United States Patent [19]

Derderian

[11] **3,735,552**

[45] **May 29, 1973**

[54] ARTICLE HANDLING MACHINE

[76] Inventor: **Edward J. Derderian,** 4514 N. Wilson Avenue, Fresno, Calif.

[22] Filed: **Nov. 19, 1970**

[21] Appl. No.: **91,112**

[52] **U.S. Cl.** **53/63,** 53/126, 53/160, 53/240, 53/244, 53/251

[51] **Int. Cl.** **B65b 57/06**

[58] **Field of Search**.....53/63, 160, 55, 126, 53/240, 244, 246, 250, 251

[56] **References Cited**

UNITED STATES PATENTS

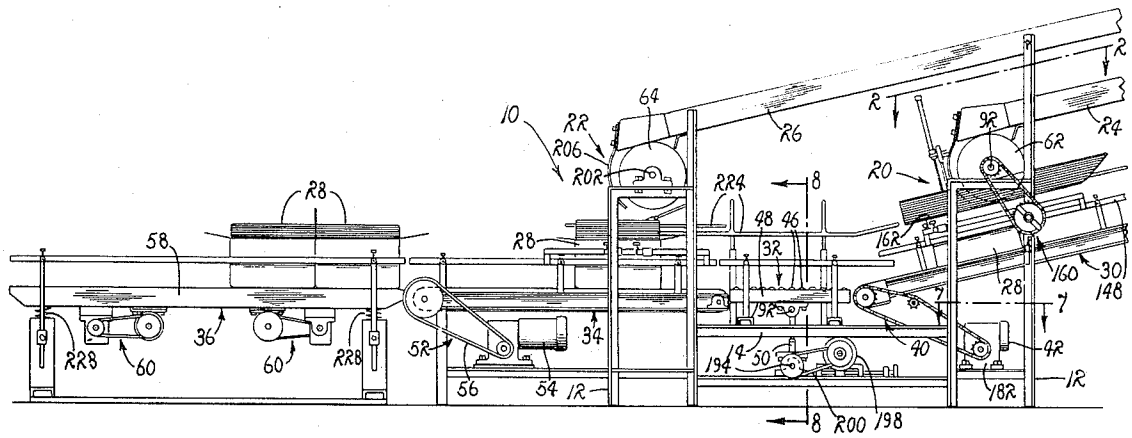
3,332,200	7/1967	Englander	53/244 X
3,470,674	10/1969	Madonia	53/160 X
2,833,095	5/1958	Stuart	53/240 X
2,855,740	10/1958	Noland et al.	53/160 X
3,492,779	2/1970	Russell	53/126 X

Primary Examiner—Travis S. McGehee
Attorney—Huebner & Worrel

[57] **ABSTRACT**

An article handling machine particularly suited for use in packing articles such as melons and the like in layers within a series of containers, characterized by multiple packing stations, each station being adapted to deliver to a common container a layer of articles. A particular feature of the invention resides in the use of a drum operatively supported at each packing station and having included in its peripheral surface an array of pockets for receiving and then discharging articles being packed in patterns dictated by the pattern of the array of the pockets.

15 Claims, 11 Drawing Figures



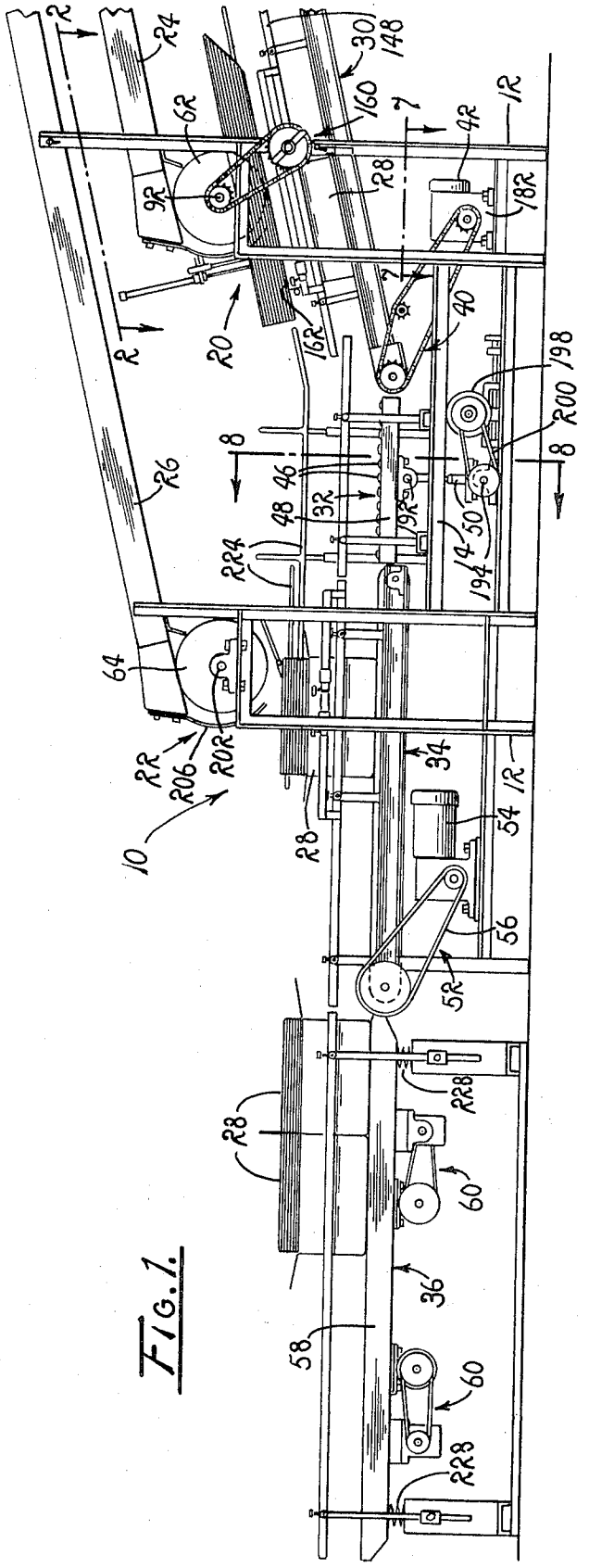


FIG. 1.

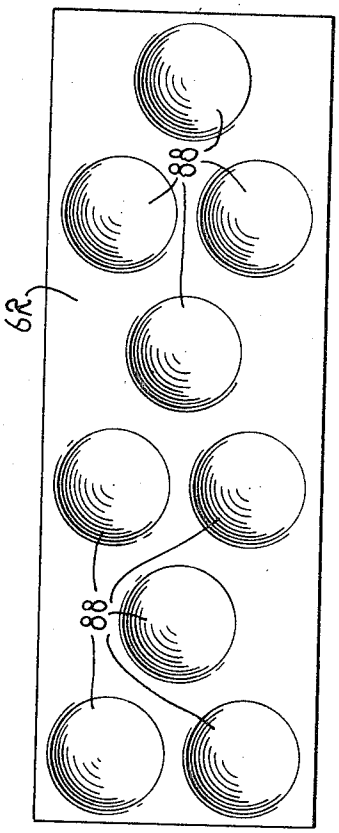


FIG. 11.

EDWARD J. DERDERIAN
INVENTOR

Huebner & Worrel
ATTORNEYS

FIG. 2.

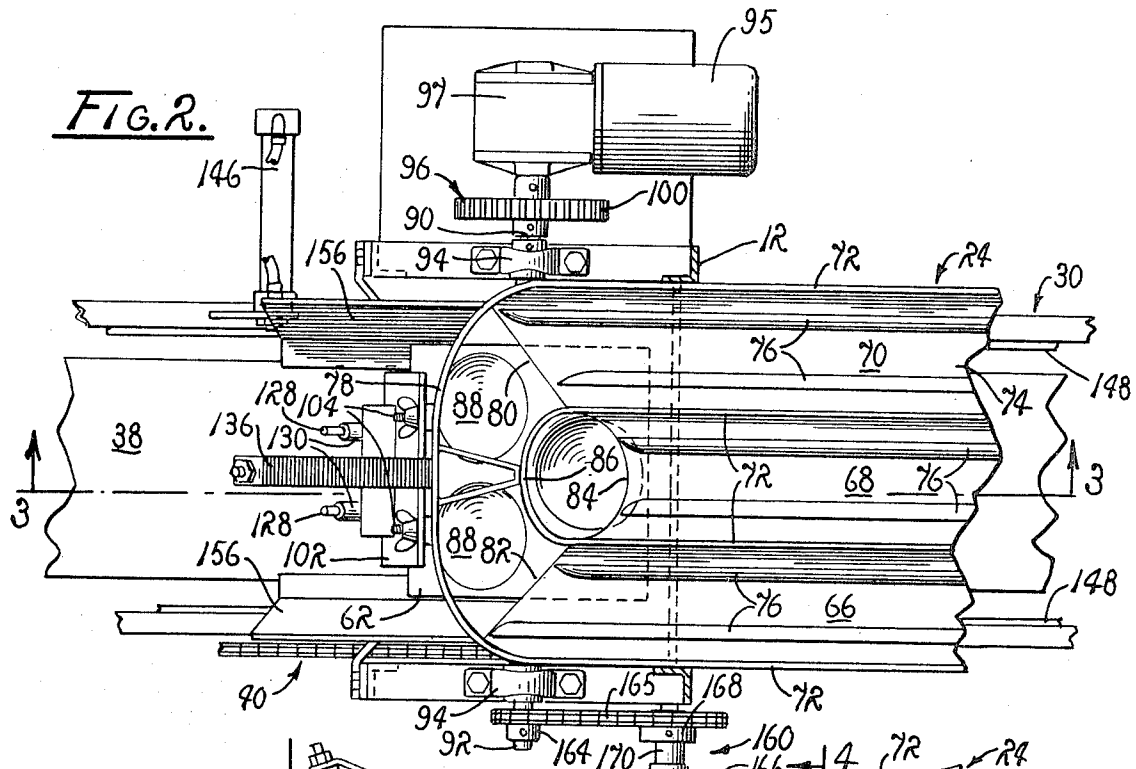
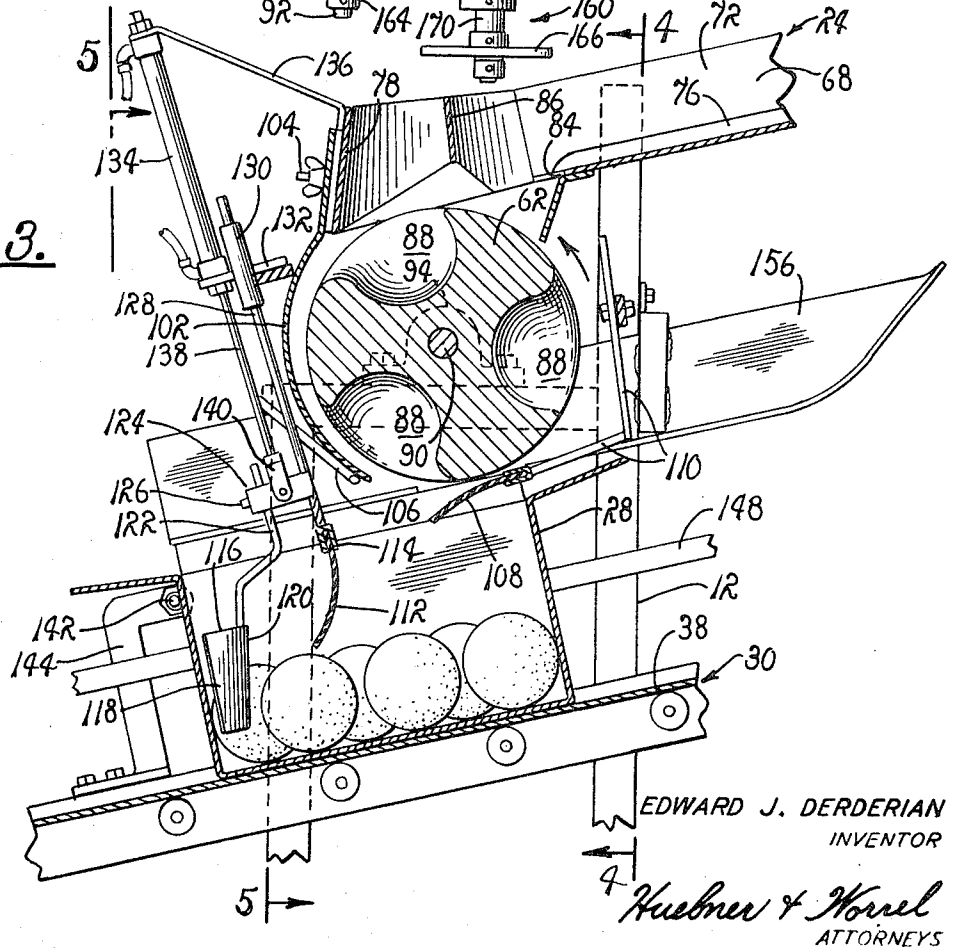


FIG. 3.



EDWARD J. DERDERIAN
INVENTOR

Kuebler & Kornel
ATTORNEYS

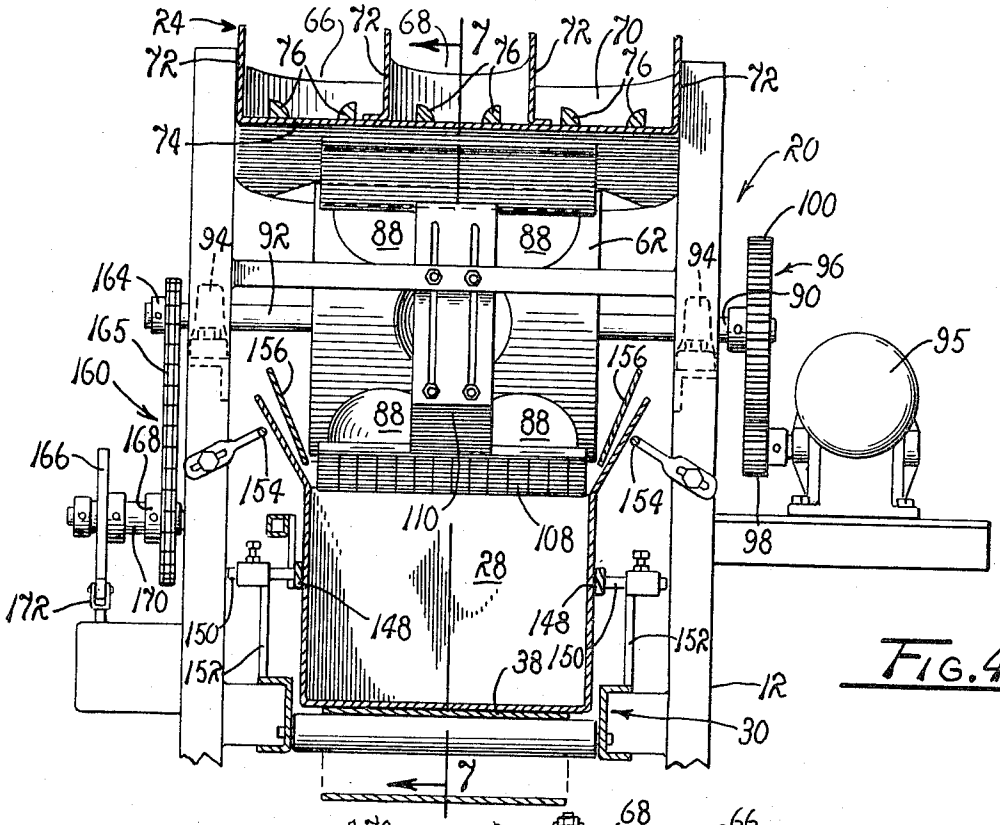


FIG. 4.

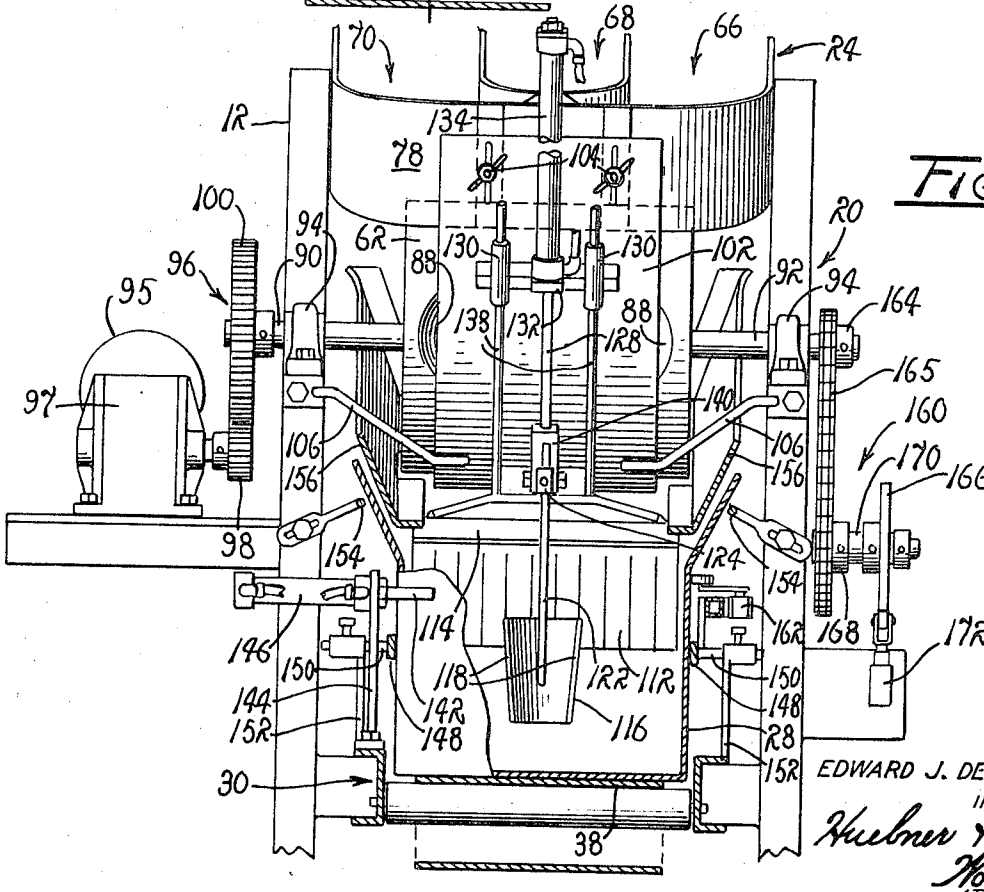


FIG. 5.

EDWARD J. DERDERIAN
INVENTOR

Kuebler & Kurel
ATTORNEYS

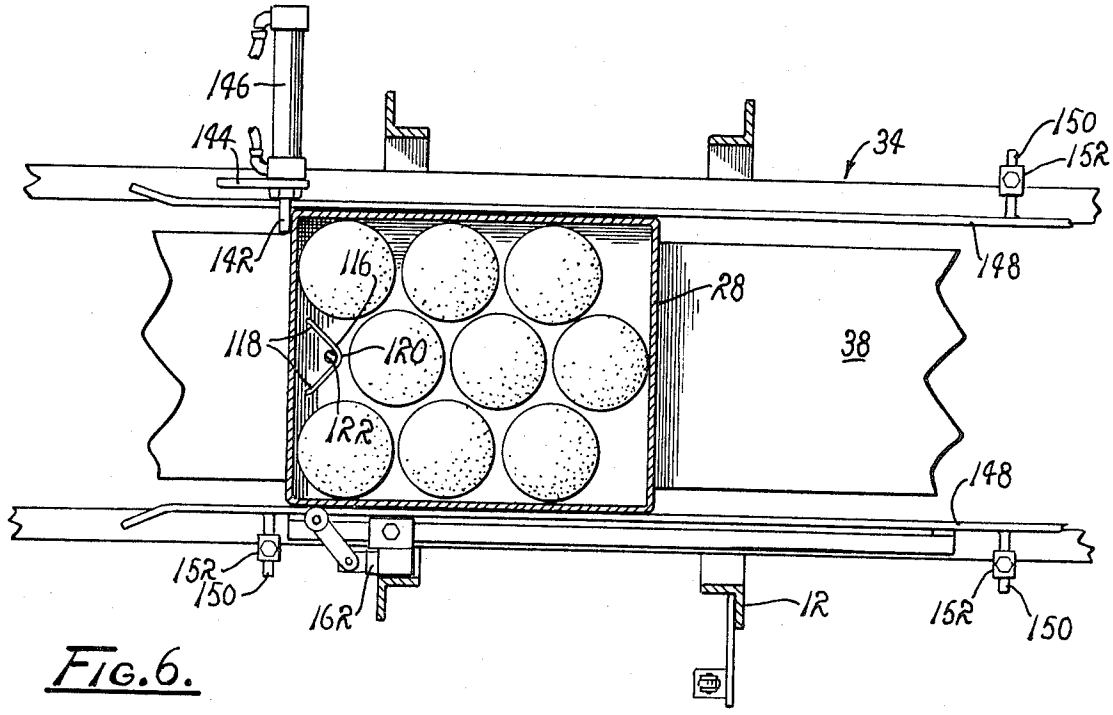


FIG. 6.

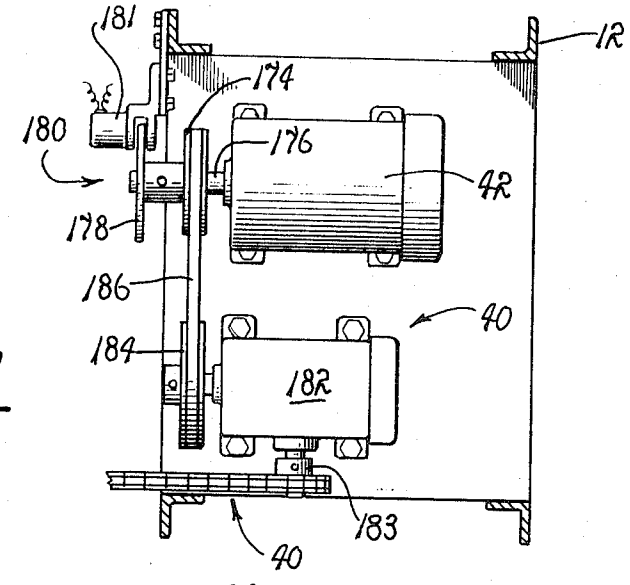


FIG. 7.

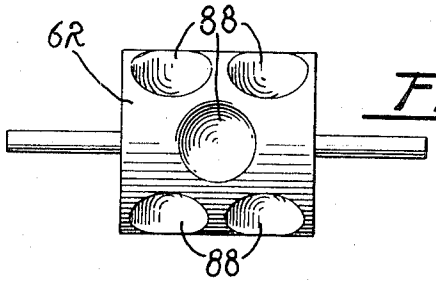


FIG. 10.

EDWARD J. DERDERIAN
INVENTOR

Huebner & Worrel
ATTORNEYS

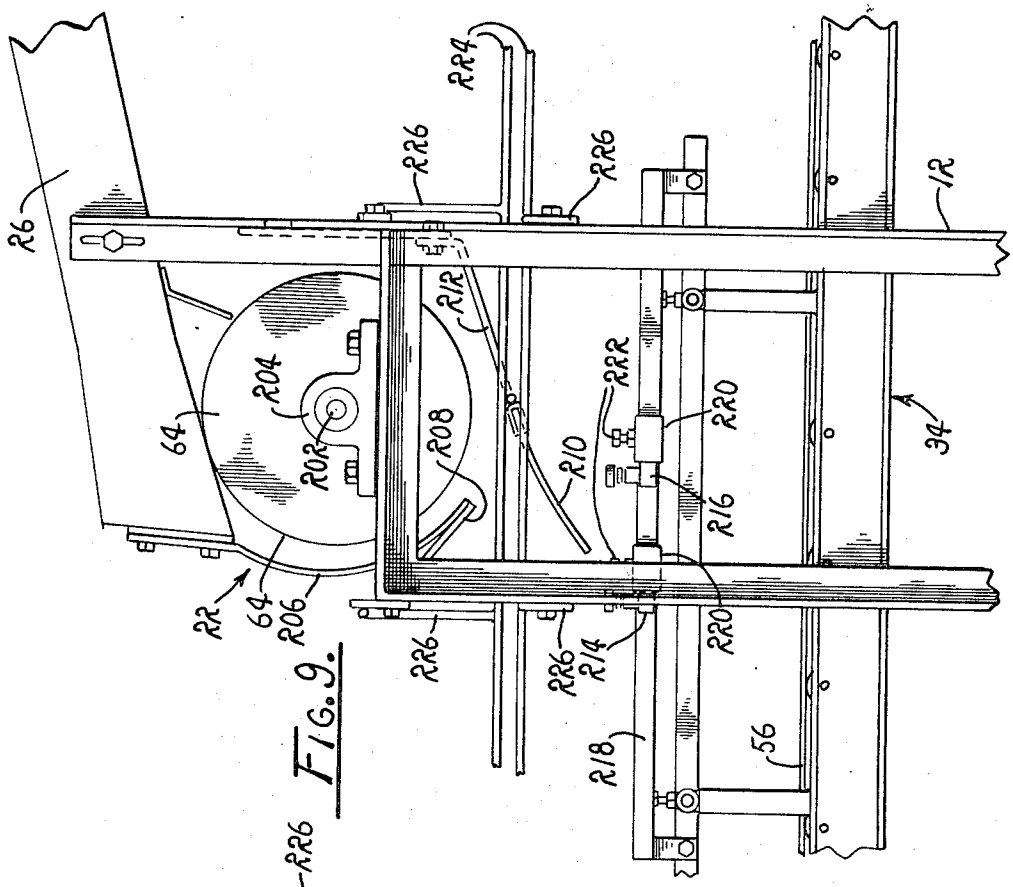


FIG. 9.

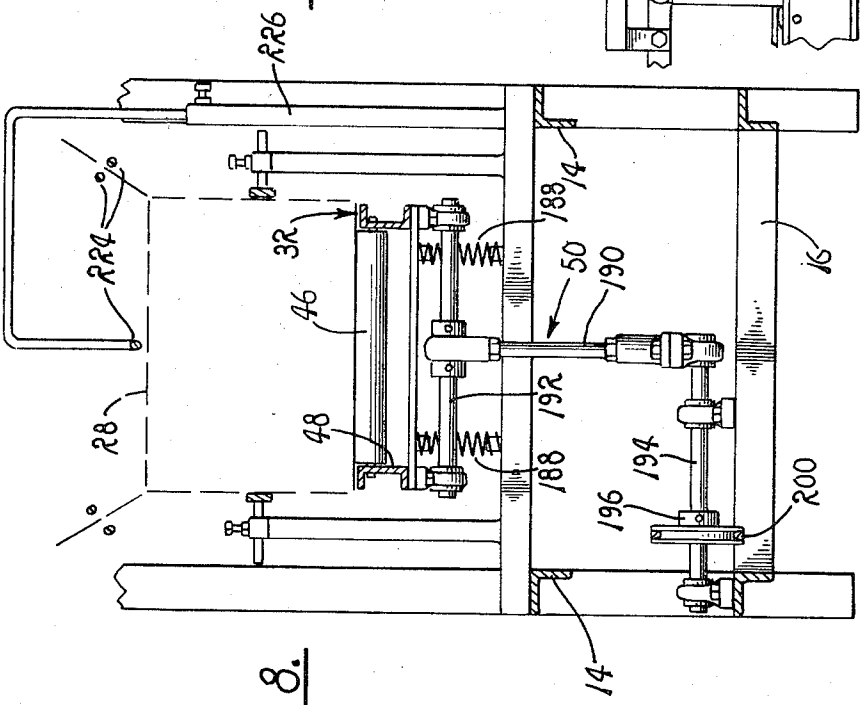


FIG. 8.

EDWARD J. DERDERIAN
INVENTOR

Hueber & Worrel
ATTORNEYS

ARTICLE HANDLING MACHINE

BACKGROUND OF THE INVENTION

The invention relates to article handling machines and more particularly to an article handling machine having particular utility in packing perishable products, such as melons and the like, in ordered layers within prepositioned containers as the containers serially are advanced through the machine.

Perishable produce, such as various types of melons including cantaloupes and the like, generally are packed for market while their flesh is firm but susceptible to bruising and cracking. Consequently, such produce is not particularly suited for machine-packing since machines characteristically tend to handle articles being packed in a rather indelicate manner.

Heretofore, it has been common practice to hand-pack melons and similar produce. Normally, this requires the melons to be deposited by hand in layers within containers. For reasons which readily are apparent, such a technique is quite expensive in terms of packing-time, labor costs, and produce damage.

Attempts have been made to automate melon packing by providing machines which are capable of packing melons within containers. However, due to the fact that the flesh of melons is particularly susceptible to bruising, cracking and splitting, difficulty in providing machines capable of counting and packing continuously obstructs efforts to automate melon packing industries.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the instant invention to provide an improved article handling machine.

Another object is to provide an article handling machine particularly suited for use in packing melons.

Another object is to provide a machine for automating melon packing operations.

Another object is to provide an article handling machine particularly suited for use in depositing layers of cantaloupes within open top containers.

Another object is to provide an article handling machine particularly suited for use in receiving and depositing cantaloupes within open top containers and in multiple counted layers.

Another object is to provide an improved packing machine including multiple packing stations for use in packing melons in staggered alignment and in multiple ordered layers, without subjecting the articles to the deleterious effects of substantial impact.

These and other objects and advantages are achieved through the use of a simplified article handling machine which includes multiple packing stations arranged in serial alignment, each station including a driven drum having provided about its periphery a staggered array of pockets, each being adapted to receive melons delivered from an inclined trough and to discharge the received melons in orderly formed and counted layers within containers serially presented to the packing station.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of an article handling machine which embodies the principles of the present invention, depicting a first and a second packing station and a container conveyor for delivering to and from the packing stations open top containers to be packed in layered increments at the packing stations.

FIG. 2 is a top plan view of one of the first in line packing stations illustrated in FIG. 1.

FIG. 3 is a side elevation, partially in section, taken along line 3—3 of FIG. 2.

FIG. 4 is a rear elevation of the packing station shown in FIGS. 2 and 3, taken generally along line 4—4 of FIG. 3.

FIG. 5 is a front elevation, partially in section, taken generally along line 5—5 of FIG. 3.

FIG. 6 is a fragmented top plan view, partially in section, of a container positioned at the packing station of FIG. 2.

FIG. 7 is a partially sectioned top plan view, taken generally along line 7—7 of FIG. 1.

FIG. 8 is an end elevation, partially in section, taken generally along line 8—8 of FIG. 1.

FIG. 9 is a fragmented side elevation of second in line packing station illustrated in FIG. 1, but on an enlarged scale.

FIG. 10 is an end elevation of a packing drum employed at each of the packing stations illustrated in FIG. 1.

FIG. 11 illustrates a delivery pattern for the drum of FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENT

General Description

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 a side elevation of an article handling machine 10 which embodies the principles of the present invention.

The machine 10 is fabricated employing suitable structural members and convenient fabrication techniques. Hence, it is to be understood that the various machine components are fabricated and coupled together in any suitable manner. Furthermore, it is to be understood that the machine can be fabricated in subcomponents and subsequently united at a point of use. In any event, the specific techniques utilized in fabricating the machine form no specific part of the instant invention, therefore a detailed description of the fabrication techniques employed is omitted in the interest of brevity.

In practice, the machine 10 is provided with a frame, not designated, including a plurality of upstanding frame members or stanchions 12 coupled together through a plurality of longitudinally extended beams 14 and transversely extended supports 16.

While any number of packing stations can be employed, as found desirable, the article handling machine 10, as illustrated in FIG. 1, includes a first in line or first packing station, generally designated 20, and a second in line or second packing station, generally designated 22. The packing stations 20 and 22 are fed by article delivery chutes 24 and 26, which serve to deliver thereto articles to be packed into containers 28. The containers 28 are of any suitable configuration and form no specific part of the instant invention. However, as currently employed, the containers are supplied to the packing stations in a rectangular form having a closed bottom, orthogonally related vertical side walls, and upstanding flaps, which subsequently are folded

into a container closing disposition for confining therewithin articles, such as melons, deposited therein.

The containers **28** are delivered through the machine **10** by means of a series of aligned conveyor segments, hereinafter designated as conveyor segments **30, 32, 34** and **36.** The conveyor segments **30** through **36** are of any design, so long as it is compatible with the functions and purposes of the instant invention. However, as currently employed, the conveyor segment **30** is an endless conveyor segment, including a belt **38** driven by a drive train **40.** The drive train **40** includes a motor **42,** operatively coupled to the conveyor segment **30** through a suitable sheave and belt coupling **44.** Since the mounting of the belt **38** and the drive train **40** can be varied as found desirable, a detailed description thereof is omitted. However, it is to be understood that the drive train **40** particularly is suited for intermittently advancing the conveyor belt **38.** Consequently, advancement of the containers **28,** as they are presented to the packing station **20,** is achieved in increments. As a practical matter, the conveyor segment **30** is inclined with respect to a horizontal plane, whereby the containers **28** are supported in a predetermined inclination at the packing station **20.**

The conveyor segment **32** is arranged in contiguous alignment with the conveyor segment **30.** The conveyor segment **32** includes a plurality of transversely oriented rollers **46** supported between a pair of longitudinally extended beams **48.** The segment **32** includes a vibrator unit **50** of a known design which serves to impart a contents-settling effect to the containers **28** as the containers are delivered from the first packing station **20** to the second packing station **22.**

Immediately adjacent to the conveyor segment **32,** in longitudinal alignment therewith, is the conveyor segment **34** which is of a design and functions quite similar to the segment **30.** However, it is important to observe that segment **34** is supported in a substantially horizontal disposition and is, in operation, continuously driven through a drive train **52.** This drive train includes a continuously energized electrical motor **54** as well as an associated sheave and belt coupling **56.** As a practical matter, the sheave and belt coupling **56** is of a design quite similar to the sheave and belt coupling **44.** Therefore, it can be appreciated that the conveyor segment **34** is, in effect, a continuously driven, endless conveyor including a belt **56** supported by suitable structure, not designated, trained about a pair of belt drums, also not designated, one of which is coupled to the drive train **52** through any suitable coupling.

The conveyor segment **36** is similar in design and function to the conveyor segment **32.** The conveyor segment **36** is arranged in longitudinal alignment with the conveyor segment **34** and serves to receive filled containers as the containers are delivered from the second packing station **22** by the conveyor segment **34.** As a practical matter, the conveyor segment **36** includes a pair of horizontally extended support rails **58** upon which is mounted a plurality of conveyor rollers, not shown. A pair of vibrator units **60,** also of a known design, is provided for purposes of vibrating and thus settling the contents of the containers **28** as they are advanced along the segment **36** to a point of discharge. If desired, the vibrator units **50** and **60** can be of a common design.

Hence, it is to be understood that packing of the containers **28** is effected as the containers in an erected and opened condition are delivered to the first packing station **20,** by the conveyor segment **30,** thence to the second packing station **22,** by the conveyor segments **32** and **34,** and ultimately discharged from the machine **10** by the conveyor segment **36,** and that the articles deposited within the containers are settled through the effects of the vibrators **50** and **60** as the containers are delivered from packing stations **20** and **22,** respectively.

The articles being packed are delivered for packing within the containers **28,** transported by the conveyor segments **30** through **36,** by a pair of packing drums, designated **62** and **64,** supported at the packing stations **20** and **22,** respectively. These drums are arranged adjacent to the delivery ends of the article delivery chutes **24** and **26,** respectively, and serve to receive articles therefrom and then to deliver the articles to the containers **28** at each of the packing stations.

First Packing Station

Referring now to FIGS. **1** through **5** and **10,** it will be noted that the article delivery chute **24** also is supported in an inclined disposition, relative to a horizontal plane and includes three parallel channels, designated **66, 68** and **70.** Each of the channels serves as a conduit for delivering a series of articles to the first packing station **20.**

Since the machine **10** is to be employed primarily in packing melons, such s cantaloupes and the like, the channels **66, 68** and **70** are so dimensioned as to accommodate a rolling and/or sliding passage of cantaloupes therealong. As a practical matter, the chute **24** is provided with a plurality of upstanding rails **72** secured to the floor of the chute **24** provided in the form of a transverse bottom plate **74** common to the channels **68** through **70.** Consequently, the rails **72** are mutually spaced a distance sufficient for accommodating gravity induced passage of articles such as cantaloupes and the like.

In practice, each of the channels **66, 68** and **70** is provided with a pair of elongated bumper pads **76** disposed in parallelism along the upper surface of the bottom plate **74** for purposes of protecting the melons against bruising and impact as they are delivered by the chute **24.**

Referring now more particularly to FIGS. **3** and **5,** it is noted that the channels **66** and **70** are closed by an upstanding end plate **78** of a horizontal arcuate configuration extended across the end of the chute **24.** As a practical matter, the end plate **78** is spaced from the adjacent end of the bottom plate **74** in a manner such as to establish a pair of horizontally spaced openings **80** and **82,** FIG. **2,** through which the articles are delivered from the chutes **66** and **70.** Delivery is achieved as the articles are permitted to drop through the openings once they have advanced beyond the lowermost end surface of the bottom plate **74.** Similarly, an opening **84** is provided at the lowermost end of the channel **68** and is defined by an upstanding end plate **86,** also of a generally horizontally extended arcuate configuration, spaced from the plate **74.** It is important to observe that the openings **80, 82** and **84** are arranged in a triangular array so that the articles are delivered in a similar array. Hence, it can be appreciated that the article delivery chute **24** serves to deliver a plurality of articles, such as cantaloupes and the like, in a predetermined staggered

array as they are dropped through the openings **80, 82** and **84.**

Disposed immediately beneath the lowermost or discharged end of the article delivery chute **24** there is arranged the packing drum **62** which, as viewed in FIG. **3,** is supported for rotation in a counterclockwise direction.

As best illustrated in FIGS. **3** and **10,** the packing drum **62** is provided with a plurality of pockets **88** arranged in a staggered array about the periphery of the drum. The drum **62** can be formed of any suitable material which permits the pockets **88** to be formed in a configuration with a diameter sufficient to accommodate a reception of the articles delivered by the chute **24.** As a practical matter, the pockets **88** are arranged in a manner such that successive pockets are arranged in a composite array established by three distinct but slightly offset rings circumscribing the periphery of the drum **62.** The pockets of each ring are so spaced as to permit all of the pockets to register with one of the openings **80, 82** and **84** of the chute **24** so that each of the articles delivered by the channels **66, 68** and **70** is received within one of the pockets **88** as it is permitted to drop through one of the openings **80, 82** and **84,** formed by the plates **78** and **86** adjacent the end of the plate **74.**

The drum **62** is supported at the packing station **20** by a pair of coaxially related stub axles **90** and **92.** These axles are received within a pair of suitable bearings **94** rigidly mounted on the frame **12.** The drum **62** is driven in rotation by means of a suitable motor **95** coupled therewith through a gear train **96.** The gear train **96** is coupled with the motor **95** through a gear box **97** and is provided with a driving gear **98** pinned to the output shaft of the motor **95,** and a driven gear **100** pinned to the stub axle **90.** Hence, it can be seen that the angular velocity of the packing drum **62** is dictated by the speed reduction factor of the gear train **96.** Of course, the angular velocity of the drum is such as to permit the pockets **88** to receive the melons and the like as they are delivered by the article delivery chute **24.**

The articles received within the pockets **88** are retained therewithin, as the drum **62** is advanced through a fraction of one revolution, by an arcuate guide plate **102** concentrically related to the axis of rotation of the packing drum **62.** The plate **102** is supported in spaced relationship with the peripheral surface of the drum **62** through a pair of stud bolts and wing nuts, collectively designated **104.** These bolts and nuts couple the arcuate guide plate **102** to the end plate **78** of the delivery chute **24** in a manner such that the guide plate **102** depends from the article delivery chute **24.** As a practical matter, the plurality of support rods **106,** FIG. **5,** also are employed in coupling the guide plate **102** to the frame **12.** As shown, the plate **102** has an arcuate length substantially greater than 90°. It should therefore be apparent that articles, such as melons and the like, delivered to the pockets **88** are retained in the pockets **88** through an engagement thereof which the adjacent surfaces of the guide plate **102** as the drum **62** is advanced for advancing the articles through approximately 180° of angular displacement.

As the drum is driven in angular displacement, articles dropped through the openings **80, 82** and **84** are permitted to fall into a container **28** retained at a loading point located directly beneath the level of the drum **62** in a position to receive the articles.

As a practical matter, the pockets **88** deliver the articles in a pattern forming within the bottom portion of the container **28** an ordered layer. Such a pattern is best illustrated in FIG. **11.** Of course, the number of articles delivered during each revolution of the drum **62** is determined by the number of pockets **88** provided in the periphery of the drum.

As illustrated in FIG. **3,** each of the containers **28** is, in practice, registered with the drum **62** in a manner such that the pockets **88** are caused to discharge the articles into the rearwardmost portion of the registered container. Due to the inclination of the container, as it is supported by the conveyor segment **30,** the articles are permitted to roll forward therewithin for purposes of arranging themselves within the forwardmost portion thereof.

As a practical matter, the transverse baffle plate **108,** formed of a flexible material, is mounted by a suitable bracket **110** in a manner such that a baffle plate serves to intercept each of the articles, or melons, as it is discharged from a pocket **88.** In this manner, the fall of the article is broken for purposes of reducing the occurrence of impact induced damage. Additionally, a vertically supported baffle plate **112** also of a flexible material is suspended from a bracket **114** and is so positioned as to engage the articles as they are caused to advance along the inclined bottom surface of a container **28.** While other structure could be employed equally as well the baffle plates **108** and **112** effectively serve to reduce the likelihood that the articles being handled will be damaged as they are delivered to the containers **28.** This is particularly important where the articles being handled are melons such as cantaloupes and the like.

In order to assure that each layer deposited by the drum **62** within a container **28** is arranged in an ordered array, a vertically disposed separator **116** is provided. The separator **116** includes a pair of forwardly facing wings **118** intersecting along a rearwardly facing, substantially vertically disposed knife edge **120.** The separator is provided to be inserted within the leading portion of each container **28,** prior to the delivery of the articles thereto.

The purpose of the separator **116** is to assure that the articles deposited in the container **28** are spaced outwardly away from the center line of the container as they come to rest against the container's forwardmost vertical wall. Through the use of the separator **116** it is possible to receive two articles simultaneously and then to center the next-in-line article between the two leading articles as they are maintained in a spaced relationship by the separator **116.** This, of course, permits the next two articles to be separated by the previously delivered article.

As a practical matter, the separator **116** is mounted on and depends from a vertically disposed rod **122** which conforms to a goose-neck configuration, FIG. **3.** The support rod **122,** in turn, is coupled to an elevator bracket **124.** The elevator bracket **124** receives therewithin the support rod **122** and is united therewith through a suitable setscrew **126.** The elevator bracket **124** also is provided with a pair of substantially vertically disposed guide rods **128** slidingly received within a pair of sleeves **130** which collectively serve to support the elevator **124.** The sleeves **130,** in turn, are sup-

ported through a suitable mounting bracket, not designated, fixed to the arcuate guide plate **102.**

The bracket **114,** as it supports the baffle plate **112,** also depends from the lower end of the guide rods **128** so that the guide rods, in effect, serve as supporting structure for the bracket **114.** Consequently, the baffle plate **112** and the separator **116** are afforded simultaneous vertical reciprocation by the elevator **124** for introducing and subsequently removing the separator **116** and the baffle plate **112** from within each container **28** as it is supported at a loading point beneath the drum **62.**

In order to drive the elevator **124** in vertical reciprocation, a bracket **132** mounts a fluid actuator **134** for vertical reciprocation adjacent to the plate **102.** The actuator **134** is a vertically disposed double-acting hydraulic slave cylinder also supported in a depending relationship from a mounting bracket **136** fixed to the arcuate plate **78.** The slave cylinder includes an output shaft **138** which is coupled at its distal end with the elevator **124** through a suitable clevis **140.** A convenient selector valve, not shown, is included within a suitable hydraulic system, also not shown, and coupled with the slave cylinder for controlling its operation. Since such systems and selector valves are well within the skill of the art, a detailed description is omitted. It is, however, to be understood that the double-acting hydraulic cylinder, through its shaft **138,** when driven in a first mode of operation, lifts the elevator **124,** and when driven in a second mode of operation depresses the elevator **124** for purposes of causing the separator **116** and the baffle plate **112** alternately to be inserted and withdrawn from a container **28** retained as it is supported at the loading point for the first packing station **20.** As the elevator **124** is reciprocated the guide rods **128** are reciprocated within the sleeves **130** while imparting stability to the elevator **124.** Of course, the throw of the actuator **134** is sufficient to permit the separator **116** and the baffle plate **118** to be completely withdrawn from each container **28** so that the container can pass thereunder in an unobstructed manner.

As hereinbefore mentioned, each container **28,** in turn, is supported in an arrested condition at a loading point beneath the drum **62** and in a position to receive articles delivered thereto. This arrested condition is achieved through a use of a laterally reciprocating stop pin **142.** The stop pin **142** is mounted for reciprocation by a suitable bracket **144** fixed at one side of the conveyor segment **30.** The stop pin is adapted to be extended and retracted relative to the path of the containers **28** as they are advanced by the conveyor segment **30** and thus arrest and release the containers **28.**

The stop pin **142** is driven by a slave cylinder **146** coupled with a suitable selector valve, not shown. The slave cylinder **146,** and its associated selector valve, are similar in design to the slave cylinder **134** and its associated selector valve. This selector valve, upon being actuated, activates the slave cylinder **146** in an appropriate manner for displacing the stop pin **142** in a selected direction. Actuation of the slave cylinder **146** preferably is initiated in response to an applied electrical signal.

Of course, it can be appreciated that each of the containers **28** should be centered, with respect to the drum **62,** as the container is advanced into engagement with the stop pin **146.** Such centering is achieved through a plurality of longitudinal guide rails **148** suitably supported by laterally adjustable pins **150.** The pins **150** are coupled to selected beams **14** through suitable brackets **152.** Since the specific structure employed in mounting the guide rails **148** can be varied as desired, a detailed description thereof is omitted. However, it is to be understood that the rails **148** adequately provide lateral support to the containers **28** as they are advanced by the conveyor segment **30.**

Additionally, it normally is desirable to position the vertical side flaps in an outwardly flared disposition relative to the vertical walls of each of the containers **28** in order to assure that the container is afforded ready access to the first packing station **20.** This is accomplished through a pair of adjustably supported guide rails **154** and a pair of associated plows **156** which together serve to engage and outwardly fold the upstanding side flaps of each of the containers **28** as the container approaches the first packing station **20.** Since this structure is of a type well known and understood, a detailed description thereof is omitted. However, it is to be understood that the guide rails **154** and plows **156** together engage the upstanding side flaps for each container and assure that the flaps achieve a desired folded disposition as the container is advanced along the conveyor segment **30.** The upstanding forward flap and the trailing flap of each container **28** are prefolded in a manner such as to "break" the flaps sufficiently so that these flaps do not encounter obstructions as they are advanced beneath the packing drum **62.** However, if it is found desirable to do so, convenient breaking units and related plows of any known configuration and design can be employed for controlling these flaps.

In order to achieve a sequential operation for effecting an appropriate packing function at the first packing station **20,** the machine **10** is provided with an electrical timing circuit, a description of which is omitted for the sake of simplicity. This circuit includes a timing unit generally designated **160,** and a container-operated microswitch **162** fixedly mounted along one side of the conveyor segment **30.** As shown, FIG. **6,** the actuating arm of the switch **162** is positioned to be displaced by a container **28** as the container is advanced by the conveyor belt **38.** The microswitch **162,** upon displacement of its arm, initiates operation for the first packing station **20** as the container **28** is advanced into a position beneath the drum **62.** The timing mechanism **160,** on the other hand, serves to terminate the operation of the packing station **20** and permits the container **28** to be discharged from the packing station.

While not shown, it is to be understood that the microswitch **162** electrically is coupled to the motors **42** and **95,** as well as to the selector valves for the slave cylinders **134** and **46.** It also is to be understood that as each successive container **28** is conveyed by the conveyor segment **30** to a position directly beneath the drum **62** the microswitch **162** is actuated through an engagement with the container **28.** This actuation of the switch **162** serves to interrupt the operation of the motor **42,** energize the motor **95,** and simultaneously therewith initiate a switching of the selector valves for the slave cylinder in a manner such that a slave cylinder **134** depresses the elevator **124** while concurrently therewith the slave cylinder **146** extends the stop pin **142** for purposes of arresting the advance of the container **28** at the loading point of the first packing station.

The timing mechanism 160 includes a driven sprocket 164 pinned to the stub axle 92, and a chain 165 trained about the sprocket 164 coupling the sprocket 164 with a driven actuator arm 166. Coupling of the sprocket 164 with the arm 166 is effected through a sprocket 168 mounted on a rotatable shaft 170 and receiving in a driving relationship the chain 165. In practice, the sprocket 168 has a periphery twice as great as the periphery of the sprocket 164 so that a ratio of two to one is established therebetween as the sprocket 164, through the chain 165, drives the sprocket 168. Hence, for each 360° for rotation of the stub axle 92, which rotates in unison with the drum 62, the sprocket 168 is driven through 180° of angular displacement. It will therefore be appreciated that the arm 166 comprises an elongated member pinned at its approximate center to the shaft 170 so that as this shaft is rotated through 180° of angular displacement, due to the driving effect of a chain 165, the terminal portion of each end of the arm 166 is caused to advance through approximately 180° of angular displacement.

Mounted on the frame 12, in a position to be engaged by the opposite end portions of the actuator arm 166, is an extended arm of a microswitch 172, FIG. 5. The arm is extended into the path of the actuator arm 166 to be depressed thereby as the end portions of the actuator arm effect an engagement with the arm of the microswitch. The microswitch 172 also is coupled to the aforementioned control circuit with which the microswitch 162 is coupled. However, the function of the microswitch 172 is to reverse the state of actuation of the circuit components previously activated in response to an actuation of the microswitch 162. Accordingly, it can be appreciated that as the microswitch 172 is activated suitable signals are delivered to the motors 42 and 95 and to the slave cylinders 134 and 146 for purposes of causing the rotation of the drum 62 to be arrested, the elevator 124 to be elevated, for thus extracting the separator 116 and baffle plate 112 from within the container 28, to withdraw the stop pin 142 and again drive the conveyor belt 38 for purposes of advancing the container 28 away from the first packing station 20.

The timing mechanism 160 also is provided with a time delay unit in series with the motor 42. This unit, while not shown, permits the elevator 124 to be raised relative to the container 28 and the stop pin 142 to be withdrawn from the path of the container 28 prior to the energization of the motor 42 in order that the separator 116 and the baffle plate 112 be extracted from the container 28 and the container released before the conveyor segment 30 again is activated for advancing a container 28 from the packing station.

As illustrated in FIG. 7, the motor 42 includes an output sheave 174 suitably pinned to the motor's output shaft 176. The shaft 176 also is extended through the output sheave and is provided with a brake disk 178 having a peripheral portion extended between a pair of brake pucks, not designated, of a mechanism 180. The pucks, in turn, are actuated in a known manner by a solenoid unit 181 of a convenient design. The pucks, in practice, are so arranged relative to the brake disk 178 as to "pinch" the peripheral portion of the disk as the solenoid of the mechanism is energized for retarding rotation of the disk and thereby arresting the rotation of the sheave 174.

As a practical matter, the drive train 40 is coupled to the sheave 174 through a convenient gear box 182 having an output sprocket 183 and a driven input sheave 184 coupled to the sheave 174 through a suitable V-belt 186 trained thereabout. Since this structure is of a generally understood design, a detailed description is omitted in the interest of brevity. However, it is to be understood that as the microswitch 162 senses the presence of a container 28 the solenoid unit 181 is energized and as the microswitch 172 is actuated, the solenoid unit is de-energized for purposes of alternately arresting and releasing the output shaft 176. The gear train of the gear box 182, of course, ultimately determines the rate at which the motor 42 drives the conveyor belt 38.

Hence, it is to be understood that as each open container 28 is advanced beneath the drum 62 its advancement is arrested, whereupon the drum 62 delivers articles, such as melons and the like, in an ordered layer along the bottom of the open container. Having once received the layer of articles, the container 28 is advanced from the first packing station 20 toward the second packing station 22.

As each container 28 is advanced from the first packing station 20, it is discharged by the conveyor segment 30 onto the horizontally disposed conveyor segment 32 which includes the vibrator 50 whereupon vibration is imparted to the articles within the container. Since such structure generally is known, a detailed description is omitted. However, it is to be understood that, in practice, the beams 48 which support the rollers 46 are, in turn, supported by a plurality of compression springs 188 which provide vertical support to the containers 28 as they are advanced along this conveyor segment. The vibrator 50 is provided with an eccentric drive 189 coupled to the beams 48 through a vertical link 190 and a transverse link 192 in a manner such that as vertical reciprocation is imparted to the vertical link by the eccentric drive 189 vibratory motion is imparted to the beams 48.

The eccentric drive 189 is driven through a suitably supported shaft 194 to which is pinned an input sheave 196. The sheave 196, in turn, is coupled with the output sheave of a continuously driven motor 198, through a V-belt 200 so that the eccentric drive 189 continuously serves to impart vibratory motion to the conveyor segment 32. Accordingly, as each container 28 is advanced across the rollers 46 it is vibrated in a vertical direction for purposes of assuring that the articles disposed within the layer deposited therein at the first packing station 20 are fully seated prior to a further introduction of articles at the second packing station 22.

Second Packing Station

The second packing station 22 is provided with article handling structure quite similar to that of the first packing station 20. However, the structure employed at the packing station 22 is, in many respects, substantially more simplified. The function of the second packing station 22 is to deposit a second layer of articles, or melons, within each container 28 as the container is advanced beneath the packing drum 64. It is to be understood that the packing station 22 can be duplicated and the duplication thereof aligned, as found practical for providing a desired number of layers in each container.

The packing station 22 is serviced by the article delivery chute 26. Of course, this chute is of a design

quite similar to the article delivery chute **24**, hereinbefore described in detail. Therefore, a detailed description of the article delivery chute **26** is omitted as the description of the article delivery chute **24** is deemed sufficient to provide a complete understanding of the invention.

Mounted directly beneath the discharge end of the article delivery chute **26** is the aforementioned packing drum **64**. The design and function of this drum is quite similar to that hereinbefore described with respect to the packing drum **62**. Since the packing drum **62** has been described in detail, the design and function of the packing drum **64** also is omitted in the interest of brevity. Therefore, it suffices to understand that the drum **64** is, in effect, a replica of the drum **62** and that the drum functions in a similar manner for similar purposes.

In practice, the drum **64** is supported for rotation by means of a pair of stub shafts **202**, one of which is illustrated in FIG. **9**, received within a pair of journal bearings **204** suitably mounted on the machine's frame.

The drum **64** also is driven through a gear train and an associated motor, not shown, coupled to the pair of stub shafts **202** in a manner quite similar to that in which the motor **95** is coupled with the stub axle **90**. Since the drive train employed in driving the drum **64** is, in effect, a duplicate of the drive train **96** employed in driving the drum **62**, it is believed that the detailed description hereinbefore provided with respect to the gear train **96** is adequately sufficient for understanding the drive train employed in driving the drum **64**. Accordingly, a detailed description of the drive train employed for the drum **64** is omitted in the interest of brevity.

It is to be understood that articles, such as melons, delivered by the article delivery chute **26** are dropped through appropriately formed openings into pockets, not designated, appropriately formed in the periphery of the drum **64** and that the drum **64** is driven in rotation for transporting the articles from the discharge end of the article delivery chute to a loading point located directly therebeneath.

The drum **64** also is provided with an arcuate guide plate **206**. This plate is supported at its uppermost end by the terminal end portion of the article delivery chute **26** and at its lower end by a bracket **208** coupled to the upstanding frame members **12**, as best illustrated in FIG. **9**.

The guide plate **206** is employed in a manner quite similar to that in which the arcuate guide plate **102** is employed at the first packing station **20**. Hence, it now should be apparent that as articles are delivered to the pockets of the drum **64**, and the drum is driven in rotation, the articles are retained within the pockets of the drum through engagement therewith of the plate **206** until such time as the pockets are advanced to a point wherein the articles are advanced beyond the lowermost or terminal portion of the guide plate **206** whereupon the articles are caused to gravitate in a downwardly directed manner.

Immediately beneath the drum **64** there is a resilient baffle plate **210** which functions in a manner quite similar to the baffle plate **108**. The baffle plate **210** is supported by a suitable bracket **212**, also coupled to the machine's frame. In practice, the baffle plate is positioned at a point directly beneath the terminal portion of the plate **206** so that as the articles are discharged from the pockets of the drum **64**, they are intercepted by the resilient baffle plate **210** so that developing forces of impact are substantially eliminated through the force dissipating effects of the baffle plate **210**. In practice, the bracket **212** is adapted to be adjustably positioned in vertical directions so that the containers **28** are afforded passage therebeneath as the conveyor segment **34** presents the containers to the loading point of the second packing station **22**.

Since the conveyor segment **34** continuously is driven, the partially filled containers **28** continuously are advanced through the loading point of the second packing station **22**. Hence, delivery of the articles into the containers **28** is initiated as the forward or leading portion of the containers is advanced beneath the terminal portion of the baffle plate **210** so that filling is initiated at the forward end of the container and terminated as the rearward or trailing portion of the container **28** is passed beneath the terminal portion of the baffle plate **210**. Due to the fact that the motion of the containers **28** is unarrested, as the containers are advanced beneath the drum **64**, the second layer of articles is deposited in an ordered array, determined by the arrangement of the pockets in the drum **64**, on the first layer previously deposited in the container at the first packing station **20**. The pattern for the second layer can be varied, depending upon the nature and number of the articles. For example, it may be preferred that the articles of the second layer be nested relative to the first, while in other instances superimposition is preferred.

It is, of course, important to understand that the drum **64** intermittently is driven through its drive train, since for reasons which readily should be apparent it is undesirable to drive the drum **64** in a continuous manner. Accordingly, a control circuit is coupled with the motor of the drive train for the drum **64** and serves to cause the drum **64** to be intermittently advanced in predetermined increments for depositing a predetermined number of articles within the containers **28**.

While the control circuit for controlling the operation of the drum **64** has been omitted, for the sake of simplicity, it is to be understood that this circuit is, in turn, controlled through a pair of microswitches **214** and **216** which when opened and closed serve to open and close electrical circuits to the associated motor in an appropriate manner.

The microswitch **214**, FIG. **9**, is mounted adjacent to the path of containers **28** and includes a control arm extended transversely of the container's path so that it is engaged and actuated by the container **28** as the container is advanced by the conveyor segment **34**. Actuation of the microswitch **214** serves to initiate a driving rotation for the drum **64** simply by completing a motor control circuit for the drum **64**. Driving of the drum **64** continues for an appropriate duration, determined by a subsequent actuation of a microswitch **216** which interrupts the circuit completed by the switch **214**. The microswitch **216** also is mounted adjacent to the path of the container **28** with its control arm extended in a position to be actuated by a container **28** as the container is advanced therepast.

In order to accommodate containers having different lengths, and thus assure a proper positioning of the containers relative to the baffle plate **210** and the drum **64**, for purposes of effecting a desired packing operation, the switches **214** and **216** adjustably are mounted

on a rail 218 fixed in parallelism with the guide rail 148. Each of these switches operatively is supported by an adjustable bracket 220 which can be longitudinally repositioned along the rail 218 and fixed in a rigid engagement therewith through a suitable setscrew 222. Since the mounting of the switches 214 and 216 can be varied, as found appropriate, a detailed description of the mounting employed is omitted. However, it is to be understood that, in practice, the switch 216 is closed for closing a circuit employed in driving the drum 64, and as the switch 214 is actuated, by the presence of the leading portion of a container 28, the circuit is interrupted between the motor and the source of electrical energy so that the motor is de-energized.

Of course, it often is found desirable to provide structure for appropriately supporting the upstanding flaps of the containers 28 as they are advanced to, and through the packing station 22. This is achieved through a plurality of appropriately positioned plows 224 mounted on the frame of the machine 10 and adapted to engage the flaps for achieving a positioning thereof as the container 28 is advanced through the second packing station 22. Since the plows 224 are of any suitable and known design, which can be varied as found desirable, a detailed description thereof is omitted. However, it is to be understood that these plows normally are formed as deformed rails adjustably supported through suitable brackets, such as bracket 226, FIG. 9, so that the plows 224 are caused to assume an appropriate position for engaging and folding the out-folded flaps in an appropriate manner. Hence, the containers are maintained in their open condition as they are presented to the loading point of the second packing station 22.

Once the containers 28 have progressed to receive a second layer of articles, for thus completing packing of the container, the rotation of the drum 64 is arrested. Of course, the container 28 is advanced by the conveyor segment 34 and ultimately discharged onto the conveyor segment 36. As hereinbefore discussed, the conveyor segment 36 includes a pair of vibrators 60 which vibrate the conveyor segment 34 for purposes of assuring a settling of the articles within the containers 28.

As a practical matter, the conveyor 36 also includes a plurality of rollers, now shown, supported by the support rails 58 mounted on a plurality of springs 228 similar to the springs 188 of the conveyor segment 32, so that the vertical vibration of the containers 28 is accommodated. Of course, the number of vibrators 60 employed can be varied as found practical.

The containers 28 are discharged from the conveyor segment 36 onto any suitable structure whereupon the containers' upstanding and out-folded flaps are manipulated into a closed relationship with the containers' contents in any appropriate manner for thus completing a packing of the containers 28.

Operation

It is believed that in view of the foregoing description, the operation of the device will be readily understood and it will be briefly reviewed at this point.

With the machine 10 assembled in the manner hereinbefore described it should readily be apparent that the machine 10 can be employed for packing various types of articles. However, the machine has been found to have particular utility with articles which are particularly subject to cracking, bruising and the like. Such articles are typified by melons including cantaloupes and the like.

In order to pack the articles, they are delivered to the article delivery chutes 24 and 26 through any suitable delivery structure including culling conveyors and the like. The chutes 24 and 26 are inclined with respect to the horizontal plane so that the articles are permitted to gravitate, that is, be advanced under the influence of gravity. Of course, powered conveying structure can be employed equally as well where the articles being packed are of a type which suggests their use. In any event, the articles to be packed are delivered to the discharge end of the chutes 24 and 26 and are received within the pockets 88 of the drums 62 and 64.

For purposes of providing a brief description of the operation of the machine which embodies the instant invention, the packing operation performed in packing a single container 28 hereinafter is described. However, it is to be understood that a series of containers 28 is, in practice, sequentially presented to the packing stations 20 and 22 for purposes of receiving herewithin a superimposed pair of layers of articles.

Each container 28 preparatory to being packed is erected through a suitable manipulation of the containers. The upstanding flaps thereof are "broken" and, subsequently, the container is inserted at the receiving end of the inclined conveyor segment 30. The drive train 40 of the conveyor 30 is energized for purposes of advancing the container 28 to the loading point of the packing station 20.

As the container 28 is advanced by the conveyor segment 30 it is brought into engagement with and actuates the actuating arm of the microswitch 162. This actuation of the arm causes the motor 42 to be inactivated, with the braking mechanism 180 being rendered effective for arresting motion of the conveyor belt 38, in the manner aforedescribed. Simultaneously with the arresting of the motion of the conveyor belt 38, the stop pin 142 is extended, in response to an actuation of the slave cylinder 146, as a signal is received at its selector valve, not shown. At this instant, the output shaft 138 of the slave cylinder 134 is extended for lowering the elevator 124. As the elevator 124 is lowered, the separator 116 is positioned within the forward end of the inclined and stationary container 28 in a manner such that its wings 118 are forwardly and outwardly directed for purposes of directing received articles into the opposite forward corners of the container 28.

Also, in response to the actuation of the switch 162, the motor 95 is energized for initiating operation of the gear train 96, whereupon the drum 62 is driven in a counterclockwise direction, FIG. 3, for purposes of causing the drum 62 to rotate for purposes of conveying articles received within its pockets 88 into a disposition directly above the baffle plate 108. As the drum 62 is rotated, the guide plate 102 serves to support the articles for precluding a premature discharge of the articles from the pockets. However, as the drum 66 continues to rotate, the pockets 66 containing articles therewithin are passed beyond the lowermost terminal portion of the guide plate 102 so that the articles thus are freed and permitted to drop into engagement with the baffle plate 108. This plate tends to interrupt the fall of the article and dissipate its stored energy. The articles thus gravitate into the container 28. Once deposited within the container, the articles are permitted to roll

forward under the influence of gravity past the baffle plate **112.** This plate also serves to dissipate the energy possessed by the articles for thus obviating damage thereto as its motion ultimately is arrested. As a practical matter, the first articles delivered into the container **28** are delivered in a side-by-side pair and are separated by the separator **116** which forces the articles into opposite corners of the container. A single article follows the pair, this article then is followed by another side-by-side pair of articles. As can readily be appreciated, by assuring that a separation of the first pair of articles dropped into the container is effected, the pattern illustrated in FIG. **11** is assured.

As the drum **62** is driven in rotation the timing mechanism **160** coupled with the packing drum **62** is activated for driving the actuator arm **166** in rotation. Since a two to one ratio is established between the rotation of the actuator arm **166** and the drum **62,** each 360° of rotation of the packing drum serves to advance the arm **166** through 180° of angular displacement. As 180° of angular displacement, or rotation, is imparted to the arm **166** an extended distal end thereof is caused to strike the microswitch **172,** which responsively is energized to reverse the operative state imposed on the circuit through the operation of the microswitch **162.** This, in effect, serves to reverse the operative position of the selector valve coupled with the slave cylinders **134** for raising the elevator **124,** and, consequently, the separator **116** and baffle plate **112** so that they thus are extracted from the container **28.** Concurrently, the stop pin **142** is retracted from a blocking position adjacent the leading portion of the container **28** as the slave cylinder **146** is actuated is response to the operation of the microswitch **162.**

In order to assure that the slave cylinders **134** and **146** have been afforded an appropriate interval time in which to perform their required functions, a time delay is interposed in the control circuit for delaying the operation of the motor **42.** At the termination of an appropriate period, the motor **42** again is energized so that the belt **38** is activated to advance the now partially filled container **28** from the packing station **20** to be received by the conveyor segment **32.**

As the container **28** is received on the conveyor segment **32,** inertia serves to drive the container across the rollers of this conveyor segment as the vibrator **50** imparts vertically directed vibratory motion to the container for thus causing the article to fully seat within the container **28,** preparatory to being delivered to the packing station **22** by the belt **56** of the conveyor segment **34.**

As the container **28** is discharged from the conveyor segment **32** and received by the conveyor segment **34,** the various plows **224** engage and appropriately position the flaps of the container for purposes of permitting the container to be positioned at a loading point beneath the drum **64** and the baffle plate **210** provided at the second packing station **22.**

The belt **56** of the conveyor segment **34** continuously is driven by the drive train **52** for continuously advancing the container **28** through the second packing station **22.** As the container approaches the loading point of the second packing station **22,** the switch **216** is closed, through an activation of the switch's actuating arm, for purposes of closing a circuit between the motor provided for the drum **64,** whereupon operative rotation is imparted to the drum so that the pockets thereof serve to advance articles to the containers **28.** Continued advancement of the container **28** occurs concurrently with the rotation of the drum so that the drum is permitted to deliver a layer of articles into the container as it is advanced. Additional advancement serves to present the container in a position opposite the switch **214** which now is engaged by the container.

As the container **28** engages the switch **214,** a circuit is opened between the motor for the drum **64** and its source of electrical potential. As a consequence of the operation of the switch **214,** rotation of the drum **64** is arrested and delivery of the articles terminated.

Consequently, operation of the drum **64** is arrested as the container **28** is advanced from the loading point of the packing station **22** and onto the conveyor segment **36.** As the containers **28** are received by the conveyor segment **36,** additional vibration is imparted thereto, through the operation of the pair of vibrators **60** for thus assuring that the articles received within each of the containers **28** are appropriately seated therewithin.

Of course, the containers **28** can be advanced along the conveyor segment **36** in any appropriate manner. For example, the containers **28** as they are discharged from the conveyor segment **34** can engage and push the preceding container toward the discharge end of the conveyor segment **36.** In any event, the containers **28,** once discharged from the conveyor segment **36,** are closed in any appropriate manner and thus prepared for further handling and shipment.

In view of the foregoing, it should readily be apparent that the machine of the instant invention provides a satisfactory solution to a perplexing problem of packing fragile articles such as melons and the like in a practical and economic manner.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the illustrative details disclosed.

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

1. An article handling machine for use in packing discrete articles within containers comprising:

A. means defining multiple packing stations arranged in serial alignment;

B. container advancing means associated with said packing stations for serially delivering a plurality of open-top containers through each of the packing stations;

C. article delivery means associated with each packing station for delivering thereto articles to be packed;

D. container packing means located at each of said packing stations including a rotatably driven packing drum having an array of article-receiving pockets arranged within the peripheral surface thereof for receiving said articles from said article delivery means and for discharging the received articles into said containers;

E. container arresting means located at a first selected packing station and associated with said packing means and said container advancing means for sequentially arresting motion of the serially delivered containers, whereby each container

is brought to rest at a point adjacent to the packing means; and

F. means associated with said container advancing means for continuously advancing said serially delivered containers through a second selected packing station.

2. The machine of claim 1 further comprising means associated with each of said packing stations for sensing the presence of each container delivered to the associated packing station and to impose control over the operation of said container packing means in a manner such that said drum is rotated only in the presence of a delivered container.

3. The machine of claim 2 further comprising article positioning means for orienting articles discharged into said containers.

4. The machine of claim 2 wherein the article positioning means is associated with said container arresting means and includes means for supporting each arrested container in an inclined disposition adjacent said drum, and an article separator removably positioned within each container.

5. An article handling machine for use in packing articles within containers having upstanding sidewalls including:

A. a packing drum mounted for rotation about a substantially horizontal axis having a peripheral surface of an arcuate configuration, and means defining within said surface an array of pockets of a substantially cup-shaped configuration disposed in staggered alignment and adapted to receive and transport articles to be packed within said container, each pocket being so arranged as to describe a circular orbit about said horizontal axis as the drum is driven in rotation;

B. means operatively associated with said drum adapted to deliver to said pockets articles to be packed;

C. means for serially positioning a plurality of containers in an article-receiving disposition adjacent to said drum; and

D. means for effecting a delivery of said articles from said packing drum to said containers including,

1. drive means for driving the drum in rotation, whereby the pockets are caused to advance between an article receiving position to an article discharge position,

2. means for permitting said articles to gravitate into said pockets when the pockets are near the top of their orbits and permitting the articles to gravitate from said pockets when the pockets are near the bottom of their orbits, and

3. a first baffle plate disposed in a substantially horizontal disposition, and a second baffle plate disposed in a substantially vertical disposition, said first and second baffle plates being disposed in the path of said articles as they are delivered from said packing drum.

6. The article handling machine of claim 5 wherein said means for delivering said articles to said pockets includes a plurality of inclined channels, each terminating at a point substantially above said drum and adjacent to an orbit described by one of said pockets.

7. The article handling machine of claim 6 further comprising:

A. another packing drum adapted to deliver and deposit articles within said containers; and

B. means for conveying said containers between said packing drums.

8. The article handling machine of claim 7 wherein said means for conveying said container includes a vibrator for vibrating said containers.

9. The article handling machine of claim 8 further comprising means for arranging said articles in ordered layers within the containers as the articles are delivered by said drums.

10. The machine of claim 9 wherein the means for arranging said articles in ordered layers includes means supporting each container of said plurality of containers in an inclined and stationary condition as the articles are permitted to gravitate from the pockets of said packing drum and means for continuously advancing said cartons as articles are delivered and deposited therewithin by said other packing drum.

11. In an article handling machine for packing articles subject to bruising, cracking and the like means including:

A. a packing drum supported for rotation about a substantially horizontal axis;

B. means defining within the periphery of said drum an annular array of article receiving pockets, said pockets being disposed in staggered alignment about the surface of the drum and adapted to receive articles therewithin and to discharge the received articles therefrom as the drum is driven in rotation;

C. a retainer plate circumscribing a substantial portion of the periphery of the drum and associated therewith to provide lateral support to articles received within the pockets as said drum is driven in rotation;

D. means for serially positioning open-top containers adjacent to said drum for receiving articles discharged therefrom;

E. resilient baffle means for engaging and guiding said articles as they are discharged from said drum;

F. article positioning means adapted to be inserted and received within each of said containers for positioning therewithin articles received thereby; and

G. support means supporting said article positioning means within each container as the container is positioned adjacent to said drum.

12. The article handling machine of claim 11 wherein said support means includes a reciprocating shaft mounted above said container as the container is positioned adjacent said drum and means for vertically reciprocating said shaft for thereby raising and lowering said article positioning means.

13. An article handling machine for use in packing articles such as melons and the like within containers having substantially vertical side walls comprising:

A. means defining a first and a second operatively related packing station, each packing station including a packing drum mounted for driven rotation about a horizontal axis;

B. means defining about the periphery of each of said drums an array of pockets arranged in staggered annular alignment for receiving and discharging articles to be packed;

C. an article delivery chute associated with each of said packing drums, disposed thereabove and adapted to deliver a plurality of articles thereto, said chute including resilient bumpers for protecting said articles against impact;

D. an arcuate guide plate circumscribing a portion of each of said drums extending from a point adjacent to the associated chute to a loading point beneath the drum;

E. means for serially delivering open top containers to a loading point adjacent to the drum at each packing station;

F. support means for supporting said containers in a stationary and inclined disposition at the loading point of the first packing station;

G. means for guiding articles discharged from said pockets into said containers as they are supported by said support means;

H. container advancing means for advancing said containers to and from said first and second packing stations;

I. means for continuously advancing said containers past the loading point of said second packing station; and

J. a vibrating means for vibrating said articles within the containers.

14. The article handling machine of claim **13** where said container advancing means includes said vibrating means.

15. The article handling machine of claim **13** where said articles are cantaloupes.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,735,552 Dated May 29, 1973

Inventor(s) Edward J. Derderian

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 30, delete "s" and insert ---as---.

Column 5, line 61, delete "which" and insert ---with---.

Signed and sealed this 27th day of November 1973.

(SEAL)
Attest;

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
☆ U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.