

Aug. 21, 1962

A. M. LEITZEL

3,049,844

ARTICLE PACKING MACHINE AND METHOD

Filed Oct. 26, 1959

5 Sheets-Sheet 1

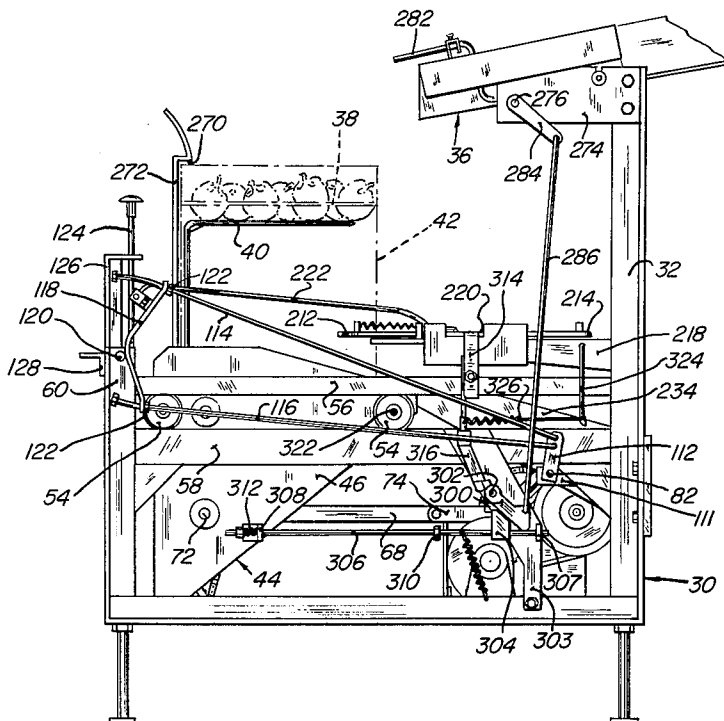


Fig. 1

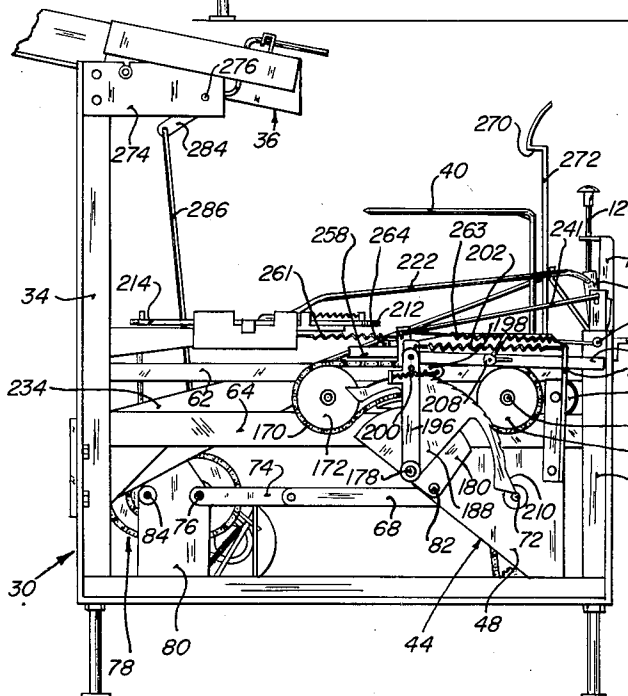


Fig. 2

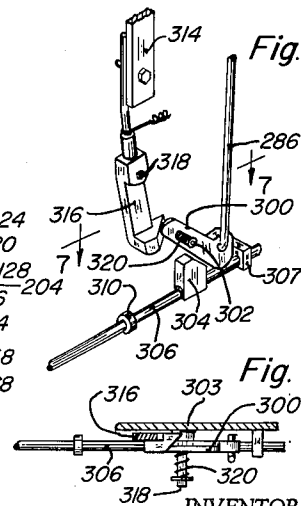


Fig. 6

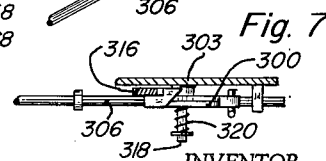


Fig. 7

INVENTOR.
AMMON M. LEITZEL

BY
Buckhorn, Cheatham & Blore
ATTORNEYS

Aug. 21, 1962

A. M. LEITZEL

3,049,844

ARTICLE PACKING MACHINE AND METHOD

Filed Oct. 26, 1959

5 Sheets-Sheet 3

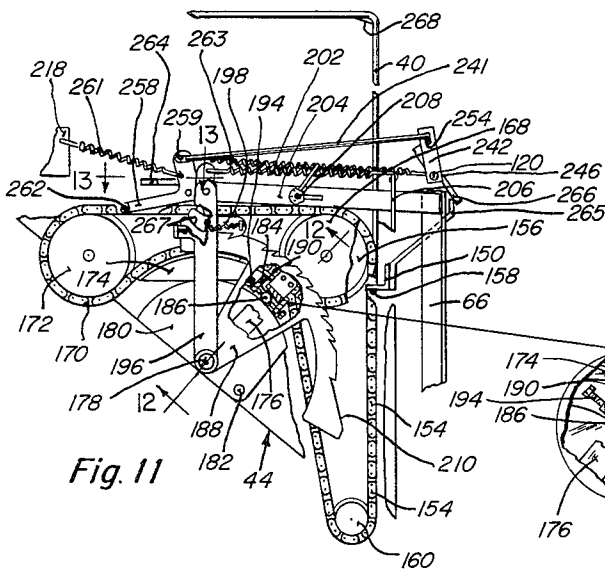


Fig. 11

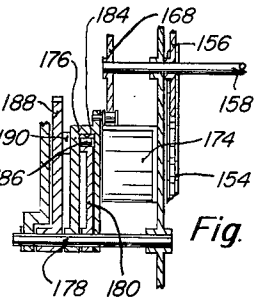


Fig. 12

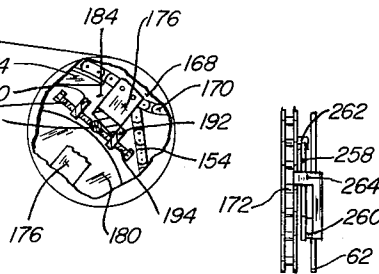


Fig. 13

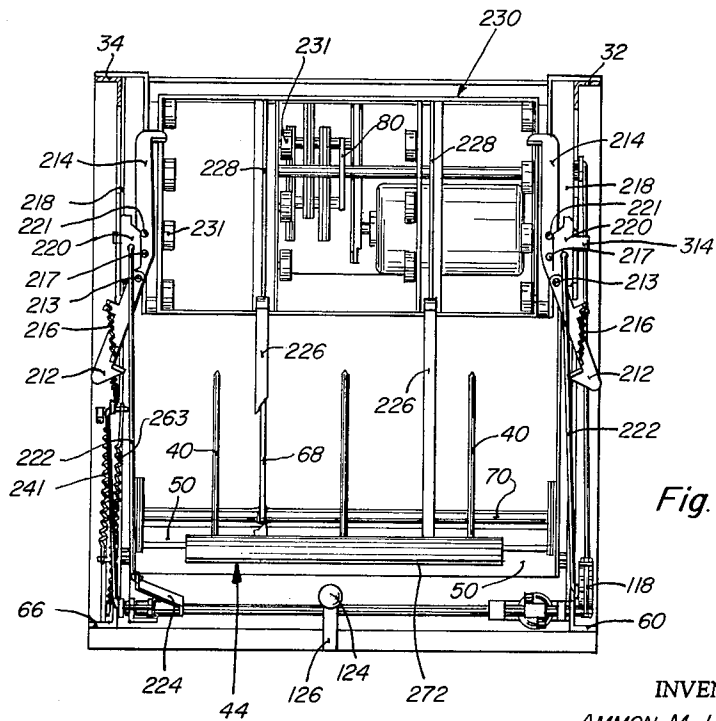


Fig. 5

INVENTOR.
AMMON M. LEITZEL

BY

Buckhorn, Cheatham & Blore
ATTORNEYS

Aug. 21, 1962

A. M. LEITZEL

3,049,844

ARTICLE PACKING MACHINE AND METHOD

Filed Oct. 26, 1959

5 Sheets-Sheet 4

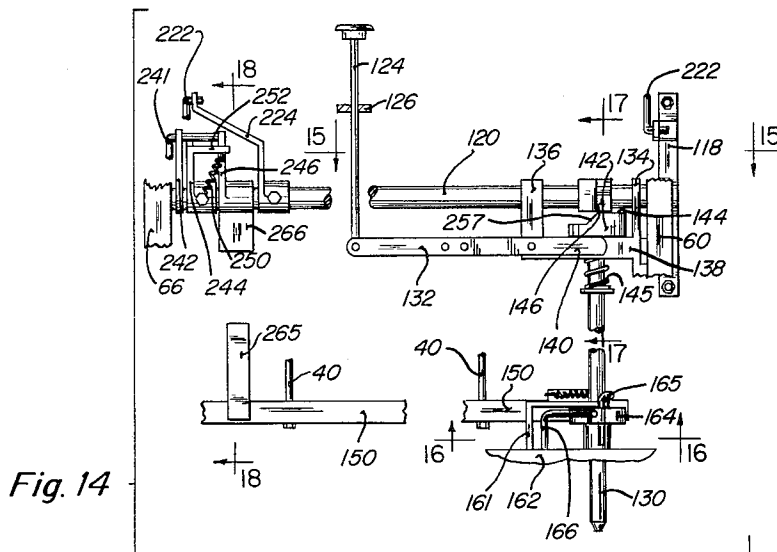


Fig. 14

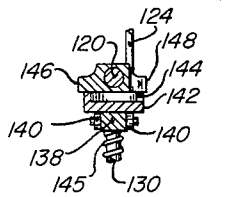


Fig. 17

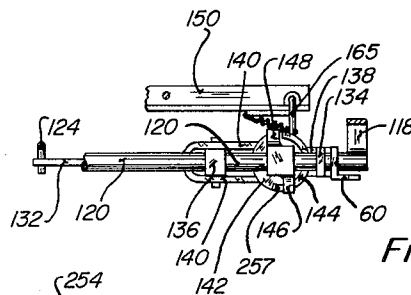


Fig. 15

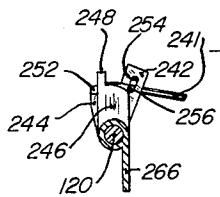


Fig. 18



Fig. 19

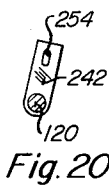


Fig. 20

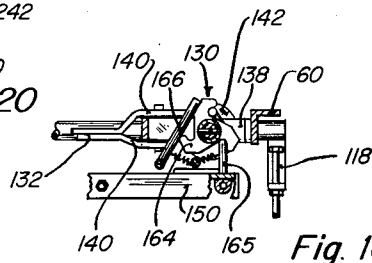


Fig. 16

INVENTOR.

AMMON M. LEITZEL

BY

Buckhorn, Cheatham & Blore

ATTORNEYS

Aug. 21, 1962

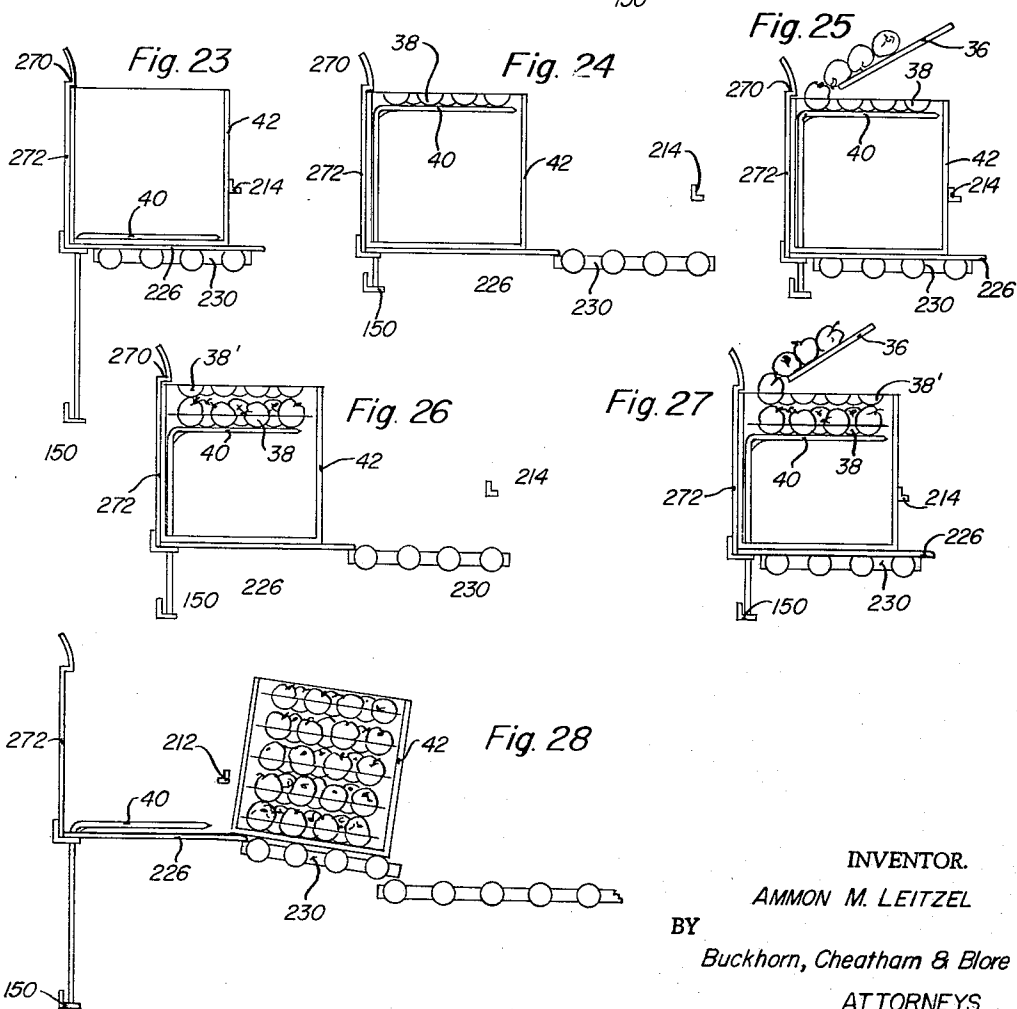
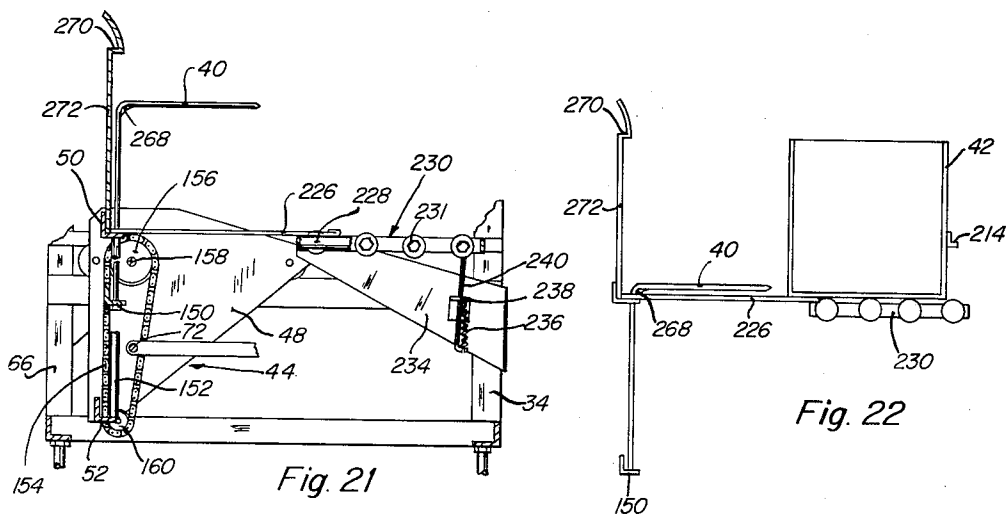
A. M. LEITZEL

3,049,844

ARTICLE PACKING MACHINE AND METHOD

Filed Oct. 26, 1959

5 Sheets-Sheet 5



INVENTOR.

AMMON M. LEITZEL

BY

Buckhorn, Cheatham & Blore
ATTORNEYS

1

3,049,844

ARTICLE PACKING MACHINE AND METHOD
Ammon M. Leitzel, Portland, Oreg., assignor to Pacific
Pulp Molding Co., Portland, Oreg., a corporation of
Washington

Filed Oct. 26, 1959, Ser. No. 848,651

11 Claims. (Cl. 53—35)

This invention relates to an article packing machine and method and more particularly to a machine and method in which a stack of superimposed packing trays and articles loaded thereon are positioned in a container having an open top but otherwise closed by progressively lowering a loaded tray or stack of such loaded trays in such container while adding loaded trays to the top of such stack.

The machine and method of the present invention is particularly adapted for packing fruit such as apples in paperboard cartons in which the apples or other fruits are supported upon and separated by trays made of molded pulp fibers. Such trays have article receiving pockets therein and large numbers of such trays are employed for packing apples in cartons. The conventional packing procedure is to place a tray in the bottom of an open carton and then place the apples manually in the pockets of the tray. Another tray is then placed on the resulting layer of apples and additional apples manually placed in the pockets of such tray. This is continued until the carton is filled. Such procedure is laborious and time consuming although a considerable improvement over the older procedure of wrapping each apple in an individual paper wrapper and placing it in a box or carton.

Attempts have been made to load the tray separately outside of the carton and then place them in the carton. A machine for rapidly loading the trays by supporting and reciprocating trays under a chute depositing measured amounts of fruit in such trays has been successfully operated but difficulty has been encountered in placing the loaded trays in the carton. Dropping of the loaded trays into the carton has caused bruising of the fruit and also the trays have frequently tipped during the tray dropping operation so as to be misaligned in the carton or even to spill the apples from the trays into the carton. It has then been necessary to remove the tray and apples manually and again attempt to drop a loaded tray into the carton. The difficulty of placing the loaded trays in the carton have prevented any considerable use of such machine.

In accordance with the present invention, a loaded tray is supported in a carton or other container near the open top thereof, and such tray or stack of loaded trays is progressively lowered in the container as more loaded trays or stack of trays are superimposed in the container. To provide such support, a lower portion of the carton is pierced by support elements which are then raised and lowered in the carton. In the machine specifically disclosed herein, a support mechanism for a tray or stack of loaded trays includes a plurality of similar laterally spaced parallel metal rods having vertical portions secured at their lower ends to a common support member and having horizontal portions extending rearwardly of the machine and at right angles from the upper ends of the vertical portions. The horizontal portions of the rods terminate in free ends provided with points for penetrating a wall of a container. The vertical portions are of somewhat greater length than the depth of the container and the horizontal portions of somewhat lesser length than the width of the container. The support rods are reciprocable both vertically in the direction of their vertical portions and horizontally in the direction of their horizontal portions.

2

An empty container, such as a carton with its cover elements folded back to provide an open top, is placed in the machine in an upright position such that the points of the horizontal portions of the support rods are directed toward a side wall of the carton at points adjacent a lower corner of the carton. The support rods are then moved horizontally toward the carton so that such points penetrate such side wall just above the upper surface of the bottom wall of the carton. The horizontal motion is continued until the horizontal portions of the rods are forced entirely into the carton adjacent its bottom wall. This slightly enlarges the holes produced by the penetration of the points and brings the vertical portions of the support rods just within the inner surface of the side wall referred to.

The support rods are then moved upwardly to bring their horizontal portions to a position adjacent the open top of the carton. The horizontal portions of the rods are thereby positioned to receive and support an article holding tray and constitute support portions for holding such tray in a horizontal position adjacent the open top of the carton. Such a tray can be manually placed in position on such support portions.

In the machine specifically shown, the carton and tray along with the support rods are then given a horizontal reciprocation under a measuring chute and returned. During the return movement of the carton, the measuring chute is tipped to load the tray by spreading a measured quantity of articles to be packed upon the upper surface of the tray. The support rods are also moved a distance downwardly which is approximately equal to the vertical height of a loaded tray. This places the loaded tray in position to have another empty tray manually placed on top of the articles in the loaded tray. The partly packed carton is then given another reciprocation under the chute to load such empty tray and move the stack of trays and articles downwardly. Another empty tray is positioned in the carton and the above described operations continued until the carton has been filled.

The tray support rods are then removed from the carton. Since the horizontal tray support portions of the support rods are in their lowermost position, they can be readily withdrawn from the carton. The filled carton is then discharged from the machine and the machine is in condition to receive another empty carton for another carton filling operation. The machine can be power driven and be made semiautomatic. It can be employed to rapidly pack articles such as pieces of fruit without damage thereto and without tipping of the trays or spilling articles therefrom.

It is therefore an object of the invention to provide an improved packing machine and method for packing articles on packing trays in containers for such objects and trays.

Another object of the invention is to provide a packing machine and method which can be employed to pack articles such as pieces of fruit on trays in a container in a rapid manner avoiding damage to the articles and avoiding spilling or misalignment of the trays.

Another object of the invention is to provide a packing machine and method in which supporting elements for trays receiving and holding articles being packed in a carton are inserted into such carton through a wall of the carton without substantial damage to the carton and in which such support devices progressively lower a filled tray or stack of filled trays as the carton is loaded with filled trays so that it is unnecessary to drop trays filled with articles into the carton.

A further object of the invention is to provide a packing machine and method in which pointed tray support elements are caused to penetrate into a side wall of a

container to provide horizontally extending support portions which are vertically movable in the carton and are moved downwardly during the filling of the container so that packing trays loaded with articles to be packed are progressively lowered in the container until the container is loaded, and then the support elements withdrawn from the container, all without material damage to the container.

A still further object of the invention is to provide a packing machine and method in which an open topped container to be packed is repeatedly reciprocated under a chute for discharging into the container a measured amount of articles to be packed and in which such articles are received on trays which are lowered a predetermined distance into such container for each such reciprocation so that dropping of the loaded trays into the container is avoided.

Other objects and advantages of the invention will appear in the following description of a preferred embodiment thereof described in connection with the attached drawings of which:

FIG. 1 is a side elevation of a machine in accordance with the present invention showing in dash dot lines the outline of a carton and of a tray and articles thereon supported at an elevated position in the carton;

FIG. 2 is partial side elevation of the other side of the machine from that shown in FIG. 1;

FIG. 3 is a partial front elevation of the machine of FIGS. 1 and 2 with parts broken away to show internal structure;

FIG. 4 is a partial rear elevation of the machine of FIGS. 1 to 3;

FIG. 5 is a horizontal section taken on the line 5—5 of FIG. 4 and showing most of the elements of the machine in top plan;

FIG. 6 is a fragmentary perspective view showing elements of a measuring chute actuating device;

FIG. 7 is a horizontal section taken on the line 7—7 of FIG. 6;

FIG. 8 is a fragmentary vertical elevation through the measuring chute of FIGS. 1 and 3;

FIG. 9 is a fragmentary vertical sectional view showing the drive mechanism of the machine including a speed reducing mechanism and certain of the elements of a one revolution clutch;

FIG. 10 is a fragmentary vertical sectional view taken on the line 10—10 of FIG. 9;

FIG. 11 is a fragmentary side elevation of the side of the machine shown in FIG. 2 with the parts in a different position and with parts broken away to show internal structure of mechanism for raising and lowering tray supports;

FIG. 12 is a fragmentary sectional view of a portion of the mechanism of FIG. 11, taken on the line 12—12 of FIG. 11;

FIG. 13 is a fragmentary horizontal section taken on the line 13—13 of FIG. 11 and showing a pawl forming part of the mechanism for raising the tray supports;

FIG. 14 is a diagrammatic front elevational view of the control mechanism for the machine including a manually actuated element for initiating the various cycles of the machine;

FIG. 15 is a fragmentary horizontal section through a portion of the control mechanism of FIG. 14 looking downwardly and taken on the line 15—15 of FIG. 14; such section showing a cycle selecting mechanism controlled by the position of the tray supports;

FIG. 16 is a fragmentary horizontal section through a portion of the same mechanism shown in FIG. 15 at a lower portion of the machine and looking upwardly, such section being taken on the line 16—16 of FIG. 14;

FIG. 17 is a fragmentary vertical section through another portion of the mechanism of FIGS. 15 and 16, taken on the line 17—17 of such FIG. 14;

FIG. 18 is a fragmentary vertical section through another portion of the control mechanism of FIG. 14, taken on the line 18—18 of FIG. 14 and showing a tripping mechanism for causing the tray supports to be moved to their uppermost position;

FIG. 19 is a side elevation of one of the elements of the mechanism of FIG. 16;

FIG. 20 is a side elevation of another of the elements of the mechanism of FIG. 16;

FIG. 21 is a partial vertical section through a portion of the machine from front to rear;

FIG. 22 is a diagrammatic view showing an empty carton positioned in the rear of the machine ready to be pierced by the tray supports movable from the front of the machine toward the rear thereof;

FIG. 23 is a view similar to FIG. 22, showing the carton still in the rear of the machine and pierced by the tray supports;

FIG. 24 is a view similar to FIG. 22, showing the carton and tray supports moved to the front of the machine with the tray supports moved to their uppermost position and a tray supported thereon;

FIG. 25 is a view similar to FIG. 22, showing the carton, tray supports and tray moved to the rear of the machine while such parts are maintained in the same relative positions as in FIG. 24;

FIG. 26 is a view similar to FIG. 22, showing the carton, tray supports and tray of FIG. 25 after being moved to the front of the machine and showing the tray in lower position and also showing articles being packed positioned on such tray and another tray positioned on such articles;

FIG. 27 is a view similar to FIG. 25, showing the carton and contents of FIG. 26 moved to the rear of the machine; and

FIG. 28 is a diagrammatic view showing the tray supports withdrawn from the carton and the carton being discharged from the machine after being filled by a repetition of the movements illustrated in FIGS. 24 to 27.

Referring more particularly to the drawings, the machine shown in FIGS. 1 and 2 includes a main frame 30 having upstanding rear corner posts 32 and 34 (see also FIG. 4), supporting a supply chute 36 shown in FIGS. 1, 3 and 8 for delivering a measured quantity of fruit or other articles onto a tray, such as the tray 38 indicated in dash dot line in FIG. 1. The tray 38 is positioned on support members 40 in a carton 42 also indicated in dash dot lines in FIG. 1. The carton and tray have been reciprocated under the chute 36 from their position at the front of the machine shown in FIG. 1 to the rear of the machine and back to the front of the machine and during its return movement to the front of the machine, a measured quantity of fruit has been delivered from the chute onto the tray. An empty tray is then placed on top of the articles and the carton again reciprocated under the chute. The tray support members are lowered each time the carton is thus reciprocated until the tray support members reach the bottom of the carton and the carton is filled.

To provide for such reciprocation, the carton is supported in a carriage 44 which has side plate members 46 and 48 (FIGS. 1 and 2) secured together by upper and lower cross members 50 and 52, respectively, both positioned at the front portion of the carriage. The upper crosspiece 50 is shown in FIGS. 3, 5 and 21 and the lower crosspiece 52 is shown in FIG. 21. The side plate members 46 and 48 of the carriage are provided with rollers 54 shown in FIGS. 1, 2 and 3, which run in tracks extending between the front and rear of the machine at the sides of the frame 30. The track for the rollers 44 on one side of the machine is provided by upper and lower track members 56 and 58, respectively, as shown in FIG. 1. The track members 56 and 58 are secured at their rear ends to the rear corner post 32 of the frame and at their front ends to an upstanding front corner post

5

60 of the frame. The track for the rollers 54 on the other side of the machine is provided by upper and lower track members 62 and 64, respectively, shown in FIG. 2. The track members 62 and 64 are secured at their rear ends to the rear corner post 34 and at their front ends to another upstanding front corner post 66.

The carriage 44 is reciprocated from its front position shown in FIGS. 1, 2 and 5 to the rear of the machine and back to such front position by a connecting rod 68 rigidly connected at one end to a sleeve 70 shown in FIGS. 3 to 5 and 21. The sleeve 70 is journaled upon a cross shaft 72 shown in FIGS. 1, 2 and 21, which cross shaft extends between the carriage side plate members 46 and 48. The other end of the connecting rod 68 is connected to one end of a crank arm 74 having its other end fixed on the output shaft 76 (FIGS. 2 and 9) of a speed reducer 78, of any desired type, the specific type shown being of the type having a plurality of speed reducing chain drives 79 in series. The chain drives include sprockets on shafts journaled in end plates 80 also shown in FIGS. 3, 4 and 9. The plates 80 extend upwardly from a subframe 81 (FIGS. 9 and 10) secured to the main frame 30 of the machine and provide journals for a drive control shaft 82. The drive control shaft controls a one revolution mechanism which causes one revolution of the shaft 76 and crank arm 74 to produce a rearward and then forward reciprocation of the carriage 44 each time the drive control shaft is given a pivotal movement in a clockwise direction in FIG. 10.

The speed reducer 78 forms part of the one revolution mechanism. Thus the speed reducer 78 has an input shaft 84 (FIGS. 2 and 10) driven from a motor 86 through a belt drive including a pulley 88 (FIG. 10) mounted on the input shaft 84, a pulley 90 mounted upon the shaft 92 of the motor and a belt 94 positioned upon such pulleys. The motor 86 runs continuously during operation of the machine but the belt 94 is normally sufficiently loose that the pulley 88 and shaft 84 are not rotated. The drive control shaft 82 has an arm 96 rigidly secured thereto and such arm has a right angularly disposed member upon which is journaled an idler pulley 98 which tightens the belt 94 upon the pulleys 88 and 90 to drive the speed reducer when the shaft 82 and arm 96 carried thereby are rocked in a clockwise direction in FIG. 10. The crank arm immediately starts one revolution, thus moving out of contact with the nose of a follower member 100 having its lower end pivotally mounted on the base of the subframe 81. Such pivoted follower member has its upper end connected to the upper end of an arm holding member 102 by a link 104. The arm holding member also has its lower end pivotally mounted on the subframe 81. The arm holding member is inclined as shown in FIG. 10 so as to be engaged by the free end of the arm 96 throughout the rocking motion of the arm described above.

The arm holding member 102 and follower member 100 are urged in a counterclockwise direction in FIG. 9 about their pivots by the spring 106 but are normally held in the position shown in FIG. 9 by the crank arm 74 and the arm 96 on the drive control shaft 82. When the free end of the arm 96 has been rocked to its uppermost position by the drive control shaft 82 and the crank arm 74 has moved away from the nose of the follower member 100, the members 100 and 102 are pivoted by the spring 106 to position in which a shoulder 108 on the arm holding member 102 is inserted beneath the free end of the arm 96 to hold it in its upper or rocked position. This holds the belt in tightened condition and the speed reducer is driven until the crank arm 74 again contacts the nose of the follower member 100 to move such member back to the position shown in the drawing. This moves the shoulder 108 of the arm holding member from beneath the free end of the arm 96. The arm 96 is then rocked in a counterclockwise direction in FIG. 10 by the spring 110 to lower the idler pulley 98 to thus

6

stop the drive. The crank arm 74 thus makes one revolution to reciprocate the carriage 44 rearwardly and then forwardly each time the shaft 82 is rocked in a counterclockwise direction in FIG. 10. The reciprocation of the carriage thus carries the carton under the supply chute for the tray loading operation above described. The carriage is also given such a reciprocation for discharging a filled carton and also another reciprocation to pierce another empty carton with the tray support members and then raise such member in the carton after which the tray loading reciprocations are repeated. A control mechanism causes this sequence of operations and each actuation of the control mechanism rocks the shaft 82 to cause a reciprocation of the carriage.

The drive control shaft 82 extends to one side of the machine and is also journaled in a bearing member 111 shown in FIGS. 9 and 1 secured to a rear corner post 32 of the frame. Such shaft has an upwardly extending lever arm 112 rigidly secured to its end adjacent such side of the machine. Upper and lower links 114 and 116 (FIG. 1) connect such lever arm 112 to the upper and lower arms, respectively, of a bell crank 118 rigidly secured to a control rock shaft 120 extending laterally across the front of the machine and journaled in the front corner posts 60 and 66 (FIG. 5). Both links 114 and 116 have lost motion connections to the arms of the bell crank 118. Thus, the links 114 and 116 slide in apertures in the arms of the bell crank and are provided with stops 122 which bear against the faces of the arms directed toward the lever arm 112 on the drive control shaft. It will be apparent that rocking of the control shaft 120 in either direction from the position shown in FIG. 1 will rock the drive control shaft 82 in a clockwise direction in FIG. 1 to cause the drive to reciprocate the carriage as above described.

The control shaft 120 is rocked by depressing a manually actuated slide member 124 guided for vertical reciprocation in an aperture in a guide member 126 (FIGS. 1, 2 and 3) secured to and extending upwardly from an upper front cross member 128 (FIG. 3) forming part of the main frame 30. As described below, repression of the sliding member will always rock the control shaft 120 one way or the other. The direction the shaft 120 is rocked controls the type of operation, such as a loading operation or a carton discharging operation, which is performed during the resulting reciprocation of the carriage. The direction in which the shaft 120 is rocked by any given depression of the slide member 124 is controlled by a selecting mechanism which is in turn controlled by the vertical position of the tray support members 40. Such selecting mechanism includes a rotary and vertically slidable selecting member 130 (FIGS. 3 and 14 to 17) which is reciprocated upwardly by a lever 132 when the manually actuated member 124 is manually depressed.

The lever 132 is pivoted intermediate its ends to a hanger member having vertically extending arms 134 and 136 surrounding the shaft 120 in bearing relationship and having a horizontally extending portion 138 forming an upper bearing for the selecting member 130. Such hanger member has one end secured to the front corner post 60 to prevent it from swinging on the control shaft 120. The lever 132 is bifurcated so as to have an arm 140 on each side of the horizontally extending portion 138 of the hanger member. The arms 140 terminate beneath a shoulder formed by a selector head 142 on the upper end of the selector member 130. The other end of the lever is pivotally connected to the lower end of the manually actuated slide member 124 so that depression of such member causes the arms 140 to raise the selector member 130 against the action of a compression spring 145 positioned between the horizontal arms 138 of the hanger member and a collar on the selector member 130.

The top surface of the selector head 142 has an upstanding flange 144 extending around approximately 180

degrees of its periphery and the control shaft 120 has secured thereto directly above the selector head 142 and flange 144 a rocker member having an arm 146 extending toward the front of the machine and a similar arm 148 extending toward the rear of the machine. It will be apparent from FIGS. 14, 15 and 17 that raising of the selector 130 when it is in the angular position shown in such figures by the lever 132 will rock the control shaft 120 in a clockwise direction in FIG. 17. This will rock the upper arm of the bell crank 118 of FIGS. 1 and 14 toward the rear of the machine to actuate the one revolution device previously described to cause a reciprocation of the carriage 44.

The selector has three angular positions 120 degrees apart and it will be apparent that rotation of the selector 130 in a clockwise direction in FIG. 15 will position the flange 144 of the selector head 142 so that raising the selector will still rock the control shaft in a clockwise direction in FIG. 17 to rock the upper arm of the bell crank 118 of FIGS. 14 and 1 toward the rear of the machine. Another rotation of the selector through 120 degrees will cause rocking of the control shaft in a counterclockwise direction in FIG. 17, when the selector member is raised. This will rock the lower arm of the bell crank 118 toward the rear of the machine. A further rotation through 120 degrees will return the selector to its original position, which is its normal position during tray loading reciprocations of the carriage. The selector is shown in such normal position in FIGS. 14 to 17, but the positions of the other parts shown in FIGS. 14 to 17 are such as to cause a carton piercing reciprocation of the carriage during which the tray supports 40 will piece an empty carton in the machine and then be raised to their upper tray loading position.

The tray support members 40 are of the inverted L-shaped form shown in FIGS. 1 and 2 with upper horizontally disposed tray support portions and also vertical portions extending downwardly from the tray support portions. As shown most clearly in FIGS. 3 and 21, the lower ends of the tray support members are rigidly secured to a vertically movable cross member 150 which is guided upon vertically extending guide rods 152 secured between the upper and lower front cross members 50 and 52 of the carriage 44. The ends of the movable cross member 150 are secured to vertically extending runs of chains 154, one of which is positioned at each side of the machine.

The chains 154 are each positioned on an upper sprocket 156 (FIGS. 11 and 21) fixed on a cross shaft 158 journaled in the upper portions of the side plate members 46 and 48 of the carriage 44, and are also each positioned upon a lower sprocket 160 journaled on a cross shaft extending between the lower portions of such side plate members. The vertical portions of the tray support members 40 extend through apertures in the upper cross member 50 of the carriage and it will be apparent that rotation of the cross shaft 158 will raise and lower the tray support member 40 in the carriage. Such shaft is rotated in one direction to lower the tray support members 40 in steps as the carriage is reciprocated during filling of the carton thereon with articles to be packed. The shaft is then rotated in the opposite direction to raise such members after a filled carton has been discharged and an empty carton to be filled has been placed in the machine and pierced by the tray support members.

The angular positions of the selector member 130 of FIGS. 3 and 14 to 17, also controls the direction of such rotation of the cross shaft 158 for raising and lowering the tray supports 40. The selective rotation of such selector to its three angular positions described above is effected by the reciprocative movement of the carriage in conjunction with the vertical position of the tray supports 40 and the movable cross member 150 to which they are attached. Thus the lower end of the selector 130

slides vertically in a guide member 161 secured to a lower front cross member 162 and also in a ratchet member 164 keyed to the selector 130 and held in position between such guide member and the cross member 162. A pawl 165 (FIGS. 3 and 14 to 16) is pivoted to the movable cross member 150 of the carriage and is positioned to engage the ratchet 164 to turn the selector member 130 to the next of its three angular positions whenever the carriage is returned to its forward position from a rearward reciprocation of the carriage and the tray supports 40 are either in their next to their lowermost position or in their lowermost position. A spring pressed stop member 166 pivoted on the lower cross member holds the selector 130 in each of its three angular positions.

The driving of the chains 154 to raise and lower the tray support members 40 is accomplished by rotating another sprocket 168 (FIGS. 2 and 11) fixed on one end of the cross shaft 158 upon which the upper sprockets 156 for the chains 154 are also fixed. A drive chain 170 is positioned on such sprocket and also another sprocket 172 journaled on the upper rear portion of the side plate member 48 of the carriage 44.

The lower run of the chain 170 is bowed upwardly over an arcuate guide member 174 secured to the plate member 48 between the sprockets 168 and 172. A chain driving member 176 (FIGS. 11 and 12) is pivoted at one of its ends on a stub shaft 178 secured to the side plate member concentrically with the guide member 174. The chain driving member has its other end connected to the arcuately bowed portion of the chain 170 and is of yoke shaped configuration as shown in FIG. 12. A brake member 180 (see also FIGS. 2 and 11) is positioned to be straddled by the yoke portion of the chain drive member 176 and has an arcuate surface concentric with the stub shaft 178. Such brake member is also mounted on the stub shaft 178 and is prevented from rotating relative to the side plate member 48 of the carriage by a bolt 182 extending between the brake member and side plate member.

The chain drive member 176 has a cam surface 184 spaced radially outwardly from the arcuate surface of the brake member 180 and inclined relative thereto so as to be at a lesser distance from the arcuate surface of the brake member in a direction toward the sprocket 168. A roller 186 is positioned between and in contacting relationship with the cam surface 184 and the arcuate surface of the brake member and has its axis parallel to the stub shaft. It will be apparent that movement of the chain driving member 176 and lower run of the chain 170 toward the rear of the carriage will jam the roller between such surfaces so as to produce a braking action preventing such movement. This is the direction of lowering of the tray support members 40 and prevents undesired lowering thereof by the action of a load on such support members.

A ratchet member 188 is also pivotally mounted on the stub shaft 178 and has a notched arcuate edge also concentric with such stub shaft. Such ratchet member has a pair of arms 190 and 192 extending axially of the shaft 178 adjacent the roller 186. One of the arms 190 is positioned on the side of the yoke portion of the chain driving member 176 which is toward the rear of the carriage and the other arm 192 is positioned on the side of such member 176 which is toward the front of the carriage. The two arms are spaced so as to engage the chain driving member 176 with a lost motion action. Each arm has an adjustable element 194 directed toward the roller and the adjustment is such that the element 194 of the arm 192 forces the roller out of jamming relationship with the surface 184 to release the braking action, above discussed, when the arm 192 is against the chain driving member 176.

The various parts are shown in FIG. 11 in the position in which the tray supporting members 40 are in their uppermost position. Thus the chain driving member 176

and the ratchet member 188 are both pivoted to the limit of their movement in a clockwise direction in such figure, and the lower run of the chain 170 is therefore also at the limit of its movement toward the front of the carriage.

The ratchet member 188 is pivoted in a counter-clockwise direction in FIG. 11 in adjustable steps during a carton filling operation. This is accomplished by a stepping mechanism including a pawl carrier 196 having its lower end also pivoted on the stub shaft 178. The pawl carrier has a pawl 198 pivotally mounted thereon in position to engage the notches in the ratchet member 188. The pawl is held in engagement with the ratchet member 188 by a spring 200 arranged to have an over center action so that it will also hold the pawl in an elevated position out of contact with the ratchet member.

The upper end of the pawl carrier 196 is urged toward the front of the carriage by a tension spring 202 connected to a pawl carrier actuating member 204 having one end pivoted to the upper end of the pawl carrier and extending forwardly of the carriage through a guide member 206 on the upper front portion of the carriage. When the carriage is in its forward position shown in FIGS. 2 and 11, the forward end of the pawl carrier actuator 204 abuts against the front corner post 66 of the machine to hold the pawl carrier in the position shown in such figures.

The actuator member 204 has a stop device 208 pivotally mounted thereon intermediate the ends of such actuator member. The stop device 208 has radially extending stops of different lengths. By pivoting the stop device on the actuator member 204 to different positions, such stops can be selectively positioned to be engaged by the guide member 206 on the carriage 44. When the carriage 44 is moved toward the rear of the machine on a tray loading reciprocation, the spring 202 causes the actuator 204 to remain in contact with the corner post 66 until the one of the stops on the stop device which is aligned with the actuator is engaged by the guide member 206 on the carriage. The pawl carrier is thereby pivoted in a clockwise direction relative to the ratchet member a distance determined by which stop on the actuator 204 is directed toward the guide member 206. The shorter, intermediate and longer stops on the stop member 208 may, for example, produce lowering of the tray support members 40 in either 4, 5 or 6 steps, respectively.

Any drag of the pawl on the ratchet member tending to pivot such ratchet member toward the front of the machine will tend to jam the roller more firmly between the braking surface on the brake member 180 and the cam surface on the chain driving member 176 so as to resist such movement of the ratchet member. The pawl will drop into the appropriate notch in the ratchet member after having traveled a distance determined by the selected stop on the stop member 208.

On return of the carriage to the front of the machine, the actuator 204 engages the corner post 66 and continued motion of the carriage causes counterclockwise pivotal motion of the pawl carrier 196 and ratchet member 188. The adjustable element 194 of the arm 192 of the ratchet member pushes the roller out of jamming engagement with the brake and cam surfaces above described, and the arm 192 then engages the chain driving member 176 to cause it to pivot such member also in a counterclockwise direction. For example, the ratchet member is moved from the position of FIG. 11 to that of FIG. 2 by two reciprocations of the carriage. Each step moves the lower run of the chain 170 in a direction toward the rear of the carriage to lower the tray support members 40 a distance determined by the selected stop on the stop member 208.

Successive tray loading reciprocations of the carriage progressively lower the tray supporting members 40 and when such members reach their lowermost position, the carton has been filled and the ratchet member 188 has reached the limit of its counterclockwise movement in FIG. 11. At the start of the next carriage reciprocation,

which is a carton discharging reciprocation described below, the pawl carrier 196 again pivots in a clockwise direction in FIG. 11 so that the latch end of the pawl 198 is cammed upwardly by the inclined surface 210 on the end of the ratchet member toward the front of the carriage. The pawl is thus moved to its upper over center position out of engagement with the ratchet member. This conditions the tray supporting mechanism for movement of the ratchet member in a clockwise direction in FIG. 11 when the tray supporting members are again raised in a subsequent operation.

Since the tray supporting members 40 are in their lowermost position under the conditions just described, the pawl 165 of FIGS. 14 to 16 has twice rotated the selector 130 from its normal position through angles of 120 degrees. This happens during return of the carriage from its last two tray loading reciprocations as described above. Such selector member is thus in an angular position which will cause rocking of the control shaft 120 in a counterclockwise direction in FIG. 1, when the member 124 is manually depressed. This causes a carton discharging reciprocation of the carriage including conditioning a front hook member 212 at each end of the machine for engaging the carton to prevent its return with the carriage to the front of the machine. As shown in FIG. 5, the rear ends of the front hook members 212 are pivotally mounted on pins 213 extending upwardly from the front ends of rear hook members 214 for movement about a vertical axis and are urged by springs 216 toward the center of the machine. The rear hook members are in turn pivoted at 217 to the upper portions of stationary support members 218 for movement about vertical axes. The support members 218 are secured to and extend forwardly from the rear corner posts 32 and 34 of the frame.

A slide member 220 on the upper surface of each support member has cam surfaces at its front end which engage the pin 213 of the associated rear hook member. The slide member also has a cam surface at its rear end which engages another pin 221 on the associated rear hook member 214. The slides will thus pivot such rear hook members about their pivots 217 so that the front hook members 212 are moved toward the center of the machine when the slide members 220 are moved toward the front of the machine. Such slide members are connected by links 222 on each side of the machine to upwardly extending arms on the control shaft 120. The link 222 on one side of the machine is connected to the upper arm of the bell crank 118 (FIG. 1) and on the other side of the machine to an arm 224 (FIGS. 2, 5 and 14).

When in position of the carriage 44, the carton 42 of FIG. 1 is supported upon rearwardly extending bar members 226 (FIGS. 5 and 21) which are secured at their forward ends to the upper front cross member 50 of the carriage. The bar members extend over and slide on rails 228 forming part of a carton discharge roller conveyor section 230 having a horizontally disposed rectangular frame provided with a plurality of rollers 231. The conveyor section 230 is pivoted at 232 (FIG. 4) to upwardly and forwardly extending stationary support members 234 (see also FIGS. 1 and 2) also secured to the rear corner posts 32 and 34. The pivots 232 provide for tipping of the conveyor section about a horizontal axis. As shown most clearly in FIG. 21, the rear portions of the conveyor section 230 is resiliently supported on tension springs 236 extending between a bracket 238 on a support member 234 and a downwardly extending member 240 secured to the conveyor section 230.

When the control shaft 120 is rocked in a counterclockwise direction in FIG. 1, the slides 220 are moved forwardly from the position shown in FIG. 5 to swing the front hook members 212 in against the carton 42 of FIG. 1. Such swinging motion is sufficient to tension the springs 216. When the carton has been moved to the rear of the machine by a discharging reciprocation of

11

the carriage 44, the hooks 212 engage behind the carton to hold it in the rear of the machine. When the carriage returns forwardly, the tray supporting members 40 are withdrawn from the carton and also the carton supporting bar members 226 are withdrawn from beneath the carton. The weight of the filled carton is thus placed on the conveyor section 230. The rear end of such conveyor section tips downwardly against the action of the springs 236 and the filled carton moves rearwardly on the rollers 231 out of the machine onto any suitable receiving mechanism. The springs 236 then return the conveyor section 230 to its level position.

The mechanism for raising and lowering the tray supporting members 40 has remained inactive during such carton discharging reciprocation of the carriage but the counterclockwise rocking of the control shaft 120 to cause such reciprocation and the rotation of the selector 130 by the return of the carriage from such reciprocation has conditioned such mechanism so that the tray supporting members will be raised to their uppermost position during the return of the carriage from its next reciprocation which is a carton piercing operation. This conditioning is accomplished by elements shown most clearly in FIGS. 14 and 18, which elements actuate a link 241 to cause such tray supporting member raising operation. Such elements include a link guiding arm 242 journaled on the shaft 120, a link actuating arm 244 fixed on such shaft and a link release member 246 also journaled on the shaft. These elements are shown in the link actuating position in FIGS. 14 and 18 ready to cause raising of the tray supporting members upon the next manual actuation of the member 124 and resultant reciprocation and return of the carriage. At all other times the bent end of the link 241 is supported upon the cam surface 248 at the top of the link release arm 246.

A spring 250 (FIG. 14) urges the link release arm in a counterclockwise direction in FIG. 18 against a stop 252 on the link actuating arm 244. For the preceding carton discharging reciprocation of the carriage described above, the shaft 120 was rocked in a counterclockwise direction from its normal position of FIGS. 1 and 18. The link releasing arm 246 followed the link actuating arm 244 so as to remove the cam surface 248 from beneath the bent end of the link 241. Such end of the link then dropped in the slot 254 in the link guiding arm 242 so as to be positioned in front of a notch 256 in the link actuating arm 244. Such notch is shown most clearly in FIG. 19. Upon return of the carriage from such carton discharging operation, the selector 130 is rotated to its position shown in FIGS. 14 and 15. An inclined surface 257 on the leading edge of its upwardly extending flange moves under the rearwardly extending arm 146 on the control shaft 120 to rock such shaft in a clockwise direction in FIGS. 1 and 18 back to its normal position. This pushes the link 241 to the right in FIG. 18. This is the position of the link 241 in FIG. 13 except that the bent end of the link has been again raised in the slot by the link release arm 246 in a subsequent operation described below.

The other end of the link 241 is connected to the upper end of an upwardly extending arm of a bell crank member 258 (FIG. 11) pivoted on an upwardly extending bracket 260 (FIG. 13) on the upper track member 62 for the carriage. The connection of the link 241 to the bell crank member is by a lost motion connection provided by a slot 259. The bell crank member 258 is urged in a counterclockwise direction in FIG. 11 by a spring 261 and has a horizontally and rearwardly extending arm, which in the position shown in FIGS. 11 and 13, is in the path of a laterally extending pin 262 on the upper run of the chain 172. With the position of the parts of FIG. 11 the carriage has just made a carton piercing reciprocation. Prior to this reciprocation the tray supporting members were in their lowermost position and the pin 262 was at the right end of the chain

12

170 in FIG. 11. The link 241 and upper arm of the bell crank 258 are normally urged to the right in FIG. 11 by a spring 263 connected between the rear end of such link and the frame of the machine. Such spring is strong enough to overcome the spring 261 and hold the lower arm of the bell crank member 258 in the raised position shown in FIG. 2 against a stop 264 (FIGS. 11 and 13) secured to the bracket 260 on the upper track member 62 of the frame of the machine. Such stop 264 and spring 261 determine the normal position of the link 241. However, the link is held in its left position in FIG. 11 against the action of the spring 261 during the carton piercing reciprocation by having its other end engaged in the notch 256 (FIGS. 18 and 19) of the link actuating member 244 on the control shaft 120 as discussed above.

The lost motion connection provided by the slot 259 in the bell crank member 258 enabled the control shaft 120 to be rocked in a counterclockwise direction in FIG. 11 to start the carton piercing reciprocation of the carriage. Also when the carriage moved to the rear of the machine during the carton piercing reciprocation, which is in a direction to the right in FIG. 11, the lost motion connection provided by the slot 259 enabled the pin 262 to cam up the horizontally extending arm of the bell crank 258 and pass under this arm. This arm again dropped to the position shown due to the action of the spring 261 so that return of the carriage engaged the pin 262 with such arm of the bell crank 258 to hold the upper run of the chain 170 stationary while the carriage continued its movement to the left. The sprockets 168 and 156 of FIG. 11 are thereby rotated to cause the chains 154 to raise the tray supporting members 40. In FIG. 11, the carriage has returned from such reciprocation and, because the vertical movable cross member 150 of the carriage is in its uppermost position, a link release member 265 on such cross member has engaged a downwardly projection portion 266 (see also FIGS. 14 and 18) on the link releasing arm 246 to pivot such arm in a counterclockwise direction in FIG. 11 (clockwise in FIG. 18) to cam the bent end of the link 241 upwardly out of the notch 256. As soon as the carriage starts its next reciprocation, which is a tray loading reciprocation, the link release member moves out of engagement with the release arm to allow the spring 263 to pivot the lower arm of the bell crank member 258 out of the path of the pin 262. This disables the tray support raising mechanism until the next carton piercing reciprocation of the carriage.

Holding the upper run of the chain 170 stationary by engagement of the pin 262 thereon with the lower arm of the bell crank member 258 during return of the carriage from a carton piercing operation moves the lower run of such chain to the right in FIG. 11 with respect to the carriage 44 over the arcuate chain guide 174. This pivots the chain driving member 176 in a clockwise direction in such figure to force it against the arm 192 on the ratchet member 188 which is at the right of the chain driving member in FIG. 11. The adjustable member 194 on such arm moves the roller 186 out of jamming contact with the brake member 180 and the cam surface 184 on the chain driving member to release the braking action described above. The chain driving member can therefore pivot the ratchet member to the position shown in FIG. 11. In such position, an inclined surface 267 on the left end of the ratchet member engages the end of the pawl 198 opposite its ratchet engaging end to return the pawl from its upper overcenter position described above to its lower overcenter position shown in FIG. 11. In the latter position, it is conditioned to engage the ratchet 188 for subsequent tray support member lowering operations during the succeeding tray loading reciprocations of the carriage.

Prior to the carton piercing reciprocation just described, an empty carton is placed manually in the ma-

chine so as to rest on the conveyor section 230 at the rear of the machine, but such carton does not have enough weight to tip such section about its pivots 232. The clockwise rocking of the control shaft 120 in FIGS. 1 and 18 under control of the selector 130 to cause a carton piercing reciprocation of the carriage, also moved the slides 220 (FIG. 5) rearwardly to swing the front hook members 212 out of the path of the carton and place the rear hook members 214 in the position of FIG. 5 so as to engage the rear of the carton. Movement of the carriage rearwardly thus causes the tray supporting members 40 to pierce the carton while held by the hook members 214. Such supporting members have short angular knife edges 268 in the side of the right angular bends therein to cut a lower corner of the carton and enable the supporting members 40 to move horizontally entirely into the carton. The carriage also has an upper hooked portion 270 on an upstanding front plate 272 secured to the upper cross member of the carriage. Such hooked portion is positioned over the upper front edge of the carton at the end of the rearward movement of the carriage. Upon return of the carriage to the front of the machine, the tray supporting members are raised as above described, and during such raising operation, the hooked upper portion 270 prevents upward movement of the carton.

When the empty carton has thus been pierced and the tray support members raised in the carton, the machine is ready for a series of carton loading reciprocation of the carriage. Each time the carriage approaches its rear position in the machine in a tray loading reciprocation, the measuring chute is actuated to place a measured load of articles on a tray previously manually placed in the carton, but the measuring chute is not actuated during carton discharging and carton piercing reciprocations of the carriage. The measuring chute is of the general type shown in the patent of Carlsen No. 2,797,540. As shown in FIGS. 1, 3 and 8, such chute is supported between side plates 274 extending forwardly from the rear corner posts 32 and 34. Such chute is secured to a cross shaft 276 journaled in the side plates 274 and has its lower portion in alignment with a supply chute 278.

A measured supply of fruit or other articles to be packed enters the measuring chute 36 and is held therein by a gate 280 adjustably mounted on gate support rods 282 at the sides of the chute 36. The rods extend rearwardly and downwardly and are pivoted to the side plates 274 at the rear ends of the rods. An arm 284 rigidly secured on the shaft 276 has connected to its free end a link 286 so that upward movement of the link pivots the chute 36 to depress its front end and elevate its rear end. Such rear end carries another gate 288 extending downwardly therefrom which closes the supply chute. Such downward tipping of the measuring chute 36 causes laterally extending ears 290 on such chute to engage and pivot the front end of the gate support rods 282 upwardly to raise the gate 280 and discharge the measured load onto a tray in the carton.

The link 286 has its lower end connected to one end of a chute actuating arm 300 (FIG. 1) which has its other end mounted on a pivot 302 carried by a support member 303 secured to the side of the frame of the machine. The end of the arm 300 to which the link 286 is connected is raised by a reciprocable cam member 304 mounted on a sliding rod 306 having one end slidable in a bracket 307 on the support member 303 and its other end slidable in a bracket 308 on the carriage 44. The cam member is positioned to engage on intermediate portion of the arm 300. The sliding rod 306 has a collar 310 fixed intermediate its ends and when the carriage 44 is reciprocated to the rear of the machine, the collar is engaged by the bracket 308 on the carriage to move the rod and cam member 304 to the right in FIG. 1 to rotate the arm 300 about its pivot 302 and thereby raise the link 286 to actuate the measuring chute 36.

The link remains in elevated or chute actuating position until the carriage 44 has returned to nearly its front position in the machine. The bracket 308 then engages a spring 312 held on the front end of the push rod 306 by a collar so that the cam member is pulled to the left in FIG. 1. This allows the chute to return to its normal position for receiving another load of articles to be packed. The articles to be packed are spread on a tray in the upper portion of the carton 42 during return of the carriage to its front position and this operation is repeated for each tray filling reciprocation of the carriage.

Just prior to a carton discharging reciprocation of a filled carton, the pawl 165 shown in FIGS. 3 and 14 has been lowered to twice rotate the selector 130 through an angle of 120 degrees to a position which causes the control shaft 120 to be rocked in a counterclockwise direction in FIG. 1 upon the next manual depression of the member 124. Such rocking of the control shaft moves the slides 220 (FIG. 5) for actuating the hook members 212 and 214 to their forward position. The slide 220 at the right of the machine in FIG. 5 has an outwardly and downwardly depending member 314 (FIGS. 1 and 6) which carries an element engaging the upper end of a pivoted cam member 316 mounted upon a pivot 318 (FIGS. 6 and 7) secured to the support member 303 (FIGS. 1 and 6). The pivoted arm 300 is also slidable laterally of the machine on its pivot 302 and a compression spring 320 on the pivot 302 urges it toward the support member 303 and into alignment with the reciprocable cam member 304 on the push rod 306. When the pivoted cam member 316 is rocked in a counterclockwise direction in FIGS. 1 and 6, the lower end of such member engages the arm 300 to cam it outwardly against the action of the spring 320 so as to remove such arm from the path of the cam member 304. The rearward movement of such cam member during the carton discharge reciprocation of the carriage therefore does not pivot the arm 300 to actuate the measuring chute. The lower end of the pivoted cam member 316 is moved behind the arm 300 so that it remains in such position until forcibly removed.

Near the end of the rearward travel of the carriage in its carton discharging reciprocation, a laterally extending pin 322 on the shaft for the rear carriage roller 54, on the side of the machine shown in FIG. 1, strikes a downwardly extending arm 324 to pivot the lower end of such arm toward the rear of the machine. The lower end of such arm is connected to the upper arm of pivoted cam member 316 by a spring 326 and tends to pivot such cam member out of engagement with the pivoted arm 300. The slide 220 carrying the depending member 314 is, however, still in its forward position and prevents such pivoting of the cam member. The lower end of the pivoted cam member 316 thus remains behind the arm 300 to keep it out of the path of the cam member 304 to prevent actuation of the measuring chute.

At the beginning of the next reciprocation of the carriage, which is a carton piercing reciprocation, the control shaft 120 is rocked in a clockwise direction in FIG. 1 to move the slide 220 and depending member 314 rearwardly in the machine. Such depending member is moved out of engagement with the upper arm of the pivoted cam member 316. Such cam member, however, remains in behind the arm 300 to hold such arm out of the path of the cam member 304 until the pin 322 on the carriage strikes the arm 324 to tension the spring 326. This pivots the cam member 316 to the position shown in FIGS. 1 and 6 so that the tray actuating mechanism is conditioned for operation during the succeeding tray loading reciprocations of the carriage. The pivoting of the cam member 316 out of contact with the arm 300 occurs too late in the travel of the carriage during the carton piercing reciprocation to actuate the measuring chute 36 in that reciprocation since the cam 304 is already behind the chute actuating arm 300. Upon return of the

15

carriage to its front position, the cam 304 is returned to its forward position and the spring 320 moves the arm 300 back into the path of the cam 304. The machine is then in condition for another series of tray loading reciprocations of the carriage.

The operation of the machine should be apparent from the above detailed description but a statement of operation will be given in conjunction with diagrammatic FIGS. 22 to 28, which also illustrate the method of the present invention. It is convenient to start with the tray supporting members 40 in their lowermost position ready to pierce an empty carton 42 which has been manually placed on the conveyor section 230 in the rear of the machine. The control mechanism of FIGS. 14 to 20 are all in the position shown in such figures so that manual depression of the member 124 to raise the selector 130 causes the flange 144 of the selector to engage the forwardly extending arm 146 on the control shaft 120 to rock such shaft in a clockwise direction in FIG. 1. This pushes the two links 222 (FIGS. 1, 2 and 5) toward the rear of the machine to move the cam slides 220 rearwardly and pivot the rear hook members 214 into position behind the carton.

The rocking of the control shaft 120 clockwise in FIG. 1 also pushes the link 114 rearwardly to rock the drive control shaft 120 clockwise in such figure and in FIG. 10. This pivots the belt tightening arm 96 of FIG. 10 to cause the roller 98 to tighten the belt 94 and start the rotation of speed reducer input shaft 84. The crank arm 74 on the speed reducer output shaft 76 (FIG. 9) rotates to release the pivoted follower member 100 and connected pivoted arm holding member 102 so that the shoulder 103 on the latter member engages under the end of the arm 96 to maintain the belt 94 in tightened condition and the drive in operation. The drive continues until the crank arm has made one revolution at which time it engages follower member 100 to pivot such member and the arm holding member 108 to release the belt tightening arm 78. The spring 110 pivots the belt tightening arm to loosen the belt 94 and stop the drive. This also rocks the drive control shaft 82 in a counterclockwise direction in FIGS. 10 and 1 to similarly rock the control shaft 120 through the link 114 back to its normal position.

The one revolution of the crank arm 74, acting through the connecting rod 68, causes the carriage to make a reciprocation to the rear of the machine and back to the front of the machine. In its rearward travel, the tray supporting members 40 move from the position shown in FIG. 22 to the position shown in FIG. 23. The pointed upper portions penetrate a side wall of the carton just above the bottom wall and the knife edges 268 of the tray supporting members cut through the lower corner of the carton while the carton is held in position by the rear hook members 214 so that such upper portions move entirely within the carton. Also the carton supporting bars 226 are inserted below the carton 42 and the hooked upper end 270 of the front plate 272 of the carriage has hooked over the front upper edge of the carton.

Upon return of the carriage from its rear position shown in FIG. 23 to its front position shown in FIG. 24, the tray supporting members are raised from their lower position shown in FIG. 23 to their upper position shown in FIG. 24. The carton 42 is held down during this operation by the hooked portion 270 of the front plate 272. The raising of the tray support members is accomplished by positioning the lower arm of the bell crank member 258 of FIGS. 2, 11 and 13 in the path of a pin 262 on the drive 170. This pin was at the right of the upper run of the chain 170 in FIGS. 2 and 11 at the beginning of the carton piercing reciprocation of the carriage and at the same time, the lower arm of the bell crank member 258 was being held in the path of the pin by the spring 261. When the carriage made its rearward movement during such reciprocation, the pin 262 cammed up and passed under the lower

16

arm of the bell crank member 258 and such arm then dropped in front of the pin.

The pawl 198 (FIGS. 2 and 11) is in its upper inactive position and upon return movement of the carriage 44, the upper run of the chain 170 is held stationary so that such upper run is moved rearwardly relative to the carriage. This rotates the sprockets 168 and 156 of FIG. 11 to raise the tray support members. This also moves the lower run of the chain 170 forwardly relative to the carriage to pivot the chain driving member 176 in a clockwise direction in FIG. 11. This releases the braking action caused by the roller 186 between the chain driving member 176 and the braking member 180 and pivots the ratchet member 188 clockwise in FIG. 11 to the position shown in such figure. The pawl 198 on the pawl carrier 196 is pivoted over center from its upper inactive position to its lower ratchet engaging position shown in FIG. 11.

The bell crank member was held in the position of FIG. 11 during the carton piercing operation because the forward end of the link 241 was engaged in a notch 256 (FIG. 19) of a link actuating arm 244 fixed on the control shaft 120 (FIGS. 2, 11 and 14 to 20) and the control shaft was held in its normal position to prevent forward rocking of the arm 244 by the upwardly extending flange 144 (FIGS. 14 and 15) of the selector 130 being positioned below a forwardly extending arm on the control shaft 120. This held the link 241 in its rearward or left position in FIG. 11 against the action of the spring 263 to enable the spring 261 to pivot the bell crank member to the position in front of the pin 262 shown in such figure.

Return of the carriage to its front position also causes a link releasing member 265 on the vertically movable cross member 150 of the carriage 44 to engage a downwardly projecting portion 266 on a link release arm 246 (FIG. 18) to pivot such arm in a clockwise direction in FIG. 18 to cam the bent end of the link 241 upwardly out of the notch in the link actuating arm 244. This is the position of the parts in FIG. 11 and it is the engagement of the link releasing member 265 with the downwardly projecting portion 266 of the link releasing arm 246 which is still holding the link 241 in its rearward position shown.

As soon as the carriage starts another reciprocation, the link releasing member 265 will move out of contact with the downwardly projecting portion 266 of the link releasing arm 246 so that the spring 263 will move the link 241 to the right in FIG. 11 and pivot the bell crank member to its inactive position shown in FIG. 2. The bell crank member remains in such position until the next carton piercing and tray supporting member raising reciprocation of the carriage. The link releasing member 265 moves downwardly with the tray supporting members during return of the carriage from its next or first tray loading reciprocation and does not again engage the link releasing arm 246 until the tray supporting members are again raised.

During the carton piercing and tray supporting member raising reciprocation just described, actuation of the measuring chute to deliver a load into the carton is prevented. The pivoted cam 316 of FIGS. 1, 6 and 7 had its lower end positioned behind the chute actuating arm 300 to move it laterally outwardly of the machine out of the path of the cam 304 on the sliding rod 306 which is moved by the carriage 44 during a reciprocation of the carriage. The link 286 and chute arm 284 were therefor not actuated. During the latter part of the rearward movement of the carriage in its carton piercing reciprocation, the pin 322 (FIG. 1) on the carriage engaged the pivoted arm 324 to tension the spring 326 to pivot the cam member 316 and remove its lower end from behind the chute actuating arm 300. The spring 320 (FIG. 7) urges the chute actuating arm 300 toward the path of the cam 304 but such cam is already behind the arm 300. When the carriage returns to its forward position, the sliding rod 306 is moved forwardly to remove the cam 304 from behind the arm 300. The arm 300 is then moved into the path of the cam 304

and the machine is in condition for a first tray loading operation.

The selector 130 of FIGS. 14 to 17 was not rotated during the carton piercing and tray supporting member raising reciprocation described. Depressing of the manually actuated member 124 again causes rocking of the control shaft 120 in a clockwise direction in FIG. 1. As explained relative to the carton piercing reciprocation of the carriage 44, this rocking of the control shaft causes a revolution of the carriage drive to produce a reciprocation of the carriage. In the first tray loading reciprocation the carton 42 is first moved from the front position shown in FIG. 24 to the rear position shown in FIG. 25. During the latter part of such movement, the measuring chute 36 is tipped to start the delivery of a load of articles to be packed upon the tray 38 on the supports 40. This occurs when the bracket 308 (FIG. 1) engages the collar 310 on the sliding rod 306 to force the reciprocable cam member 304 under the chute actuating arm 300, which is now positioned in the path of the cam 304. This rocks the arm 300 upwardly to tip the chute 36 through the link 286 and arm 284 on the cross shaft 276 fixed to the chute 36.

During the return of the carriage from its rear position of FIG. 25 to its front position of FIG. 26, the articles to be packed are spread on the tray 38 and the chute 36 tipped back to its normal position. Such tipping occurs when the bracket 308 (FIG. 1) on the carriage engages the spring 312 on the sliding rod 306 to withdraw the cam member 304 from beneath the chute actuating arm 300 to allow such arm and chute 36 to assume the position of FIG. 1.

During the latter part of such return of the carriage, the tray supporting members are lowered from their upper position shown in FIG. 25 to the next lower position shown in FIG. 26. When the carriage began its rearward movement, the spring 202 of FIGS. 2 and 11 caused the pawl carrier actuating member 204 to remain stationary so as to pivot the pawl carrier 196 of the carriage in a clockwise direction in FIG. 2. This pivoting was selectively limited by positioning a desired stop on the pivoted stop member 208 so as to be directed toward and engage a guide member 206 for the actuator 204, which guide member is on the carriage 44. The length of the selected stop on the stop member 208 determines how far the pawl carrier 196 is thus pivoted and how far the pawl 198 on such carrier moves along the notched surface of the ratchet member 188. The three stops shown on the stop member 208 may, for example, provide for loading 4, 5 or 6 trays into the carton, the longer the stop selected the greater the number of trays in a carton for which the machine is set.

Upon return of the carriage to its front position of FIG. 26, the pawl carrier actuator of FIGS. 2 and 11 engages a front corner post 66 of the frame of the machine to stop such actuator. As movement of the carriage continues, the pawl carrier 196 is pivoted counterclockwise in FIGS. 2 and 11. The pawl 198 thereon is in its lower overcenter position so as to engage and pivot the ratchet member 188 a distance determined by the selected stop on the stop member 208. The arm 192 on the ratchet member, which is at the right of the chain driving member 176 in FIG. 11, engages the chain driving member and the adjustable member 194 on such arm engages the roller 186 to release the braking action on the brake member. The chain driving member is thus pivoted to the left in FIG. 11 to move the lower run of the chain 170 toward the rear of the carriage and drive the sprockets 168 and 156 to lower the cross member 150 carrying the tray supporting members 40 to the position of FIG. 26.

Another tray 38' is placed in the carton on top of the articles packed therein. The selector 130 of FIGS. 3 and 14 to 17 was not rotated during the first tray packing reciprocation of the carriage described above, and another manual depression of the member 124 of FIGS. 1 to 3

and 14 will cause another tray loading reciprocation of the carriage in which the operation of the machine is the same as in the tray loading reciprocation just described. Thus rearward movement of the carriage moves the carton to the position shown in FIG. 27 in which the chute 36 has again been tipped to direct a load of articles to be packed upon the tray 38'. The following forward movement of the carriage spreads the articles on such tray and again lowers the tray supporting members 40. The tray loading reciprocation of the carriage continues until the carton is full.

When the carriage returns to its front position in the machine during its next to the last tray loading reciprocation in a carton filling cycle, the pawl 165 of FIGS. 3 and 14 to 16 has been lowered sufficiently in the machine to engage the ratchet 164 keyed to the selector 130 to rotate the selector through 120 degrees. Such pawl is carried by the vertically movable cross member 150 of the carriage which is lowered to lower the tray supporting members 40. Such rotation of the selector 130 does not change the operation of the machine during the next reciprocation of the carriage, which is the last tray loading reciprocation in a carton filling cycle, but does position the selector so that the next rotation thereof through 120 degrees conditions the selector to cause a carton discharging reciprocation of the carriage. Such next rotation of the selector 130 is produced by engagement of the pawl 165 with the ratchet 164 during the return of the carriage 44 in its last tray loading reciprocation in a carton filling cycle. The flange 144 (FIGS. 14 to 17) of the selector 130 is thereby positioned to cause the next manual depression of the member 124 to rotate the control shaft 120 in a counterclockwise direction in FIGS. 18 and 1.

The return of the carriage during the last tray loading reciprocation in a carton filling cycle also lowered the tray supporting members 40 to their lowermost position. This means that the ratchet member 188 of FIGS. 2 and 11 has been pivoted to its extreme counterclockwise position in such figures and that the ratchet engaging end of the pawl 198 on the pawl carrier will be cammed upwardly by the inclined surface on the front end of the ratchet member at the beginning of the next reciprocation of the carriage. This will move the pawl to its upper overcenter position out of contact with the ratchet.

The next reciprocation of the carriage 44, which is the carton discharging operation, is initiated by manually depressing the member 124 to rotate the control shaft 120 in a counterclockwise direction in FIGS. 18 and 1. Such rotation of the shaft 120 pushes the link 116 of FIG. 1 rearwardly to rock the drive control shaft 82 in a clockwise direction in such figure to cause a reciprocation of the carriage. It also pulls the links 222 of FIGS. 1 to 5 forwardly to move the cam slides 220, best shown in FIG. 5, forwardly to pivot the rear hook members 214 out of the rearward path of the carton and pivot the front hook members 212 inwardly into position to engage the front of the carton. Forward movement of the slide 220 in FIG. 1 moves the depending member 314 carried thereby forwardly to rock the pivoted cam 316 of FIGS. 1, 6 and 7 to move the lower end of such cam member behind the measuring chute actuating arm 300. This moves the arm 300 laterally against the action of the spring 320 so that such arm is out of the path of the cam 304 on the sliding rod 306 moved by the carriage. This prevents actuation of the measuring chute 36 during the carton discharging reciprocation of the carriage.

In FIG. 28 the carton 42 after being filled has been moved to a rearward position in the machine by a rearward movement of the carriage during a carton discharging reciprocation of the carriage. The front hook members 212 have pivoted in front of the carton and the return of the carriage has pulled the tray supporting members 40 from the filled carton. Also the carton supporting bars 226 have been pulled from beneath the carton and the

weight of the filled carton has tipped the rear end of the discharge conveyor section 230 downwardly so that the filled carton is discharged from the machine.

The counterclockwise rocking of the control shaft 120 in FIGS. 1 and 18 to initiate the carton discharging reciprocation of the carriage, also rocked the link releasing arm 246 of FIG. 18 out from under the bent end of the link 241 so that such end of the link dropped in the slot 254 in the link guiding arm 242 so as to be positioned in front of the notch 256 (FIG. 19) in the link actuating arm 244. The shaft remains in its rocked position until near the end of the return movement of the carriage from its carton discharging reciprocation so that the bell crank member 258 of FIGS. 2 and 11 remains in its inactive position shown in FIG. 2 during such reciprocation. Near the end of such return motion of the carriage, the pawl 165 of FIGS. 3 and 14 to 16 again engages and rotates the selector 130 to cause the inclined surface 257 (FIG. 14) to raise the arm 146 on the shaft 120 and rock such shaft in a clockwise direction in FIG. 19 to push the link 241 rearwardly in the machine. This enables the spring 261 (FIGS. 1 and 11) to rock the bell crank member 258 from the inactive position of FIG. 1 to the position of FIG. 11 in which the lower arm of the bell crank member can engage the pin 262 (FIGS. 11 and 13) on the chain 170 to cause raising of the tray support members in the next or carton piercing reciprocation of the carriage. The parts are therefore again in the positions described above for the start of a tray piercing and tray supporting member raising reciprocation. Another empty carton is placed in the position in the rear of the machine as indicated in FIG. 22 and the manually actuated member 124, shown in FIGS. 1, 2, 3, 5 and 14, again depressed to initiate the first of a series of operations which position tray supporting members in the carton and thereafter provide for loading and lowering the trays in the carton until the carton is filled and then withdraw the tray supporting members from the carton and discharge the carton from the machine.

I claim:

1. A machine for packing articles on article holding trays in a container having an open top, which machine comprises, support means including elongated horizontally extending pointed portions insertable into said container through a side wall of said container for supporting a tray of articles in said container adjacent the top of said container, means for forcing said pointed portions through a lower portion of said side wall to cause said pointed portions to puncture said side wall and enter said container, means to elevate said portions in said container, means for progressively lowering said portions relative to said container to provide for loading additional trays and articles into said container to fill said container, and means for withdrawing said portions from the resulting filled container through said side wall.

2. A machine for packing articles on article holding trays in a container having an open top, which machine comprises, support means including elongated horizontally extending pointed portions insertable into said container through a side wall of said container for supporting a tray of articles in said container, means for relatively moving said support means and said container to cause said pointed portions to puncture the lower part of said wall and to raise said portions relative to said container to provide for supporting said tray of articles adjacent the top of said container, means for relatively moving said support means and said container for progressively lowering said portions relative to said container to provide for loading additional trays and articles into said carton to fill said container, and means for relatively moving said support means and said container for withdrawing said portions from the resulting filled container through said wall.

3. A machine for packing articles on article supporting trays in a container, which comprises, supporting means

for a tray or stack of said trays and articles in a container having an open top but otherwise closed, said supporting means including elongated members having free ends provided with points, means for moving said members relative to said container for driving said points through the lower portion of a wall of said container and for inserting and elevating said members in said container, and means for progressively lowering said members relative to said container as said container is filled with said trays and said articles and for thereafter moving said members relative to said container for withdrawing said members from said container through said wall.

4. A machine for packing articles on article supporting trays in a container, which comprises, supporting means insertable into a container having an open top but otherwise closed, said supporting means including elongated members having free ends, means for driving said free ends through the lower portion of a side wall of said container and for inserting said members into said container by a longitudinal movement of said members parallel to a bottom wall of said container, said supporting means having supporting portions extending parallel to said side wall, means for elevating said supporting means in said container by movement thereof in a direction parallel to said side wall, means for progressively lowering said supporting means as said container is filled with said trays and said articles and means for withdrawing said supporting means through said side wall.

5. A machine for packing articles on article holding trays in a container having an open top but which is otherwise closed, which machine comprises, supporting means having pointed members for piercing a wall of said container and insertable into said container through said wall for supporting a tray in said container adjacent the top of said container, means for driving said pointed members through said wall, means for depositing a load of articles on said tray in said container, means for lowering said supporting means relative to said container to provide for positioning at least another tray on said articles and for depositing additional articles on said other tray and means for withdrawing said support means through said wall.

6. A machine for packing articles upon article holding trays in a carton, comprising means for supporting in said machine a carton having an open top but otherwise closed, a plurality of elongated tray supporting means having lower vertically extending portions and upper horizontally extending portions terminating in free ends, means for relatively horizontally moving said supporting means and said carton to pierce a side wall of said carton with said free ends adjacent a lower corner of said carton and move said horizontally extending portions into said carton, means for relatively vertically moving said supporting means and said carton to move said vertically extending portions into said carton and position said horizontally extending portions adjacent said top of said carton, means for relatively vertically moving said supporting means and said carton to lower said supporting means relative to the top of said carton as trays and articles are loaded into said carton through said open top so as to fill said carton, and means for relatively horizontally moving said carton and said supporting means to withdraw said supporting means from said carton.

7. A machine for packing articles upon article holding trays in a carton, comprising, a reciprocable carriage for holding a carton having an open top in said machine, a plurality of elongated tray supporting means on said carriage, said supporting means having lower vertically extending portions and upper horizontally extending portions parallel to the path of said carriage and terminating in free ends, means for holding said carton in said machine in the path of said horizontally extending portions, means for horizontally moving said carriage toward said carton to pierce a side wall of said carton with said free ends adjacent a lower corner of said carton and

move said horizontally extending portions into said car-

21

ton to thereby position said carton on said carriage, means for holding said carton on said carriage against vertical movement and for moving said supporting means upwardly to move said vertically extending portions into said carton and position said horizontally extending portions adjacent said top of said carton, means for progressively lowering said supporting means in said carton as said trays and articles are loaded into said carton through said open top until said carton is filled and said supporting means are in the lower portion of said carton, and means for horizontally moving said carriage away from said carton to withdraw said supporting means from said carton.

8. A machine for packing articles upon article holding trays in a carton, comprising, a horizontally reciprocable carriage for holding a carton having an open top in said machine, a plurality of elongated tray supporting means on said carriage, said supporting means having vertically extending portions and upper horizontally extending portions parallel to the path of said carriage and terminating in free ends, means for holding an empty carton in the path of said carriage, means for moving said carriage toward said carton to pierce a side wall of said carton with said free ends adjacent a lower corner of said carton and move said horizontally extending portions into said carton, means for returning said carriage and moving said supporting means upwardly to move said vertically extending portions into said carton and position said horizontally extending portions adjacent the top of said carton to enable a tray to be positioned thereon adjacent said top, a measuring chute for articles to be packed in said carton, means for reciprocating said carriage under said measuring chute to deposit a load of said articles on said tray including means for returning said carriage and for lowering said supporting means in said carton, to enable the positioning of another tray in said carton, means for repeating said reciprocations to fill said carton, and means for relatively withdrawing said supporting means from the filled carton and discharging said filled carton from said machine.

9. The method of packing a container, which comprises, piercing a wall of said container with a plurality of spaced pointed tray supports, supporting an article re-

22

ceiving tray adjacent the open top of said container on said supports, filling said tray with articles to be packed and lowering said supports in said container to lower the resultant filled tray, placing another tray in said container on top of said filled tray, filling said other tray with said articles and again lowering said supports to lower the resulting stack of trays and articles, continuing to place and fill trays in said container while lowering said supports until said container is filled and then withdrawing said supports from said container through said wall.

10. The method defined in claim 9 in which the container is reciprocated under a measuring chute to fill each of said trays with said articles.

11. The method of packing a carton with articles supported upon trays, which comprises, piercing the lower portion of a side wall of said carton with a plurality of spaced horizontally extending and pointed tray supports and inserting said supports into said carton through said side wall, filling a first tray with said articles and supporting the resulting first filled tray on said supports adjacent the top of said carton while the top of said carton is open, lowering said supports to lower the filled tray a distance substantially equal to the height of said filled tray, filling a second tray with said articles and supporting the resulting second filled tray on said first filled tray, lowering said supports to lower resulting stack of trays and articles said distance, continuing the filling and supporting of trays and lowering of said supports until said carton is filled, and withdrawing said support from said carton through said side wall.

References Cited in the file of this patent

UNITED STATES PATENTS

1,269,115	Reese	June. 11, 1918
1,512,603	Kasser	Oct. 21, 1924
1,686,375	Greer	Oct. 2, 1928
2,045,292	Carey	June 23, 1936
2,825,193	Loveridge	Mar. 4, 1958
2,827,082	Baum	Mar. 18, 1958
2,834,169	Stuart	May 13, 1958
2,910,193	Lindeman et al.	Oct. 27, 1959
2,921,702	Gross	Jan. 9, 1960

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,049,844

August 21, 1962

Ammon M. Leitzel

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 27, for "fro mthat" read -- from that --;
column 6, line 41, for "repression" read -- depression --;
column 13, line 14, for "side" read -- inside --; column 22,
line 29, for "support" read -- supports --.

Signed and sealed this 1st day of January' 1963.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents