

March 24, 1942.

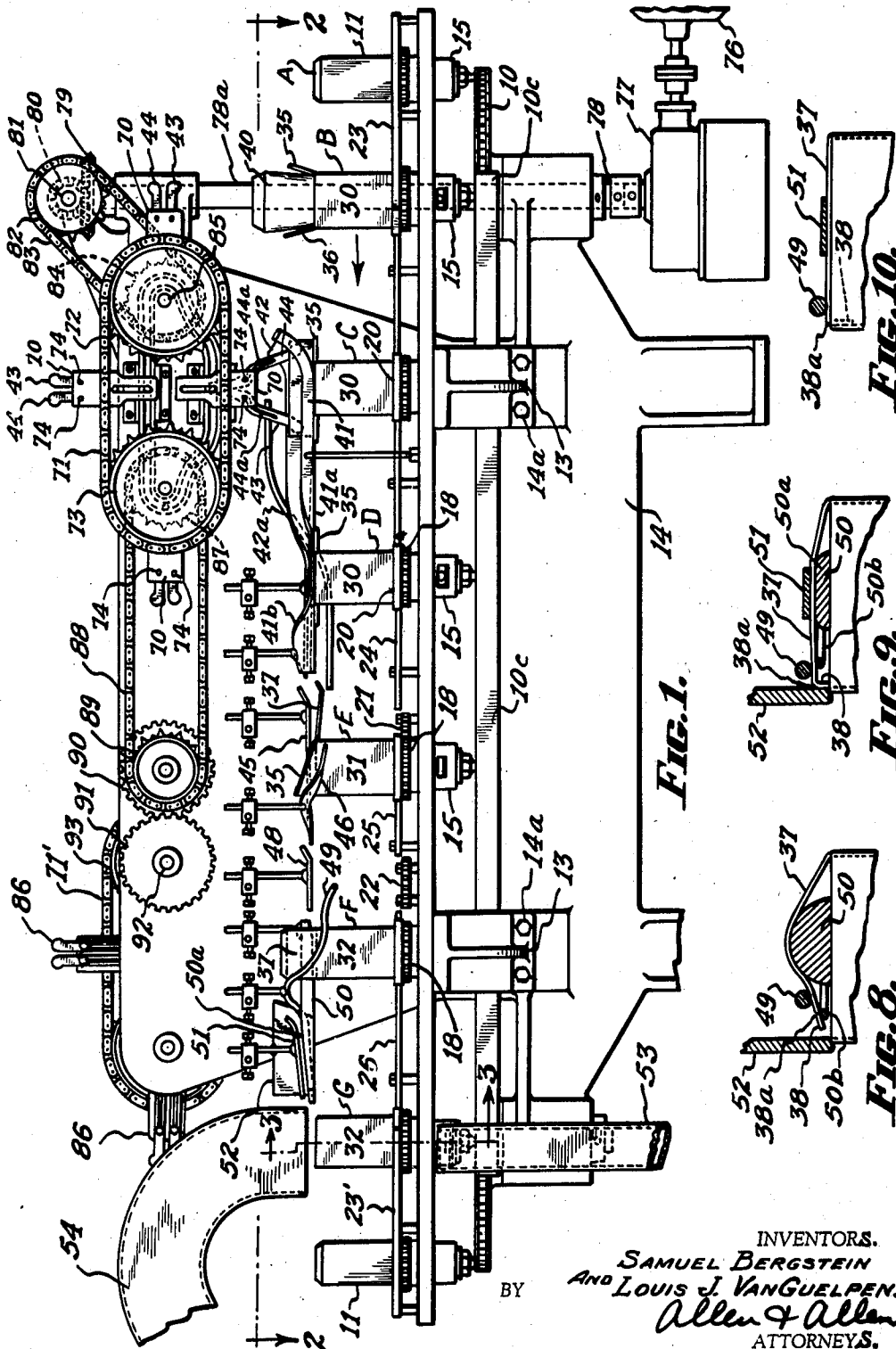
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2,277,289

ROTATABLE PACKAGING MACHINE AND METHOD

Filed Aug. 20, 1940

7 Sheets-Sheet 1



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7 Sheets-Sheet 2

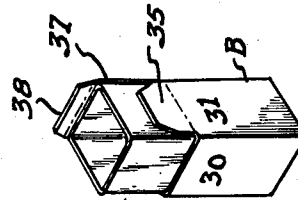
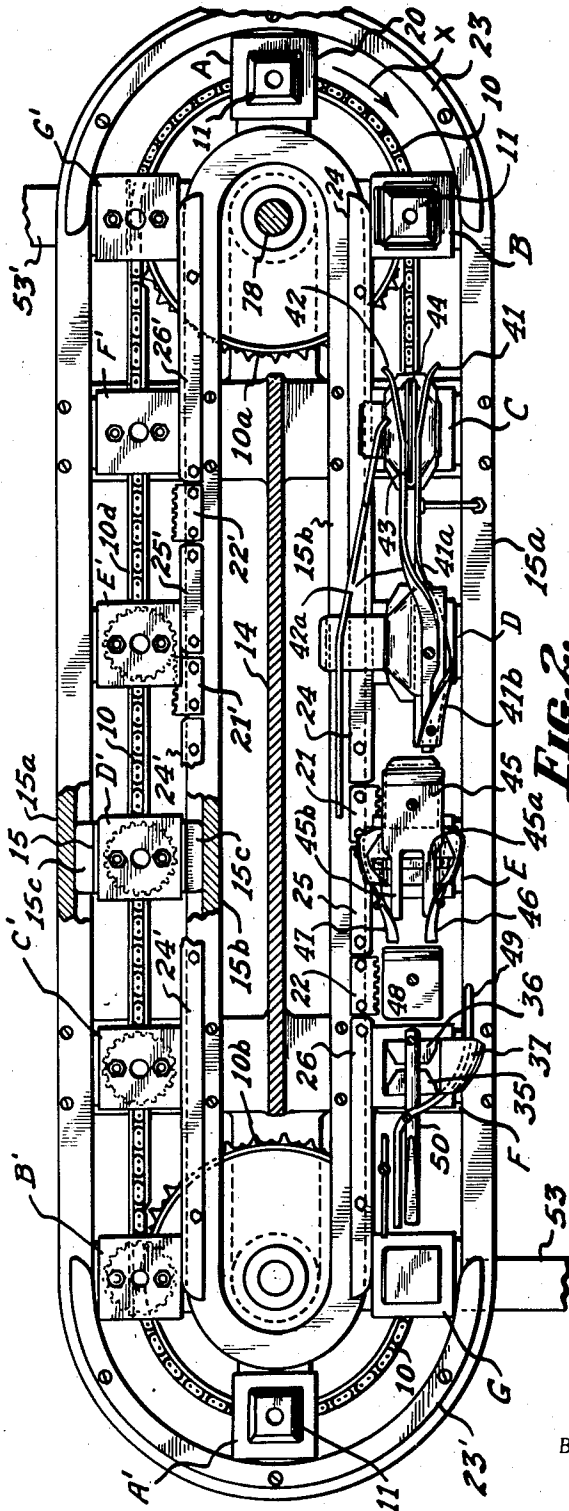


FIG. 2f.

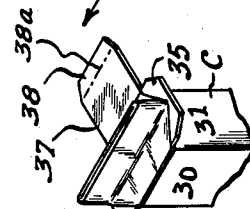


FIG. 2e.

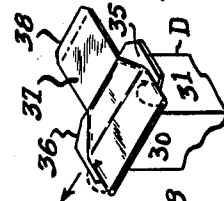


FIG. 2d.

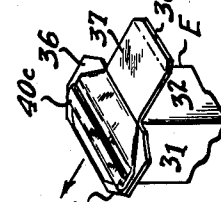


FIG. 2c.

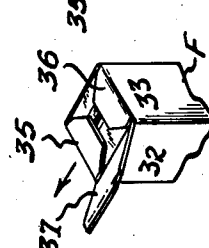


FIG. 2b.



FIG. 2a.

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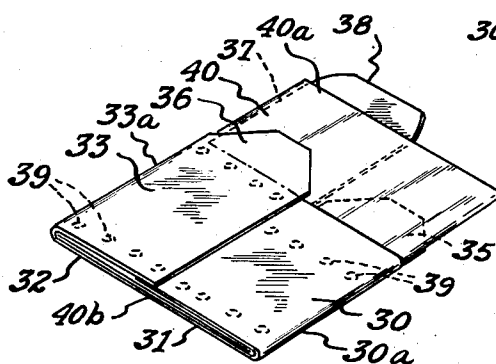


FIG. 5.

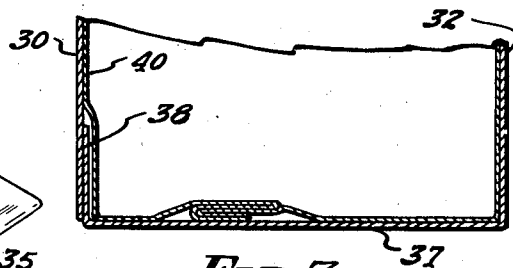


FIG. 7.

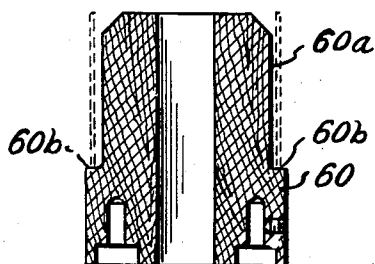


FIG. 4.

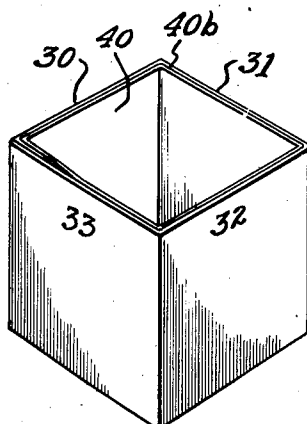


FIG. 6.

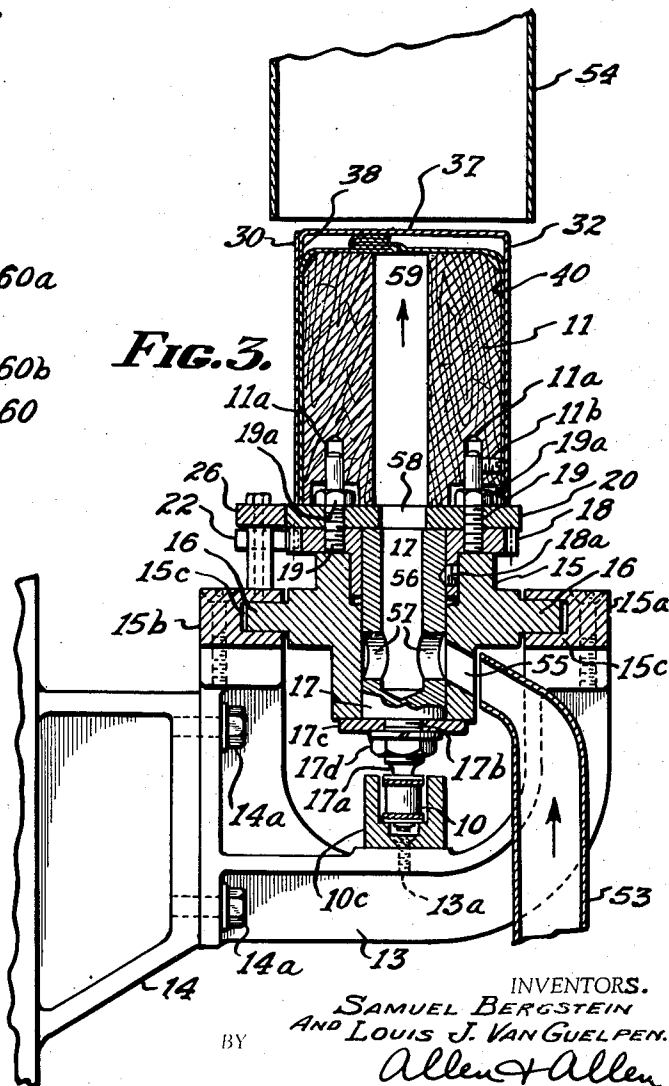


FIG. 3.

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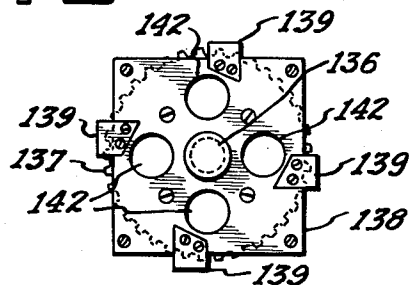
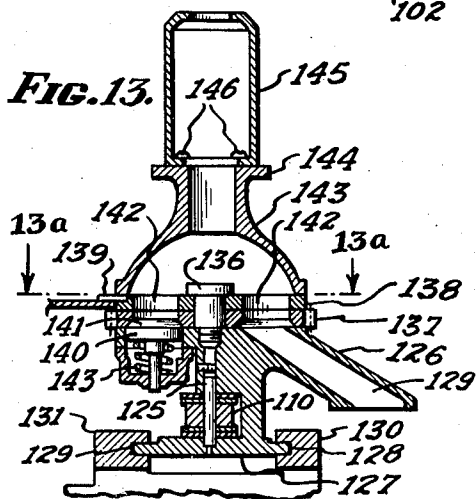
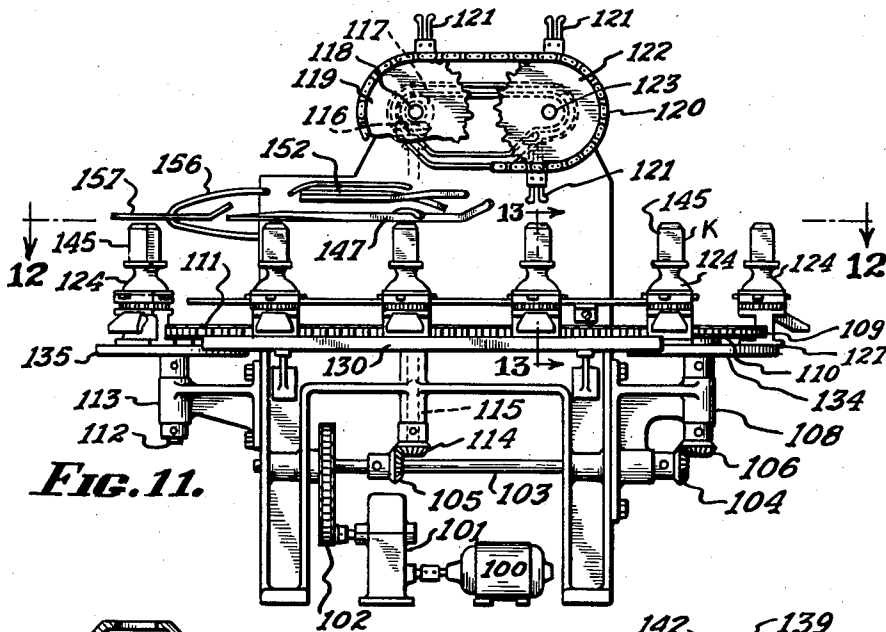
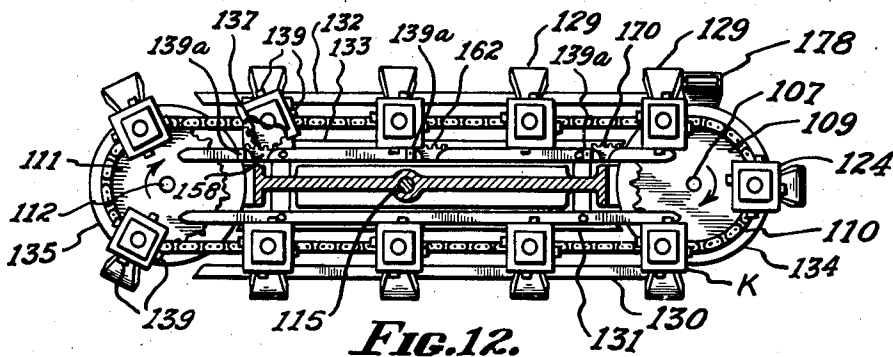
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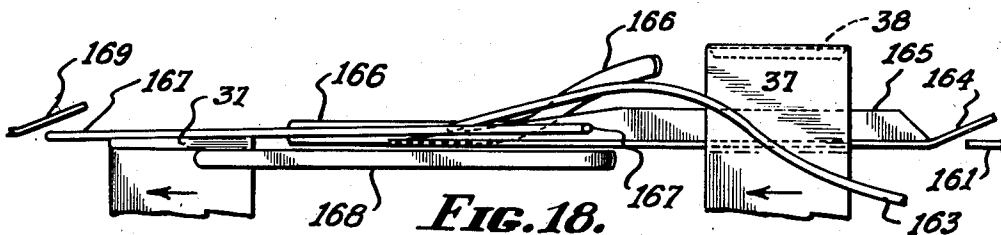
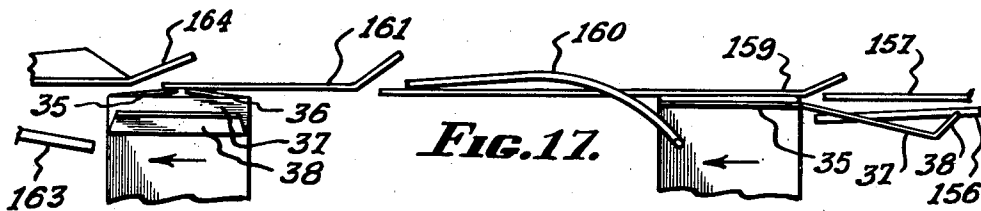
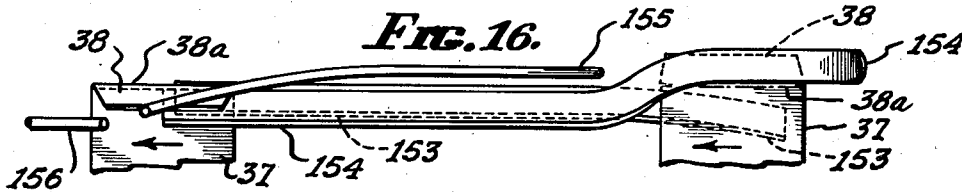
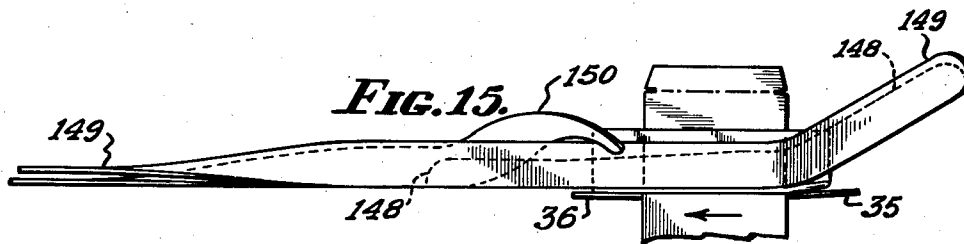
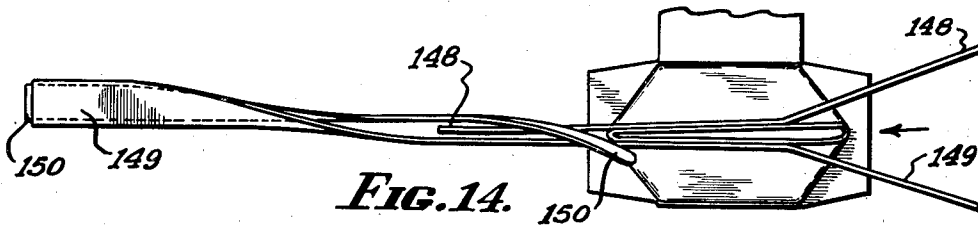
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ROTATABLE PACKAGING MACHINE AND METHOD

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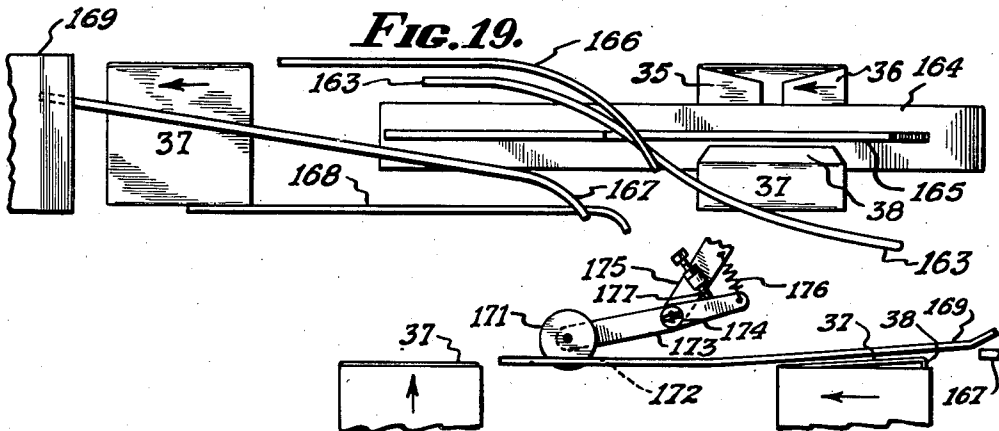


FIG. 20.

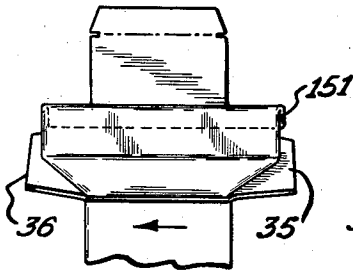


FIG. 23.

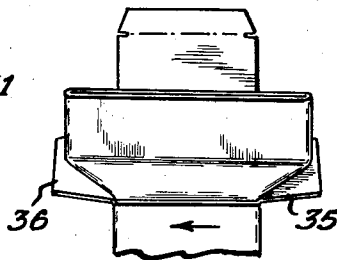


FIG. 22.

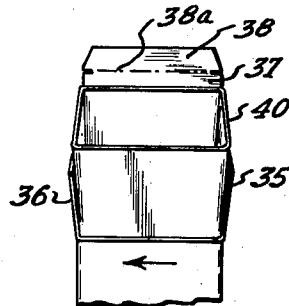


FIG. 21.

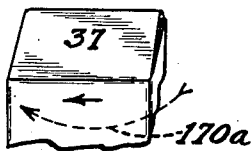


FIG. 26.

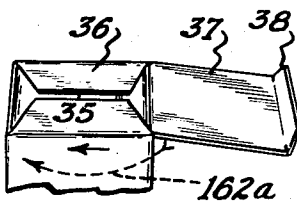


FIG. 25.

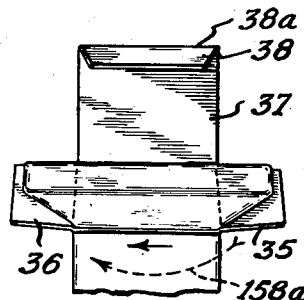


FIG. 24.



FIG. 27. BY

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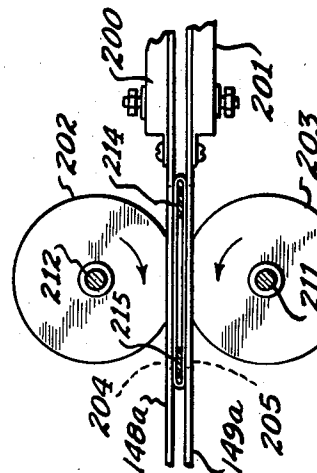
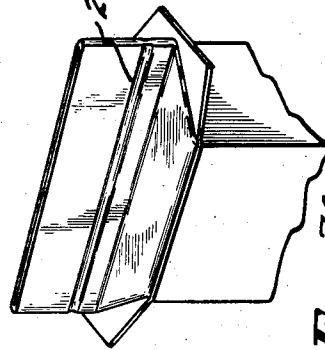
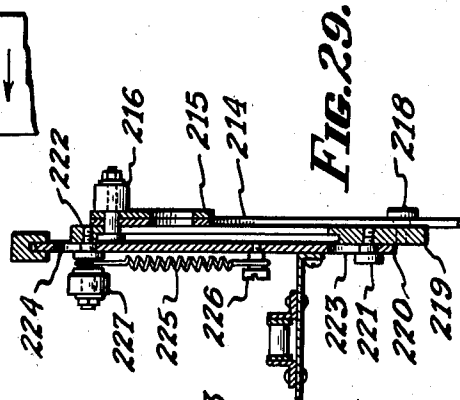
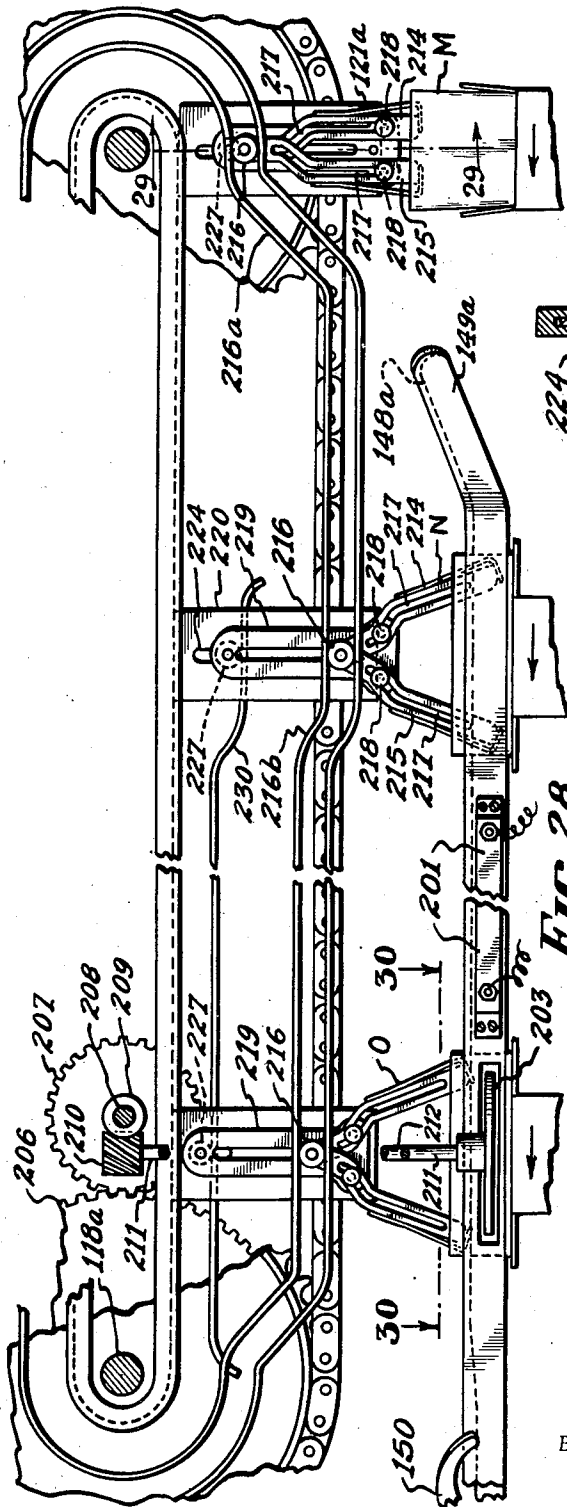
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ROTATABLE PACKAGING MACHINE AND METHOD

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UNITED STATES PATENT OFFICE

2,277,289

ROTATABLE PACKAGING MACHINE AND METHOD

Samuel Bergstein, Cincinnati, and Louis J. Van Guelpen, Middletown, Ohio, assignors to Robert Morris Bergstein and Frank David Bergstein, trustees

Application August 20, 1940, Serial No. 353,402

28 Claims. (Cl. 93—44)

In Bergstein Patent No. 2,206,761 issued July 2, 1940, there are disclosed machines and methods for package closure, particularly in relation to closing the extending liner mouth and end flaps of lined containers. This invention relates to machines and methods for effecting package closures on containers similar to those involved in said aforesaid patent, and to other types of lined and unlined containers as well.

One object of the invention is to provide a novel and improved packaging device wherein a series of flaps are brought into folded condition while the containers are moved in a direction parallel to the fold line of said closing flaps.

Another object of the invention is to provide novel means to rotate the package during the course of its travel so that the folding operations may be carried out by stationary members positioned in the course of travel of the container, as the fold lines of the flaps of the container are brought into parallel relationship with said stationary folding means.

Among other objects of the invention are the following: to provide novel means to hold the carton retaining devices in securely locked position during their course of travel between the intervals wherein the carton retaining devices are rotated or pivoted; to provide means and methods whereby all flaps are held in unobstructing position to permit the change in orientation of the container as it is conveyed along; to provide novel means and method for elongating the mouth of an extending liner and retaining the elongation securely and without wrinkles as other means apply heat and pressure to seal together the flattened mouth walls; to provide novel and improved devices for assuring a neat and positive folding of the liner mouth in conjunction with the folding of the carton closure flaps; to provide novel means to automatically interlock the tuck end flap into closed position, and to assure the positive register thereof.

With these general objects in view and other objects which will be apparent as the description proceeds, the invention consists of a machine, methods, and in the various structures, arrangements and combinations of parts, all as hereinafter described, and particularly defined in the claims at the end of this specification.

Referring now to the drawings:

Figure 1 is a side elevation, with parts broken away, showing a preferred embodiment of our machine.

Fig. 2 is a horizontal sectional view taken along

line 2—2 of Fig. 1 and having parts broken away and certain parts removed.

Figs. 2a to 2f inclusive constitute a group of views illustrating in perspective the various stages of operation seen in Fig. 2.

Fig. 3 is an enlarged section taken along line 3—3 of Fig. 1.

Fig. 4 is a sectional view illustrating a form or block which may be employed for smaller size containers.

Fig. 5 is a perspective illustrating in knock-down form a container of the type for which our machine is particularly adapted.

Fig. 6 is a perspective showing the set up container.

Fig. 7 is an enlarged sectional view through the bottom portion thereof, and

Figs. 8, 9 and 10 illustrate consecutive stages in the final closing.

Fig. 11 is a side elevation showing an alternate arrangement of the machine but with certain parts removed and certain support members omitted.

Fig. 12 is a sectional view taken on line 12—12 of Fig. 11.

Fig. 13 is a section taken along line 13—13 of Fig. 11.

Fig. 13a is a section taken on line 13a—13a of Fig. 13.

Figs. 14 and 15 are respectively, a plan and a side elevational view of the initial folding bars.

Fig. 16 is a side elevation of certain bars employed to pre-break the score line of the tuck.

Fig. 17 is a side elevation of bars and plates employed for turning the end flaps.

Fig. 18 is a side elevation of folding bars employed in the final folding operation.

Fig. 19 is a plan view thereof.

Fig. 20 is a side elevation showing the final means for completing closure of the carton.

Figs. 21 to 27 inclusive, illustrate in perspective various stages of operation performed on the carton while passing through the machine of Fig. 11.

Fig. 28 is a fragmentary side elevation showing an alternate arrangement of the liner spreading devices and the primary folding bars wherein means for heat sealing the liner are incorporated.

Fig. 29 is a sectional view through one of the spreading devices being taken on the line 29—29 of Fig. 28.

Fig. 30 is a sectional view taken on line 30—30 of Fig. 28, and

Fig. 31 is a perspective showing a carton after the heat sealing of the liner has been performed.

In Figs. 1 and 2 we have illustrated a machine of duplex character, that is, a machine to which two cartons may be fed simultaneously, be operated upon by similar devices, and ejected both at the same time. As shown in Figs. 1 and 2 a conveyor chain 10 traveling continuously in the direction indicated by arrow x in Fig. 2, has affixed a series of carriages 15 having mounted thereon blocks or forms 11 which blocks serve to carry the cartons or containers through the machine in proper alignment.

After being squared up, a carton is placed over one of the blocks 11 as it passes the point or station indicated by A in Fig. 2. After passing through various folding and closing operations later to be described, the set up container is ejected from the machine as it passes the point or station G. Simultaneous with the application of the said container at point A, a second operator standing at point A' may place upon the block 11 passing thereby another carton or container. This second carton, after passing the interposed folding and closing devices, is ejected from the machine at point G'.

As the folding and closing mechanisms interposed between points A' and G' are merely a repetition of those employed between stations A and G, they have not been completely illustrated in the drawings and the following description of folding and closing devices shall be confined to those between stations A and G, similar devices between stations A' and G', where they appear on the drawings, shall be indicated by similar numerals with a prime (') appendage.

It will be understood that this duplex feature is not a limitation on our invention and is employed merely to obtain greater production from a single machine.

The conveyor chain 10 operates over sprockets 10a and 10b at opposite ends of the machine and in its travel therebetween it is supported in alignment by channel members 10c and 10d. The members 10c and 10d are supported by brackets 13 to which they are affixed by screws 13a. The brackets 13, as seen in Fig. 3, are fixed to the frame member 14 by screws 14a.

The blocks 11 are removably mounted on the carriage members or castings 15 which members are supported and guided in alignment with the chain by an outer guide or track 15a and an inner guide 15b. Each of these guide members is suitably channeled as at 15c (Fig. 3) to receive tongues 16 of the carriages 15.

Rotatably mounted in each carriage 15 a shaft 17 has a downwardly extending reduced portion 17a which is pivotally fixed in chain 10. The shaft 17 has fixed at its upper end a gear 18 held thereto by set screw 18a and near its lower end the shaft has a threaded portion 17b, washer 17c and lock nut 17d. Threaded studs 19 engage the gear 18 and clamp thereto, by means of nuts 19a, a square plate 20. The blocks 11 have holes 11a which fit over the upper ends of studs 19. Set screws 11b fasten the blocks securely to the studs and provide for convenient removal and changing when desired.

As thus described the assembly including shaft 17, gear 18, plate 20 and block 11 are free to rotate within the carriage 15. This rotation of the assembly will occur at desired intervals of travel where it is necessary to change the position of the container and is caused by short rack portions 21 and 22 arranged to engage the gear 18 and rotate the assembly through one-quarter revolution and in clockwise direction as seen in Fig.

2. At all other points of travel rotation of the assembly is prevented by guide rails 23, 24, 25 and 26, which rails are arranged to bear against an edge or side of the plate 20.

Referring to Fig. 5, the carton body here shown may be formed of any desired paperboard or cardboard material, and if desired, the outer carton body material may be impregnated with paraffine or the like. The carton body has side wall panels 30, 31, 32 and 33, and articulated to the respective side wall panels as shown are flaps 35 and 36. Merely for the sake of clarity in description these flaps will be referred to as end flaps, these so-called end flaps being the flaps which underlie the elongation of the liner, and the pair of flaps which are folded in prior to the folding of the remaining flap or flaps. Articulated to the side wall panel 32 as shown is an outer closure flap or panel 37. Here again this designation as to outer closure panel is used merely to designate the fact that in this particular construction this panel is the one which is folded into closed position last, being the outer flap of the end closure, and this description, too, is used for purposes of clarity. Secured to this outer closure panel 37, is a tuck 38. Secured by adhesive 39 to the inner side of the various wall panels is a tubular liner 40, which liner, for purposes of sealing and closure, being of sufficient length to extend beyond the side wall panels, as shown. This extending portion of the liner, for purposes of convenience of description, will be referred to as the liner mouth. In the particular drawing as shown, the other end of the liner 40b, may be flush with the end of the wall panel.

In the operation of the machine the operator picks up the carton in its knock-down form as seen in Fig. 5 and squares same by pressing on the corner edges 30a and 33a. The carton is next placed over the block 11 at A and will then appear as seen at B throughout Figs. 1, 2 and 2a.

As the carton is carried onward, past the point B, the upstanding liner portion is contacted by a pair of converging bars, 41 and 42 and a spreading device consisting of a pair of fingers 43 and 44, later described in detail, enters the open upper end or mouth of the liner.

The cooperative action of the converging bars 41 and 42 together with the spreading fingers 43 and 44 brings the liner to the flattened and elongated position seen at C throughout the drawings.

The mechanism (fingers 43 and 44) for elongating or spreading the extending mouth of the liner is similar to that described in Patent No. 2,114,622 issued April 19, 1938, to Robert Morris Bergstein. In the present arrangement we have shown four pairs of the fingers, each pair being mounted upon a plate 70 which plate in turn is fixed to chain 71, running over sprockets 72 and 73. The fingers are curved and slotted as at 44a, the slotted portions being slidable over studs 74 fixed in the plate. At their upper end the fingers are pivotally fixed to a roller which roller rides in cam track 75, to effect operation of the fingers.

As the carton is carried from position C, the flattened portion of the liner is folded downward by the twisted portions 41a and 42a of the bars 41 and 42 respectively. The liner then appears as shown at D and as the carton moves onward a second twisted portion 41b of the bar 41 and the narrowed portion 42b of bar 42 operate to fold over and inwardly a margin of the liner. Just as this second fold is completed, the gear 18 comes into mesh with rack 21 causing the carton

to be rotated through one-quarter revolution to the position E. In Fig. 2a the second fold of the liner is clearly shown at 40c. During rotation of the carton a plate 45 bears lightly but firmly against the liner to retain same in its folded condition.

As the carton leaves position E, a pair of twisted bars 46 and 47 engage and turn inwardly the flaps 35 and 36, carrying therewith the overlying portions of the folded liner. Cooperating with the bars 46 and 47 extending fingers 45a and 45b of plate 45 assist in this operation and effect a neat fold in the liner.

The carton, with the flaps 35 and 36 turned inward, then passes beneath plate 48 which retains the flaps in their folded position while the carton is again moved through a quarter revolution by reason of the gear 18 coming into mesh with rack 22. As seen at F a curved bar 49 then engages the panel 37 to turn it inwardly outlying a bar 50. The bar 50 serves as a hold down member for the flaps 35 and 36 and is of semi-circular cross section at its front end. When panel 37 is turned over bar 50 by rod 49 the panel is brought into arch shaped formation as seen in Fig. 8, thus bringing the outer end of tuck 38 into position suitable for final closure. The bar 50 has a flattened and tapered portion 50a and as the carton travels to the position seen in Fig. 9 an overhead bar 51 pushes downward on panel 37 to force tuck 38 against a side plate or bar 52. This action bends the tuck downward about its score line 38a and with the plate 52 being suitably positioned the bar 50 terminates and bars 49 and 51 push downward on flap 37 to drive the tuck to its position of final closure as seen in Figure 10. A short rod or bar 50b extends sideways from the bar 50 to underlie the score line 38a of the tuck and insure proper bending thereof. The set up carton in its upright position is shown in Fig. 6.

As the carton passes position G a blast of air coming through tube 53 blows the carton from the block 11 and up through the delivery chute 54 from which final disposition may be as desired. To permit removal or ejection of the carton by this means the carriages 15 (see Fig. 3) are each provided with an air passage 55 located to be in alignment with the outlet of the tube 53. The shafts 17 each have a passage 55 communicating with 55 through ports 57. Plates 20 and the blocks 11 have passages 58 and 59 respectively.

For closing smaller cartons the blocks 11 may be removed and replaced by blocks such as shown in Fig. 4. The block 60 as here shown is of the same height and base dimensions as the block 11 but has a reduced upper end 60a and shoulder 60b upon which shoulder the smaller containers rest while passing through the machine.

Referring to Fig. 1 the machine may be driven by motor 76 acting through reduction unit 77 to drive shaft 78. The sprocket 10a, fixed to shaft 78, drives the conveyor chain 10.

The driven shaft 78 may extend upward as at 78a and be provided at its upper end with bevel gear 79 to drive bevel gear 80, shaft 81, and sprocket 82. A chain 83 running over sprocket 82 drives sprocket 84, shaft 85 and sprocket 72, thus driving the chain 71 with the attached spreading devices in timed relation with the chain 10.

Driving means for the second spreading members indicated at 86 may be arranged in any convenient manner. As shown, a sprocket 37, fixed to rotate with sprocket 73, drives chain 88;

sprocket 89; gears 90 and 91; and shaft 92. Fixed to the shaft 92 on the other side of the machine a sprocket 93 drives chain 71' by which chain the spreading devices 86 are carried.

In the machine of Figs. 11 and 12 a motor 100 operating through reduction unit 101 and chain drive 102 drives shaft 103 having fixed thereon bevel gears 104 and 105. The gear 104 has a mate 106 fixed to shaft 107 which shaft is journaled in bearing bracket 108 and has fixed at its upper end a sprocket 109 for driving the conveyor chain 110. The chain 110 runs over idler sprocket 111 which is fixed to shaft 112 journaled in bearing bracket 113.

The gear 105 has a mate 114 fixed to a shaft 115 which is suitably journaled in the frame and has at its upper end a bevel gear 116 having a mate 117 fixed to shaft 118. The shaft 118 is provided with suitable bearing means and has affixed at its forward end a sprocket 119 which sprocket serves to drive chain 120 carrying a series of spreading devices generally indicated at 121. The chain 120 passes over idler sprocket 122 on shaft 123 which may be suitably journaled and supported in any desired manner.

The conveyor chain 110 has attached a series of carriages generally indicated at 124. A sectional illustration of one of these carriages is seen in Fig. 13, as here shown the chain 110 is provided with an extending pin 125 which is retained in a casting 126. The casting 126 has a base portion 127 with flanges or feet 128 and 129 suitably machined to ride in guide members 130 and 131 on the forward side of the machine and in guide members 132 and 133 on the rear side as seen in Figs. 11 and 12. Suitably positioned beneath the sprocket 109 is a disc member 134 which is fixed to shaft 107. A similar disc member 135 is provided beneath sprocket 111 and as the carriage members leave the guides 130 and 131 or 132 and 133 to pass about the said sprockets the base portions 127 of the carriages ride onto and rest upon the discs thus providing complete support for the carriage members in their path of travel about the machine.

Referring again to Fig. 13 the base 127 of each carriage is provided with a headed stud 136 about which stud a gear 137 is freely rotatable. Gear 137 has fixed to its upper side a square plate 138 which plate as seen in Fig. 13a is provided with four extending fingers 139. Positioned in the base member 127 is a spring pressed plunger 140 which has a chamfered upper end 141 adapted to engage in any of four suitably chamfered openings 142 of gear 137 and plate 138. Thus the gear and its associated elements will be frictionally locked in position until sufficient force to overcome the spring 143 is encountered.

Fixed by screws to the upper side of plate 138 a casting 143 has a square upper flange 144 to which block 145 is fixed by screws 146.

It will now be clear that the members 137, 138, 143 and 145 being fixed together to rotate about stud 136 form a turret which may be frictionally locked in any of four positions due to the spring pressed plunger 140.

In the operation of the machine the squared up carton is placed over the block 145 as it approaches the position K as indicated in Fig. 11 or 12. The position of flaps and end closure member at this stage is shown in Fig. 21.

As the carton is conveyed to the left a pair of the spreading devices 121 enter the upstanding mouth of the liner 40 and expand to spread same to an elongated or flattened condition. The end

flaps 35 and 36 are also bent outward and downward simultaneously by action of the spreaders. The liner 40 then comes into engagement with a set of folding bars which are generally indicated at 147 in Fig. 11 and are shown in detail in Figs. 14 and 15 to which figures reference is now made. As there shown the liner is first engaged by a pair of downward bent converging bars 148 and 149. The action of these two bars complete the flattening or elongation of the liner to the position seen in Fig. 22 whereupon the spreading device 121 is removed from the liner mouth due to formation of the cam track 121a. Further travel of the carton brings an upper margin of the flattened mouth into engagement with the bar 150 which is curved as shown to fold downward over bar 148 the said upper margin of the liner to the position seen in Fig. 23. The bars 148 then terminate and the folded margin of the liner 151 is retained in folded position by bars 149 and 150 which bars are curved as shown to fold downward the entire flattened portion of the liner while retaining the fold 151 in position. It is to be noted that these bars also serve as a guide or hold down means for the flaps 35 and 36 to retain them in their folded down position. As the carton emerges from the bars 149 and 150 it appears as seen in Fig. 24.

In Fig. 24 it is also to be noted that the tuck 38 has been turned down or pre-broken along its score line 38a. This pre-breaking of the tuck about its score line assists in final closure of the carton and is accomplished by a set of bars generally indicated at 152 in Fig. 11. These bars, for convenience of design, are arranged to operate concurrently with the bars 148, 149 and 150 above described for folding the liner mouth and are shown in detail in Fig. 16.

Referring now to Fig. 16 the panel 37 is engaged from behind by a bar 153 and on its forward side by a bar 154. The bars 153 and 154 converge together so as to guide the panel 37 and tuck 38 into operative relation with bar 155. Bar 155 is so curved as to engage behind tuck 38 and bend it forward and downward about the upper edge of bar 154 to the position shown at the termination thereof. As the carton is conveyed onward from this position a bar 156 engages the forward side of the end closure 37. Referring now to Figs. 11 and 12 the bar 156 is curved to follow the path of the carton in its travel about sprocket 111 and it is also curved gradually downward so as to bend the closure member 37 backward and down from the position seen in Fig. 24. While this operation of bending down the end closure is performed the folded mouth of the liner is retained in its folded position by a plate 157 which plate is arranged to bear lightly but firmly upon the folded liner. The plate 157 is of course, curved to overlie the carton in its path of travel about the sprocket 111.

With the folded liner and the end flaps 35 and 36 still retained in folded position by plate 157 and the end closure held downward by bar 156, the gear 137 of the turret comes into engagement with a short rack 158 causing the turret and the carton carried thereon to be rotated through one quarter revolution in the direction indicated by the dotted arrow 158a of Fig. 24. The carton will then appear as seen in side elevation at the right side of Fig. 17 where the liner is again retained in its folded position by a plate 159 and the end flaps 35 and 36 with the overlying portions of the folded liner lie outwardly extended.

The plate 159 is of a width slightly less than

that of the carton body so that the longitudinal edges of the plate substantially overlie the lines of articulation of the flaps to the carton body. As the control is moved on in the direction indicated a pair of curved bars 160 (one at each side of plate 159) engage the flaps 35 and 36 and turn the flaps with the overlying portions of the folded liner to the position seen in Fig. 25.

It is to be pointed out that the overhead guide means or plate 159 provides an accurately defined folding edge both for the flattened liner, the flattened triangular extensions of which are folded in over this guide means, and for the flaps which are likewise folded in over this same guide means. One of the real problems of handling the closure of a lined container is the fact that the liner is likely to spring up a little bit even after it is folded, and cause an inaccurate condition, whereas by our device of arranging to rotate the carton to make the folding parallel to the direction of motion, we are able to provide accurately aligned guide means along the particular fold line and point where the liner is to be folded, and by other stationary means the extending portions of the flattened liner and the flap can be neatly, accurately, and positively folded in into desired closed position. For purposes of clarity in the use of terms, we may hereafter refer to the guide means over which the folding is done as internal supporting or guide members since these are positioned over the body of the carton and contact the inner surface of the carton flaps folded thereover; and we may refer to the guide members which do the folding as external folding or guide members, since these are generally located beside the carton body and contact the outer or external surface of the carton flaps.

As the carton travels from beneath the plate 161 to the position seen at the right side of Fig. 18 the intumed flaps 35 and 36 are retained in folded position by bar 164. Referring also to Fig. 19, the bar 164 has welded thereto an up-standing member or bar 165 which is tapered as shown at its left end. The bar 163 engages the closure panel 37 and bends it into arch shaped formation over bar 165. A guide bar 166 then contacts the previously broken tuck 38 and guides it into desired position over the part where the tuck is to be inserted. A bar 167 which as seen in Fig. 19 is diagonally positioned in relation to the direction of travel of the carton then comes into engagement with the partly closed panel 37 and as the carton is carried onward beneath the bar the diagonal inclination thereof tends to force the panel 37 and tuck 38 to the position of final closure. A bar 168 arranged to bear lightly against the presented side panel of the carton serves to prevent any tendency of the side panel bulging outward while the closure panel 37 is being turned inward.

It is to be noted that by this device of arching the outer closure panel there is in effect a shortening laterally across the direction of motion of this panel, thus bringing the end of the flap to which the tuck is articulated, into desired position over the part where the tuck is to be inserted. And simultaneous to this there are guide means arranged to fold in the previously broken tuck and start it into tucked position.

Here it should also be noted that the tuck is only tucked partially into its closed position, that is, it is guided downwardly so that the end of the tuck is in tucked position, but that the panel itself has not been brought completely down. If

desired, guide means or pressure could be applied to bring the tuck down into its full closed position, but for the sake of greater accuracy and more positive register, we prefer to effect the final pressure and closure of the flap and tuck at a succeeding station, after another rotation has been made, as will be described later. If desired adhesive could be applied to the tuck by means of having it pass over a glue roller, before being folded in and also to the under-side of the outer closure panel as well, so when this panel is brought down into closed position there will be adhesive between the outer closure panel and the end flaps, as well as between the tuck and the wall next to which it lies.

As the carton passes the end of bar 167 it is engaged by an overhead hold down plate 169. At this point the carton appears as seen in Fig. 26 and the gear 137 of the particular carriage on which the carton happens to be carried comes into engagement with rack 170 (Fig. 12) to rotate the carton through another quarter revolution as indicated by the broken arrow 173a of Fig. 26. The carton then appears as seen in side elevation in Fig. 20 where it is to be noted that plate 169 is gradually bent downward to iron down the outer closure flap 37 and tuck 38 into final closed position. To assure a positive interlocking and ironing down of this outer closure flap a pair of rollers 171 which operate through cut-out portions 172 in plate 169 are arranged to bear against the carton top and bring panel 37 and tuck 38 to the position of final closure.

The rollers 171 are mounted on a lever bar 173 which is pivoted at 174 to a support bracket 175. A tension spring 176 urges the lever arm to the position shown and a screw or other suitable stop member 177 limits the motion of the lever.

It might even be mentioned that the reason for the final turn of the carton is that when the carton is in its previous orientation, particularly a long flap or the flap of a rather large size carton, naturally tends to have some twist or tort, as it is folded over. Therefore, by this invention of merely folding over enough in the previous station to start the tuck into its final position, which requires no close register because the bottom of the tuck is tapered as shown in the drawings, and then by turning the carton so that the line of articulation of the outer closure flap is the advancing edge, the ironing action that this flap receives in this final station now, both from the smoothing plate and from the rollers which work through the smoothing plate, assures automatically an accurate positive register and dependable and trouble-free operation.

To assure proper meshing of the turret gears 137 with the rack portions 158, 152 and 170 we have mounted before each rack a block 139a. These blocks are located in the path of travel of the fingers 139 which as before mentioned extend from the four sides of the turret plate 138. The internal turning movement of the turrets and the effort required to overcome the frictional locking devices before described is caused by the fingers striking these blocks which are properly located to bring the gears into exact mesh with the racks.

On the machine as shown we have not indicated a fourth turn of the carton but it will be understood that if desired the container can again be rotated another quarter turn, that is, to a complete 360 degree angle from the point of application. This would be desirable in the case of rectangular shaped containers where it would

be desirable to incorporate another quarter turn in order to bring the block back into proper position to receive the next carton as it starts around the machine again. This, of course, could readily be accomplished by application of the same principles used for the previous described turns.

The finally closed carton is ejected from the machine and up into a delivery chute such as shown in Fig. 1 by a blast of air issuing from the rectangular tube 178 seen in Fig. 12. The tube is arranged to communicate with the extended channel or passage 179 of the carriage base member 126.

In Figs. 28 to 31, inclusive, we have shown an alternate arrangement of the primary folding bars including means whereby the mouth of the liner may be provided with a hermetic seal, said means consisting of electrical heater bars and a pair of pressure rollers, the liner, of course, being of heat-sealable material or having an inner coating or lining of heat sealable material.

As seen in Figs. 28 and 30 the initial folding bars 148a and 149a are heated by electrical units 200 and 201. As the flattened and elongated mouth of the liner is conveyed between the bars the heat sealable material of the liner is activated and application of pressure to the opposite walls of the mouth will result in sealing same. As shown the pressure means consist of a pair of rollers 202 and 203 which operate to effect the seal through cut-out portions 204 and 205 in the bars 148a and 149a respectively.

The rollers 202 and 203 are driven in lineal timed relation with the conveyor movement by gear 206 which is fixed on shaft 118a. The gear 206 drives a smaller gear 207 which is mounted on a transverse shaft 208 which shaft has affixed two spiral gears one of which is shown at 209. The gear 209 drives gear 210 which is fixed to the upper end of shaft 211 having at its lower end the pressure roller 203. The other pressure roller 200 is carried at the lower end of a shaft 212 which shaft is driven by a pair of spiral gears (not shown) at its upper end, one of the gears, of course, being fixed to shaft 212 and the other to shaft 208.

The sealed mouth of the liner is shown at 213 in Fig. 31 and after this seal has been accomplished the liner and carton may then be carried through the folding and closing operations previously described.

As seen in Figs. 28 and 29 the spreading devices which are generally indicated at 121a are of special construction. As here shown the fingers 214 and 215 are at their upper end pivotally fixed to a cam roller 216 and are slotted as at 217 to slide upon the studs 218. The studs 218 are fixed in a plate 219 which plate itself is slidably mounted on plate 220 by the headed stud 221 at its lower end and by stud 222 at its upper end, the studs being slidable in slots 223 and 224 respectively of the plate 220. The plate 219 which carries the spreading fingers is normally retained in the position seen in Fig. 29 by reason of tension spring 225 which is attached at its upper end to stud 222 and at its lower end to a screw 226 in the plate 220. The stud 222 also serves to carry a cam roller 227.

The position of the spreading device as it first enters the carton mouth is seen at M in Fig. 28. As the carton is carried to the left the cam track 216a depresses roller 216 to descend and spread the fingers 214 and 215 to the position seen at N where the liner is in flattened and elongated

condition between the folding bars 148a and 149a. As the carton is carried to the left the roller 227 is engaged by a cam track 230 which lifts the plate 219 and the fingers carried thereon upward against tension of spring 225 to the position seen at 0. Simultaneous with the lifting of the plate 219 the cam roller 216 is lifted upward by the rise of track 216a, thus no expansion or contraction of the fingers occur as they are retracted upward within the liner.

The relationship of these moving spreader or guide fingers to the sealing devices is to be particularly noted. To achieve an accurate dependably tight heat-seal or seam between the opposite mouth walls, it is important that there should not be wrinkles which are likely to cause leaks or pinholes through the seam. We have achieved this important result by an assured and positive means. As described, the spreader fingers retract upwardly slightly before the container passes through the heating members and the pressure rolls, but they stay in their spread position in the liner mouth, to keep the liner mouth positively stretched and flattened, as the sealing is carried out, and thereafter the spreader fingers are brought together and retract to lift out of the liner mouth.

It should be noted that when a liner is flattened or spread out, there are triangulations at the ends thereof, as clearly indicated in the drawing. There are always a few slight wrinkles at the ends of these triangulations, and therefore it is desirable to make the seam or fused closure of the liner mouth slightly above the level of the ends of these triangular liner extensions. It is for this reason that we have arranged to lift or raise the fingers sufficiently so that there is a clear space provided above the ends of the triangulations of the liner, to form the fused closure seam, and yet at the same time by the fingers remaining in operative position at a level above the area to be seamed, the liner is retained positively in flat smooth condition, to provide the tightest and most effective hermetical seal.

It should be noted that while in the description given reference has been made largely to the style of container which requires closure at one end only, the other end being open with the liner flush, these same principles can readily be adapted to the initial end closure of containers having the liner projecting beyond the body at both ends thereof, as shown in Patent No. 2,206,761 previously referred to.

It should further be noted that while certain portions of our device as described are particularly adapted to the closure of an end flap arrangement involved an outer closure flap which has a tuck thereon, that many of the general principles of our invention are readily adapted to the closure of containers having other types of end flap arrangement. If an interlocked arrangement of the final closure flaps should be preferred, the types of devices referred to in the patent previously mentioned above could readily be incorporated in our machine, involving the folding along parallel lines of two outer closure flaps, instead of a single one as in the case of the tuck end construction described. Also as mentioned in the description of the machine, adhesive can be incorporated if desired as a sealing medium to secure the outer closure flap either to the end flap, or to secure a pair of final outer closure flaps to each other, or to the end flaps as well. All such variations are contemplated within the scope of our invention.

The principles herein disclosed are equally well adapted to forming the final end closure on a contents-containing container. To accomplish this cages or supports are used, in place of the block or mandrel described. In this way, a container having one end closed, with the other end open, may be placed on the machine, which will thereupon carry out the closure of the open end in the same manner as has been previously described. If desired, both mandrels and cages may be used, so that the same mechanism may be adapted to successively seal opposite ends, the filling operation being carried out in the interim.

It will also be evident from the description herein that this invention is adapted to form the end closures of unlined containers. That is, the flap folding principles and locking or sealing arrangement is adapted to form the end closure of cartons or containers, which do not have an extending liner mouth projecting intermediate the closure flaps.

By our invention as herein disclosed we have provided a rapid, simple, and efficient container-closure process. If there is a liner within the package, the liner may be provided with a secure double fold, and if the inner surface of the liner be of heat-sealable material an accurate hermetically tight fused seam may be provided in the liner mouth. It is of particular importance that all the inward folding, that is, the folding which brings the various flaps into closed position, is accomplished while the container is traveling in the direction of motion parallel the lines of articulation of the respective flaps. By this means we are enabled to use simple stationary guide members which have a positive action on a moving carton, without the need of complex or intricate timed folding devices. And if a liner mouth is to be closed simultaneously, our invention also provides for a positive folding of the liner mouth, and positive control as the extending portions of the liner mouth are folded, to provide a neat and accurate folding both of the liner and of the carton-closure flaps.

In connection with cartons having a closure involving a tuck, and outer closure flap, our invention provides a fully automatic, simple, and dependable locking arrangement. As described, our preferred method for accomplishing this involves both a pre-breaking of the tuck line of fold, and folding over the flap to which the tuck is articulated, while the container is moving in the direction parallel to the line of articulation of said flap, to register the tuck partially in closed position, and thereafter during the course of motion again turning the container so that the line of articulation of the flap is the leading edge in the direction of motion and ironing down the flap to bring the tuck into its final fully closed position, assuring a positive register and a tight closure.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention what we claim as new and desire to secure by Letters Patent, is:

1. A method of forming end closures on cartons in erect form, having articulated end flaps projecting from at least two adjoining side-wall panels thereof, which includes retaining said cartons in erect form, moving said cartons along, and, at successive stages in the course of travel,

changing the position of the carton in relation to its direction of motion, said flaps being successively folded inwardly between said stages, and while traveling there-between in a direction of motion parallel to the respective lines of articulation of said flaps.

2. A method of forming end closures on cartons in erect form, having articulated end flaps projecting from at least two adjoining side-wall panels thereof, which includes retaining said cartons in erect form, moving said cartons along, and, at successive stages in the course of travel, changing the position of the carton in relation to its direction of motion, said flaps being successively folded inwardly between said stages, and while traveling there-between in a direction of motion parallel to the respective lines of articulation of said flaps, said operation being carried out during the continuous motion of said cartons.

3. A method of forming end closures on cartons in erect form, having articulated end flaps projecting from at least two adjoining side-wall panels thereof, which includes retaining said cartons in erect form, moving said cartons along, and, at successive stages in the course of travel, changing the position of the carton in relation to its direction of motion, said flaps being successively folded inwardly between said stages, and while traveling therebetween in a direction of motion parallel to the respective lines of articulation of said flaps, all previously folded flaps being retained in a plane substantially at right angles to the carton body, as the position of the carton in relation to its direction of motion is changed.

4. The method of closing cartons having a tuck in outer closure panel articulated to one wall thereof and end flaps articulated to the two adjoining walls, which includes moving said carton along in a direction of motion parallel to the lines of articulation of said end flaps, and folding said flaps inwardly, changing the orientation of the carton in relation to its direction of motion whereby the line of articulation of said outer closure panel is parallel to the direction of motion, and infolding said tuck as said closure panel is folded into position overlying said previously folded end closure panel is folded into position overlying said previously folded end flaps.

5. The method of closing cartons having a tuck in outer closure panel articulated to a wall thereof and end flaps articulated to two adjoining walls, which includes moving said carton along with the line of articulation of said outer closure panel parallel to the direction of motion and folding said outer closure panel and said end flaps outwardly substantially at right angles to the respective walls to which said flaps are articulated, changing the position of the carton in relation to its direction of motion to bring the lines of articulation of the end flaps parallel to the direction of motion, and folding in said end flaps, and then again changing the position of the carton in relation to its direction of motion to bring the line of articulation of the outer closure panel parallel to the direction of motion of the carton, and folding in the outer closure panel to overlie said previously folded end flaps.

6. A method of carton closure which includes moving a carton along in the direction of motion parallel the line of articulation of the closure flap having a tuck thereon, two adjoining walls having end flaps articulated thereto, folding said flaps folded inwardly substantially at right

angles to the respective walls, and retaining said end flaps in folded position, and folding the outer closure flap with the tuck articulated thereto inwardly to bring said tuck partially into position between said infolded end flaps and remaining wall of the carton, and thereafter changing the position of the carton in relation to its direction of motion whereby the line of articulation of the end closure flap becomes the advancing edge of the carton in the direction of motion, and pressing downwardly on said outer closure flap during further motion of said carton to complete insertion of the tuck.

7. A method of closing cartons having a tuck-in panel articulated to a wall thereof, and end flaps articulated to two adjoining walls, which includes conveying said carton parallel to the direction of motion of lines of articulation of said end flaps and folding in said flaps, changing the orientation of the carton in relation to its direction of motion whereby the line of articulation of said tuck-in flap is parallel to the direction of motion, partially folding over said outer closure flap and infolding the tuck, retaining said folds while again changing the orientation of the carton in relation to its direction of motion whereby the line of articulation of said tuck-in flap is the leading edge in the direction of motion, and completing the infolding of the tuck-in flap and releasing the tuck into engaged position to complete said end closure.

8. In a device of the character described conveying means having means thereon to receive and retain a carton in squared up condition with closure flaps extending therefrom, one of said flaps having a tuck thereon, means for moving said carton parallel the line of articulation of said tuck flap and folding outwardly said flap and remaining pair of opposite flaps, means for turning the carton substantially through a 90 degree arc while retaining all flaps in outward folded position, fixed shaped members pressing against the outer surface of said remaining flaps in combination with a fixed internal guide member adjoining the lines of articulation of said flaps, to fold same inwardly, means thereafter to again turn said carton through a substantially 90 degree arc and a combination of fixed stationary internal and external guide means to fold said closure flap and the tuck thereon inwardly in the course of further motion.

9. In a packaging machine wherein an erect carton is conveyed along with one pair of opposite end flaps folded outwardly and a closure flap with a tuck thereon likewise folded outwardly, a series of fixed shaped internal and external guide members located in the path of travel of said carton to successively infold all flaps and the tuck as the carton is moved along, in combination with means for altering the position of the carton in relation to its direction of travel intermediate said successive guide members.

10. In a machine of the character described means for continuously moving along a series of members retaining erect cartons with flaps extending therefrom and means for effecting successive quarter turns in said members at predetermined positions during said course of motion in combination with fixed guide members to engage and fold flaps articulated parallel the respective directions of motion, said means for effecting the quarter turn comprising stationary means adjacent the course of conveyance to engage the base of said members as said members are conveyed past said means.

11. In a machine for forming the closure on the end of a container having a pair of flaps articulated to a pair of opposite walls thereof and one of the remaining walls of which has articulated thereto an outer closure panel with a tuck-in flap thereon, there being a flexible liner within the body of said container with an open mouth thereof projecting intermediate said flaps, a series of moving members for retaining the bodies of said containers in erect condition with the aforesaid flaps and projecting liner mouth extending therefrom, means for moving said mandrels in direction of motion parallel with the line of articulation of said outer closure panel, moving means operating in timed relation to the travel of said containers which spread apart and flatten together the opposite sides of said open liner mouth in the direction of motion parallel the course of travel, thereby folding outwardly and backwardly said pair of flaps, fixed guide means to fold back and outward said outer closure panel and fixed guide means to make a series of folds in the flattened liner mouth to bring said folded liner mouth into position overlying the top of the mandrel and said pair of flaps and means for retaining all folded flaps and the folded liner in folded position in combination with means for turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion.

12. In a machine for forming the closure on the end of a container having a pair of flaps articulated to a pair of opposite walls thereof and one of the remaining walls of which has articulated thereto an outer closure panel with a tuck-in flap thereon, there being a flexible liner within the body of said container with an open mouth thereof projecting intermediate said flaps, a series of moving members for retaining the bodies of said containers in erect condition with the aforesaid flaps and projecting liner mouth extending therefrom, means for moving said mandrels in direction of motion parallel with the line of articulation of said outer closure panel, moving means operating in timed relation to the travel of said containers which spread apart and flatten together the opposite sides of said open liner mouth in the direction of motion parallel the course of travel, thereby folding outwardly and backwardly said pair of flaps, fixed guide means to fold back and outward said outer closure panel and fixed guide means to make a series of folds in the flattened liner mouth to bring said folded liner mouth into position overlying the top of the mandrel and said pair of flaps and means for retaining all folded flaps and the folded liner in folded position, in combination with means for turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion, fixed means positioned between the lines of articulation of said pair of flaps over which said flaps and the folded liner portions thereon are urged inwardly and downwardly by other fixed guide means during the further course of travel and means to retain all flaps in folded position in combination with means for again turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion.

13. In a machine for forming the closure on the end of a container having a pair of flaps articulated to a pair of opposite walls thereof and one of the remaining walls of which has articulated thereto an outer closure panel with a tuck-

in flap thereon, there being a flexible liner within the body of said container with an open mouth thereof projecting intermediate said flaps, a series of moving members for retaining the bodies of said containers in erect condition with the aforesaid flaps and projecting liner mouth extending therefrom, means for moving said mandrels in direction of motion parallel with the line of articulation of said outer closure panel, moving means operating in timed relation to the travel of said containers which spread apart and flatten together the opposite sides of said open liner mouth in the direction of motion parallel the course of travel, thereby folding outwardly and backwardly said pair of flaps, fixed guide means to fold back and outward said outer closure panel and fixed guide means to make a series of folds in the flattened liner mouth to bring said folded liner mouth into position overlying the top of the mandrel and said pair of flaps and means for retaining all folded flaps and the folded liner in folded position, in combination with means for turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion, fixed means positioned between the lines of articulation of said pair of flaps over which said flaps and the folded liner portions thereon are urged inwardly and downwardly by other fixed guide means during the further course of travel and means to retain all flaps in folded position in combination with means for again turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion and other fixed guide means to fold said outer closure panel inwardly in combination with guide means located over said previously folded flaps to arch said outer closure panel as it is folded inwardly and other means to deflect the tuck thereon inwardly to register said tuck into closed position between said in-folded flaps and remaining outer wall during the further course of travel of said container.

14. In a machine for forming the closure on the end of a container having a pair of flaps articulated to a pair of opposite walls thereof and one of the remaining walls of which has articulated thereto an outer closure panel with a tuck-in flap thereon, there being a flexible liner within the body of said container with an open mouth thereof projecting intermediate said flaps, a series of moving members for retaining the bodies of said containers in erect condition with the aforesaid flaps and projecting liner mouth extending therefrom, means for moving said mandrels in direction of motion parallel with the line of articulation of said outer closure panel, moving means operating in timed relation to the travel of said containers which spread apart and flatten together the opposite sides of said open liner mouth in the direction of motion parallel the course of travel, thereby folding outwardly and backwardly said pair of flaps, fixed guide means to fold back and outward said outer closure panel and fixed guide means to make a series of folds in the flattened liner mouth to bring said folded liner mouth into position overlying the top of the mandrel and said pair of flaps and means for retaining all folded flaps and the folded liner in folded position, in combination with means for turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion, fixed means positioned between the lines of articulation of said pair of flaps over which said flaps and the

folded liner portions thereon are urged upwardly and downwardly by other fixed guide means during the further course of travel and means to retain all flaps in folded position in combination with means for again turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion and other fixed guide means to fold said outer closure panel inwardly in combination with guide means located over said previously folded flaps to arch said outer closure panel as it is folded inwardly and other means to deflect the tuck thereon inwardly to register said tuck into closed position between said infolded flaps and remaining outer wall during the further course of travel of said container and after the termination of said arching means, means to again turn the container on its vertical axis substantially through an angle of 90 degrees to bring the line of articulation of said outer closure flap forwardly of the direction of motion and overhead pressure means to press said outer closure flap and the tuck thereon into final flattened tucked position during the further course of travel of said container.

15. In a machine for forming the closure on the end of a container having a pair of flaps articulated to a pair of opposite walls thereof and one of the remaining walls of which has articulated thereto an outer closure panel with a tuck-in flap thereon, there being a flexible liner within the body of said container with an open mouth thereof projecting intermediate said flaps, a series of moving mandrels with apertures therein on which mandrels the bodies of said containers in erect condition are positioned with the aforesaid flaps and projecting liner mouth extending therefrom, means for moving said mandrels in direction of motion parallel with the line of articulation of said outer closure panel, moving means operating in timed relation to the travel of said containers which spread apart and flatten together the opposite sides of said open liner mouth in the direction of motion parallel the course of travel, thereby folding outwardly and backwardly said pair of flaps, fixed guide means to fold back and outward said outer closure panel and fixed guide means to make a series of folds in the flattened liner mouth to bring said folded liner mouth into position overlying the top of the mandrel and said pair of flaps and means for retaining all folded flaps and the folded liner in folded position, in combination with means for turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion, fixed means positioned between the lines of articulation of said pair of flaps over which said flaps and the folded liner portions thereon are urged upwardly and downwardly by other fixed guide means during the further course of travel and means to retain all flaps in folded position, in combination with means for again turning said mandrel on its vertical axis substantially at right angles to its former position in relation to its direction of motion and other fixed guide means to fold said outer closure panel inwardly in combination with guide means located over said previously folded flaps to arch said outer closure panel as it is folded inwardly and other means to deflect the tuck thereon inwardly to register said tuck into closed position between said infolded flaps and remaining outer wall during the further course of travel of said container and after the termination of said arching means, means to

again turn the container on its vertical axis substantially through an angle of 90 degrees to bring the line of articulation of said outer closure flap forwardly of the direction of motion and overhead pressure means to press said outer closure flap and the tuck thereon into final flattened tucked position during the further course of travel of said container and means thereafter to release a blast of air under pressure through the aperture in said mandrel to eject said container therefrom.

16. In a machine of the character described fixed folding means to fold outwardly an outer closure panel and to fold inwardly and thereafter after release a tuck flap on said panel, both of said foldings being carried out while the carton is conveyed parallel to said lines of fold, means to change the orientation of the carton and means to subsequently re-orient it to its original position, and other fixed means in the subsequent course of travel of said carton to fold said outer closure panel inwardly and to fold said tuck flap inwardly and downwardly.

17. In a machine for sealing and folding the inner liners of lined cartons the combination of carrier means for advancing the cartons through the machine, moving means for elongating the liner tops in the direction of movement of said carrier means, fixed means for supporting the outer surface of said elongated top and means for partially retracting said elongating means during the movement of said liner between said fixed means.

18. In a machine for forming end closures on an erect container having a heat-sealable open liner mouth projecting intermediate the flaps at an end thereof, in combination, means for moving along said container and means for elongating and flattening together the opposite mouth walls parallel to the direction of motion, and means for partially retracting said elongating means during the movement of the flattened mouth walls between fixed heated members located below said partially retracted elongating means.

19. In a machine for heat-sealing the open mouth of a heat-sealable liner means, in combination, for moving along said liner, expansible means for elongating said mouth in the direction of motion, means for partially retracting, while retaining in expanded form, said expansible means, and means for applying heat across a zone of said flattened mouth below said partially retracted expansible means.

20. In a packaging machine wherein erected cartons having extending flaps are conveyed along, means for successively changing the position of the carton in relation to its direction of motion, in combination with fixed internal supporting members over which said flaps may be folded, said supporting members being located so as to be adjacent the fold lines of the respective flaps when the said fold lines are parallel to the direction of motion of the carton, and means for folding said flaps over said supporting members.

21. In a machine of the character described, means for initially conveying along an erected carton with all flaps articulated thereto outfolded in a plane substantially at right angles to the body of the carton, means to change the position of the carton, means to retain said flaps in said outfolded condition as the position of the carton in relation to its direction of motion is changed, means for folding inwardly a set of flaps on the carton, and means in the course of further travel

to again change the position of the carton in relation to its direction of motion while said set of flaps is in inwardly folded condition, the remaining flaps being folded outwardly, and means to retain said infolded and outfolded flaps in respective folded conditions during said subsequent change in position.

22. In a machine of the character described, means for conveying an erected carton having flaps extending from lines of articulation substantially at right angles to each other, means to infold one pair of opposite flaps including internal guide members positioned over the body of the carton adjacent the lines of fold of said pair of opposite flaps, means to change the position of the carton in relation to its direction of motion, means to retain said pair of flaps in infolded condition as the position of said carton is changed, and means to fold in the other flaps after the position of the carton is changed

23. In a machine of the character described, means to convey along an erected carton having flaps extending from lines of fold substantially at right angles to each other, with open liner mouths projecting therebetween, means to elongate, flatten together and fold down opposite liner mouth walls to form flattened triangular liner extensions overlying one pair of outfolded opposite carton flaps, means to change the orientation of the carton with respect to its direction of travel so that the lines of fold of said pair of flaps lie parallel to the direction of travel, fixed supporting means to retain said folded liner located thereover and adjacent said lines of fold when the orientation of said carton is so changed, and other means to infold said triangular liner extensions and said pair of flaps over said fixed supporting means.

24. In a machine of the character described, means to convey along an erected carton having flaps extending from lines of fold substantially at right angles to each other, with open liner mouths projecting therebetween, means to elongate, flatten together and fold down opposite liner mouth walls to form flattened triangular liner extensions overlying one pair of outfolded opposite carton flaps, means to change the orientation of the carton with respect to its direction of travel so that the lines of fold of said pair of flaps lie parallel to the direction of travel, fixed supporting means to retain said folded liner located thereover and adjacent said lines of fold when the orientation of said carton is so changed, and other means to infold said triangular liner extensions and said pair of flaps over said fixed supporting means, means to again

change the orientation of the carton, and means to fold in at least one remaining flap along a line of fold positioned parallel to the direction of travel of said carton by said change of orientation.

25. In a machine of the character described, means to move along a carton having one pair of opposite flaps and at least one remaining flap folded outwardly, means for retaining all flaps in said folded position as the carton is rotated about the axis at right angles to its direction of motion, means for rotating said carton, means for folding in said aforementioned pair of opposite flaps, means for retaining said pair of flaps infolded and at least one remaining flap outfolded as the carton is again rotated about an axis at right angles to its direction of motion, means for again rotating said carton, and means to infold at least the said one remaining flap to overlie said previously infolded pair of opposite flaps.

26. In a packaging machine, in combination, successive series of fixed, shaped, internal guide and external folding members in combination with means for conveying therebetween in alternate orientations cartons having flaps articulated thereto along lines at right angles to each other whereby all said flaps are folded inwardly along lines of articulation parallel to the direction of motion and over said internal means located adjacent said lines of articulation.

27. In a machine for closing the flaps articulated to the walls of an erected carton, means for moving an erected carton in a path, successively acting sets of stationary folding means located along and extending in the direction of said path, and means for changing the axial orientation of said carton intermediate said sets so as to present to said sets in the same orientation, flaps articulated to different walls of said carton.

28. In a machine for heat-sealing the open mouth of a heat-sealable liner, in combination, means for moving along said liner, expansible means for elongating said mouth in the direction of motion, means for partially retracting, while retaining in expanded form, said expansible means, and means for applying heat across a zone of said flattened mouth below said partially retracted expansible means, and means thereafter to press said zone together, said last named means comprising opposed pressure members driven at the same lineal rate of travel as said liner.

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