensing device has been effected.

The dispensed carton 46 is thus positioned on the conveying means 133, and is carried along the belt 139 thereof, being engaged rearwardly by pusher lugs 140, in order to secure correct spacing of dispensed containers along the belt 139, as is illustrated in FIGURES 19 and 20.

The electrical circuit illustrated in FIGURE 6 is operative to facilitate engaging the clutch means 122 in response to the speed of the conveyor means 133, as determined by the speed of rotation of the cam 142 carried by the shaft 134 of the conveyor means 133, wherein clutch actuation results in transmission of driving torque from the motor 121 to the shafts 63 and 67.

In the operation of the circuit illustrated in FIGURE 6, the circuit breaker 147 will normally be closed, and the manually controlled switch 146 will be in an "on" position, connecting the circuit breaker 147 and in a position adapted to connect with switch 145, upon an inward movement of the switch 145. During the operation of the conveyor means 133, the cam 142 mounted on the shaft 134 rotates to a position where the dwell point 143 of the cam 142 is engaged by the roller 144 of the switch 145 riding within the dwell 143 of the switch 142, whereby the switch 145 is moved leftward, to the position illustrated in FIGURE 6.

The engagement of the roller 144 of switch 145 in the dwell 143 of cam 142 completes an initial starting circuit for the dispensing device through the circuit breaker 147, the switch 146, the switch 145, line 150, the solenoid 148, the line 159 and the line 160. A suitable voltage supply is provided across line 160 and the remote pole of the circuit breaker 147. Thus, the solenoid 148 is energized thereby magnetically drawing the pole 153 of the double-pole single throw switch 151 downwardly, into contact with the line 168. The pole 152 of the switch 151 is also drawn downwardly into contact with the line 167, whereby a closed circuit is effected actuating the solenoid 155 through the line 160, the line 158, the line 154, pole 152 of switch 151, line 167, line 162 and line 161.

Upon actuation of the solenoid 155, the pawl 156 is drawn to the left as viewed in FIGURE 6, against the action of spring 157, out of engagement with the teeth 123 on the clutch means 122, and thereby permitting the slip-clutch 122 to be operative to transmit driving torque from the motor 121 to the sprocket 124, the chain 125 and the sprocket 126 to the drive shaft 63, and consequently to the drive shaft 67, thereby permitting a slight instantaneous initiation of the operation of the dispensing device of this invention.

As soon as the dispensing device begins to operate, the continuously rotating shaft 134 rotates the cam 142 such that the roller 144 of the switch 145 is no longer engaged within the dwell 143 of the cam 142, thus forcing the switch 145 to the right as viewed in FIGURE 6, thereby breaking electrical contact between the switch 145 and the switch 146.

However, the initial engagement of the clutch 122 and consequent rotation of the shafts 63 and 67 have caused rotation of the cam 166 mounted on the shaft 67 to a position out of the dwell 165 of the cam 166. This movement of the roller 164 of the switch 163 out of the dwell 165 of the cam 166 completes a circuit from line 161, through line 162, through switch 163 which has been moved into a position of electrical contact with the line 168, through the pole 153 of the switch 152, through the line 150, across the solenoid 148, through the line 159, to line 160, whereby the solenoid 148 is again energized to retain poles 153 and 152 downwardly into contact with the lines 168 and 167 respectively. Thus, when the roller 164 is not within the dwell 165 of the cam 166, a complete circuit is also effected for energizing the solenoid 155 through the lines 160, 158, 154, the pole 152, the line 167, the line 162 and the line 161, thereby permitting actuation of the pawl 156 in the above-mentioned manner, and consequent actuation of the clutch means 122. The actuation of the clutch 122 will allow the motor 121 to transmit torque to the drive shafts 63 and 67, thus allowing the above-described dispensing operations to be effected. As soon as a complete cycle of operations has been completed, the shaft 67 will rotate the cam 166 to a position where the roller 164 will engage within the dwell 165 of the cam 166 and break the circuit which actuates the solenoid 155, thereby permitting the spring 157 to return the pawl 156 into engagement between teeth 123 of the clutch 122, whereby machine operation is stopped. It is to be noted that at all times when a complete cycle of machine operation has been effected, the roller 164 will engage in a stopped position within the dwell 165 of the cam 166, thus leaving the cam 166 in the correct position for the next operation.

It will also be noted that whenever the cam 142 and roller 144 of switch 145 are operative to energize the solenoid 148 and thereby to consequently energize the solenoid 155 for actuation of the clutch means 122, the roller 164 and cam 165 are disposed in positions not operative to actuate the solenoid 148, the solenoid 155 and consequently the clutch means 122. The converse of this is also true, such that when the cam 166 and switch 163 are operative to actuate the solenoid 148, the cam 142

and switch 145 are positioned to leave an open circuit between the switch 145 and the switch 146.

In FIGURE 24 there is illustrated an alternative conveyor means 181, comprising one or more rollers 182 having belt means 183 disposed therebetween to receive a dispensed container 46 from the hopper 34, in a manner similar to that described above. However, the embodiment illustrated in FIGURE 24 does not utilize spaced pusher lugs 140, but rather utilizes a rearward guide means 184 for correctly positioning the container 46 on the moving belt 183. The electrically actuated clutch response means illustrated in FIGURE 6 is also adapted for use with the type of conveyor means illustrated in FIGURE 24.

From the foregoing, it will be seen that novel and advantageous provisions have been made for carrying out the desired end. However, attention is again directed to the fact that additional variations may be made in this invention without departing from the spirit and scope thereof.

I claim:

1. In a machine for dispensing articles from a stack of articles within a hopper means, hopper means defining a path of movement of articles, means movable transversely of the path of movement of articles within the hopper means for limiting movement of articles outwardly of the hopper means, means for wedgingly separating an article adjacent the movement limiting means from other articles in the hopper means, means for propelling a separated article adjacent the movement limiting means away from the hopper means, said separating means remaining in engagement with the stack of articles in the hopper means while said propelling means propels a separated article away from the hopper means, and means independent of said separating means for restraining a force from other articles in the hopper means from being applied to said separating means.

2. The machine of claim 1 wherein the hopper is vertically disposed and the movement limiting means are at a lower end of the hopper means and are movable into and out of engagement with a lowermost article in the stack of articles.

3. The machine of claim 1 wherein the separating means are movable into and out of engagement with articles between adjacent articles in a stack.

4. The machine of claim 3 wherein the separating means includes opposed finger-like plunger means movable transversely of the path of movement of articles within the hopper means for wedgingly separating adjacent articles.

5. The machine of claim 1 wherein the restraining means are movable into and out of engagement with articles in the stack.

6. The machine of claim 5 wherein the restraining means include gripper means movable transversely of the path of movement of articles within the hopper means for engagement of article edges with articles therebetween.

7. The machine of claim 6 wherein said gripper means are of sponge rubber construction.

8. The machine of claim 6 wherein the restraining means are pivotally mounted and are resiliently biased away from the hopper means.

9. The machine of claim 8 wherein the restraining means includes cam operated pusher members in engagement with rearward sides of said restraining means and said gripper means are disposed on forward sides of said restraining means.

10. The machine of claim 5 wherein the restraining means are operable for engagement with articles in a stack when the movement limiting means are in a position not in engagement with a lowermost article in a stack of articles.

11. The machine of claim 10 wherein the hopper is vertically disposed and the movement limiting means are at a lower end of the hopper means and are movable into

and out of engagement with a lowermost article in the stack of articles, wherein the separating means are movable into and out of engagement with articles between adjacent articles in the stack and wherein the articles are gravity-fed to the lower end of the hopper means and the force to be restrained is that of the weight of the stack of articles in the hopper means.

12. The machine of claim 5 wherein the restraining means are operable for engagement with articles in a stack when the separating means are in a position of engagement with articles in a stack.

13. The machine of claim 1 wherein said propelling means are operable when the movement limiting means are in a position not in engagement with a lowermost article in a stack of articles and are rotatably mounted.

14. The machine of claim 1 wherein the propelling means include contacting portions for engagement with edge portions of a lowermost article in the stack of articles.

15. The machine of claim 1 wherein conveyor means are provided below said hopper means for receiving a dispensed article therefrom.

16. The machine of claim 15 wherein means are provided on said conveyor means for locating dispensed articles thereon at predetermined spaced positions.

17. The machine of claim 15 including means for commonly driving said restraining means, said movement limiting means and said separating means intermittently in response to movement of the conveyor means.

18. In a machine for dispensing articles from a stack of articles within a hopper means, hopper means defining a path of movement of articles, means for limiting movement of articles outwardly of the hopper means, means for separating an article adjacent the movement limiting means from other articles in the hopper means, means for restraining a force from other articles in the hopper means from being applied to said separating means, conveyor means disposed below said hopper means for receiving a dispensed article therefrom, electrical circuit means responsive to the conveyor speed, for actuating a clutch means; said clutch means being operable when actuated to facilitate commonly driving said restraining means, said movement limiting means and said separating means.

19. The machine of claim 1 wherein said propelling means comprises at least one pair of paddle means mounted on oppositely rotatable shafts.

20. The machine of claim 1 including means for commonly driving said restraining means, said movement limiting means, said separating means and said propelling means in timed relation; said driving means including oppositely driven shafts disposed on opposite sides of said hopper means, and cam means carried by said shafts for controlling the operation of said restraining means, said movement limiting means, and said separating means.

21. A machine for dispensing a lowermost carton from a stack of nested cartons having spaced lips comprising a vertically disposed hopper adapted to receive cartons

therein and having opposed shelf-like means at a lower end of the hopper for limiting vertically downward movement of cartons in the hopper; the shelf-like means being pivotally mounted and synchronously driven for movement between positions beneath a lowermost carton in the stack and out of a dispensing path of cartons leaving the hopper; the shelf-like means each being driven by members connected thereto and carrying rollers in engagement with associated cams mounted on first oppositely rotating shafts, opposed restraining plates disposed normally outwardly of and adjacent sides of the hopper and having grippers on opposing inner surfaces thereof; said plates being pivotally mounted on associated shafts and being movable toward and away from the hopper and being normally spring biased for synchronous movement of the grippers away from the hopper; pushers being disposed for contact against outer surfaces of the restraining plates; said pushers being pivotally mounted and synchronously driven by associated cams carried by said first oppositely rotating shafts, opposed pairs of spear-like finger members adapted for movement toward and away from the hopper transversely of a dispensing path of cartons dispensed from the hopper between spaced lips of adjacent cartons whereby a lowermost carton is wedgingly separated from an adjacent carton; said finger members being synchronously driven by associated cams mounted on said first oppositely rotating shafts, paddle means carried by second oppositely rotating shafts driven by the respectively associated first oppositely rotating shafts in timed relation; said paddle means being adapted to engage opposite lips of a just-separated lowermost carton and to propel the same downwardly, a conveyor means mounted below the hopper and having spaced lug means thereon for properly spacing dispensed cartons received by the conveyor, cam operated switch means associated with the conveyor means and responsive to the spacing of lugs on the conveyor means, a motor operative for rotating said first rotating shafts through a clutch means, and electrical circuit means responsive to said switch means for intermittently engaging said clutch means to transmit torque to said first rotating shafts.

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