Oct. 20, 1942. H. L. EVANS 2,299,474

PACKAGING MACHINERY

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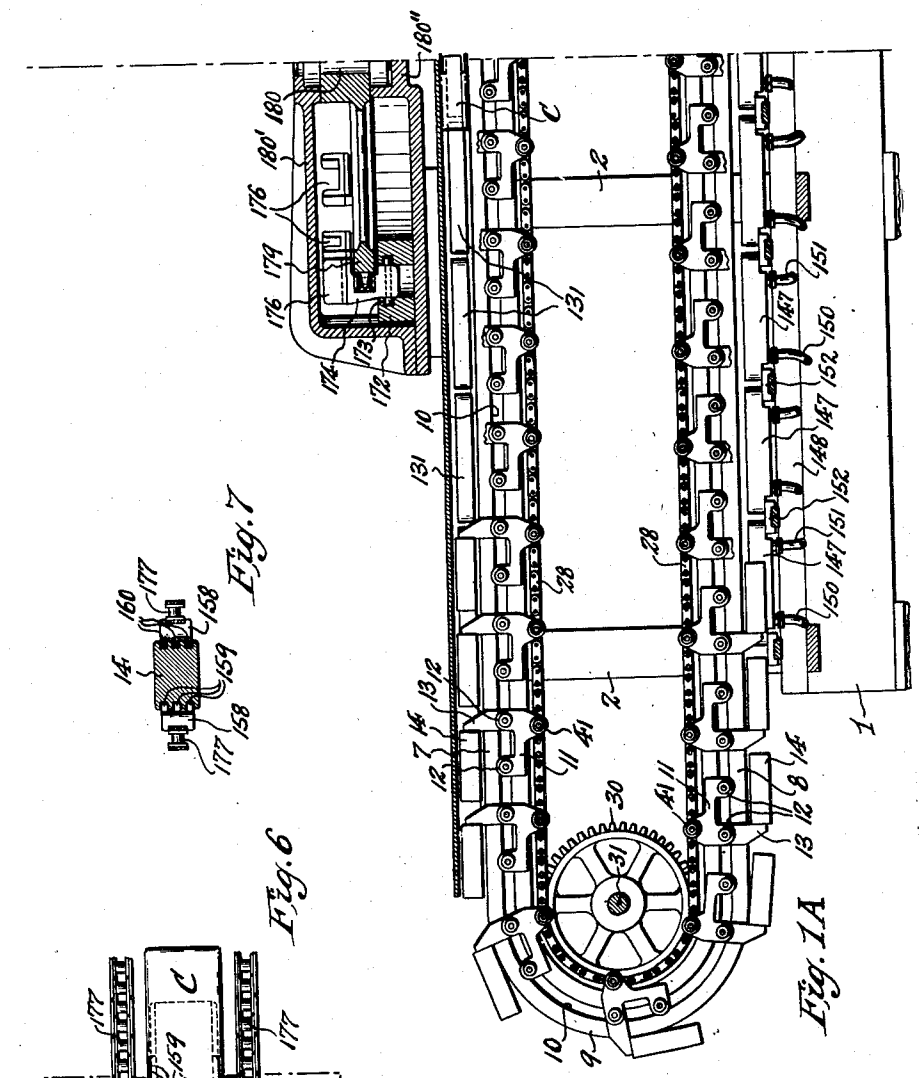


Fig. 1A

Fig. 7

Fig. 6

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Oct. 20, 1942. H. L. EVANS 2,299,474

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Filed Nov. 29, 1939 12 Sheets-Sheet 2

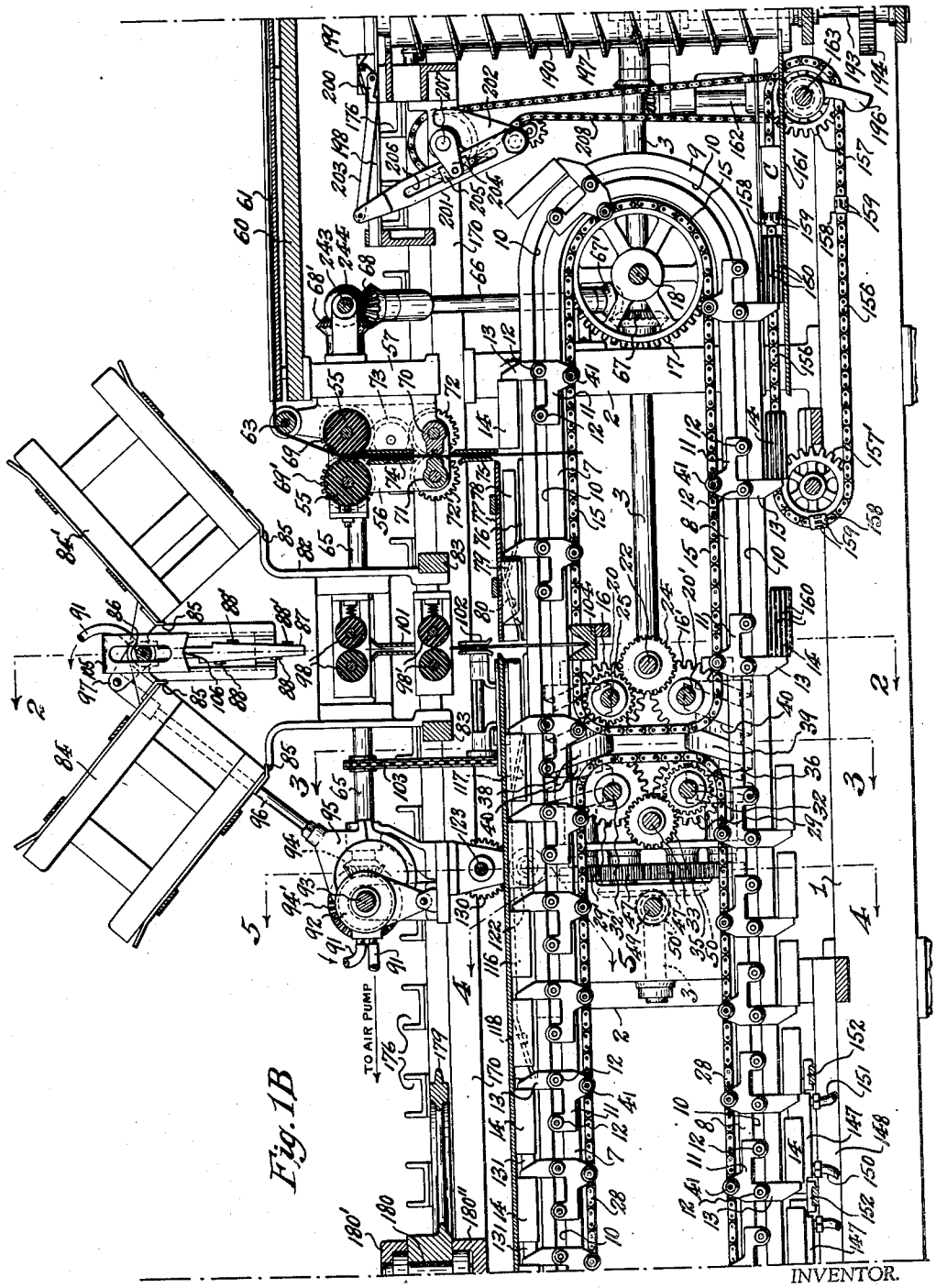


Fig. 1B

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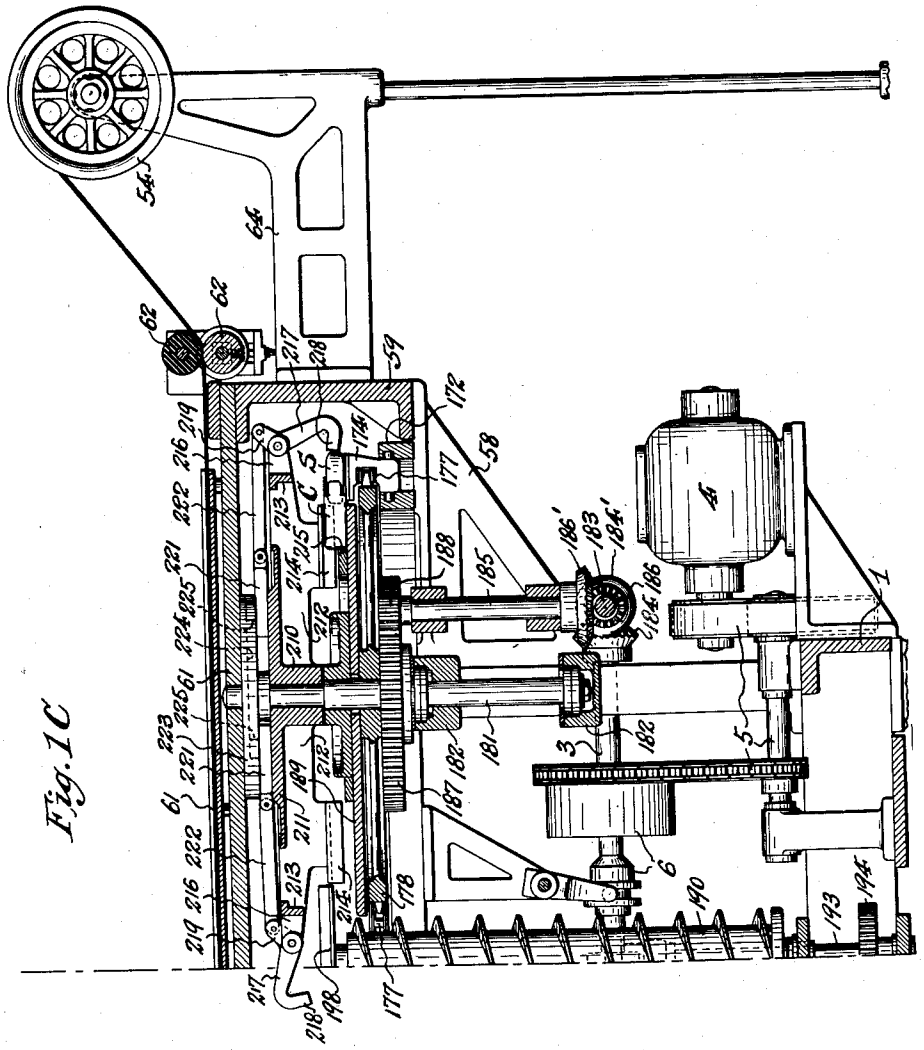


Fig. 1C

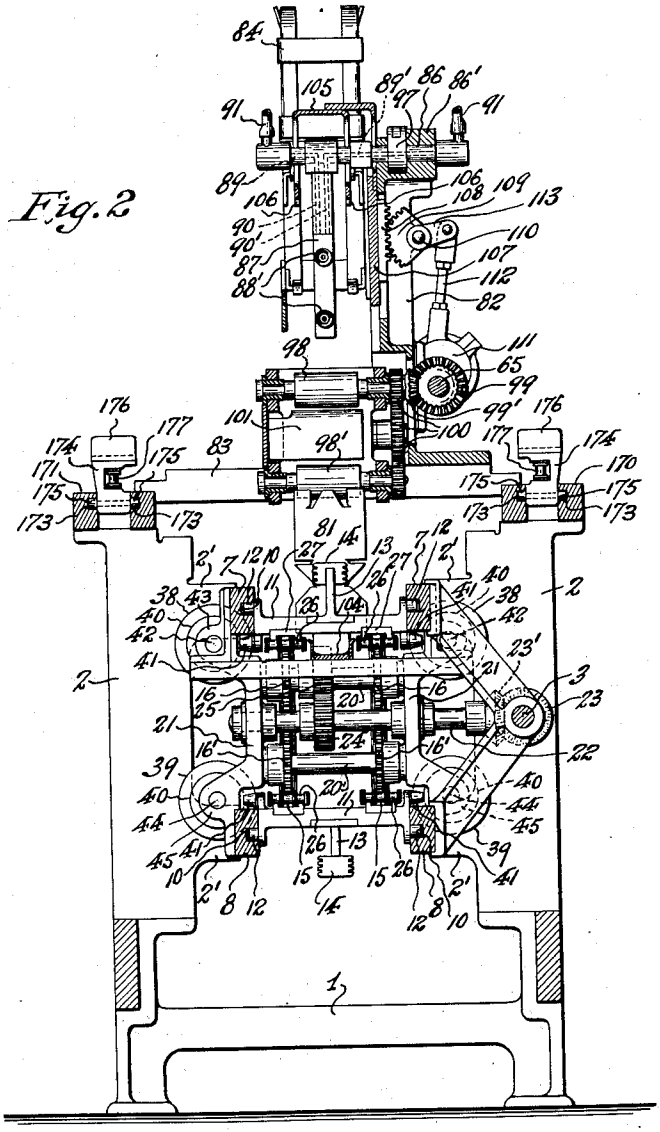
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Oct. 20, 1942. H. L. EVANS 2,299,474

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Fig. 2



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Oct. 20, 1942. H. L. EVANS 2,299,474

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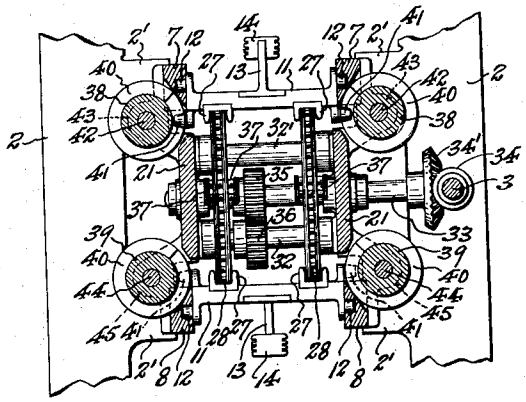


Fig. 3

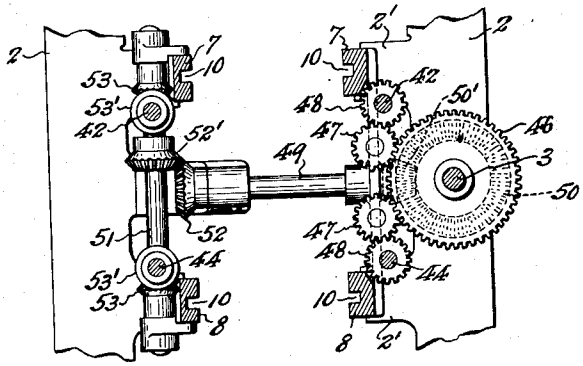


Fig. 4

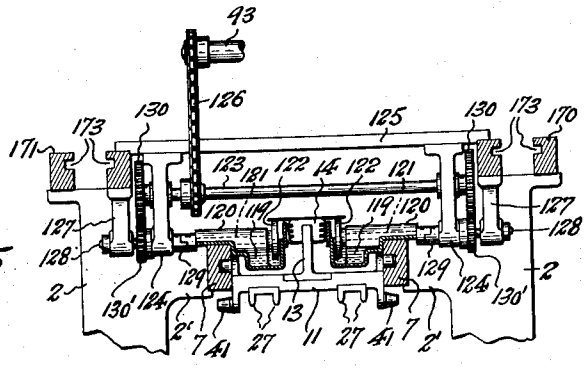


Fig. 5

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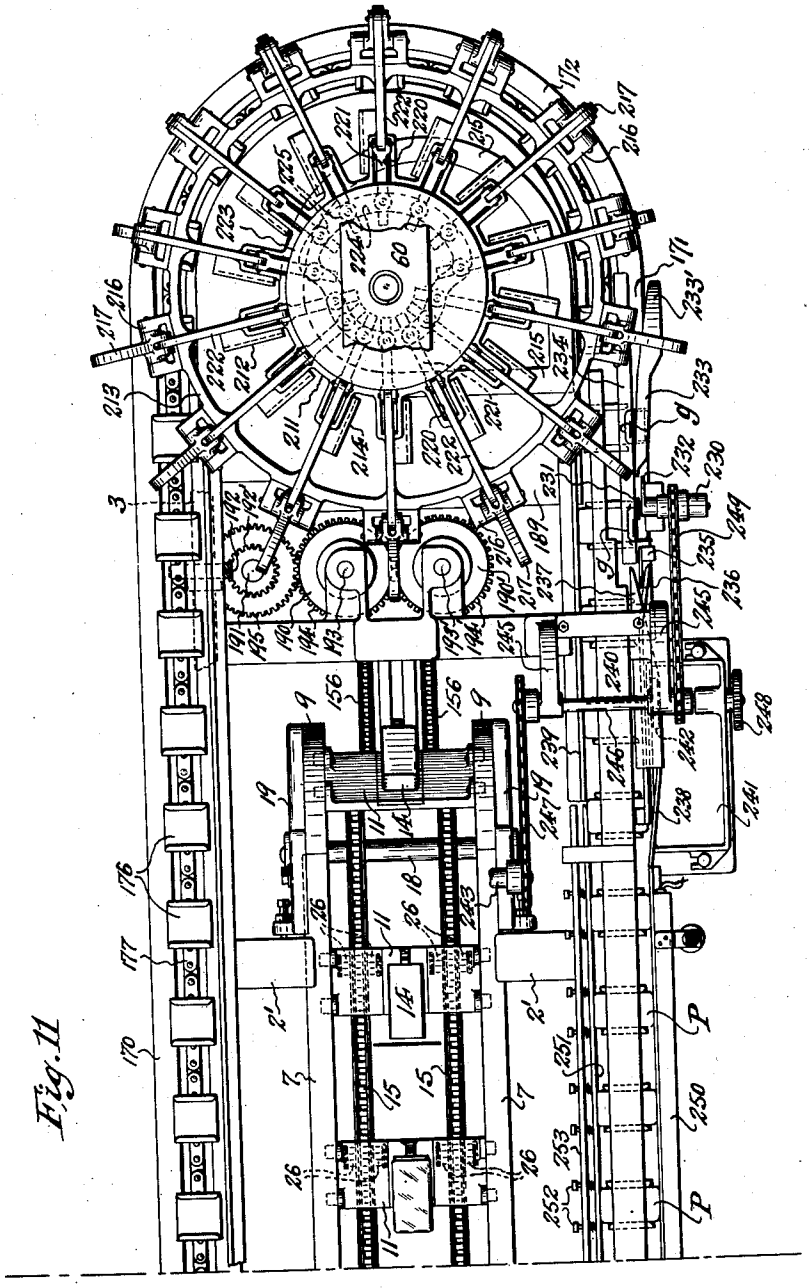


Fig. 11

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Filed Nov. 29, 1939 12 Sheets-Sheet 7

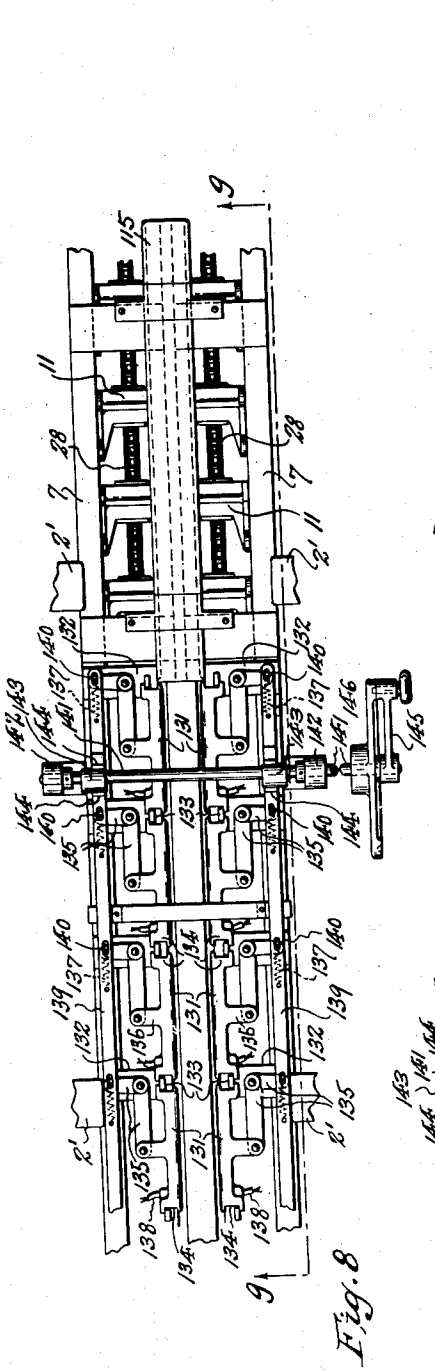


Fig. 8

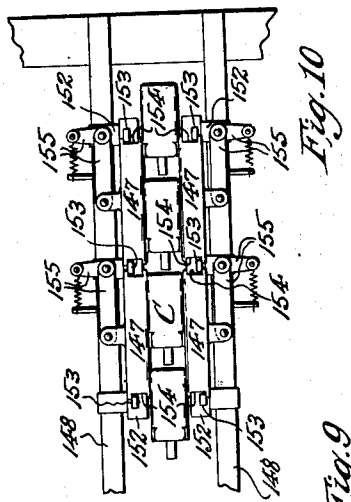


Fig. 10

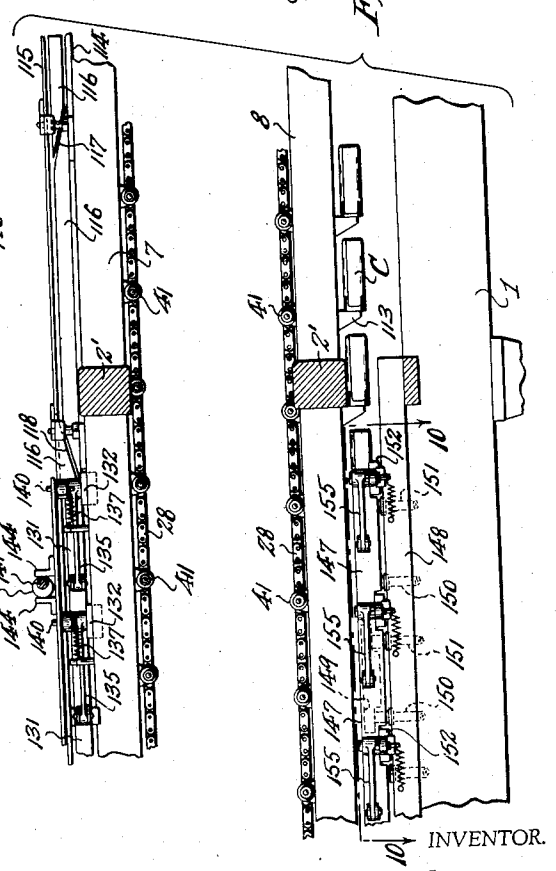


Fig. 9

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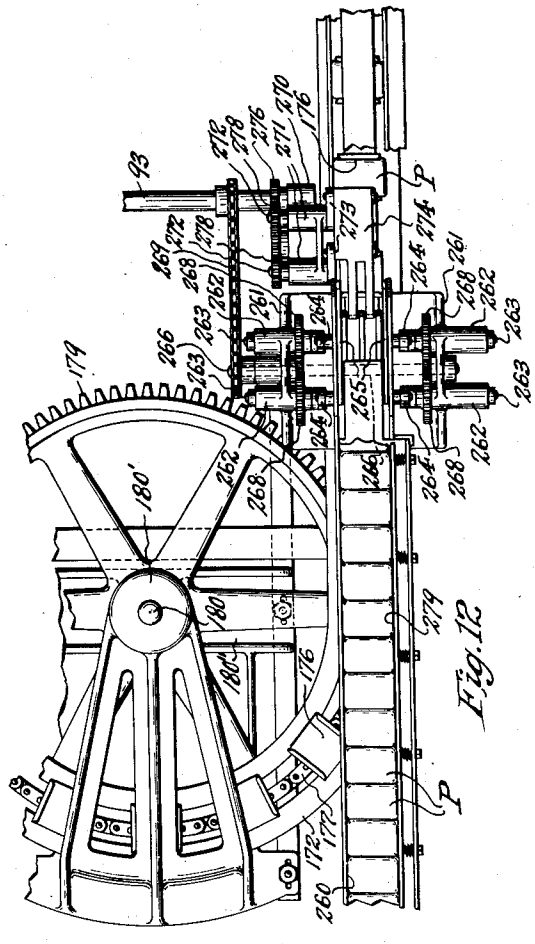


Fig. 12

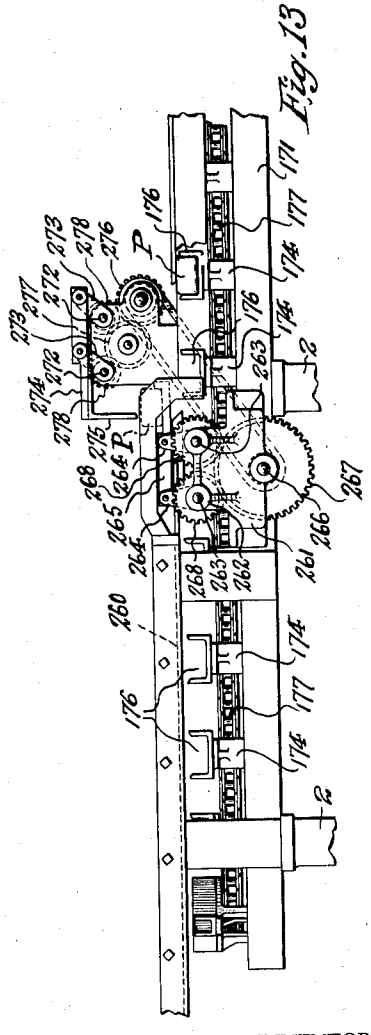


Fig. 13

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Filed Nov. 29, 1939 12 Sheets-Sheet 9

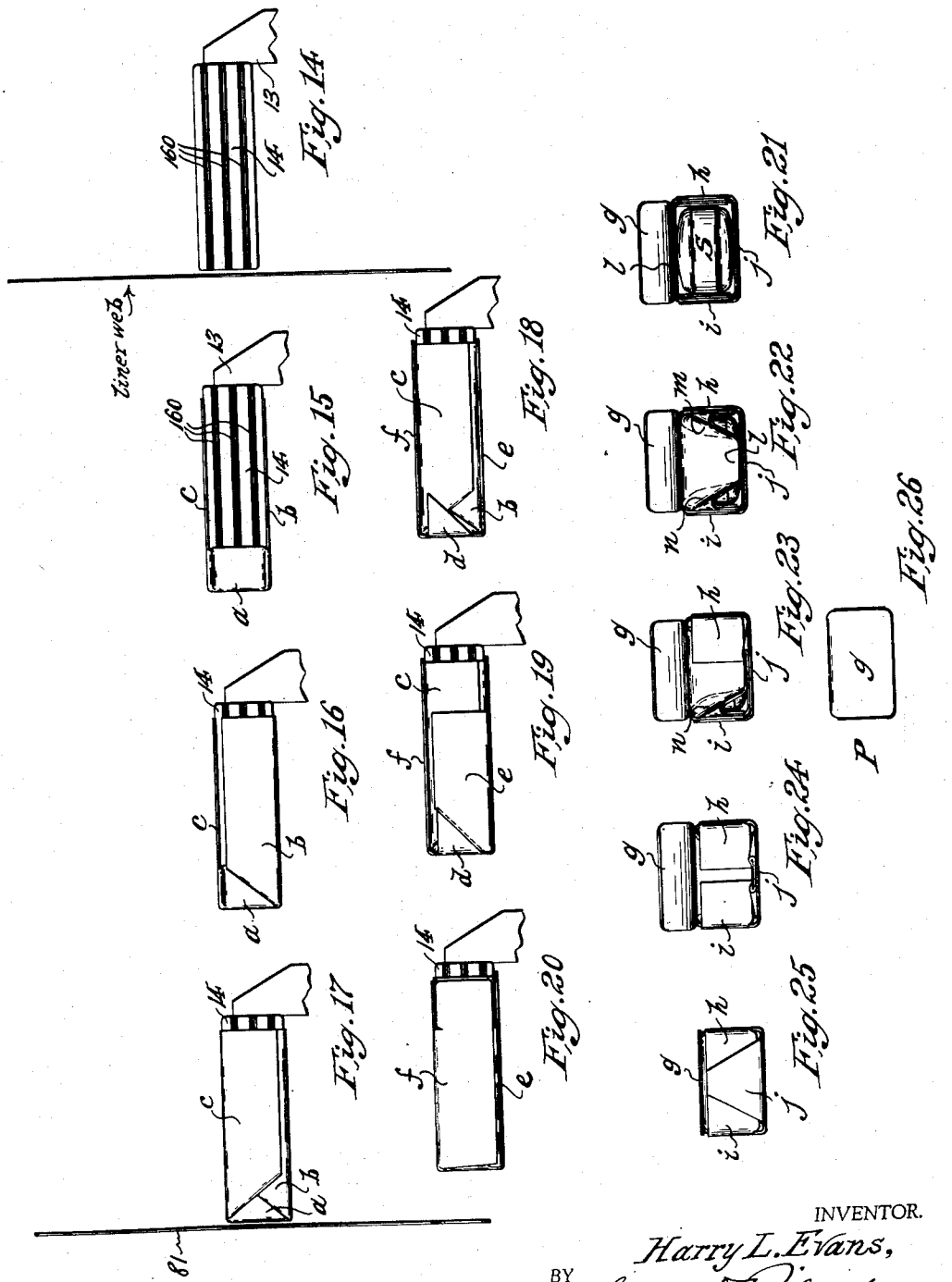


Fig. 14

Fig. 15

Fig. 16

Fig. 17

Fig. 18

Fig. 19

Fig. 20

Fig. 21

Fig. 22

Fig. 23

Fig. 24

Fig. 25

Fig. 26

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PACKAGING MACHINERY

Filed Nov. 29, 1939 12 Sheets-Sheet 10

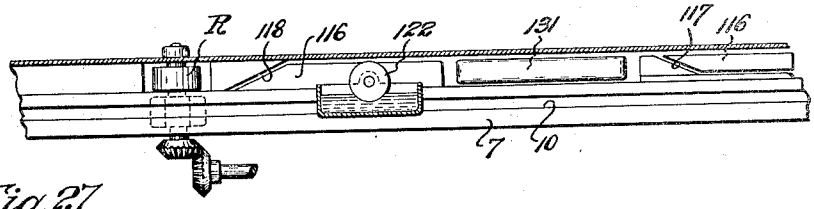


Fig. 27

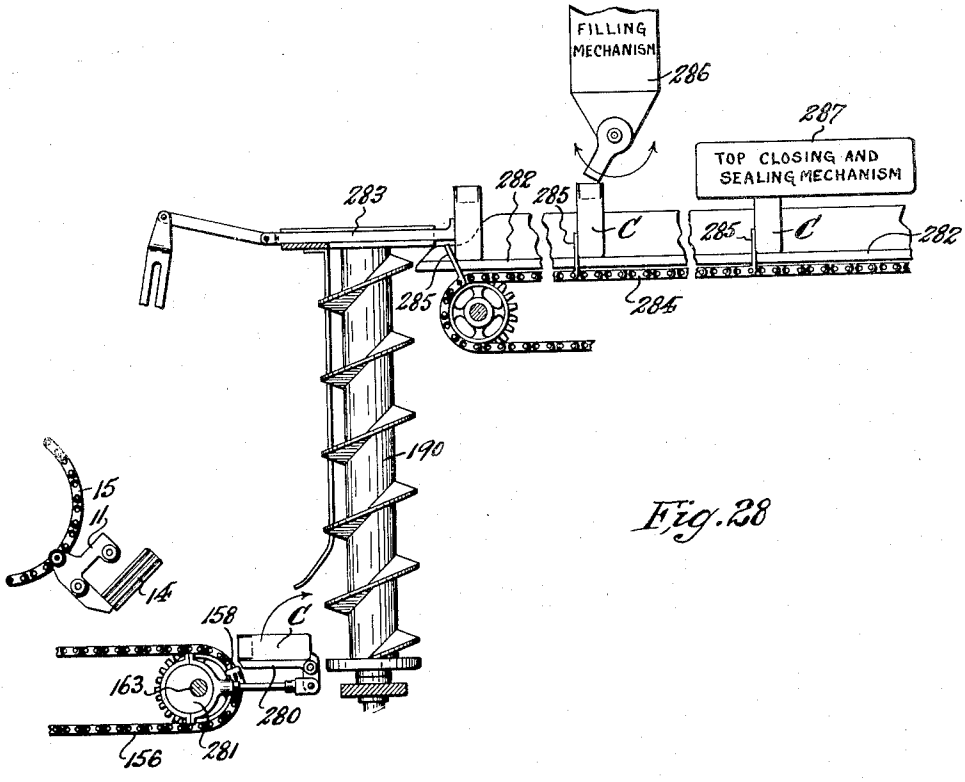


Fig. 28

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PACKAGING MACHINERY

Filed Nov. 29, 1939 12 Sheets-Sheet 11

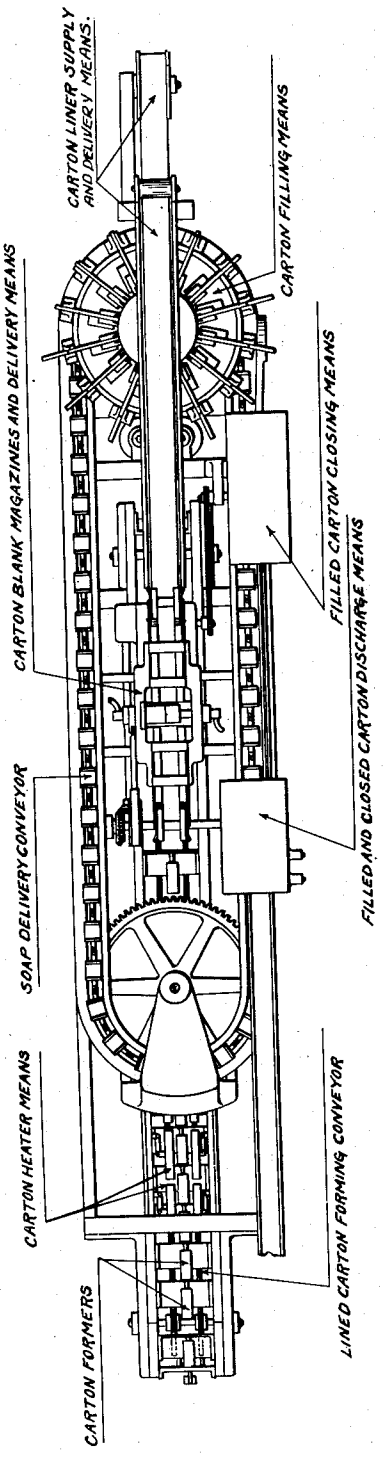


Fig. 1

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PACKAGING MACHINERY

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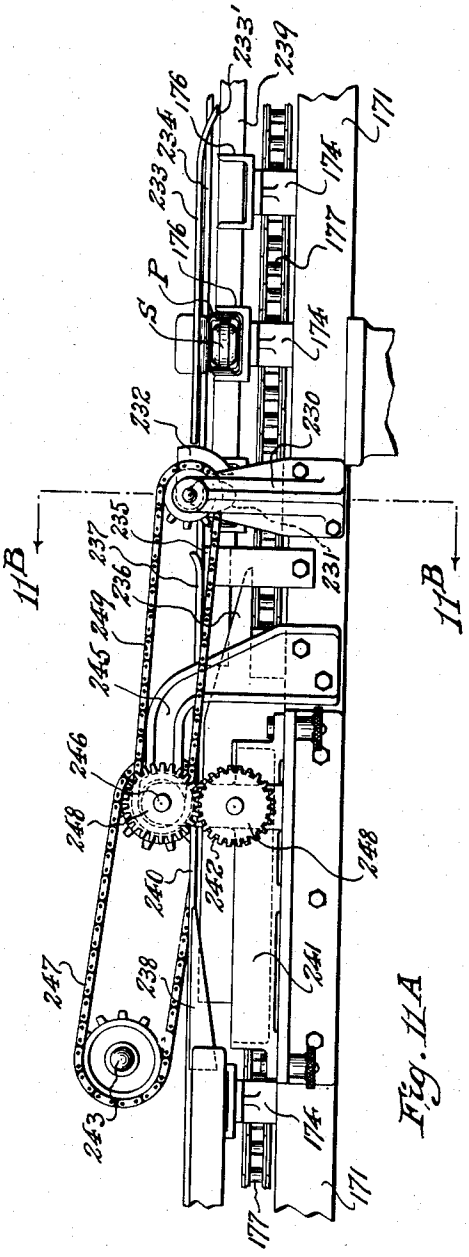


Fig. 11A

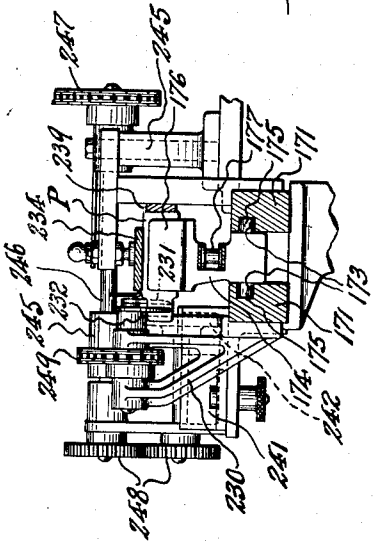


Fig. 11B

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Patented Oct. 20, 1942 2,299,474

UNITED STATES PATENT OFFICE

2,299,474

PACKAGING MACHINERY

Harry L. Evans, Newport, R. I., assignor to United States Automatic Box Machinery Co., Inc., Roslindale, Mass., a corporation of Massachusetts

Application November 29, 1939, Serial No. 306,600

22 Claims. (Cl. 93—3)

This invention relates to improvements in packaging machinery; and the invention has reference, more particularly, to package making, filling and closing machinery adapted to function by a continuous motion mode of operation and consequently at high speed.

An object of this invention is to provide a novel construction of continuous motion, high speed mechanism whereby blanks are automatically supplied and formed into cartons ready for filling; and whereby, when desired, provision is made for also supplying carton lining material to and preforming the same upon a traveling former block preparatory to the formation of a carton blank about the latter.

Another object of the invention is to provide in package forming machinery a plurality of conveyers for propelling a series of successively spaced traveling former blocks, said conveyers being arranged end to end, and means being provided for automatically transferring the former blocks from one conveyer to another, whereby the spaced relation of said former blocks is automatically changed at desired points in the travel thereof, so as to efficiently accommodate the movement thereof relative to the operation of means for feeding and manipulating the package forming material, on the one hand, and, on the other hand, so as to provide, through a minimum distance of linear travel, a maximum period of contact of the formed cartons with means for drying and setting the glued seams with which they are provided, and for sealing the liner seams and setting the liners in attached relation to the carton interiors, when said cartons are provided with liners.

Another object of the invention is to provide in packaging machinery novel mechanism comprising, in combination, a train of continuously traveling spaced former blocks; means cooperative with said former blocks for first supplying wax paper lining material across the path of former block travel, together with means for folding said wax paper about the moving former blocks so as to provide thereon preformed liners; means for then supplying carton blanks across the path of former block travel, together with means for folding said blanks over the preformed liners and about the moving former blocks, including means to provide cartons thus produced with glued seams; and novel means for subjecting the thus produced cartons to pressure and heat sufficient to penetrate the carton walls and fuse the wax of the liner paper so as to seal the liner seams or joints, while at the same time drying and setting the glued seams of the carton formations; and also, if desired, additionally including means to subsequently transfer heat from the produced cartons and from the former blocks by which they are carried with accompanying chilling and setting of the fused wax of the liner paper.

Another object of the invention is to provide for cooperation with the traveling former blocks and formed cartons carried thereby a novel means for stripping the latter from the former.

A further object of the invention is to provide novel means for transporting the cartons removed from the former blocks and delivering the same to means whereby they are charged with the content desired to be enclosed therein.

A still further object of the invention is to provide novel means for supplying articles to be enclosed in the cartons and thereupon manipulating the cartons and articles so as to enter the latter into the former.

Additional objects of the invention are to provide means for closing and sealing the filled cartons to complete the package subject to discharge from the machine; and to provide novel means for discharging the completed packages from the machine.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a schematic plan view of the packaging machine according to this invention.

Figs. 1A, 1B and 1C, taken together show a longitudinal vertical sectional view through the packaging machine according to this invention.

Fig. 2 is a vertical cross section through the machine, taken on line 2—2 in Fig. 1B; Fig. 3 is a fragmentary vertical cross section, taken on line 3—3 in Fig. 1B; Fig. 4 is another fragmentary vertical cross section, taken on line 4—4 in Fig. 1B; and Fig. 5 is still another fragmentary vertical cross section, taken on line 5—5 in Fig. 1B.

Fig. 6 is a fragmentary plan view in part section of the means for stripping or removing formed cartons from the former blocks upon which the same are made up; and Fig. 7 is a detail vertical cross section, taken on line 7—7 in Fig. 6.

Fig. 8 is a fragmentary plan view of the means for applying sealing pressure and heat to the carton formations carried by the traveling

former blocks; Fig. 9 is a fragmentary longitudinal sectional view, taken on line 9—9 in Fig. 8, this view also showing the underlying cooler means; and Fig. 10 is a fragmentary horizontal section, taken on line 10—10 in Fig. 9, the same showing the cooler means in plan.

Fig. 11 is a fragmentary plan view of an end portion of the machine showing the means for supplying and entering articles into the formed cartons, and including a plan view of the means for finally closing the cartons after reception of said articles therein. Fig. 11A is a fragmentary front elevation of the means for finally closing the filled cartons; and Fig. 11B is a fragmentary cross-sectional view, taken on line 11B—11B in Fig. 11A.

Fig. 12 is a fragmentary plan view of the means for discharging the filled and closed cartons from the machine; and Fig. 13 is a side elevational view of said means.

Figs. 14 to 17 inclusive respectively illustrate successive stages of the operation of forming a carton liner upon and about the traveling former blocks.

Figs. 18 to 20 inclusive respectively illustrate successive stages of the operation of forming a carton over the preformed liner and upon and about the traveling former blocks.

Figs. 21 to 26 inclusive respectively illustrate successive stages of the operation of closing and sealing the filled lined cartons.

Fig. 27 is a schematic longitudinal sectional view showing a modified arrangement and sequence of the means for folding the carton blank about the traveling former blocks and sealing the seams of the liner within the carton formation.

Fig. 28 is a schematic view of a modified arrangement of mechanism for transferring cartons removed from the former blocks in upright position subject to filling by gravity and closing.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

The various cooperating mechanisms making up the novel packaging machine according to this invention are supported from a suitable frame work 1 including longitudinally spaced transversely disposed and opposed upstanding frame standards 2. Journaled in and through certain of said standards 2 is a longitudinal drive shaft 3. This drive shaft is driven from a suitable source of power, such, e. g., as an electric motor 4, by suitably arranged transmission means 5 including a control clutch means 6.

The traveling former block mechanism

The machine is provided with a train of continuously traveling former blocks for supporting and carrying the package making material subject to the operations of manipulating the same to form the desired containers or cartons ready for use. To determine the path of travel of said former blocks, whereby the same move in a circuit disposed in longitudinal vertical plane comprising, an upper level course, along which they move longitudinally forward, and a lower level return course, along which the same move longitudinally rearward, transversely opposed and spaced track circuit bars are affixed to and supported by bracket arms 2' with which said frame standards 2 are provided. Said track circuit bars comprise upper course portions 7 and lower course portions 8 connected at their respective corresponding ends by semi-circular connecting sections 9. Formed in the inwardly facing sides of said track circuit bars are channeled trackways 10.

Arranged to move along and between said track circuit bars are the former block carriages 11; the same having traction rollers 12 to ride in the channeled trackways 10 of said track circuit bars. Each carriage 11 is provided with an upstanding bracket 13 to which the rearward end portion of a former block 14 is affixed, whereby said former block is carried in freely projected forwardly extending disposition, and in outwardly spaced relation to the carriage.

Means are provided for propelling the carriages 11, and the former blocks 14 carried thereby, around the circuit of said track bars, whereby the former blocks are moved in suitably spaced successive order. This propelling means comprises primary and secondary endless conveyers arranged end to end between said track circuit bars, and arranged intermediate the adjoining ends of said conveyers, for cooperation therewith, is a transfer mechanism for shifting the carriages 11 from one conveyer to the other at desired points in the course of their travel around said track circuit. The primary conveyer cooperates with the carriages 11 in such manner as to move the same in successive order but relatively spaced apart at a maximum distance of separation so as to accommodate the former blocks 14 to the locations of the mechanisms for feeding and applying the package forming material thereto, as well as to time the movements of said former blocks in proper relation to the operations of said mechanisms. On the other hand, the secondary conveyer cooperates with said carriages 11 in such manner as to move the same in successive order but relatively spaced apart at a minimum distance of separation so as to provide a maximum time of contact of package material, as formed on and carried by the former blocks 14, with the heaters and coolers or other devices employed to close and seal the package seams, to the end that such operations may be efficiently performed without necessity for unduly lengthening the track circuit and consequently the machine as a whole, in other words, so that a compact machine requiring but a minimum of floor space for installation is attained. The transfer mechanism for shifting the carriages 11 from one conveyer to the other is of such novel character and cooperative effect that the carriage movement is speeded up and retarded as required to attain the change in spaced relation when disengaging one conveyer and engaging the other.

The primary conveyer comprises a pair of laterally spaced endless conveyer chains 15 supported at their forward ends to run over vertically spaced sprockets 16—16', and at their rearward ends to run over idler sprockets 17 which are concentric to the rearward semi-circular sections 9 of the track circuit bars. Said idler sprockets 17 are mounted on a carrying shaft 18 which is journaled in and between bearing brackets 19 adjustably supported in connection with the track circuit bars so as to permit regulation of the running tension of said conveyer chains. Said sprockets 16—16' are respectively mounted on carrying shafts 20—20' which are journaled in and between bearing brackets 21 fixedly supported by the track circuit bars. The means for driving said primary conveyer chains 15 comprises a transverse transmission shaft 22, also

journaled in and betwen said bearing bracket 21, which is driven from said drive shaft 3 by intermeshing bevel gearing 23—23' (see Fig. 2). Fixed on said transmission shaft 22 is a drive pinion 24 which meshes with a like pinion 25 fixed on said shaft 20, whereby the latter shaft is driven to in turn drive the sprockets 16, which thus serve as drive sprockets for actuating said conveyer chains 15. Said conveyer chains 15 are provided, at suitably spaced intervals along the length thereof, with laterally offset coupling socket links 26. Affixed to each carriage 11, to project from its under or inward side, are coupling teeth elements 27 which are adapted to mesh with said conveyer chain socket links 26, to thereby operatively couple said carriages 11 and conveyer chains 15 so that the movement of the latter is imparted to said carriages. The longitudinal spacing of the coupling socket links 26 along the conveyer chains 15 is such as to space the carriages 11, and the former blocks 14 carried thereby, at a desired maximum distance of linear separation; e. g., at intervals of twelve inches.

The secondary conveyer, similarly, comprises a pair of laterally spaced endless conveyer chains 28, disposed in alignment, end to end, with said primary conveyer chains 15, with their rearward ends in spaced apart relation to the forward ends of the latter. Said secondary conveyer chains 28 are supported at their rearward ends to run over vertically spaced sprockets 29—29', and at their outer or forward ends to run over idler sprockets 30, concentric to the forward semicircular sections 9 of the track circuit bars, which sprockets are mounted on a carrying shaft 31 adjustably supported to permit regulation of the running tension of said conveyer chains 29, in manner similar to the above described support of the idler sprocket shaft 18 of the primary conveyer chains. Said sprockets 29—29' are respectively mounted on carrying shafts 32—32' which are also likewise journaled in and between said bearing brackets 21. The means for driving said secondary conveyer chains 28 comprises a transverse transmission shaft 33, journaled in and between said bearing brackets 21, which is also driven from said drive shaft 3 by intermeshing bevel gearing 34—34' (see Fig. 3). Fixed on said transmission shaft 33 is a drive pinion 35 which meshes with a like pinion 36 fixed on said shaft 32, whereby the latter shaft is driven to in turn drive the sprockets 29, which thus serve as drive sprockets for actuating said conveyer chains 28. Said conveyer chains 28 are provided, at suitably spaced intervals along the length thereof, with laterally offset coupling socket links 37 (see Fig. 3), the same being engageable by the coupling teeth elements 27 of the carriages 11, to thereby operatively couple said carriages 11 and conveyer chains 28 so that the movement of the latter is imparted to said carriages. The longitudinal spacing of the coupling socket links 37 along the conveyer chains 28 is such as to space the carriages 11, and the former blocks 14 carried thereby, at a desired minimum distance of linear separation; e. g. at intervals of six inches.

The means for transferring the carriages 11 from one conveyer to the other comprises, rotatable transfer screw cylinders 38 exteriorly offset on axes parallel to and so as to extend between the upper forwardly moving courses of the primary and secondary conveyer chains 15 and 28, and similar rotatable transfer screw cylinders 39, exteriorly offset on axes parallel to and so as to extend between the lower rearwardly moving courses of the secondary and primary conveyer chains 28 and 15. These screw cylinders 38 and 39 are cut to provide spiral splines or slots 40 of progressively varied pitch from end to end, so as to conform the movement of the carriages 11, operatively engaged thereby, at one end to match the successive speed of movement of the coupling socket links at the adjacent end of one conveyer, and at the other end to match the successive speed of movement of the coupling socket links at the adjacent end of the other conveyer, whereby the transfer movement of said carriages 11 is increased and decreased to properly determine their relatively spaced positions for successive coupled connection with the respective conveyers when disengaged by one and engaged by the other thereof. Each carriage 11 is provided, in suitably disposed position for projection from opposite sides thereof, with roller studs 41, which, at proper times are engaged by the spiral splines or slots 40 of the transfer screw cylinders 38—39, when the carriages disengage one conveyer means so as to be moved into engagement with the other conveyer means.

Said transfer screw cylinders 38 are mounted on and driven by longitudinal shafts 42 journaled in and between upper bearing members 43 provided in connection with said bearing brackets 21; and said transfer screw cylinders 39 are mounted on and driven by longitudinal shafts 44 journaled in and between lower bearing members 45 also provided in connection with said bearing brackets 21 (see Figs. 2 and 3). The means for driving the upper and lower transfer screw cylinders 38 and 39 at one side of the track circuit (i. e., at the right hand side as viewed in Figs. 2 to 4 inclusive) comprises a drive gear 46, which is fixed on and driven by said drive shaft 3, and which drives through intermediate gears 47, the gears 48 which are respectively affixed to the shafts 42 and 44 of said screw cylinders (see Fig 4). The means for driving the upper and lower transfer screw cylinders 38 and 39 at the other side of the track circuit (i. e., at the left hand side as viewed in Figs. 2 to 4 inclusive) comprises a transverse transmission shaft 49, which is driven from said drive shaft 3 by intermeshing bevel gearing 50—50', and a vertical transmission shaft 51, which is driven from said transverse transmission shaft 49 by intermeshing bevel gearing 52—52'. The respective shafts 42 and 44 of said transfer screw cylinders are driven from said vertical transmission shaft 51 by intermeshing bevel gearing 53—53' (see Fig. 4).

The liner feeding and forming mechanism

In the herein described embodiment of the machine, which is illustrative of the features of the present invention, devices are included to supply material and to form therefrom means to line the interiors of the produced packages or cartons. To such end, a roll 54 of wax paper of suitable width is provided, together with means for automatically drawing the web thereof from the roll, feeding said web downwardly in front of an approaching former block 14 forwardly advanced by the primary conveyer means, severing from the web a liner forming length thereof to be engaged by the advancing former block, so as to be folded about the same by the action of liner forming devices, past which said former block is caused to travel by said primary conveyer means.

The means for feeding the wax paper com-

prises, a pair of opposed feed rolls 55 transversely mounted in bearing frames 56 which are suitably carried by frame pieces 57 forming part of the machine framework. One of said feed rolls 55 is yieldably thrust toward the other by suitable means, so as to operatively grip the wax paper web passed therebetween. Said feed rolls 55 are positioned above and between the upper course portions 7 of the track circuit bars, so as to feed the wax paper downwardly across the forward path of travel of the former blocks 14 as advanced by the primary conveyer means. At the rearward end of the machine is provided a framework extension 58 which supports an upstanding frame member 59. Extending longitudinally between said frame pieces 57 and said frame member 59 is a longitudinal horizontally disposed frame plate 60. Suitably supported by said frame plate 60, to extend along the length thereof, is a wax paper guideway 61. Supported adjacent to the rearward end of said guideway 61 are a pair of vertically opposed idler guide rolls 62, one of which is yieldably thrust toward the other by suitable means, so that the wax paper web, passed therebetween, is operatively engaged thereby. Supported adjacent to the forward end of said guideway 61, and above the feed rolls 55, is an idler guide roll 63 over which the wax paper web moves in passing from said guideway 61 to said feed rolls. The supply roll 54, from which the wax paper web issues, is removably supported, in outwardly offset relation to the rearward end of said guideway 61, by suitable carrying bracket means 64. The web of wax paper is drawn from the supply roll 54, and led to and between the guide rolls 62, to thence pass forwardly through the guideway 61 and over the guide roll 63, and thence between the feed rolls 55 so as to be operatively gripped thereby.

The means for actuating the feed rolls 55 comprises a suitably supported longitudinal counter shaft 65 which is disposed along one side of the machine in the plane of the axes of said feed rolls. This counter shaft 65 is driven from said drive shaft 3 through a transmission shaft 66 extending therebetween. Intermeshing bevel gearing 67—67′ transmit power from the drive shaft 3 to the lower end of said transmission shaft 66; and, similarly, intermeshing gearing 68—68′ transmit power from the upper end of said transmission shaft 66 to said counter shaft 65. Said feed rolls are driven by similar bevel gearing (not shown) interconnected between a shaft of one of the feed rolls and said counter shaft, and said feed rolls are driven oppositely, in directions calculated to feed the interposed liner paper web downwardly therefrom, by intermeshing gears 69—69′.

Transversely mounted in the bearing frames 56, in position spaced downwardly from the feed rolls 55 and at a proper distance above the path of advancing movement of the former blocks 14 as propelled by the primary conveyer means, are opposed liner paper web serving rolls comprising, a female cutter roll 70 and a cooperating male cutter roll 71, between which the liner paper web is moved by the operation of said feed rolls 55. Said severing rolls are oppositely driven by intermeshing gears 72—72′, which are in turn driven from the gearing 69—69′ by an intermediate transmission gear 73. Arranged between the feed rolls 55 and severing rolls 70—71 are suitably formed paper web guides 74; and, in like manner extending below said severing rolls toward the path of movement of the former blocks 14 are additional paper web guides 75.

Mounted on the upper course portions 7 of the track circuit bars, immediately beyond the path of descent of the liner paper web across the path of advance of the former blocks 14, are liner folding devices. These devices comprise bottom folder plates 76 over which the advancing former blocks 14 pass, and a top folder plate 77 beneath which the advancing former blocks 14 pass. Arranged between said top and bottom folder plates, and adjacent to each side of the path of movement of the former blocks 14, so that the latter, in advancing, pass therebetween, are folder blocks 78 each having an upwardly inclined fold turning guideway 79 adapted to up-turn a side fold or lap of the liner paper, and a downwardly inclined fold turning guideway 80 adapted to down-turn a side fold or lap of the liner paper.

In the operation of the liner feeding and forming mechanism, the wax paper web is fed vertically downward by the feed rolls 55, to position a predetermined length thereof in front of an advancing former block 14, so that the mid-portion thereof is engaged by the forward end of said advancing former block (see Fig. 1B and Fig. 14). As thus engaged, the wax paper web is thrust forward by the advancing former block, so as to contact the ends of the bottom and top folder plates 76—77 and of the folder blocks 78 opposed thereto, whereupon the severing rolls 70—71, by their timed rotation, operate to sever the required predetermined length of wax paper from the main body of the web thereof, to thus provide a free liner sheet. The liner sheet is carried forward by the advancing former block 14 so as to enter between the bottom and top folder plates 76—77, and between the folder blocks 78. Contact with the bottom folder plates 76 folds back the lower end portion of the liner sheet flatly against the under face of the former block, and contact with the top folder plate 77 folds back the upper end portion of the liner sheet flatly against the upward face of said former block, while contact with the ends of the folder blocks 78 of the oppositely and laterally projecting free portions of that part of the liner sheet, which lies contiguous to the leading end of the former block, tucks back said portions against the sides of the latter to form tuck folds *a* (see Fig. 15), thus leaving lower and upper side laps *b* and *c* freely projecting respectively from and in the planes of the liner sheet face portions back-folded respectively against the under and upper faces of the former block (see Fig. 15). As the former block 14 continues its advancing movement, the lower side laps *b* are first engaged by the fold turning guideways 79, the upwardly inclined portions of which operate to upturn said laps *b* against the sides of the former block (see Fig. 16), whereafter the upper side laps *c* are engaged by the fold turning guideways 80, the downwardly inclined portions of which operate to downturn said laps *c* against the sides of the former block and into lap seam forming overlapping relation to the previously upturned side lap *b* (see Fig. 17). By the operations, thus above described, a liner is produced for the interior of a carton subsequently to be formed.

The carton blank feeding mechanism

The cartons, which the machine according to

this invention is designed to make up, are produced from preformed flat carton blanks 81 of suitable form. The carton blanks 81 are deposited in and automatically fed from magazine racks in timed relation to the successive movement of the former block 14, as advanced by the primary conveyer means, so as to be operatively engaged by said former blocks after the liners are formed on the latter, at least when such liners are included in the make-up of the finished package.

The means for feeding the carton blanks comprises, an upstanding frame member 82 supported by transverse carrier bars 83 which form a part of the machine framework. Supported by said frame member 82, in spaced relation one to the other, are a pair of magazine racks 84—84' the same being angularly disposed in downwardly inclined convergent relation, so as to oppose their lower discharge ends respectively to opposite sides of an oscillatable carton blank extractor means which is operatively mounted therebetween. A supply of carton blanks is deposited in each magazine rack subject to successive withdrawal therefrom. The lower discharge end of each magazine rack is provided with suitably arranged and disposed retainer fingers 85 for normally holding the carton blanks against escape therefrom, but over which fingers a carton blank will readily spring so as to be released when operatively engaged and outwardly moved by the carton blank extractor means.

The carton blank extractor means comprises, a transverse rock-shaft 86 mounted in supporting bearing means 86' with which the upper end of the frame member 82 is provided, whereby said rock-shaft is disposed between and somewhat above the discharge ends of the magazine racks 84—84'. Fixed on said rock-shaft 86, to depend therefrom and to be oscillated thereby for back and forth swinging movement between the discharge ends of the magazine racks 84—84', is an extractor arm 87. Said extractor arm 87 is provided, on the face thereof which is opposed to the magazine rack 84, with carton blank gripper means, preferably in the form of resilient suction cups 88 adapted to operatively grip and withdraw the lowermost carton blank from said magazine rack 84 when brought into contact therewith; and, similarly, said extractor arm 87 is provided, on the face thereof which is opposed to the magazine rack 84', with like carton blank gripping suction cups 88', to grip and withdraw the lowermost carton blank from said magazine rack 84' when brought into contact therewith. Provided in one end portion of said rock-shaft 86 is a duct 89 which communicates with a duct 90 leading through said extractor arm into communication with the interiors of the suction cups 88; and, in like manner, the opposite end portion of said rock-shaft 86 is provided with a duct 89' which communicates with a duct 90' leading through said extractor arm into communication with the interiors of the suction cups 88' (see Fig. 2. The duct passages 89—90 and 89'—90' are respectively connected by flexible conduit means 91 and through automatic control valve means 92 with an exhaust pump (not shown), whereby suitably timed making and breaking of suction gripping effects exercised by the suction cups 88 and 88' are properly controlled. The control valve means 92 is actuated by a transverse transmission shaft 93, which is driven from said counter shaft 65 through intermeshing bevel gearing 94—94' (see Fig. 1B). The means for oscillating the rock-shaft 86, and through it the extractor arm 87 comprises, an eccentric 95 driven by said transmission shaft 93. The connecting rod 96 of said eccentric is pivotally joined to a rocker arm 97 which is affixed to said rock-shaft 86.

Suitably mounted in connection with said frame member 82, to be disposed in spaced position below and in vertical alignment with the medial position of said extractor arm 87, are carton blank feed roll sets comprising, an upper pair of opposed transverse feed rolls 98 and a lower pair of opposed transverse feed rolls 98'. One of the feed rolls of each set is yieldably thrust toward the other thereof by suitable means, so as to operatively grip a carton blank passing downwardly therebetween, and so as to feed such carton blank downwardly across the forward path of travel of the former blocks 14 as the latter leave the previously described liner forming or folding means. Said feed roll sets are actuated from said counter shaft 65 by intermeshing bevel gears 99—99' interconnected between the latter and a shaft of one of the feed rolls. The feed rolls of said sets are actuated in mutually cooperating relation from the driven roll shaft by interconnecting gearing 100 (see Fig. 2).

Arranged between the sets of feed rolls 98 and 98' are suitably formed carton blank guides 101. Additionally, rotary carton blank guide devices 102 are disposed below the lower feed rolls 98' immediately above the path of movement of the advancing former blocks 14. Said rotary guide devices are driven by chain and sprocket transmission means 103 from the countershaft 65, and operatively engage side margins of a carton blank during its downward movement to a position operatively related to the path of travel of the former blocks 14, but thereafter disengage said blank so as not to obstruct initial folding movements thereof after its engagement and advance by a former block.

Suitably supported below the path of movement of the advancing former blocks is a carton blank stop 104 adapted to determine the proper placement of a delivered carton blank across the path of former block movement, and ready for engagement by an advancing former block.

Means are provided for positively transferring a carton blank from the extractor arm 87 into the nip of the upper set of feed rolls 98. This transfer means comprises a vertically reciprocable push-piece 105, the spaced arms of which are slotted to embrace the rock-shaft 86 so as to ride up and down across the same. The lower extremities of said arms are notched, as at 106, whereby the same may engage the upper extremity of a carton blank at spaced points across the width thereof. Said push-piece 105 is carried by a slide plate 107 vertically slidable in a guideway 108 with which the frame member 82 is provided. The means for reciprocating said slide plate 107 and the push piece 105 carried thereby comprises, a rack 108 affixed to the back of said slide plate. Operatively meshing with said rack 108 is an oscillatable quadrant gear 109 fixed on a rock-shaft 110 which is mounted on the frame member 82. The means for actuating the rock-shaft 110 comprises, an eccentric 111 driven by the countershaft 65. The connecting rod 112 of said eccentric is pivotally coupled to a rocker arm 113 which is affixed to said rock-shaft 110.

In the operation of the carton blank feeding

mechanism above described, the extractor arm 87, when swung to the left, as viewed in Fig. 1B, engages the lowermost carton blank contained in the magazine rack 84 so as to grip the same by its suction cups 88. Timed to coincide with operative contact of said suction cups with the carton blank, the control valve means 92 functions to connect the suction cups operatively with exhaust pump means for suction effect, whereby said carton-blank is gripped, and as the extractor arm 87 thereupon swings from left to right, said carton blank is removed from the magazine rack 84 and carried to position above and aligned with the upper set of feed rolls 98. When the removed carton blank is thus positioned above said feed rolls, the push-piece 105, under its timed actuation, is caused to descend and engage the upper end of said carton blank, and, simultaneously, the control valve means 92 functions to shut off communication between said suction cups 88 and the exhaust pump means, so as to break the gripping suction effect of said cups and thus release the carton blank from the extractor arm 87. By its descending movement, the push-piece 105 exerts a downward thrust upon the released carton blank, to thereby assure both its positive removal from the extractor arm 87 as well as its propelled descent, whereby its lower end is carried into engagement by the nip of the upper set of feed rolls 98. Said feed rolls 98 operate to carry down the carton blank into engagement by the nip of the lower set of feed rolls 98', which, in turn, feed the carton blank on down, until the same comes to rest in operative position in front of an approaching former block 14, as determined by its stopped engagement with the stop 104. In the meantime, the extractor arm 87 continues its swinging movement from left to right until engaged with the lowermost carton blank contained in the magazine 84', so as to grip said carton blank by its suction cups 88', whereupon the swinging movement of the extractor arm 87 is reversed, and by operations corresponding to those above described, the said carton blank is carried into alignment with the feed rolls 98—98', to be fed downward thereby into position to be engaged by a succeeding former block advancing toward the same, while the previously delivered carton blank is carried on through forming or folding means to be presently described.

Since one of the objects of this invention is to provide a high speed continuous motion packaging mechanism, it will be obvious that the above described carton blank feeding means is highly advantageous in such connection by reason of the fact that there is no lost motion in the operation of the extractor arm 87, which, by its novel oscillatory disposition between two opposed carton blank supplies, operates to supply carton blanks alternately from said supplies in very rapid succession, without pause for recovery motions and consequently with neither waste of motion or time.

The carton forming devices

The devices for folding and forming delivered carton blanks about the advancing former blocks 14, and over the liners formed upon the latter, when the finished carton is to include such liner, are mounted in connection with the upper course portions 7 of the track circuit bars, immediately beyond the path of descent of the carton blanks across the path of advance of the former blocks 14. These devices comprise bottom folder plates 114 over which the advancing former blocks pass, and a top folder plate 115 beneath which said advancing former blocks pass. Arranged to border each side of the path of movement of the former blocks 14, so that the latter, in advancing pass therebetween, are folder devices 116, formed to provide an upwardly inclined folder guideway 117, adapted to up-turn a side lap of an engaged carton blank, and therebeyond a downwardly inclined folder guideway 118, adapted to down-turn a side lap of an engaged carton blank.

Supported in positions intermediate said folder guideways 117 and 118, on each side of the track circuit, are devices for applying glue to certain of the carton blank side laps. These glue applying devices comprise suitably designed glue reservoirs 119, respectively mounted on opposite upper course portions 7 of the track circuit bars. Said glue reservoirs are so shaped that the former block carriages 11 may pass beneath the same, while the former blocks per se pass between the same. Connected with each glue reservoir is a bearing member 120 in which is mounted a shaft 121 for rotating a glue applicator wheel 122. The glue applicator wheels dip their lower sides into the liquid glue content with which the reservoirs are supplied, while the upper sides thereof are positioned to engage carton blank side laps, as carried into contact therewith by an advancing former block, to thereby coat such laps with an application of glue for adhering upturned and down-turned side laps together to form side closure seams of a formed carton body. The means for transmitting power to the shafts 121 to rotate the glue applicator wheels 122 (see Fig. 5), comprises, a transverse transmission shaft 123 which is journaled in and between bearing hangers 124 dependent from a suitably supported bridge bar 125. Said shaft 123 is driven from the shaft 93 by a chain and sprocket transmission 126. Journaled in and between the lower ends of said bearing hangers 124 and similar additional and suitably supported bearing hangers 127 outwardly spaced therefrom are driver shafts 128. These driver shafts are respectively aligned with the respective glue applicator wheel shafts 121, and the latter are detachably coupled therewith by cooperating clutch elements 129, with which their adjoining ends are respectively provided. Said drive shafts 128 are each driven from said transmission shaft 123 by intermeshing gears 130—130' with which they are respectively provided.

In the operation of the carton forming means, the carton blank 81, fed vertically downward in front of an advancing former block 14 carrying a liner previously formed on and about the same, is engaged at its midportion by the forward end of the latter (see Fig. 1B and Fig. 17). As thus engaged, the blank is thrust forward by the advancing former block so as to contact the ends of the bottom and top folder plates 114—115 and of the folder devices 116 opposed thereto. Contact with the bottom folder plates 114 folds back the lower section of the carton blank flatly against the under face of the former block, and contact with the top folder plate 115 folds back the upper section of said blank flatly against the upper face of said former block, while contact with the ends of the folder devices 116 of end wings *d*, with which the blank is provided, folds back these end wings flatly against the sides of said former block, thus leaving lower and upper side laps *e* and *f* freely projecting respectively from and in the planes of the back folded lower and upper face sections of the blank

(see Fig. 18). As the former block 14 continues its advancing movement, the lower side laps *e* are first engaged by the upwardly inclined folder guideways 117 of the folder devices 116, whereby the same are upturned against the sides of the former block 14 (see Fig. 19).

In the meantime, the former block 14 having picked up the carton blank and started the same through the forming devices, the carriage 11 by which it is carried comes to the end of the forwardly propelling course of the primary conveyer means so that the latter disengages the same, whereupon the upper transfer screw cylinders 38 engage said carriage so as to carry the same onward with an accelerated movement, until it is engaged by and operatively coupled with the secondary conveyer means in shortened spaced relation to a preceding carriage, whereupon said secondary conveyer means takes over the work of continuing the movement of the carriage and former block carried thereby.

After the side laps *e* have been up-folded against the former block sides, the continued advance of the former block carries the still projecting side laps *f* to and over the rotated glue applicator wheels 122, whereby the latter apply an application of glue to the undersides of said side laps *f*.

After receiving the applications of glue, and under the forward advance thereof by the traveling former block, said side laps *f* are carried into engagement with the downwardly inclined folder guideways 118 of the folder devices 116, whereby said side laps *f* are downturned against the sides of the former block with their glue coated faces disposed in overlapping side closure seam forming relation to the previously upturned side laps *e* (see Fig. 20); thus forming an open mouthed carton body, within and lining the interior of which is disposed the liner initially formed on and about the former block.

The liner and carton body setting and sealing means

Beyond the carton forming devices, and bordering opposite sides of the path of travel of the former blocks, as propelled by the upper forwardly moving course of the secondary conveyer means, are located devices for applying heat and pressure to the sides of the formed carton bodies carried by said former blocks. These devices serve to dry and set the glue by which the side closure seams of the carton bodies are secured, as well as to transmit heat to the lapped side portions of the liner within the carton body, whereby the wax content of the liner is fused to adhere said lapped side portions together in substantially air tight seam forming relation, while at the same time affixing the liner to the carton body side walls by adhesion of fused wax.

The devices serving these purposes comprise a series of longitudinally successive heater blocks 131, the number of which is optional, but which is so selected as to provide sufficient group lengths thereof as is calculated to maintain the heat and pressure application to the carton bodies, moved along and engaged thereby, for a time period adequate to permit effective penetration of heat through the carton body walls to the interior wax paper liner, so as to assure desired fusing of the wax content of the latter.

A longitudinal row of said heater blocks 131 is supported from each upper course section 7 of the track circuit bars. Each heater block is mounted to lie parallel to the adjacent side of a passing former block 14, subject to independent inwardly pressing, yieldable movement toward the same. To this end, carrier brackets 132 are affixed to and project inwardly from said upper course sections 7 of the track circuit bars, so as to underlie and support the end portions of said heater blocks. Affixed to said carrier brackets 132 are upstanding stop posts 133 which are straddled by the bifurcate extremities 134 with which the end portions of said heater blocks 131 are provided, and whereby lateral bodily movements of said heater blocks are limited. Pivotally mounted on said carrier brackets 132, outwardly of and to respectively cooperate with the respective heater blocks, are bell-crank levers 135. Each heater block is provided intermediate its ends with a tail-piece 136 projecting outwardly from its rear side. One arm of each bell-crank lever 135 is pivotally coupled with the tail-piece of a corresponding heater block, while to the other arm thereof is connected an anchored pull spring 137, which operates to swing the bell-crank lever so as to yieldably press the heater block served thereby toward the passing former blocks 14 and the lined carton bodies carried thereon.

Each heater block 131 is provided with an internally mounted electrical heater unit (not shown), to which energizing current is served, through attached conducting means 138, from any suitable source and in any suitably controlled manner, as is already familiar to the art.

It is desirable to provide means for retracting the heater blocks 131 from normal operative positions at will, so as to give unimpeded access to the former blocks 14 and carton bodies disposed therebetween when occasion requires, and so as to remove the heater blocks from contact with the carton formations when the machine is stopped, thus avoiding applying heat thereto under such circumstances. An illustrative means serving this purpose, and which is operative to act simultaneously on all heater blocks, is shown (see Figs. 8 and 9), and comprises draw bars 139 respectively serving each group of heater blocks. The draw bars 139 are operatively connected, by pin and slot coupling connections 140, to and between the outer arms of the bell-crank levers 135. The means for actuating said draw bars comprises a transverse actuating shaft 141 journaled in and between bearings 142 supported from the track circuit bars. Fixed on said actuating shaft 141 are cams 143 to respectively cooperate with the respective draw bars, the latter having thrust members 144 to embrace and cooperate with said cams. Affixed upon an end of said actuating shaft 141 is a hand crank lever 145 for manually operating the shaft, and cooperative with said crank lever 145 is a stationary stop plate 146 with which the crank lever may be selectively interlocked by suitable means, to hold the mechanism in heater block retracting or releasing position as desired. When the hand crank lever 145 is swung to the right (as viewed in Fig. 8), the shaft and its cams are turned to shift the draw bars 139 forward to thereby release the bell-crank levers 135, subject to the influence of the pull springs 137, whereby the same may swing the heater blocks 131 to operative positions. When the heater blocks are thus released for operative effect, the pin and slot connections 140 between the draw bars and the arms of the bell-crank levers permit sufficient play to admit of the desired inwardly thrust yieldable movement of the heater blocks relative to the passing former blocks and carton bodies carried thereby. When

the hand crank lever 145 is swung to the left, the shaft and its cams are turned to shift the draw bars rearwardly, thereby turning said bell-crank levers 135 against the tension of the pull springs 137, and so as to effect an outward retracting pull upon the heater blocks 131, whereby the same are withdrawn from operative relation to the former blocks 14 and carton bodies carried thereby.

After the former blocks 14 emerge from engagement with the heater blocks 131, the chains of the secondary conveyer means pass over the outer idler sprockets 30, whereupon the former blocks 14 and carton bodies carried thereon are caused to move along with the lower rearwardly moving or return course of said secondary conveyer means. If desired, devices may be provided along this return path of movement for cooling the carton bodies and chilling the contained wax paper lining to thoroughly set or again solidify the previously fused wax.

The devices serving such purpose comprise a series of longitudinally successive cooler blocks 147, the number of which is optional, but which is so selected as to assure such period of contact of the moving carton bodies therewith as will obtain sufficient cooling effect.

Longitudinal rows of said cooler blocks 147 are supported from longitudinal carrier rails 148, suitably mounted in connection with the machine framework (see Figs. 1A, 9 and 10), to border opposite sides of the path of travel of the former blocks 14, as propelled by the lower return course of the secondary conveyer means. Each cooler block is provided with an internal chamber 149 (see Fig. 9 wherein such chamber is indicated by broken lines in connection with one of the cooler blocks shown therein). A cold fluid, such e. g., as cold water, is circulated, by suitable means and from a suitable supply source (not shown), through the chamber of each cooler block; the same being delivered through input conduits 150 and discharged through output conduits 151 with which each cooler block is provided. Each cooler block 147 is mounted to lie parallel to the adjacent side of a passing former block 14, subject to independent inwardly pressing, yieldable movement toward the same. To this end carrier brackets 152 are affixed to and project inwardly from said carrier rails 148, so as to underlie and support the end portions of the cooler blocks. Affixed to said carrier brackets 152 are upstanding stop posts 153 which are straddled by the bifurcate extremities 154 with which the end portions of said cooler blocks are provided, and whereby lateral bodily movements of said cooler blocks are limited. Pivotally mounted on said carrier brackets 152, to cooperate with each cooler block, are spring actuated bell-crank levers 155, by means of which said cooler blocks are urged to yieldably press toward and in contact with the passing former blocks 14 and lined carton bodies carried thereon; all in a manner similar to that already above described in connection with the heater blocks 131. Although not shown, it will be obvious that, if desired, means similar to that used to retract the heater blocks 131 from operative positions, may be likewise employed to effect a like retraction of the cooler blocks. The use of such retracting means in connection with the cooler blocks is entirely optional, and in many cases would not be necessary.

It will also be understood that, in many cases, the use of the cooler block system itself may be dispensed with, and mere radiation of heat from the carton bodies to the atmosphere alone relied upon, or air blast cooling or similarly produced cooling effects resorted to. This would be especially the case where the mechanism is employed to form simple carton bodies without internal liners, or lined carton bodies wherein sealing of the liner seams is not desired or required.

Means for stripping the formed carton bodies from the former blocks

After passing through the cooling means above described, the former blocks 14 and carton bodies carried thereby reach the terminus of the return course of the secondary conveyer means, and are thereupon transferred to the return course of the primary conveyer means. As the carriages 11 are disengaged by the secondary conveyer means, the same are operatively engaged by the lower transfer screw cylinders 39, whereby they are carried onward with retarded movement until the same are engaged and again operatively coupled with the primary conveyer means in lengthened spaced relation, whereupon their former blocks are subjected to the action of means operative for stripping off therefrom the formed carton bodies for ultimate delivery to means for inserting thereinto the articles or other content desired to be enclosed therein.

The means for stripping the formed carton bodies from the former blocks is situated to underlie and extend beyond the end of the return course of said primary conveyer means, where the same runs around the idler sprockets 17 to resume its forwardly extending course (see Figs. 1B, 6 and 7). The stripper means comprises, laterally spaced endless stripper chains 156 arranged to run over and between actuating sprockets 157 and 157', the shafts of which are suitably journaled in bearing supports mounted on the machine framework. The upper, rearwardly moving courses of said stripper chains respectively run parallel to the opposite sides of the path of movement of the former blocks 14 as moved by the return course of the primary conveyer. Affixed to the inner sides of said respective stripper chains, at suitably spaced intervals along the lengths thereof, and so as to project toward the sides of passing former blocks 14 moving between said chains, are stripper members 158. These stripper members 158 are provided with one or more stripper fingers 159 extending laterally therefrom. Each former block 14 is provided in and along its respective sides with one or more open ended channels or grooves 160 countersunk in the surface thereof, and into and through which said stripper fingers may pass to travel from end to end of the former block. Said stripper chains 156 are driven at a linear speed which is greater than that of the linear speed of the former blocks as propelled by the primary conveyer means, and as a consequence, the stripper members 158 are operated to overtake a passing former block 14 from the rear, and thereupon enter its stripper fingers 159 in the channels or grooves 160 of said former block and then rapidly move the same therealong just prior to time the former block is carried upwardly for return to its forwardly moving course through the machine. Upon thus entering the former block channels or grooves 160, the stripper fingers 159 engage the sides of the carton body carried thereon at the open end of said body, and consequently exert upon the carton body a forward propulsive effect relative to the former block, which operates to slide said body off and away

from the latter. A suitable stationary slideway or support 161 is provided to receive and carry the removed carton body as further advanced by the stripper chains 156 to engage means for transferring and delivering the same for filling operations.

Said stripper chains 156 are driven at required speed from the drive shaft 3 by a transmission shaft 162 connected by suitable gearing between said drive shaft 3 and the shaft 163 on which the sprockets 157 are affixed, whereby said latter sprockets are the drivers and the sprockets 157' are idlers.

It will be obvious that if desired, the formed cartons may be removed from the machine at this point, if the filling thereof is to be done by separate machinery or by hand. Within the scope and objects of this invention however is the provision of means for inserting articles or otherwise filling the cartons with a desired content, wherein such means is properly coordinated with the above described carton body forming mechanism to provide a high speed, continuous motion mode of operation.

The carton filling mechanism and means for delivering formed cartons thereto

In the illustrative embodiment of this invention herein shown and described, mechanism is provided for supplying single articles, such as soap cakes, and thereupon inserting the same into the formed carton bodies; although it will be understood that, in its broader aspects and in general principles, the invention is not necessarily limited to such particular form of filling mechanism or type of content to be entered in the carton bodies, as will be subsequently further adverted to.

The mechanism, therefore, as designed for supplying soap cakes, or like single articles, or integral article groups, and inserting the same into the formed carton bodies comprises the following arrangement and relation of agencies functioning to such end. An endless train of upwardly open and open ended traveling carrier pockets is provided to support and carry soap cakes (e. g.) subject to the operations of engaging the carton bodies thereover, and thereafter carrying the latter, with the soap cakes entered therein, subject to the operation of means for closing the open ends of the carton bodies to complete the packages.

To determine the path of travel of said carrier pockets, whereby the same move in a circuit disposed in longitudinal horizontal plane, horizontally opposed and spaced inner and outer track circuit bars are affixed to and supported by the upper end portions of said frame standards 2, so that said circuit is located above the carton body forming devices and the conveyer means serving the latter. Said track circuit bars comprise ingoing course portions 170 and outgoing course portions 171 connected at their respective corresponding ends by semi-circular connecting sections 172. Formed in the inwardly facing opposed sides of the inner and outer track circuit bars are channeled trackways 173.

Arranged to move along and between said inner and outer track circuit bars are the carrier pocket carriages 174; the same having traction rollers 175 projecting from opposite sides thereof to ride in the channeled trackways 173 of said track bars. The means for propelling the carriages 174, and the carrier pockets 176 supported thereby, around the track bar circuit which establishes their course of travel, comprises, an endless conveyer chain 177 to which said carriages 174 are affixed in spaced apart relation, whereby the carrier pockets 176 are caused to travel in properly spaced successive order. Said conveyer chain 177 runs over and between supporting sprocket wheels 178 and 179; the rearward sprocket wheel 178 being driven and the forward sprocket wheel 179 being an idler. The supporting shaft 180 of said idler sprocket wheel 179 is journaled in and between upper and lower bearing brackets 180 and 180', which are suitably supported from and in connection with the machine framework (see Figs. 1A, 1B and 12). The driven sprocket 178 is affixed to a vertical power shaft 181, journaled in bearing supports 182 suitably connected with and forming parts of the machine framework (see Fig. 1C). Said power shaft 181 is driven from the drive shaft 3 through intermediate transmission means which comprises, a transverse countershaft 183, connected with said drive shaft 3 by intermediate intermeshing bevel gears 184—184', and a vertical transmission shaft 185, connected with said countershaft 183 by intermediate intermeshing bevel gears 186—186'. Fixed on said power shaft 181 is a gear wheel 187, and fixed on said transmission shaft 185 is a pinion 188 which meshes with and drives said gear wheel 187, and thus the power shaft 181 and conveyer chain actuating sprocket 178.

Supported within the circuit of the rear end portion of the path of travel of the carrier pockets 176, skirted by the rearward semi-circular section 172 of the track bars, and consequently concentric to the axis of the conveyer power shaft 181, is a fixed circular platform 189, the upper surface of which is flush with the level of the floors of the carrier pockets 176 which are moved around portions of the periphery thereof. Upon this platform 189 are delivered the open carton bodies C so that the same are supported subject to manipulation for inserting of soap cakes S thereinto.

The means for transferring and delivering the carton bodies C, after removal from the former blocks 14 by the stripper mechanism previously described, comprises the following mechanism:

Suitably journaled, to extend between the discharge end of the stripper mechanism and the receiving side of said platform 189, are a pair of vertically extending laterally opposed and oppositely rotated elevator screw cylinders 190—190', the respective right and left handed spiral flanges of which cooperate to provide means for elevating the carton bodies C from the level of the discharge end of said stripper mechanism to the level of said platform 189. The means for driving said elevator screw cylinders 190—190' (see Figs. 1B, 1C and 11) comprises a suitably journaled vertical transmission shaft 191, which is driven from said drive shaft 3 by intermeshing gearing 192—192' connected between the latter and its upper end. The lower ends of the shafts 193—193', on which said elevator screw cylinders are respectively carried, are provided with intermeshing gears 194—194' by which the same are revolved in opposite directions, and these gears are driven by a transmission gear 195 affixed to the lower end of said transmission shaft 191 to mesh with one of the same.

Associated with the discharge end of the stripper mechanism is means for delivering the carton bodies between and into operative engagement with the lower ends of said elevator screw cylin-

ders. This means comprises a revolving shifter arm 196 which is mounted on and revolved by the drive shaft 163 (see Fig. 1B). As a stripped carton body C is carried by the stripper mechanism toward the elevator screw cylinders, the shifter arm 196, in its revolution, is caused to swing upward behind said carton body so as to engage the same, and thereupon thrust the same forward away from the stripper mechanism and then between and onto the opposed spiral flanges of said elevator screw cylinders. The revolved spiral flanges of said elevator screw cylinders exert an upwardly moving thrust upon the received carton body, whereby the same is carried upwardly to the level of the platform 189. A fixed vertical guide strip 197 is mounted to extend upwardly between the elevator screw cylinders so as to guard the rising carton body against outward accidental displacement from its operatively engaged relation thereto.

Cooperative with the upper end portions of said elevator screw cylinders is a transfer means (see Figs. 1B and 1C) for discharging the elevated carton body from the same and thereupon depositing said carton body onto the platform 189 subject to operation of means for entering the soap cakes thereinto. Said transfer means comprises a horizontal slideway 198 in which is mounted a slide-block 199 for back and forth reciprocation thereon. Carried by said slide-block 199 is a retractible push-finger 200. Said slide-block and push-finger are reciprocated in timed relation to successive arrivals of the carton bodies C at the upper end portions of said elevator screw cylinders, and the means for so actuating the same comprises an oscillatable lever member 201, the lower end of which is fulcrumed on a suitably fixed and supported frame bracket 202, while the upper end thereof is operatively interconnected with said slide block and push-finger by a link bar 203. The means for actuating said lever member 201 comprises a revolving crank member 204, the free end of which is pivotally connected with a slide piece 205 slidingly mounted in a longitudinal slotway 206 with which the body of said lever member 201 is provided. Said crank member 204 is revolved by a shaft 207 journaled in said frame bracket 202, and said shaft 207 is driven from the shaft 163 of the stripper mechanism by an interconnecting chain and sprocket transmission 208; although the same may be driven by any other suitable transmission means and from any other source of motion as may be found equally or more convenient. In the operation of said transfer means, as the lever member 201 swings toward the elevator screw cylinders from its retracted initial position, the imparted thrust upon the link bar 203 operates to swing down the push-finger 200 into operative position for engaging a carton body C arrived at the top end portions of said elevator screw cylinders, whereafter continued thrust of said link bar engages the push-finger 200 with the carton body so that the continued forward movement thereof with the slide block 199 thereupon shifts the carton body away from the elevator screw cylinders and onto the platform 189. As the lever member 201 swings back to normal retracted position, the transmitted pull upon the link bar 203 first swings up the push-finger 200 so that, as the same returns with the slide block 199, it will pass over a succeeding carton body which has arrived at the top end portions of the elevator screw cylinders.

Extending upwardly through the platform 189 is an extension of the power shaft 181 to which is affixed and by which is driven a revolving loading head, in coordinated and synchronized relation to the travel of the carrier pockets 176 coincident to the periphery of said platform.

The revolving loading head comprises a hub portion 210 having at its upper end a central carrier plate 211, spaced above and in a plane parallel to that of said platform 189. Beneath said carrier plate are a plurality of radial arms 212, disposed to project outwardly from said hub portion 210, and to terminate at their outer extremities in the peripheral rim portion 213 of said loading head. Dependent from said arms 212 are offset push-plate members 214. Fixed upon the platform 189 is a stationary carton shifting cam member 215 upon which the closed ends of the carton bodies C abut, when the latter are delivered onto said platform 189, and around and in engagement with which said carton bodies are moved by the propulsion effect of the push-plate members 214 as moved around by the revolving loading head of which they form a part.

Affixed to the rim portion 213 of said loading head, and in alignment with the longitudinal axes of the carton bodies C as engaged by the push-plate members 214 and propelled thereby around the platform 189, are outwardly projecting bifurcate bearing yokes 216, in which are pivotally fulcrumed oscillatable backer arms 217, having free end portions 218 suitably shaped to engage, when said backer arms are lowered to operative positions, the outer ends of soap-cakes S supported in and carried along by the contiguous carrier pockets 176 moving around the periphery of said platform 189. Extending upwardly from the pivoted inner end portions or hubs of said backer arms 217 are rocker arms 219 for oscillating the same. Provided on the top side of said carrier plate 211 are a plurality of radial slideways 220 in aligned relation to said backer arms 217. Slidably mounted, for longitudinal reciprocable movement in said slideways 220, are actuator slide bars 221. The outer end portions of said actuator slide bars 221 are respectively coupled with the rocker arms 219 of the respective backer arms 217 by connecting links 222. To properly control the operative movements of said backer arms 217, in coordination with the operation of the soap-cake conveyer means and the alignment of the carton bodies C, by the propelled movement thereof around the platform 189, with soap-cakes S presented by the conveyer carrier pockets 176 in opposition thereto, a stationary control cam 223 is suitably fixed above the carrier plate 211 and slide bars 221 thereon. For example, said control cam 223 may be secured in operative stationary position by attachment to the underside of the heretofore described frame plate 60. Cut into the underside of said control cam 223 is a suitably shaped cam race 224. Each actuator slide bar 221 is provided on its inner end portion with an upwardly projected roller stud 225 adapted to operatively engage in said cam race 224.

In the operation of the loading head mechanism, said backer arms 217 are initially upraised to the position shown at the left in Fig. 1C, whereby the same may, in the course of their movement around the platform 189 as carried by the revolving loading head, unobstructedly pass over the ingoing and outgoing courses of the soap-cake conveyer means, as well as over the mechanisms by which the carton bodies C are delivered onto the platform 189. In operation, a carton body C, being delivered onto the platform 189, with its

closed end abutting the carton shifting cam member 215, is engaged by an approaching push-plate member 214 of the revolving loading head, so as to be moved clockwise over the platform 189 toward the ingoing part of the ingoing soap-cake conveyer means, until brought into longitudinal alignment with a carrier pocket 176 and the soap-cake S lodged therein. This occurs when the inner end of said carrier pocket 176 lies tangent to the periphery of the platform 189, and thereupon begins its concentric contiguous movement around said platform periphery. In the meantime, the revolving movement of the loading head has likewise carried around a corresponding upraised backer arm 217, the associated actuator slide bar 221 of which, once said upraised backer arm has crossed the ingoing course of the soap-cake conveyer means, is outwardly moved by engaging effective portions of the control cam 223, to thereby swing downward said backer arm 217, so as to position its free end portion 218 behind the outer end of the soap-cake lodged in the carrier pocket 176 with which the carton body C is operatively aligned. The soap-cake S is thereupon held against longitudinal displacement during the application of the carton body thereto. The aligned relation of the carton body and soap-cake having been thus attained, as the same are respectively together moved on around the platform 189, the one by revolving loading head and the other by the soap-cake conveyer means, the movements of which are synchronized to such end, the closed end of the carton body is caused to move in engagement with and along the eccentrically projected portions of the carton shifting cam member 215, whereby said carton body is longitudinally and outwardly shifted to enter the carrier pocket 176 and over the soap-cake contained therein, until the latter is fully entered within the interior of the lined carton body. These operations being completed, by the time the carrier pocket 176 reaches a point at which the outgoing course of the supporting conveyer lies tangent to and thence moves away from the periphery of the platform 189, to carry the soap filled carton body to mechanism for closing the remaining open end thereof, the cooperating backer arm 217 is, by engagement of other effective portions of the control cam 223 with its actuator slide bar 221, again up-swung to initial upraised position. It will be understood that the above described operations are successively repeated by the several corresponding mechanisms carried by the revolving loading head.

Although the loading mechanism as constructed to provide the particular mode of operation in assembling a soap-cake and carton body, to fill the former with the latter, whereby the carton body is moved relative to the soap-cake which remains stationary, is desirable; said loading mechanism, within the broader aspects of this invention, is not to be necessarily limited to a construction having such mode of operation, since the same is subject to more or less modification both in detail structure and mode of operation. So far as soap and like products are concerned, however, the described loading mechanism and mode of operation thereof is of advantage in that, by moving the lined carton body C onto the stationary soap-cake S, the only rubbing of the soap-cake is by the soft and non-abrasive wax liner paper, and consequently risk or likelihood of undesirable scratching or other marring of the soap-cake surfaces is avoided.

The means for closing the filled cartons

As the filled carton bodies are successively carried away from the loading head mechanism by the conveyer propelled carrier pockets 176 and moved along the outgoing course portions 171 of the conveyer track circuit bars, the same are submitted to engagement by devices for closing and sealing the open ends thereof and their liners (see Figs. 11, 11A, and 11B), all of which are suitably supported from the outer track bar of the conveyer track circuit.

The carton body end closing and sealing means includes a rotary tucker device, which is supported in a bearing standard 230 affixed to the outer track bar of the outgoing course portion 171 of the conveyer track circuit, so as to be opposed to the open ends of the carton bodies as moved along said course. Said rotary tucker device comprises a liner tucker 231 and a carton trailing side tab folder 232. The means for driving said tucker device will be subsequently described.

Suitably supported in advance of the position of said rotary tucker device is a carton end closure flap plow bar 233 for lifting and back folding said flap to expose the open end portion of the carton liner *l* to the action of the rotary tucker device. Said plow bar 233 is provided at its leading end with a downwardly inclined or curved end portion 233' for leading the flap into operative engagement therewith. Cooperative with said plow bar 233, and extending behind the same and said tucker device, is a guide bar 234 to back the uplifted carton end closure flap.

As a soap filled carton body passes the rotary tucker device, with its end closure flap *g* lifted and back folded (see Fig. 21), the revolving liner tucker 231 engages the upwardly facing portion of the liner *l*, so as to press the same downwardly and inwardly over the adjacent soap cake end, and so as to form liner side tuck folds *m* and *n* (see Fig. 22). Immediately after such initial closing of the liner mouth is accomplished, the revolving carton side tab folder 232, which in its revolution trails the liner tucker 231, engages the trailing carton side tab *h* so as to swing the same, together with the contiguous liner side tuck fold *m*, inwardly across the carton body end (see Fig. 23).

Immediately beyond the rotary tucker device is positioned a stationary carton leading side tab folder 235, which engages the leading carton side tab *i* so as to, in turn, swing the same, together with the contiguous liner side tuck fold *n*, inwardly across the carton body end (see Fig. 24).

Beyond the side tab folder 235 are located suitably shaped and associated stationary devices for manipulating the carton end closure flaps, which include an inner seal base flap *j* and the aforesaid outer end closure flap *g*, as said flaps are moved along and in engagement therewith. These devices include a plow plate 236, the leading end of which is suitably shaped to upturn into the plane of the carton end, and over the inturned side tabs *h* and *i*, said seal base flap *j*, together with the liner portions contiguous thereto, and a plow plate 237, the leading end of which is suitably shaped to downturn, into the plane of the carton body face from which it springs, said end closure flap *g*, whereby the latter is horizontally extended subject to the application of sealing glue to its inner face (see Fig. 25). Said devices further include a plow plate 238, suitably shaped and disposed to downturn the end closure flap *g* into the plane of the carton end, with its glue coated inner face ap-

plied in adhering engagement with the upturned seal base flap *j* (see Fig. 26).

Suitably affixed to the inner track bar of the conveyer track circuit is an upstanding backing flange **239** adapted to abut the inner closed end of the filled cartons so as to prevent displacement thereof relative to the carrying pockets **176**, while the above outer end closing and sealing operations are taking place. Suitably supported top guide plate means **240** is also provided, beneath which the filled cartons pass, and by which the same are held against upward displacement or movement relative to said carrying pockets **176**.

Mechanism is provided for applying glue to the inner face of the end closure flap *g*. This mechanism is located in advance of the plow plate **238**, and comprises a suitably supported glue containing reservoir **241** provided with a glue applicator wheel **242**. This glue applicator wheel **242**, as rotated, dips its lower side into the liquid glue content with which the reservoir **241** is supplied, while its upper side is positioned to engage the inner face of said carton end closure flap *g*, while the latter is moving past the same, to thereby coat said flap with an application of glue for adhering the same to the seal base flap *j*, when folded down in contact with the latter.

The means for driving said glue applicator wheel **242** includes a transverse countershaft **243** driven from the previously described countershaft **65** by the bevel gear **68'** of the latter, which meshes with a bevel gear **244** with which said countershaft **243** is provided. Mounted in suitably supported bearing standards **245** is a lay shaft **246**, which is driven from said transverse countershaft **243** by an intermediate sprocket and chain transmission **247**. Said lay shaft **246**, in turn, drives the shaft of the glue applicator wheel **242** through intermediate gearing **248**.

Said lay shaft **246** is also utilized to supply actuating power to said shaft of the heretofore mentioned rotary tucker device, comprising the liner tucker **231** and carton side tab folder **232**; the power being transmitted from said lay shaft by a sprocket and chain transmission **249**.

Means is provided, beyond the above described carton end closing and sealing devices and along the outgoing course **171** of the conveyer track bars, for applying pressure and heat to the closed outer ends of the filled cartons, to thereby dry and set the glue by which the end closure flaps *g* are secured, as well as to transmit heat to the laps of the end closing folds of the inner liner, whereby the wax content of said liner folds is fused to adhere the same together, so that the sealing of the liner into a substantially air-tight soap enclosing envelope is attained. The devices serving such purposes include, a suitably supported heater block **250** with which outer closed ends of the cartons are engaged, as the latter are moved along contiguous to the former by the outwardly progressing carrying pockets **176**. This heater block **250** is heated by electrical heater elements (not shown), with which it is interiorly provided. Suitably mounted to engage the inner ends of the cartons moved therealong is a spring-urged presser bar **251**. This presser bar **251** is movably supported by rearwardly projecting studs **252** which are slidably engaged through a fixed carrier bar **253** mounted along the inner track bar of the outgoing course **171** of the conveyer. Said presser bar **251** exerts an endwise thrust upon the cartons engaged thereby, so that the outer closed ends of said cartons are maintained in close heat receiving contact with the heater block **250**. Said heater block **250** is made of such length as is adapted to maintain heat application to the package for a predetermined time sufficient to assure the desired glue setting and wax fusing effects.

Mechanism for removing the completed packages from the carrying conveyer and discharging the same from the machine

At a suitably selected point along the outgoing course **171** of the conveyer track bar circuit, in advance of the forward sprocket wheel **179** around which the conveyer turns to resume its ingoing course, means is provided for removing the filled, closed and sealed cartons, which constitute the finished packages P, from the carrying pockets **176** of the conveyer, and thereupon delivering the same to a discharge chute means, subject to outward discharging propulsion therethrough by propelling means which cooperates with said removing means (see Figs. 12 and 13).

To serve these purposes, a forwardly extending package discharge chute **260** is suitably supported with its inner or receiving end portion in alignment with the outgoing course **171** of the conveyer track bar circuit, but spaced above the plane of the conveyer carrying pockets **176**, so that the latter may, in continuing their movement around the track bar circuit, pass onward beneath said chute.

Arranged for operation between the carrying pockets **176** and the receiving end portion of said chute **260** is a revolving transfer means for lifting a package P upwardly out of a carrying pocket **176** to the level of said chute **260** for entrance thereinto. This transfer means comprises bearing frames **261** respectively mounted in connection with the conveyer system track bars so as to be disposed on opposite sides of the path of travel of the carrying pockets **176** thereof. Each bearing frame **261** is formed to provide in connection with its upper portion a pair of horizontally spaced bearings **262** to journal the shafts **263** of a pair of revolvable crank arms **264**. Pivotally supported on and across the free end portions of each pair of crank arms is a transfer bar **265**. These transfer bars **265** are respectively revolved so as to move upwardly across and adjacent to the respective ends of each carrying pocket **176**, as the latter approaches the receiving end of said package discharge chute **260**. The floor of the receiving end of said discharge chute is suitably slotted to permit passage of said transfer bars **265** during the revolution thereof. The means for driving said crank arm sets and transfer bars carried thereby, includes a transverse transmission shaft **266**, which is journaled in and between the lower end portions of said opposed bearing frames **261**. On said transmission shaft **266** are drive gears **267** which respectively mesh with and drive gears **268** with which the shafts **263** of each set of crank arms **264** are provided, so that said crank-arms and the transfer bars **265** actuated thereby are operatively driven in synchronism. Said transmission shaft **266** is driven from the previously described transmission shaft **93** by a sprocket and chain transmission **269**.

Cooperating with said transfer means is a means for propelling the packages P, when delivered onto the discharge chute **260**, outwardly therethrough and away from the machine. This

propelling means is supported adjacent to the inner side of the outgoing course 171 of the conveyer track circuit by a bearing bracket 270. This bearing bracket is provided with a pair of revolvable crank-arms 273. Pivotally supported on and across the free end portions of said crank arms 273 are driven from said transmission end, a dependent push-piece 275. The crank arms 273 are driven from said transmission shaft 93 by a drive gear 276 with which the latter is provided. This drive gear 276 meshes with and drives an intermediate gear 277 mounted in connection with said bearing bracket 270, which, in turn, meshes with and drives gears 278 with which the shafts 272 of the crank arms 273 are provided.

In operation, the transfer bars 265, being revolved in anti-clockwise direction, are caused to move upward, respectively past the respective ends of a conveyer carrying pocket 176, as the latter moves toward and reaches a point adjacent to the receiving end of the discharge chute 260. In thus moving upwardly past the carrying pocket ends, said transfer bars 265 respectively engage the respective end portions of the package P contained in the carrying pocket, and thereupon lifts said package upwardly out of the latter, thence transferring the same to and into the receiving end of said discharge chute 260. Timed to operate in synchronism with the delivery of the package P into the receiving end of said discharge chute, the revolving push-bar 274, which also revolves in anti-clockwise direction, enters its forward phase of movement whereby its push-piece 275 is caused to move behind and thereupon engage the delivered package P so as to push the same onward along the discharge chute, after the package is disengaged by the then descending transfer bars 265. In this manner successive packages P are delivered into and pushed outwardly along the discharge chute 260, thus forming an outgoing train thereof which moves continuously away from the machine.

If desired, the discharge chute 260 may be provided along one side thereof with a spring tensioned pressing bar 279 of suitable length, adapted to exert endwise pressure upon the packages P to hold their closed and sealed ends against accidental release until such time as the sealing glue and fused wax is thoroughly dried and set.

Generally as to variations or modifications in the construction and use of the machine mechanisms

It will be obvious that the machine mechanisms, or so much thereof as required for the purpose, could be used solely for the purpose of forming, from blanks, cartons or like boxes or containers, either with or without the internal lining. It will be understood that the form or style of carton to be formed may be varied. For example, either cartons having open end closure flaps subject to be secured by gluing may be formed, or the open end closure flaps may be of the well known tuck type. In the latter case the closing mechanisms would be modified to manipulate the tuck flaps, by any suitable means already well known to the art.

One of the important features of the machine as designed to form a carton having an internal lining fixed therein, resides in the arrangement of mechanism, and its novel mode of operation, whereby the liner is preformed over the same former block about which the carton blank is subsequently formed. As above set forth, glue is applied to seam forming parts of the carton, and subsequently heat is then applied in such manner as to dry the glue, while, at the same time, the applied heat is transferred through the carton material to the underlying portions of the wax paper liner, so as to fuse the wax content of the latter to seal the liner seams, and simultaneously attach, by the fused wax, the liner body in adhered and fixed relation to walls of the formed carton body against displacement. In this connection, however, if the carton bodies produced carry printing on their exterior sides which might be deleteriously affected by direct rubbing contact with the heater blocks, a modification of the mechanism may be provided to alter the sequence of operations whereby the heat is applied prior to folding down and gluing the exterior lap of the seamed sides of the carton body upon which the printing is applied. An illustrative modification of the mechanism to such end is schematically shown in Fig. 27 of the accompanying drawings. In such modified arrangement, the folder devices 116 are longitudinally separated and disposed to provide the first acting folder guideway 117, which up turns the side lap *e* of the carton blank. Immediately beyond this folder guideway 117 is located the heater block means 131, with the glue applicator roll means 122 following, whereafter is located the last acting folder guideway 118, which downturns the printed and exterior side lap *f* of the carton blank. By this sequence arrangement, the heat is applied through the unprinted upturned inner side lap *e* to the underlying wax paper liner to seal the seams of the latter and adhere the same to said upturned inner side laps *e*. Thereafter the printed outer side lap *f* of the carton receives its application of glue, and is thereupon downturned into adhering contact with the previously upturned inner side lap *e*. In order to press home the downturned outer side lap *f*, one or more pressure rollers R are provided. These rollers R are driven to provide a peripheral speed substantially equal to the linear speed of the carton body as moved past the same by the traveling former blocks 14 by which they are carried, and, consequently, although adequate pressure is applied to press home and maintain the outer side lap *f* in contact with the inner side lap *e* until the applied glue sets, the exterior printed face of the carton side lap *f* is not subjected to any rubbing or frictional abrasion likely to injure or mar the printing carried thereby. It will be understood that any suitable form of traveling pressure exerting means, other than the roller or rollers R, may be employed, as long as its carton contacting means moves at the same speed as that at which the carton travels, to thereby avoid rubbing.

While in the specific embodiment of the machine previously described, the formed cartons when stripped from the former blocks 14 are transferred in horizontal position to the loading mechanism; which mode of operation is highly satisfactory in cases where the content with which the carton is to be filled comprises a single body or a unitary group of articles. There are, however, many uses for the machine which would involve filling the cartons with free flowing material or gravity fed articles, in which case, delivery of the formed cartons to the loading station in an upright position would be desirable. An illustrative modification of the ma-

chine to such end is schematically shown in Fig. 28. As therein shown, a means is provided for upturning the carton bodies, after the same are stripped from the former blocks 14, by the stripper members 158 of the driven stripper chains 156. For example, this means may comprise a pivoted rocker carriage 280 actuated by an eccentric 281 driven by the shaft 163 of said stripper mechanism. This rocker carriage 280, upon receiving a stripped carton body from the stripper mechanism, is swung from its horizontal carton receiving position to its vertical carton delivering position, whereby the carton body is delivered to the carton elevator screw cylinders 190—190' in an upright position, with its open end upward. Said elevator screw cylinders thereupon lift the upright carton body to the level of a loading platform 282, onto which it is shifted, from the elevator screw cylinders, by a reciprocating transfer device 283. Cooperative with said loading platform, is a conveyer means 284, having longitudinally spaced push-plates 285, by which the carton body is propelled onward past a filling mechanism 286 operative to deliver the content to be packet thereinto, and thence on and past suitable means 287 for closing the top or open end of the carton preparatory to discharging the thus filled and closed carton from the machine.

In connection with the lined carton forming operations, it is in some cases desirable to provide that the open mouth portions of the liner which lies contiguous to the inner faces of the extending carton side tabs *h* and *i* be securely glued to the latter, whereby these parts may mutually reenforce each other in resistance to accidental injury when engaged by the stripping mechanism during removal of the carton formations from the former blocks 14, and whereby the further advantage is obtained of firmly holding the liner mouth against inward displacement by goods, when the latter are inserted into the carton interior at the loading station. To effect such gluing of the liner mouth parts to the contiguous carton side tabs *h* and *i*, the effective peripheries of the glue applicator wheels 122 are extended so as to apply glue to the inner faces of said carton side tabs *h* and *i* as well as to the carton side laps *f*, whereby when said side laps *f*, together with the side tabs *h* and *i*, are subsequently turned down by the folder guideways 118, not only will the carton side laps *f* be engaged with and glued to the previously upturned carton side laps *e*, but the glue coated faces of said carton side tabs *h* and *i* will at the same time be carried into engagement with the adjacent liner mouth parts and adhered thereto.

It will be understood that many other changes and modifications could be made in the various mechanisms and devices making up the novel packaging machine according to this invention, and that many apparently widely different embodiments of the features of this invention could be made without departing from the scope thereof as defined by the following claims. It is therefore intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In package machinery, an endless track circuit, former block devices movable around said circuit, first and second continuously driven conveyers spaced end to end within said track circuit, each conveyer and said former block devices having cooperative means for automatically coupling and uncoupling the latter relative to the former whereby said former block devices are successively spaced a maximum distance apart in connection with the first conveyer and a minimum distance apart in connection with the second conveyer, means for automatically transferring the former block devices from one conveyer to the other, means for delivering container forming material for engagement by former block devices as moved by the first conveyer, and means bordering the path of movement of the former block devices along the track circuit for forming the container material upon and around the same.

2. In packaging machinery, an endless track circuit, former block devices movable around said circuit, first and second continuously driven conveyers spaced end to end within said track circuit, each conveyer and said former block devices having cooperative means for automatically coupling and uncoupling the latter relative to the former whereby said former block devices are successively spaced a maximum distance apart in connection with the first conveyer and a minimum distance apart in connection with the second conveyer, means for automatically transferring the former block devices from one conveyer to the other, means for delivering container forming material for engagement by former block devices as moved by the ingoing course of the first conveyer, means bordering the path of movement of the former block devices along the track circuit for forming the container material upon and around the same, and means cooperative with the former block devices as moved by the return course of the first conveyer for stripping the formed containers therefrom.

3. Packaging machinery, an endless track circuit, former block devices movable around said circuit, first and second continuously driven conveyers spaced end to end within said track circuit, each conveyer and said former block devices having cooperative means for automatically coupling and uncoupling the latter relative to the former whereby said former block devices are successively spaced a maximum distance apart in connection with the first conveyer and a minimum distance apart in connection with the second conveyer, means for automatically transferring the former block devices from one conveyer to the other, means for feeding carton blanks for engagement by former block devices as moved by the ingoing course of the first conveyer, means bordering the path of movement of the former block devices along the track circuit for folding the carton blanks about said former block devices, said latter means including means to apply glue to overlapping side seam forming portions of the carton blank and means to fold said portions into overlapping adhered engagement, means bordering the path of movement of the former block devices as advanced by the second conveyer for applying heat to the formed cartons to dry and set the glue adhered portions thereof, and means cooperative with the former block devices as moved by the return course of the first conveyer for stripping the formed cartons therefrom.

4. In packaging machinery, an endless track circuit, former block devices movable around said circuit, first and second continuously driven conveyers spaced end to end within said track cir-

cuit, each conveyer and said former block devices having cooperative means for automatically coupling and uncoupling the latter relative to the former whereby said former block devices are successively spaced a maximum distance apart in connection with the first conveyer and a minimum distance apart in connection with the second conveyer, means intermediate the forwardly moving courses and the return courses of said conveyers for automatically transferring the former block devices from one corresponding course to the other, means for feeding and severing sheet material to provide and deliver liner blanks for engagement by former block devices as advanced by the forwardly moving course of the first conveyer, means bordering the path of movement of the former block devices advanced by said first conveyer to form the liner blanks upon and around the same, means for feeding carton blanks for engagement by the liner carrying former block devices as still advanced by the first conveyer, means bordering the path movement of the liner carrying former block devices along the track circuit for folding the carton blanks about the same into carton formations, and means cooperative with the former block devices as moved by the return course of the first conveyer for stripping the formed cartons therefrom.

5. In packaging machinery, an endless track circuit, former block devices movable around said circuit, first and second continuously driven conveyers spaced end to end within said track circuit, each conveyer and said former block devices having cooperative means for automatically coupling and uncoupling the latter relative to the former whereby said former block devices are successively spaced a maximum distance apart in connection with the first conveyer and a minimum distance apart in connection with the second conveyer, means intermediate the forwardly moving courses and the return courses of said conveyers for automatically transferring the former block devices from one corresponding course to the other, means for feeding and severing sheet material to provide and deliver liner blanks for engagement by former block devices as advanced by the forwardly moving course of the first conveyer, means bordering the path of movement of the former block devices advanced by said first conveyer to form the liner blanks upon and around the same, means for feeding carton blanks for engagement by the liner carrying former block devices as still adanced by the first conveyer, subsequently acting means bordering the path of movement of the liner carrying former block devices for folding the carton blanks about the same, said latter means including means to apply glue to overlapping side seam forming portions of a carton blank and means to fold said portions into adhered engagement, heating means contiguous to the path of movement of the former block devices as advanced by the second conveyer to apply glue drying and setting heat to the carton side seam formations, and means cooperative with the former block devices as moved by the return course of the first conveyer for stripping the formed cartons therefrom.

6. In packaging machinery, an endless track circuit, former block devices movable around said circuit, first and second continuously driven conveyers spaced end to end within said track circuit, each conveyer and said former block devices having cooperative means for automatically coupling and uncoupling the latter relative to the former whereby said former block devices are successively spaced a maximum distance apart in connection with the first conveyer and a minimum distance apart in connection with the second conveyer, means intermediate the forwardly moving courses and the return courses of said conveyers for automatically transferring the former block devices from one corresponding course to the other, means for feeding and severing a web length of wax paper to provide and deliver liner blanks for engagement by former block devices carried by the forwardly moving course of the first conveyer, means bordering the path of movement of the former block devices as carried by the forwardly moving course of the first conveyer operative to fold a liner blank about the engaging former block device, means for feeding carton blanks for engagement by liner carrying former blocks as further advanced by the forwardly moving courses of said first conveyer, subsequently acting means bordering the path of movement of the carton blank engaging former block devices for folding the carton blank about the same and over the previously formed liner thereon into carton formations, said latter means including means to apply glue to overlapping side seam forming portions of a carton blank and means to fold said portions into adhered engagement, a series of yieldable inwardly pressing heater blocks bordering the path of movement of the former block devices as carried by the forwardly moving course of the second conveyer, said heater blocks being operative to apply heat to the carton sides and therethrough to the underlying liner for the purposes described, and means cooperative with the former block devices as moved by the return course of the first conveyer for stripping the formed cartons therefrom.

7. In packaging machinery, an endless track circuit, former block devices movable around said circuit, first and second continuously driven conveyers spaced end to end within said track circuit, each conveyer and said former block devices having cooperative means for automatically coupling and uncoupling the latter relative to the former whereby said former block devices are successively spaced a maximum distance apart in connection with the first conveyer and a minimum distance apart in connection with the second conveyer, means intermediate the forwardly moving courses and the return courses of said conveyers for automatically transferring the former block devices from one corresponding course to the other, means for feeding and severing a web length of wax paper to provide and deliver liner blanks for engagement by former block devices carried by the forwardly moving course of the first conveyer, means bordering the path of movement of the former block devices as carried by the forwardly moving course of the first conveyer operative to fold a liner blank about the engaging former block device, means for feeding carton blanks for engagement by liner carrying former blocks as further advanced by the forwardly moving course of said first conveyer, subsequently acting means bordering the path of movement of the carton blank engaging former block devices for folding the carton blank about the same and over the previously formed liner thereon into carton formations, said latter means including means to apply glue to overlapping side seam forming portions of a carton blank and means to fold said portions into adhered engagement, a series of yieldable inwardly pressing heater blocks bor-

dering the path of movement of the former block devices as carried by the forwardly moving course of the second conveyer, said heater blocks being operative to apply heat to the carton sides and therethrough to the underlying liner for the purposes described, a series of yieldable inwardly pressing cooler blocks bordering the path of movement of the former block devices as carried by the return course of the second conveyer, said cooler blocks being adapted to transfer heat from the carton and its liner for the purposes described, and means cooperative with the former block devices as moved by the return course of the first conveyer for stripping the formed cartons therefrom.

8. Packaging machinery according to claim 6 including, means for receiving and transferring the formed lined cartons stripped from said former block devices to filling mechanism.

9. In packaging machinery, the combination with conveyer carried former blocks continuously movable in successively spaced relation, upon which former blocks carton bodies are formed and carried, of means to apply heat to the thus carried carton formations comprising, a plurality of heater blocks mounted to extend along the path of movement of said former blocks, means to support said heater blocks for movement toward and from said former blocks, spring actuated lever means connected to said heater blocks and adapted to yieldably urge the same toward and into operative relation to said former blocks, and manipulatable devices for retracting said heater blocks from operative relation to said former blocks.

10. In packaging machinery, the combination with conveyer carried former blocks continuously movable in successively spaced relation, upon which former blocks carton bodies are formed and carried, of means to apply heat to the thus carried carton formations comprising, a plurality of heater blocks mounted to extend along the path of movement of said former blocks, means to support said heater blocks for movement toward and from said former blocks, spring actuated lever means connected to said heater blocks and adapted to yieldably urge the same toward and into operative relation to said former blocks, and manipulatable devices for retracting said heater blocks from operative relation to said former blocks, said latter devices including drawbar means having coupled connection with said lever means, and means for actuating said drawbar means to swing said lever means in heater block retracting direction.

11. A continuous motion packaging machine comprising, an endless conveyer circuit in vertical plane around and by which a succession of former blocks are continuously moved to pass means for forming material supplied thereto into containers, a second endless conveyer circuit in horizontal plane above said first circuit around and by which a procession of goods is continuously moved to receive application of formed containers thereover, means for applying formed containers over the carried goods while in motion along said second conveyer circuit, and means to remove formed containers from said first conveyer circuit and transfer them to said means for applying the same to the goods carried along said second conveyer circuit.

12. A continuous motion packaging machine comprising, an endless conveyer circuit in vertical plane around and by which a succession of former blocks are continuously moved to pass means for forming material supplied thereto into containers, a second endless conveyer circuit in horizontal plane above said first circuit around and by which a procession of goods is continuously moved to receive application of formed containers thereover, means for applying formed containers over the carried goods while in motion along said second conveyer circuit, means to remove formed containers from said first conveyer circuit and transfer them to said means for applying the same to the goods carried along said second conveyer circuit, and means bordering said second conveyer circuit beyond said applying means for finally closing the applied goods enveloping containers.

13. A continuous motion packaging machine comprising, an endless conveyer means the circuit of which is disposed in vertical plane, a second endless conveyer means the circuit of which is disposed in horizontal plane above said first conveyer means, means to continuously operate said first and second conveyer means in synchronous relation, said first conveyer means carrying spaced former blocks adapted to be successively and continuously moved thereby past means for forming material supplied thereto into containers, said second conveyer means carrying spaced pockets to hold goods to be packaged, means for applying formed containers over the carried goods while held and moved along by the pockets of said second conveyer means, means to remove formed containers from the former blocks of said first conveyer means, and means to elevate said removed formed containers and deliver the same to said applying means.

14. A continuous motion packaging machine comprising, an endless conveyer means the circuit of which is disposed in vertical plane, a second endless conveyer means the circuit of which is disposed in horizontal plane above said first conveyer means, means to continuously operate said first and second conveyer means in synchronous relation, said first conveyer means carrying spaced former blocks adapted to be successively and continuously moved thereby past means for forming material supplied thereto into containers, said second conveyer means carrying spaced pockets to hold goods to be packaged, means for applying formed containers over the carried goods while held and moved along by the pockets of said second conveyer means, means to remove formed containers from the former blocks of said first conveyer means, means to elevate said removed formed containers and deliver the same to said applying means, and means bordering said second conveyer means beyond said applying means for finally closing the applied goods enveloping containers.

15. A continuous motion packaging machine comprising, an endless conveyer means the circuit of which is disposed in vertical plane, a second endless conveyer means the circuit of which is disposed in horizontal plane above said first conveyer means, means to continuously operate said first and second conveyer means in synchronous relation, said first conveyer means carrying spaced former blocks adapted to be successively and continuously moved around the circuit thereof, means to first supply and form liner material about the former blocks, means to next supply and form carton blanks about the former blocks and over formed liners thereon, said second conveyer means carrying successively and continuously moved pockets to

hold goods to be packaged, means for applying lined cartons over the carried goods while held in and moved along by said pockets, means to strip lined cartons from the former blocks of said first conveyer means, and means to thereupon receive, elevate and deliver said lined cartons to said applying means.

16. A continuous motion packaging machine comprising, an endless conveyer means the circuit of which is disposed in vertical plane, a second endless conveyer means the circuit of which is disposed in horizontal plane above said first conveyer means, means to continuously operate said first and second conveyer means in synchronous relation, said first conveyer means carrying spaced former blocks adapted to be successively and continuously moved around the circuit thereof, means to first supply and form liner material about the former blocks, means to next supply and form carton blanks about the former blocks and over formed liners thereon, said second conveyer means carrying successively and continuously moved pockets to hold goods to be packaged, means for applying lined cartons over the carried goods while held in and moved along by said pockets, means to strip lined cartons from the former blocks of said first conveyer means, means to thereupon receive, elevate and deliver said lined cartons to said applying means, and means bordering said second conveyer means beyond said applying means for finally closing the applied goods enveloping containers.

17. A continuous motion packaging machine as defined in claim 13 wherein the means for elevating and delivering the formed containers removed from the former blocks to the applying means comprises, a pair of cooperative vertically disposed rotated elevator screw cylinders between the first and second conveyer means, means for delivering the removed containers to and between the lower end portions of said elevator screw cylinders, and means cooperative with the upper end portions of said elevator screw cylinders for transferring containers therefrom to said applying means.

18. A continuous motion packaging machine as defined in claim 15 wherein the means to receive, elevate and deliver lined cartons stripped from the former blocks of the first conveyer means to the applying means comprises, a pair of cooperative vertically disposed rotated elevator screw cylinders between the first and second conveyer means, means for delivering the stripped lined cartons to and between the lower end portions of said elevator screw cylinders, and means cooperative with the upper end portions of said elevator screw cylinders for transferring the lined cartons therefrom to said applying means.

19. In a packaging machine, an endless conveyer means having spaced former blocks adapted to be successively and continuously moved about the circuit of said conveyer means, means for feeding and severing waxed paper to provide and deliver liner blanks to be first engaged by the moving former blocks, means bordering the circuit of said conveyer means to fold the liner blanks upon and around said former blocks so as to form liners having lapped side folds, means for feeding carton blanks to be next engaged by the advancing liner carrying former blocks, means bordering the circuit of said conveyer means to thereupon fold the carton blanks about the liner carrying former blocks so as to form cartons having lapped side folds overlying the lapped side folds of the enclosed liner, said latter means including means to apply adhesive to the carton side folds, heat and pressure applying means also bordering the circuit of said conveyer means operative to engage the lapped carton side folds whereby to transmit heat therethrough to fuse the wax content of the underlying lapped liner side folds to seal the latter and simultaneously adhere the liner to the carton material, and subsequently acting means to strip the lined cartons from the former blocks.

20. In a packaging machine, an endless conveyer means having spaced former blocks adapted to be successively and continuously moved about the circuit of said conveyer means, means for feeding and severing waxed paper to provide and deliver liner blanks to be first engaged by the moving former blocks, means bordering the circuit of said conveyer means to fold the liner blanks upon and around said former blocks so as to form liners having lapped side folds, means for feeding carton blanks to be next engaged by the advancing liner carrying former blocks, means bordering the circuit of said conveyer means to thereupon fold the carton blanks about the liner carrying former blocks so as to form cartons having lapped side folds overlying the lapped side folds of the enclosed liner, said latter means including means to apply adhesive to the carton side folds, heat and pressure applying means also bordering the circuit of said conveyer means operative to engage the lapped carton side folds whereby to transmit heat therethrough to fuse the wax content of the underlying lapped liner side folds to seal the latter and simultaneously adhere the liner to the carton material, cooling means likewise bordering the circuit of said conveyer means for thereafter transferring heat from the formed lined carton to chill and set the previously fused wax, and subsequently acting means to strip the lined cartons from the former blocks.

21. In a packaging machine, an endless conveyer means having spaced former blocks adapted to be successively moved about the circuit of said conveyer means, means for feeding and severing waxed paper to provide and deliver liner blanks to be first engaged by the moving former blocks, means bordering the circuit of said conveyer means to fold the liners about the former blocks, means for feeding carton material to be next engaged by the advancing liner carrying former blocks, means bordering the circuit of said conveyer means to thereafter fold the carton material about the liner carrying former blocks into lined carton formation, heat and pressure applying means also bordering the circuit of said conveyer means operative to transmit heat through the carton material to the liner material to fuse the wax content of the latter and thereby adhere the liners to the carton formations, and subsequently acting means to strip the completed lined carton formations from the former blocks.

22. In a packaging machine, an endless conveyer means having spaced former blocks adapted to be successively moved about the circuit of said conveyer means, means for feeding and severing waxed paper to provide and deliver liner blanks to be first engaged by the moving former blocks, means bordering the circuit of said conveyer means to fold the liners about the former blocks, means for feeding carton material to be next engaged by the advancing liner carrying former blocks, means bordering the circuit of said

conveyer means to thereafter fold the carton material about the liner carrying former blocks into lined carton formation, heat and pressure applying means also bordering the circuit of said conveyer means operative to transmit heat through the carton material to the liner material to fuse the wax content of the latter and thereby adhere the liners to the carton formations, cooling means likewise bordering the circuit of said conveyer means for thereafter transferring heat from the lined carton formations to chill and set the previously fused wax, and subsequently acting means to strip the completed lined carton formations from the former blocks.

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