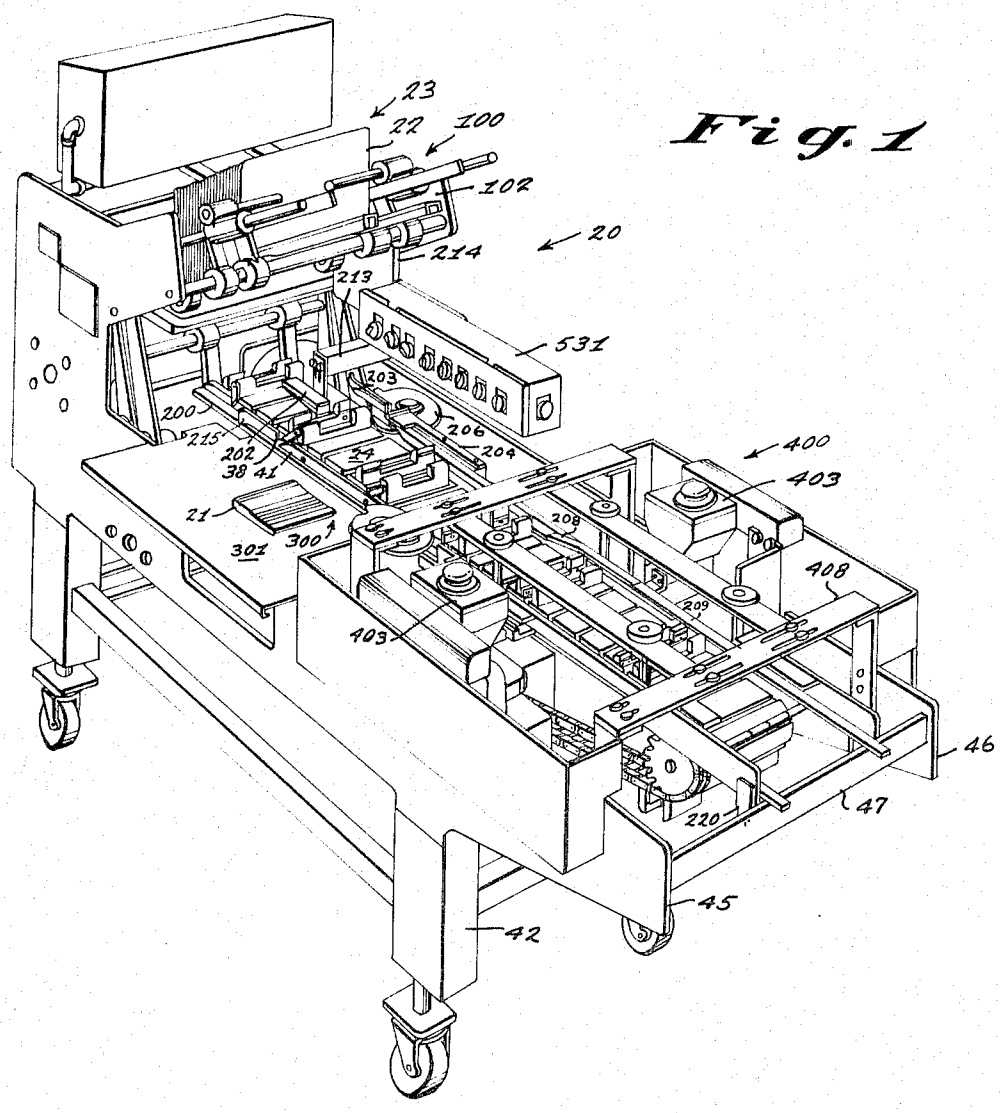
Feb. 7, 1967 G. C. CURRIE 3,302,365

PACKAGING MACHINE AND METHOD

Filed Sept. 23, 1963 10 Sheets-Sheet 1

Fig. 1



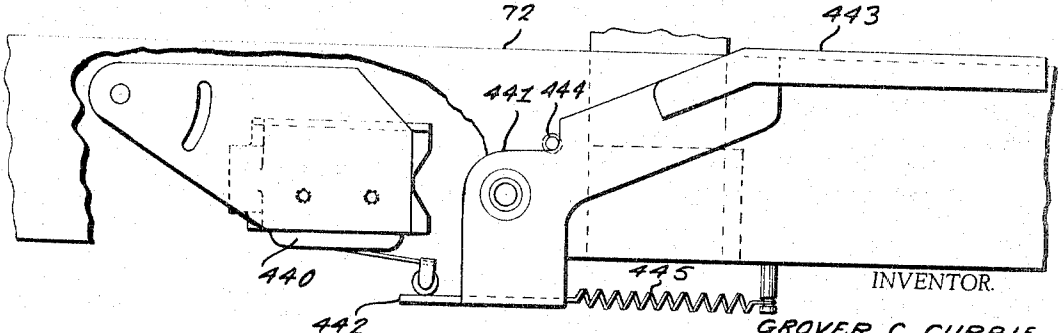


Fig. 6

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PACKAGING MACHINE AND METHOD

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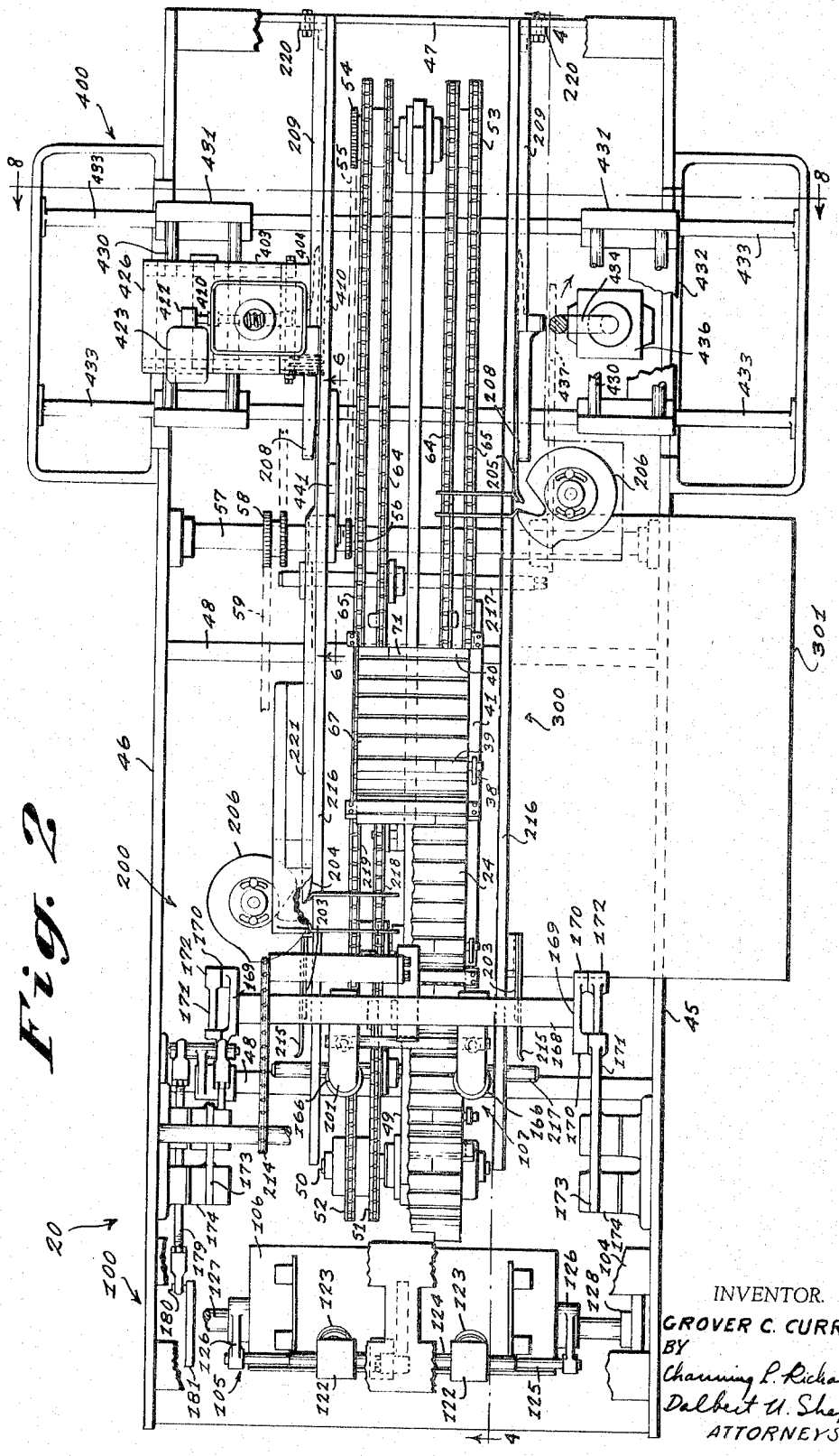


Fig. 2

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PACKAGING MACHINE AND METHOD

Filed Sept. 23, 1963 10 Sheets-Sheet 3

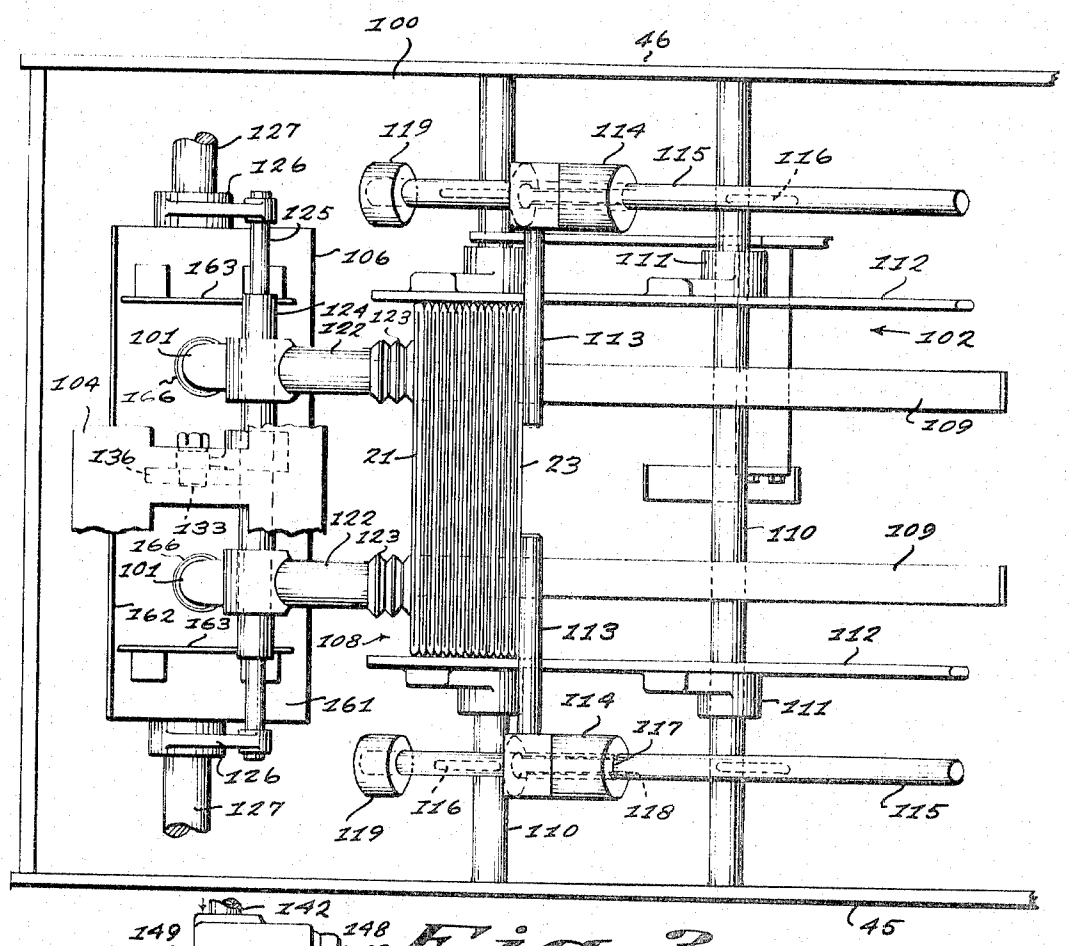


Fig. 3

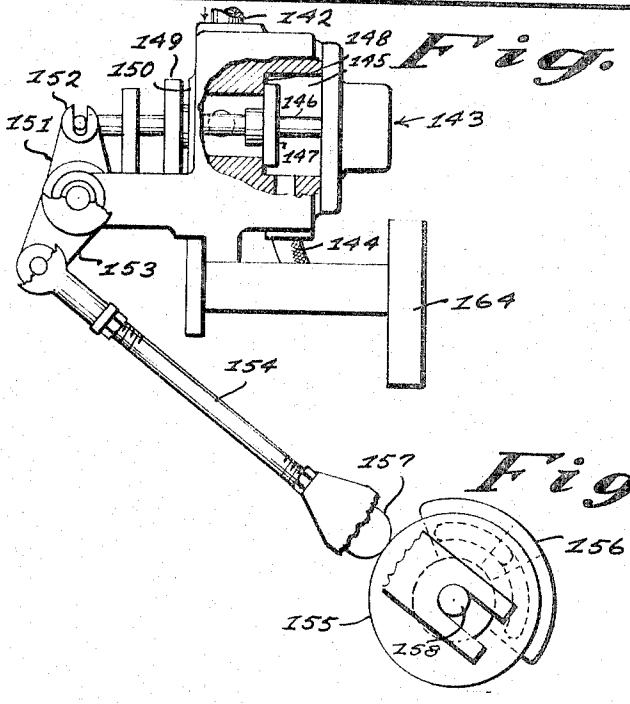


Fig. 5

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PACKAGING MACHINE AND METHOD

Filed Sept. 23, 1963 10 Sheets-Sheet 4

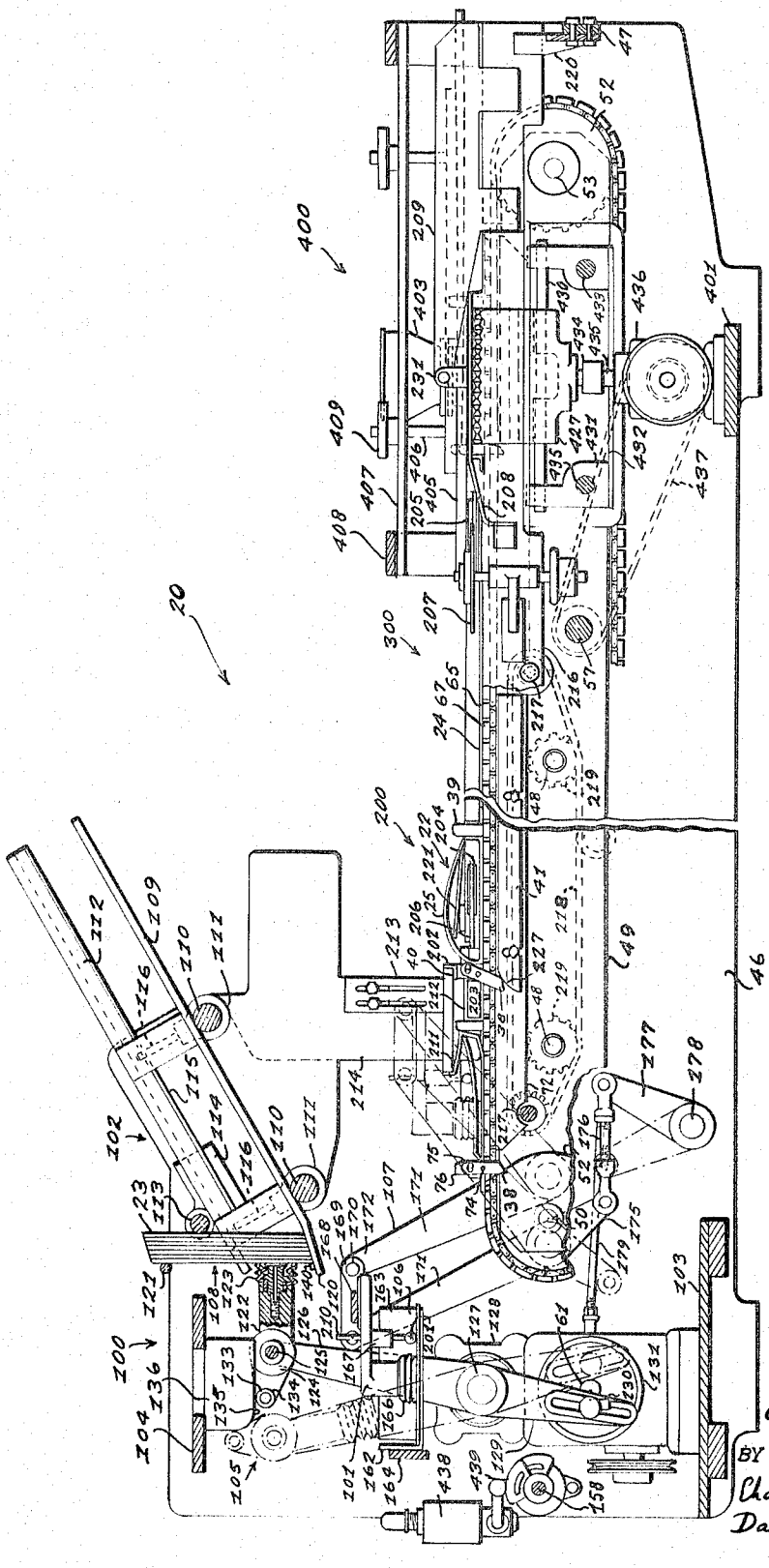


Fig. 1

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PACKAGING MACHINE AND METHOD

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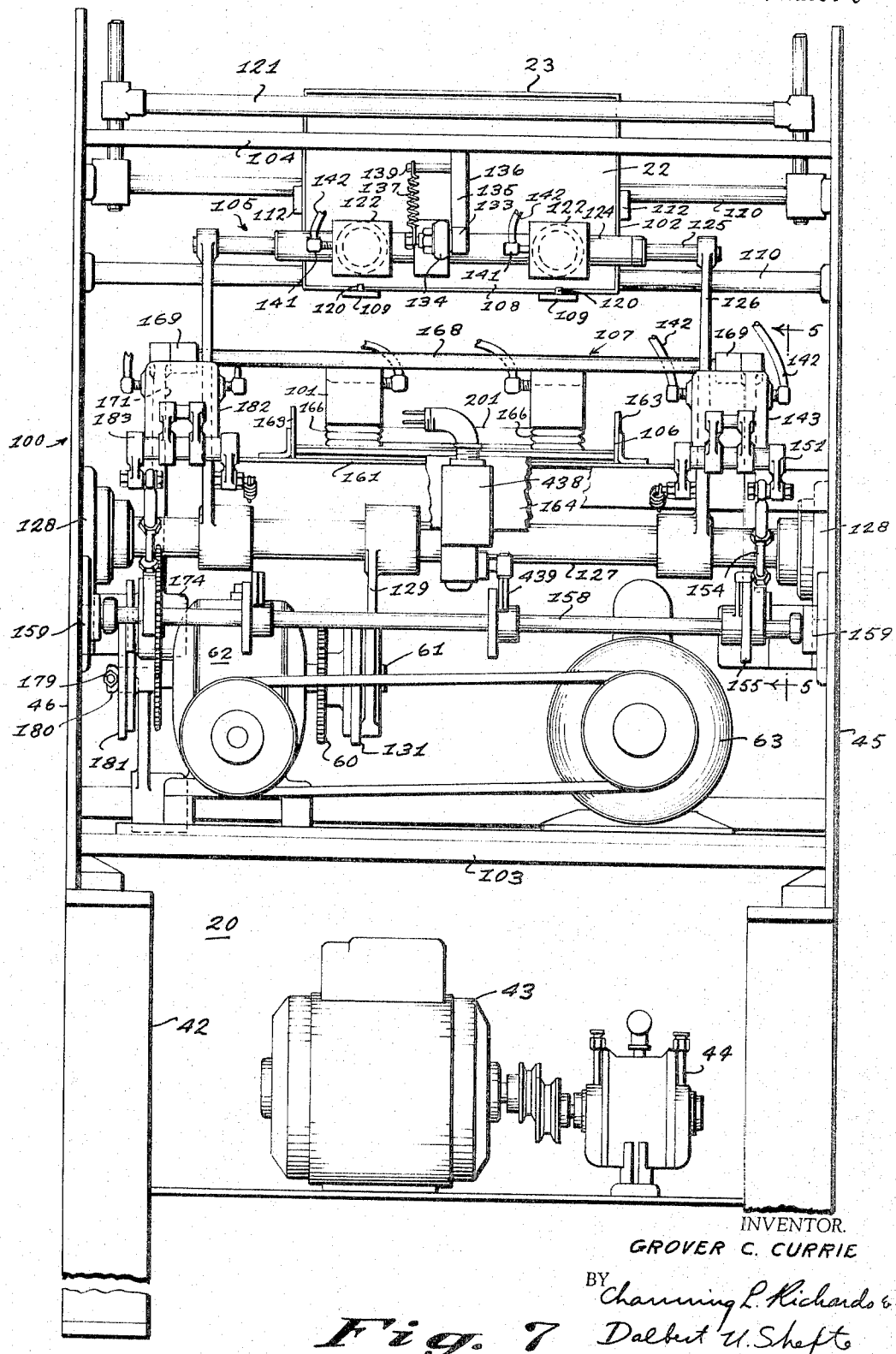


Fig. 7

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Feb. 7, 1967 G. C. CURRIE 3,302,365

PACKAGING MACHINE AND METHOD

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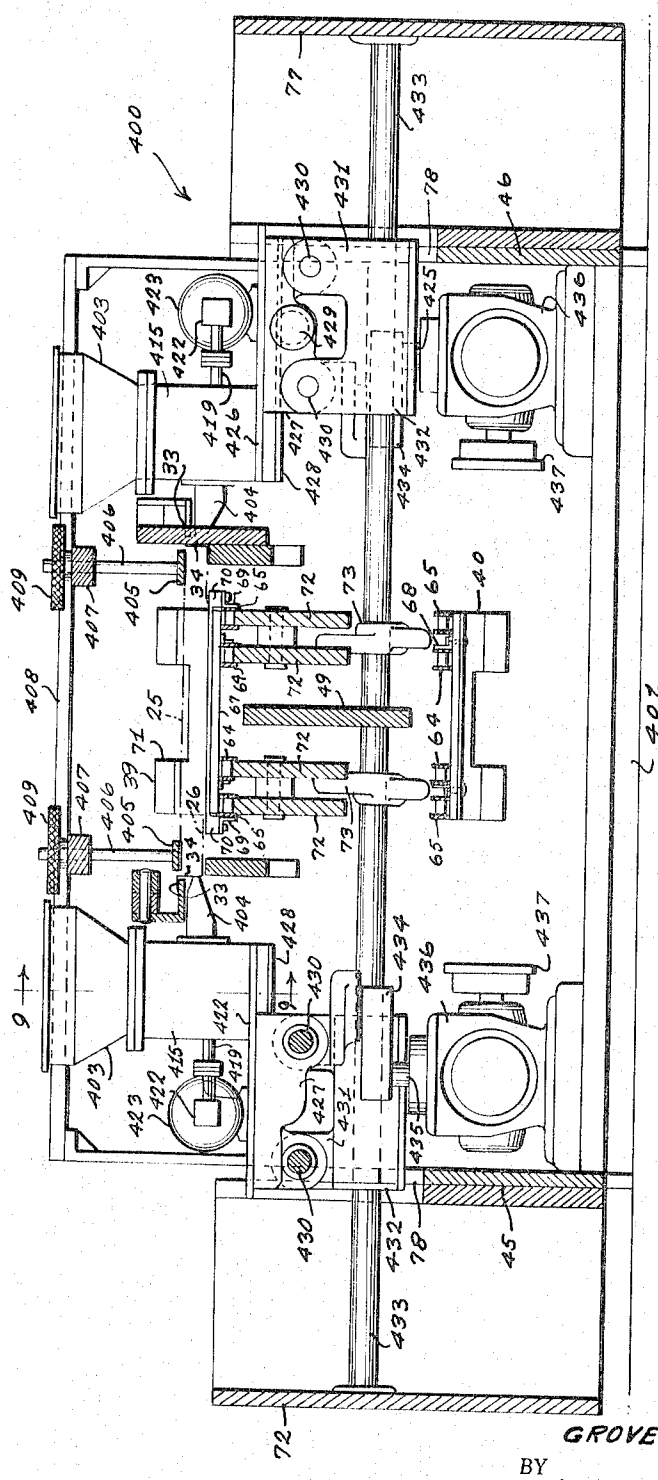


Fig. 8

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PACKAGING MACHINE AND METHOD

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Fig. 9

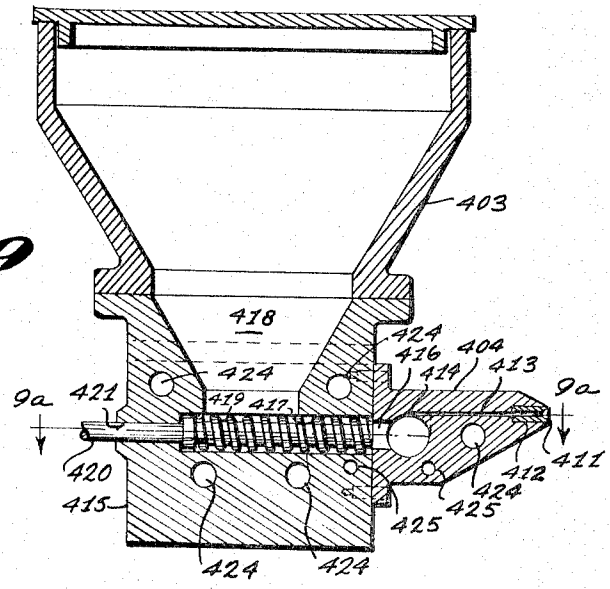
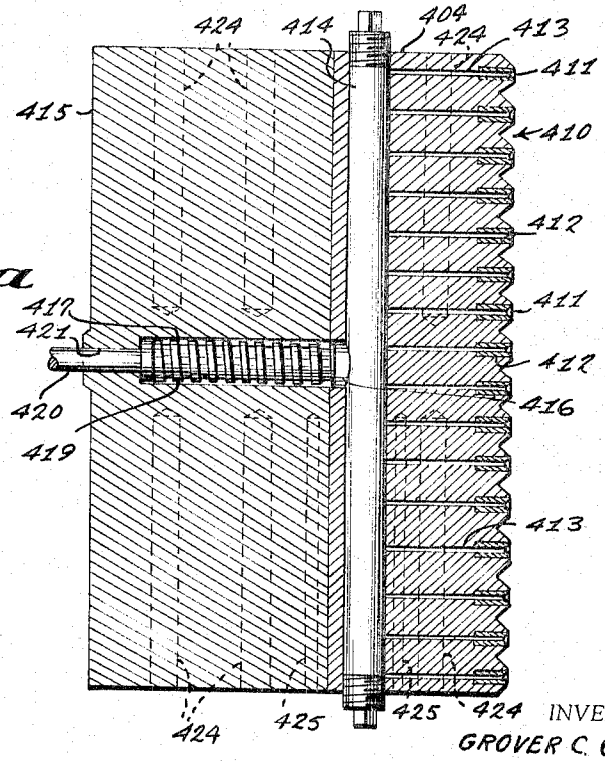


Fig. 9a



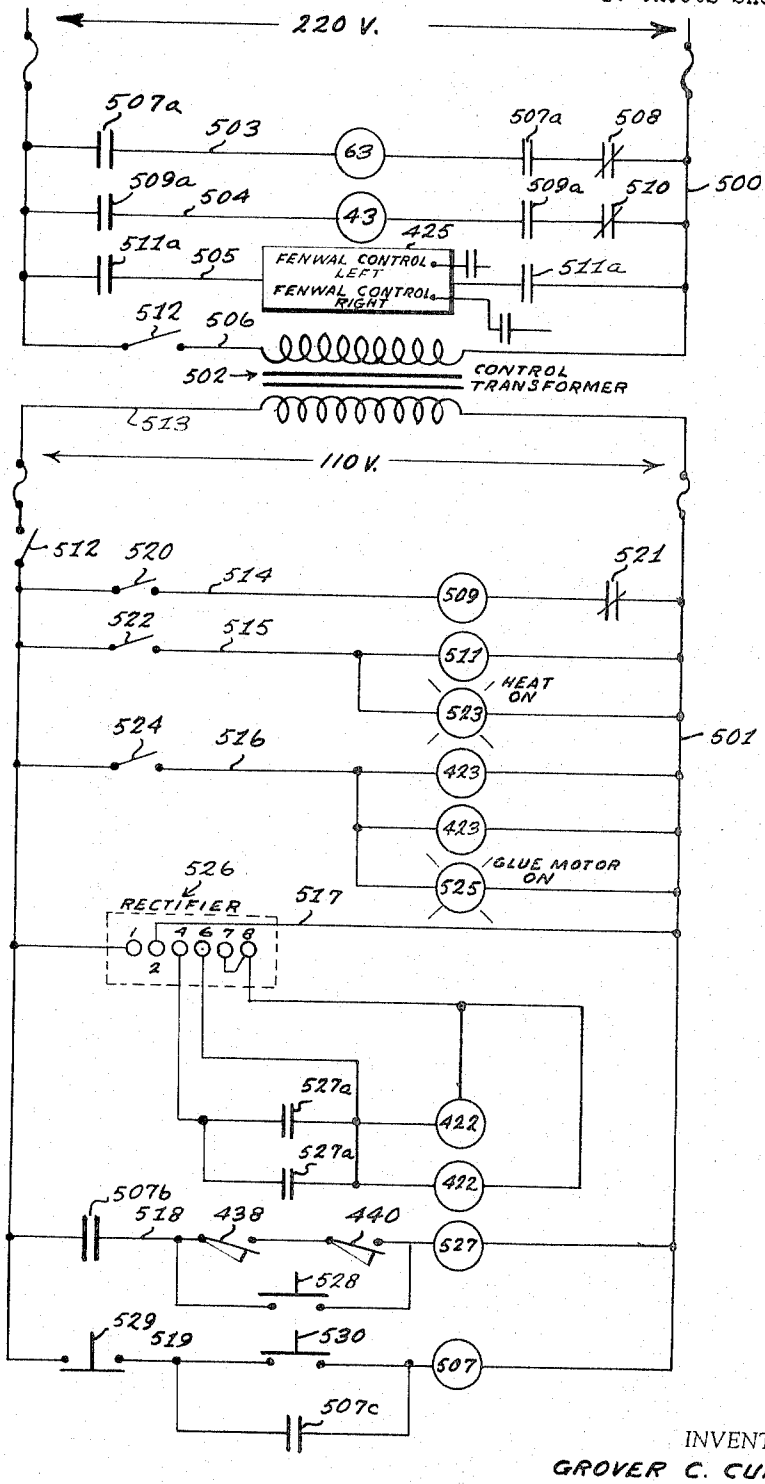
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PACKAGING MACHINE AND METHOD

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Fig. 10

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PACKAGING MACHINE AND METHOD

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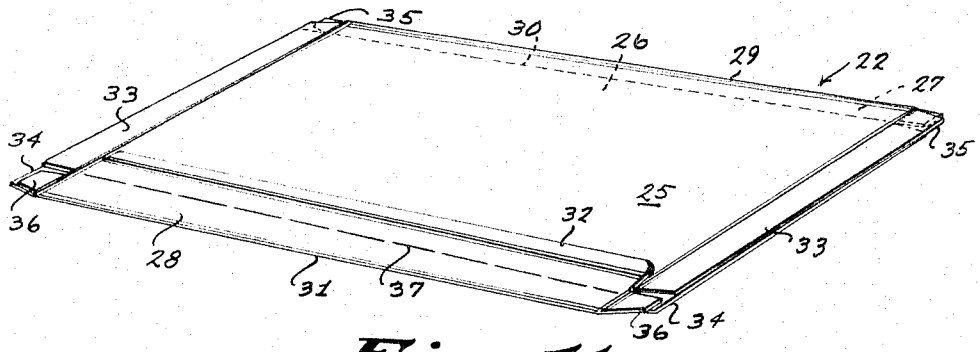


Fig. 11

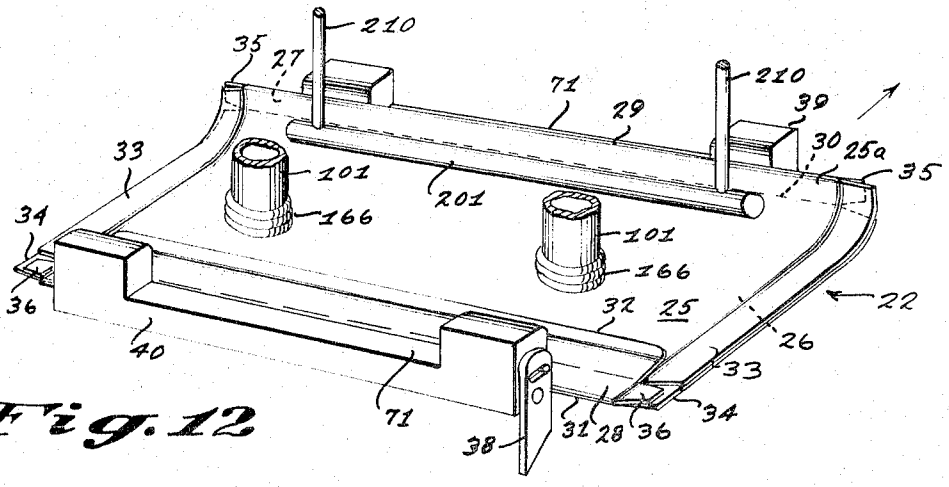


Fig. 12

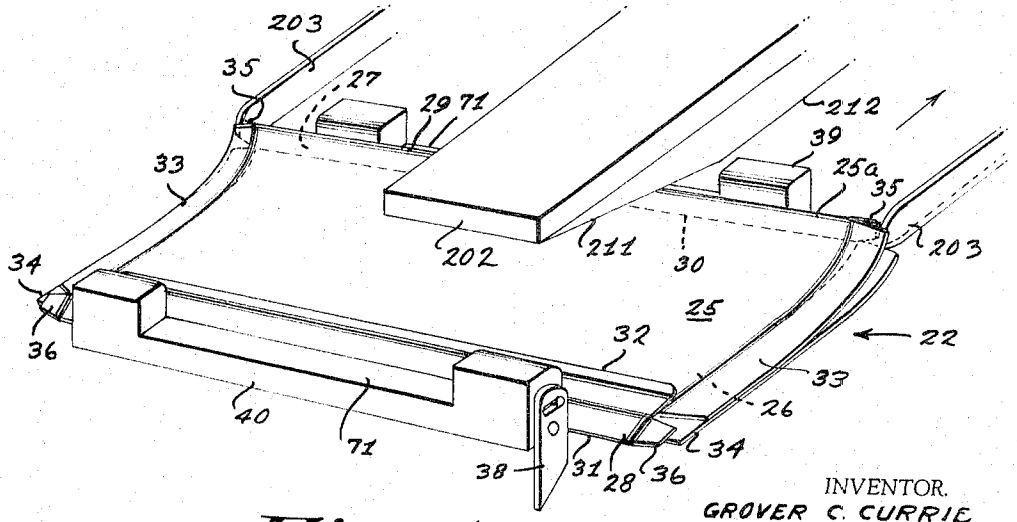


Fig. 13

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Feb. 7, 1967 G. C. CURRIE 3,302,365

PACKAGING MACHINE AND METHOD

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Fig. 14

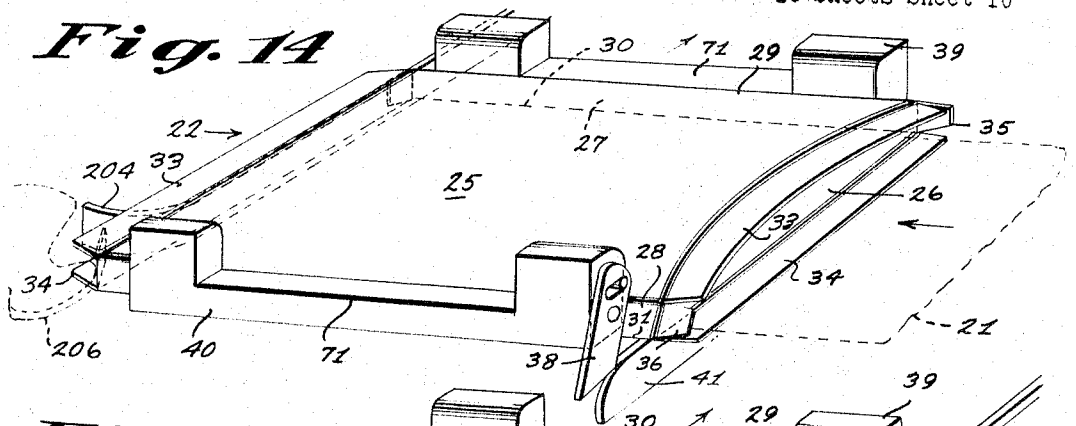


Fig. 15

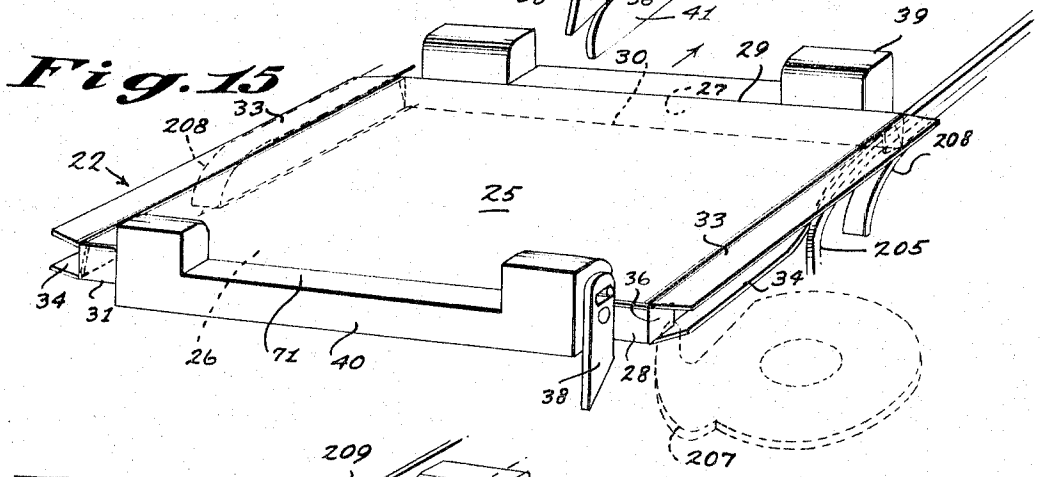


Fig. 16

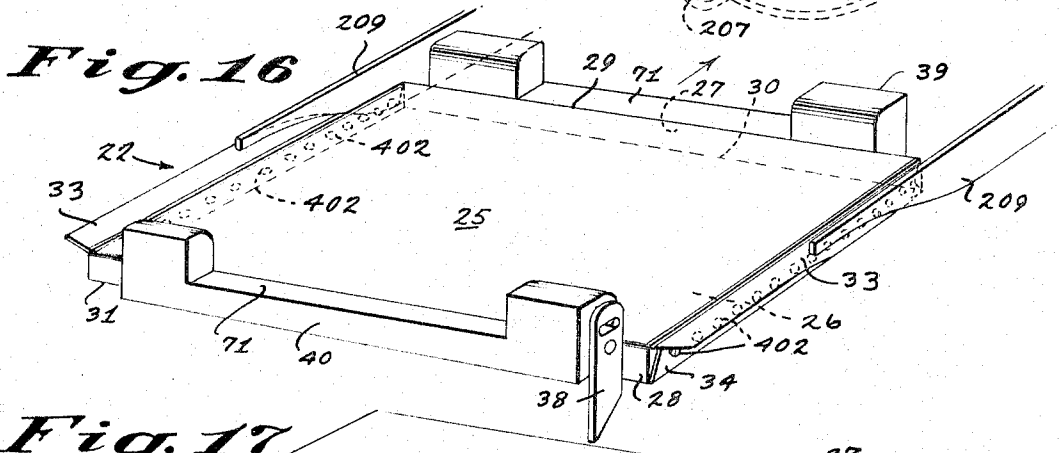
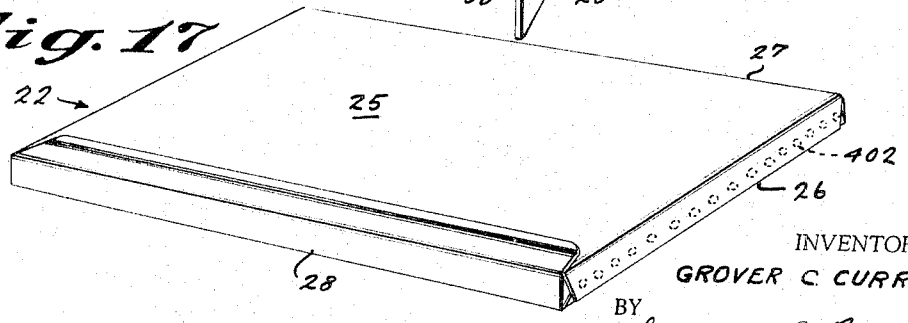


Fig. 17



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United States Patent Office

3,302,365
Patented Feb. 7, 1967

3,302,365

PACKAGING MACHINE AND METHOD

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Filed Sept. 23, 1963, Ser. No. 310,759
42 Claims. (Cl. 53—29)

The present invention relates to a packaging machine and method, and more particularly to a method and means for forming packages from flat carton blanks in a continuous and automatic operation in which the carton blanks are opened, loaded and sealed to form complete packages in a uniquely compact and efficient manner at relatively high speed.

The packaging machine and method of the present invention includes feeding collapsed carton blanks from a supply onto a conveyor; setting-up the carton blanks as they are deposited on the conveyor and bowing the set-up carton blanks slightly to facilitate loading of contents thereinto; and uniquely applying measured amounts of glue to the ends of the loaded cartons for sealing as the cartons move to the discharge end of the conveyor, all of these operations being accomplished in a compact structure and functioning together to provide automatic and continuous packaging.

In the preferred embodiment of the present invention, feeding means transfers collapsed carton blanks from a supply hopper to a moving conveyor by first transferring each carton singly to an intermediate platform and then transferring the carton from the platform to the conveyor as a subsequent carton is being transferred from the hopper to the platform. This arrangement permits high-speed operation while allowing the hopper to be disposed directly above the conveyor in a location convenient to the operator for loading the hopper during operation, and conserves floor space is compared with a machine in which the hopper extends outwardly beyond the conveyor.

The feeding means cooperates with setting-up means to force the collapsed carton blanks between flights on the conveyor in such a manner as to cause a portion of the blank to fold against one of the flights to an upright disposition, following which the setting-up means opens the blank about the upright portion, which becomes a side wall of the set-up carton. This setting-up is accomplished without positively setting-up the opposite side wall to a fully upright disposition so that this opposite side wall tends to incline slightly inward and causes bowing of the top panel of the set-up carton, which bowing facilitates loading of the carton. To accentuate and positively control this bowing, a movable restraining member is disposed for movement against this inclined opposite side wall to retain it in inclined, carton bowing, disposition during loading.

The loaded cartons are sealed by gluing means that measures predetermined amounts of hot-melt glue from a supply and disposes the measured amounts in bead form for application to the ends of the cartons. The gluing means is heated to maintain the disposed amounts of hot-melt glue at a temperature sufficient to render the glue transferable by contact. To apply the glue, the gluing means revolves in timed relation to the advance of cartons on the conveyor to bring the beads of glue into contact with the carton ends and momentarily advances therewith as the beads adhere to the carton and remain thereon as the gluing means retracts.

Thus the gluing means of the present invention provides the proper amount of glue at the proper location and at the proper time, with the bead form providing neat and precise transfer without dripping or waste and the use of hot-melt glue permitting immediate sealing without an extended pressure section being necessary on the machine, which, therefore, can be compactly arranged to discharge the sealed cartons upon final folding after gluing.

The various features and advantages of the present invention are disclosed herein in detail in relation to the preferred embodiment described below and illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of a packaging machine according to the preferred embodiment of the present invention;

FIG. 2 is a plan view of the packaging machine of FIG. 1 with the supply hopper and other superstructure removed;

FIG. 3 is an enlarged plan view of the left portion of FIG. 2 with the supply hopper in place;

FIG. 4 is a front elevational view, partially in section, of the packaging machine of FIG. 1;

FIG. 5 is an enlarged elevational view, partially in section, of vacuum control means of the packaging machine of FIG. 1, taken along line **5**—**5** of FIG. 7;

FIG. 6 is an enlarged vertical sectional view of the glue applicator control switch of the packaging machine of FIG. 1, taken along line **6**—**6** of FIG. 2;

FIG. 7 is a left end elevational view of the packaging machine of FIG. 1;

FIG. 8 is a vertical sectional view taken along line **8**—**8** of FIG. 2;

FIG. 9 is an enlarged vertical sectional view of a glue applicator of the packaging machine of FIG. 1, taken along line **9**—**9** of FIG. 8;

FIG. 9*a* is a horizontal sectional view taken along line **9***a*—**9***a* of FIG. 9;

FIG. 10 is a schematic wiring diagram of the electrical system of the packaging machine of FIG. 1; and

FIGS. 11–17 are perspective views showing the progressive stages of a carton blank being set-up, loaded and sealed to form a package according to the method of the present invention and as the carton blank progresses through the packaging machine of FIG. 1.

As illustrated in the drawings, the preferred embodiment of the present invention is incorporated in a machine **20** for packaging articles **21**, such as trays of sliced bacon, in sleeve-type cartons **24**. The machine operates automatically to continuously advance carton blanks from a feeding station **100** through a setting-up station **200**, a loading station **300**, and a gluing station **400**, with the machine discharging completed packages ready for storage or shipment.

At the feeding station **100**, initially collapsed, sleeve-type, carton blanks **22** are fed singly from a supply **23** onto a moving conveyor **24** that advances the carton blanks serially through the setting-up station **200**, at which the initially collapsed carton blanks are opened to permit end loading and are bowed to increase the loading opening for ease of loading; then through the loading station **300**, at which the contents **21** are inserted manually through the set-up open ends of the carton blanks as they move on the conveyor; then through the gluing station **400**, at which the ends of the loaded carton blanks are glued and sealed to provide completed packages, and finally to the end of the machine, where the completed packages are discharged therefrom.

A typical example of a carton blank **22** used with this packaging machine is illustrated in FIG. 11. This carton blank has serially connected top, bottom, and opposed side wall panels **25**, **26**, **27** and **28**, respectively, that are initially collapsed so that the top wall panel **25** is flat against the bottom wall panel **26**, with one side wall panel **27** underying the top wall panel and lying flat with the bottom wall panel and the other side wall panel **28** overlying the bottom wall panel and lying flat with the top wall panel. The carton blank **22** is preferably formed from a single piece of paperboard with the top wall panel

25 integrally connected to the underlying side wall panel 27 along a fold line 29, the underlying side wall panel 27 integrally connected to the bottom wall panel 26 along the initially unfolded score line 30, and the bottom wall panel 26 integrally connected to the overlying side wall panel 28 along a fold line 31. The overlying side wall panel 28 has, foldably extending therefrom, a sealing flap 32 secured, as by gluing, to the top wall panel 25 to complete the serial connection of the wall panels to form the sleeve-type carton blank.

To provide for ultimate sealing of the carton after loading, the top wall panel 25 and bottom wall panel 26 extend outwardly endwise to form end flaps 33 and 34 for folding over the ends of the carton in overlapping relation, and the side wall panels 27 and 28 extend outwardly endwise a distance slightly less than the extension of the top and bottom wall panel end flaps 33 and 34 to form end tabs 35 and 36 foldable over the ends of the carton under the top and bottom wall panel end flaps.

According to the method of the preferred embodiment of the present invention, this initially collapsed, sleeve-type, carton blank 22 (FIG. 11) is set-up, loaded and sealed as illustrated in FIGS. 12 through 17. First, the underlying side wall panel 27 and the portion 25*a* of the top wall panel thereabove are folded to an upright disposition with respect to the bottom wall panel 26, thereby setting-up the underlying side wall panel 27 (FIG. 12). This folded top wall panel portion 25*a* is then unfolded along the juncture 29 with the set-up underlying side wall panel, and the remainder of the top wall panel is separated from the bottom wall panel (FIG. 13), thereby opening the carton blank for loading. The overlying side wall panel 28 is not positively set-up to a fully upright disposition with respect to the bottom wall panel 26, and, particularly when the score line 37 at the juncture of the overlying side wall panel 28 and its sealing flap 32 is initially unbroken, the overlying side wall panel will tend to incline inwardly and cause a bowing of the top wall panel 25, thereby increasing the opening between the top and bottom wall panels, which facilitates loading (FIG. 14). This bowing can be positively controlled and accentuated as by, for example, the use of a pivoted bowing finger 38 (FIG. 14). The side wall panel end tabs 35 and 36 and the bottom wall panel end flaps 33 and 34 are then folded over the ends of the loaded carton blank (FIG. 15), and glue is applied to the outwardly facing surfaces of the upturned bottom wall panel end flaps 34. Finally, the top wall panel end flaps 33 are down-folded over the glue-bearing surfaces of the bottom wall panel end flaps (FIG. 16), with the glue securing the end flaps together to seal the carton and form the completed, loaded and sealed package (FIG. 17).

This progressive manipulation of the carton blanks as they progress through the packaging machine 20 is accomplished automatically by the machine components. Thus, the initially collapsed carton blanks 22 are fed singly from the supply 23 onto the moving conveyor 24 by suction heads 101 that are timed with movement of the conveyor to deliver each carton blank 22 between the flights 39 and 40 of a pair of spaced flights on the moving conveyor. The flights of each pair are spaced apart a distance substantially equivalent to the width of the bottom wall panel 26 of the carton blank and the carton blank is initially positioned with the trailing edge of the bottom wall panel at the trailing flight 40, with the underlying, or leading, side wall panel 27 and the portion 25*a* of the top wall panel thereabove extending over the leading flight 39 as a result of the spacing of the flights.

As the suction heads 101 are depositing the carton blank between the flights, the underlying side wall panel 27 and top wall panel portion 25*a* thereabove are folded to an upright disposition by the action of a breaker bar 201 operating in conjunction with the suction heads 101. The operation of the breaker bar 201 results in an initial breaking of the score line 30 at the juncture of the underlying side wall panel 27 and the bottom wall panel 26, and a resulting erection of the side wall panel in upright disposition with respect to the bottom wall panel.

As the suction heads 101 and breaker bar 201 retract, the conveyor 24 advances the carton blank 22 under a fixed hold-down plow 202 that engages the top edge of the underlying side wall panel 27 to retain the panel in its upright disposition, while allowing the folded top wall panel portion 25*a* above the underlying side wall panel to be unfolded about the fold line juncture 29 with the underlying side wall panel (FIG. 13). This folded top wall panel portion is then unfolded and the remainder of the top wall panel is raised from the bottom wall panel to set-up the carton blank by a pair of opening side plows 203 disposed adjacent each end of the carton blank outwardly of the side wall panel end tabs 35 and 36 in the path of the portions of the top and bottom wall panel end flaps 33 and 34 extending beyond the side wall panel end tabs. These opening side plows 203 first engage the folded top wall panel end flap portions and force them upwardly to unfolded disposition, and then retain the top wall panel end flaps in spaced relation above the bottom wall panel end flaps to dispose the top and bottom wall panels in opened disposition for end loading.

Preferably, the score line 27 at the juncture of the overlying side wall panel and its sealing flap is initially unbroken so that this score line tends to resist a complete right angle folding when the top and bottom wall panels are opened. As a result, the overlying side wall panel 28 tends to incline slightly inwardly, which causes a bowing of the top wall panel 25. As the opening side plows 203 maintain the spacing of the top and bottom wall panels, this bowing is directed upwardly, resulting in an increased spacing between the top and bottom wall panels such as to facilitate end loading of articles into the carton blanks.

This advantageous bowing is positively controlled and accentuated in the preferred embodiment of the present invention by the pivoted bowing finger 28 mounted at an end of the trailing conveyor flight 40 of each pair for pivoting by a cam plate 41 as the carton blank 22 is conveyed to and through the loading station 300. This bowing finger 38, when pivoted, acts on the overlying side wall panel 28 to position it at a controlled inclination for desired bowing of the top wall panel during loading (FIG. 14). When using bowing fingers, it is not necessary that the score line 37 at the juncture of the overlying side wall panel and its sealing flap be initially unbroken, as these fingers will positively produce inclination of the overlying side wall panels.

Prior to loading the leading side wall panel end tab 35 at the rear is folded inwardly across the end of the carton blank by a stationary tab tucker plow 204 and the trailing side wall panel end tab 36 at the rear is folded forwardly by an oscillating tucker finger 206. The carton is then loaded and the leading side wall panel end tab 35 at the front is folded inwardly by a stationary tab tucker plow 205 and the trailing side wall panel end tab 36 is folded forwardly by an oscillating tucker finger 207. The end flaps 34 extending from the bottom wall panel 26 are then folded upwardly by preliminary flap folding plows 208 over the end of the carton blank outwardly of the end tabs (FIG. 15).

Glue is then applied in bead form to the outwardly facing surfaces of the upturned bottom wall panel end flaps 34, and the top wall wall panel end flaps 33 are folded downwardly by final flap folding plows 209 that force the top wall panel end flaps 33 into sealing engagement with the glue-bearing surfaces of the upturned bottom wall panel end flaps 34 (FIG. 16) to form a loaded and sealed package (FIG. 17) ready for shipping or storage.

The preferred embodiment of the packaging machine 20 of the present invention illustrated in the drawings, performs the above-described method of setting-up, bow-

ing, loading and sealing of carton blanks to produce loaded and sealed packages. This packaging machine **20** has a base frame **42** composed of legs and cross supports, and is mounted on casters for mobility. Mounted on the base frame **42** is an electric vacuum pump motor **43** connected by a belt drive to a pneumatic vacuum pump **44** that provides vacuum for operation of the vacuum heads at the feeding station which were mentioned above and will be described in detail hereinbelow.

Mounted on the base frame **42** and extending vertically therefrom are a front frame plate **45** and a rear frame plate **46** extending the full length of the machine in parallel relation for support of the various machine elements therebetween.

At the left of the machine, as seen in FIGS. 1 and 4, the front and rear frame plates **45** and **46** extend upwardly above the level of the remaining portions of these plates to provide support for the supply hopper **102** and the operating elements at the feeding station **100**. The remainders of the front and rear frame plates extend substantially at the level of the top reach of the conveyor **24** with the front plate providing a mounting for a loading platform **301** in the loading station **300**, on which loading platform articles **21**, such as trays of bacon, are handled, and from which the articles are inserted into the set-up carton blanks endwise by sliding from the loading platform. At the right in FIGS. 1 and 4, the front and rear frame plates serve to support the elements at the gluing station **400**.

The front and rear frame plates **45** and **46** are rigidly secured in spaced relation by a tie bar **47** at the right end of the machine, by a gluing station cross plate **401**, feeding station lower and upper cross plates **103** and **104**, respectively, and numerous cross members on which machine elements are supported in operating relation.

Two of these cross members are spaced conveyor support bars **48** that support, in the center of the machine, a longitudinally extending, vertically disposed, conveyor support plate **49**. This conveyor support plate extends from adjacent the feeding station to adjacent the discharge end of the machine. At the feeding station end of this plate is mounted, in a suitable bearing, a horizontal idler shaft **50** carrying a pair of inner conveyor guide pulleys **51** adjacent the support plate, and a pair of outer conveyor guide pulleys **52** located outwardly of the inner pair. The conveyor support plate **49** carries a drive shaft **53** in a suitable bearing at the discharge end thereof, which similarly carries an inner pair of conveyor guide pulleys **51** and an outer pair of conveyor guide pulleys **52**, and, in addition, carries a drive sprocket **54** mounted thereon outwardly of the rear pulley of the pair of outer pulleys. The drive sprocket **54** is driven by a chain **55** trained around the drive sprocket and around a sprocket **56** on a transverse main drive shaft **57** mounted centrally of the machine and extending between the front and rear frame plates. The main drive shaft **57** is driven through a sprocket **58** mounted thereon by a main drive chain **59** that is driven by a sprocket **60** mounted on the output shaft **61** of a gear box **62** on the lower feeding station cross plate **103**, with the gear box **62** being driven by belt drive connection to an electric motor **63**, also mounted on the lower feeding station cross plate **103**.

The four guide pulleys **51** and **52** at each end of the conveyor support plate **49** support four conveyor chains **64** and **65** that are trained around the corresponding pulleys at each end of the support plate. These chains carry the conveyor **24** itself, which is in the form of transverse flat slats **67** secured by angle brackets **68** (see FIG. 8) to the two chains **64** trained around the inner pairs of guide pulleys **51**. The outer two chains **65** are trained around the pairs of outer guide pulleys **52**, and also support the slats **67** of the conveyor through the upper reach thereof, but are not secured thereto.

As mentioned previously, the conveyor **24** has mounted thereon pairs of transverse flights **39** and **40** that extend upwardly therefrom as they move with the slats through the upper reach of the conveyor. The flights of each pair extend transversely across the conveyor in spaced relation for setting-up therebetween of a carton blank for end loading. The trailing flight **40** of each pair is secured by the aforementioned slat brackets **68** with the slats to the inner chains **64** to remain fixed thereto, while the leading flight **39** of each pair is supported on the adjacent slat of the conveyor, but is not secured thereto, rather being secured to the two outer chains **65** that are trained around the outer pairs of guide pulleys **52**. This attachment is attained by angle brackets **70** secured to the chains and secured to outward extensions of the flights (FIG. 8).

With this attachment of the flights to the chains, the spacing between flights of each pair may be adjusted to accommodate cartons of different sizes by shifting the phase of the pairs of outer pulleys **52** with respect to the inner pulleys **51** so that the leading flights are moved closer to or farther from the trailing flights as desired.

The flights **39** and **40** extend from the slats **67** to a height greater than the height of a set-up carton to provide positive and firm support therefor, but are recessed centrally, as at **71**, to accommodate the aforementioned hold-down plow **202** at the setting-up station **200**.

The upper reaches of the four chains **64** and **65** are guided and supported at a fixed level by four longitudinally extending guide bars **72**, each of which extends from closely adjacent the pairs of idler pulleys at the left of the machine to closely adjacent the driven pulleys at the right end of the machine. These guide bars **72** are mounted in fixed position by attachment to various cross members, such as the support bars **48** described above and mounting brackets **73** on a pair of transverse slide rods **433** at the gluing station **300**, as illustrated in FIG. 8.

Referring now in detail to the feeding station **100**, as shown in FIGS. 1, 2, 3, 4, 5 and 7, the machine **20** has at this feeding station a supply hopper **102**, means **105** for removing and turning collapsed, sleeve-type, carton blanks from the supply hopper to an intermediate horizontal platform **106**, and means **107** for delivering the cartons from the intermediate platform onto the previously-described conveyor **24** between the flights **39** and **40** thereon.

The supply hopper **102** is located between the upward extensions of the front and rear frame plates **45** and **46** above the conveyor **24** and extending in the longitudinal direction of conveyor advancement for support of a stacked supply **23** of vertically disposed, collapsed, sleeve-type, carton blanks **22** in a supply line extending parallel with the conveyor, with the hopper having a discharge end **108** facing in the opposite direction, i.e. to the left in FIGS. 2, 3, and 4.

The supply hopper **102** has a pair of longitudinally extending base flats **109** supported on cross bars **110** that extend between the front and rear frame plate extensions, and on which also are mounted brackets **111** that support opposed side members **112**, which cooperate with the base flats **109** to retain the supply **23** of carton blanks in proper position as they advance through the supply hopper.

The stack of carton blanks is maintained in feeding position at the discharge end **108** of the supply hopper by a pair of retaining fingers **113** acting on the back of the stack. These retaining fingers **113** extend behind the stack from slide brackets **114** slidably mounted on longitudinal slide rods **115** that are supported on struts **116** extending upwardly from the cross bars **110**. The slide brackets **114** are centrally bored, as at **117**, for mounting on the cylindrical slide rods, and have longitudinal slots **118** communicating with the bores **117** and extending downwardly through the brackets to accommodate the struts **116** as the brackets **114** slide on the slide rods. The brackets are normally positioned with the slots aligned with the struts as the retaining fingers rest on the side members as they extend inwardly behind the stack.

The slide rods **115**, base flats **109** and side members **112** are inclined downwardly toward the discharge end **108** of the supply hopper to facilitate feeding of the carton blanks thereto with the weight of the brackets and retaining fingers pushing against the supply of carton blanks by gravity. Downward sliding of the retaining fingers **113** and slide brackets **114** is arrested as the supply of carton blanks is exhausted by enlargements **119** on the ends of the slide rods **115**, which stop the brackets thereat.

The cartons are removably positioned at the discharge end **108** of the supply hopper **102** by small stop lugs **120** extending upwardly from the base flats **109**, and by a retaining rod **121** extending transversely between the upstanding frame plates **45** and **46** adjacent the top of the first carton blank in the supply. Carton blanks are removed past these stop lugs **120** and positioning rod **121** singly by the removing and turning means **105**, which picks up the first carton blank in the supply **23** and pulls it away therefrom, causing the carton blank to flex and slide over the stop lugs **120** and under the positioning rod **121**. To avoid additional carton blanks from sliding past the stop lugs and positioning rod, when the first carton blank is removed, the end portions of the base flats **109** at the discharge end are shaped to extend horizontally, such that the first several cartons in the stack are in a horizontal, rather than an inclined, row.

With the supply hopper structure as described above, the supply of carton blanks is arranged close to the operator, who is normally at the loading station **300** and can easily supplement the supply by placing additional carton blanks behind the retaining fingers **113**, pivoting the slide brackets **114** to move the retaining fingers out of the path of the carton blanks, sliding the brackets to the end of the stack and pivoting the fingers behind the supplemented supply. As there are two retaining fingers and slide brackets, one can remain in operating position as the other one is retracted, thereby maintaining a constant supply pressure on the stack of cartons.

The aforementioned removing and turning means **105** has a pair of spaced suction heads **122** with bellows-type suction cups **123** thereon facing the carton blanks at the discharge end **108** of the supply hopper **102** above the base flats **109** thereof for engagement of the carton blanks by suction. The suction heads **122** are laterally spaced on a cylindrical sleeve **124** that is oscillatably mounted on a horizontal mounting rod **124** fixed to the ends of a pair of rocker arms **125**, which rocker arms are fixed on a horizontal rocker shaft **126** mounted in bearing blocks **128** on the front and rear frame plates **45** and **46**. The rocker shaft **126** is oscillated by a slotted operating arm **129** connected by a crank pin **130** slidable in the slot of the operating arm and attached to a rotating crank plate **131** mounted on the driven shaft **61** of the aforementioned gear box **62**. Rotation of the crank plate **131** causes oscillation of the rocker shaft **127** by the crank pin **130** and slot connection for oscillation of the rocker arms **126** to move the suction heads **122** between the supply hopper **102**, for picking-up carton blanks, and the intermediate platform **106**, for discharge thereonto of the picked-up carton blanks.

When the suction heads **122** are positioned at the supply hopper **102** by the rocker arms **126**, they are horizontally disposed by the engagement of a cam follower pin **133** mounted on a control arm **134** extending from the suction head sleeve **124** on the opposite side thereof from the suction cups **123** with the lower cam surface **135** of a cam plate **136** that depends from the upper feeding station cross plate **104**. The cam surface **135** of the plate includes a horizontally extending portion on which the cam follower pin rides when the suction heads are positioned horizontally at the discharge end of the supply hopper for picking up carton blanks therefrom, and curves upwardly at the left in FIG. 4 to a generally vertical position for movement of the cam follower pin **133** thereon to pivot the suction heads **122** to a vertical, downwardly facing, disposition upon oscillation to the left in FIG. 4, to turn the carton blanks from their vertical position, when withdrawn from the supply hopper, to a generally horizontal disposition above the intermediate platform **106** for placement thereon.

The operating arm **129** is biased upwardly to retain the cam follower pin **133** in cam following contact with the cam plate **136** by a coil spring **137** having one end connected to a lug **138** on the operating arm **129** and the other end connected to a lug **139** extending from the cam plate **136** thereabove.

Suction is obtained at each suction cup **123** through a central bore in a plug **140** that serves to seat the bellows-type suction cup **123** on the suction head **122**. This central bore communicates with a passage in the suction head that is connected in turn by a tube connection **141** to a flexible hose **142** leading exteriorly of the suction head to a valve mechanism **143** connected by tubing **144** to the aforementioned vacuum pump **44**.

The valve mechanism **143**, as illustrated in FIG. 5, has an interior chamber **145** communicating between the tubing **144** from the vacuum pump and the flexible hoses **142** leading to the suction heads. A valve stem **146** extends through the central portion of this valve chamber **145** and carries a valve seat **147** operable against a shoulder **148** of the chamber intermediate the suction head and pump inlets to close the valve. The valve stem **146** extends exteriorly to the left in FIG. 5, and carries a closure plate **149** engageable over a port **150** for opening and closing the suction head side of the valve chamber **145** to the atmosphere. When the valve stem **146** is at the left, as illustrated in FIG. 5, the valve seat **147** is against the shoulder **148** to close the suction head flexible hoses **142** from the vacuum pump **44**, and the closure plate **149** is spaced from the port **150** to allow air to enter the valve chamber **145** and pass through the flexible hoses to the suction heads **122** to release suction thereat. When the valve stem **146** is moved to the right, the closure plate **149** closes the port **150** and the valve seat **147** moves away from the shoulder **148** to connect the vacuum pump **44** to the flexible hoses **142** for drawing vacuum in the suction cups **123**.

The valve stem **146** is reciprocated by a bell crank **151** pivoted on the valve mechanism with one arm **152** of the bell crank **151** connected to the end of the valve stem **146** and the other arm **153** of the bell crank connected to one end of a cam follower arm **154**, the other end of which rides on a cam disk **155** having adjustable outwardly extending segments **156** that engage the follower element **157** of the cam follower arm **154** to rock the bell crank **151** as the segments **156** are rotated past the cam follower element **157**.

The cam disk **155** is mounted for rotation on a transverse timing cam shaft **158** extending horizontally between bearing mountings **159** on the front and rear frame plates **45** and **46**, and driven from the gear box shaft **61** by a chain and sprocket connection **160**.

The adjustable segments **156** of the cam disk **155** are adjusted in relation to the oscillation of the suction heads **122** so that suction is drawn at the suction cups from prior to contact with the carton blank in the supply hopper **102** until the carton blank is withdrawn and turned to a horizontal position above the intermediate platform **106**, at which time the cam disk segments **156** advance past the cam follower element **157** to operate the valve mechanism **143** to close the vacuum pump connection and open the suction cups to the atmosphere, which allows the carton blank to drop from the suction heads onto the intermediate platform.

The intermediate platform **106** is located below the carton discharge position of the suction heads **122** to the left of both the supply hopper **102** and the conveyor **24** and vertically therebetween. The intermediate platform **106** has a carton receiving bottom surface **161**, an upstanding back wall **162** and opposed upstanding side walls **163** for receiving and properly positioning carton

blanks as they are discharged from the suction heads, but is unwalled forwardly to facilitate subsequent removal of carton blanks therefrom by the delivery means **107**. The intermediate platform **106** is mounted on the machine **20** by attachment of the back wall **162** thereof to a support plate **164** extending between the front and rear frame plates **45** and **46** of the machine.

The delivery means **107** of the illustrated preferred embodiment is a parallel, double lever, operating mechanism that picks-up carton blanks from the intermediate platform **106** and translates them in their horizontal disposition onto the conveyor **24** between flights **39** and **40** of the aforementioned pairs of conveyor flights at the setting-up station **200** of the machine.

The delivery means **107** includes a pair of laterally spaced suction heads **101** having downwardly facing bellows-type suction cups **166** similar to those of the removing and turning means **105** described above. The suction heads **101** have top plates **167** extending forwardly to attachment to the underside of a flat horizontal support plate **168** that extends laterally and has upstanding end flanges **169** with longitudinally spaced pivot mountings **170** thereon. Each of these flanges **169** is attached to a pair of longitudinally spaced, parallel, rocker arms **171** by pin connection of the outer ends **172** of the rocker arms **171** at the spaced pivot mountings **170** of the flange **169**. These pairs of parallel rocker arms have their other ends **173** pivotally mounted in bearings **174** on the front and rear frame plates, with one of the rocker arms **171** having an operating arm **175** extending therefrom on the opposite side of the frame plate bearing **174**, to the outer end of which operating arm is pivoted one end of a connecting rod **176** that it has its other end pivoted to a rocker finger **177** oscillatatably mounted on a stub shaft **178** secured to the rear frame plate **46**. This rocker finger **177** is oscillated by a connecting rod **179** that has one end attached to the rocker finger and its other end attached to a crank pin **180** on a rotating disk **181** fixed to the gear box shaft **61**. Thus, rotation of the gear box shaft produces oscillation of the delivery means suction heads **101** from a carton pick-up position at the intermediate platform **106** to a carton delivery position at the conveyor **24**, with the double lever arrangement resulting in the carton blanks being retained in horizontal disposition as they are translated by the delivery means **107** from the intermediate platform **106** to the conveyor **24**.

Suction is obtained at the suction heads **101** by structure identical to that of the removing and turning means suction heads **122**, with an identical valve mechanism **182** and valve operating linkage **183**. In this case, the cam segments are adjusted to produce suction at the suction cups **166** prior to the suction heads **101** reaching the intermediate platform **106** until the suction heads **101** have carried a carton blank to its proper delivery position on the conveyor **24**.

The removing and turning means **105** and the delivery means **107** operate continuously with the delivery means removing a carton blank from the intermediate platform **106** and delivering it to the conveyor **24** as the removing and turning means **105** withdraws a carton blank from the supply hopper **102** and delivers it to the intermediate platform **106**. This operation is synchronized in proper phase relation by adjustment of the crank plates **131** and **181**, which are mounted on the common gear box shaft **61**. Also, the delivery means **107** is synchronized with the advance of the pairs of flights **39** and **40** on the conveyor to deliver carton blanks in proper position between flights by adjustment of the crank pin disk **181** with respect to the conveyor drive sprocket **60**, both being carried on the gear box shaft **61**.

The carton blanks **22** are still in collapsed condition as they are deposited by the delivery means **107** onto the conveyor **24** between flights **39** and **40** at the setting-up station **200**, but are immediately acted upon to initiate setting-up of the carton blanks, which setting-up continues as the carton blanks are conveyed through the setting-up station. The initial setting-up action is the forcing of the collapsed carton blank downwardly into the restricted space between flights **39** and **40**, which causes up-folding of the underlying side wall panel **27** and the top wall panel portion **25***a* thereabove. This is accomplished by the aforementioned laterally extending horizontal breaker bar **201**, which is fixed to the lower ends of vertical support rods **210** secured in the horizontal top plates **167** of the suction heads **101** in advance of the suction cups **166**. The support rods **210** are adjusted to extend downwardly sufficient to position the breaker bar **201** at about the level of the bellows-type suction cups **166** when these cups are collapsed, and are spaced in advance of the suction cups to position the breaker bar closely adjacent the leading flight **39** as the suction cups move downwardly between flights to deposit the carton blank therebetween as illustrated in FIG. 12 (this relationship is not shown in FIGS. 2 and 4). The action of this breaker bar **201** causes a breaking of the score line **30** at the juncture of the underlying side wall panel **27** and the bottom wall panel **26** so that the side wall panel can be retained in proper upright disposition with respect to the bottom wall panel. As this partially set-up carton blank is released by the suction cups, and the suction head and breaker bar begins the return stroke, the underlying side wall panel **27**, which is now the leading side wall panel, passes under the aforementioned centrally disposed hold-down plow **202**, which is located immediately adjacent the forward position of the breaker bar **201** and extends downwardly into the aforementioned recesses **71** in the flights. The hold-down plow **202** has a downwardly tapering carton blank engaging surface **211** that initially engages the carton blank at the juncture **29** of the leading side wall panel **27** and the top wall panel **25** to further seat the side wall panel in proper upright disposition by downward movement thereof as the carton blank progresses therealong, and has a horizontal surface **212** extending forwardly from the inclined surface **211** at the lower level thereof to retain the leading side wall panel in its proper upright disposition. This hold-down plow is mounted on an angle bracket **213** that has an upstanding portion adjustably secured to a vertical plate **214** that depends from the supply hopper cross bars **110**. Adjustment of the bracket **213** on the plate **214** is provided to allow for vertical adjustment of the hold-down plow for carton blanks of different heights.

As the leading side wall panel begins to move under the hold-down plow **202**, the top wall panel **25** and bottom wall panel **26** of the carton blank are separated to open the carton blank by the pair of oppositely disposed opening side plows **203** formed inwardly on lateral positioning plows **215**. The positioning plows **215** have diverging ends facing the feeding station **100** and tapering to the remaining longitudinally extending portions of the plows, which remaining portions are spaced apart a distance equivalent to the distance between the ends of opposed end flaps. Thus, these positioning plows **215** serve to align the progressing carton blanks in proper disposition for the succeeding operations that are to be carried out thereon. The opening side plows **203** overlap the hold-down plow **202**, and are of a thickness inwardly of the lateral positioning plows **215** not more than the distance that the carton end flaps **33** and **34** extend outwardly beyond the end tabs **35** and **36**, such that the opening plows do not engage the end tabs, but do engage the end flaps to separate the top and bottom wall panels for opening of the carton blank as it is retained by the hold-down plow. To perform this function, the opening side plows **203** have top and bottom surfaces that diverge from an initial point to horizontal top and bottom portions. The points of the opening plows are located so as to contact the portions of the end flaps that are folded with the down-folded side wall panel portion **25***a* as a result of the breaker bar

201 action. As the carton blank progresses along the opening plows 203, the plows first force the folded top wall panel portion 25*a* upwardly about the juncture 29 of the top wall panel with the leading side wall panel and then engage the remaining portions of the top end flaps 33 to force the top wall panel and its end flaps to a generally horizontal disposition, with the lower surfaces of the opening plows engaging the bottom end flaps 34 to retain these end flaps an dthe bottom wall panel in flat disposition on the conveyor.

The lateral positioning plows 215 and the opening side plows 203 carried thereby are mounted on the outer faces of longitudinally extending side plates 216 supported on various cross members of the machine with the upper surfaces of the side plates aligned with the bottom wall panel 26 and bottom end flaps 34 of the carton blanks for support thereof as the carton blanks progress on the conveyor.

These side plates 216 are literally movable simultaneously to adjust the spacing between the plows carried thereon when the machine is adjusted to handle a different size carton. This adjustment is accomplished by a pair of longitudinally spaced transverse adjusting rods 217 that have opposite ends threadably seated in opposite side plates 216 and threaded oppositely so that upon turning of the adjusting rods 217, the side plates 216 will be moved toward or away from each other, as desired. The adjusting rods 217 are rotated simultaneously by a chain 218 trained over sprockets on the adjusting rods and over a set of idler sprockets 219 on shafts mounted on the conveyor support plate 49. At the discharge end of the machine, the side plates 216 are adjustably attached by brackets 220 to the transverse tie bar 47 of the frame.

Closely adjacent the rear opening side plow 203 in the direction of conveyor advancement is a rear end flap retaining top plow 221 that tapers downwardly in the direction of conveyor advancement to the level of the opened top wall panel 25 and top end flap 33 extending therefrom to engage and retain the end flap and associated top wall panel in proper opened position throughout the setting-up station and loading station.

Under the initial inclined portion of the top plow 221 is a stationary rear tab tucker plow 204 that tapers inwardly toward the conveyor in the direction of conveyor advancement to a longitudinal portion aligned with the end of the leading side wall panel 27 for engagement of the end tab 35 extending therefrom to fold this end tab inwardly at the end of the carton. This stationary tab tucker plow 204 extends through the loading station 300 to serve as a backstop against which articles are positioned as they are loaded into the opened carton, and also serves to retain the top end flap 33 and top wall panel 25 in opened disposition.

Associated with the stationary tab tucker plow 204 and accommodated in a longitudinal slot at the tapered end thereof is an oscillating tucker finger 206 mounted for oscillation on a vertical shaft 224 mounted in a bracket 225 fixed to, and extending outwardly from, the rear side plate 216. As seen in FIG. 2, this oscillating tab tucker finger 206 is oscillatable in the direction of conveyor advancement into the path of the end tab 35 extending from the trailing or overlying side wall panel 27 in timed relation to the advancement of carton blanks, and is driven by a driving connection of a conventional type to the aforementioned main drive shaft 57 so that as the cartons advance the oscillating tab tucker finger 206 will engage behind the end tab of the trailing side wall panel to fold it forwardly at the end of the carton, with the tucker finger being accommodated in the aforementioned slot of the stationary tab tucker plow 204, which engages the folded trailing end tab and retains it in folded position.

As the opened carton blank advances from under the previously described hold-down plow 202, the top wall panel 25 is free to bow upwardly. Such bowing may be caused in part or entirely by resistance of the fold line 37 at the juncture of the top wall panel 25 and the trailing side wall panel 28 to fold to a full right angle, which resistance is accentuated if the fold line is an unbroken score line. This upward bowing remains as the carton blank progresses through the loading station to facilitate loading of contents 21 endwise into the set-up carton blank.

This upward bowing may be positively controlled and further accentuated by the aforementioned bowing fingers 38, which are pivotally mounted intermediate their ends on pivot pins 74 extending laterally from the trailing flights 40, and are retained in a generally vertical disposition by a retaining pin 75 extending laterally from the trailing flight above the pivot pin, which retaining pins 75 are contained in horizontal slots 76 in the upper ends of the bowing finers 38, with the slots 76 extending sufficiently to permit limited pivoting of the upper end of the bowing finger in the direction of conveyor advancement to engage the trailing side wall panel 28 and incline it in the direction of conveyor advancement to impart desired bowing to the top wall panel 25.

Pivoting of the bowing fingers 38 is accomplished by a cam plate 41 extending longitudinally from the area of the hold-down plow 202 into the loading station 300. This cam plate 41 is mounted on the front conveyor chain guide bar 72 in vertical alignment with the path of the bowing fingers 38, and has a camming surface 227 extending upwardly from the area of the hold-down plow 202 in the direction of conveyor advancement to a horizontal portion. The lower ends of the bowing fingers 38 extend downwardly for engagement of the camming surface 227 of the cam plate so that the cam plate 41 will displace the lower ends of the bowing fingers to pivot them about the pivot pins 74 and pivot the upper ends into engagement with the carton side wall panels 28 for bowing of the top wall panels 25, with the cam plate 41 retaining the bowing fingers 38 in pivoted position as the carton blanks are loaded at the loading station 300.

Beyond the loading station 300 in the direction of carton advancement is a front stationary tab tucker plow 205 and an oscillating tab tucker finger 207 of identical construction and operation as the rear stationary tab tucker plow 204 and rear oscillating tab tucker finger 206 described above, for folding of the end tabs 34 and 35 at the front edges of the side wall panels 27 and 28 into folded disposition. Adjacent the forward ends of the front tab tucker plow 205 and the extension of the rear tab tucker plow 204, and slightly overlapping these plows, are preliminary end flap folding plows 208 that are inclined upwardly from below these previous plows to horizontal portions just below the top wall panel 25 and in line with the top end flaps 33 for folding of the bottom end flaps 34 upwardly across the ends of the cartons and over the previously tucked end tabs 35 and 36 to position the bottom end flaps 34 for receipt of glue as the carton is conveyed through the gluing station 400 by the moving conveyor 24.

In the embodiment illustrated, glue is applied to the up-turned bottom end flaps 34 in the form of a plurality of spaced beads 402 of hot-melt glue applied by a pair of opposed glue applicators 403 at opposite sides of the moving conveyor 24. The glue may consist of any desired combination of waxes and resins commercially available for use in sealing paperboard cartons.

The carbon blank flaps 34 and 35 and tabs 35 and 36 are maintained in proper position as the glue beads 402 are applied by the glue applicators 403 by the aforementioned preliminary end flap folding plows 208, which extend through the glue applicating position above the level of glue heads 404 of the glue applicators for support of the unfolded top end flaps 33 as the glue heads engage the upfolded bottom end flaps 34. The carton blanks are maintained in proper vertical alignment with the glue

heads of the glue applicators by support on the aforementioned side plates **216**, with the carton blanks being retained thereon by hold-down plates **405** mounted above the side plates at the bottom of adjustable vertical support rods **406** that are adjustably mounted in longitudinal elements **407** of a superstructure **408** that extends upwardly from and is mounted on the front and rear frame plates **45** and **46**. Vertical adjustment of the support rods **406** is accomplished by hand wheels **409** threadably attached to the support rods and carried on top of the longitudinal elements **407**, in which the vertical support rods slide upon rotation of the hand wheels to vertically adjust the position of the hold-down plates to accommodate changes in carton size.

Attached to upstanding flanges **231** on the preliminary end flap folding plows **208** adjacent the glue applicators **403** are a pair of opposed final end flap folding plows **209** that extend downwardly from above the carton blanks at the glue applicators into the path of the unfolded top end flaps **33** beyond the glue applicators for down-folding of the top end flaps onto the glue-bearing upfolded bottom end flaps **34**. These final end flap folding plows **209** extend a short distance beyond the glue applicators **403** with vertical surfaces that bear against the down-folded top end flaps **33** to assure contact of the end flaps sufficient to cause the glue to seal the flaps together to complete the formation of a loaded and sealed package. In this sealing space, the final end flap folding plows **209** are attached to the outer sides of the aforementioned side plates **216** on which the carton blanks ride as they are discharged from the end of the conveyor for removal from the machine.

As seen in FIGS. 2, 4, 8, 9 and 9*a*, the glue heads **404** of the glue applicators **403** have elongated carton facing surfaces **410** with a plurality of spaced transfer ports **411** thereon, at which ports glue is disposed in bead form for application to the upfolded bottom end flaps **34** of the carton blanks. These transfer ports **411** are formed in the ends of replaceable cylindrical inserts **412** that can be replaced by other inserts having differently contoured ports for varying the bead size depending upon the particular application and type of glue. These replaceable inserts **412** have interior channels that communicate with feeding channels **413** extending horizontally inward from each insert **412** to the top of a cylindrical, transversely extending, distribution chamber **414** that distributes glue uniformly to all feeding channels **413**, with the communication of the feeding channels at the top of the distribution chamber **414** allowing intermittent feeding of glue without undesirable draining of glue between intermittent feedings.

The glue head **404** is mounted on the base **415** of the glue applicator **403** with the distribution chamber **414** having an opening **416** communicating with a transverse cylindrical supply passage **417** in the base **415**, which supply passage **417** extends to a position below, and opening upwardly into, a supply reservoir **418** in which glue is maintained for feeding through the supply passage **417**, distribution chamber **414** and feeding channels **413** to the transfer ports **411**. Feeding of the glue is positively controlled by a worm **419** disposed in the cylindrical supply passage **417** and having a shaft **420** extending outwardly from the supply passage through a bore **421** in the glue applicator base **415**. This worm shaft **420** is driven through a clutch connection **422** by an electric motor **423** for intermittent operation of the worm **419** to advance glue to the transfer ports **411** for forming of glue beads **402** thereat.

In the preferred embodiment, in which a hot-melt glue is used, heating means are provided for maintaining the glue at optimum temperature as it is fed to the transfer ports **411** and as the glue is in bead form at the transfer ports for application to the carton blanks. This heating means includes a plurality of elongated electrical heating elements **424** of any desired commercial construction, such as those made by Hotwatt, Inc., of Danvers, Mass. These heating elements **424** are mounted in bores in the glue applicator base **415** adjacent the supply passage **417** and adjacent the lower portion of the reservoir **418**, and also in the glue head **404** adjacent the feeding channels **413**. These heating elements **424** are connected by lead lines to a source of electricity through intermediate control means, such as a Wheatstone bridge, to which is connected thermistor, probe-type, control rods **425** mounted in bores in the glue applicator base **415** and in the glue head **404** to detect the temperatures therein. These thermistor control rods **425** may be of any commercial design, such as those manufactured by Fenwall, Incorporated of Ashland, Mass., which are designed to vary the resistance in proportion to temperature variation to vary the electrical input from the Wheatstone bridge to the heating elements for maintaining a predetermined temperature in the glue applicator base and in the glue heads. Thus, the temperature of the hot-melt glue beads **402** at the transfer ports **411** can be maintained at a desired level to render the glue readily transferable upon contact and to control the surface tension of the beads so that the glue will remain in bead form without dripping, with the contour of the transfer ports **411** and the controlled feeding of glue determining the size of the beads **402** such that the beads are not sufficiently large to overcome the surface tension.

The glue applicators **403** are movably mounted for simultaneous movement to bring the transfer ports **411** of the glue heads **404** into contact with the upfolded bottom end flaps **34** of the carton blanks as the carton blanks move continuously on the conveyor **24**. To accomplish this movement, each glue applicator **403** is mounted on a platform **426** on which the worm drive motor **423** is also mounted, and this platform **426** is slidably carried on a carriage **427**, with the platform having downwardly facing transverse racks **428** slidable in grooves of the platform with a pinion **429** in the platform mating with the racks for adjustment of the glue applicators toward or away from the conveyor to accommodate different size cartons. Each carriage **427** is mounted for linear sliding movement parallel to the direction of conveyor movement on a pair of spaced movable slide rods **430** that extend parallel to the conveyor. These movable slide rods **430** are mounted between upstanding brackets **431** on a subcarriage **432** that is mounted for linear sliding movement transverse to the conveyor on a pair of stationary main slide rods **433** that extend across the machine under the conveyor for support of the subcarriages **432** of both glue applicators **403** on the single pair of main slide rods **433**, with the ends of the main slide rods being mounted on outward extensions **77** of the front and rear frame plates **45** and **46** of the machine, which extensions **77** are provided to accommodate sliding movement of the glue applicator mechanisms. Also, to accommodate this movement, the front and rear frame plates are recessed, as at **78**, at the glue station **400**.

The combination of the transverse sliding of the subcarriages **432** on the main slide rods **433** and the longitudinal sliding of the carriages **427** on the subcarriage slide rods **430** permit translation of the glue applicators **403** in any direction while maintaining the elongated carton facing surfaces **410** parallel with the end flaps **34** of the carton blanks.

The glue applicators **403** are driven in circular translation to move the carton facing surfaces **410** of the glue heads **404** in a path tangent to the upfolded bottom end flaps **34** of the carton blanks and in the same direction as the moving carton blanks in the area of tangency so as to contact the flaps and move therewith for a short interval to assure proper transfer of the glue beads **402** from the transfer ports **411** to the flaps **34** by contact. The rate of movement of the glue applicators **403** being such that the glue heads **404** move at the same speed as the end flaps **34** during this period of contact.

This circular translation of the glue applicators **403**

is accomplished by crank arms 434 having outer ends mounted to the undersides of the main carriages 427 and inner ends mounted on the upstanding ends of crankshafts 435 extending from gear boxes 436 mounted on the aforementioned cross plate 401 and driven by chains 437 from the aforementioned main drive shaft 57 with the gear boxes 436 being synchronized so that the glue applicators 403 operate simultaneously to apply glue to a carton blank advancing therebetween. Also, the gear box drives are synchronized with the movement of conveyor flights to bring the glue applicators into carton contacting position in proper timed relation with the advancement of carton blanks.

As mentioned hereinabove, glue is fed to the transfer ports by intermittent rotation of the worms 419 by the drive motors 423. This feeding is timed to occur prior to contact of the end flaps 34 by the transfer ports 411 and is controlled so that no feeding will occur if no carton blank is being advanced to feeding position. The intermittent operation of the worms 419 for feeding of measured amounts of glue to the transfer ports 411 is controlled by a timing switch 438 mounted on the intermediate platform support plate 164 at the feeding station 100 and operated by an adjustable cam 439 carried on the aforementioned timing cam shaft 158, with the cam 439 being adjusted in relation to the operation of the other elements of the machine to actuate glue feeding clutches during an interval in advance of contact of the carton blanks by the glue heads 404. This intermittently actuated timing switch 438 is connected to the glue feeding drive motor clutches 422 in series with a carton blank sensing switch 440 mounted on the rear side plate 216 in advance of the glue applicators. As shown in FIG. 6, this carton blank sensing switch 440 is normally in an open position in which the clutches 422 disengage the glue feeding motors 423 from the worms 419 regardless of the actuation of the aforementioned timing switch 438. The carton blank sensing switch 438 is operated by a bell crank 441 pivoted to the same side plate with a switch finger 442 extending for operation of the switch and a carton blank sensing finger 443 extending upwardly in the path of advancing carton blanks. The bell crank 441 is biased in an open switch position against a stop pin 444 by a spring 445 connected to the bell crank and to the side plate, in which biased position the carton sensing finger is in the path of advancing carton blanks. As a carton blank advances over the carton sensing finger 443, it depresses the finger to rock the bell crank 441 and cause the switch contacting finger 442 to close the carton blank sensing switch 440 so that closing of the timing switch 438 during this period will cause operation of the clutches 422 for driving the worm to feed measured amounts of glue to the transfer ports 411 for subsequent transfer of glue to the sensed carton blank. When no carton blank is advancing on the conveyor to the glue applicators, the carton sensing switch 440 will remain open so that closing of the timing switch 438 will not actuate the clutches 422 and no glue will be fed to the transfer ports.

The packaging machine 20 described hereinabove in detail is energized and controlled for automatic operation through the electrical circuitry shown schematically in FIG. 10. This circuitry includes a primary circuit 500 connected to a 220-volt power source, and a secondary circuit 501 energized by a transformer 503 in the primary circuit 500 to provide 110-volt power in the secondary circuit 501.

The primary circuit 500 has connected in parallel a drive motor line 503, a vacuum pump motor line 504, a heat control line 505, and a transformer line 506. The drive motor line 503 includes the main drive motor 63 and a relay contact 507*a* on each side thereof operated by a motor start relay 507 in the secondary circuit. The drive motor line also includes an overload circuit breaker 508.

The vacuum pump motor line 504 includes the vacuum pump motor 43 and a relay contact 509*a* on each side thereof for closing by the vacuum control relay 509 of the secondary circuit, and also includes an overload circuit breaker 510.

The heat control line 505 includes the temperature control rods 425 of the glue applicators 403 and relay contacts 511*a* on both sides thereof for closing by the heat control relay 511 of the secondary circuit. The heat control rods 425 are connected to the heating elements 424 (not shown in FIG. 10) for heating of the glue applicator bases 415 and glue heads 404.

The transformer line 506 includes the primary winding of the transformer 502 and a main switch 512 operable to close the transformer line 506 to energize the transformer. This main switch 512 is a double-throw switch with another component in the secondary circuit 501 for closing the secondary circuit and energizing the elements thereof.

The secondary circuit 501 has connected in parallel a transformer line 513, a vacuum control line 514, a heat control line 515, a glue motor line 516, a glue motor clutch line 517, a clutch control relay line 518, and a start and stop line 519.

The transformer line 513 includes the secondary winding of the transformer 502 for 110-volt input to the secondary circuit 501.

The vacuum control line 514 includes the vacuum control relay 509, which, when energized, closes the relay contacts 509*a* in the vacuum pump motor line 504 of the primary circuit to energize the vacuum pump motor 43 to create suction in the suction heads 122 and 101 at the feeding station 100. This vacuum control line also includes a switch 520 that is manually operable to close the line, and includes an overhead circuit breaker 520.

The heat control line 515 includes the heat control relay 511 and a manual switch 522 that is closed to energize the heat control relay 511 for closing of the relay contacts 511*a* in the heat control line 505 of the primary circuit, which energizes the heat control rods 425 and the heating elements 424 in the glue applicators 403 for maintaining the glue at a desired temperature level therein. Connected in parallel with the heat control relay 511 is an indicator light 523 that provides an indication to the operator that the glue applicators are being heated.

The glue motor line 516 includes, connected in parallel, the glue motor 423 for each glue applicator, and a manually operable switch 524 that is closed to energize the glue motors 423, which remain in operation as long as the switch 524 is closed, but do not operate the feeding worms 419 of the glue applicators 403 until the clutches 422 are engaged as described hereinafter. The glue motor line also includes, in parallel with the glue motors, an indicating light 525 to indicate to the operator that the glue motors 423 are energized.

The glue motor clutch line 517 includes a rectifier 526 to which are connected, in parallel, the clutches 422 for the glue motors 423 and relay contacts 527*a* that are closed by the clutch control relay 527 to energize the clutches, which then engage the glue motors 423 with the feeding worms 419 to cause glue to be fed to the transfer ports 411 of the glue applicators as long as the clutch control relay contacts 527*a* are closed.

The clutch control relay line 518 includes the clutch control relay 527, which, when energized, closes the aforementioned relay contacts 527*a* in the clutch line 517. The clutch control relay line also includes, in series, the timing switch 438, which is operated from the timing cam shaft 158, and the carton sensing switch 440, which is closed by a carton blank approaching the glue applicators 403. Both of these switches 438 and 440 must be closed to energize the clutch control relay 527. Connected in parallel with the switches is a glue primer switch 528, which can be manually closed to energize the clutch control relay 527 for feeding of glue through the glue appli-

cator to prime the system at the beginning of operation of the machine. Also included in the clutch control relay line **518** is a relay contact **507***b* operated by the motor start relay **507** to energize the clutch relay line.

The stop and start line **519** includes, in series, a normally closed stop switch **529**, a normally open start switch **530** and the motor start relay **507**. Connected in parallel with the start switch **530** is a relay contact **507***c*, which is closed upon energizing of the motor start relay **507** by closing of the start switch **530**, so that upon subsequent release of the start switch the relay will remain energized. This motor start relay **507** closes the aforementioned relay contact **507***b* in the clutch control relay line **518** and also closes the relay contacts **507***a* mentioned above in the drive motor line **503** of the primary circuit.

As seen in FIG. 1, the electrical controls may be mounted in a housing **531** at the rear of the machine above the level of the conveyor and in general alignment with the loading station **300** for convenient manipulation of the various switches by the operator, who would normally be stationed at the loading station. This housing **531** is mounted on an extension of the hold-down plow support plate **214** and has mounted on its front face, a main control switch button, a vacuum control switch button, a heat control switch button, a glue motor switch button, a stop switch button, and a start switch button, each of which operates its corresponding switch.

The machine is placed in operation by first depressing the main control button to close the main switch **512**. The vacuum control switch button, the heat control switch button, and the glue motor switch button is then depressed to energize the vacuum pump motor **43**, the heating elements **424** and the glue motors **423**. The machine is then ready to begin operation, which is started by depressing the start switch button, which energizes the motor start relay **507**, which in turn energizes the drive motor **63** to begin operation of the conveyor **24** and the carton blank removing and delivering means **105** and **107** at the feeding station **100**. This motor start relay **507** also closes the contact **507***b* in the clutch control relay line **518**. The glue applicators **403** are then primed by depressing the glue primer switch **528** in the clutch control relay line **518** to prepare the glue applicators for application of glue to the advancing cartons.

As the carton transferring and turning means **105** is withdrawing vertically disposed carton blanks singly from the supply hopper **102** and depositing them on the intermediate platform **106**, the delivery means **107** is translating carton blanks singly from the intermediate platform onto the conveyor **24** between flights **39** and **40** of each pair of flights. The conveyor carries the carton blanks serially through the setting-up station **200** to set up the carton blanks as illustrated in FIGS. 12 through 14, and described in detail hereinabove. As the carton blanks progress continuously on the conveyor, they are end-loaded at the loading station **300** and the end flaps **33** and **34** and tabs **35** and **36** are folded as shown in FIG. 16 and described hereinabove, with the bottom end flaps **34** upfolded for receipt of glue, and the top end flaps **33** remaining unfolded. The loaded carton blanks then pass over the carton blank sensing bell crank **441** to close the corresponding switch **440** for energizing of the clutch control relay **527** upon closing of the timing switch **438** by the cam **439** on the timing cam shaft **158** for actuation of the glue feeding worms **419** as the glue applicators are translated toward contact with the upturned bottom end flaps **34** of the approaching carton blank, with the glue applicators being circularly translated continuously by the driving connection from the main drive shaft **57**, which is continuously driven by the drive motor **63** as long as the aforementioned motor start relay **507** is energized.

The beads **402** of glue that are fed to the transfer ports **411** by operation of the glue motors **423** are transferred by contact to the bottom end flaps **34** of the carton blanks during the short period of contiguous movement of the glue heads **404** with the bottom end flaps **34**. As the carton blanks progress past the glue applicators, the top end flaps **33** are folded down onto the glue-bearing bottom end flaps and held thereagainst by the final folding plows **232** until the carton blank is discharged at the end of the conveyor as a completely sealed and loaded package.

The machine continues to operate automatically until the stop switch button is depressed, thereby de-energizing the motor start relay **507**, which in turn opens the relay contacts **507***b*, **507***c* and **507***a* in the clutch control relay line **518**, in the motor start relay line **519**, and in the drive motor line **503**, thus de-energizing the clutch control relay to stop feeding of glue to the transfer ports and de-energizing the drive motor to stop the drive to all moving parts, except the glue motors, which are stopped by turning the main operating switch button to off position. The vacuum pump motor **43** is independently turned off by turning the vacuum control relay switch button to off position, and the heat control is turned off by turning the heat control relay switch button to off position.

It should be noted that the glue applicators of the above-described preferred embodiment of the present invention could be used to apply any liquid, such as an adhesive, a wax, or other liquid material, and could be adapted for use with machines other than packaging machines, such as paperboard folding machines. Also, the glue applicators could be used to apply adhesive to any line of articles and could be used without heat for subsequent heat sealing at some time or place beyond the glue applicator.

With these glue applicators, predetermined measured amounts of glue can be presented in bead form for application to an article with the surface tension of the beads preventing dripping, such that there is a substantial reduction in the amount of glue used to the extent of less than half as much as used in conventional glue applicating devices.

When using the glue applicators to apply hot-melt glue, the temperature control provided by the present invention results in a positive control of surface tension of the glue beads to avoid dripping and to control in conjunction with the transfer port configuration and glue feeding operation the amount of glue that can be supplied in each bead.

The present invention has been described in detail above for purposes of illustration only and is not intended to be limited by this description or otherwise, except as defined in the appended claims.

I claim:

1. A method of feeding collapsed, sleeve-type carton blanks from a supply onto a moving conveyor and setting-up the carton blanks thereon for end loading, said carton blanks being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition in which one side wall panel underlies the top wall panel and the other side wall panel overlies the bottom wall panel, said method comprising disposing a supply of said collapsed carton blanks in a hopper adjacent the moving conveyor with the carton blanks in a row, periodically removing said collapsed carton blanks singly from said supply and placing said removed carton blanks on an intermediate platform, periodically transfering carton blanks from said intermediate platform onto the moving conveyor in a generally horizontal disposition and in timed relation to said removal of carton blanks from said supply, setting-up the carton blanks on the moving conveyor by folding both the underlying side wall panel and the top wall panel portion thereabove to a generally upright disposition with respect to said bottom wall panel and subsequently unfolding said top wall panel portion about the juncture with said underlying side wall panel, thereby separating said top and bottom wall panels and setting-up said carton for end loading.

2. A method of setting-up a collapsed, sleeve-type, carton blank for end loading, said carton blank being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition in which one side wall panel underlies the top wall panel and the other side wall panel overlies the bottom wall panel, said method comprising folding both said underlying side wall panel and the top wall panel portion thereabove to a generally upright disposition with respect to said bottom wall panel, and unfolding said top wall panel portion about the juncture with said underlying side wall panel, thereby separating said top and bottom wall panels and setting-up said carton blank for end loading.

3. A method for setting-up a collapsed, sleeve-type, carton blank according to claim 2 in which said carton blank is characterized further in that said top wall panel extends endwise beyond said underlying side wall panel and said unfolding is accomplished by applying an upward unfolding pressure on the underside of the extent of said top wall panel beyond said underlying side wall panel.

4. A method of setting-up a collapsed, sleeve-type, carton blank for end loading, said carton blank being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition in which the side wall panels lie flat with one side wall panel underlying the top wall panel and the other side wall panel overlying the bottom wall panel, said method comprising folding both said underlying side wall panel and the portion of the top wall panel thereabove to a generally upright disposition with respect to said bottom wall panel, retaining said underlying side wall panel in said generally upright disposition while unfolding said top wall panel portion about the juncture with said underlying side wall panel to a generally horizontal disposition, thereby raising said top wall panel from said bottom wall panel and erecting said overlying side wall panel, and, while retaining said underlying side wall panel in said generally upright disposition, inclining said erected overlying side wall panel slightly inwardly to cause an upward bowing of said top wall panel to facilitate endwise loading of contents into the thusly set-up carton blank.

5. A method of setting-up a collapsed, sleeve-type carton blank for end loading, said carton blank being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition in which the side wall panels lie flat with one side wall panel underlying the top wall panel and the other side wall panel overlying the bottom wall panel and with an unbroken score line at the juncture of the top wall panel and the overlying side wall panel, said method comprising folding said underlying side wall panel to a generally upright disposition with respect to said bottom wall panel and separating said top wall panel with said unbroken score line resisting a fully upright disposition of the overlying side wall panel with respect to the top wall panel such that the overlying side wall panel is slightly inclined and causes a bowing of the top wall panel that facilitates insertion of contents into the thusly set-up carton blank.

6. A method of setting-up a collapsed, sleeve-type, carton blank for end loading, said carton blank being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition in which the side wall panels lie flat with one side wall panel underlying the top wall panel and the other side wall panel overlying the bottom wall panel and with an unbroken score line at the juncture of the top wall panel and the overlying side wall panel, said method comprising folding both said underlying side wall panel and the top wall panel portion thereabove to a generally upright disposition with respect to said bottom wall panel, unfolding said top wall panel portion about the juncture with said underlying side wall panel and separating said top wall panel from said bottom wall panel, thus setting-up the carton blank with said unbroken score line resisting a fully upright disposition of the overlying side wall panel with respect to said top wall panel such that the overlying side wall is slightly inclined and causes a bowing of the top wall panel that facilitates insertion of contents into the thusly set-up carton blank.

7. A method of forming a package from a collapsed, sleeve-type carton blank that has serially connected top, bottom and opposed side wall panels disposed in an initially collapsed condition in which the side wall panels lie flat with one side wall panel underlying the top wall panel and the other side wall panel overlying the bottom wall panel and with end flaps extending outwardly from each end of the top and bottom wall panels, said method comprising folding both said underlying side wall panel and the portion of the top wall panel thereabove to a generally upright disposition with respect to both the bottom wall panel and the remainder of the top wall panel, retaining said underlying side wall panel in said generally upright disposition while unfolding said top wall panel portion about the juncture with said underlying side wall panel to a generally horizontal disposition and thereby raising said top wall panel above the bottom wall panel and erecting said overlying side wall panel, loading contents endwise into the carton blank between the separated top and bottom wall panels, folding one end flap at each end into an end closing disposition, measuring amounts of glue in bead form for application to said folded end flaps, applying said measured amounts of glue by contact to said folded end flaps to secure the flaps together and thereby seal the ends of the package.

8. A method of closing and sealing a carton that has serially connected top, bottom and opposed side walls and end flaps extending outwardly from each end of the top and bottom walls, said method comprising folding one end flap at each end of the carton into an end closing disposition, measuring amounts of glue in bead form for application to said folded end flaps, applying said measured amounts of glue by contact to said folded end flaps, and folding the other end flaps over the glue bearing flaps to secure the flaps together and thereby seal the ends of the package.

9. A method of closing and sealing a carton according to claim 8 and characterized further in that said glue is a hot-melt glue and said method includes maintaining the measured beads of hot-melt glue at an elevated temperature prior to application to said carton ends.

10. A method of closing and sealing cartons in a continuous process, said cartons having an open end with a pair of end flaps extending outwardly thereat and foldable for closing said open end, said method comprising continuously advancing cartons with their open ends facing laterally through a preliminary folding station, past a glue applicator and through a final folding station, folding one end flap into end closing disposition as each carton progresses continuously through said preliminary folding station, feeding measured amounts of hot-melt glue to a carton contacting surface of the glue applicator, maintaining the measured amounts of hot-melt glue at an elevated temperature sufficient to render the glue transferable by contact, revolving said applicator in timed relation to the progression of cartons into contact and momentary movement with the folded end flap of a progressing carton for transfer of the measured amount of hot-melt glue to the folded end flap, and folding the other end flap over the glue bearing flap as the carton progresses continuously through the final folding station and while the glue is still hot enough to secure the flaps together and thereby seal the end of the package.

11. A method of closing and sealing cartons in a continuous process, said cartons having opposed open ends with end flaps extending outwardly thereat and foldable for closing of the open ends, said method comprising continuously advancing cartons with their open ends facing laterally through a preliminary folding station, between

a pair of opposed glue applicators and through a final folding station, folding one end flap at each end of each carton into an end closing disposition as the carton progresses continuously through said preliminary folding station, feeding measured amounts of hot-melt glue to transfer ports at carton contacting surfaces of the glue applicators, maintaining the measured amounts of hot-melt glue at an elevated temperature sufficient to render the glue transferable by contact, revolving said applicators in timed relation to the progression of cartons therebetween into contact and momentary movement with the folded end flaps of the progressing cartons for transfer of the measured amounts of hot-melt glue to the folded flaps, and folding the other end flaps over the glue bearing flaps as the cartons progress continuously through the final folding station and while the glue is still hot enough to secure the flaps together and thereby seal the ends of the package.

12. Means for feeding articles from a supply onto a moving conveyor, said means comprising a supply hopper disposed above said moving conveyor for supporting a supply of articles in a row extending generally in the direction of the moving conveyor with the articles inclined with respect to their intended dispostion on the moving conveyor, said supply hopper having a discharge end facing in the direction opposite to the direction of conveyor movement for presentation of the supply articles singly thereat, an intermediate platform for receiving articles from said hopper in position for subsequent transfer to said conveyor, removing and turning means for periodically removing articles singly from said supply at said hopper discharge end and turning the removed articles to said intended position and depositing said turned articles onto said intermediate platform, and delivery means for periodically translating articles in said intended disposition from said intermediate platform onto said moving conveyor in timed relation to the operation of said removing and turning means.

13. Means for feeding flat articles from a supply onto a moving conveyor, said means comprising a supply hopper disposed above said moving conveyor and extending from a discharge end in the general direction of said moving conveyor for supporting a supply of flat articles uprightly disposed and facing said discharge end for sequential presentation singly thereat, an intermediate platform for receiving articles from said hopper in horizontal disposition for subsequent transfer to said conveyor, an oscillatable rocker arm having article engaging means pivotally mounted thereon adjacent said hopper discharge end, means for pivoting said article engaging means in relation to oscillation of said rocker arm between a horizontal article engaging position at said hopper discharge end for engaging articles thererat and a generally vertical article depositing position at said intermediate platform for releasing articles removed from said hopper onto said platform in horizontal disposition, a parallel, double lever, operating mechanism carrying article pick-up means and oscillatable to translate said article pick-up means between said intermediate platform for picking up articles thereat and said moving conveyor for depositing articles thereon in horizontal disposition, and drive means for oscillating said rocker arm and said operating mechanism in timed relation.

14. In a packaging machine, means for feeding collapsed, sleeve-type, carton blanks from a supply onto a moving conveyor and setting-up the carton blanks thereon for end loading, said carton blanks being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition, said means comprising a moving endless conveyor carrying pairs of upstanding flights extending transversely and with the flights of each pair spaced apart longitudinally of the conveyor a distance equivalent to the width of the bottom wall panels of the carton blanks, a supply hopper disposed adjacent said conveyor for supporting a supply of collapsed carton blanks and having a discharge end at which carton blanks are removed singly from said supply, an intermediate platform for receiving carton blanks from said hopper for subsequent transfer to said conveyor, removing means for periodically removing carton blanks singly from said supply at said hopper discharge end and transporting said removed carton blanks onto said intermediate platform, delivery means for periodically transfering carton blanks from said intermediate platform onto said moving conveyor in timed relation to the movement of said conveyor flights to position each transferred carton blank at a pair of flights with one collapsed side wall panel over one flight and the bottom wall panel extending flatly therewith between the flights of said pair, folding means operable downwardly on each transferred carton blank between said flights and adjacent said one flight to force said carton blank downwardly between flights and cause said one side wall panel and the top wall panel portion thereabove to fold against said one flight to an upright disposition, and opening means beyond said folding means and operable against the underside of said top wall panel to separate said top and bottom wall panels to set-up disposition for end loading of the carton blank.

15. In a packaging machine, means for feeding and setting-up carton blanks according to claim 14 and characterized further in that said folding means is mounted on said delivery means for movement therewith and for folding of said one side wall panel and top wall panel portion at the end of the delivery stroke of said delivery means.

16. In a packaging machine, means for setting-up carton blanks for end loading, said carton blanks being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition, said means comprising a moving endless conveyor carrying pairs of upstanding flights extending transversely and with the flights of each pair spaced apart longitudinally of the conveyor a distance equivalent to the width of the bottom wall panels of the carton blanks, delivery means for periodically transferring carton blanks from a supply onto said moving conveyor in timed relation to the movement of said conveyor flights to position each transferred carton blank at a pair of flights with one collapsed side wall panel over one flight and the bottom wall panel extending flatly therewith between the flights of said pair, folding means mounted on said delivery means for movement therewith and operable downwardly on each transferred carton blank between said flights and adjacent said one flight to force said carton blank downwardly between flights and cause said one side wall panel and the top wall panel portion thereabove to fold against said one flight to an upright disposition, and opening means beyond said folding means and operable against the under side of said top wall panel to separate said top and bottom wall panels to a set-up disposition for end loading of the carton blank.

17. In a packaging machine, means for setting-up carton blanks according to claim 16 and characterized further in that said delivery means comprises a parallel, double lever, operating mechanism carrying a carton blank supporting head for translating carton blanks in the direction of movement of said conveyor onto said conveyor and downwardly between flights of a pair, and said folding means is mounted on said head for movement therewith to fold said one side wall panel and said top wall panel portion as said delivery means moves downwardly between flights.

18. In a packaging machine, means for setting-up collapsed sleeve-type, carton blanks for end loading, said carton blanks being characterized by serially connected top, bottom and opposed side wall panels in an initially collapsed condition with one side wall panel underlying the top wall panel and the other side wall panel overlying the bottom wall panel, said means comprising a moving conveyor for continuously advancing a serial progression of carton blanks initially disposed thereon in flat, col-

lapsed disposition, folding means operable on the progressing initially collapsed carton blanks on the conveyor to fold the underlying side wall panel and top wall panel portion thereabove to an upright disposition with respect to said bottom wall panel, and opening means beyond said folding means and operable against the underside of said top wall panel to separate said top and bottom wall panels to a set-up disposition for end loading of the carton blank.

19. In a packaging machine, means for setting-up carton blanks according to claim 18 and characterized further in that said carton blanks have open ends facing transversely of the moving conveyor and the top wall panel extends transversely beyond the underlying side wall panel, said underlying side wall panel being the leading side wall panel with respect to the direction of movement of the conveyor, and said opening means is a side plow disposed adjacent said conveyor for opening engagement first with the uprightly disposed top wall panel portion at the extent thereof beyond said underlying side wall panel.

20. In a packaging machine, means for setting-up carton blanks according to claim 18 and characterized further in that the juncture of the top wall panel and overlying side wall panel of the carton blanks is an initially unbroken score line that resists fully upright disposition with respect to said top wall panel upon operation of said opening means and thereby causes an upward bowing of the top wall panel that facilitates end loading of the thusly set-up carton blank.

21. In a packaging machine, means for setting-up carton blanks according to claim 18 and characterized further by bowing means engageable with the overlying side wall panel after operation of said opening means to incline said underlying side wall panel slightly toward the opposite side wall panel and thereby cause upward bowing of said top wall panel to facilitate end loading of the thusly set-up carton blank.

22. In a packaging machine, means for setting-up carton blanks according to claim 21 and characterized further in that said conveyor has pairs of upstanding flights extending transversely of the conveyor with the flights of each pair spaced longitudinally on the conveyor for disposition of carton blanks therebetween with the carton blanks having open ends facing transversely and the overlying side wall panel adjacent the trailing flight of the pair, and said bowing means is a finger pivotally mounted in vertical disposition on said trailing flight and a fixed cam plate mounted adjacent said conveyor in line with the progression of the finger with the moving conveyor and extending through a loading station for displacing engagement with the finger to cause pivoting thereof inwardly against said overlying side wall panel to incline said overlying side wall panel sligthly and thereby bow said top plate panel upwardly to facilitate end loading.

23. A packaging machine in which sleeve-type carton blanks are set-up, loaded and sealed, said carton blanks being characterized by serially connected top, bottom and opposed side wall panels with the top and bottom wall panels having end flaps extending outwardly therefrom for subsequent folding into end closing disposition, said carton blanks being initially in collapsed condition with one side wall panel underlying the top wall panel and the other side wall panel overlying the bottom wall panel, said packaging machine comprising a moving conveyor for continuously advancing a serial progression of carton blanks initially disposed thereon in flat, collapsed disposition with the ends of the carton blanks facing laterally of the conveyor, side wall folding means operable on the progressing initially flat carton blanks to fold the underlying side wall panel and the top wall panel portion thereabove to an upright disposition with respect to said bottom wall panel, opening means beyond said side wall folding means and operable against the underside of said top wall panel to separate said top and bottom wall panels to a set-up disposition for end loading, a loading station beyond said opening means and at which contents are loaded into the progressing, set-up carton blanks laterally through the open ends thereof, preliminary end flap folding means beyond said loading station for folding one end flap of each carton blank into end closing disposition, a glue applicator mounted adjacent the conveyor beyond said preliminary end flap folding means and having glue transfer ports facing said conveyor in line with the folded end flap, glue feeding means for feeding measured amounts of glue to said transfer ports to form beads of glue thereat, means for moving said glue applicator laterally into contact with the folded end flaps of the progressing carton blanks and in timed relation to the progression of carton blanks for transfering said measured glue beads from said transfer ports onto the folded end flaps by contact therewith, and final end flap folding means beyond said glue applicator for folding the other of said end flaps over the folded, glue bearing flaps to secure the flaps together and thereby seal the end of the package.

24. In a packaging machine wherein cartons are disposed in a serial progression on a moving conveyor with the cartons having laterally facing open ends at which pairs of end flaps extend outwardly for subsequent folding into end closing disposition, means for closing and sealing the carton ends comprising preliminary end flap folding means for folding one end flap of each pair into end closing disposition, a glue applicator mounted adjacent the conveyor beyond said preliminary end flap folding means and having glue transfer ports facing said conveyor in line with the folded end flaps, glue feeding means for feeding measured amounts of glue to said transfer ports to form beads of glue thereat, means for moving said glue applicator laterally into contact with the folded end flaps of the progressing cartons and in timed relation to the progression of cartons for transfering said measured glue beads from said transfer ports onto the folded end flaps by contact therewith, and final end flap folding means beyond said glue applicator for folding the other end flaps over the folded, glue bearing flaps to secure the flaps together and thereby seal the end of the carton.

25. In a packaging machine, means for closing and sealing carton ends according to claim 24 and characterized further in that said glue is a hot-melt glue and means are provided for heating said glue applicator to maintain the beads of hot-melt glue at a temperature sufficient to render the beads transferable by contact without dripping.

26. In a packaging machine, means for closing and sealing carton ends according to claim 24 and characterized further in that said cartons have opposed open ends facing laterally, in that said preliminary end flap folding means folds one end flap at each opposed end of each said cartons, in that there are a pair of said glue applicators in opposed relation for applying glue simultaneously to the folded end flaps at both ends of said cartons with said glue feeding means and said moving means being associated with each glue applicator, and in that said final end flap folding means folds the other end flap at both ends of the cartons to seal both ends of the cartons simultaneously.

27. Means for applying glue to articles conveyed in a serial progression on a moving conveyor with laterally facing surfaces on which glue is to be applied, said glue applicating means comprising a glue applicator mounted adjacent the conveyor with a supply reservoir for containing a supply of glue and with glue transfer ports facing the conveyor in line with the laterally facing surfaces of said serially progressing articles, glue feeding means incorporated in said glue applicator for feeding measured amounts of glue from said supply reservoir to said transfer ports to form beads of glue thereat, means for moving said glue applicator laterally into contact with said laterally facing article surfaces in timed relation to the progression of articles for transfering said measured beads of glue from said transfer ports onto said laterally facing surfaces by contact therewith.

28. Glue applicating means according to claim 27 and

characterized further in that said feeding means comprises a supply passage communicating between said supply reservoir and said transfer ports, pumping means disposed in said supply passage, and pump activating means for activating said pumping means in relation to the progression of articles to feed measured amounts of glue to said transfer ports for each application of glue to said article surfaces.

29. Glue applicating means according to claim 28 and characterized further in that said supply passage has a cylindrical portion, and said pumping means includes a rotatable worm in said cylindrical portion operable to extrude controlled amounts of glue therethrough to supply said measured amounts of glue to said ports.

30. Glue applicating means according to claim 28 and characterized further in that there are a plurality of said transfer ports disposed in an elongated article facing surface and said supply passage includes a distribution chamber extending within said applicator generally parallel to said article facing surface and intermediate said pumping means and said transfer ports.

31. Glue applicating means according to claim 30 and characterized further in that said supply passage includes individual channels leading from the top of said distribution chamber to each of said transfer ports.

32. Glue applicating means according to claim 30 and characterized further in that said glue is a hot-melt glue and an electrical heating element extends within said glue applicator generally parallel to said article facing surface and adjacent said ports to maintain said measured beads of glue at a temperature sufficient to render the beads transferable by contact without dripping.

33. Glue applicating means according to claim 32 and characterized further in that a temperature control rod extends adjacent said heating element to detect the temperature of said glue applicator for control of the heating element temperature.

34. Glue applicating means according to claim 28 and characterized further in that said glue is a hot-melt glue and an electrical heating element is disposed within said glue applicator adjacent said transfer ports to maintain said measured beads of glue at a temperature sufficient to render the beads transferable by contact without dripping.

35. Glue applicating means according to claim 28 and characterized further in that said glue is a hot-melt glue and electrical heating elements are disposed within said glue applicator adjacent said ports and adjacent said supply reservoir and said supply pasage, and control rods are disposed within said glue applicator adjacent said ports and adjacent said supply reservoir and said supply passage to detect the temperature of said glue applicator for control of the temperature of the heating elements.

36. Glue applicating means according to claim 28 and characterized further in that said transfer ports are formed in replaceable inserts removably mounted in said glue applicator to permit substitution of inserts having differently sized and contoured ports.

37. Means for applying glue to articles conveyed in a serial progression on a moving conveyor with laterally facing surfaces on which glue is to be applied, said glue applicating means comprising a glue applicator mounted adjacent the conveyor with an elongated article facing surface at which measured amounts of glue are presented in bead form for transfer to said article surfaces, means for moving said glue applicator in curvilinear translation tangent to the path of said article surfaces in timed relation to the progression of articles for glue transferring contact of said elongated article facing surface against said article surfaces as the articles progress on said conveyor.

38. Glue applicating means according to claim 37 and characterized further in that there are a pair of said glue applicators in opposing disposition on opposite sides of said moving conveyor for simultaneously transfering of glue to opposed laterally facing surfaces of said progressing articles.

39. Glue applicating means according to claim 37 and characterized further in that said glue applicator is mounted on a carriage and said moving means includes driven crank means connected to said carriage to revolve said carriage and said glue applicator, and restraining means are provided to restrain said carriage for carton facing disposition of said glue applicator during revolving thereof, said glue applicator thereby moving in circular translation.

40. Glue applicating means according to claim 39 and characterized further in that said restraining means comprises a subcarriage on which said carriage is mounted for linear sliding movement thereon and main support means on which said subcarriage is mounted for linear sliding movement transverse to the linear movement of the carriage on the subcarriage, said linear sliding movements combining to permit circular translation of the glue applicator by said crank means.

41. Glue applicating means according to claim 40 and characterized further in that said subcarriage includes a pair of parallel, carriage supporting, rods on which said carriage is slidably mounted for said linear movement thereof, and said main support means includes a pair of parallel main rods extending transverse to said carriage supporting rods and on which said subcarriage is slidably mounted for said linear movement thereof.

42. Glue applicating means according to claim 41 and characterized further in that there are a pair of said glue applicators in opposing disposition on opposite sides of said moving conveyor for simultaneous transferring of glue to opposed laterally facing surfaces of said progressing articles, a said subcarriage supports each said glue applicator with said subcarriage rods extending parallel to the direction of conveyor movement, and said pair of main rods extends transversely on each side of the conveyor for aligned mounting of said subcarriages.

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