Nov. 11, 1958 A. H. BURNETT 2,859,570

CARTONING MACHINE

Filed Aug. 22, 1955 5 Sheets-Sheet 1

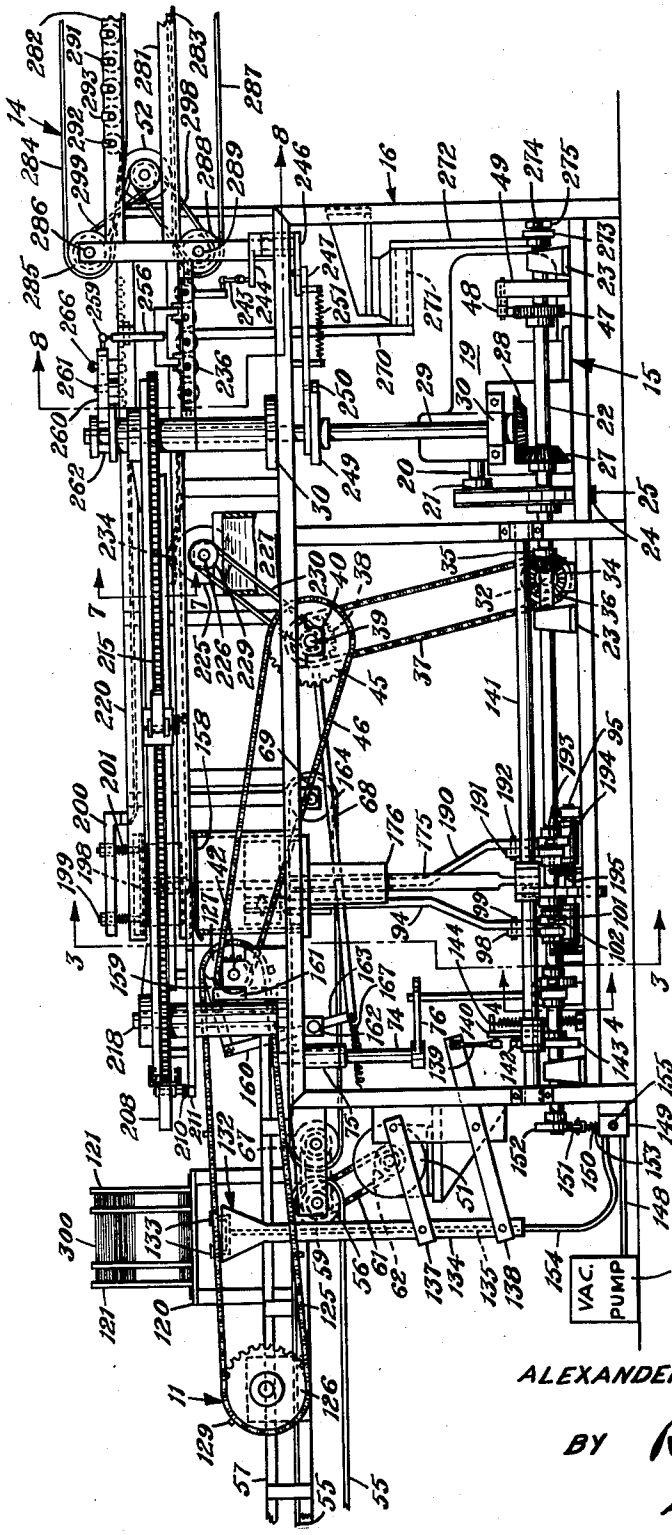


Fig. 1

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CARTONING MACHINE

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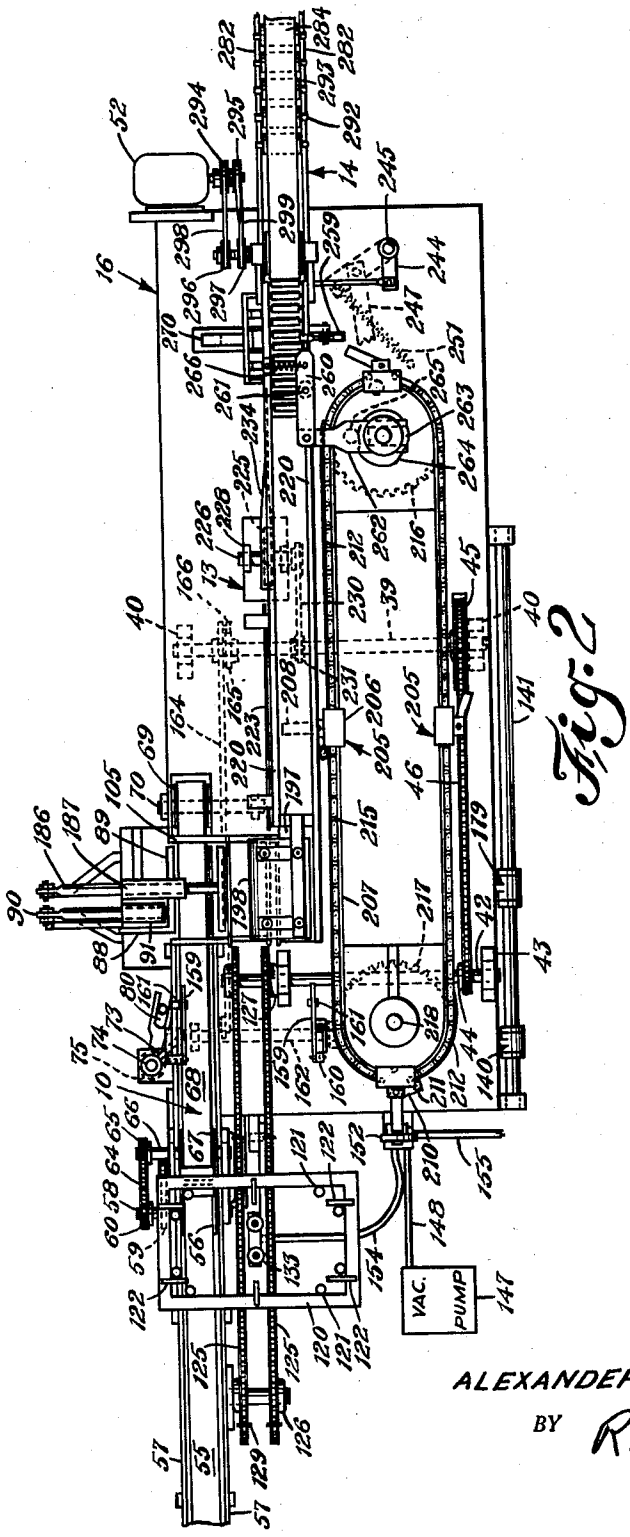


Fig. 2

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CARTONING MACHINE

Filed Aug. 22, 1955 5 Sheets-Sheet 3

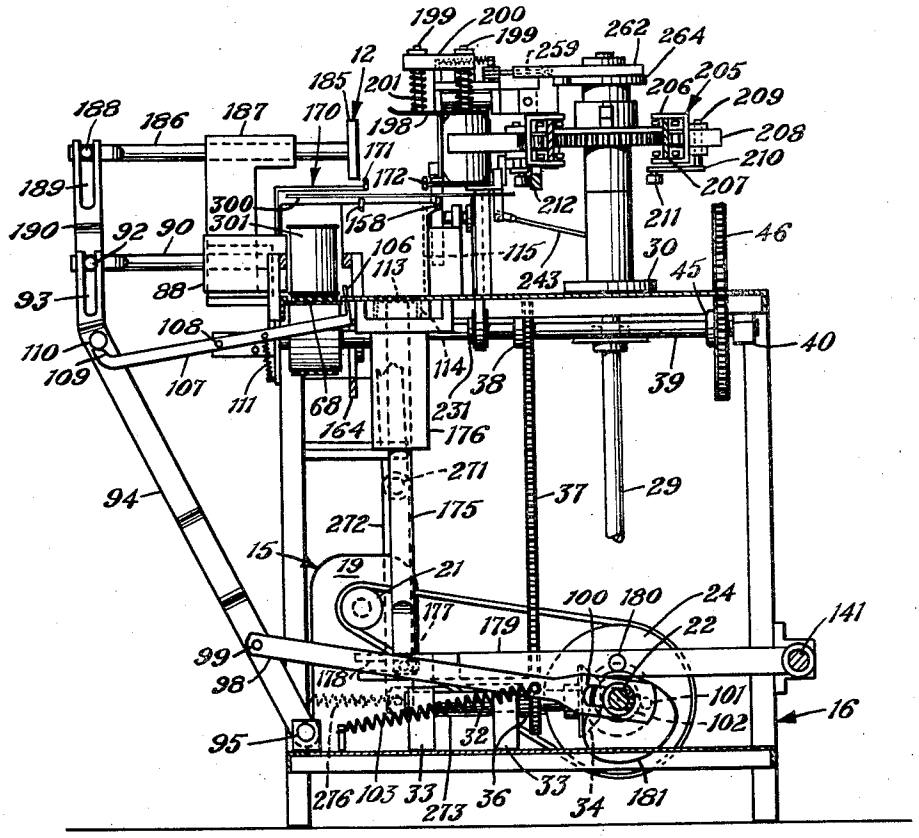


Fig 3

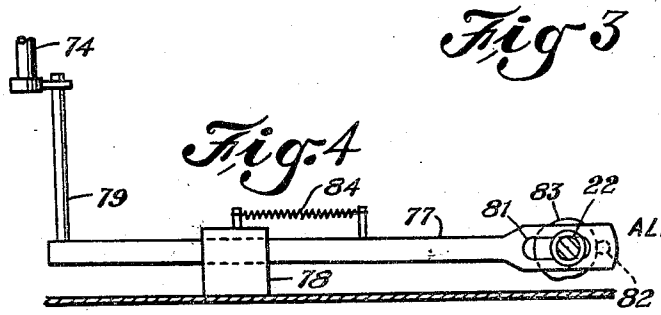


Fig 4

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CARTONING MACHINE

Filed Aug. 22, 1955 5 Sheets-Sheet 4

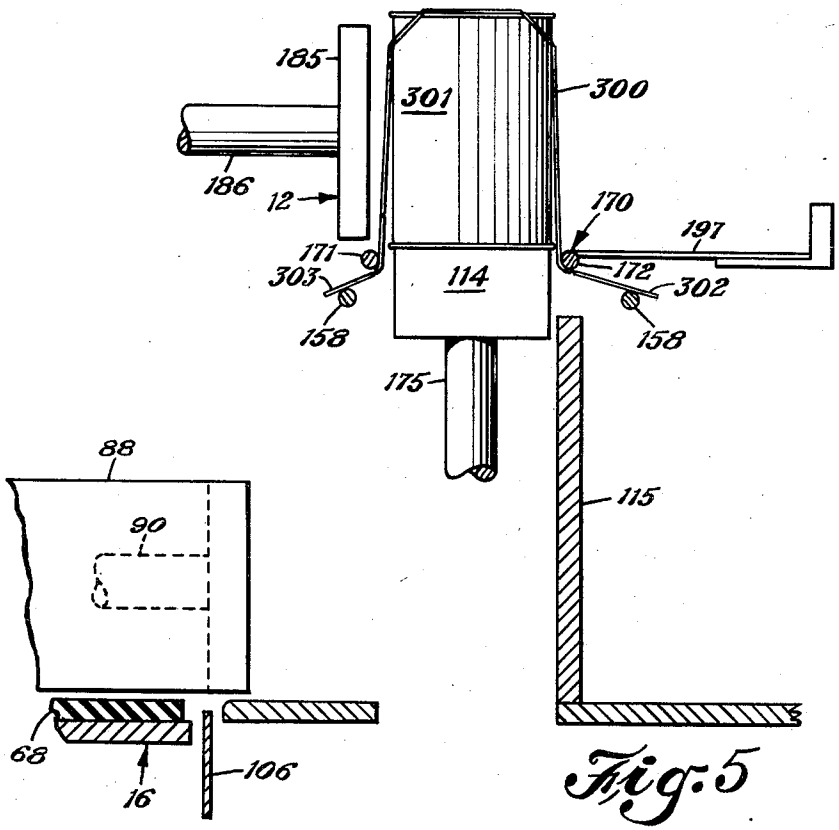


Fig. 5

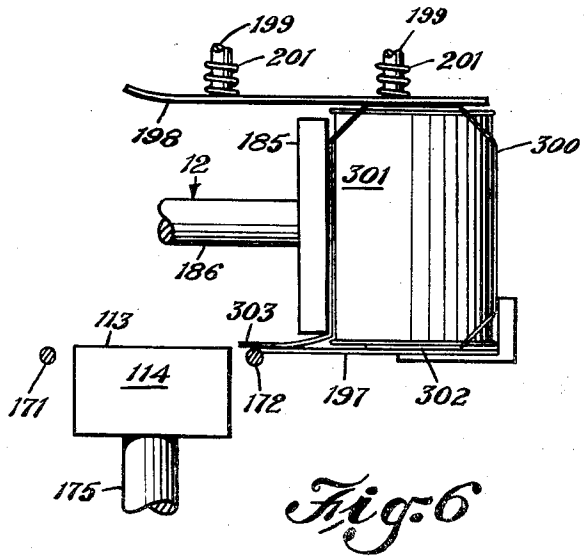


Fig. 6

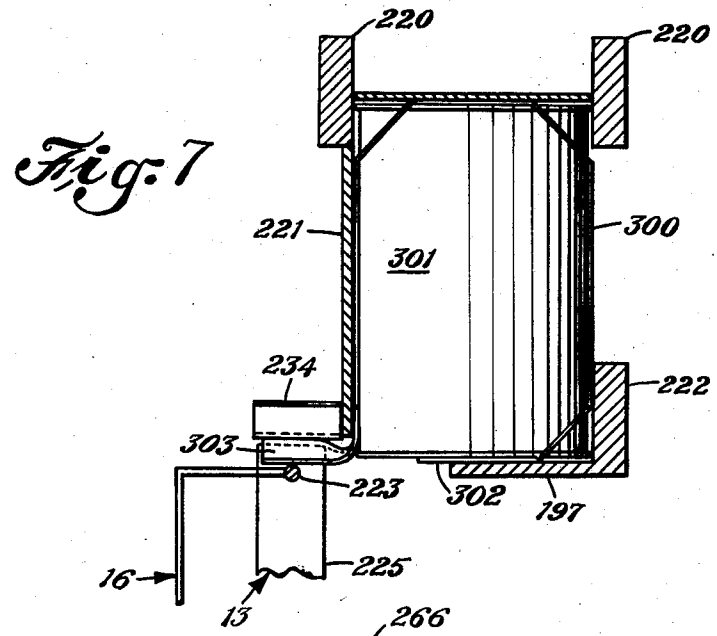
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CARTONING MACHINE

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Fig. 7



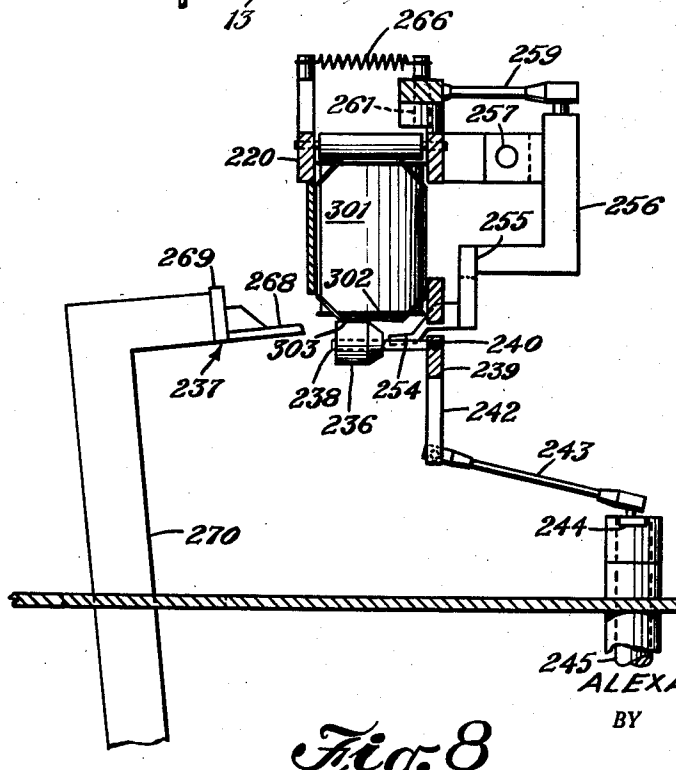


Fig. 8

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United States Patent Office 2,859,570 Patented Nov. 11, 1958

2,859,570

CARTONING MACHINE

Alexander H. Burnett, Chicago, Ill., assignor to Swift & Company, Chicago, Ill., a corporation of Illinois

Application August 22, 1955, Serial No. 529,796

14 Claims. (Cl. 53—3)

The present invention relates to a method and apparatus for forming a carton from a carton blank about a unit to be packaged.

The term "unit" as used herein may comprise one or more separate items. The disclosed embodiment was devised for the purpose of forming a carton about three cans of cleanser that are to be packaged for sale together. The particular type of carton disclosed and employed with the machine is one that is also disclosed and claimed in my copending application, Serial No. 474,350, the disclosure of which is incorporated herein by reference. However, it will be readily apparent to those skilled in the art that the invention is applicable to forming other types of cartons about other types of units.

It is the general practice in the packaging of product to form a carton and then to insert the unit into the preformed carton. An object of the present invention is to provide a method and apparatus wherein the carton is formed in situ about the unit. The advantages of such a procedure are readily apparent. The prior practice is a two-step process and reducing this to a single step will obviously result in the requiring of less work and will speed up the packaging process.

With some types of cartons, of which the one disclosed and claimed in application Serial No. 474,350 is an example, the individual items, in this case cans, which make up the unit are held in the carton by reason of the shape of the carton. The very fact that the shape of the carton holds the unit within the carton causes difficulty, if it doesn't make it impossible, to insert the unit into the carton after the carton is made. When this occurs it is necessary that the carton be formed about the unit. Obviously this can be done by hand, but hand operations always are a costly process; thus, a second object of the present invention is to provide a method and apparatus whereby cartons may be automatically formed about units for use in those cases where it is impractical or impossible to insert the units into the cartons after the formation of the cartons.

Other objects and advantages will become apparent from the following description taken in conjunction with the drawings, in which:

Figure 1 is a side elevation of an embodiment of the machine;

Figure 2 is a plan view of the embodiment of Figure 1;

Figure 3 is a section taken at line 3—3 of Figure 1;

Figure 4 is a partial section taken at line 4—4 of Figure 1;

Figures 5 and 6 are enlarged diagrammatic views of the structure performing the initial bending of the carton about the unit;

Figure 7 is a fragmentary section taken at line 7—7 of Figure 1; and

Figure 8 is a fragmentary section taken at line 8—8 of Figure 1.

The method employed in accordance with the present invention for forming the carton from a carton blank about the unit to be packaged is to place the blank on

one side of the unit with the blank approximately centered over the unit. The blank is then pressed in the direction of the unit in the areas immediately to either side of the unit, thus bending the blank to overlie three sides of the unit. In doing this the unit is supported in an area at least as small as the side of the unit opposite said one side so that after the pressing takes place the ends of the two sides of the blank that were pressed down extend downwardly below the bottom of the unit. The unit is then slid to one side while at the same time pressing the blank along a line immediately below the unit, thus bending one of the extending edges of the blank under the unit. The unit is then supported in the area which the bent extending edge overlies and the other extending edge of the blank is then folded under to meet the previously bent extending edge of the blank. The two juxtaposed edges to which an adhesive previously has been applied are then pressed together for a sufficient period of time to permit whatever adhesive is used to fasten the two edges together.

In the disclosed embodiment this method is performed by the following general assemblage of parts: first a can feed, generally **10**, which assembles the cans into a unit and positions them for the forming of the carton; a carton blank feed, generally **11**; a carton folder, generally **12** (best seen in Figures 3, 4 and 5); a glue applicator, generally **13**; a presser, generally **14**; and suitable power drive means, generally **15**. The machine is mounted on a frame generally **16**.

Power means

The main drive of the power means **15** is operated by a gear head motor **19** with the output shaft **20** carrying a sheave **21**. A jack shaft **22** suitably mounted in bearing **23** carries a sheave **24** which is driven from sheave **21** by a belt **25**. A bevel gear **27** on jack shaft **22** drives a second bevel gear **28** attached to vertical shaft **29** mounted in bearing **30** on frame **16**. A first cross shaft **32** (Figure 3) is mounted in bearings **33** attached to frame **16**. Shaft **32** carries a bevel gear **34** which meshes with a bevel gear **35** on shaft **22**. Cross shaft **32** also carries a sprocket **36** that drives a chain **37** which in turn drives a sprocket **38** on the second cross shaft **39**. Cross shaft **39** is suitably journaled in bearings **40** on frame **16**.

A third cross shaft **42** is journaled in bearings **43** mounted on frame **16** (Figure 2) and has attached to it a sprocket **44**. A sprocket **45** on second cross shaft **39** drives a chain **46** which also drives sprocket **44** on the third cross shaft **42**.

Jack shaft **22** has a ratchet wheel **47** mounted thereon which cooperates with a dog **48** pivotally secured to post **49** of frame **16** to prevent any backing up of the machine when the motor **19** is de-energized (see Figure 1).

Power means **15** also includes a supplemental motor **51** to drive the can feed **10** and supplemental motor **52** to drive the presser **14** as hereinafter described. It will be readily apparent that these could be driven from the main motor **19** but for convenience of construction and since no timing interrelationship was involved it was found to be desirable to use supplemental motors.

The power means **15** includes various additional parts, such as cams, sprockets, levers, push rods, etc. However, these will be described in connection with the specific parts that they drive.

Can feed

The cans resting on one end thereof are fed to the machine on a belt **55** which passes over a pulley **56** and a second pulley, not shown. Stationary guides **57** at each side of the upper run of belt **55** maintain the sequential alignment of the cans on the belt. Pulley **56**

is attached to a shaft 58, suitably journaled in frame 16, and also carries a pair of sprockets 59 and 60. Sprocket 59 is driven by a chain 61 passing over a sprocket 62 on the output shaft of motor 51. Sprocket 60 is connected by a chain 64 to a sprocket 65 on a shaft 66. Shaft 66 is suitably journaled in frame 16 and carries a pulley 67 which drives a belt 68 mounted thereon. The other end of the belt 68 is supported on an idler pulley 69 attached to shaft 70 journaled in frame 16.

A gate 73 mounted on the upper end of shaft 74 initially controls the admission of the cans to the machine along belts 55 and 68. Shaft 74 is mounted in a bearing 75 on frame 16 and has an arm 76 mounted on the lower end thereof. Referring to Figure 4, a push rod 77 is slidably mounted in a bearing 78 on frame 16. At one end of rod 77 is an upstanding finger 79 that is received within the slot 80 of arm 76. At the other end of the push rod 77 is a slot 81 through which shaft 22 passes. Beyond slot 81 a cam follower 82 is attached to rod 77 and is held in contact with a cam 83 on shaft 22 by a spring 84 attached to push rod 77 and to bearing 78. Thus the rotation of shaft 22 and cam 83 urges push rod 77 against the resistance of spring 84 to turn shaft 74 and open and close gate 73.

The second control gate with respect to the entrance of the cans into the machine is formed by an abutment 88 along the upstream side, with respect to the direction of movement of the cans on the feed belt 68, of ram 89 (Figure 2). Ram 89 is attached to a rod 90 slidably mounted in bearing 91 with the other end of the rod carrying a pin 92. Pin 92 is received in slot 93 of lever 94 pivotally attached to frame 16 by a shaft 95 attached to frame 16.

A push rod 98 has one end thereof connected to lever 94 by a pin 99. The other end of push rod 98 has a slot 100 through which shaft 22 is passed. Beyond slot 100 is a cam follower 101 which is held against a cam 102 attached to shaft 22 by a spring 103 connected to push rod 98 and to frame 16.

The cans moving along belt 68 are positioned in front of ram 89 by a stop 105 crossing above the top of belt 68. To prevent the cans from jiggling off the side of the belt before being moved by ram 89, a movable lip 106 (see Figure 3) which projects upwardly from a lever 107 is pivotally attached to frame 16 at 108. The other end of lever 107 forms a cam surface 109 that is held against a pin 110 on lever 94 by a spring 111 attached to lever 107 and to frame 16. It will be seen that when the ram is retracted as shown in Figure 3, pin 110 pivots lever 107 so that the lip 106 projects upwardly to hold the cans on belt 68, while when the ram 89 moves forwardly, spring 111 is permitted to rotate lever 107 in the opposite direction, lowering lip 106 to allow the cans to be pushed from the conveyor belt 68 onto the pressure face 113 of the pusher 114. A stop 115 at the opposite side of pusher 114 arrests the movement of the cans and in conjunction with stop 105 aligns them for proper positioning during the carton folding operation.

Carton blank feed

The carton blanks are stacked horizontally in a magazine 120 which has an open bottom as seen in Figure 2. A plurality of upstanding guides 121 align the blanks in the magazine. At the bottom of the magazine are a plurality of projecting fingers 122 which reduce the area of the bottom opening in the magazine and project just under the edges of the blanks to releasably hold the blanks in the magazine.

Immediately below magazine 120 are a spaced pair of endless conveyors formed of chains 125 rotating around sprockets 126 and 127. Sprockets 126 are rotatably mounted on idler shaft 128 and sprockets 127 are mounted on and driven by third cross shaft 42 of the power means previously described. At spaced intervals each of chains 124 has a projecting lug 129.

Between spaced chains 125 is a vacuum head generally 132 comprising a pair of vacuum cups 133 mounted on an arm 134 which has a bore 135 communicating with cups 133. A first and second parallel lever 137 and 138, respectively, are each pivotally connected to arm 134 and to frame 16, thereby positioning arm 134 for vertical movement toward and away from the magazine 120. Arm 138 extends beyond its pivotal connection with frame 16 and at the opposite end thereof is attached a connecting rod 139 which is also attached to a lift arm 40 pivotally mounted on fixed shaft 141. Intermediate the ends of lift arm 140 is a cam follower 142 which is held against cam 143 on shaft 22 by a spring 144 hooked to arm 140 and to frame 16. Thus the rotation of cam 143 raises and lowers vacuum head 132 toward and away from magazine 120 where the vacuum cups 133 can engage the lowermost blank in the magazine adjacent the central portion thereof and by bending the blank downwardly draw it past fingers 122 in the magazine.

The vacuum is applied to the cups 133 from a vacuum pump 147 which communicates through pipe 148 to a conventional 3-way valve 149. The valve stem 150 of valve 149 carries a cam follower 151 which is urged against cam 152 on shaft 22 by a spring 153. The second side of the valve 149 is connected to bore 135 by a flexible tube 154. The third connection of valve 149 communicates with atmospheric pressure (or if desired a source of superatmospheric pressure) through a pipe 155. Thus with the rotation of shaft 22 the vacuum head 132 is moved upwardly so that the cups 133 are in contact with the bottom blank in magazine 120. At this time the vacuum from pump 147 is applied to vacuum cups 133 by cam 152 moving valve stem 150. After the vacuum head 132 is lowered so that the cups are below the upper run of chains 125 the valve stem 150 is again actuated by cam 152 so as to shut off the vacuum from the cups 133 and to place the cups into communication with atmospheric (or superatmospheric) air pressure from pipe 155 thus releasing the blank from the vacuum head 132.

The blank that is deposited on chains 125 by vacuum head 132 is engaged by lugs 129 and moves forward to the folding station above plunger 114 where it is slid onto a spaced pair of guides 158, best seen in Figure 5. However, before the blank is completely in position on guides 158, lugs 129 slip by the blank by the curvilinear movement of the lugs around sprocket 127. At this time a pair of positioning fingers 159 are moved forward to catch the rear edge of the blank and perform the final positioning of the blank on the guides 158.

One end of fingers 159 is pivotally attached to rocker arm 160, with the other end being slidably supported in fixed guides 161. Rocker arms 160 are attached to a rocker shaft 162 suitably journaled in frame 16. A downwardly extending arm 163 is also attached to rocker shaft 162 with the end of the arm being pinned to a push rod 164. The other end of push rod 164 has a slot through which second cross shaft 39 passes in the same manner in which push rod 77 fits about shaft 22 as shown in Figure 4. A cam 165 attached to cross shaft 39 (Figure 2) controls the movement of push rod 164 through a cam follower 166 on rod 164 which is held in engagement with cam 165 by a spring 167 connected between arm 163 and frame 16 (Figure 1).

Carton folder

The basic structure of the carton folder 12 is the pusher 114 and a folding member generally 170. The folding member 170 has an opening which in the disclosed embodiment is the space defined by rods 171 and 172. These rods are spaced apart a distance only slightly greater than the width of the unit to be packaged, as

best seen in Figure 5, and it is in this space that the carton blank is initially folded about the top and down the sides of the cans as they are pressed through the opening by pusher **114** which preferably is just slightly smaller in width than the width of the cans to be packaged.

Pusher **114** is mounted on a vertical rod **175** slidably mounted in a bearing **176** attached to frame **16**. The lower end of rod **175** has a projecting pin **177** which is received in slot **178** of one end of a lift arm **179**. The other end of arm **179** is pivotally mounted on fixed shaft **141**. Intermediate the ends of arm **179** is a cam follower **180** that rides on a cam **181** on shaft **22**. The weight of the pusher and pusher rod **175** hold the cam follower **180** against cam **181**.

After the initial fold is made by the raising of pusher **114** to its uppermost position as illustrated in Figure 5, one of the downwardly extending edges of the carton blank is folded under the can by a sidewards movement of the cans and partially formed package. This movement is developed by a second ram **185** mounted on rod **186** slidably received in a bearing **187** attached to frame **16**. At the end of rod **186** is a pin **188** received within the forked opening **189** of lever **190**. Lever **190** is pivotally mounted on shaft **95** as was lever **94** and is operated in the same manner by a push rod **191** corresponding to push rod **98** connected by a pin **192** to lever **190** and fitting about shaft **22** adjacent the other end thereof. A cam follower **193** held in engagement with a cam **194** by a spring **195** actuates push rod **191** and lever **190**.

As seen in Figure 6, when ram **185** pushes the semi-formed packages over onto supporting platform **197** the leading, downwardly extending, edge of the carton blank is folded under the unit by rod **172** of folding member **170**. To facilitate this action a pressure shoe **198** rides on the top of the carton to prevent any possibility of the unit not folding the carton but rather riding upwardly. Shoe **198** is mounted on four rods **199** slidably mounted in a bracket **200** forming a part of frame **16**. Shoe **198** is urged downwardly by springs **201** which press between the upper face of the shoe and the lower face of bracket **200**. The trailing edge of the carton blank extends out rearwardly as seen in Figure 6 and it is to this edge that the adhesive is applied for the sealing of the carton.

Gluing apparatus

The semi-formed cartons are moved to and through the glue applicator by a conveyor comprising supporting platform **197** on which the cartons rest and a plurality of power operated pushers generally **205**. Each of pushers **205** comprises a carrier **206** which is mounted on an endless track **207**. Pusher fingers **208** are pivotally secured to carrier **206** by a pin **209** and each finger **208** has a cam lever **210** mounted integrally therewith and carrying a cam follower **211** on the end thereof. Along the side of the track adjacent the supporting platform **197** is a cam **212**. When the pushers **205** are on the portion of the track adjacent the cam, followers **211** ride on the cam and maintain the fingers **208** in the extended position. As the carriers **206** leave the portion of the track bounded by the cam **212**, the fingers **208** are free to pivot rearwardly as seen at the right end of Figure 2 so that they are no longer in the extended position.

Each of carriers **206** is attached to a chain **215** which moves around sprockets **216** and **217**. Sprocket **216** is driven by shaft **29** to which it is attached, while sprocket **217** is mounted on idler shaft **218** suitably journaled in frame **16**.

As the package approaches and traverses the glue applicator (Figure 7) a pair of side guides **220** contact the upper portion of the carton. A side plate **221** contacts the lower portion of one side and an abutment **222** on supporting platform **197** contacts the other lower corner. A guide **223** attached to frame **16** holds the rearwardly extending edge of the carton in the extended position in which it was left at the completion of the ram stroke illustrated in Figure 6.

The glue applicator **13** comprises a roller **225** mounted on a shaft **226** and rotates in a bath of adhesive in tank **227** on frame **16**. On the upper edge of tank **227** are bearings **228** in which shaft **226** is journaled. At one end of shaft **226** is mounted a pulley **229** which is driven by a belt **230** from a pulley **231** on shaft **39** (Figure 2). A guide **234** extends over the top of the glue roller and is positioned so that the rearwardly extending edge of the carton will slide under the guide. The guide is suitably curved, as seen in Figure 1, so as to insure the edge of the carton coming into contact with glue roller **225**. The guide is then curved inwardly, as seen in Figure 2, so as to bend the flap of the carton to which the adhesive has been applied approximately straight down.

The pushers **205** continue the movement past the glue roller and at the time that the carton is positioned on a plurality of rollers **236** of the tucker mechanism generally **237**, the fingers **208** are released by the ending of cam **212** so that the fingers swing back out of the way to permit them to go by the semi-formed carton.

Referring particularly to Figures 2 and 8, rollers **236** are mounted on spindles **238** fastened to carrier **239**. Pins **240** projecting from each end of carrier **239** pivotally support the carrier in frame **16**. An arm **242** fastened to and projecting downwardly from carrier **239** is attached by means of a connecting rod **243** to a crank **244** on shaft **245** suitably journaled in frame **16**. At the lower end of shaft **245** is an actuating lever **246** to which is pinned one end of a push rod **247**. The other end of push rod **247** is enlarged and slotted to slip about shaft **29** in the manner in which push rod **77** fits about shaft **22** as shown in Figure 4. A cam **249** attached to shaft **29** actuates push rod **247** through a cam follower **250** held in contact with cam **249** by a spring **251** connected between the end of actuating lever **246** and a projecting portion of frame **16** (see Figures 1 and 2).

A pair of supporting feet **254** are attached to a cross member **255** (see Figures 1 and 8) which in turn is supported by a depending leg **256** pivotally attached to frame **16** by a pin **257**. At the upper end a connecting rod **259** is pivotally attached to leg **256** and to a rocker **260** (best shown in Figure 2) rotatably mounted on frame **16** by pin **261**. The other end of rocker **260** is pivotally attached to a push rod **262** with the other end of the push rod being slotted at **263** to fit about shaft **29**. Push rod **262** rests on a cam **264** attached to shaft **29** and a cam follower **265** on the underside of push rod **262** is held aganist the periphery of cam **264** by a spring **266** drawn between rocker **260** and one of the guide members **220** of frame **16**.

The tucker fingers **268** are attached to cross member **269** mounted on supporting arm **270** secured to one end of a shaft **271** suitably journaled in frame **16** (see Figure 1). On the other end of shaft **271** is attached a second arm **272** (see Figures 1 and 3) with the lower end being pivotally attached to a push rod **273**. Adjacent the other end of push rod **273** is a slot by which push rod **273** fits about shaft **22**. Beyond the slot is a cam followed **274** which rides on a cam **275** attached to shaft **22**. The cam follower is held in engagement with the cam by a spring **276** secured to push rod **273** and to frame **16**.

Presser

The presser generally **14** is supported on a pair of lower side guides **281** and a pair of upper supporting members **282** attached to frame **16**. A supporting plate **283** is secured to the two lower guides **281** adjacent the lower edge thereof. An upper belt **284** is carried on a roller **285** with the roller having a shaft **286** journaled in frame **16**. A lower belt **287** is carried on a roller **288** with a shaft **289** of the pulley journaled in frame **16**. As seen in Figure 1, the upper run of belt **287** overlies supporting plate **283** and rides thereon. Idler rollers, not shown, sup-

port the other end of the belts. Upper supporting members **282** have a plurality of slots **291** therein in which slots are received the axles **292** of pressure rollers **293**. The slots are positioned so that the bottom run of belt **284** is slightly closer to the top run of belt **287** than the height of the packages, whereby as the packages are going through the pressure station the rollers **293** will press belt **284** toward the bottom belt **287** thus applying pressure against the ends of the carton to hold the two end flaps of the carton blanks together while the glue sets. The length of the presser **14** and speed of operation of the belts will be such as to hold the package thus compressed for a sufficient length of time to allow the particular glue being used to set.

The output shaft of motor **52** carries a pair of pulleys **294** and **295**. A pulley **296** is mounted on shaft **289** and a corresponding pulley **297** is mounted on shaft **286**. Pulley **296** and thus belt **287** is driven by a belt **298** from pulley **294** while pulley **297** and thus belt **284** is driven by a belt **299** from pulley **294**.

Operation

The carton blanks **300** are stacked flat in magazine **120** as seen in Figure 1. The cans are delivered to the machine sequentially along belts **55** and **68** where they pile up in sequential order against gate **73**. As ram **89** moves forward from the retracted position shown in Figure 2, the gate **73** opens to permit the cans to be moved along by belt **68**. However, they are then stopped by abutment **88** on ram **89**. The distance between abutment **88** and gate **73** corresponds to the length of the group of cans that are to make up the packaging unit. In the illustrated embodiment this is three cans. The gate **73** then closes to shut out more than the three cans already occupying the space between abutment **88** and gate **73**. Ram **89** retracts opening the space above belt **68** and allowing the three cans to continue on along belt **68** until restrained by stop **105**. The three cans are held on the belt by lip **106**.

Ram **89** starts forward towards its extended position, at which time lip **106** is lowered to permit the ram to transfer the three cans onto pusher **114** with the cans being aligned by stop **115**. It will be noted that the alignment of the cans was fixed by the cooperation of stops **105** and **115**.

In the meantime vacuum head **132** would have been raised to bring the vacuum cups **133** in contact with the lowermost blank in magazine **120** and the vacuum would have been applied to cause the cups to grip that blank. Vacuum head **132** was lowered to withdraw the blank from the magazine and deposit the blank on conveyor chains **125**. The vacuum would then be shut off to release the blank and the blank would have been moved along the conveyor by lugs **129** on the conveyor. As the blanks approach the end of the conveyor chains **125** as defined by sprockets **127** the blank would slide up over guide **158** and would be left in this position as the lugs **129** turned around sprockets **127**. The final positioning of the blank on guides **158** would be performed by fingers **159** which slide forwardly contacting the rear edge of the blank and pushing it into exact position on the guides.

Pusher **114** is then raised to press the top of the blank **300** between the top of the three cans forming the packaging unit **301**, and the lower edge of the folding member **170** as defined by rods **171** and **172**, with the continued movement of the pusher folding the blank **300** down about the sides of the packaging unit **301**. The leading side **302** and the trailing side **303** extend below the folding member **170** along the sides of pusher **114**.

At this time second ram **185** is moved from the retracted to the extended position to slide the partially formed package from pusher **114** onto platform **197**. The leading side **302** is bent rearwardly with the partially formed package being prevented from riding up by pressure shoe **198**. Thus at the finish of the stroke of ram **185** the partially formed package assumes the position illustrated in Figure 6.

At this time one of the pushers **205** contacts the rear of the package and moves it along platform **197**. The trailing side **303** of the carton blank **300** is held in the extended position by guide **223**. During the course of its travel the partially formed package is moved past the glue roller **225** where the roller deposits a film of adhesive on the under side of the trailing side **303** (see Figure 7).

Upon leaving the glue roller the trailing side **303** is turned downwardly by guide **234** and the package is ultimately deposited on rollers **236** by the retraction of fingers **208** of pushers **205** as the cam followers **211** reach the end of cam **212**.

The feet **254** then move up under the outer edge of the leading side **302** (that is folded under the can) to support the package in conjunction with the upper guides **220**, and the rollers **236** are turned downwardly to be out of the way of tucker fingers **268**. Tucker fingers **268** move in towards the package with the fingers **268** contacting the downwardly extending side **303** of the package and turning side **303** under in contact with the leading side **302** that was previously turned under the package. The tucker fingers **268** move back out of the way, rollers **236** are brought up in contact with the bottom of trailing side **303**, and the feet **254** are moved away from the package.

The package then remains in this position until the package immediately following is pushed towards the rollers **236** by the pushers **205**. When the following package contacts the leading package already on the rollers **236**, the leading package is pushed forwardly onto conveyor belt **287** with the following package being deposited on rollers **236** as just described. The power driven conveyor belts **284** and **287** then move the leading package through the presser **14** with the rollers **293** applying pressure to the top of the package through belt **284** and pressing the package against the roller belt **287**. As previously mentioned, the speed and length of the presser **14** is such as to thus hold the package compressed for a sufficient period of time to permit the glue to set so that when the package emerges from the end of the presser **14** the package has been completed.

The foregoing detailed description is only for clearness of understanding and for the purpose of complying with 35 U. S. C. 112, and we do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

I claim:

1. The method of folding a carton blank about a unit to be cartoned including the steps of supporting the unit on an area of no greater width than the unit, placing the blank on one side of the unit and approximately centered thereon, pressing the sides of the carton blank in the direction of said unit in the areas immediately to either side of said unit to fold the blank about said one side of the unit and the two adjacent sides, with the remaining portion of the blank extending downwardly from said two adjacent sides, sliding the unit to one side while pressing the leading carton side under the unit, supporting the unit along the outside portion of the carton side folded under the unit, and folding the other side of the blank under the unit and pressing said other side against the inner portion of the carton side initially folded under the unit.

2. The method of folding a carton blank about a unit to be cartoned including the steps of supporting the unit on an area of no greater width than the unit, placing the blank on one side of the unit and approximately centered thereon, pressing the carton blank in the direction of said unit in the areas immediately to either side of said unit to fold the blank about said one side of the unit and the two adjacent sides, with the remaining portion of the blank extending downwardly from said two adjacent sides, sliding the unit to one side while pressing the lead-

ing carton side under the unit, supporting the unit along the outside portion of the carton side folded under the unit, applying an adhesive to the extremity of one of said sides, and folding the other side of the blank under the unit, pressing said other side against the inner portion of the carton side initially folded under the unit, and holding said sides in juxtaposition until the adhesive sets.

3. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit, with the sides of the carton extending below the unit, means to move said unit horizontally from said opening across said member thereby bending one side under said unit, means to apply an adhesive to a portion of a side, means to fold the remaining extended side into overlapping relationship below the unit, and means to hold the sides in said relationship until said adhesive sets.

4. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit, means to move the unit in a horizontal direction across the width of said opening thereby pressing one of said sides against the edge of the opening and bending said side under said unit, and means for folding the other side of the carton about said unit in juxtaposition to said one side.

5. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a conveyor positioned adjacent the first position of said pusher to place a unit on said pusher when the latter is in said first position, means to align the unit placed on said pusher with respect to said opening, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit, means to move the unit in a horizontal direction across the width of said opening thereby pressing one of said sides against the edge of the opening and bending said side under said unit, and means for folding the other side of the carton about said unit in juxtaposition to said one side.

6. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, supporting means having a supporting surface positioned to one side of the first position of said pusher with said surface at substantially the same elevation as said face, a ram movable along a first path above said surface normal to said line from a retracted position at which a unit may be moved in front of said pusher to a position at which said unit will be pushed onto said face, a stop at the opposite side of said pusher from said supporting means, said supporting means including a conveyor to move a unit in front of said ram when in said retracted position along a second path substantially normal to said first path in a given direction and a stop beyond said ram in said direction, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit, means to move the unit in a horizontal direction across the width of said opening thereby pressing one of said sides against the edge of the opening and bending said side under said unit, and means for folding the other side of the carton about said unit in juxtaposition to said one side.

7. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, supporting means having a supporting surface positioned to one side of the first position of said pusher with said surface at substantially the same elevation as said face, a ram movable along a first path above said surface normal to said line from a retracted position at which a unit may be moved in front of said pusher to a position at which said unit will be pushed onto said face, said supporting means including an endless conveyor to move units sequentially in a given direction into a position in front of said ram when said ram is in the retracted position, said ram having an abutment on the upstream, with respect to said direction of movement of the units on said conveyor, side thereof extending rearwardly from the face of the ram to block the movement of subsequent units on said conveyor when said ram is extended, a gate positioned along said conveyor upstream from said abutment a distance only slightly greater than the length of a unit, said gate being operatively connected to said ram to close prior to the return of the ram to the retracted position and open after the ram leaves the retracted position, a second means to position a carton blank between said unit and said member, and power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit.

8. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit and to stop the pusher at a second position with said face at about the level of the top of said member, a ram movable along a path normal to said line above said face at said second position thereby pressing one of said sides against the edge of the opening and bending said side under said unit, and means for folding the other side of the carton about said unit in juxtaposition to said one side.

9. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger

in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit, means to move the unit in a horizontal direction across the width of said opening thereby pressing one of said sides against the edge of the opening and bending said side under said unit, means for supporting the partially enclosed unit with the portion thereof to be covered by the other side exposed, means to convey said unit from said opening while so supported, a tucker to fold said other side about the unit overlapping a portion of said one side, and means to hold said other side against the overlapped portion of said one side.

10. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit and to stop the pusher at a second position with said face at about the level of the top of said member, a ram movable along a path normal to said line above said face at said second position, thereby pressing one of said sides against the edge of the opening and bending said side under said unit, means for supporting the partially enclosed unit with the portion thereof to be covered by the other side exposed, means to convey said unit from said opening while so supported, a tucker to fold said other side about the unit overlapping a portion of said one side, and means to hold said other side against the overlapped portion of said one side.

11. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit and to stop the pusher at a second position with said face at about the level of the top of said member, a ram movable along a path normal to said line above said face at said second position thereby pressing one of said sides against the edge of the opening and bending said side under said unit with the other side being bent away from the unit, a conveyor positioned adjacent said member adjacent said edge of the opening to receive the partially cartoned unit pushed across said member by said second ram, means associated with said conveyor and constructed and arranged to support said partially cartoned unit on only the outer portion of said one side, means along said conveyor to apply adhesive to a portion of a first of said sides, a tucker further along said conveyor to fold said other side about said unit overlapping the exposed portion of said one side, and means to hold said other side against the overlapped portion of said one side.

12. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, supporting means having a supporting surface positioned to one side of the first position of said pusher with said surface at substantially the same elevation as said face, a ram movable along a first path above said surface normal to said line from a retracted position at which a unit may be moved in front of said pusher to a position at which said unit will be pushed onto said face, a stop at the opposite side of said pusher from said means, said supporting means including a conveyor to move a unit in front of said ram when in said retracted position along a second path substantially normal to said first path in a given direction and a stop beyond said ram in said direction, a second means to position a carton blank between said unit and said member, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit, a second ram movable along a path normal to said line above said face at said second position thereby pressing one of said sides against the edge of the opening and bending said side under said unit with the other side being bent away from the unit, a conveyor positioned adjacent said member adjacent said edge of the opening to receive the partially cartoned unit pushed across said member by said second ram, means associated with said conveyor and constructed and arranged to support said partially cartoned unit on only the outer portion of said one side, means along said conveyor to apply adhesive to a portion of a first of said sides, a tucker further along said conveyor to fold said other side about said unit overlapping the exposed portion of said one side, and means to hold said other side against the overlapped portion of said one side.

13. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a pair of guide bars immediately below said member and spaced beyond the opposite sides of said opening, a pair of spaced endless conveyors to move a carton blank onto said guide bars, a pair of position fingers to position said blank on said guide bars in alignment with said opening, a magazine for holding carton blanks, feed means to remove a blank at a time from said magazine and transfer it to said conveyors, power means connected to said pusher to push said unit through said opening folding the blank about the sides of the unit, means to move the unit in a horizontal direction across the width of said opening thereby pressing one of said sides against the edge of the opening and bending said side under said unit, and means for folding the other side of the carton about said unit in juxtaposition to said one side.

14. In a device for forming a carton from a carton blank about a unit to be packaged, a folding member having a generally horizontal opening only slightly larger in width than the width of said unit, a pusher having a generally horizontal pressure face and movable toward said member along a line intersecting said opening from a first position at which said face is spaced below said opening, a first means to place said unit on said face in alignment with said opening when said face is in said first position, a second means to position a carton blank between said unit and said member, power means con-

nected to said pusher to push said unit through said opening folding the blank about the sides of the unit, means to move the unit in a horizontal direction across the width of said opening thereby pressing one of said sides against the edge of the opening and bending said side under said unit and bending the other side outwardly away from said unit, a conveyor adjacent said member to receive the unit moved across said member by said last mentioned means, said conveyor having a section constructed and arranged to move out from under said unit, means including a pair of supporting feet adapted

to support said unit when said section is moved from under said unit with the edge of said one side exposed, a tucker movable toward said unit to engage said other side of said blank to turn it under said unit, and means to press said other side against the exposed edge of said one side.

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