

July 15, 1958

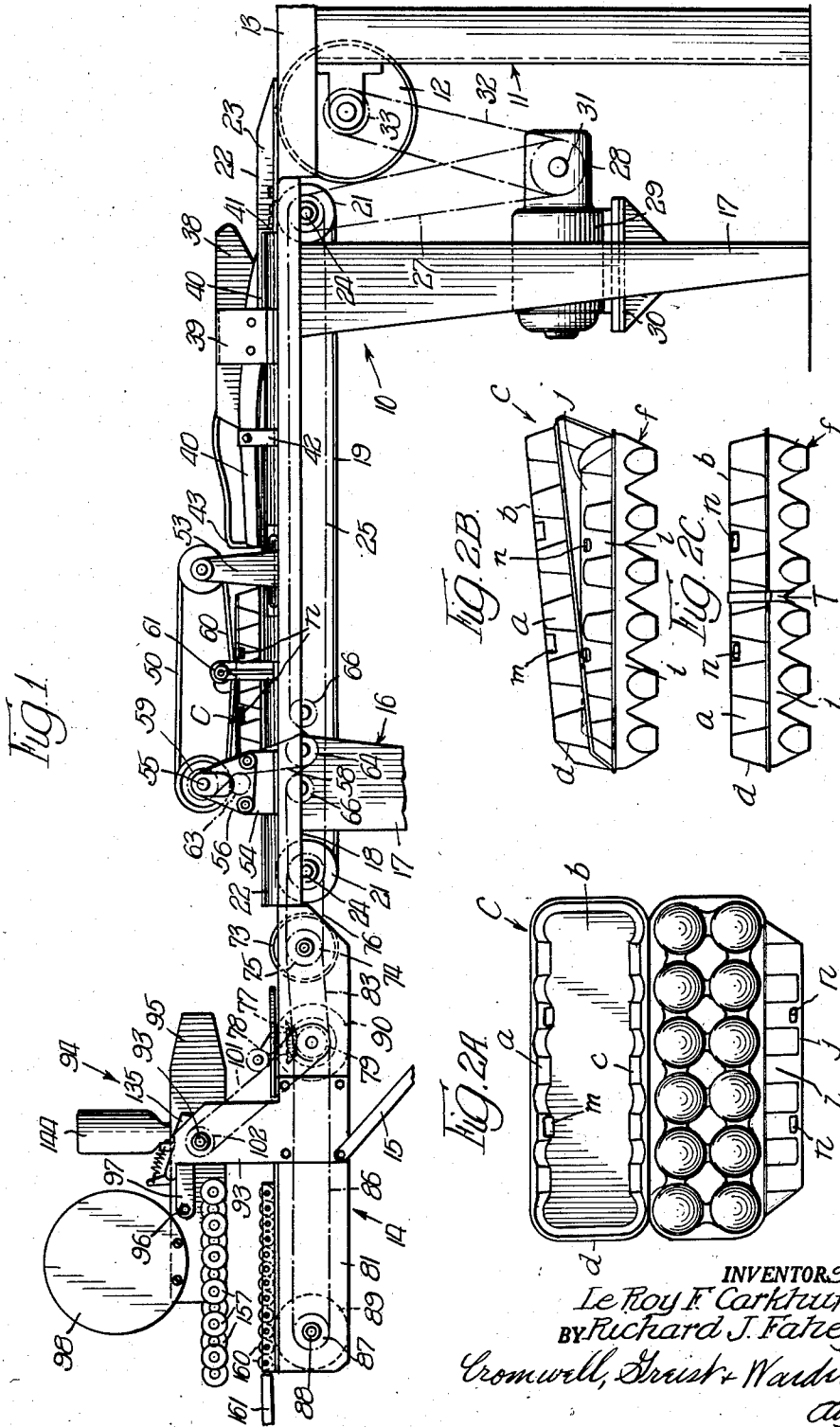
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2,842,920

CARTON CLOSING MACHINE

Filed Sept. 24, 1954

6 Sheets-Sheet 1



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6 Sheets-Sheet 2

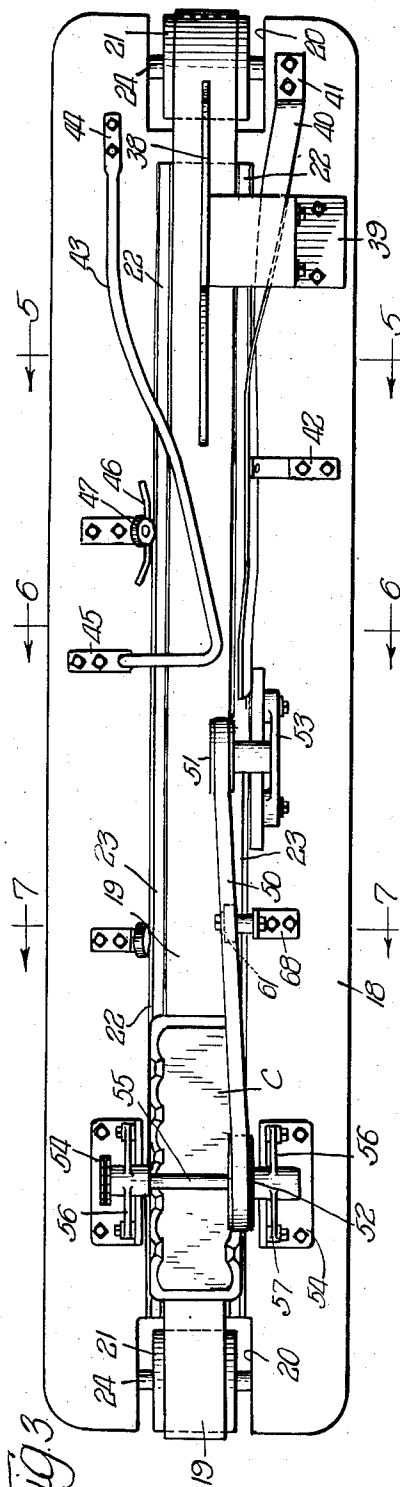


Fig. 3

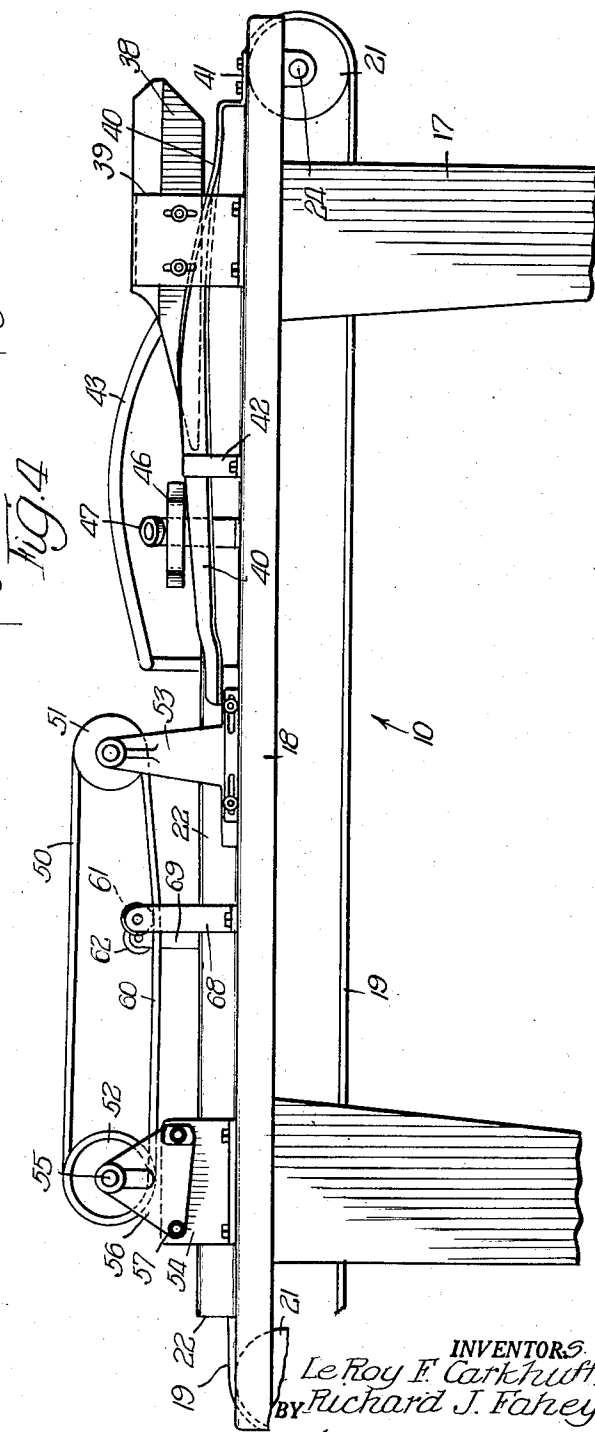


Fig. 4

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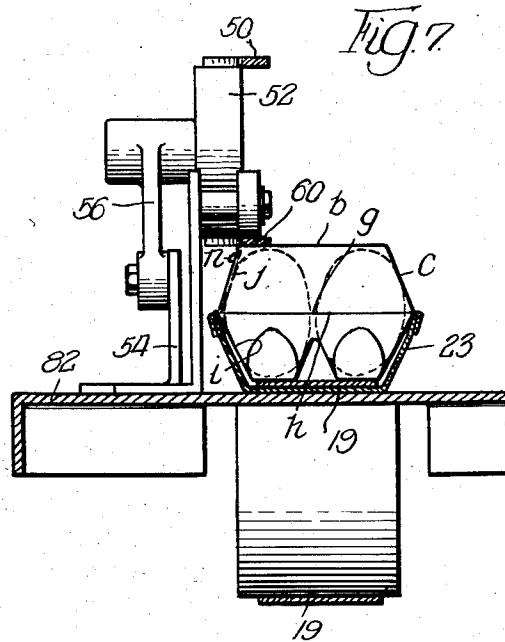
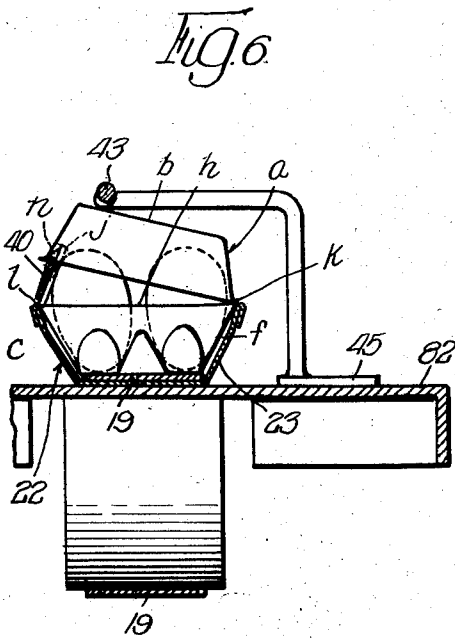
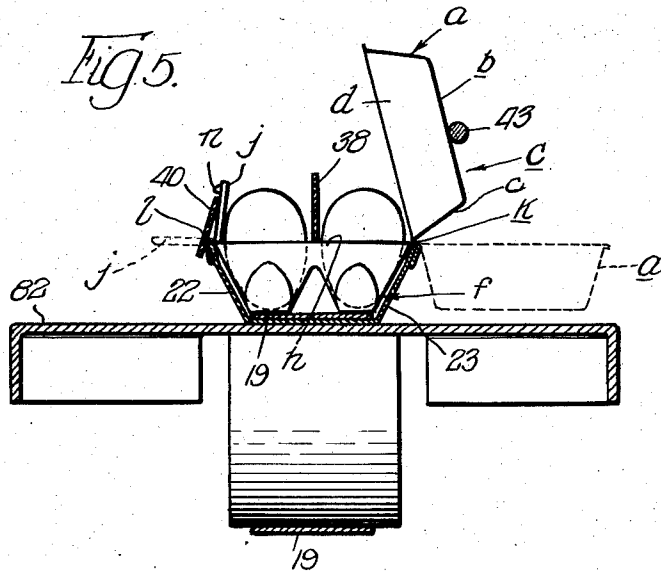
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CARTON CLOSING MACHINE

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6 Sheets-Sheet 3



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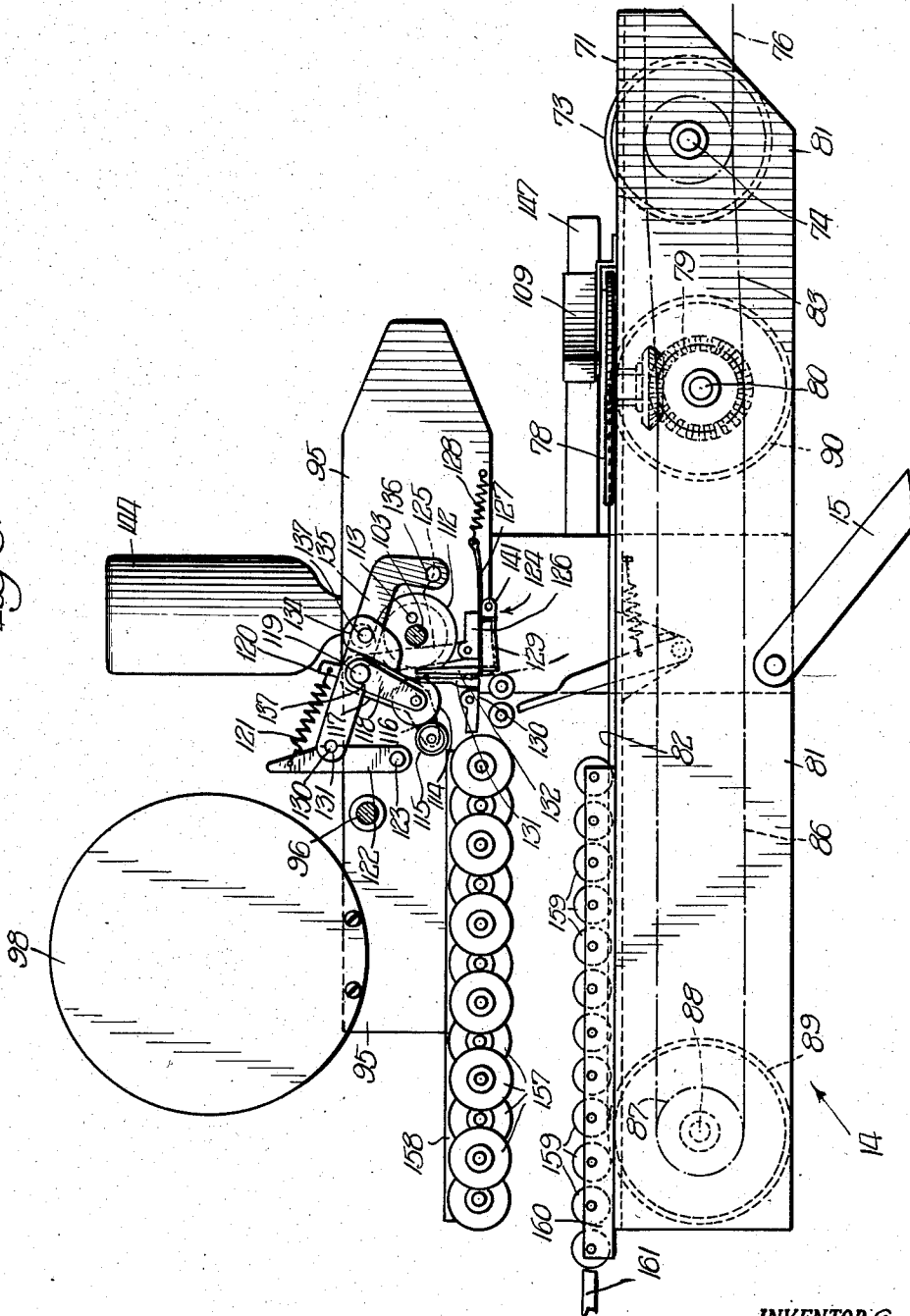
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Fig. 8.



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FIG. 10

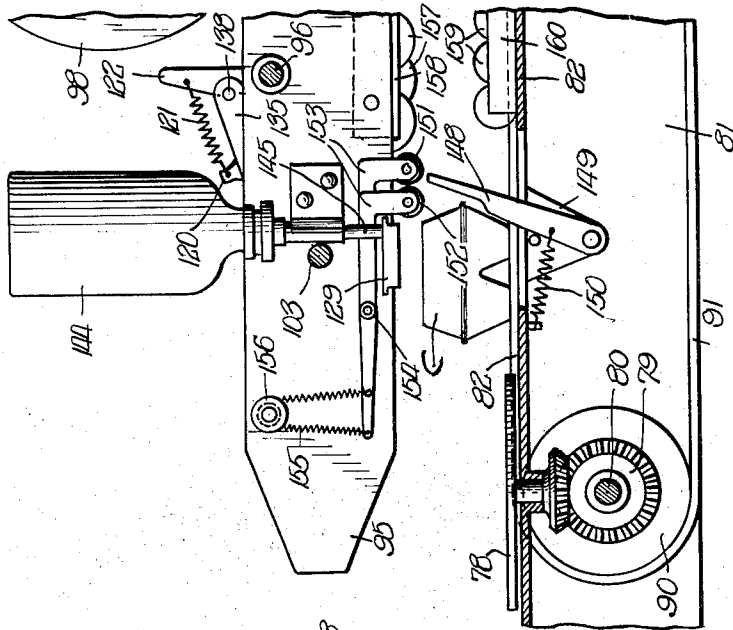
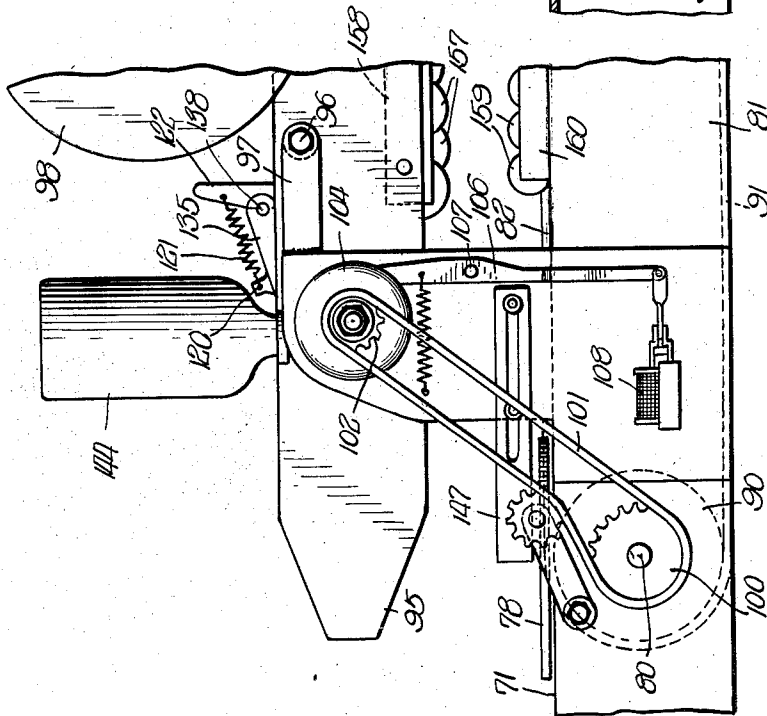


FIG. 9



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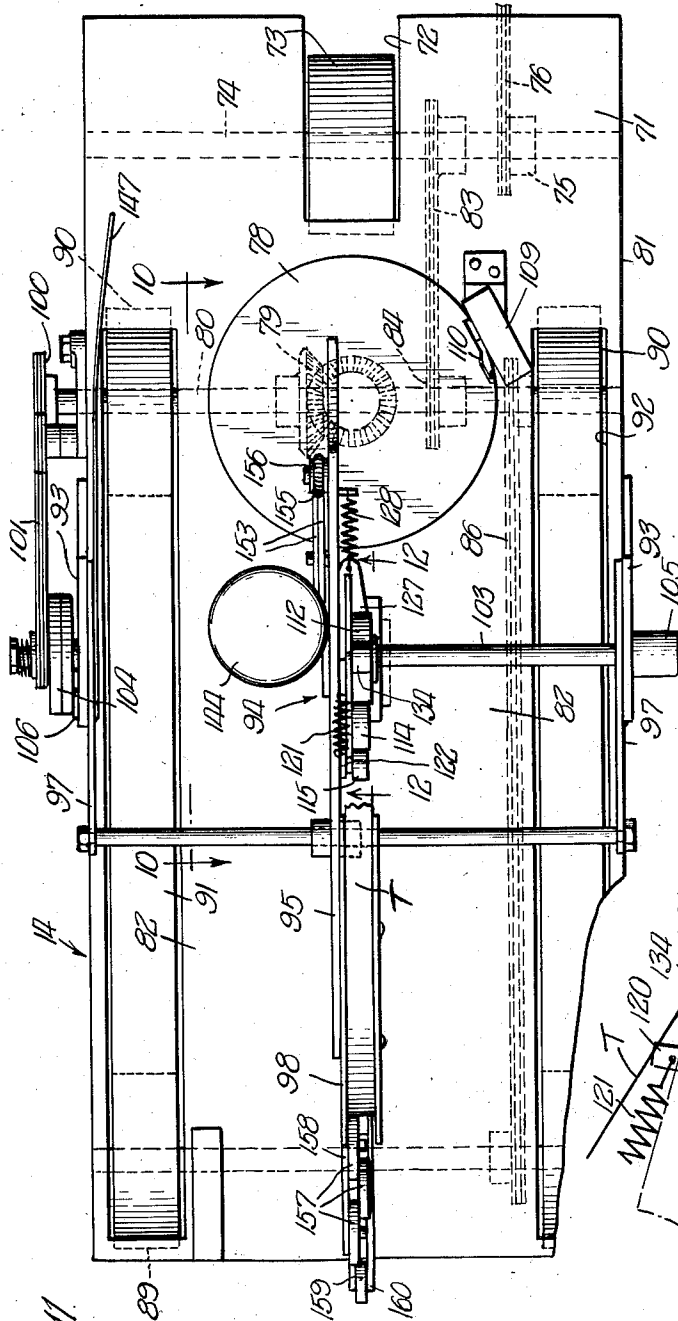


Fig. 11.

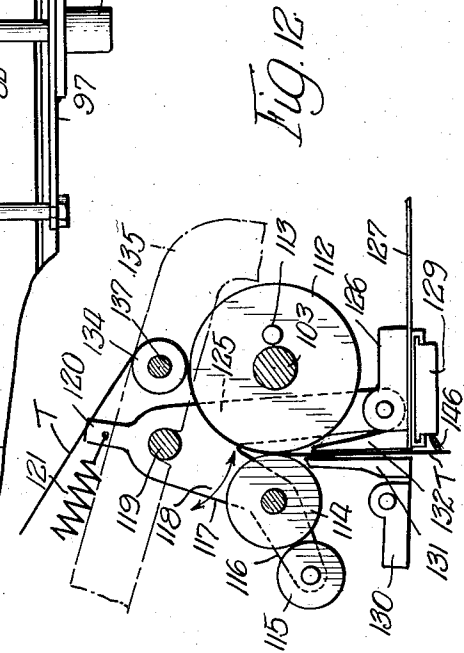


Fig. 12.

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## CARTON CLOSING MACHINE

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Application September 24, 1954, Serial No. 458,239

10 Claims. (Cl. 53—137)

The present invention relates to an improved and wholly automatic machine for closing and tape dating and sealing cartons of a compartmented type commonly used in the packaging of eggs. The machine is particularly devised for the handling of molded pulp egg cartons embodying an improvement on that shown and described in the patent to Cox No. 2,529,140 of November 7, 1950, in the form of an improved integral snap locking arrangement to hold the sections of the carton in closed condition.

Generally considered, the present apparatus receives a molded pulp carton, filled with its complement of eggs, at a rear or feed-in side of the apparatus, the carton moving in a direction parallel to its length. This is also parallel to the length of elongated hinges which integrally articulate opposite sides of a cellular bottom section with a non-cellular cover section and with an internal locking and reinforcing flange, respectively.

The general character of the molded pulp cartons is illustrated in Figs. 2A, 2B and 2C, also in Figs. 5, 6 and 7 in reference to operations performed by the apparatus, to which reference in greater detail will hereinafter be made. The operation of the latter is to swing the locking and reinforcing flange upwardly from initial horizontal position, in which it is coplanar with the bottom and cover sections, the latter also being swung upwardly and inwardly about its longitudinal articulating hinge as the flange is manipulated.

These folding operations are performed by fixed plow members past which the filled and open carton is forwarded by a continuously traveling feed belt, with the bottom section of the carton laterally restrained in a guide channel through which the belt passes. Inasmuch as the cover closing plow member exerts a substantial frictional drag on the carton cover, magnified by the considerable length of transverse moment arm between its outer wall and hinge, usually there is some distortion in regard to the exact transverse alignment of the cover with the bottom section and flange as the carton traverses the machine in the longitudinal direction. It follows that due to this drag and distortion, certain locking apertures molded in the longitudinally extending outer side wall of the cover section, which are intended to be snapped over and interengaged with similarly spaced, outwardly projecting locking buttons or lugs molded in the flange, will trail the lugs in respect to longitudinal position.

To correct this and properly register the lugs and apertures, the apparatus embodies a vertically acting, continuously traveling closer belt which is overspeeded in relation to the rate of travel to the carton advancing belt, and which has frictional engagement with the top of the cover as the carton issues from the fixed folding plow members. Under such overspeeded frictional forwarding effect, the carton cover is shifted forwardly in relation to the remainder of the carton, the degree of overspeed being sufficient to produce the transverse and vertical alignment of the cover apertures and flange lugs

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by the time the carton issues from the speed-up belt. So issuing, the cover has been caused by the belt to engage downwardly over the upturned flange of the bottom section, which has been previously positioned alongside the outer row of eggs in the bottom section, and the locking apertures and lugs of the cover and flange are properly interlocked with a snap action.

Another specific aspect of the invention concerns its improved provisions to drive a bottom, cover engaging reach of the overspeeded closer belt and the upper reach of the conveyor belt unidirectionally in relation to the advancing cartons. This involves the use of a reversing drive chain having as its source of power a drive chain for the conveyor belt. A simplified, clog-proof and foul-proof interdrive of the two belts results.

The carton is next subjected to the action of a sealing device driven in synchronized relation to the closer unit. Here the orientation of the carton in reference to its direction of travel is changed by rotating the carton horizontally 90° about its vertical centerpoint. This is accomplished by a continuously rotating horizontal turntable to which the carton issuing from the closer unit is delivered. Traveling longitudinally with the length of the carton now at 90° to the path of travel, the carton passes beneath a tape sealing unit which operates to date an adhesive backed paper tape, moisten and cut off an appropriate length thereof, and apply the same to the forward portion of the advancing carton, at the longitudinal centerpoint of the same. This holds the closed carton sections in sealed relation so that unauthorized opening of the carton is revealed by the breaking of the sealing tape.

The tape applying operations are all performed automatically under the control of a single revolution clutch and a control solenoid and microswitch therefor, the microswitch being actuated by a re-oriented carton at the rotating horizontal turntable. Furthermore, the invention offers a considerable simplification in respect to the re-orienting turntable and to the means for feeding, dating, severing and applying tape lengths to the re-oriented closed carton.

Considered more specifically in reference to its first, carton closer unit, the apparatus has special features to insure the successful manipulation of the carton parts in the closing thereof. These include a rigid elongated hold-down plate at the feed-in side of the apparatus, which is longitudinally centered over the carton guide channel, and beneath which the certain cell separating formations of the bottom section of the open filled carton pass. It slidingly engages these formations from above and, with the guide channel, gives assurance that the carton is positively held against skewing as it is subjected to frictional cover and flange folding action on its opposite, longitudinally extending sides.

The previously mentioned improvement at the overspeed closer belt, in driving the same by means of its own sprocket and chain from the drive for the main conveyor belt, and thereby obtaining the desired direction of travel of the closer belt, frees the apparatus from certain disadvantages of clogging and fouling inherent in the operation of other direction reversing means, such as meshing gears.

The apparatus, in both the initial cover closing section and the final dating and sealing section thereof, has all of its working instrumentalities driven from a single common source of power. It is thus insured that these successively acting means will operate in accurately timed relation to one another, from the entry of an open filled carton at the feed-in side, through the folding and speed-up closing units and to and through the continuously acting, re-orienting tape sealer unit. Above all, the con-

tinuity of the operations performed by the apparatus means that its output rate is extremely high, capable of handling the output of many candler in a large scale egg inspection room. It goes without saying that this is a factor of great importance in a modern packing establishment.

The apparatus is compact, rugged and inexpensive in construction, occupying a minimum amount of floor space. It can be operated alone, or ganged with other similar units, by a minimum personnel generally overseeing the installation and attending to the maintaining an adequate supply of filled cartons at its feed-in side.

The foregoing statements are indicative in a general way of the nature of the invention. Other and more specific objects will be apparent to those skilled in the art upon a full understanding of the construction and operation of the apparatus.

A single embodiment of the invention is presented herein for purpose of illustration. It will be appreciated that the invention may be incorporated in other modified forms coming equally within the scope of the appended claims.

In the drawings:

Fig. 1 is a fragmentary view in side elevation, illustrating in a general way the coordinately driven carton closing and sealing unit of the apparatus in their operating relation to one another and to a carton in-feed or supply unit;

Fig. 2A is a top plan view of a molded pulp egg carton in an open but filled condition as it is supplied at the in-feed side of the apparatus;

Figs. 2B and 2C are, respectively, side elevational views schematically illustrating the carton in a partially closed, partially telescoped condition and in a wholly closed condition thereof, as it undergoes successive folding and closing manipulations;

Fig. 3 is a top plan view, in somewhat enlarged scale, of the closer unit of the apparatus, also depicting folding manipulations performed thereby at successive stages therealong;

Fig. 4 is a fragmentary view, partially broken away, in side elevation, and also in enlarged scale as compared with Fig. 1, further illustrating the relationship, and some details, of the operating instrumentalities of the closer unit;

Figs. 5, 6 and 7 are, respectively, views in transverse vertical section along lines 5—5, 6—6 and 7—7 of Figs. 3 and 4;

Fig. 8 is a fragmentary side elevational view similar to Fig. 1 but in larger scale to show only the tape dating and sealing unit of the invention;

Fig. 9 is a fragmentary elevational view of the sealer unit, looking from the side of the apparatus opposite that shown in Figs. 1 and 8;

Fig. 10 is a fragmentary view in vertical longitudinal section, along line 10—10 of Fig. 11, showing further details of the sealer unit;

Fig. 11 is a top plan view of the sealer; and

Fig. 12 is a fragmentary view in vertical longitudinal section along line 12—12 of Fig. 11, illustrating further the operating parts of the sealer unit.

Reference should first be had to Figs. 2A, 2B and 2C, also to Figs. 5, 6 and 7, for a general representation of the sort of carton, designated C, on which the improved apparatus operates. It consists of three integrally articulated sections, i. e., an open, tray-like cover section *a* having a top forming panel *b* which merges into downwardly and outwardly inclined end and side walls *c*, *d*, respectively; a cellular bottom forming section *f* which is subdivided internally by transverse and longitudinal partitions *g*, *h* to define a number of egg receiving cells *i* disposed in parallel rows of six each; and a reinforcing flange element *j*, which, in the closed condition of the carton, is disposed in upstanding, reinforcing relation inwardly of a free front side wall *d* of the cover section. Bottom section *f* is integrally hinged to the cover and

reinforcing flange respectively, by means of parallel, longitudinally extending creases *k*, *l*.

It will be noted that front side wall *d* of cover section *a* is provided, adjacent the junction of that wall with its top forming panel *b*, with a pair of longitudinally spaced, generally rectangular locking apertures *m*. These are in transverse alignment with similarly spaced, outwardly projecting lugs *n* molded in flange *j* adjacent its free outer longitudinal margin, and when the carton is closed and locked, lugs *n* snap outwardly into apertures *m* thereby affording a positive interlock between the sections which holds carton C in closed condition. It is with the proper transverse registering and interlocking of these respective lugs and apertures, as the carton passes the cover closing means of the apparatus, that one phase of the invention is concerned.

Referring now to Figs. 1, 3 and 4, an elongated carton closer unit 10 of the apparatus is disposed in longitudinally aligned, receiving relation to the out-feed side of a carton forwarding device. Unit 10 thus receives successive cartons C filled with eggs as the cartons pass over a large diameter delivery drum 12 journaled on device 11, about which drum the forward end of a carton supply belt 13 of device 11 is trained. Device 11 may be of any appropriate character suited to the supply in succession of open filled cartons and, other than in the driven and positional relationship of its belt 13 to closer unit 10, constitutes no part of the present invention.

A carton tape sealing unit, generally designated 14, is associated in receiving relation to the opposite or forward end of the closer 10. It is preferably supported on the latter by suitable provisions, such as the rearwardly and downwardly inclined struts 15 which are sustained by the framework 16 of unit 10; and it is contemplated that the last named unit may optionally be supplied to the trade independently of sealer 14 or as a combined unit including the same. In the latter case the sealing unit will preferably derive its support from the closer as described, in the interest of preserving proper transverse and longitudinal alignment and proper coordination of timing. To the same ends the drive for unit 14 will have a common origin with that for unit 10 and for drum 12, as will be further described.

Framework 16 consists of pairs of appropriately braced front and rear upright legs 17 of channel or angle iron construction, which support a rigid sheet metal machine bed 18 of rectangular shape, over which an endless carton advancing belt 19 passes and is vertically supported. Referring particularly to Fig. 3, bed 18 is provided with rectangular belt drum openings 20 at opposite ends thereof, through which cylindrical end pulleys or drums 21 for belt 19 are upwardly exposed. These drums support the upper reach of belt 19 at a proper elevation for longitudinal travel over the bed and through an elongated, trough-like guide channel 22 secured on the bed, the belt being supported by the floor of channel 22 in so traveling. The channel extends substantially the entire longitudinal distance between end bed apertures 20 and its side walls 23 diverge upwardly and outwardly from the side margins of belt 19 at approximately the same angle as the inclination of the sides of carton bottom section *f*.

Belt drums 21 are mounted on transverse shafts 24, appropriately journaled by brackets depending from bed 18, which have chain sprockets secured thereto adjacent one end thereof, and a continuous horizontal drive chain 25 is trained about these sprockets. Rear shaft 24 is driven by a drive chain 27 trained about a similar sprocket thereon, chain 27 being driven from a larger sprocket 28 on a geared head drive motor 29.

This motor is supported on a transversely extending sub-platform 30 between the rear uprights 17 of framework 16, and a further sprocket on the opposite end of motor output shaft 31, similar to sprocket 28, is the agency



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by which belt feed-in drum 12 and belt 13 are driven. To this end, a drive chain 32 is trained around the last mentioned sprocket, and around a further sprocket 33 on the drum. The latter may be journaled in a pair of forwardly projecting brackets 34 on supply device 11.

Upon being deposited by belt 13 on the main carton advancing belt 19 of closer unit 10, cartons C have the opposed longitudinally extending sides of their bottom section *f* closely confined and guided by and between the upstanding walls 23 of channel 22, the cover *a* extending laterally outwardly over one channel wall and the flange *j* extending similarly outwardly over the other wall 23. At this point carton C is in a flat horizontal plane as depicted in Fig. 2A.

A rigid, longitudinally extending restrainer or carton hold-down plate 38 is supported by an upstanding bracket 39 on the machine bed 18 to depend over the longitudinal center line of carton bottom section *f*, the longitudinal partition provisions of that carton section being vertically and slidingly engaged by the plate to hold the carton firmly onto belt 19 in passing the folding means to be described. The folding provisions comprise a longitudinally extending, specially shaped folding bar 40 which is fixed to the top of machine bed 18, to extend adjacent one side of channel 22, by a rear securing bracket 41; it may additionally be similarly supported further forwardly by an upstanding bracket 42. An elongated, specially shaped plow rod 43 is disposed on the opposite side of the channel 22, paralleling and then curving over the top of the same, as shown in Fig. 3. This rod is equipped with a rear securing ear portion 44 and a forward securing flange 45, both bolted to the machine bed. As illustrated in Figs. 3, 5, 6 and 7, bar 40 acts on the carton flange *j* to fold the same progressively towards an upright position above the outer or front wall of the carton bottom section, and rod 43 performs a similar function on the cover *a* of the carton, progressively folding the same from a generally horizontal relation to carton bottom *f* towards a position in which it is vertically telescoped downwardly over upstanding flange *j*.

These operations are performed in a more or less conventional manner with the assistance of a side guide ironing element 46 and roller 47 supported on the machine bed. Ironing element 46 engages along the outside of the longitudinal hinge between the cover and bottom sections of a carton, and roller 47 rides against the rear cover wall *c* adjacent and above its hinge *k*, tending to hold the cover in its position to which it is swung by plow rod 43.

It has been found that the frictional drag exerted on carton cover *a* by rod 43, as the carton undergoes the folding manipulations referred to above, has the effect of causing the cover to skew somewhat to the rear and to lag behind the bottom and flange. This is due in part to the progressively longer outward torque moment arm of the cover, as acted on by rod 43, in relation to its hinge *k*. There is a resultant distortion or skewing action at this hinge connection to the bottom section, which in turn results in transverse misalignment of the cover locking apertures *m* and flange lugs *n*, as shown in Figs. 2B and 3.

Accordingly, upon the issuing of the forward end of carton C from the folding bar 40 and rod 43, yet while the carton is still under the frictional restraining drag of the latter, the carton cover next passes beneath a speed-up belt 50 for correction of the condition just described.

Belt 50 is a relatively narrow, V-type belt, being trained about appropriate pulleys 51, 52 at its rear and forward ends, which are located in such manner that the horizontal bottom reach thereof angles forwardly and outwardly from a rear, transversely overlapped relation to the upper reach of belt 19. Pulleys 51, 52 are secured on shafts which are sustained by upstanding

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brackets 53, 54 on machine bed 18, provision being made for the longitudinal adjustment of rear bracket 53 and for the vertical adjustment of the forward belt pulley 52. To this end a forward pulley shaft 55 which extends across belt 19 is carried by auxiliary brackets 56 having provision to swing the same vertically about pivots 57 on brackets 54 and to lock the auxiliary brackets in adjusted position.

A drive chain 58 is trained about a sprocket 59 secured on forward pulley shaft 55 and is driven in a manner to produce forward movement of the lower reach 60 of belt 50. One reach of chain 58 passes around an idler sprocket 63 and the chain is trained at its bottom about a driving sprocket 64. Sprocket 64 is driven by the upper reach of the main conveyor driving chain 25, which passes around tensioning idler sprockets 66 on either side of sprocket 64 for a full engagement with the latter. Thus belt reach 60 is driven for a forward movement in the same direction as the upper reach of conveyor belt 19. The chain and sprocket arrangement is self-leaning of debris, chips, dust, and other foreign matter, and constitutes a simpler and more efficient arrangement than direction reversing gears.

Lower belt reach 60 is held by a sheave or pulley 61 at an elevation to take frictional depressing engagement with the carton cover, as its folding is completed in passing plow bar 40 and rod 43, and as the cover is held down by a further presser roller 62 above the cover hinge side of the carton. Sheave 61 is supported by a bracket 68 on machine bed 18 and roller 62 is similarly mounted on a bracket 69. In this position the belt 50, substantially overspeeded in relation to the rate of travel of main conveyor belt 19 due to the selection of its drive sprocket sizes, frictionally urges the cover *a* of the carton forwardly, in relation to the bottom *f* and flange *j* thereof, as the carton continues forward on belt 19. The locking apertures *m* of the cover wall are thus urged forwardly into vertically and transversely aligned register with flange lugs *n* and are caused to interlockingly engage the latter without interruption in the forward travel of the carton.

Referring now to Figs. 8 through 12 in conjunction with Fig. 1, the closed carton issues from the forward end of unit 10 onto a rear receiving table 71 of sealer unit 14, which table is cut away at 72 to expose the upper portion of a frictional speed-up drum 73. The shaft 74 of drum 71 has a sprocket 75 thereon driven by a chain 76 from a like sprocket on the forward belt shaft 24 of the closer unit 10, and hence drivingly coupling sealer 14 with that unit. Accordingly, drive means for the sealer are unnecessary. It may be quickly and easily linked onto the closer when needed, or the latter can be operated independently when the application of a dating and sealing tape is not desired.

Receiving table 71 is also apertured to receive the vertically extending shaft 77 of a centrally disposed rotary turntable 78. Shaft 77 has a bevel gear thereon meshing with a bevel gear 79 on a transversely extending shaft 80 journaled in depending side members 81 of a horizontal sheet metal bed 82 of sealer 14, of which receiving table 71 is a part. Shaft 80 is driven by a rearwardly extending chain 83 trained about a sprocket 84 thereon and around a similar sprocket on drum shaft 74.

A further sprocket 85 on shaft 80 receives a forwardly extending drive chain 86 which is trained at its forward end about a sprocket 87 on a forward transverse shaft 88. Shaft 88 is journaled in the side members 81 of the sealer bed 82 and a forward belt pulley or drum 89 is secured on shaft 88. Similar aligned drums 90 are secured on shaft 80 to the rear, and a pair of carton advancing belts 91 are trained about the respective drums 89, 90. The upper reaches of these belts are exposed above the surface of sealer bed 82 through elongated slots 92 formed in the latter, and the belts travel over the intervening bed surface.

A pair of upwardly extending supporting plates 93 are secured on opposite side members 81 of the sealer bed. They serve as sustaining members for the tape supply, dating, gluing, cut-off and applying unit of sealer 14, which is generally designated by the reference numeral 94. It comprises a central, longitudinally extending and vertically disposed carton hold-down plate 95 appropriately supported on a transversely extending rod 96, which extends between and is secured to rigid forwardly extending bars 97 welded on plates 93 adjacent the top thereof. A circular, cradle-type tape holder 98 is bolted to one side of the hold-down plate 95, and a supply roll of paper sealing tape T is disposed within this holder, the tape being progressively unreeled from the roll under the action of feeding, dating, wetting and cut-off means now to be described.

The drive for these instrumentalities is derived from belt and turntable drive shaft 80 through a sprocket 100 secured to that shaft outwardly of one side of the sealer, as illustrated in Fig. 11. A chain 101 is trained about this sprocket and about a further sprocket 102 which is adapted to be drivingly connected to shaft 103 extending transversely through hold-down plate 95 and appropriately journaled in the side support plates 93. This connection is effected through the agency of a conventional single revolution clutch 104. A knurled hand wheel 105 is secured to one end of shaft 103 for manual operation of unit 94, when desired.

The operation of single revolution clutch 104 is controlled through a vertically extending latch arm 106 pivoted in one of the side members 93 at 107, and arm 106 is operated by a solenoid 108, which is in turn controlled by a normally open microswitch 109 (Figs. 9 and 11). Switch 109 is mounted on the sealer bed adjacent and to one side and toward the rear of carton turntable 78, as illustrated in Fig. 11. The microswitch and solenoid are wired in an electrical energizing circuit by provisions not deemed necessary to illustrate or describe, being entirely conventional in nature, with the result that when a contact finger 110 of the microswitch is actuated by a carton, at the conclusion of a swinging of the same 90° on turntable 77, solenoid 108 is energized, tripping arm 106. A 360° rotation of shaft 103 ensues.

A platen roller 112 (Fig. 12) is secured on shaft 103 to one side of the hold-down plate 95, this roller having an appropriate frictional surface for driving engagement with tape T issuing from tape holder 98. One surface of roller 112 has an eccentric actuating lug 113 extending therefrom, for a purpose to be described.

A conventional type of dating roll 114 coacts with platen roll 112, being provided with appropriate printing indicia on its periphery; and an inking roll 115 is held in inking engagement with these indicia. Roll 115 is journaled on an arm 116 secured to one of two parallel arms 117, 118 beneath which dating roller 114 is journaled.

Arms 117, 118 are pivotally mounted on a transverse pin 119 projecting from a side of hold-down plate 95, and an upward extension 120 of one of these arms receives one end of a coil tension spring 121, by which the dating and inking assembly is urged in counterclockwise direction about pivot pin 119. The opposite end of spring 121 is anchored on an upwardly extending arm 112 pivoted at 123 on plate 95, the arm 122 having a further function to be hereinafter referred to.

A tape cut-off unit, generally designated 124 (Figs. 8 and 12), is associated with the mounting means for dating assembly 94, so as to move with the latter as a unit. To this end, a downwardly extending arm 125 is secured to the dating roller support arms 117, 118 adjacent their pivot at 119, the set of arms 117, 118 and 125 thus acting as a bell crank. A cutter head 126 is pivotally mounted on the lower end of arm 125 and has a hori-

zontally arranged cut-off blade 127 thereon. The head is urged rearwardly by a coil spring 128 anchored on hold-down plate 95, and blade 127 is adapted to be advanced horizontally, above the upper surface of a tape moistening pad unit 129 to be hereinafter referred to, and to coact with a suitable shear member 130 secured on plate 95 in severing a length of tape T.

Such actuation of the blade 127 occurs when its pivot arm 125 is engaged by the eccentric lug 113 on platen roller 112, during the single revolution operation of shaft 103. As this occurs, a length of tape which has been forwarded downwardly between fixed guide members 131, 132 on plate 95, and appropriately dated by roll 114, is cut off by knife 127. The cut off length of tape is then applied to a transversely arranged carton advancing on belt 90 by the provisions to be described.

In issuing from tape roll holder 98 the tape T is threaded to the rear and downwardly around a transverse guide rod 134 carried by a releasable, L-shaped arm 135. This arm is pivotally mounted at its short rear angular extremity on the hold-down plate 95, as at 136, and guide rod 134 has an eccentric mounting 137 on an angularly forwardly and upwardly extending portion of arm 135, the eccentric provision enabling the rotative adjustment of guide rod 134, as desired. By this means the tape is properly positioned in relation to the surface of platen roller 112 about which the tape is to be drawn in the dating cycle.

A clearance notch 138 is provided in an intermediate portion of arm 135, simply to accommodate pivot pin 119 of the inking roller-cut-off blade bell crank 117, 118, 125, and the forward extremity of the arm has a pin 139' thereon which is receivable in a notch 139 intermediate the length of the pivoted arm 122. Arm 122, as stated above, acts as an anchor for the urging of the bell crank in a counterclockwise direction and also serves as a latch or detent member for tape guide arm 135, maintaining the transverse guide rod 134 of the latter in proper relation to platen roll 112. Arm 135 is readily released by backing off detent arm 122 when it is desired to thread new tape between rod 134 and the platen roll 112. It is restored to holding position with equal facility.

The tape moistening pad unit 129 referred to above simply consists of an appropriate slide member 141, supported on hold-down plate 95, in which an absorbent pad 142 is removably received with a transverse sliding movement. The pad extends to one side of hold-down plate 95, and the latter has provision to removably support a gravity type liquid dispensing container 144, in the form of an up-ended bottle having a dispensing tube 145 positioned to discharge to the moistening pad. A wick 146 projects laterally from the pad adjacent the discharge path of tape T, and the tape T is caused to be fed in frictional engagement with the wick, thereby moistening an adhesive coating on the same for application to an advancing carton.

Upon being rotated bodily 90° about their centerpoint as an axis, by means of turntable 78, and upon initiation of a cycle of the dating and cut-off instrumentalities by the tripping of microswitch 109, carton C are advanced longitudinally by belts 90, being additionally lined up by a flexible intake guide plate 147 projecting rearwardly of the sealer structure at one side thereof. The carton is advanced beneath the hold-down plate 95 by parallel feed belts 90, by which it is carried beneath the tape feed, dating and moistening and cut-off mechanisms described above. The forward side of the carton now engages the depending tape against an upright wiper finger 148, which is pivoted on a depending bracket 149 on the sealer bed and is urged in counterclockwise direction by a coil tension spring 150, whereupon cut-off blade 127 operates to sever the tape.

Secured initially to the carton by finger 148, in a portion of the carton face below the meeting line of its coating cover and bottom sections, the tape is next

ironed upwardly and rearwardly about that face and over cover panel *b* by a pair of spring urged rollers 151, 152 under which the cover of the carton passes. These rollers are each mounted in a bearing on the shorter arm of a horizontally elongated, L-shaped support 153, support 153 being in turn pivoted at 154 on hold-down plate 95. The ends of a single coil tension spring 155 are secured to the respective arms, and this spring is brought upwardly over an anti-friction idler on plate 95, thus urging rollers 151, 152 downwardly against the carton cover and tape applied thereto. Suitable stops limit the downward swing of arms 153.

This completes the application of the sealing tape to the carton, and the latter progresses forwardly and outwardly of sealer 14. As it does, it passes underneath a series of transversely and longitudinally staggered ironing rollers 157 located along the centerline of the apparatus and journaled between spaced supports 158 mounted on plate 95. The alignment of the carton is maintained by a further series of longitudinal guide rollers 159, also journaled between side plates 160 which are mounted on sealer bed 82. Pressure is thus maintained on the tape for a sufficient interval to insure its adhesive securement to the carton, and, thus sealed, the carton issues from the sealer onto an appropriate receiver, such as a rotary horizontal table 161 schematically depicted in Fig. 1.

It is believed that the operation of the apparatus will be reasonably clear from the foregoing description. A 2 x 6 style molded pulp carton C, filled with its complement of twelve eggs, is advanced in the direction of its length by supply belt 13 and is discharged onto the rear or intake side of the bed 18 of the closer unit 10, its loaded bottom section being received within the upwardly divergent side walls 23 of the bed guide channel 22. It is picked up by continuously advancing conveyor belt 19 and separated somewhat from a succeeding carton, since the linear speed of belt 19 slightly exceeds that of supply or feed-in belt 13.

The central longitudinal partition structure *h* of the carton bottom section passes beneath hold-down plate 38, sliding along the lower edge thereof as it is subjected to the folding action of plow bar 40 on the outwardly projecting flange *j* of the carton, and of plow rod 43 on the carton cover section. The flange and cover are swung through the positions illustrated in Figs. 5, 6 and 7, and as these operations are practically fully completed, the cover of the carton is engaged by speed-up belt 50. The lower reach 60 of the belt frictionally advances the cover forwardly in relation to the bottom and flange, compensating for the rearward lag of the cover occasioned by frictional plow drag, and cover wall apertures *m* are caused to take transversely aligned register with the flange locking lugs *n*. The lugs snap into the apertures, completing the closing of the carton, and the latter issues from the forward end of unit 10 onto the receiving table 71 of the tape sealer unit 14, which is coupled onto unit 10 as an operating part of the combined apparatus.

Receiving drum 73 of the sealer, being somewhat over-speeded in relation to conveyor belt 19, separates the carton from a following carton and slides it forwardly onto the continuously rotating turntable 78 which, like the other operating instrumentalities, is driven from a common power source at motor 29 by means of successively associated chain and sprocket drive connections. These include the driving arrangement whereby the direction of travel of the lower speed-up belt reach 60 is determined.

Turntable 78 rotates carton C bodily about its central vertical axis, swinging the carton 90° into engagement with the resilient side guide member 147, and as this occurs the carton, now in overhanging relation to belts 91, engages the control finger or element 110 of micro-switch 109. Resultant energization of solenoid 108 trips

latch arm 106 and a single revolution operation of clutch 104 follows. Platen roll 112 is operated to advance a length of tape T, which is printed by dating roller 114 and is moistened by the wick of the absorbant pad unit 129.

Upon engagement of cut-off arm 125 by the lug 113 on the platen roller, blade 127 is advanced to sever the tape, and the latter is wiped about the carton by the upstanding finger 148 projecting through sealer bed 82. The advancing carton then further wipes the tape underneath the presser rollers 151, 152, and belts 91 convey the thus sealed carton out of the apparatus to receiving table 161 or other delivery device.

The combined apparatus is fully automatic in operation, requiring very little supervision, in fact only the maintenance of a proper supply of filled cartons to closer unit 10, and the removal of closed and sealed cartons from the machine, are essential. It is very compact and inexpensive in nature, due to a considerable extent to the derivation of the drive for the various operating instrumentalities from a single power source. The unit may be easily and quickly ganged with similar equipment to handle the output of practically any size commercial egg room.

We claim:

1. An apparatus for closing cartons characterized by a bottom section having hinged thereto an inner member and a cover member together with cooperating locking elements on said carton members which are adapted to interlock in the closed condition of the carton, said apparatus comprising a longitudinally traveling conveyor to transport said cartons forwardly with said bottom section resting thereon and said inner and cover members projecting toward opposite sides of the line of travel, means progressively folding said members toward superposed and telescoped engagement of the cover over the inner member as the carton is advanced by said conveyor, means cooperating with said longitudinal conveyor for restraining the bottom of said carton against movement relative to said longitudinal conveyor, a closer belt engageable from above with said cover member in generally parallel, superposed relation to said conveyor, means driving said conveyor continuously at predetermined longitudinal speed, and means interconnected with and driven by said conveyor drive means for driving said closer belt at greater longitudinal speed, so as to shift and press said cover member downwardly and forwardly in relation to said inner member and bottom section and to transversely align and interengage said interlocking elements as the carton travels forward.

2. An apparatus for closing cartons characterized by a bottom section having hinged thereto an inner member and a cover member together with cooperating locking elements on said carton members which are adapted to interlock in the closed condition of the carton, said apparatus comprising a longitudinally traveling conveyor to transport said cartons forwardly with said bottom section resting thereon and said inner and cover members projecting toward opposite sides of the line of travel, means cooperating with said conveyor for restraining said carton bottom section against shifting movement relative to said conveyor as it is advanced thereby, means progressively folding said members toward superposed and telescoped engagement of the cover over the inner member as the carton is advanced by said conveyor, a relatively narrow closer belt engageable from above with the top of said cover member along the edge thereof opposite its hinged connection with the bottom section in superposed relation to said conveyor, means driving said conveyor continuously at predetermined longitudinal speed, and means driving said closer belt from said drive means at greater longitudinal speed, so as to shift and press said cover member downwardly and forwardly in relation to said inner member and bottom section and to transversely align and interengage said locking elements as the carton

travels forward, said last named drive means comprising a meshing chain and sprocket drivingly connected to said closer belt and driven from said conveyor drive means.

3. In closing apparatus for cartons characterized by a bottom section having a cover member hinged thereto together with cooperating locking elements on the bottom section and cover member of said carton which are adapted to interlock in the closed condition of said carton, a longitudinally traveling conveyor belt to transport said cartons forwardly with said bottom section on the upper reach thereof and said cover member projecting laterally outwardly of the line of travel, means progressively folding said cover member toward superposed position of a wall thereof over the bottom section as the carton is advanced by said conveyor belt, a closer belt of lesser width than said conveyor belt and having a lower reach traveling in the same direction as said upper conveyor belt reach and engageable from above with said cover member in generally parallel, superposed relation to said conveyor belt at a side zone thereof, said closer belt engaging said cover member along the side opposite the hinge connection between said cover member and bottom section, continuous chain-type means driving said conveyor belt at predetermined longitudinal speed, and means driving said closer belt from said drive means at greater longitudinal speed, so as to shift said cover member downwardly and forwardly in relation to said bottom section and to transversely align and interengage said locking elements as the carton travels forward, said last named drive means comprising a chain and sprocket drivingly connected to said closer belt and driven from a reach of said conveyor belt chain drive means.

4. Apparatus for closing a molded pulp carton which is characterized by a bottom section subdivided by a central upstanding longitudinal partition structure, and a cover integrally hinged to a longitudinal margin of said bottom section together with cooperating locking elements on the bottom section and cover of said carton which are adapted to interlock in the closed condition of said carton, comprising a continuously traveling conveyor to transport said cartons longitudinally in the direction of the cover hinge, a longitudinally extending hold-down member positioned medially above said conveyor and engaging said longitudinal partition structure of said carton as the latter traverses said guide, and means to close said cover during such traverse, comprising a closer belt driven in overspeeded relation to said carton conveyor and engaging said cover to shift the same forwardly in relation to said bottom section and to transversely align and interengage said locking elements.

5. Apparatus for closing a molded pulp carton which is characterized by a bottom section subdivided by a central upstanding longitudinal partition structure, and a cover integrally hinged to a longitudinal margin of said bottom section together with cooperating locking elements on the bottom section and cover of said carton which are adapted to interlock in the closed condition of said carton, comprising a continuously traveling conveyor to transport said cartons longitudinally in the direction of the cover hinge, a trough-like longitudinal guide having upstanding walls through which said carton passes, in side confining engagement of said bottom section with said guide walls, a longitudinally extending hold-down member positioned medially above said conveyor and engaging said longitudinal partition structure of said carton as the latter traverses said guide, and means to close said cover during such traverse, comprising a closer belt driven in overspeeded relation to said carton conveyor and engaging said section to shift the same forwardly in relation to said bottom section and to transversely align and interengage said locking elements.

6. Apparatus for closing a molded pulp carton which is characterized by a bottom section subdivided by a central upstanding longitudinal partition structure, and a cover integrally hinged to a longitudinal margin of said

bottom section together with cooperating locking elements on the bottom section and cover of said carton which are adapted to interlock in the closed condition of said carton, comprising a continuously traveling conveyor to transport said cartons longitudinally in the direction of the cover hinge, a trough-like longitudinal guide having upstanding walls through which said carton passes in side conforming engagement of said bottom section with said guide walls, a longitudinally extending hold-down member positioned medially above said conveyor and engaging said longitudinal partition structure of said carton as the latter traverses said guide, and means to close said cover during such traverse, comprising a folding member engaging said cover and swinging the same toward closing relation to said bottom section as said carton travels in said guide, and a closer belt driven in overspeeded relation to said carton conveyor and engaging said section to shift the same forwardly in relation to said bottom section and to transversely align and interengage said locking elements in the closing thereof.

7. Apparatus for closing and sealing hinged cover-type cartons comprising a conveyor to feed cartons in a direction longitudinally of the hinge thereof, means to swing the carton cover about the hinge thereof into carton closing position as the carton is fed longitudinally, means receiving, re-orienting and advancing said closed cartons in the same direction but with said hinge at an angle to the direction of advance, comprising a flat rotatable turntable substantially in the plane of said conveyor, drive means for said conveyor and turntable, and a tape applying unit drivingly connected to said drive means and operating to apply a length of sealing tape to a forward surface of the re-oriented and advancing carton.

8. Apparatus for closing and sealing hinged cover-type cartons comprising a conveyor to feed cartons in a direction longitudinally of the hinge thereof, means to swing the carton cover about the hinge thereof into carton closing position as the carton is fed longitudinally, means receiving, re-orienting and advancing said closed cartons in the same direction but with said hinge at an angle to the direction of advance, comprising a flat rotatable turntable substantially in the plane of said conveyor, common drive means for said conveyor and turntable, and a tape applying unit drivingly connected to said common drive means and operating to apply a length of sealing tape to a forward surface of the re-oriented and advancing carton.

9. Apparatus for closing and sealing hinged cover-type cartons comprising a conveyor to feed cartons in a direction longitudinally of the hinge thereof, means to swing the carton cover about the hinge thereof into carton closing position as the carton is fed longitudinally, including a longitudinally traveling closer belt operating on said covers in overspeeded relation to said conveyor, means receiving, re-orienting and advancing said closed cartons in the same direction but with said hinge at an angle to the direction of advance, comprising a flat rotatable turntable substantially in the plane of said conveyor, driving means for said conveyor and turntable, and a tape applying unit drivingly connected to said drive means and operating to apply a length of sealing tape to a forward surface of the re-oriented and advancing carton.

10. Apparatus for closing and sealing hinged cover-type cartons comprising a conveyor to feed cartons in a direction longitudinally of the hinge thereof, means to swing the carton cover about the hinge thereof into carton closing position as the carton is fed longitudinally, including a longitudinally traveling closer belt operating on said covers in overspeeded relation to said conveyor, means receiving, re-orienting and advancing said closed cartons in the same direction but with said hinge at an angle to the direction of advance, comprising a flat rotatable turntable substantially in the plane of said conveyor, common drive means for said conveyor, overspeeded closer belt and turntable, and a tape applying unit drivingly connected to said common drive means and operating to

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apply a length of sealing tape to a forward surface of the re-oriented and advancing carton.

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