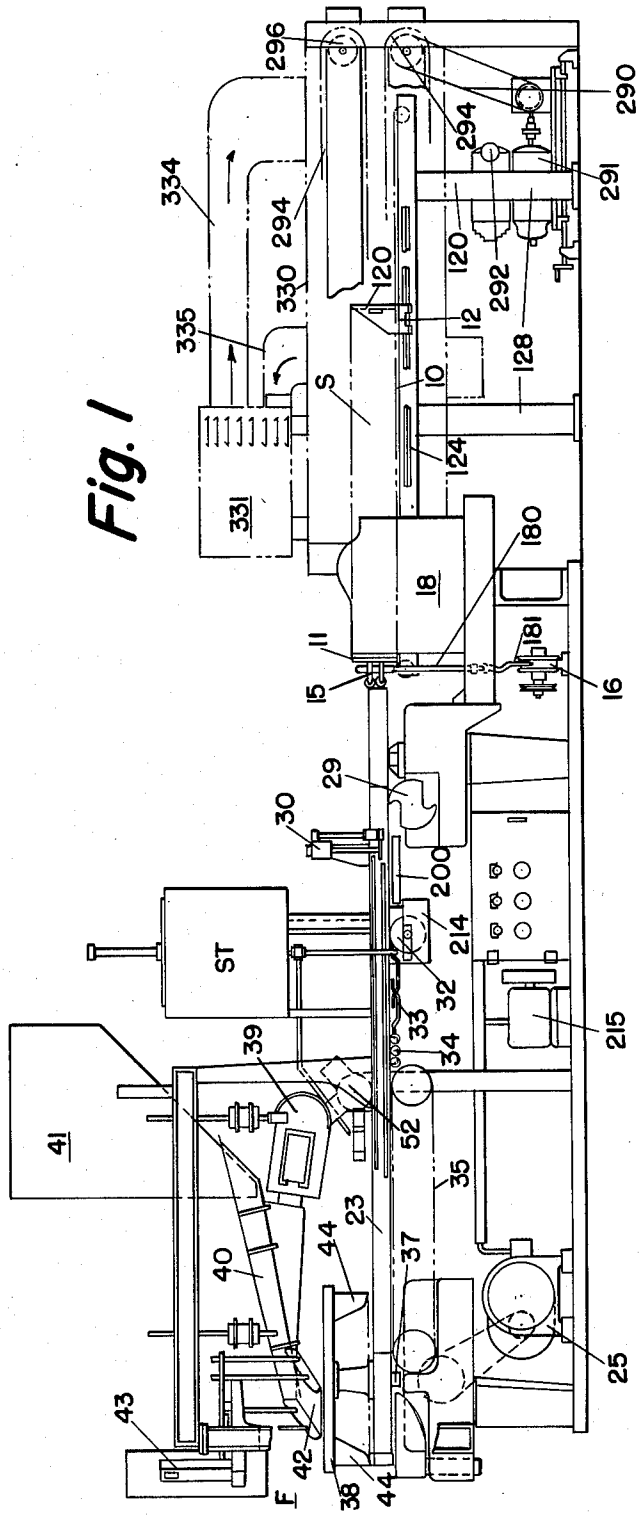
March 7, 1961 J. F. KILLION 2,973,608

HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

Filed Sept. 4, 1957 11 Sheets-Sheet 1

Fig. 1



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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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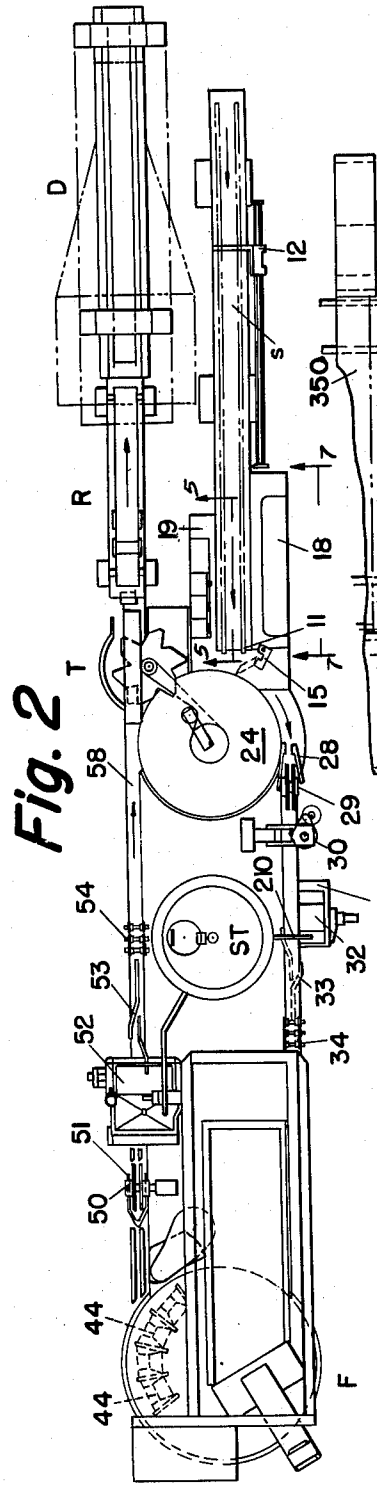


Fig. 2

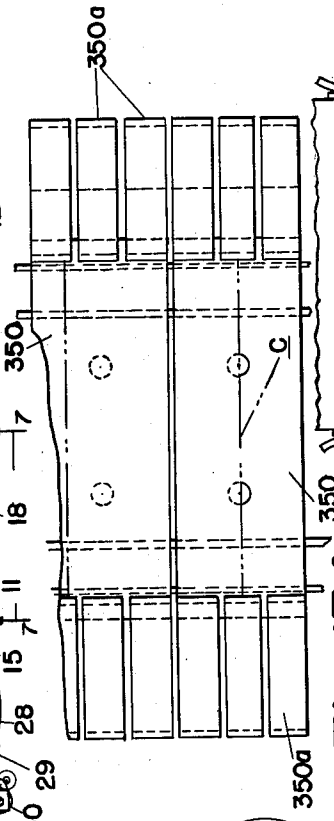


Fig. 13A

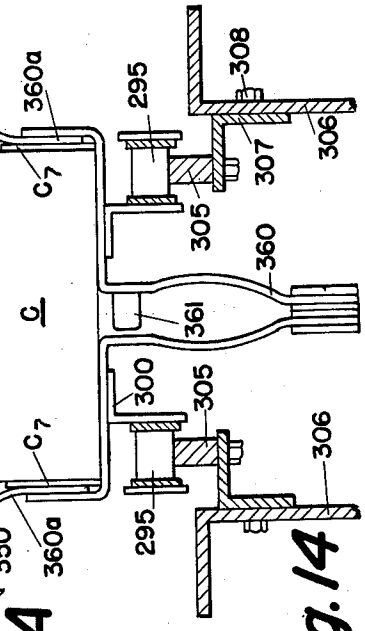


Fig. 14

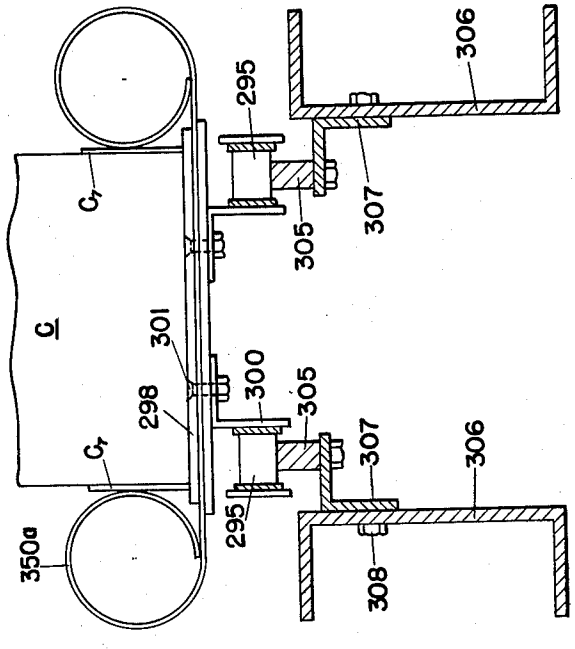


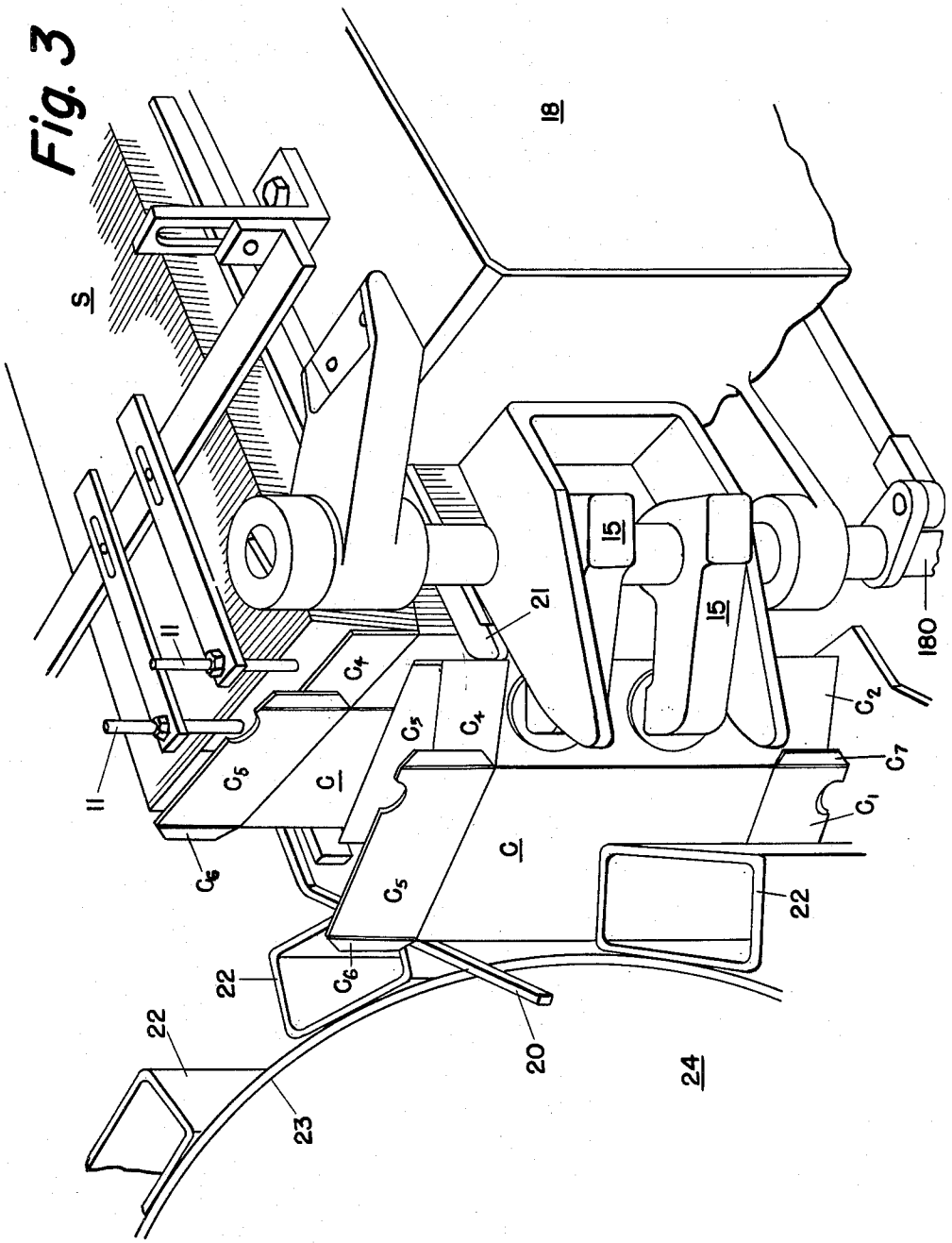
Fig. 13

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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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Fig. 3

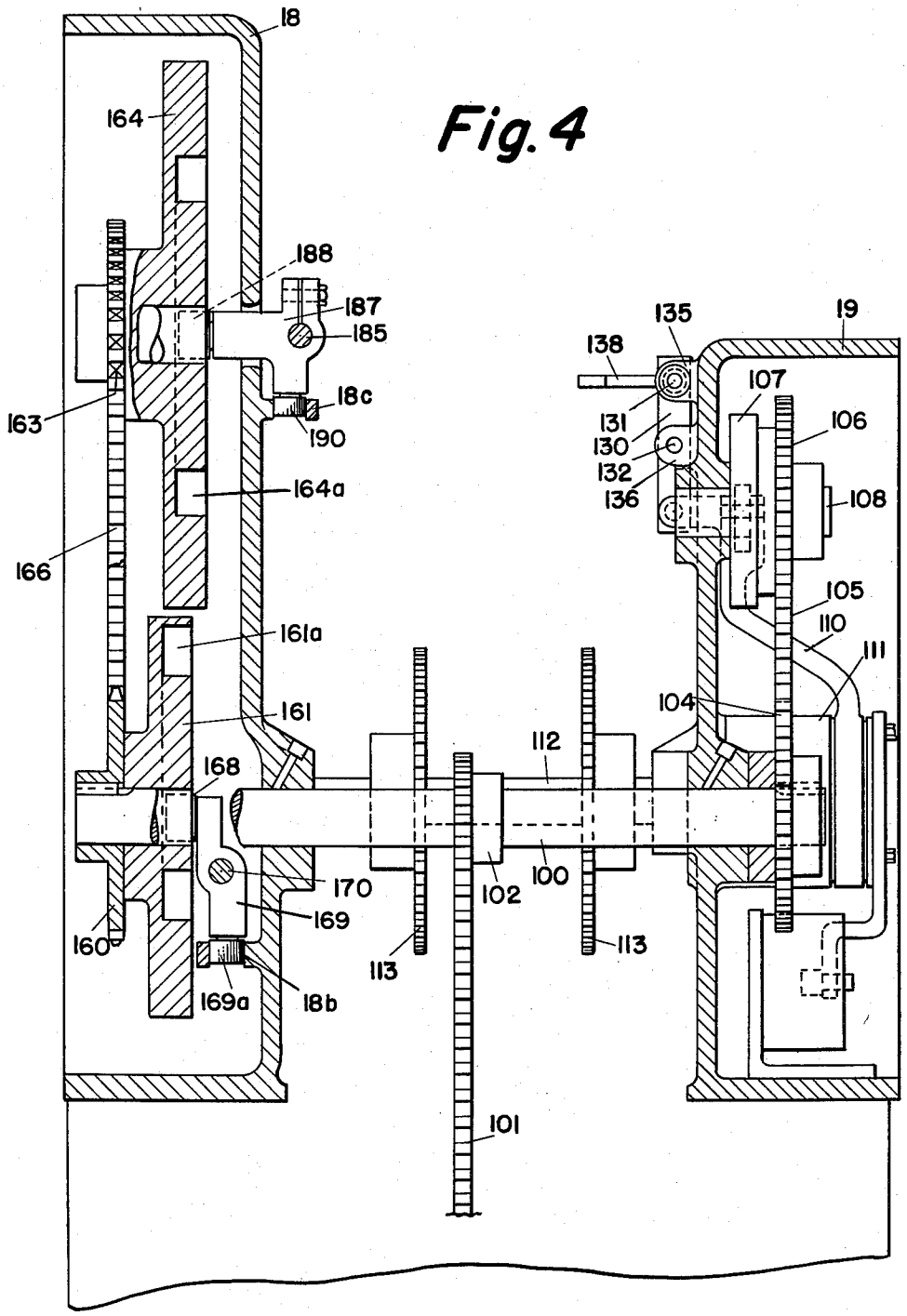


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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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Fig. 4



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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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Fig. 5

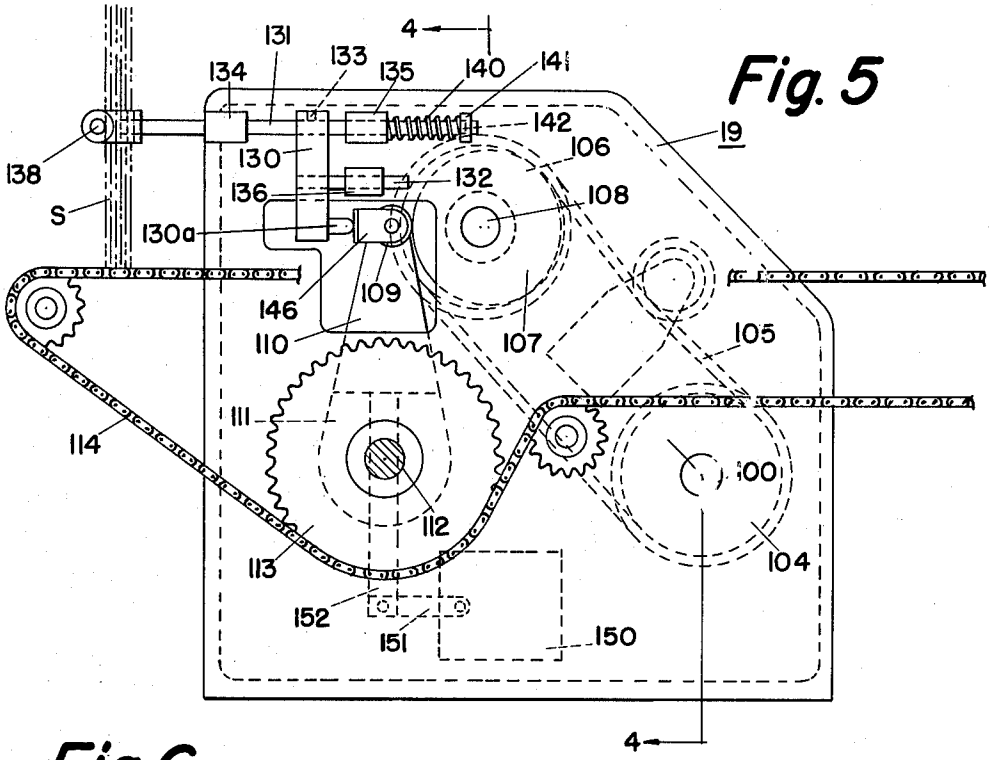
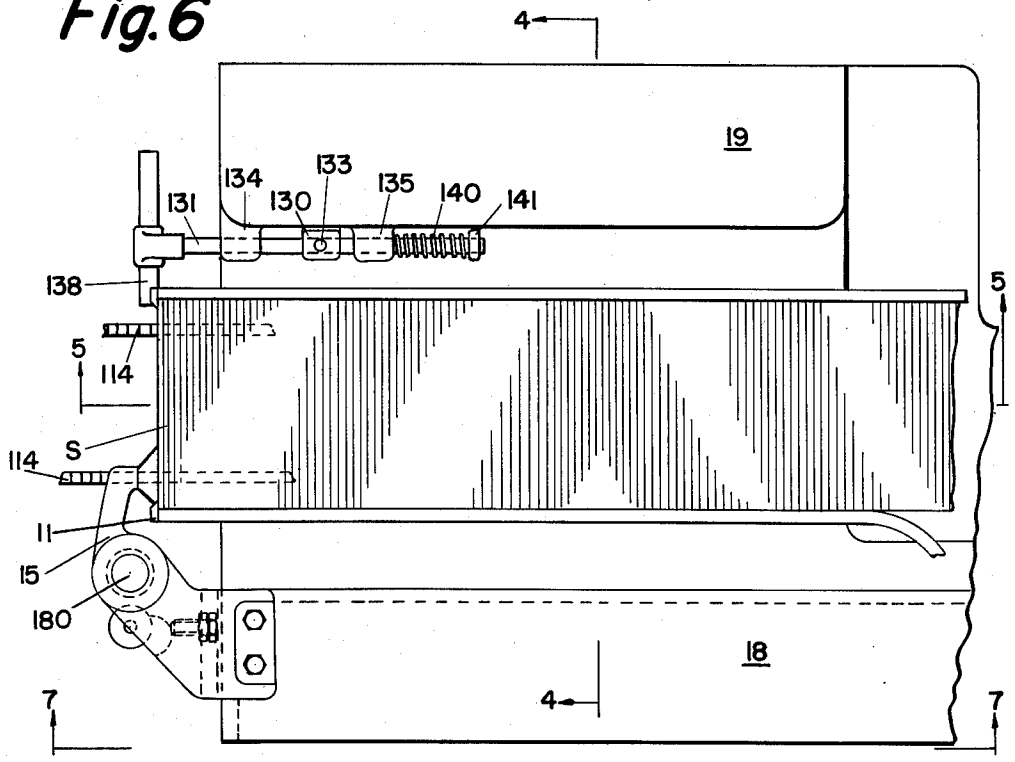


Fig. 6

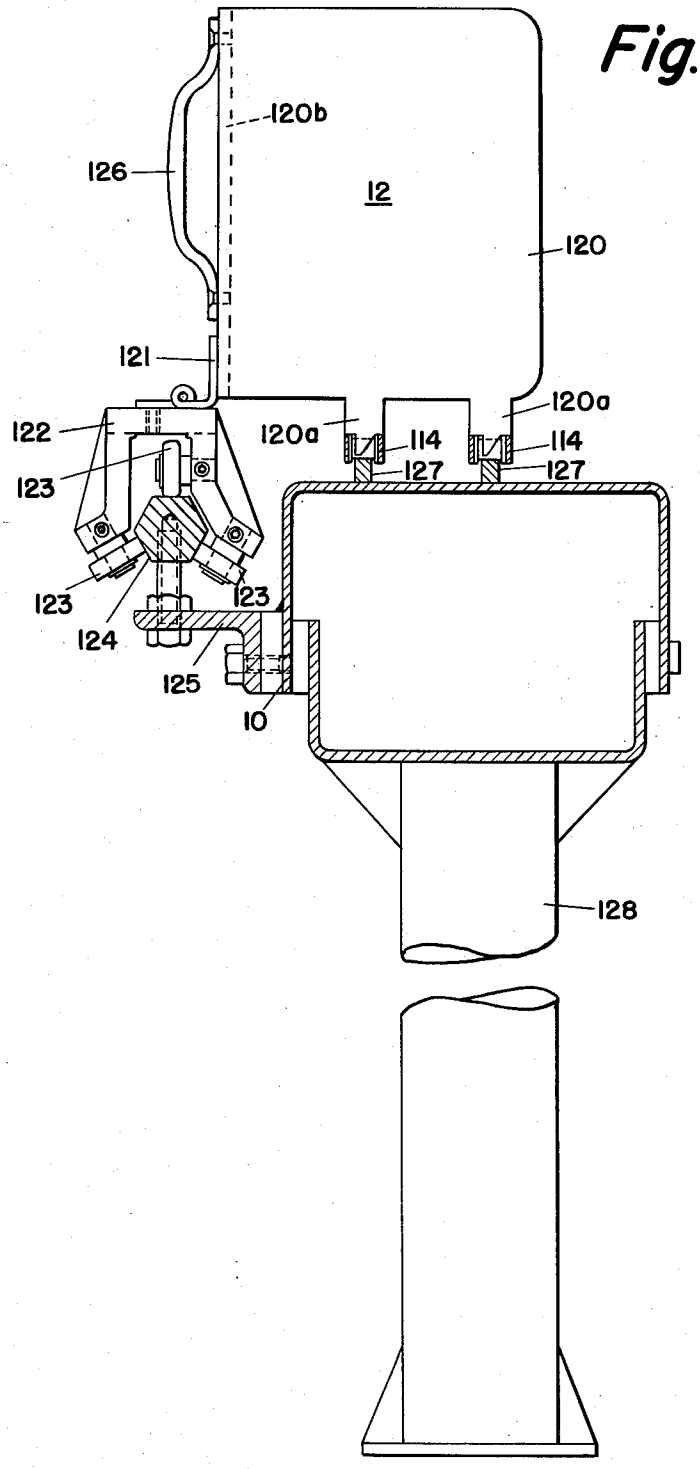


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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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Fig. 5 A

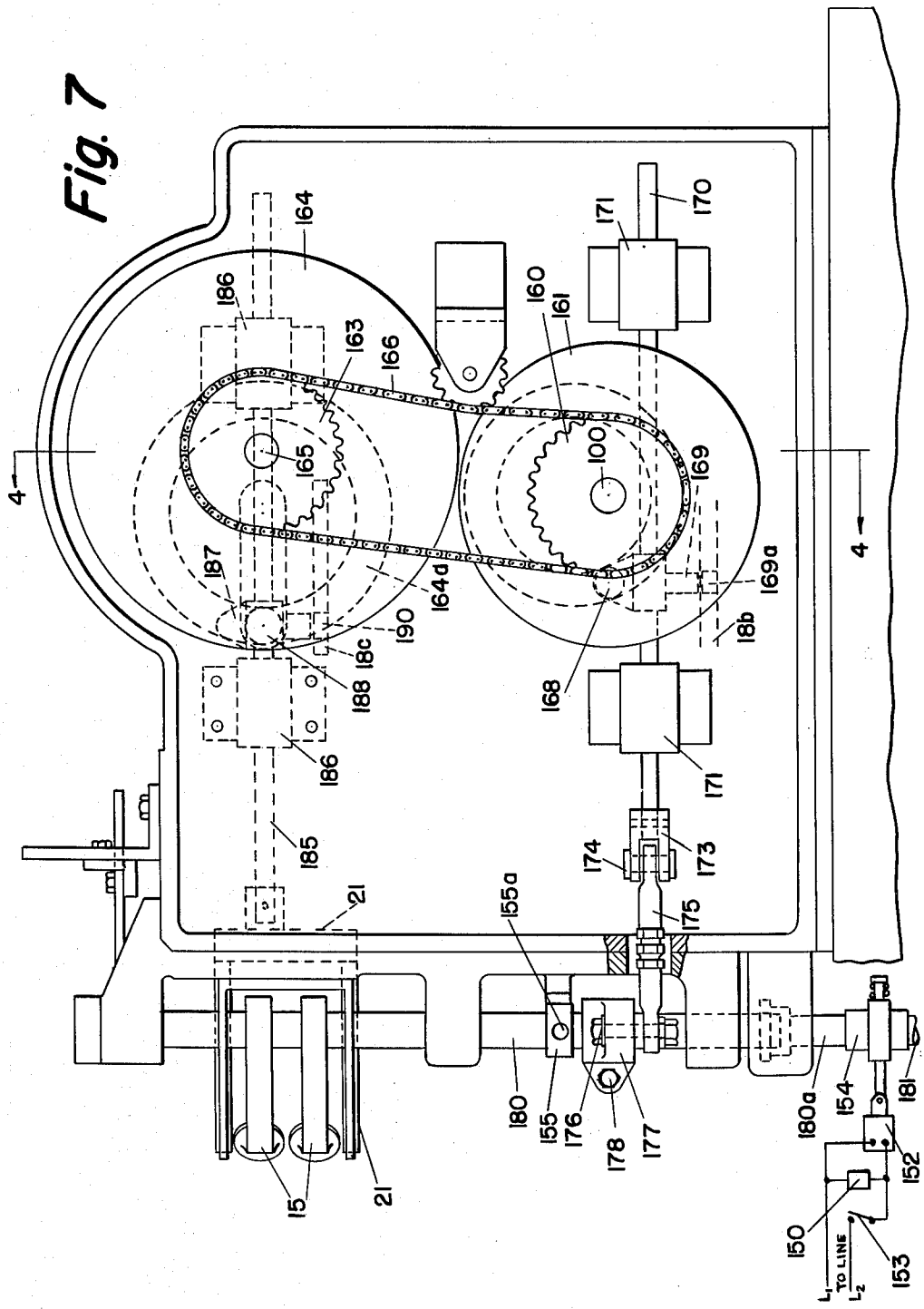


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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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Fig. 7



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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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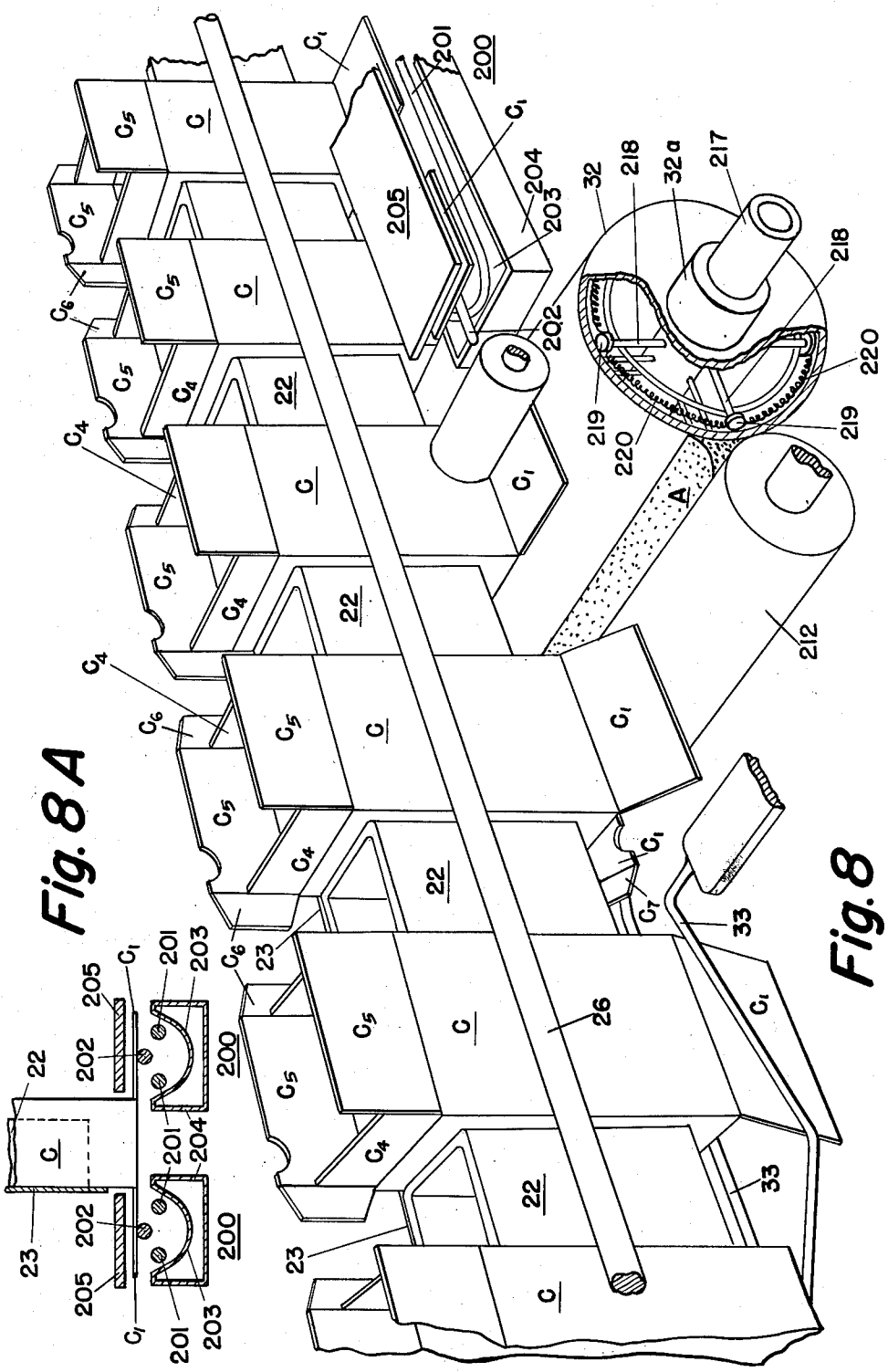


Fig. 8

Fig. 8A

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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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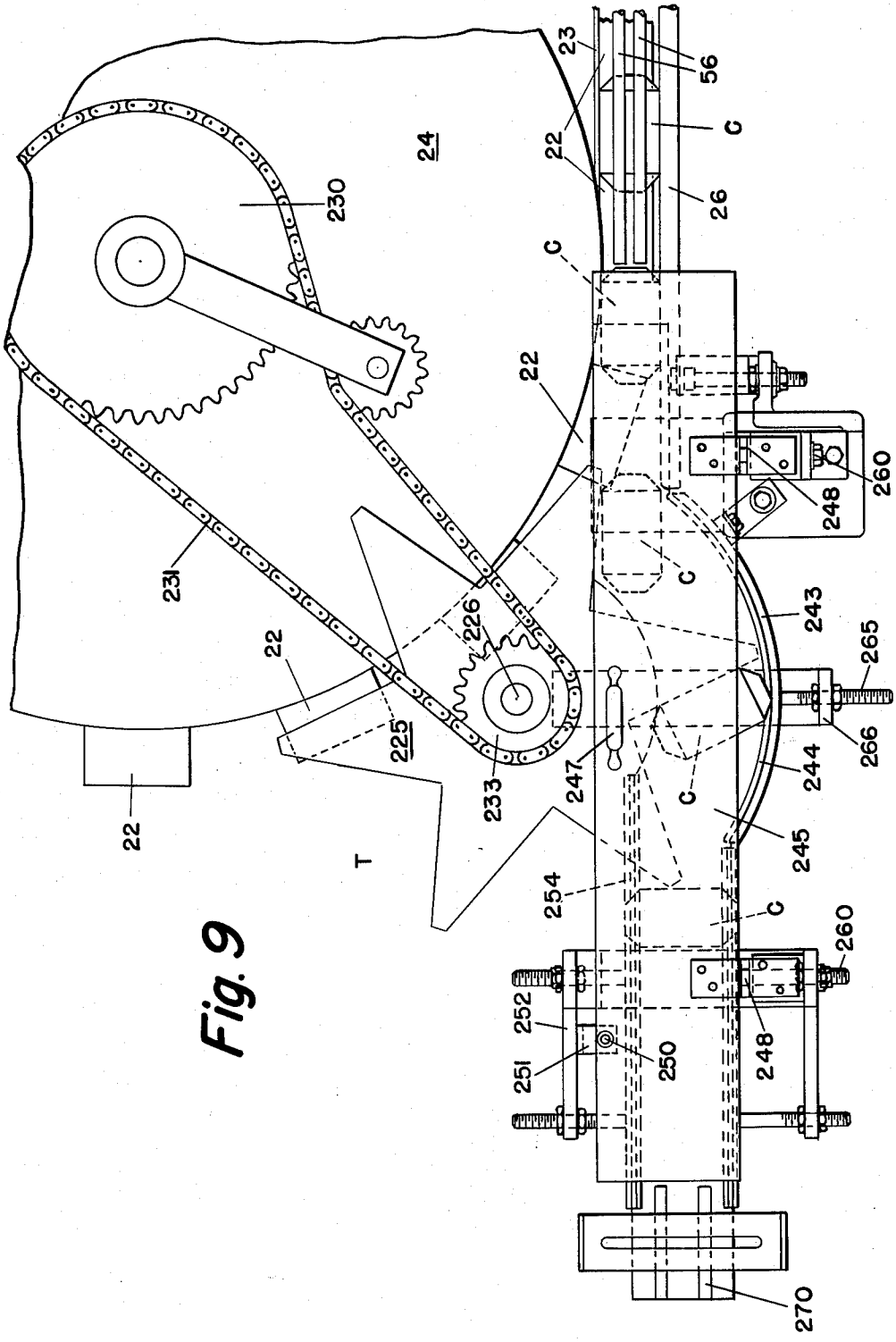


Fig. 9

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HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

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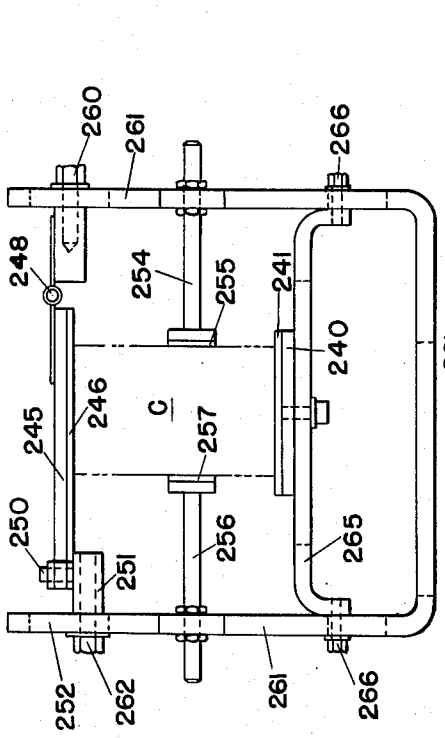


Fig. 11

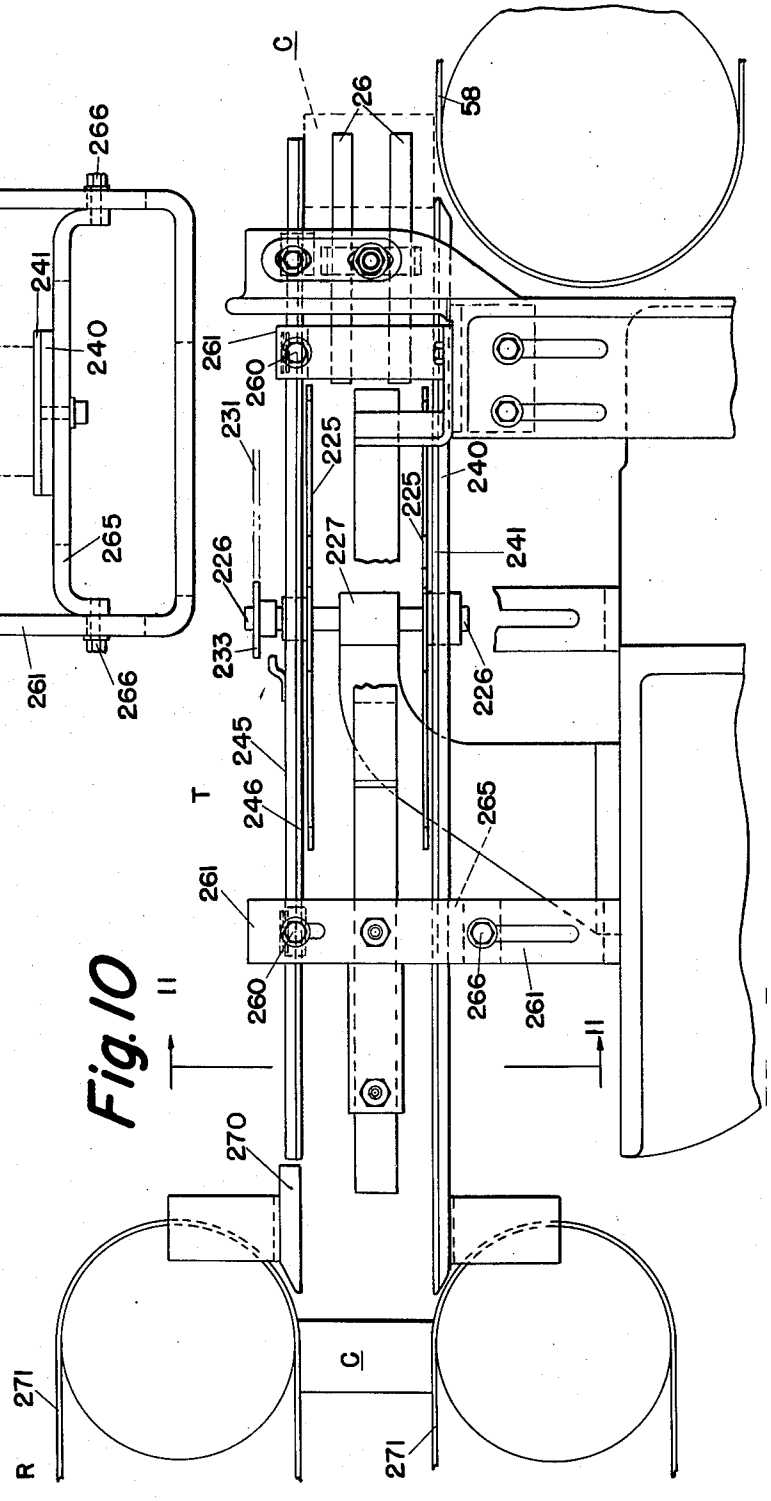


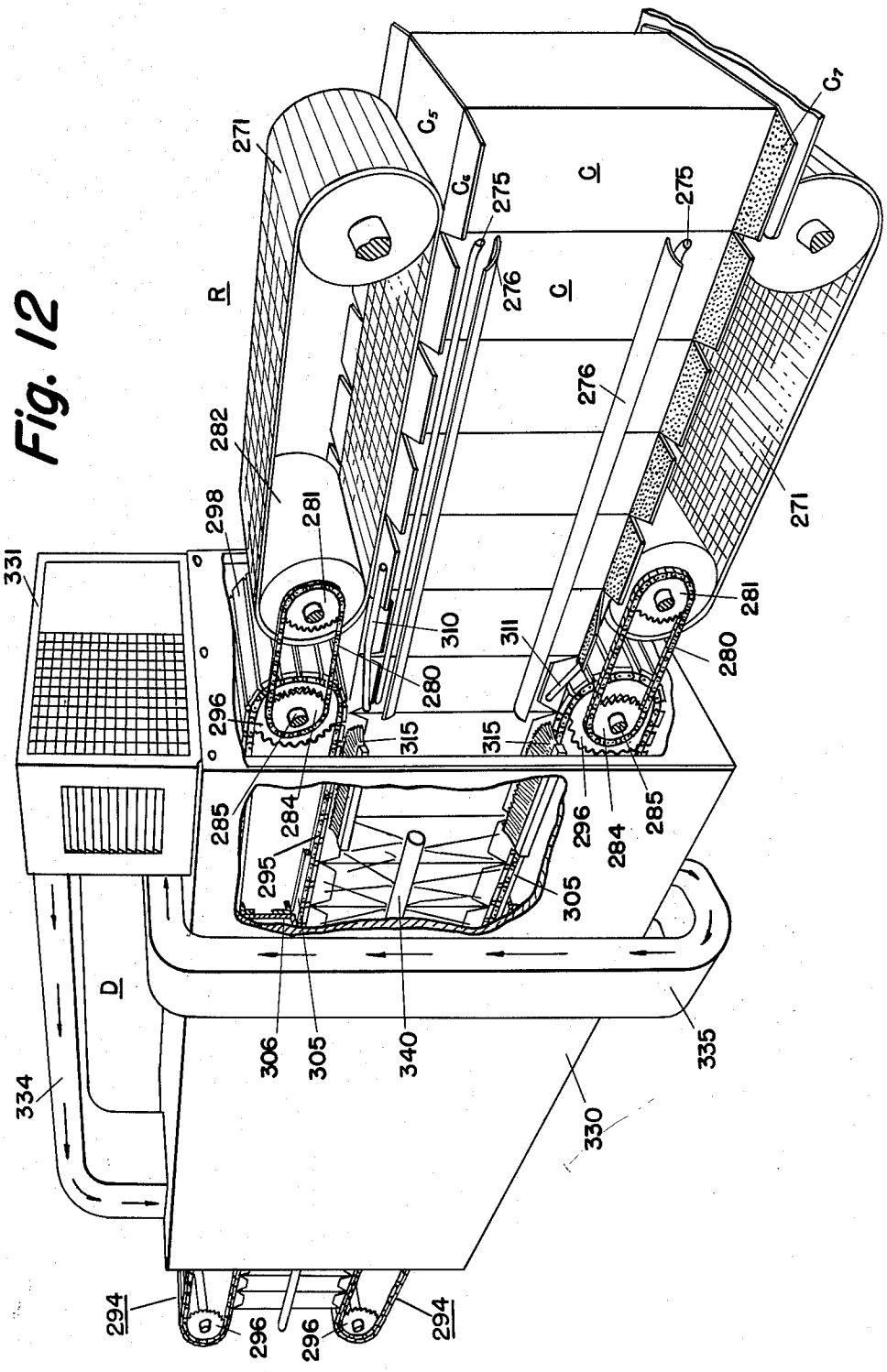
Fig. 10

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Fig. 12



United States Patent Office 2,973,608
Patented Mar. 7, 1961

2,973,608

HIGH-SPEED SYSTEM FOR FEEDING AND SEALING CARTONS

John F. Killion, Philadelphia, Pa., assignor, by mesne assignments, to Food Machinery and Chemical Corporation, San Jose, Calif., a corporation of Delaware

Filed Sept. 4, 1957, Ser. No. 682,042

28 Claims. (Cl. 53—38)

This invention relates to systems in which cartons in the flat are opened and fed to a filling station and thereafter closed and sealed, and has for an object the provision of improved means for automatically feeding and sealing the cartons at high rates of speed.

The present invention is an improvement on the systems described and claimed in First et al. Patents Nos. 2,293,498 and 2,318,208. The present invention permits operation at substantially higher rates of speed with a normal operating speed corresponding with an output in the order of 400 or more cartons per minute. Such high operating speeds are obtainable by reason of the novel features included in the present system.

In accordance with the invention, folded cartons are fed at high speed from a stack of cartons in the flat to a carton conveyor. The feeding means brings the stack of flattened cartons so that the front end of the stack is against an abutment adjacent the carton conveyor preparatory to transfer of a carton thereto. A spring-biased tell-tale is engageable with the front end of the stack for detecting the pressure applied to the cartons in the stack and for controlling this pressure within predetermined limits. The folded cartons are adapted to be removed from the stack by suction members and transferred to the carton conveyor. If the cartons were allowed to be continuously advanced in the stack, the cartons would soon become packed very tightly against each other in the stack, and this would prevent their being removed rapidly from the stack by the suction members, once it was desired to feed the cartons again through the machine.

Further in accordance with the invention, after the cartons are on the carton conveyor, the end flaps thereof are preheated prior to being coated with adhesive, the adhesive being of the hot-melt type and being applied to the end flaps with heated applicators.

Further in accordance with the invention, and after the end flaps at both ends of the cartons have been closed and sealed, the cartons are turned through an angle of 90° to bring their short dimension lengthwise of the conveyor to minimize the length of the drying conveyor and to permit reactivation and folding of the Van Buren ears on the cartons. The cartons are turned by a turn-around mechanism which is driven in predetermined timed relation with respect to the carton conveyor and maintains the individual cartons in predetermined spaced relation during the turning operation.

After the cartons have been turned, they pass through a drying conveyor which is adapted to apply pressure to the tops and bottoms of the cartons while a drying medium is directed against the sealed end flaps of the cartons to minimize the drying time for the adhesive.

The present invention is particularly adapted for sealing cartons of the type including the aforesaid Van Buren ears which are adapted to be sealed against the narrow sides of the carton to make the cartons more "sift-proof." After the cartons have been turned through the angle of 90°, they are adapted to pass through a reactivating

conveyor where the adhesive on the Van Buren ears is reactivated, and the ears thereafter pressed tightly against the sides of the carton where they are maintained while passing through the drying conveyor. The drying conveyor is surrounded by a housing through which the drying medium flows, the drying medium being either hot or cold fluid depending upon the type of adhesive applied to the carton flaps.

For further objects and advantages of the invention and for a more detailed understanding thereof, reference is to be had to the following specification taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an elevational view of apparatus for feeding, filling and sealing cartons in accordance with the present invention;

Fig. 2 is a top plan view of the apparatus shown in Fig. 1;

Fig. 3 is a fractional perspective view of the carton-feeding and transfer station of the apparatus shown in Fig. 1;

Fig. 4 is a vertical sectional view of the carton-feeding mechanism and the carton-opening and transfer mechanism;

Fig. 5 is a side elevation of the carton-feeding mechanism taken along the lines 5—5 in Fig. 2;

Fig. 5A is an end elevation of the carton feed pusher device shown in Figs. 1 and 2;

Fig. 6 is a top plan view of Figs. 5 and 7;

Fig. 7 is a side elevation of the carton-opening and transfer mechanism taken along the lines 7—7 of Figs. 2 and 6;

Fig. 8 is a perspective view showing the preheaters for the carton flaps and the glue-applying roll;

Fig. 8A is a sectional view of the preheaters for the carton flaps;

Fig. 9 is a top plan view of a carton turn-around mechanism shown in Fig. 2;

Fig. 10 is a side elevation of the carton turn-around mechanism;

Fig. 11 is a sectional view taken along the lines 11—11 in Fig. 10;

Fig. 12 is a perspective view of the reactivating conveyor and drying conveyor of the apparatus shown in Figs. 1 and 2;

Figs. 13 and 13A are top plan and end elevation views of a modification of a pressure-applying means for sealing the end flaps and the Van Buren ears on the cartons; and

Fig. 14 is another modification of a pressure-applying means for sealing the end flaps and the Van Buren ears on the cartons.

The apparatus shown in Figs. 1 and 2 is generally of the type disclosed in First et al. Patents Nos. 2,293,498, 2,318,208 and 2,320,581. The cartons are disposed in the flat in a stack S, Fig. 1. The stack of cartons S is disposed in the carton magazine 10 with the forward carton in the stack being held against an abutment 11 by pusher 12, the latter engaging the rear of the stack S. The folded cartons are adapted to be removed from the stack S by a suction device 15. The suction device 15 may be of the type disclosed in the aforesaid Patent 2,318,208 and adapted to be provided with a source of suction illustrated by a vacuum pump 16. The new mechanism for controlling the feed and opening of cartons from the stack S is contained within housings 18 and 19, Fig. 2, and will be hereinafter described more in detail. The cartons are removed from the stack and moved against a guide 20, Fig. 3, to assist in opening the cartons from their flattened position, and the open cartons are then pressed into position by a pusher device 21. The cartons C are thus transferred from the stack S to an endless carton conveyor which comprises a plu-

rality of pairs of blocks or similar clamping elements **22** forming pockets in which the cartons C are disposed during their transport extending outwardly from the endless conveyor belt **23**, Fig. 3. The moving belt **23** passes around a pair of drums **24**, Figs. 1 and 2, and is driven continuously from a synchronous motor **25**. One or more guide rails **26**, Fig. 8, are disposed along the outer side of the conveyor and assist in holding the carton in the conveyor pockets.

After the cartons C are transferred to the carton conuveyor, the long end flaps C_1, Fig. 3, at the bottom of the carton are adapted to be turned outwardly to a horizontal position by guides **28**, Fig. 2, and the short end flaps C_2, Fig. 3, at the bottom of the carton are turned inwardly by a rotating device **29**, Figs. 1 and 2. One of the long top end flaps C_5 is then adapted to be marked with a suitable code by a codinng device **30**, for example, of a type similar to that disclosed in the aforesaid Patent 2,293,498. The bottom flaps C_1 are then preheated and coated with adhesive by a roller **32** in manner hereinafter described more in detail. The adhesive-coated end flaps C_1 are then turned inwardly by guides **33**, and the folds are squared by pressure-applying devices **34**, Figs. 1 and 2. After the bottom flaps of the carton C have been coated with adhesive and closed, the flaps are adapted to be held in closed position while the adhesive sets by the endless belt **35** which is disposed beneath the carton conveyor **23**.

As the cartons move along on the conveyor **23** at a high rate of speed, they pass through a filling station F which is adapted to fill cartons at a high rate of speed, for example, in the order of 400 to 500 or more cartons per minute. The filling station F preferably includes mechanism of the type described and claimed in copending application, Serial No. 681,240, filed August 30, 1957, by Walter E. Flack, a co-employee. Briefly, as the cartons move along on the conveyor **23**, they engage a switch **37** which is disposed along their path of movement at a point adjacent a rotary filling head or turret **38**. When the switch **37** is closed, the actuator **39** for the product conveyor **40** is energized which starts a controlled flow of product from a supply hopper **41** along the product conveyor **40** so that it passes over an inclined scale pan **42** which is connected with a weighing scale **43**. The product passes over the inclined scale pan **42** and into the plurality of funnels **44** which depend from the rotary turret **38**. The product passes through the funnels **44** and into the individual cartons C which are positioned beneath the funnels on the continuously moving carton conveyor **23**. The motor **25** is adapted to drive both the carton conveyor **23** and the turret **38** at a predetermined uniform speed so that the pockets or funnels **44** will move continuously at the same speed and in synchronism with the cartons which are disposed therebeneath on the carton conveyor belt **23**. When the density of the product changes, the position of the scale pan **42** will be raised or lowered accordingly, and this action is transformed into a corresponding electrical signal which is transmitted to the actuator **39** to increase or decrease the motion of the conveyor **40** as required to maintain a flow of uniform weight of product across the scale pan **42**. With the foregoing arrangement, the individual cartons will be filled rapidly and with a uniform weight of product regardless of change in density of the product during the particular run.

After the cartons have been filled with the product at the filling station F and as they continue to be moved along by the endless carton conveyor belt **23**, the short end flaps C_4 at the top of the carton C are folded inwardly by a device **50**, Fig. 2, and the long end flaps C_5 at the top of the carton are folded outwardly by guides **51**, the latter flaps being preheated and coated with adhesive by an adhesive-applying device **52** and thereafter folded over into sealed position by guides **53**, with the folded corners being squared by pressure members **54**, Fig. 2. The top end flaps of the carton are held in sealed position by a pair of rods **56**, Fig. 9, which extend over the carton conveyor belt **23**. The bottom flaps on the carton are held in sealed position by an endless belt **58**, Fig. 2, which is driven at the same speed as the carton conveyor belt **23**. The cartons C are then transferred to the turn-around station T, Fig. 2, where the cartons are turned through an angle of 90° so that they will proceed broadside through the remainder of the system. The turn-around station T includes mechanism for positively controlling the position and spacing of the cartons while they are being turned through the angle of 90°, as later to be described in detail. After the cartons have been turned to their broadside position, they pass through an adhesive reactivating station R and an adhesive drying station D, Fig. 2, as later to be described in detail. Since the cartons are moving through the system at a high rate of speed, it will be appreciated that it is extremely important that the flaps on the cartons be dried as rapidly as possible in order to minimize the length of the drying conveyor.

Having described the complete system in general, specific portions of the system will now be described in detail. The construction of the carton-feeding and opening mechanism is shown in Figs. 3–7. Referring to Fig. 4, there is shown a main drive shaft **100** which is driven from the main drive motor **25** by way of a chain **101** on a sprocket **102**. The drive shaft **100** is adapted to drive both the carton-feeding mechanism contained in housing **19**, and also the carton-opening or transfer mechanism contained in housing **18**, Fig. 4. The main shaft **100** at its right-hand end is provided with a sprocket **104** which cooperates with a chain **105** to drive a sprocket **106** which is fixed to an eccentric cam **107** and rotates on a stub shaft **108**. As may be seen in Fig. 5, the surface of the eccentric cam **107** is adapted to be engaged by a cam follower shown in the form of a roller **109** mounted on the end of an arm **110** which extends from the one-way clutch **111**. The one-way clutch **111** is of the ratchet type and when the arm **110** is rotated in a counterclockwise direction, as shown in Fig. 5, the clutch **111** is effective to drive the sprocket wheel **113** in a corresponding direction and thus advance the chain conveyor **114** for the stack of carton blanks S. As may be seen in Fig. 4, the shaft **112** is provided with a pair of sprocket wheels **113**, each adapted to drive a sprocket chain **114** to form the chain conveyor for the carton stack. The chains **114** pass through the bottom of the carton magazine, Fig. 1, and are adapted to drive the carton pusher device **12** toward the left, as viewed in Fig. 1.

The carton pusher device, as shown in Fig. 5A, comprises a plate member **120** which is hinged at **121** to a trolley member **122**. The trolley member **122** is substantially U-shaped and includes a plurality of rollers **123** which are adapted to engage the flat spaced sides of a guide rail **124** which is mounted along the side of the carton magazine **10**, as by brackets **125**. The plate **120** is provided with a handle **126** to aid in rotating the plate **120** about the hinge **121** to remove the lugs **120***a* at the bottom of the plate from engagement with the respective chains **114** for reloading the carton magazine with a new stack of cartons. To aid in guiding the cartons, the plate **120** is provided with a side member **120***b* to which the handle **126** is secured, Fig. 5A.

The chains **114** are adapted to pass over guides **127** which are adjustable transversely of the carton magazine **10** to accommodate cartons of different sizes. The magazine **10** is supported on floor stands **128** as shown in Figs. 1 and 5A.

The cartons C are adapted to be removed from the stack S by means of pivoted suction members **15**, Fig. 3, and in order for these suction members **15** to be able to

feed the cartons at high rates of speed, such for example, as 400 or 500 cartons per minute, it is necessary that the pressure of the cartons in the stack S be controlled. If the cartons are pressed too tightly together in the stack, it will hinder their removal by the suction members **15** and thus prevent the machine from obtaining the desired high operating speeds. To this end, there is provided means for automatically controlling the pressure on the cartons C in the stack S in accordance with a predetermined selected pressure.

As may be seen in Figs. 4 and 5, there is provided a member **130** which is adapted to be secured to a pair of guide rods **131** and **132**. The control member **130** is adapted to be adjustably secured to rod **131**, as by a set screw **133**. The rods **131** and **132** are adapted to reciprocate in the respective bearing members **134—136** which in turn are secured to the sides of the housing **19**. Connected to the outer end of the rod **131** and extending transversely across the end of the stack of cartons S is a feeler or tell-tale member **138**, Figs. 5 and 6, which is adapted to engage the outermost carton in the stack. The feeler **138** is adapted to be urged against the outermost carton by means of a coil compression spring **140** which surrounds the opposite end of rod **131** with one end of the spring **140** in engagement with the adjacent end of the bearing sleeve **135**, Fig. 5. The opposite end of the spring **140** is engaged by a collar member **141** which is adjustably secured by a set screw **142** to the rod **131**. By adjusting the position of collar **141** lengthwise of the rod **131**, the compression on the spring **140** can be controlled in a predetermined manner and this, in turn, will control the pressure applied to the cartons in the stack by the pusher device **12**, as now to be described.

As may be seen in Fig. 5, the spring **140** is adapted to move the rod **131** to the right and thus move the feeler **138** into engagement with the outermost carton in the stack S. This action also is adapted to move the projection **130***a* on member **130** into engagement with the member **146** carried at the outer end of the clutch arm **110**. From the foregoing, it will be seen that the spring **140** is adapted to urge the cam roller **109** against the surface of the eccentric cam **107**. When the cam **107** rotates, the high portion of the cam will in turn cause the arm **110** to rotate in a counterclockwise direction about shaft **112**, and the spring **140** is adapted to rotate the arm **110** in reverse direction about shaft **112** to return the arm to its original position, preparatory to rotation again in a counterclockwise direction by the eccentric cam **107**. The foregoing action takes place as long as the pressure of the carton stack S on the feeler member **138** does not exceed the pressure of the spring **140**. As soon as the pressure of the cartons in the stack exceeds the pressure produced by the spring **140**, the latter is not effective to return the control member **130** and its projection **130***a* to the right a sufficient distance to move the cam follower or roller **109** into engagement with the eccentric cam **107**. Thus the control member **130** and its projection **130***a* will be positioned to the left a slight distance from that shown in Fig. 5 with the member **146** at the outer end of the one revolution clutch arm **110** in engagement with projection **130***a*. The arm **110** of the clutch remains in this position with the eccentric cam **107** continuing to rotate but not engaging the cam follower **109** until a sufficient number of cartons are removed from the stack S to reduce the pressure on the cartons in the stack below the predetermined pressure controlled by the spring **140**. When the carton pressure in the stack is reduced below the predetermined value, the spring **140** will again bring the cam follower **109** against the eccentric cam **107** to rotate the arm **110** of the one cycle clutch in a counterclockwise direction to again advance the feed chains **114** for the carton magazine, thus moving the stack S to the left, as shown in Fig. 5.

In order to prevent the spring **140** from continuing to be effective to control advancement of the feed chains **114**, there is provided a solenoid **150** including a plunger or movable element **151** which is connected by way of a lever **152** to the arm **110** of the one cycle clutch. When the solenoid **150** is energized, the member **151** is adapted to hold the arm **110** of the clutch out of engagement with the periphery of the eccentric cam **107** and thus prevent the one cycle clutch **111** from further advancing the conveyor chains **114** and thus maintain the pressure of the cartons in the stack S at the then existing value.

It is sometimes desirable to stop removing cartons from the stack S but to continue the movement of the carton conveyor **23** so as to clear the conveyor of all cartons on it at that time. Since the drive shaft **100** continues to be driven with the conveyor **23**, the cam **107** will continue to rotate. The highspeed rotation of cam **107** creates a slight cycling action of spring **140** which in turn may cause a slight feed of stack S. To prevent this when cartons are not being removed from the stack, the solenoid **150** is adapted to be energized along with the solenoid **152**, Fig. 7, by switch **153** which operates the vacuum valve **154** to conduit **180** so as to cut off suction to the suction members **15** from the vacuum pump **16**, Fig. 1, thus locking the arm **110**, Fig. 5, and preventing movement of the feed chains **114**.

Referring to Figs. 4 and 7, it will be seen that the drive shaft **100** is also adapted to drive the suction transfer members **15**, Fig. 7, and the carton pusher **21** which, because of its prongs, is sometimes referred to as a devil's fork. A sprocket wheel **160** is secured to the left-hand end of drive shaft **100**, Fig. 4. The sprocket wheel **160** in turn is secured to the balanced cam **161** which is adapted to rotate with the sprocket **160** on the drive shaft **100**. A sprocket wheel **163** is secured to another balanced cam **164**, both of which are adapted for rotation on a stub shaft **165**, by way of a sprocket chain **166** which surrounds and interconnects the sprockets wheels **160** and **163**. The balanced cam **161** is provided with a circular cam track **161***a* which is adapted to receive a cam follower in the form of a roller **168** which is carried by a member **169** secured to a rod **170**. The rod **170** is adapted for reciprocation in bearing structure **171**, Fig. 7, and the lower end of the member **169** is provided with a guide **169***a* which is adapted to reciprocate in a slot **18***b* in housing **18**. The rod **170** is connected by way of a bifurcated member **173**, pin **174**, and link **175** to a pin **176** which extends through an opening in an arm **177** which is secured by a bolt **178** to a tubular member **180**. The lower end of member **180** is connected as by a non-rotating section **180***a* and a hose **181** to the suction pump **16**. The suction members **15**, which are adapted to engage cartons in the stack S, are secured to the tubular member **180** and are adapted for rotation about the axis of the tubular member **180**. From the foregoing, it will be seen that the rotation of the tubular member **180**, and thus the suction members **15**, results from the reciprocation of rod **170** which in turn is produced by the rotation of cam **161** driven from drive shaft **100**. The tubular member **180** is provided, as the aforesaid Patent 2,318,-208, with a relief valve **155** which is in normally closed position and is timed to open when the suction devices **15** have removed a carton from the stack S. The tube **180** is provided with an opening in the side wall which moves into and out of alignment with the opening **155***a* in valve **155** to cyclically connect the tube **180** with atmosphere. As mentioned above, when cartons are not being fed from the stack S, the solenoid valve **154** cuts off suction to the devices **15**, but the latter continue to reciprocate.

The carton pusher device **21** which assists the suction members **15** in opening the cartons from the flat and transferring them to the carton conveyor **23** is adapted to be driven in timed relation with the suction members **15**. The device **21** is connected to the end of a rod **185** which

is supported for reciprocation in bearing structure **186**. Secured to the rod **185** is a member **187** which is provided with a cam follower in the form of a roller **188** which is adapted to engage the cam track **164***a* in the balanced cam **164**. The member **187** is also provided with a guide member **190** which is adapted to be received in a slot **18***c* in the housing **18**. Since the balanced cams **161** and **164** are both driven from the main drive shaft **100**, the suction members **15** and the pusher device **21** will be moved in predetermined timed relation with respect to each other and with respect to rotation of the carton conveyor **23**. By providing balanced cams in the drive mechanisms for members **15** and **21**, it is possible to feed the cartons at high rates of speed, such for example, in the order of 400 to 500 or more cartons per minute.

After the cartons C have been transferred to the carton conveyor **23** and the lower end flaps C_1 have been folded into horizontal position by guides **29**, Fig. 1, the flaps C_1 are adapted to be preheated, preparatory to the application of adhesive of the hot-melt type to the flaps C_1. As may be seen in Figs. 8 and 8A, flaps C_1 are adapted to pass through the preheater **200**, one being disposed on each side of the carton conveyor **23** to receive the corresponding end flaps C_1, Fig. 8A. Each of the preheater devices **200** comprises a U-shaped electrical radiant heating element **201** which is supported in a horizontal position, lengthwise of the conveyor and beneath the carton flaps C_1. The carton flaps C_1 are adapted to be held in horizontal position by means of guide rods **202** which extend lengthwise of the conveyor and above the heating elements **201**. To concentrate the heat on the carton flaps C_1, there is provided a curved reflector **203** which is disposed beneath the heaters **201** and is supported by a housing **204**. The reflector **203** is curved, as shown in Fig. 8A, to redirect the radiant energy from the heater elements **201** and concentrate it on the lower surface of the end flaps C_1. There is also provided an upper reflector plate **205** which is disposed above the carton flaps C_1 and cooperates with the lower reflector **203** and heating elements **201** to form a heating zone for the carton flaps C_1. By preheating the flaps of the cartons, the adhesive to be applied thereto is enabled to penetrate the surface of the flaps more readily due to opening of the pores in the board. After the flaps C_1 have passed through the preheating zone, they are adapted to be adhesively coated by the glue-applying roller **32**. The adhesive is of the hot-melt type and is fed from a storage tank ST, Figs. 1 and 2, by way of a pipe **210** to a position A, Fig. 8, between the doctor roll **212** and the adhesive transfer roll **32**. The surplus adhesive which passes through the rolls **212** and **32** is permitted to drain into a trough **214**, Figs. 1 and 2, from which it is returned to the storage tank ST and recirculated through the adhesive-applying system. The adhesive transfer roll **32** is adapted to be driven from a motor **215**, Fig. 1. The motor **215** is adapted to rotate the roll **32** at slow speed after the carton conveyor **23** has stopped. This prevents the adhesive from "setting-up" during temporary shut-down periods of the system and maintains the roll at uniform temperature. When the conveyor **23** is running, the roll **32** is adapted to be driven from the main drive motor **25** by way of over-running clutches.

As may be seen in Fig. 8, the adhesive-applying roll **32** is heated internally. The roll **32** is a hollow tubular member having disposed therein a stationary heating unit comprising a supporting web having a central tubular section **217** from which extend a plurality of arms **218**. At the outer ends of the arms **218**, there are disposed insulating members **219** which are adapted to support a plurality of heating elements **220**. The heating elements **220** extend around the inner surface of the roller **32** and throughout its entire length to provide a uniform temperature. The roll **32** is adapted to rotate about its journals **32***a*, Fig. 8, while the heating unit within the roll **32** remains stationary, as does the shaft extension **217**. A source of electrical power is supplied to the heating elements **220** by way of conductors passing through the shaft extension **217**.

From the foregoing description, it will be seen that the preheaters for the flaps C_1 of the cartons are particularly advantageous since they permit the adhesive to penetrate the flaps in a minimum amount of time and also prevent the flaps from chilling the adhesive when they are brought in contact with the adhesive-applying roll **32**. This enables the carton conveyor to operate at a high rate of speed and, at the same time, provides for a good seal of the carton flaps.

After the flaps C_1 at the bottom of the cartons have been coated with adhesive, they are folded inwardly, as shown in Fig. 8, by guides **33**, and thereafter maintained in folded position while the adhesive sets by the endless belt **35**, Fig. 1. The cartons are then moved to the filling zone F of the machine where they are filled, after which the short upper end flaps C_4 are folded inwardly and the long upper end flaps C_5 are folded outwardly into a horizontal plane. The flaps C_5 are adapted to pass through a heating zone similar in construction to the one previously described for flaps C_1. After the flaps C_5 have been preheated, they are adapted to be coated with adhesive by an adhesive-applying device **52**, Fig. 2, which includes a heated roller similar to roll **32** described above in detail in connection with Fig. 8. If it is desired to apply the adhesive to the end flaps of the cartons C in a predetermined pattern, the glue-applying roll **32** may be provided with an exterior construction, as described in copending application Serial No. 366,452, filed July 7, 1953, by Griffin and Killion, now U.S. Patent No. 2,873,717.

After the end flaps at the top and bottom of the cartons have been sealed, the cartons are turned through an angle of 90° so that they will proceed through the remainder of the system in broadside position. This minimizes the length of the drying conveyor required and positions the cartons which include Van Buren ears C_6, C_7 so that the adhesive on these ears may be reactivated and the ears turned down and sealed against the sides of the cartons as now to be described.

Since the cartons are traveling at a very high rate of speed through the system, it is important that they be positively controlled during their rotation to the broadside position. As may be seen in Figs. 9 and 10, the transfer station T of the machine includes a 6-pronged star wheel **225** comprising a pair of spaced plate members, Fig. 10, secured to a shaft **226** which is adapted for rotation in a bearing member **227**. The star wheel **225** is driven in timed relation with the carton conveyor **23** by means of the sprocket wheel **230** which rotates with the drum **24** and the sprocket chain **231** which connects the sprocket wheel **230** with a sprocket **233** which is secured to the shaft **226** of the star wheel **225**. As may be seen in Fig. 9, the cartons C are engaged by one of the spokes of the star wheel **225** before they leave contact with the block **22** which forms one side of the pocket on the conveyor belt **23**. It will be noted in Fig. 9 that the cartons advance in straight-line position until they are beyond the influence of the carton conveyor blocks **22** at which time one of the fingers on the star wheel **225** engages the rear inner corner of each carton and causes the cartons to be rotated in a clockwise direction until each reaches its broadside position, which is a position rotated 90° from the positions of the cartons on the conveyor **23**.

To assist the star wheel **225** in turning a carton C, there is provided a bottom supporting plate **240** having an upper anti-friction surface, such for example, as "Teflon," or equivalent, which is adapted to engage the bottom of the carton C. "Teflon" is a trademark which identifies a polymer of tetrafluoroethylene, one of the fluorocarbon resins. In addition to the bottom plate **240**, the turning zone includes a side plate or guide **243** which is curved

and is also provided with an inner surface of Teflon indicated by reference character **244**, Fig. 9. The tops of cartons C are adapted to be engaged by a top plate **245** which also is lined with Teflon at **246**. The top plate **245** is provided with a handle **247** and is hinged at **248** to permit removal of the cartons from the turn-around station. The effect of the pressure of the top plate **245** on the carton C is important in regard to the action of the star wheel **225**. If the pressure of the top plate **246** is too great, the star wheel **225** will cut into the carton C as it advances them, thus damaging the cartons. If the pressure of the top plate is too light, the cartons will tilt during advancement and jam the star wheel **225**. Thus, in order to control the pressure of the top plate **246** on the cartons C, there is provided an adjustment screw **250**, Figs. 9 and 11, which extend through the top plate **246**, and is adapted to engage a projection **251** extending from a support **253** alongside the path of the cartons.

The cartons are adapted to be stripped from the star wheel **225** by means of guide structure **254** which is provided with a Teflon face **255**, Fig. 11. Similar guide structure **256** is provided for engaging the opposite sides of the carton C. The guide structure **256** is also faced with Teflon **257**, Fig. 11. To adapt the turn-around station to handle cartons of various sizes, it will be noted in Fig. 11 that the top plate **245** is adjustable vertically by means of bolts **260** which extend through slots in vertical supports **161**. Member **251** is likewise adjustable vertically by means of a bolt **262** which extends through a slot in vertical member **252**. The bottom plate **240** is carried by a support **265**, the latter being secured by bolts **266** which extend through slots in the vertical supports **261**. As may be seen in Fig. 11, the side guides **254** and **256** likewise are adjustable to accommodate cartons of different dimensions. The curved side plate **243** is adjustable by means of the rod **265** which extends through support **266**.

The star wheel **225** is adapted to feed the cartons C through the turn-around station T and to push them beneath the top guides **270** into position between the spaced endless conveyor belts **271** of the reactivating conveyor R. As may be seen in Fig. 12, the cartons C have been turned so that their short dimension is lengthwise of their direction of travel and the Van Buren ears C_6 and C_7 at the top and bottom of the cartons project horizontally outward from the sidewalls of the carton. These ears C_6 and C_7 were coated with adhesive at the previously described adhesive-applying stations since the ears C_6 and C_7 are in effect extensions of the corresponding end flaps C_5 and C_1, respectively. Since the hot-melt adhesive sets rapidly, it is necessary to reactivate the adhesive on the ears C_6 and C_7 before they are sealed to the sidewalls of the cartons C. This is accomplished by means of the electric radiant heater elements **275** which are adapted to be supported adjacent the Van Buren ears C_6 and C_7 on both sides, and at the top and bottom, of the reactivating conveyor R. Each of the radiant heating elements **275** is provided with a reflector **276** which is adapted to direct the heat against the respective ears C_6 and C_7 and additionally to direct the heat against the portions of the sidewalls of the cartons C to which the ears C_6 and C_7 are to be sealed. The preheating of the portions of the sidewalls allows the adhesive to penetrate the board more rapidly, as previously described in connection with the preheating of the end flaps C_1 and C_5. The conveyor belts **271** of the reactivating conveyor preferably are formed from wire mesh, so as to resist the absorption of heat and prevent them from scorching the cartons. The temperature provided by the heater elements **275** is in the order of 1400° F. This temperature is similar to that provided by the heating members **201** for preheating the end flaps C_1 shown in Fig. 8.

The conveyor belts **271** are driven from sprocket chains **280** which connect the sprocket wheels **281** on pulleys **282** of the reactivating conveyor R with the sprocket wheels **284** carried by the shafts **285** on the drying conveyor at the drying station D, Fig. 12. The drying conveyor is driven from a chain **290**, Fig. 1, which is connected to an adjustable feed drive unit **291** of conventional type. By adjusting the wheel **292**, the speed of the belts **294** which comprise the drying conveyor may be adjusted in predetermined relation with respect to the speed of the carton conveyor **23**.

Each of the drying conveyor belts **294** is formed by a pair of spaced chains **295** which are adapted to pass over pairs of sprocket wheels **296** carried by the shaft **285**, Fig. 12. The surfaces of the conveyor belts **294** are formed by a plurality of flights constructed from narrow metal plates **298**. The sides of the links of the chains **295** are provided with L-shaped brackets or lugs **300**, as shown in Fig. 13, and the flight plates **298** are adapted to be screwed to the brackets, as by screws **301**. In order that the flight plates **298** of the drying conveyor belt **294** will apply the proper pressure to the top and bottom ends of the cartons C, the chains **295** are supported by rods **305** which extend lengthwise of the conveyor and are adjustable vertically on the side supports or channels **306**. The rods **305** are carried by L-shaped brackets **307** which in turn are secured by bolts **308** which extend through vertical slots in supports **306**.

The preferred embodiment for the drying conveyor belt is shown in Fig. 12 and includes the flat metal plates or flights which are attached to the L-shaped brackets **300** carried by the chains **295**. These belts are not subject to the disadvantage of fabric or rubber belts. At high speeds, the fabric or rubber belts cause the cartons to tilt during passage therebetween since the thickness of the belt material varies, and thus it is impossible to maintain a uniform spacing between the belts. The chain belts with the metal plates are of accurate dimension, and thus a uniform spacing can be maintained between the two belts **294** and a uniform controlled pressure applied to the end flaps of the cartons. The cartons C will not tilt on the belts **294**, and thus there is averted any pile-up or damage to the cartons when they pass through the drying conveyor D.

As may be seen in Fig. 12, when the cartons C leave the reactivating conveyor R, the Van Buren ears C_6 and C_7 will be engaged by the guides **310** and **311**, respectively, which press the ears C_6 and C_7 against the preheated sides of the cartons C. As the cartons pass through the drying conveyor, the Van Buren ears C_6 and C_7 are held against the sidewalls of the cartons C by means of pressure-applying devices illustrated in the form of brushes **315**. The brushes **315** are made up of nylon bristles and extend lengthwise of the conveyor and on both sides with one pair disposed at the top and one pair near the bottom of the carton to engage the Van Buren ears C_6 and C_7 at both ends of the cartons. The brushes **315** provide a uinform pressure against the Van Buren ears and thus permit the ears to be sealed tightly against the sides of the cartons C. It is important that the pressure be maintained uniform, since if the pressure varies, the ears are permitted to "breathe," i.e., the ears, instead of being tightly held against the sides of the cartons, will be permitted to move away from it. This is undesirable, since the ears should be held against the sides of the carton sufficiently long to permit the adhesive to bite into the cardboard and thus obtain an initial set. Once the ears have started to "breathe," the adhesive will not set up and the carton ears will be loose. The foregoing action is also true with respect to the end flaps of the cartons, and this is other reason why the chains **295** with the metal plates **298** are preferable over fabric or rubber type belts.

With the hot-melt adhesives, it is necessary to chill the adhesive on the sealed flaps as rapidly as possible in order to cause it to set in the minimum amount of time. To accomplish this, the drying conveyor D is preferably enclosed within a housing **330**, the ends of which are pro-

vided with openings of sufficient area to permit the entry and discharge of the cartons C. The walls of the housing 330 preferably are insulated with heat insulation, such for example, as glass wool. At the top of the housing 330, there is positioned an air-conditioning unit 331 which is connected to the housing 330 by way of a delivery duct 334 and a return duct 335. The air-conditioning unit 331 may be of any conventional type, such for example, as air-cooled or water-cooled, and should have sufficient capacity for controlling the temperature of the air within the drying conveyor D within predetermined limits. With adhesives of the hot-melt type, satisfactory results have been obtained by controlling the temperature of the air within the housing 330 to a temperature of approximately 35° F. This temperature chills the adhesive, allowing it to set up rapidly and form a good seal on the flaps and ears of the cartons, but at the same time the temperature is above freezing so as not to form frost on the metal conveyor belts. The flights 298 preferably are formed from a good heat conducting metal, such for example, as aluminum, which will rapidly conduct the heat away from the sealed flaps of the cartons as the cartons move through the conveyor housing 330 and when the flights 298 move out of contact with the cartons at the discharge end of the housing 330, the cold air passing through duct 334 will rapidly chill the flight plates 298 as they return to the opposite end of the conveyor preparatory to engaging another carton and moving with it through the housing 330. Since the Van Buren ears have been reheated for reactivation of the adhesive just prior to entry into the drying conveyor, additional cooling medium may be directed against these ears by means of a pipe 340 having a plurality of openings lengthwise thereof which are adapted to direct an air blast against the bristles of the respective brushes 315. The air which is passed through the pipe 340 preferably is cooled and derived from the air-conditioning unit 331.

While the modification shown in Fig. 12 employing brushes 315 for providing the uniform pressure against the Van Buren ears is preferred, other satisfactory modifications are shown in Figs. 13, 13A and 14. In Figs. 13 and 13A, the flight plates 298 have been raised above the L-shaped lugs 300 and a compression spring member 350 has been inserted between the flight plate 298 and the L-shaped lugs 300 carried by the chains 295.

As may be seen in Fig. 13A, each of the compression spring members 350 includes circular spring elements 350*a* disposed at opposite ends of member 350 and adapted to engage the respective Van Buren ears C_7 at the opposite sides of the cartons. While only the bottom conveyor belt is shown in Figs. 13 and 13A, it will of course be understood that both the upper and lower conveyor belts will be provided with the compression spring members 350. When the compression members 350 pass around the sprocket wheels, the circular elements 350*a* are caused to spread outwardly by a carton C entering therebetween. Once the members 350 are again in the straight-line path at the top or bottom of the conveyor belts, they again force the circular elements 350*a* tightly toward each other and thus hold the Van Buren ears tightly against the sides of the cartons.

Another modification in which the pressure-applying means for the Van Buren ears is carried by the drying conveyor belts is shown in Fig. 14. In this modification, the flight plates have been removed from the L-shaped brackets 300 supported by the chains 295 and in their place, there is provided a spring-clamping device 360. The side members 360*a* of the clamping device 360 are biased toward each other, and are adapted to hold the Van Buren ears C_7 against the sides of the carton C. A stop 361 is adapted to prevent the clamping elements 360*a* from being forced too closely together, to prevent a carton from being placed therebetween. The guide rods 305 are adapted to be moved away from each other on the horizontal arms of the supports 307 at each end of the conveyor in order to spread the clamping elements 360*a* so that the cartons may enter and be discharged from the conveyor D.

While the drying conveyor D has been described in connection with the use of hot-melt adhesives on the flaps of the cartons and thus the air-conditioning unit 331 adapted to supply cold air for cooling the adhesive, it is to be understood that the drying conveyor may also be used in connection with the cold type or water-soluble adhesives. In such applications, the air-conditioning unit 331 is used to supply warm air for drying the water-soluble adhesive.

While the invention has been described in connection with cartons of the type having Van Buren ears, it is, of course, understood that certain of the features of this invention are also applicable to feeding and sealing cartons of other types at high speed. It is to be understood the invention is not limited to the specific arrangements shown and that changes and modifications may be made in the scope of the appended claims.

What is claimed is:

1. A system for feeding folded cartons at high speed from a stack in the flat to a carton conveyor comprising a main drive shaft, a pair of balanced cams continuously driven by said main drive shaft, each of said balanced cams having a cam track, a pair of reciprocable rods each having cam followers adapted for cooperation with said tracks in the respective ones of said cams, a suction device carried by one of said rods, a pusher device carried by the other one of said rods, said suction device and said pusher device being adapted for engagement with the front carton of the carton stack and operable in timed relation to remove successive cartons from the stack and transfer them into opened position on the carton conveyor.

2. A system according to claim 1 including valve means for cutting off the suction to said suction device while permitting continued actuation of said suction device into engagement with the cartons in the stack so as to render said suction device ineffective for removal of cartons from the stack.

3. A method of sealing cartons of the type having end flaps and ears comprising the steps of moving cartons along a predetermined path with the flaps and ears thereof in extended horizontal position, heating the flaps and ears while in said horizontal position without interrupting the movement of the cartons so as to raise the temperature of the flaps and ears above ambient and render the surface of the flaps and ears more receptive to adhesive, immediately thereafter applying adhesive to the preheated surfaces of the flaps and ears, folding the flaps against the ends of the cartons to close the cartons, reheating the adhesive coated ears to reactivate the adhesive thereon, and thereafter folding the ears and sealing them against the sides of the cartons.

4. A system for feeding and sealing cartons comprising a carton conveyor for supporting cartons and moving them along a predetermined path with their end flaps in extended position, means for moving the end flaps of the carton into a horizontal position, means for heating the surfaces of the end flaps while maintained in said horizontal position, a heated roller adapted for engagement with said heated end flaps for applying adhesive thereto, said heated roller comprising a tubular member forming the outer surface of said roller, and electrical heating structure disposed within said tubular member, said tubular member being adapted for rotation without rotating said electrical heating structure.

5. A system for feeding and sealing cartons of the type including end flaps and ears comprising a carton conveyor adapted to convey cartons along a predetermined path, means for preheating the end flaps of the cartons to raise the temperature thereof above ambient, means for applying adhesive to the end flaps and ears while at the raised temperature, means for folding the end flaps

into sealing engagement at the ends of the cartons while leaving the ears in extended position, and means for reheating the ears to reactivate the adhesive thereon and thereafter fold them into engagement with the sides of the cartons.

6. A method of sealing cartons of the type having end flaps and ears which comprises moving the cartons along a predetermined path with their narrower sides presented respectively to like sides of the preceding and following cartons and performing, during movement of each of the cartons all of the steps of applying adhesive to the flaps and ears thereof, folding the flaps into adhesive attachment with one another to close the ends of the carton while leaving the ears on the flaps in extended position, applying pressure to the ends of the carton, turning the carton broadside to the preceding carton, reactivating the adhesive on the ears, folding the ears into adhesive attachment with the sides of the cartons, and thereafter concurrently applying pressure to the flaps at the ends of the cartons and to the ears at the sides of the cartons while continuing to move the cartons along said predetermined path.

7. A system for feeding and sealing the cartons comprising a conveyor for moving cartons in predetermined spaced relation to each other, and rotatable means for turning said cartons to an angle of 90° for continued movement through said system, said turning means comprising wheel structure having a plurality of spaced projections rotated in timed relation to the movement of said conveyor, each of said projections being adapted to engage a carton and initiate the turning thereof while the carton is still under the influence of said carton conveyor so as to maintain the predetermined spacing between the cartons while they are turned through the angle of 90°.

8. In a system for feeding and sealing cartons, means for turning the cartons through an angle of 90° comprising rotating structure having a pair of spaced plates, each of said plates having a plurality of arms, one arm on each of said plates cooperating to engage the side walls of a carton, a support for the bottom of the cartons along the side of said rotating structure, guide means carried by said support and adapted to engage the side and top of said cartons in cooperation with said rotating structure in turning the cartons through the angle of 90°.

9. Apparatus according to claim 8 wherein said support and said guide structure is provided with an antifriction surface for engaging the carton.

10. Apparatus according to claim 9 wherein said antifriction surface is formed from a fluorocarbon resin.

11. Apparatus according to claim 8 wherein said guide structure for engaging the top of the cartons comprises a hinged cover member, and means for adjusting the pressure of said cover member against the top of the cartons for controlling the pressure of said arms of said rotatable member on the side walls of the carton during rotation of the carton through the angle of 90°.

12. A system for feeding and filling cartons of the type including end flaps and ears comprising a carton conveyor adapted to convey cartons along a predetermined path, means for applying adhesive to the end flaps and ears of the cartons while on said carton conveyor, means for folding the end flaps into engagement at the ends of the cartons while leaving the ears in extended position, means for rotating said cartons from an angle of 90° and moving said cartons between a pair of spaced endless belts engaging the ends of the cartons, means for heating the ears of the cartons to reactivate the adhesive thereon, means for thereafter folding the ears against the sides of the carton, and conveyor means for applying pressure to the end flaps of the carton and to the ears of the carton while directing a drying medium against the surface of the carton to dry the adhesive on the flaps and ears and seal the carton.

13. In a system for sealing cartons having end flaps and ears, a reactivating conveyor for reactivating the unsealed ears on the closed end flaps of cartons comprising a pair of spaced endless belts adapted to engage the closed end flaps of the cartons while permitting the ears to extend therefrom, heater means arranged along the sides of the endless belts and adjacent the ears of the cartons for heating the ears to reactivate the adhesive thereon, and means for folding the heated ears against the sides of the cartons.

14. A reactivating conveyor according to claim 13 wherein said endless belts have a construction for resisting the absorption of heat from said heater means so as to prevent scorching of said cartons.

15. A reactivating conveyor according to claim 13 wherein said heater means comprises electrical radiant heaters extending lengthwise of said belts, and reflector means cooperating with said heaters concurrently to reactivate the adhesive on the ears and preheat the adjacent surface areas of the sides of the cartons against which the ears are adapted to be folded.

16. A system for feeding and sealing cartons comprising a carton conveyor for supporting cartons and moving them along a predetermined path with their flaps in extended position, a heated roller for applying adhesive to the end flaps of the cartons while moved along by said conveyor, and means for driving said heated roller independly of movement of said conveyor so as to maintain the roll at uniform temperature and prevent the adhesive from "setting-up" during temporary shutdown periods of said system.

17. A system according to claim 16 wherein said heated roller comprises a hollow tubular member, and a plurality of electrical heating elements extending around the inner surface of said tubular member and throughout its length to uniformly heat the exterior adhesive-applying surface of said tubular member.

18. In a system for feeding cartons, the improvement comprising a carton magazine, cyclically movable means for supporting a stack of folded cartons in the flat on their edge in said magazine, said cyclically movable means including at least one drive chain extending the length of said magazine, guide structure extending along the side of said magazine, trolley structure movable along said guide structure, a pusher device pivoted to said trolley structure and movable into and out of locking engagement with said drive chain of said cyclically movable means, said pusher device cooperating with said drive chain for applying pressure to the rear end of the stack of folded cartons to cyclically advance the stack along said carton magazine and said pusher being movable out of engagement with said drive chain to add cartons to the stack in said magazine.

19. In a system for sealing cartons, the improvement of a drying conveyor for closed cartons comprising a pair of endless belts adapted to receive cartons therebetween and transport them through a drying zone, an insulated housing surrounding said drying zone, means for controlling the pressure of said belts on the ends of the cartons to hold the flaps in sealing engagement, means for directing a drying fluid of predetermined temperature into said drying zone for controlling the temperature of the cartons as they pass through said drying zone, and means for controlling the temperature of said drying fluid.

20. A drying conveyor according to claim 19 wherein said belts comprise spaced endless chains, and a plurality of flat metal plates carried by said chains, and said means for controlling the pressure comprises guide structure for said chains extending lengthwise of said conveyor to maintain a uniform spacing between said belts and to receive the cartons.

21. In a system for sealing cartons of the type including flaps and ears, the improvement of a drying conveyor for closed cartons comprising a pair of endless belts adapted to receive cartons therebetween and transport them through a drying zone, means for controlling the pressure of said belts on the ends of the cartons to hold

the flaps in sealing engagement, means within said drying zone for applying a uniform pressure to the carton ears to hold them in sealing engagement with the sides of the carton during transport of the carton through said drying zone, and means for directing a drying fluid of predetermined temperature into said drying zone for controlling the temperature of the cartons as they pass through said drying zone.

22. A drying conveyor according to claim 21 wherein said means for applying pressure to the ears on the cartons comprises brush means having bristles engaging the carton ears.

23. A drying conveyor according to claim 22 including means for directing a blast of drying fluid against said brush means and the carton ears to assist in drying the ears.

24. A drying conveyor according to claim 21 wherein said means for applying pressure to the carton ears comprises spring-biased means carried by said pair of endless belts and engaging the ears to clamp them against the sides of the cartons.

25. A system for feeding and sealing folded cartons at high speed from a stack in the flat, comprising carton conveyor means, means for feeding a stack of flattened cartons to bring the front end of the stack against an abutment adjacent said carton conveyor means preparatory to transfer of a carton thereto, means for transferring the carton at the front end of the stack to said carton conveyor means, pressure means cyclically movable with said carton transfer means for applying a predetermined pressure against the front end of the stack, said last-named means being effective during removal of the cartons from the stack to prevent increase in compression on the cartons in the stack above said predetermined pressure, means to render said cyclically movable means ineffective when said conveyor is moving but cartons are not being removed from the stack so as to maintain constant the then-existing pressure on the cartons in the stack, means for opening the cartons so that their end flaps and ears project therefrom as they are conveyed along a predetermined path and at a predetermined spacing by said conveyor means, means for preheating the end flaps of the cartons to raise the temperature thereof above ambient, means for applying adhesive to the end flaps and ears while at the raised temperature, means for folding the end flaps into sealing engagement at the ends of the carton while leaving the ears in extended position, rotatable means for turning the cartons through an angle of 90° for continued movement through said system with their short dimension lengthwise of said conveyor means to permit reactivation and folding of the ears on the cartons, said rotatable means comprising wheel structure having a plurality of spaced projections rotated in timed relation to the movement of said conveyor means, each of said projections being adapted to engage a carton and initiate the turning thereof while the carton is under the influence of said carton conveyor means so as to maintain the predetermined spacing between the cartons while they are turned through the angle of 90°, means for reheating, the ears to reactivate the adhesive thereon and thereafter fold them into engagement with the sides of the cartons as they continue to be conveyed through said system, brush means disposed along said conveyor means and having bristles engaging the carton ears for applying pressure to the ears on the cartons, and means for directing a blast of drying fluid against said brush means and the carton ears to assist in drying the ears for completion of the sealing of the cartons.

26. A system for feeding folded cartons at high speed from a stack in the flat to a carton conveyor comprising means for feeding a stack of flattened cartons to bring the front end of the stack against an abutment adjacent the carton conveyor preparatory to transfer of a carton thereto, a main drive shaft, an eccentric cam driven continuously from said main drive shaft, a one-cycle clutch for operating said stack-feeding means, and cyclically movable means for applying a predetermined pressure against the front end of the stack effective durinf normal operation of said system to prevent increase in compression on the cartons in the stack above said predetermined pressure, said cyclically movable means for applying a predetermined pressure against the front end of the stack of cartons comprising control means normally adapted to engage the front end of the stack, spring means for biasing said control means against said stack and into engagement with an arm on said one-cycle clutch, said spring means being adapted to apply a predetermined pressure against said stack and adapted to move said arm against the surface of said eccentric cam until the pressure on cartons in said stack exceeds the predetermined pressure of said spring biasing means.

27. A system according to claim 26 including means to render said cyclically movable means ineffective when cartons are not being removed from the stack so as to maintain constant the then existing pressure on the cartons in the stack.

28. A system according to claim 27 wherein said means to render said cyclically movable means ineffective comprises a solenoid including a movable element which is connected to said arm of said one-cycle clutch, said solenoid being selectively energized to hold said arm of said one-cycle clutch out of engagement with the surface of said eccentric cam and thus prevent said one-cycle clutch from further advancing said stack-feeding means to maintain the pressure of the cartons in the stack at the then existing value.

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