Oct. 13, 1970 A. H. LLOYD 3,533,213

PACKING MACHINE

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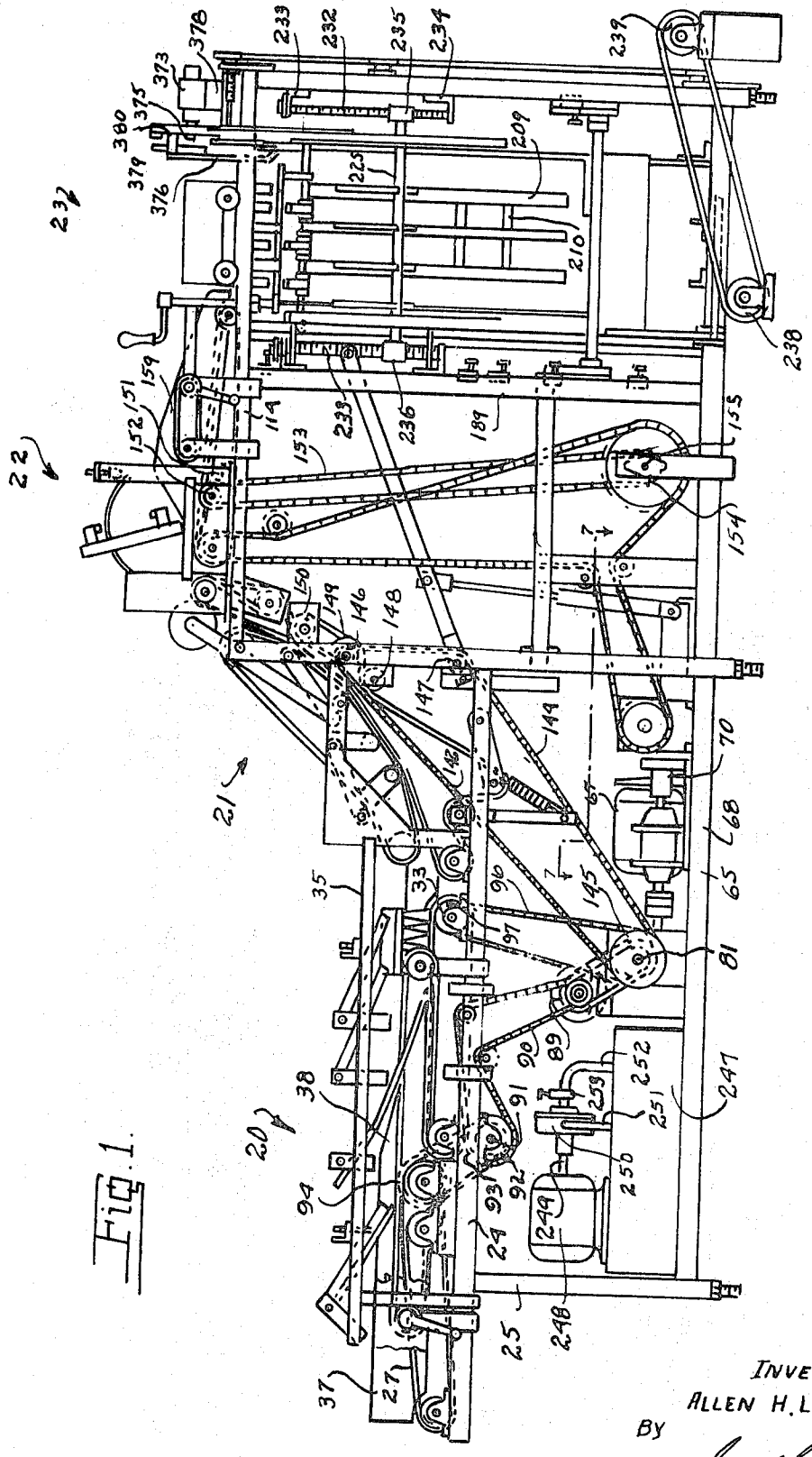


Fig. 1.

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PACKING MACHINE

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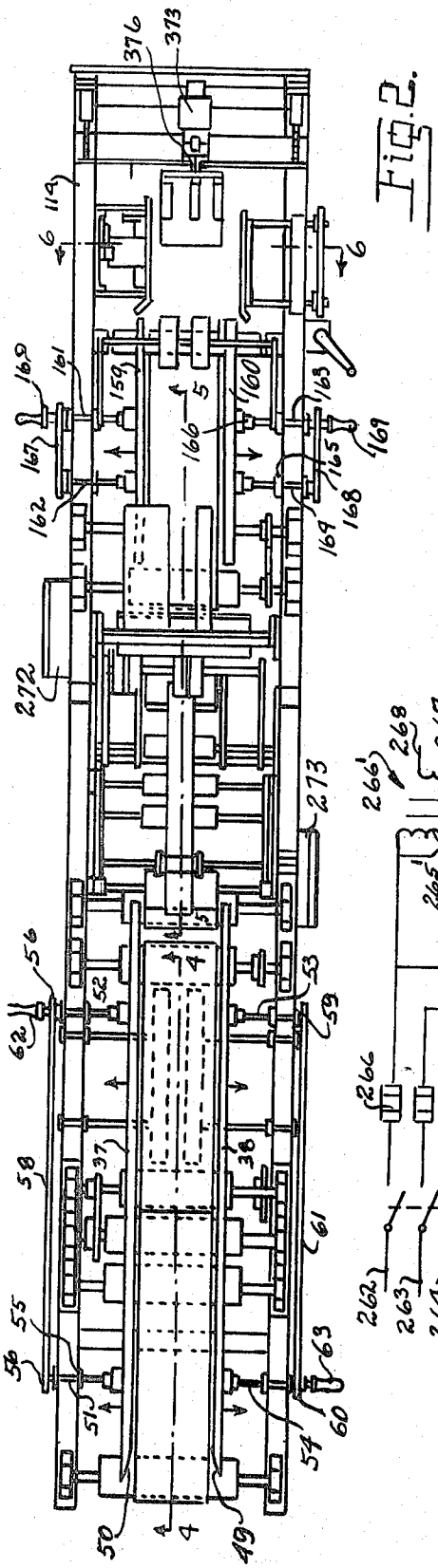


Fig. 2.

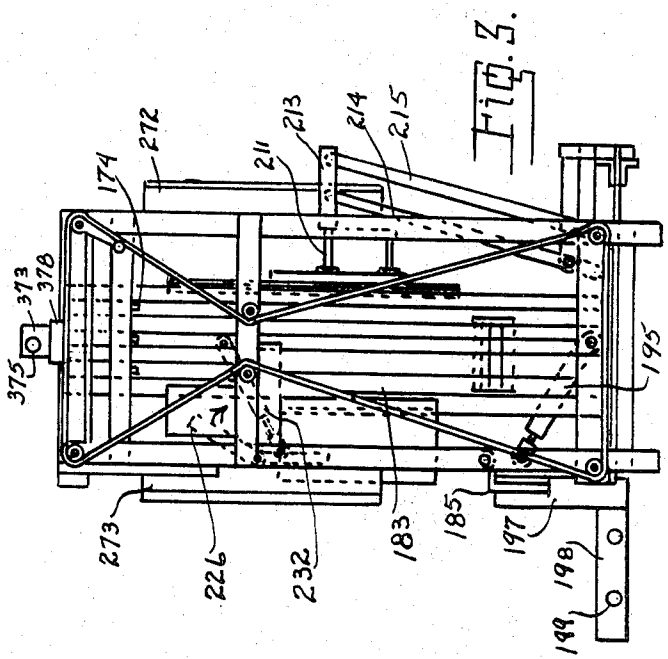


Fig. 3.

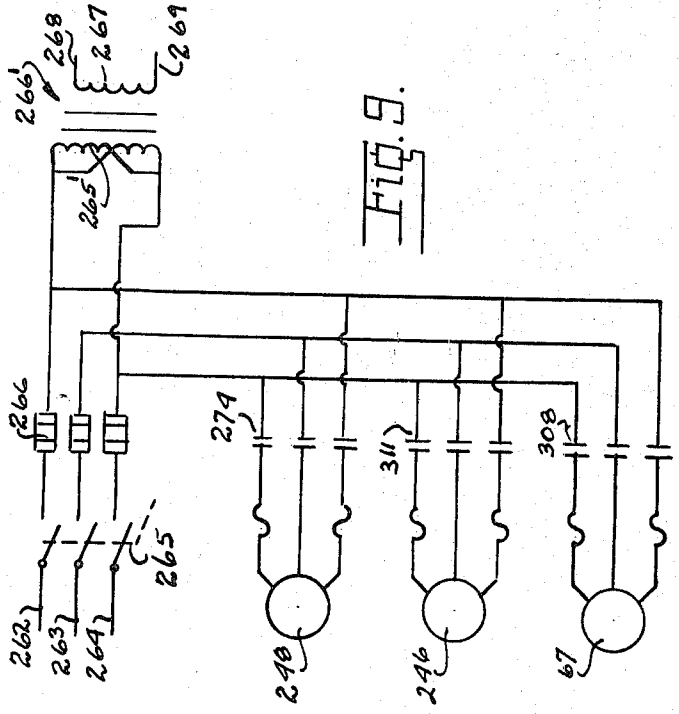


Fig. 9.

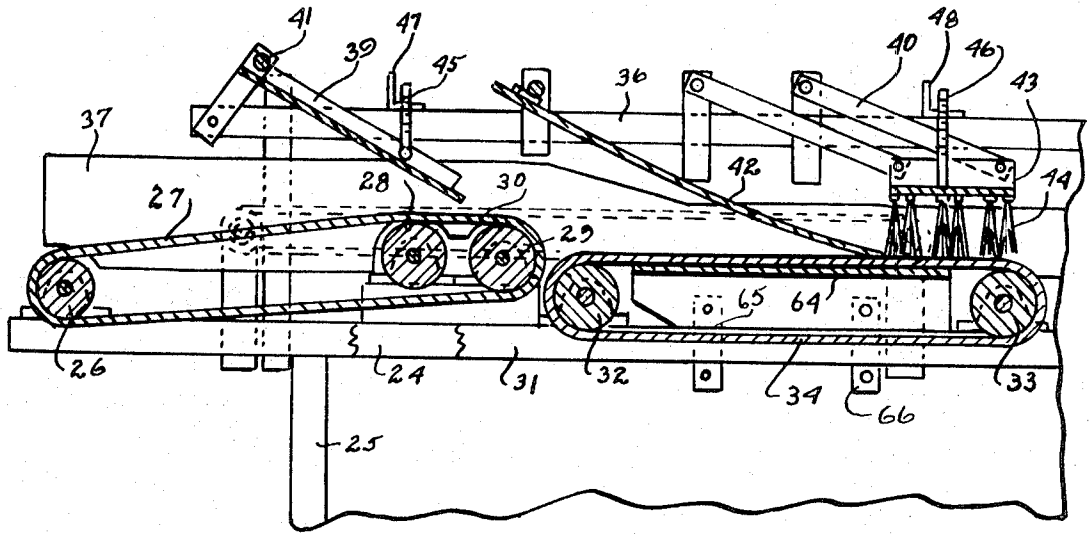
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Oct. 13, 1970 A. H. LLOYD 3,533,213

PACKING MACHINE

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Fig. 4.



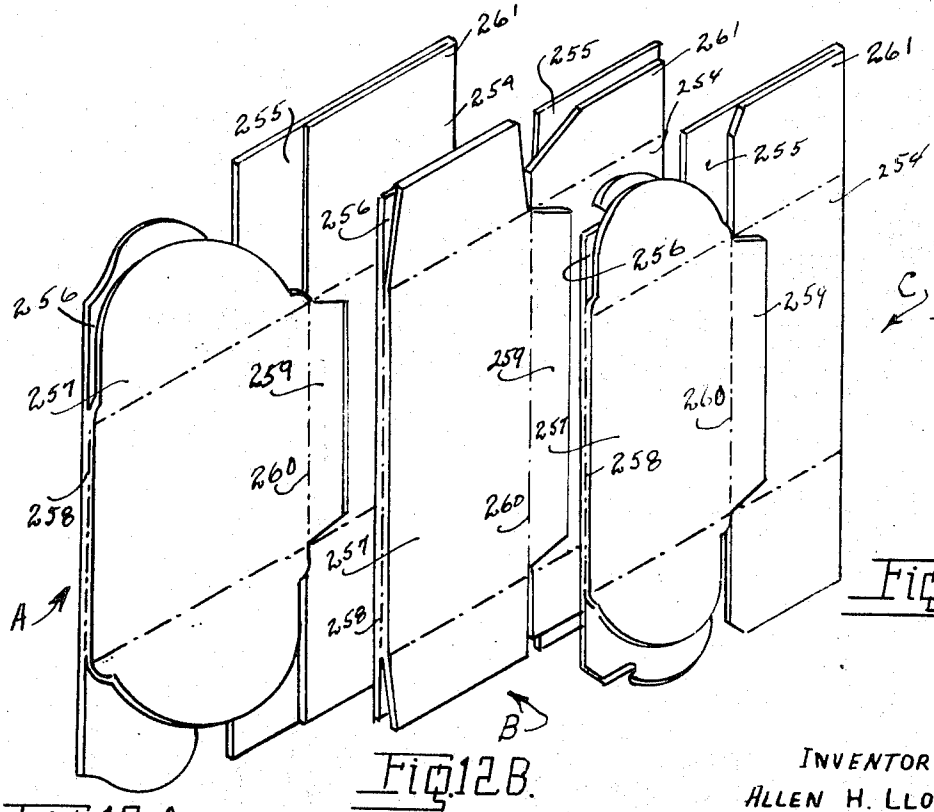


Fig. 12 A.

Fig. 12 B.

Fig. 12 C.

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PACKING MACHINE

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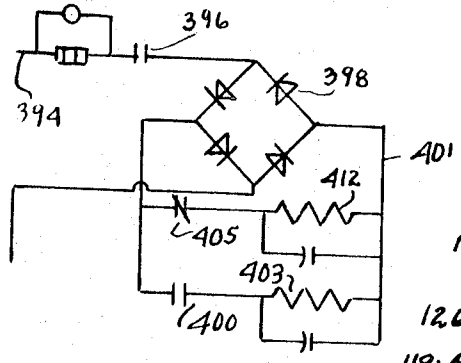


Fig. 11.

Fig. 5.

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3,533,213

PACKING MACHINE

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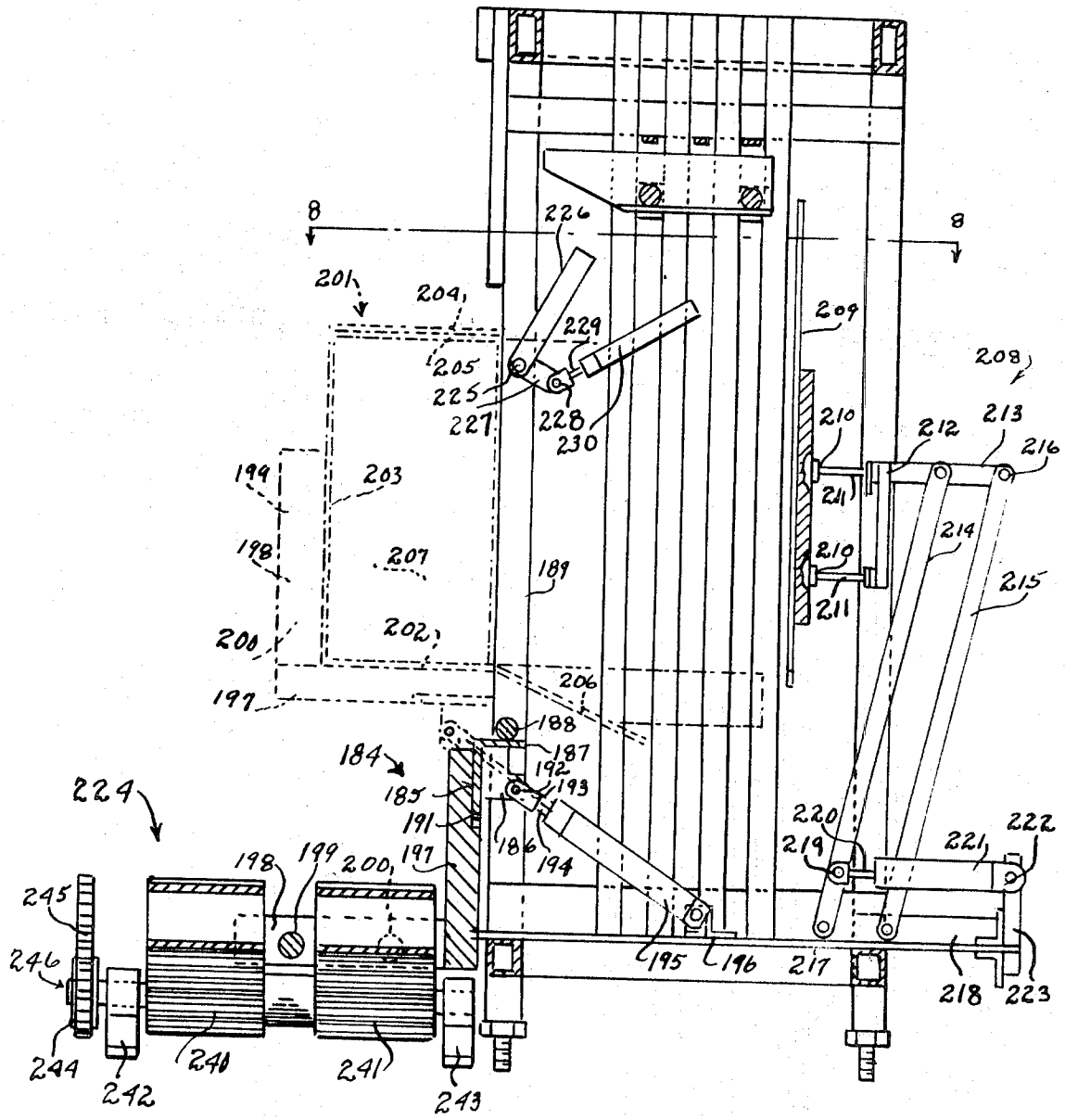


Fig. 6.

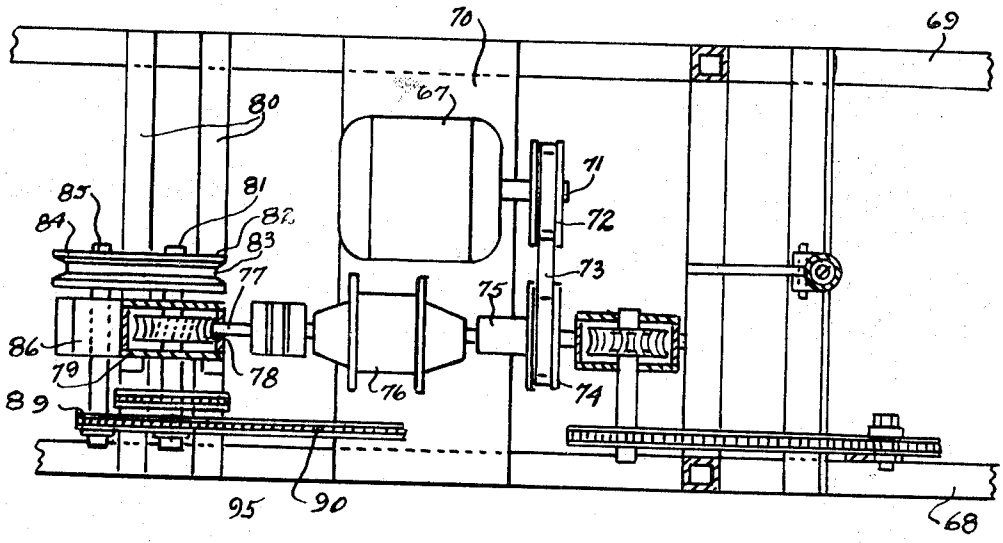
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Oct. 13, 1970 A. H. LLOYD 3,533,213

PACKING MACHINE

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Fig. 7



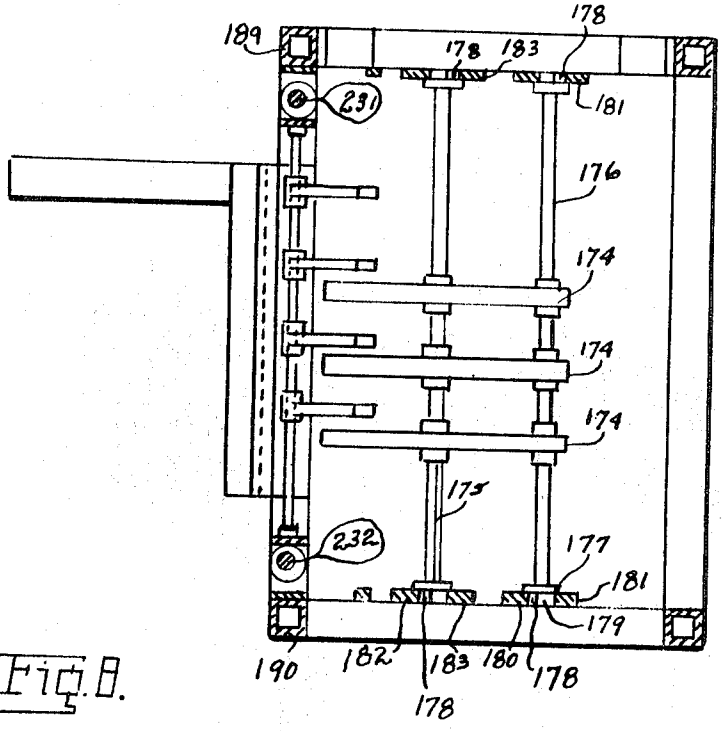


Fig. 8.

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Oct. 13, 1970 A. H. LLOYD 3,533,213

PACKING MACHINE

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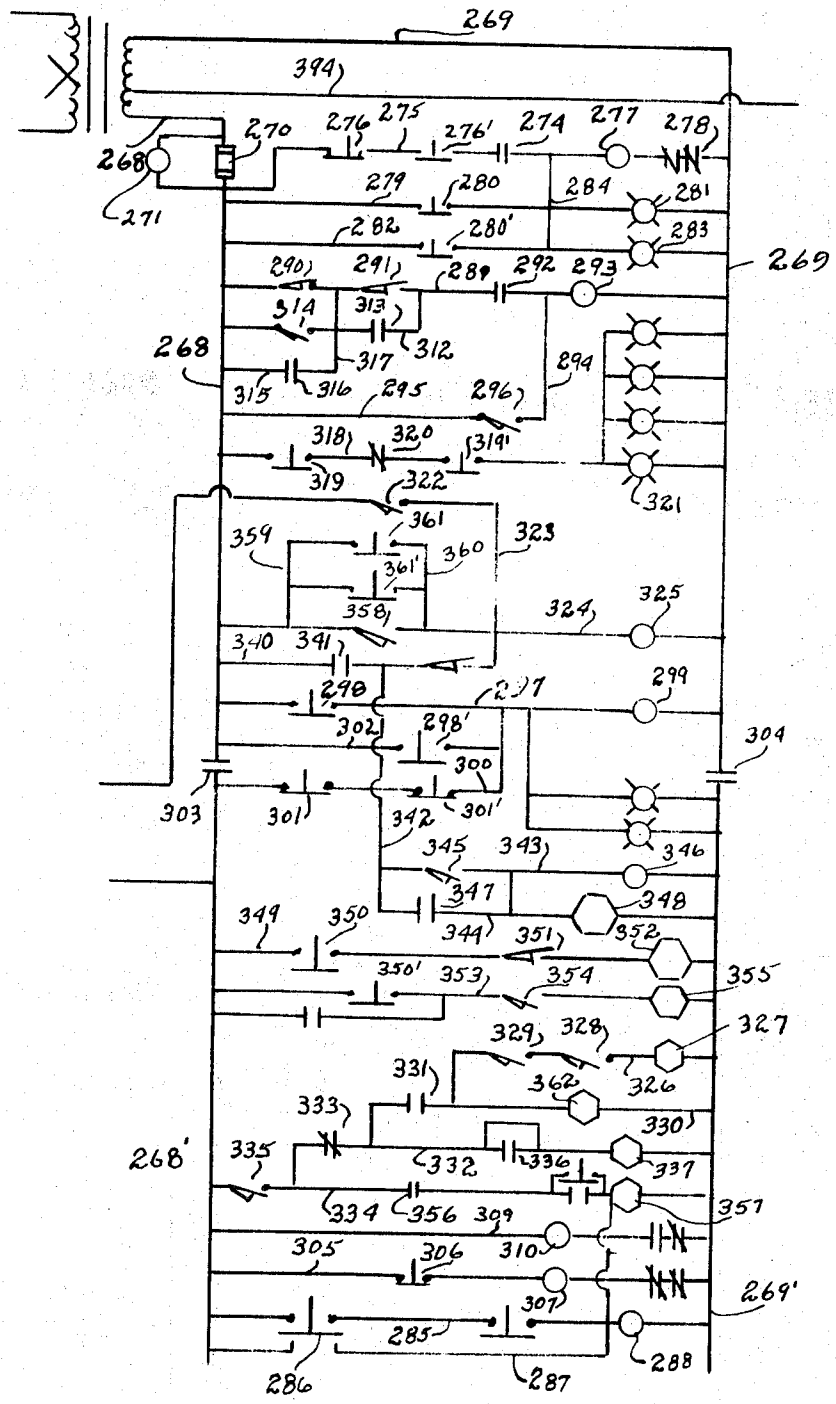


Fig. 10.

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Oct. 13, 1970 A. H. LLOYD 3,533,213

PACKING MACHINE

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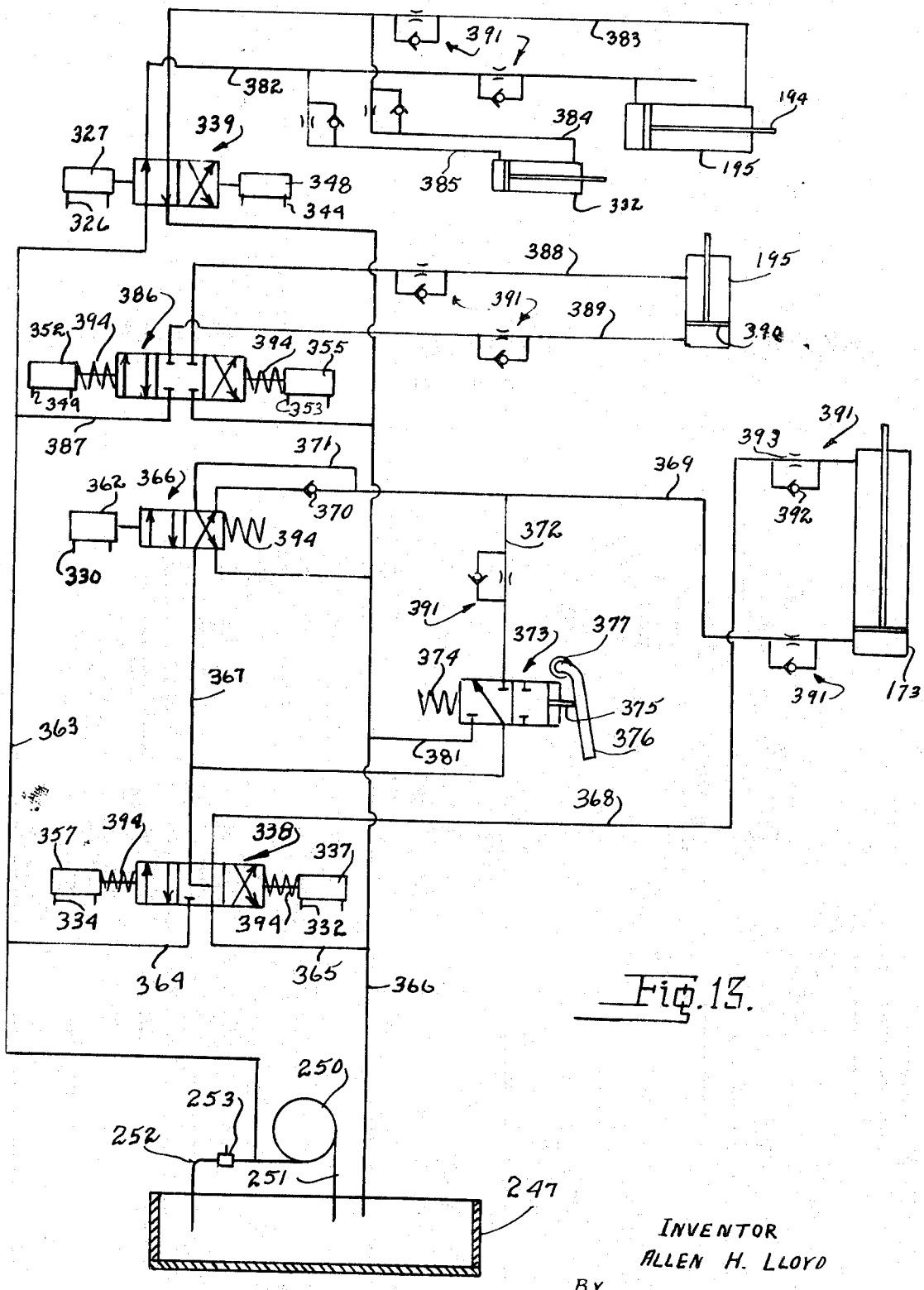


Fig. 13.

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United States Patent Office 3,533,213 Patented Oct. 13, 1970

3,533,213

PACKING MACHINE

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Filed Jan. 2, 1969, Ser. No. 788,443
Int. Cl. B65b 57/20
U.S. Cl. 53—78 15 Claims

ABSTRACT OF THE DISCLOSURE

The packing machine of the present invention is employed for arranging and stacking relatively flat articles, such as folded cartons and counting the same, so that subsequent stacks of exactly the same number thereof, for example, 250 items per stack, and then disposing of the stack into a shipping and/or storage container, such as, corrugated boxes. The present machine is adapted to stack, count and automatically pack articles of different areas, that is, for example, knocked-down cartons which when erected would have a capacity for a half-gallon of liquid, a quart of liquid, or a pint of liquid.

Upon the inserting of a stack of the articles into the storage and/or shipping container, the same is automatically discharged from the machine and an empty such storage and/or shipping container automatically positioned for the next stack.

This invention relates to improvements in packing machines, that is, in machines for packing flat articles; the machine of the present invention being particularly designed for the packing of folded, printed cartons into a storage or shipping container.

An object of the present invention is the provision of a machine which upon receiving flat articles, such as folded printed cartons, from the printing and/or sealing machine in a continuous, but not necessarily uniform, stream of cartons, positively positions them with respect to one another in a stack and which stack upon reaching a desired height is automatically pushed into a container, positioned for receiving same, for subsequent storage and/or shipment.

Another object of this invention is the provision of a machine which in addition to the function as set forth in the preceding object, simultaneously counts the said articles while being stacked preparatory to insertion into a storage and/or shipping container.

It is also an object of this invention to provide a machine wherein the stream of articles to be inserted in the aforementioned storage and/or shipping container, and which articles may or may not be counted, has the stream of said articles arranged in a relatively fixed relation to one another prior to being counted and/or stacked preparatory to insertion within the said storage, packing and/or shipping container.

A still further and important object of the present invention is the provision of means in the machine of the present invention whereby the effective dimensions of the operating and control portions of the machine may be adjusted to accommodate flat articles, specifically, folded cartons, of different dimensions and whereby the said cartons are maintained in operative relation to one another and the various portions of the machine so that, regardless of the size of the cartons being worked all of the said cartons are properly stacked with respect to the shipping and/or storing container.

It is also an object of the present invention to interconnect various units of the machine that the same will function in rhythmic sequence to have the articles being packed always at points wherein interference is afforded.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawings, forming a part thereof, and it is to be understood that any modifications may be made in the exact structural details there shown and described without departing from or exceeding the spirit of the invention.

In the drawings;

FIG. 1 is a side elevational view of the mechanism or machine of the present invention.

FIG. 2 is a top plan view of the machine of FIG. 1.

FIG. 3 is an end elevational view of the machine of FIGS. 1 and 2 and as seen, particularly, from the right hand end thereof.

FIG. 4 is an enlarged, sectional view through the left hand or receiving end of the machine as seen from line 4— on FIG. 2.

FIG. 5 is an enlarged, vertical, sectional view through the portion of the machine which counts the articles as they pass therethrough and at the same time position the articles for subsequent delivery into a hopper, as seen from line 5—5 on FIG. 2.

FIG. 6 is an enlarged, sectional view through the discharge and elevator or table end of the machine as seen inwardly of the right hand end thereof in FIG. 2, on line 6—6 on said FIG. 2.

FIG. 7 is an enlarged plan view of the drive mechanism for the machine as seen from line 7—7 on FIG. 1.

FIG. 8 is a horizontal, sectional view through the discharge and packing end of the machine as seen from line 8—8 on FIG. 6.

FIG. 9 is a wiring diagram of the several motors used in the operation of the machine.

FIG. 10 is a wiring diagram of the machine and particularly the various control mechanisms wherefore the machine will operate substantially, automatically in counting, stacking and discharging the artices being packed.

FIG. 11 is a diagrammatic view of the electric circuit which operates the electric brake and clutch mechanism for effecting smooth and instant control of the machine.

FIG. 12 is a perspective view of several cartons as used in the food industry and which cartons are counted, stacked and inserted in the storage and/or shipping container.

FIG. 12*a*, strictly for comparison purposes, and in no wise a limiting factor, a folded carton which when opened and has the ends folded in a closing position has a capacity of approximately one gallon;

FIG. 12*b* is one form of a foldable carton for holding baked goods and has a capacity between those of FIGS. 12*a* and 12*c*; and

FIG. 12*c* disclosing a carton for the same purpose as FIG. 12*a* but which carton 12*c*, again merely for comparison purposes, has a capacity of one-half gallon or one quart.

FIG. 13 is a diagrammatic view of the hydraulic mechanism and illustrating the control thereof from the main control circuit.

Throughout the several views of the drawings similar reference characters are employed to denote the same or similar parts.

As shown in FIG. 1, most particularly, the machine may be said to have a receiving and sorting section indicated in its entirety by the reference numeral **20**, a section arranging the cartons for proper presentation to a counting mechanism and which section is indicated in general by the reference numeral **21**, the highest point on the machine is the section that counts the cartons as they pass thereby to the stacking mechanism and which counting section is indicated in general by the reference numeral **22**, and finally the machine has a stacking and

discharging section which receives the cartons after being counted for properly stacking the same and positioning the stack for disposal in a shipping or storage container and which last section is indicated in its entirety by the reference numeral **23**.

The receiving and sorting section **20** is illustrated on a somewhat enlarged scale in FIG. 4, and which includes a portion of the machine front side, upper frame rail **24** held in a position above and parallel with the floor by depending frame members or legs **25**. The section **20** has mounted on the said rail **24** at its longitudinal outer end a transmission belt pulley or drum **26** around which extends an endless conveyor belt **27** which, in turn, extends over a belt pulley or drum **28** and then around belt pulley or drum **29** of substantially similar diameter, a diameter larger than the diameter of the pulley **26**, and wherefore the belt **27** is provided with a relatively short horizontal portion **30** between the supporting pulleys **28** and **29**.

Each of the said belt pulleys or drums **26**, **28** and **29** has a shaft that is journaled in bearings or bearing blocks respectively supported by the aforementioned forward, upward, horizontal rail **24** and its laterally offset or opposite rear horizontal rail **31**.

Further mounted in bearings on the said horizontal rails **24** and **31** are a second pair of belt pulleys or drums **32** and **33** about which extends an endless conveyor belt **34** which has its upper flight substantially in a plane horizontal to the floor and to a normal longitudinal axis through the machine.

The belt **27** may be designated as a receiving belt and receives the articles to be counted and packed on the upper surface of its upper flight and carries them to the right as seen in FIGS. 1 and 4. These articles, while generally reasonably accurately positioned with respect to a longitudinal center or axis through the stream, do not have these articles, folded and glued cartons, in any particular relation to one another in a vertical direction, that is, the said cartons may be tandem to one another, they may be overlapped but with their leading edges anywhere from directly above one another to the tandem position just expressed, or the said cartons may be stacked several deep with, again, their leading edges either in alignment or irregularly spaced with respect to the corresponding edge of the cartons of the stream above and below any one thereof.

The receiving section **20** of the machine in addition must be designated as a discriminating mechanism and includes a pair of longitudinally extending forward and rearward bars **35** and **36** respectively carried by the front and rear path defining plates **37** and **38**. The said plates or members **37** and **38** support a plurality of arms **39** and **40** which are held in place and adjustable around connected end pivot bars **41** at their outer end and which arms may be termed discriminators, since the inner end of the discriminator arms **39** overlies the horizontal portion **30** of the transmission belt **27** for thereby holding back cartons which are above and on the carton presently on the said belt **27**.

The cartons are discharged from the belt **27** onto the discriminator belt **34** and relative to which belt a spring finger or discriminator element **42** lies to insure that the said cartons are flat on the belt **34** as they move therewith. Ahead of, to the right, as seen in FIGS. 1 and 4, is a brush mechanism including a body portion **43** connected with the other or inner ends of the discriminator bars **40** and which bars act as a parallelgram for the body portion or brush frame **43**. The brush frame **43** has the brush bristles **44** projecting downwardly thereof to the belt **34** and is the final member to insure but a single carton passing over and beyond the said belt **34** at any given instance.

Obviously, cartons or other flat articles will be made from different gauge materials wherefore certain folded and sealed or glued cartons will have more thickness

than others and for this reason the more or less fixed discriminator arms **39** and **40** are adjustable, the former through an adjusting screw **45** while the latter is through an adjusting screw **46** each of which screws operates through a supporting angle iron, respectively, **47** and **48** carried by the arms **35** and **36** thereabove. The said discriminating arm **39** and the discriminating arms **40** with their brush **44** are therefore adjustable with respect to the belt surfaces with which they work, so as not to unduly restrict flow beneath them but will prevent too thick an article, group of articles, to pass thereunder. As intimated above, disposed on each side of the belts **27** and **34** are path defining plates or side panels **35** and **36** and which plates or panels are spaced from one another with respect to the belts **27** and **34** that a trough of the desired width of carton being packed and which spaced side plates or panels **35** and **36** maintain the carton stream with each carton in axial alignment with the other. These side plates or panels have their forward ends outwardly flared at respectively **49** and **50** for thereby providing an entrant mouth or throat and the said side panels are adjustaed toward and from one another for varying sizes of widths of folded cartons.

As illustrated in the drawings, FIGS. 1, 2 and 4, each side plate or panel **35** and **36** has connected therewith an inner swiveling end of an adjusting screw **51**, **52**, **53** and **54** which are suitably mounted for axial adjustment in a nut and bearing support **55**. Each of the adjusting screws **51** through **54** has an end laterally projecting beyond the side plates or panels **35** and **36** with the corresponding ends of the adjusting screws **51** and **52**, respectively, having keyed or otherwise secured thereto a chain sprocket or gear **56** and **57** and trained about said sprockets or gears **56** and **57** is a sprocket chain **58**. The adjusting screws **53** and **54** likewise have connected with their outer or free ends chain sprockets or gears **59** and **60** and about which is trained a sprocket chain **61**. Either of the adjusting screws on each side of the receiving station, or respectively outwardly of each side plate or panel **35** and **36**, is provided with a manually operable handle **62** and **63**. Specifically, adjusting screw **52** has secured thereto the handle **62** while the adjusting screw **54** has secured thereto the handle **63**. Depending on the hand of the adjusting screws depends whether the side panels upon the actuation of the handles **62** and **63** are adjusted inwardly or outwardly with respect to one another. In any event the adjustment of one corner of either side plate or panel adjusts both corners and therefore the entire length of the side panel is equally adjusted and in the same direction.

The belt **34** between the belt pulleys or drums **32** and **33** has its upper flight on a supporting table **64** and which table is mounted in operative position through attaching brackets **65** and **66** on opposite sides of the belt **34** for securing the same in position, respectively, on the top frame rails **31** and **32**.

Each of the belts **27** and **34** is driven in the same direction, that is, with their upper flights running from left to right as seen in FIGS. 1 and 4. In order to effect the operation of the said belts use is made of a motor **67** carried by the lower longitudinal frame members **68** and **69**. As seen in said views the motor **67**, is, in reality, mounted on a plate **70** which is welded or otherwise secured at its opposite ends to said longitudinal members **68** and **69**.

The motor shaft **71** from said motor **67** has thereon a pulley **72** around which is mounted a belt **73** which, in turn, extends around a driven belt pulley **74**. The said pulleys **72** and **74** are of the adjustable variety for thereby varying the speed of the pulley **74** with respect to the speed of the motor shaft **71**.

The pulley **74** is secured to a driven shaft **75** which, in effect, constitutes the countershaft of a driving chain since it is from this shaft that the various gear trains are taken for effecting the operation of the machine as

will be presently described in detail. The said driven or counter-shaft **75** extends through an electric clutch and brake mechanism **76**, which, it is believed, is a well-known device and needs no further structural disclosure or description, the said combined clutch and brake is illustrated in a portion of the electric diagram which will be described in detail subsequently. The said counter-shaft **75** has on one end thereof, its left hand end as seen in FIGS. 1 and 7, a worm **77** meshing with a worm wheel **78** in a gear box **79** carried by a plate or plates **80** which extend parallel to the motor plate **70** and are in turn secured by welding or otherwise to the machine frame longitudinal members **68** and **69**. Obviously, the worm **78** has an r.p.m. and therefore its output shaft **81** has an r.p.m. less than the countershaft **75**. The said worm wheel shaft **81** projects from both sides of the gear box **79** with the one end thereof having thereon a pulley **82** around which is trained a belt **83** and which belt **83**, in turn, is trained around a second pulley **84** secured to a shaft **85** in a bearing block **86** mounted on a suitable support of the machine frame or mounted directly to the gear box housing **79**. The said pulleys **82** and **84** are made of members of the variable effective diameter pulleys and wherefore the r.p.m. of the shaft **85** is variable with respect to the r.p.m. of the worm wheel shaft **81**.

The shaft **85** is mounted for rotation in a bearing block **86** and has secured to its other, outer, end a sprocket **89** for a sprocket or roller chain **90**. The sprocket or roller chain **90** extends around various sprocket members to an ultimate final sprocket shaft **91**, see FIG. 1 and from which the sprocket chain returns to the sprocket **89** on shaft **85**.

The sprocket shaft **91** not only has thereon the sprocket **92** for the sprocket chain **90** but also has thereon a second sprocket around which extends a sprocket chain **93**, and which sprocket chain extends about a sprocket **94** on one end of the shaft of the belt pulley or drum **29**.

From this it will be understood that the conveyor belt **27** is driven at a speed which is variable depending upon the size of the folded carton being placed in the storage and shipping container and the speed at which the cartons are being received by the said conveyor belt **27**.

Again referring to FIGS. 1 and 7, the shaft from the gear box or worm wheel shaft **77** has its other end outwardly of the gear box **75** to have secured thereto a sprocket **95** about which is trained a sprocket or roller chain **96** and which sprocket or roller chain in turn extends about a sprocket **97** on the belt pulley or drum **33** and around which drum extends the endless conveyor belt **34**.

From the foregoing it will be noted that the folded cartons on being received from an outside source which may be a printing machine, a sealing machine, or the like, are discriminated to the extent of the stacked and/or laterally displaced cartons eventually leaving the said conveyor belt **34** in a single file and in succession with the leading edges of the cartons being similarly spaced from one another throughout the line to substantially the end thereof from the discharge point to the discriminating mechanism. It should be noted that the conveyor belt **27** is rotated at a somewhat slower speed than the conveyor belt **34** so that the folded cartons, or other items, upon reaching the end of the conveyor belt **27** are rapidly shifted away from succeeding cartons to insure no interference with the movement of the cartons from the conveyor belt **27**.

The said folded cartons now enter the counting section **21**, of the machine, and this section, since it stands the cartons substantially on end while counting the same, comprises an operative section including conveyor belts above and below the carton. As shown in FIGS. 1 and 5, the latter, particularly, use is made of a conveyor belt **98** extending around a belt pulley or drum **99** which is carried by the upper longitudinal frame members **23** and **24**. The upper reach of the conveyor belt **98**, in turn, extends around a belt pulley or drum **100** which is carried by uprights **101** of the machine frame. The lower reach of the belt **98**, in succession, passes over belt pulleys or drums **102**, **103** and **104**. The belt pulley or drums **102** and **104** are each mounted on a separate shaft which, in turn, are rotatably mounted in bearings supplied by the upright **101** and the horizontal frame member **23**. The belt pulley or drum **103**, intermediate the belt pulleys or drums **102** and **104**, is rotatably mounted in the outer end of a lever or arm **105** which lever or arm has its other end pivotally mounted at **106** to the horizontal frame member **23**. The arm **105**, and particularly the end supporting the pulley or drum **102** has connected therewith one end **107** of a tension spring **108**. Said tension spring **108**, in turn, has its free end secured to the lower end of a stationary bracket member **109** secured to and depending from the machine horizontal member **23**.

The upper reach of the belt **98**, between its main supporting pulleys or drums **99** and **100** extends or, moves in a plane very close to 45°. In substantial alignment and shifting the cartons from the horizontal receiving position to a position relatively vertical, beyond the belt **98** is a second belt **110** which extends about belt pulleys or drums **111** and **112** each having its shaft, respectively, rotatably mounted in bearings carried by the opposed vertical upright **101** and opposed plate **113** secured to and upstanding from the horizontal frame member **114** of the counting section **21**. In order to maintain proper tension in the upper or operating reach of the belt **110** the lower reach of said belt is contacted by a belt pulley or drum **115** and thereby maintains tension in said transferring or upper reach of the belt **110**.

Cooperating with portions of each of said belts **98** and **110**, and completing the transportation system, is a belt **116** extending about a pulley or drum **117** rotatably mounted in opposing supporting plates **118**. Said plates **118** being located, respectively, at opposite sides of a guide-way through which the articles being packed must pass for-transportation to the counting mechanism. Said belt **116** is further extended about a belt pulley or drum **119** journaled in upright **101** and horizontal frame member **114**. The said belt **116** is held in operative position and tensioned by idler pulleys **120**, **121** and **122** whose shafts are journaled at opposite ends in a plate **118**. A further tensioning and positioning pulley **123** is provided, it being journaled on a shaft which in turn is carried by or journaled in one end of an arm **124** and through which the said pulley **123** is maintained, by gravity, in an outward and downward position and holds the said belt **116** at that point against the belt **110** and the belt pulley or drum **111**, all for a purpose to be presently set forth. The said arm **124** is pivoted at **125** on a shaft carried by the plates **118**. Also mounted on the shaft **125** is an arm **126** having rotatably mounted at its upper end a roller **127** which is positioned to lie on the belt **110** as it passes over the belt or pulley **112** and which construction is for a purpose to be presently made clear.

The belt **116** and the various pulleys just described are particularly concerned with maintaining, what may be termed the lower flight of the said belt **116** and holding said belt lower flight against the upper flights of the belts **98** and **110** in insuring the movement of the cartons between the said belts. In order to take up slack in the said transmission belt **116** use is made of a pulley roller **128** at the outer end of a pivotally mounted arm **129** and which roller **128** rides on the outer or upper flight of the transmission belt **116** for, as noted above, thereby keeping slackness or play out of the said belt **116** when in operation.

It should be noted that the belt **110** has its outer flight **130** very near a vertical position so that the cartons or articles being counted leave the transferring station in a substantially vertical position. It should also be noted that the distance between the belt pulleys or drums, **100** and **111**, and their respective belts **98** and **110**, while separated, this separation is not as great as the length of

the folded cartons being transferred thereby, wherefore, the carton will be above the belt drum **111** before it leaves the belt drum **100**.

The belt **110** feeds the cartons in succession against a curved deflector plate **131** for transfer to a final transmission belt **132**. The deflector plate **131** is secured at **133** to a finger and holding mechanism **134** carried by the aforementioned opposed plates **113** in which is journaled the shaft of the drum **112** of the transmission belt **110**. The deflector plate **131** has its arc varied by an adjusting screw **135** which brought a rounded foot **136**, on the end of the screw **135**, is adjustable through an angle iron **137** forming a support for the adjusting screw and which angle iron **137** is mounted in place by opposed uprights **138** respectively from the opposed horizontal frame members **114**.

Carried by the opposed plate **113** is a bracket **139** having its inner end **150** at an angle to the main portion of the bracket and through which angled end portion **140** a post **141** is adapted to be transversely and rotatably adjusted relative to the bracket **139** as will presently be made clear.

The post **141** may take any desired form and is provided downwardly of its upper end with a source of light **142** while, likewise, upwardly of the lower end of the said post **141** it is provided with an electric eye **143**. Whether the eye is near the lower end or the upper end of the post **141**, and the light source at the opposite end is of no particular importance since the beam from the light to the eye is interrupted each time a carton, or other article being counted and stacked, passes beneath the deflector plate **131**.

By reference to FIGS. 1 and 7 it will be noted that the conveyor belt **98** is driven by a sprocket chain **144** which passes over a sprocket **145** on the shaft **81** and outwardly of the sprocket **95** on the said shaft. The sprocket chain **144** passes over a chain sprocket **146** on the outer end of the shaft of the belt pulley or drum **100**; the sprocket chain **144** in turn passes over idler sprocket **147** before returning to the driving sprocket **145**. It will be noted that this mechanism effects the rotation and operation of the power driven transmission belt **98**.

The transfer belt **110** is similarly driven by having at one end of its belt pulley or drum shaft a sprocket wheel **148** around which extends a sprocket chain **149** in turn passing around a chain sprocket **150** on the shaft of the transmission belt pulley or drum **111**.

Mounted on the uppermost longitudinal supporting member **114** is a bearing block **151** in which is mounted a shaft **152** having at one end thereof a sprocket wheel or gear around which sprocket chain **153** extends and also extending around a similar sprocket wheel or gear **154** on the idler sprocket gear shaft **155**. The shaft **152** has associated therewith a cam **156** which cooperates with articles being counted for shifting a bar **157** which is to be regarded as a patter, patting the back edges of the cartons as they are being discharged into the stacker mechanism **23**. The said patter bar **157** pushes the cartons against a rear partition member **158** for maintaining the cartons in a vertical stack on an elevator table, as will presently be made clear.

The counting section of the mechanism, section number **22**, similarly to the receiving section **20**, has a path or trough therethrough between opposed side members **159** and **160** and which are movable toward and from one another, the said parts similar to the receiving trough or passageway boards **43** and **44** are illustrated, substantially, in their innermost positions. In order that the said side boards **159** and **160** be movable they are provided near opposite ends thereof with adjusting screws, those for side board **159** being indicated by the reference numerals **161** and **162** while the adjusting screws for the side board **160** are identified by the reference numerals **163** and **164**. These screws are rotatably and threadedly mounted in upright supports **165** from the uppermost longitudinal frame members **114**. Each screw is connected with its board by a swivel **166** and the adjusting screw **161** and **162** are connected to one another through a sprocket chain **167** extending around suitable sprockets on the outer ends of said screws **161** and **162**. The opposed adjusting screws **163** and **169** are likewise connected with one another by a sprocket chain **168**. One or the other of screws **161** and **162** and one of the screws **163** and **164** has secured thereto a manually operable crank **169** and through which the said connected pairs of adjusting screws are simultaneously rotated in opposite directions and wherefore the said side boards are maintained in parallelism throughout the range of their adjustment.

As was noted above, the discharge belt **132** in discharging the folded cartons extends around a belt pulley or drum **170** and also extends around a pulley or drum **171** with its upper flight **172** on a table **173**. The driving of the discharge belt **132** is such that the cartons as placed thereon are discharged over the belt pulley or drum **171** into the stacker mechanism **23**.

The stacker mechanism is an elevator including a platform of sufficient solidity to receive and hold the cartons as they are being discharged thereonto and the said platform or table is moving downwardly at normal rate of receiving the cartons from the counter mechanism. The said table as illustrated in the drawings consists of a plurality, three as shown in the drawings, of members **174** shown in elevation in FIGS. 6 and 8 and maintained in parallelism by a pair of supporting shafts or bars **175** and **176**. The said table is vertically movable in a downward direction at a relatively slow speed and in a rapid speed upwardly and the movement of this elevator is effected through a piston and cylinder mechanism **177**, see FIG. 5, under control of a hydrauic valve mechanism as will presently be made clear.

The said table **174** is movable in a vertical direction similar to an elevator and is suitably guided. As shown in FIG. 8 the table members **174** have at the ends of their supporting bars **175** and **176** means, in effect, guide shoes at their ends for maintaining the elevator members horizontal driving movement. The said guide shoes at each end of each bar **175** and **176** consists of a plate **177** having projecting from the outer face thereof a guide roller **178**. The guide rollers **178** at the opposite ends of the shaft or bar **176** are disposed in a channel **179** between vertical channel forming bars **180** and **181**. It should be noted that the roller **178** of the guide shoe **177** engages the inner face of the guide way forming bar **180** while the said guide shoe roller **178** at the other end of the bar **176** engages the inner face of the guide way forming member **181**. Similarly the guide shoes **177** at the opposite ends of the bar **175** are disposed in guide ways formed vertically of the elevator shaft by guide forming bars **182** and **183** and with the guide shoe **177** having its contacting roller in engagement with the inner face of the guide way forming bar **182**. The guide bearing **178** at the other end of the bar or rod **175** is likewise provided with a guiding roller and engages the inner surface of the guide bar **183**. It will be appreciated that with this construction the table forming members **174** are maintained in horizontal position during movement.

Upon delivery of the desired number of folded cartons to the table **174** it reaches substantially the point therein shown in FIG. 6 by the dot and dash line of said table forming members. Just below this position there is provided a storage and/or shipping container support and discharge mechanism indicated in its entirety by the reference numeral **184** and which mechanism includes a bracket in the form of an angle bar **185** having thereon a block **186**. The angle bar **185** on one of its legs **187** has secured thereto a bar **188** to act as a pivot and which bar is rotatably journaled in frame uprights **189** and **190**.

Secured to the other leg **191** of the angle iron is, as

above noted, the block 186 and which block is pivotally connected at 192 to the clevis 193 of a piston rod 194. The piston rod 194 including a piston, not shown, operatively associated with a cylinder 195 pivotally mounted to a bracket 196 substantially centrally of the elevator shaft.

Secured to the said leg 191 of the angle bar or bracket 185 on the outer surface thereof is a member 197 which normally depends in front of the elevator shaft from the pivot bar 188 to a point downwardly but short of the floor. The plate 197 has extending from its one end an arm-like member 198 from which projects bars 199 and 200 with said bars projecting substantially laterally of the elevator cage.

The entire mechanism indicated by the reference numeral 184 is, as above indicated, a support for a storage or shipping container, illustrated in dot and dash lines and identified in its entirety by the reference numeral 201. When the mechanism 184 is supporting the said storage or shipping container for receiving the stack of cartons on the table when in the dot and dash line position has its one end wall 202 on the plate member 197 and the arm 198 and outwardly projecting bars 199 and 200 are positioned against the bottom 203 of the said shipping container. This shipping container has its end flaps positioned as shown in FIG. 6. The upper end flap 204 is laid back on the end wall 205 of the storage or shipping container while the lower end wall 206 is positioned at a downwardly and inwardly extending angle, all as illustrated in FIG. 6 of the drawings. The side walls 207 have their flaps projecting into the elevator shaft as illustrated in dot and dash or phantom lines.

The said storage or shipping container mechanism 184 is operated from the solid line position to the dot and dash line position thereof, in FIG. 6, by a hydraulic medium to opposite ends of the cylinder 195 at a point in the cycle of operation of the mechanism as well subsequently be made clear.

With the storage or shipping container in the operative positioned illustrated in phantom lines in FIG. 6 and with the elevator members in the phantom lines position, again as in FIG. 6, the pusher or discharge mechanism, indicated in general by the reference numeral 208 in the drawings, is brought into play for shifting the stack of cartons from the table members into the container.

The pusher means 209 which are bars of steel spaced from one another to be located between the table members as clearly illustrated in FIG. 1. The pusher members or bars 209 are connected in proper relation by transverse members 210 from which project connecting rods 211 into an operating plate 212. The operating plate 212 has rearwardly projecting therefrom at its upper end a pair of bars 213 located, respectively, at the opposite ends of the plate 212. Depending from each of said bars 213 is a pair of legs 214 and 215 with said legs each pivoted at 216 to the projecting bar 213 and said legs 214 further being pivoted at 217 to a bottom member 218 of the machine. The vertical members or legs 214 and 215 are pivoted at each end so that said members or legs will extend in parallelism with one another along with the members to which said legs are pivoted constituting a parallelogram and whereby movement of the said legs 214 and 215 push in a horizontal plane the pushing members 209. In order to effect the movement of the legs 214 and 215 the leg 214 has pivoted to its at 219 a piston rod 220 outwardly projecting from a cylinder 221. The cylinder 221 is pivotally mounted at 222 to an upright 223 from the bars or bottom 218 of the machine.

It should be here noted, as will later be made clear, the elevator table members descend as the folded cartons are deposited thereon and which elevator members continuously downwardly move until the proper number or height of cartons are on the table and whereupon the pusher mechanism 208 is automatically inwardly shifted to push the stack into the shipping container positioned to receive them, all as in FIG. 6. As soon as the stack is in the storage or shipping container 201 the pusher mechanism is retracted and upon its complete retraction the carton discharge mechanism 184 is operated from the phantom line position thereof to the solid line position in FIG. 6. This deposits the storage or shipping container on its base or bottom 203 on a discharge mechanism 224 which discharges the filled shipping container to a point for storage and/or shipment.

Disposed in the elevator table shaft through a rod 225 is a compressor for the compression of the cartons or other items just before they are pushed into the shipping or storage container. Specifically, the compressor comprises a plurality of arms 226 spaced longitudinally of the said pivoted rod 225. At one end of the rod 225, adjacent either of the uprights 189 and 190, is a link 227 pivoted at its outer end 228 to the piston rod 229 that is associated and projects from a cylinder 230. The cylinder 230 is mounted against independent movement wherefore the outward projection of the piston rod 229, FIG. 6, effects the rotation of the compressor fingers or arms 226. The operation of the piston 229 relative to the cylinder 230 is effected automatically and in sequence with the pusher mechanism, as will presently be made clear.

The compressor mechanism is adopted to be vertically moved wherefore articles of different thicknesses may be packed and wherein the number of articles in the stack if consistant will result in smaller or lower stacks of an equal number. In order to adjust the said compressing mechanism use is made of a pair of adjusting screws 231 and 232, one on each side of the table elevator shaft, as seen in FIG. 1. The said screws 231 and 232 are each rotatably mounted at their opposite ends in angle irons 233 and 234 which are respectively secured to the uprights 189 and 190. The said screws 231 and 232 each, respectively, have thereon a nut 235 and 236 and which nuts have secured thereto the compressor pivoting bar 225.

From the foregoing it will be noted that the compressor is adjustable with respect to the elevator table members so as to be in operative position when a shorter stack is being deposited in the shipping or storage container. The above referred to discharge mechanism 224 comprises a pair of fixed endles belt pulleys or drums 238 and 239 on which are conveyor belts 240 and 241 which are spaced from one another to permit the supporting bar 199 of the transfer mechanism to shift therebetween in placing the bottom 203 of the storage or shipping container on the moving surfaces of the discharge belts 240 and 241. The said drums 238 and 239 are respectively mounted in bearings 242 and 243 with the shaft of the drum 239 upwardly spaced from the shaft of the drum 238 and the said upper shaft is provided on its outer end with a sprocket 244 about which is trained a sprocket chain 245 which in turn extends about a sprocket on the shaft of a motor 246.

In practice the motor 246 is continuously rotating so that a shipping and storage container upon being placed on the discharge belts 242 and 243 is immediately removed from the machine so that a new carton may be placed for the next load of cartons being counted and stacked.

As was noted above the various operating piston and cylinder mechanisms are operated by a hydraulic medium such as oil as is usual in this type of motion mechanism. The said medium is contained in a tank 247 carried by the lower longitudinal frame members 68 and 69. The tank 247 has mounted on its upper closed surface a motor 248 with its shaft 249 terminating in a pump mechanism 250. The pump mechanism 250 includes a suction pipe or conduit 251 from the interior of the tank 247 and at the same time the pump 250 has an outlet conduit or pipe 252 which extends to valves presently to be identified, for controlling the operation of the said piston and cylinders. The outlet pipe 252 has therein a pressure setting valve 253 which determines and maintains the operating pressure in the hydraulic system.

As was noted above the present machine was particularly designed for use with several different sizes of cartons, that is, folded cartons which after folding are similar to a flat tube since one edge of the carton is glued or otherwise secured to an adjacent edge of the blank. The several cartons, illustrated in the drawings and herewith presented are in no wise limiting in so far as the capacity or operation of the machine is concerned but said cartons are for purposes of illustration only. There is, therefore, illustrated in said FIG. 12 a carton A, a second carton B and a third carton C.

Specifically each of the cartons A, B and C are formed of, to all intents and purposes, four walls respectively identified by the reference numerals **254**, **255**, **256** and **257** with the panels or sides **256** and **257** having an adjacent edge hingedly connected to one another as at **258** while the remaining edge of panel **256** is similarly hingedly connected to the adjacent edge of panel **255**, and said panel **255** has its other edge hingedly connected to the adjacent edge of panel **254** with the adjacent edges of panels **254** and **257** secured to one another through a glue flap **259** which may be integral with either of the panels **254** and **257** and overlap the other panel. As illustrated in the drawings the glue flaps **259** are hingedly connected at **260** with its panel.

For purposes of illustration the carton A is of a size when erected and its end flaps folded in has a capacity, for example, of one-half (½) gallon of ice cream while the carton B when erected and its end flaps properly folded has a capacity of one (1) pound of cookies, and the carton C, in substantially all respects, as far as outline is concerned, is similar to carton A, except, that its capacity is one (1) quart or one-half (½) the capacity of said carton A.

It will be noted in FIG. 12 that each of the cartons have their upper right hand corner in alignment and from which it will be obvious that the length of the folded cartons are each different because of the ultimate capacity thereof. By the same token the flattened panels, **255** and **256**, for example, as well as the panels **254** and **257** are in each carton different from one another, again due to the capacity thereof. It is for this reason that the entrant throat side members **35** and **36** are adjustable toward and from one another as is the counting mechanism side members **159** and **160** while to properly position these cartons when in a stack the outermost side of the elevator shaft is movable as a whole toward and from the table forming members as well as toward the inner or fixed side of the said table shaft.

It is to be again noted that the particular formation of the carton sides or panels is not controlling since any size or configuration of carton sides or panels may be formed within the capacity of the machine. It should be, however, noted that in each of cartons A, B and C the upper right hand corner **261** is in each instance formed of the upper edge and right hand edge of the carton panel **254** and it is this corner **261** that is employed in operating the counting mechanism as most clearly illustrated in FIG. 5 which has the photo electric cells **142** and **143** arranged that as each catron corner is removed from the path of the light, between the said electric eye elements so that the mechanism is accurate and actually counts each carton corner as it passes through the counter into the elevating mechanism.

The several functions of the machine hereinbefore set out in the sequence in which they occur are under the control of a plurality of limit switches which limit the amount and extent of operation of the several motion controlling mechanisms. This electrical control mechanism is disclosed most completely in FIG. 10 and will now be described in detail:

Before, however, describing the sequential operation of the mechanism attention is called to FIG. 9 wherein the wiring of the several electric motors is shown. As illustrated in FIG. 9 three phase power lines **262**, **263** and **264** are illustrated as coming from a commercial source of current with each line having therein a manually operable switch **265** and which switch either simultaneously opens the lines **262**, **263** and **264** or closes the same. Beyond the switch **265** each of the wires includes an overload fuse **266** to prevent damage to the electrical circuit in the event of an overloading of one of the motors. As further illustrated in FIG. 9 each of the lines **262**, **263** and **264** is connected with its part of the motors **67**, **246** and **248**.

The current from the said lines **262**, **263** and **264** is of the 220-volt capacity while the capacity across any two of these lines would be 110 volts and the outer lines **262** and **264** terminate in the primary coil **265'** of a transformer **266'** and which includes the secondary coil **267** to provide a control circuit voltage of 110 volts and from which the control lines **268** and **269** extend.

The lines **268** and **269** are the feed lines for the various limit and manually operated switches for controlling and effecting the sequence of operation of the machine.

The line **268** has therein a safety fuse **270** and has strapped therearound an indicator or lamp **271** to indicate the operation of the fuse **270**.

It should be noted that the electric mechanism, that is, the control limit and manually operable switches are in part carried by a control cabinet **272** mounted on one side of the machine and certain, duplicates, switches on a control panel **273** and mounted on the other side of the machine. In this way the operation and control of the various motors of the machine is at all times within reach of the operator regardless of on which side of the machine he is located.

The lines or wires between the feed lines or wires **262**, **263** and **264** and the electrically operated motor **248** for the hydraulic pressure system have therein normally open solenoid switch contacts **274** and which switches, see FIG. 11, are under control of solenoid and/or, push button switches, as will presently be made clear.

The said solenoid switch contacts **274** are in a wire **275** that extends between the control circuit main current supply wires **268** and **269**. In the said wire **275** are normally closed push button switches **276** and **276'** as well as a solenoid switch coil **277** and normally closed overload switches **278**. It should be here noted that hereinafter the push button switches indicated by a reference numeral having a "'" and by the same reference numeral without a "'" are the same switch and maybe, or are, simultaneously operated and that said switches with a "'" are to be considered as in the control cabinet **272** while the switches with the same reference numeral without the "'" are on the control panel **273**.

The said wire **275** with the switches therein is to be considered the control wire for stacking and shutting off the motor **248**. This is effected by opening either switch **276** or switch **276'** which will deenergize the switch coil **277** and permit the solenoid switches **274** to return to their normally open position.

Below the control circuit transverse wire **275** is a wire **279** having therein normally open, manually closable, switch **280** and which feed wire **279** between the main feed lines **268** and **269** has therein a signal light **281**. Again below the wire **279** is a transverse wire **282** which extends between the main feed lines **268** and **269** and has therein a normally open, manually closable, push button switch **280'** and further has therein a signal light **283**. Each of the transverse wires **279** and **282** are strapped to one another and strapped to the wire **275** by a strap or wire **284**, the connection of the wire or strap **284** puts into the circuit for the hydraulic motor control the solenoid **277** and the switches **280** and **280'**.

Depending upon whether the operator is on the front or the back side of the machine either of the switch **280** or **280'** will be closed and thereby complete a circuit including either of the connecting wires **279** and **282**, the cross strap **284** and the portion of the wire **275** out-

wardly, to the right, of the strap 284 and therefore the solenoid 277.

The energization of the solenoid 277 closes the solenoid switch contacts 274 in the line 275 and also closes the solenoid switch contacts 274 in the lines between the hydraulic medium circulating motor 248 and the source of current supply. The closing of the solenoid switches contacts 274 upon the energization of solenoid coil 277 maintains them in closed position even though the push button switches 280 and/or 280' drops out of its closed position, to its normal position, after the hydraulic motor has been started.

The starting of the hydraulic motor 248 brings the hydraulic medium in the pump and circuit conduits or pipes up to the desired working pressure so that upon the operation of the various valves, presently to be indicated, the control thereby is immediately effected.

Assuming, that the machine is now ready for operation the various limit switches and the remaining push button control switches will be in the positions illustrated in FIG. 11 and which switches and their related positions are as follows:

At the bottom of the diagram in FIG. 10 is a wire 285 extending between power lines 268' and 269' which includes a pair of manual push button switches 286 and 287. The push button switch 286 upon being operated to either of its two positions effects the operation of the machine either manually or automatically. For the purpose of this description it is assumed the switch 286 is at its automatic position. With the switch in the automatic position current will bypass push button 287 and energize a solenoid switch coil 288 in the said wire 285.

Extending between the power supply lines 268 and 269 is a transverse wire 289 having therein closed limit switches 290 and 291 and also a pair of normally open solenoid switch contacts 292 and a solenoid coil 293. Extending downwardly from the wire 289 is a strap 294 the end of which is connected with a wire 295 that terminates in the power line 268. The wire 295 has therein normally open limit switch 296 and which is now closed so that the cycle of operation of the machine may be effected or completed. The cooling of the limit switch 296 effects a current flow from power line 268 through line 295, now closed limit switch 296, strap 294, and part of line 285 from a point just ahead of the solenoid coil 293 and including said coil 293 to the other power line 269. This flow of electric current closes the normally open solenoid switch contacts 292 for energizing the coil 293 and closes switch 292 for maintaining the coil 293 energized even though the normally open switches drops out to their normally open positions.

Extending transversely between the feed wires 268 and 269 is a wire 297 having therein a normally open push button switch 298 and a solenoid switch coil 299. Between the normally open push button switch 298 and the solenoid switch coil 299 the wire 297 has depending therefrom a strap 300 that terminates in, as will presently be made clear, an extension of the power line 268, indicated in the drawings by the reference numeral 268'. Said strap 300 has therein a pair of normally closed push button switches 301 and 301'. Extending between the power line 268 and the strap 300 is a wire 302 having therein the normally open push button switch 298'.

The extending power line 268' and 268 has between them a normally open solenoid switch contacts 303 and there is, similarly, between the power line 269 and an extension power line thereof 269' a pair of normally open switch contacts 304.

The push button switches 298 and 298' are starting switches and the closing of either one will complete a circuit to the solenoid switch coil 299 and the energization of this solenoid switch coil 299 closes the solenoid switch contacts 303 and 304 for thereby connecting the power lines 268 and 269 with its extension power line 268' and 269'.

With the current now flowing through the auxiliary or extension power lines 268' and 269', near the bottom of the diagram is a wire 305 extending between the power lines 268' and 269' with said wire having therein a normally open, manually operable, switch 304 which energizes the solenoid coil 307 having under its control the normally open solenoid switch contacts 308, see FIG. 9, disposed between the main drive motor 67 and the initial power line switch and therefore the power control lines. From this it will be noted that the closing of the push button switch 306 initiates the rotation of the main motor 67 and maintains the same in operation.

At the time of the closing of the solenoid switches 303 and 304 current was established through a wire 309 between the auxiliary power lines 268' and 269' for energizing a solenoid switch coil 310 in said wire 309. The energization of the solenoid switch coil 310 closes normally open solenoid switch contacts 311, see FIG. 9, in the lines joining the discharge conveyor motor with the main current or circuit lines.

From the foregoing it will now be appreciated that the folded carton transporting means are in operation and that the hydraulic operating mechanism is likewise in operation as is the discharge mechanism, since the motors 67, 248 and 246 are in operation for effecting the foregoing functions of the machine.

The operation of the machine from this point on is normally under the control of the limit switches in their relation to one another as illustrated in FIG. 10.

As illustrated in FIG. 10, there is below the line 289 a line 312 which has therein a pair of normally open solenoid switch contacts 313 and a normally open limit switch 314. The line or wire 312 extends from the feed line 268 to line 289 at a point between limit switch 291 and normally open solenoid contact switches 292 and the function of which will be subsequently made clear.

Again, below the line 312 there is extending from the line 268 a short line 315 having therein a pair of normally open solenoid switch contacts 316 and which line 315 is connected by a strap 317 to the lines 312 and 289; the strap 317 connecting with the line 312 at a point between the normally open limit switch 314 and the normally open solenoid switch contacts 313 and said strap 317 terminates in the line 289 at a point between the normally closed limit switches 290 and 291.

Below the line 295 there is a line 318 extending between the power supply lines 268 and 269, said line 318 having therein push button switches 319 and 319' with normally closed solenoid switch contacts 320 in the line between the said switches 319 and 319'. The line 318 has therein one of a group of signals 321 with the other signals of the group 321 being in parallel with the signal in the line 318 and the purpose of which signals 321 is believed clear as indicating the mechanisms operation.

As was noted above the mechanism of the present invention is for counting the number of folded cartons to be stacked so that each shipping and/or storage container will contain the same amount. Obviously stacks of folded cartons of the same number will be substantially equal in height. In the event the stack being prepared is of insufficient height and the table reaches the point of operating the pusher mechanism, subsequently to be made clear, the normally open limit switch 322 is closed and which switch is in a wire or line 323 that extends from the counting mechanism, under control of the electric eye, see FIG. 1, and which line 323 has a connection with a line 324 extending between the control power lines 268 and 269. Said line 324 between the point of connection with the line 323 therewith and the power control line 269 has therein a time delay solenoid switch coil 325.

The energization of the time delay solenoid switch coil 325 after the said delay time period has elapsed closes the normally open switch contacts 313 in line 312 which extends between power line 268 and cross line 269. Since at this time the switch 314, likewise in the line 312, is

closed by the shipping and/or storage container rack in its up position the circuit from the power line **268**, normally open now closed switch **314**, now closed normally open solenoid switch contacts **313**, in the line **312** to and through line **289** including normally open now closed contacts **292** and time delay solenoid coil **293** to the power line **269**. As noted above the solenoid coil **293** maintains the contacts **292** closed so as to maintain the said circuit.

It should be noted that the closing of said normally open contact switches **303** and **304** place in circuit power lines **268'** and **269'** for eventually energizing the various valves for the various hydraulic piston and cylinders, supra. It should also be noted that the combined switch **298** and **298'** are what may be termed the machine starting switch, while the switch or switches **301** and **301'** is or are the machine stopping switch.

Extending from the power line **269'** is a wire **326** having therein valve solenoid **327**, a normally open limit switch **328** and a second normally open limit switch **329** with said wire **326** terminating in a second wire **330** substantially parallel with the wire **326**. Said wire **330** extends from the power line **269'** to a point beyond the wire **326** and has in said extending portion normally open solenoid switch contacts **331** but which contacts are under the control of the time delay solenoid coil **325** and upon the elapse of the time delay are closed. Said wire **330** is connected with a further wire **332** which extends from the power line **269'** to a point beyond the wire **330** and which extending portion of wire **332** has therein normally closed solenoid switch contacts **333**. The said further wire **332**, also, extends from power line **269'** beyond the solenoid switch contacts **333** and terminates in a wire **334** and which wire **334** connects or extends between power lines **268'** and **269'** with said wire **334** having therein beyond the wire **332** a normally open limit switch **335**.

The wire **332** in addition to the normally closed solenoid switch contacts **333** has therein normally open now closed solenoid switch contacts **336** associated with the main drive motor, and which contacts were closed when the motor solenoid was energized. The line **332** in addition has therein a valve solenoid coil **337** for actuating the table cylinder valve **338**, see FIG. 13, as will subsequently be made clear. The energization of the valve solenoid coil **337** and shifting of the valve **338** causes the table to descend while having disposed thereon, in succession, the folded cartons or other items as they leave the counting mechanism to be packed. During descent of the said table the limit switch **335**, while normally open, is closed by the pusher being in its retracted position and wherefor the table may ascend and descend. As the table reaches its lowermost limit the limit switch **335** is opened and the limit switch **329** is closed and since limit switch **328** is closed due to the case rack being in operative position the valve solenoid **327** is energized for thereby shifting hydraulic valve **339** to the position for effecting the pusher movement to push the stack of cartons or the like from the table into the storage or shipping container in position to receive the same.

The valve **338** as illustrated in the diagrammatic view in FIG. 13 as spring loaded for balance and wherefore the energization of the solenoid coil **337** spring loaded the said valve **338** and upon the opening of limit switch **335** the said coil **337** was deenergized and thereby permitted the said valve **338** to return to its normal position. This normal position is illustrated in FIG. 13 and thereby, as will subsequently be made clear, disconnect the fluid passing therethrough and the stopping of the table piston and cylinder in its descent.

Extending from power line **268** toward power line **269** is a wire **340** having therein normally opened now closed solenoid switch contacts **341**, said contacts having been closed upon the energization of the time delay switch solenoid coil **325**. Extending from the said line or wire **340** is a strap **342** from which extends a wire or line **343** to the power line **269'**. Also extending from the lower end of the strap **342** is a second wire or line **344** that likewise terminates in the extension line **269'**. In the line **343** is a limit switch **345** and a solenoid switch coil **346** while in the line **344** is a pair of normally open solenoid switch contacts **347** and a valve solenoid coil **348**.

Upon the pusher reaching the limit of its stroke for transferring the stacked articles from the table into the storage or shipping container the limit switch **345** is closed for thereby energizing switch solenoid coil **346**. The energization of the solenoid switch coil **346** closes the normally open contacts **347** for thereby completing the circuit to energize the valve solenoid **348**.

Upon the energization of the valve solenoid **348** the valve **339** is shifting to its second position for thereby energizing the piston and cylinder, supra, for retracting the pusher to its normal position.

Extending between the power lines **268'** and **269'** is a wire or line **349** having therein a push button switch **350** which was closed at the time of starting the machine and at the same time the said line **349** has therein normally closed limit switch **351** and a valve solenoid coil **352** and which solenoid is associated with the valve **338** for effecting the movement of the table in reverse direction, supra, at this time, up.

Extending between the power lines **268'** and **269'** below the wire **349** is a wire or line **353** having therein a second part of the push button switch **350**, and with said wire or line **353** having, additionally, therein limit switch **354** which is tied to the limit switch **351** so that when the limit switch **351** is closed the limit switch **354** is open. The line **353** in addition has therein a valve solenoid **355** for operating the valve **339** in the opposite direction and thereby operating the piston and cylinder mechanism to return the pusher to its normal position. Upon the pusher reaching its return or normal position the upward movement of the table is effected.

The mechanism to effect the upward movement of the table includes the switch **335** in wire or line **334** which also has therein normally open now closed solenoid switch contacts **356**; the switch contacts **356** are now closed because the switch solenoid coil **346** which control the same is energized. Included in the wire or line **334** is a valve solenoid coil **357** which is associated with the valve **330** for causing the table to return to its upward position.

It should be noted, and as later will be made clear, at the time the pusher was pushing the stack from the table into the shipping and/or storage container the stack compressor was in operation to insure the top of the stack is below and thereby clearing the upper end wall **199** of the said storage and/or shipping container.

As soon as the table reaches the upper limit of its movement the limit switch **296** is closed to repeat the cycle of operation as above described.

As was noted above in the event that the stack of folded cartons on the table to be placed in the shipping and/or storage container, is not of the proper amount when the limit switch **322** was closed the pusher would not operate. The wire **324** in its portion beyond the wire **323** to the main line **268** has therein a normally open limit switch **358** and which switch **358** is closed when the starting switch **291** is opened. Strapped around the said switch **358** are wires or straps **359** and **360** in which are respectively push button switches **361** and **361'** and which push button switches do the job of limit switch **358** when it is desired to reject the pile or stack of folded cartons or the like being placed on the table members **174**.

In the cross wire **330** which extends from the extension power line **269'** toward the power line **268'** has therein a valve solenoid coil **362** associated with, what is termed, a quick index mechanism. The solenoid coil **362** is operable upon the closing of the normally open solenoid switch contacts **331** and which is controlled by the solenoid coil **325**, supra.

As shown in the hydraulic diagram, FIG. 13, the tank **247** with the pump **250** mounted thereabove and from which outlet pipe **252** extends has connected therewith the pressure line **363** and having the pressure therein determined by the pressure regulator **253**.

The said main pressure line **363** has extending therefrom a branch pressure line **364** that terminates in the table control valve **338**. The valve **338** includes a movable member to the opposite ends of which is connected, respectively, the solenoid coils **337** and **357**. Extending from or through the valve as is the usual practice are ports or the like with which is connected pipes or conduits as will presently be made clear.

As illustrated in the drawing the branch pressure line **364** connects with one of valve **338** ports while a second of said ports has connected therewith a branch discharge line or conduit **365** and which in turn terminates in the main discharge line **336** and the tank **247**. As presently illustrated a further port of the valve **338** has connected therewith a line or conduit **367** which terminates in the, so called, quick index valve **366**, while a still further port of the table control valve **338** has connected therewith a line or conduit **368** that terminates in the upper end of the table raising and lower piston and cylinder mechanism.

The lower end of said table actuating piston and cylinder mechanism has connected therewith one end of a line or conduit **369** which terminates in the quick index valve mechaninsm **366**; said line having therein a check valve **370** thereby bringing into operation a second short line or conduit **371** that likewise terminates in the quick index valve **366**.

The said line or conduit **369** from the lower end of the table operating piston and cylinder mechanism has extending therefrom, at a point before the check valve **370**, a line or conduit **372** that terminates in the main control valve mechanism indicated in general by the reference numeral **373**.

The control or feed valve mechanism illustrated diagrammatically in FIG. 13 and, structurally, in FIG. 1 at the upper right hand corner thereof, includes a movable valve member which is operated to a closed position by spring means **374** acting on one end of the valve movable member. The other end of the said table rate control valve **373** movable member has projecting from its other end a pushing member or rod **375** which engages an arm **376** pivoted at **377** to a portion of the machine.

As shown structurally in FIG. 1 the valve **373** is mounted on a block or the like **378** upstanding from the longitudinal upper frame member **114** and with said valve having projecting from its left hand end the rod or the like **375**. The movable arm or valve actuator **376** is pivoted at **379** to a projecting finger **380** extending from an upright member adjacent the valve **373**.

It will be noted that the said control valve **373** has its arm **376** in the line of movement of the folded cartons or other members as they pass through the electric counting eye and are delivered to the stack table. It is the engagement of the said folded cartons or other flat articles that operates the said valve actuating arm **376** in order to open the valve mechanism **373** otherwise the said valve **373** remains closed and prevents a flow therethrough.

In other words, unless there is a flow of movement of folded cartons or other flat articles to the table the said table will remain stationary since the valve **373** will not permit a flow from the cylinder and therefore the machine remains inoperative until there is again a supply of folded cartons or other flat objects to and from the receiving belt **27**.

The said rate control valve **373** has extending from another port of the valve **373** a line or conduit **381** which terminates in the main discharge conduit **366** and therefore to the tank **247**.

As illustrated in FIG. 13 the main pressure line or conduit **363** terminates in a port of the pusher actuating valve **339**. Said valve **339** has a second port from which extends the main discharge line or conduit **366** to the sump or tank **247**.

The valve mechanism **339** has extending from a pair of additional ports, respectively, a line or conduit **382** and **383** which respectively terminate at opposite ends of the piston and cylinder mechanism which operates the pusher bar for pushing successive stacks of folded cartons or other flat articles into the shipping and/or storage container.

As noted above the said shifting mechanism has a normal position behind the table and is operable only while the table is at the lower end of its movement and which is the relative positions of the ports as illustrated in FIG. 13.

Again, as noted above, use is made of a compressor which is hydraulically actuated to compress or push down on the upper surface of the said stack so that it will pass beneath the upper wall of the container. As illustrated in FIG. 13 said compressor piston and cylinder mechanism has connected, respectively, to opposite ends thereof a line or conduit **384** and **385** which respectively terminate at their other ends in lines or conduits **382** and **383** and wherefore said compressor members are operable only during the forward movement of the pusher so that the said stack is readily insertable within the said carton.

As was noted above the shipping and/or storage container support and ejecting mechanism is in an upward position for holding the shipping and/or storage container in position to receive a stack of folded cartons or the like. The operation of the said shipping and/or storage container carrier and ejector is controlled by a valve **386** which includes a movable valve member **391** adapted to be positioned for connecting, when in one position, the branch pressure line or conduit **387** from the main pressure line or conduit **363** with one of or the other of lines or conduits **388** and **389** which extend from the said valve **386** and respectively terminate in the case rack actuating cylinder **195** for actuating the piston **390** therein, respectively, in a downward and an upward direction.

Disposed in each of the lines or conduits extending between the several valves and their respective piston and cylinder ends is a flow controlling mechanism indicated in connection with table actuating piston and cylinder, for example, in its entirety by the reference numeral **391** is a flow and rate of flow mechanism comprising a one way check valve **392** and an adjustable flow orifice **393**. It will be noted that the adjustable flow orifice controls the flow of the hydraulic medium from the cylinder to the storage tank while the one way flow valve **392** permits substantially unrestricted flow to the other end of the said cylinder.

It is believed obvious that the shifting of the movable valve member of the valve **386** to opposite ends of the valve cylinder effects the upward and lowering of the shipping and/or storage container supporting rack by pivoting same about the pivot bar **188**.

It should be noted that the rack control valve **386** is a valve somewhat similar to that the table control valve **338** in that it is spring loaded to the extent that the movable member of each valve is normally yieldably retained in an inoperative position and said movable members of said valves is operated to their normal positions by spring means which are loaded upon moving of the said movable member by the solenoids operating the same. The pusher control valve **339** has two operative positions and which positions are effected by the solenoids and the movable member of which valve **339** is retained in either position until the operation of the opposite solenoid. Since, the pusher is normally in a retracted position the valve **339** may be said to be in its normal position as diagram-

matically illustrated in FIG. 13. The quick index valve **336** has its movable member yieldably positioned at its normal position by a spring and which position is that as illustrated diagrammatically in FIG. 13, and upon its operation, supra, by its control solenoid is to load said spring and upon the deenergization of said control solenoid the movable member of the valve **366** is automatically yieldably returned to its position. The springs in each of these valves is indicated by the reference numeral **394**.

Extending from the voltage reducing transformer and particularly the coil **267** thereof and from the opposite ends of which extends the control circuit power lines **268** and **269** with the said secondary coil **267** having a third line or wire **395** extending therefrom to a D.C. current rectifier **396**. The said center line **395** has therein normally open switch contacts **397** that are operated by the switch coil **306** upon the closing of the machine starting switch **296**. The said line **395** has therein a fuse **398** to insure the operation of the direct current rectifier **396**.

Extending from one side of the rectifier **396** is a wire **399** terminating in adjacent ends of the clutch coil **400** and brake coil **401**. A further line **402** extends from the other side of the rectifier **396** to the other ends of the clutch coil **400** and brake coil **401**. The line **402** has therein ahead of the clutch normally closed solenoid switch contacts **403** while the said line **402** has therein, also, ahead of the brake coil **401** a pair of normally open solenoid switch contacts **404**. The said normally closed solenoid switch contacts **403** and normally open solenoid switch contacts **404** are under the control of a switch solenoid **325** and this switch solenoid when the machine is running is not energized wherefore the normally closed switch contacts **425** keep the clutch energized for driving the folded carton or other flat articles moving belts through the machine as above set forth and operated by the main motor.

Upon however of the stopping of the machine and the opening of the switch **291** the normally open solenoid contacts **404** are closed and the normally closed solenoid switch contacts **403** are opened.

Briefly, from the foregoing, it will be noted that the mechanism or machine of the present invention receives folded cartons or other flat items that are to be counted, stacked and inserted into a shipping, transporting or storage container, generally a corrugated cardboard container, as the said items are delivered from a previous mechanism or machine that prints them, drys them out, or folds and glues or seals them. This cycle of operation consists in passing the said items through a counting mechanism, specifically, a photo-electric cell, receiving and stack the articles as they are received until a desired stack is obtained, whereupon the stack is automatically transferred into a container previously arranged to receive the same and which container upon receiving the stack is automatically discharged from the machine and whereupon the stacking mechanism is re-activated to accept a second stack.

What is claimed is:

1. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a set up shipping and/or storage container, the combination of a supporting frame, means on said frame receiving said flat articles and positioning said articles with respect to one another and moving same toward a counting section, a flat article counting section including means for counting said flat articles as they are individually and continuously moved through said counting section, a transporting and stacking section receiving said articles after they have passed the couting section and including means moving said articles in a stack until a given number of said articles is reached, a set up shipping and/or storage container laterally of the counted stack of said flat articles, and means operable after said given number of said articles have been counted and stacked as they passed through said counting section for removing said stack of flat articles from the said transporting and stacking section into the said set up shipping and/or storage container.

2. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said receiving and positioning section including side members, and positioning means between said side members for positioning the flat articles received thereby to move said articles one at a time from the said receiving and positioning section through said flat articles transporting section.

3. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said receiving and positioning section including side members, positioning means between said side members for positioning the flat articles received thereby to move said articles one at a time from the said receiving and positioning section through said flat article transporting section, and means carried by the machine frame and receiving and positioning section side members for adjusting said side members toward and from one another to accommodate different width of flat members.

4. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said flat article counting section including means counting each article as it enters thereinto, means removing said article after counting from said counting section into the stacking section, and side members carried by said supporting frame, respectively, one on each side of the counting section between which the flat article is moved to the stacking section.

5. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said flat article counting section including means counting each article as it enters thereinto, means removing said article after counting from said counting section into the stacking section, side members carried by said supporting frame, respectively, one on each side of the counting section between which the flat article is moved to the stacking section, and means carried by said supporting frame and counting section side members for adjusting said side members toward and from one another to accommodate different widths of flat articles.

6. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said receiving and positioning section including side members, positioning means between said side members for positioning the flat articles received thereby to move said articles one at a time from the said receiving and positioning section through said flat article transporting section, said flat article counting section including means counting each article as it enters thereinto, means removing said article after counting from said counting section into the stacking section, and side members carried by said supporting frame, respectively, one on each side of the counting section between which the flat article is moved to the stacking section.

7. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said receiving and positioning section including side members, positioning means between said side members for positioning the flat articles received thereby to move said articles one at a time from the said receiving and positioning section through said

flat article transporting section, means carried by the machine frame and receiving and positioning section side members for adjusting said side members toward and from one another to accommodate different widths of flat members, said flat article counting section including means counting each article as it enters thereinto, means removing said article after counting from said counting section into the stacking section, and side members carried by said supporting frame defining the path of movement through the counting section and between which side members the flat article is moved to the stacking section, and means carried by said supporting frame and counting section side members for adjusting said side members toward and from one another to accommodate different widths of flat articles.

8. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said stacking section including a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting frame flanking the moving table vertically of the frame, and means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members.

9. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said stacking section including a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting frame flanking the moving table vertically of the frame, means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members, and means carried by the supporting frame and table flanking side members for moving said flanking vertical side members toward and from one another depending upon the width of the flat articles.

10. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said stacking section including a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting frame flanking the moving table vertically of the frame, means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members, means carried by the supporting frame and table flanking side members for moving said flanking vertical side members toward and from one another depending upon the width of the flat articles, and means between the supporting frame and vertical forwardly positioning means for mounting same for adjustment toward and from the side members to accommodate different lengths of flat articles to be inserted into the shipping and/or storage container.

11. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said receiving and positioning section including side members, positioning means between said side members for positioning the flat articles received thereby to move said articles one at a time from the said receiving and positioning section through said flat article transporting section, said flat articles counting section including means counting each article as it enters thereinto, means removing said article after counting from said counting section into the stacking section, side members carried by said supporting frame, respectively, one on each side of the counting section between which the flat article is moved to the stacking section, said stacking section including a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting frame flanking the moving table vertically of the frame, and means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members.

12. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said receiving and positioning section including side members, positioning means between said side members for positioning the flat articles received thereby to move said articles one at a time from the said receiving and positioning section through said flat article transporting section and means carried by the machine frame and receiving and positioning section side members for adjusting said side members toward and from one another to accommodate different widths of flat members, said flat article counting section including means counting each article as it enters thereinto, means removing said article after counting from said counting section into the stacking section, side members carried by said supporting frame defining the path of movement through the counting section and between which side members the flat article is moved to the stacking section, means carried by said supporting frame and counting section side members for adjusting said side members toward and from one another to accommodate different widths of flat articles, said stacking section including a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting frame flanking the movable table vertically of the frame, and means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members.

13. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said stacking section including a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting frame flanking the moving table vertically of the frame, means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members, said set-up shipping and/or storage container including a bottom and upstanding side and end walls, said shipping and/or storage container when in position laterally of the counted stack of flat articles being supported on one of its side or end walls at a point at the lower point of movement of the movable table and in line with the lowest article of the counted stack, means carried by the machine supporting frame for supporting the shipping and/or storage container in said position, and said counted stack of flat articles removing means in the form of a pusher operable across the stack supporting table for pushing the counted stack into the shipping and/or storage container.

14. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said stacking section including

a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting frame flanking the moving table vertically of the frame, means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members, said set-up shipping and/or storage container including a bottom and upstanding side and end walls, said shipping and/or storage container when in position laterally of the counted stack of flat articles being supported on one of its side or end walls at a point at the lower point of movement of the movable table and in line with the lowest article of the counted stack, means carried by the machine supporting frame for supporting the shipping and/or storage container in said position, and said counted stack of flat articles removing means being in the form of a pusher operable across the stack supporting table for pushing the counted stack into the shipping and/or storage container, said means supporting the shipping and/or storage container being movably mounted on the supporting frame for removing the container and its stack of flat articles after disposition of the stacked articles into the said shipping and/or storage container.

15. In a packing machine for packing a given number of equally sized flat articles through a cycle of operation into a shipping and/or storage container as set forth in claim **1** characterized by, said stacking section including a vertically movable table receiving the flat articles from the counting section, said table moving downwardly, incrementally, as the flat articles are successively deposited one on the other from the counting mechanism, said table moving between side members carried by the supporting

frame flanking the moving table vertically of the frame, means vertically, forwardly, of the supporting frame positioning the flat articles on the table and between the vertical members, said set-up shipping and/or storage container including a bottom and upstanding side and end walls, said shipping and/or storage container when in position laterally of the counted stack of flat articles being supported on one of its side or end walls at a point at the lower point of movement of the movable table and in line with the lowest article of the counted stack, means carried by the machine supporting frame for supporting the shipping and/or storage container in said position, and said counted stack of flat articles removing means being in the form of a pusher operable across the stack supporting table for pushing the counted stack into the shipping and/or storage container, said means supporting the shipping and/or storage container being movably mounted on the supporting frame for removing the container and its stack of flat articles after disposition of the stacked articles into the said shipping and/or storage container, and means carried by the supporting frame for compressing the stack of counted flat articles against their supporting table during the pushing of the said stack across its supporting table.

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53—159; 93—93

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,533,213 October 13, 1970

Allen H. Lloyd

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

Column 19, line 72, "couting" should read -- counting --. Column 20, line 27, "width" should read -- widths --. Column 22, line 68, after "means" insert -- being --.

Signed and sealed this 30th day of March 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents