

Nov. 7, 1967

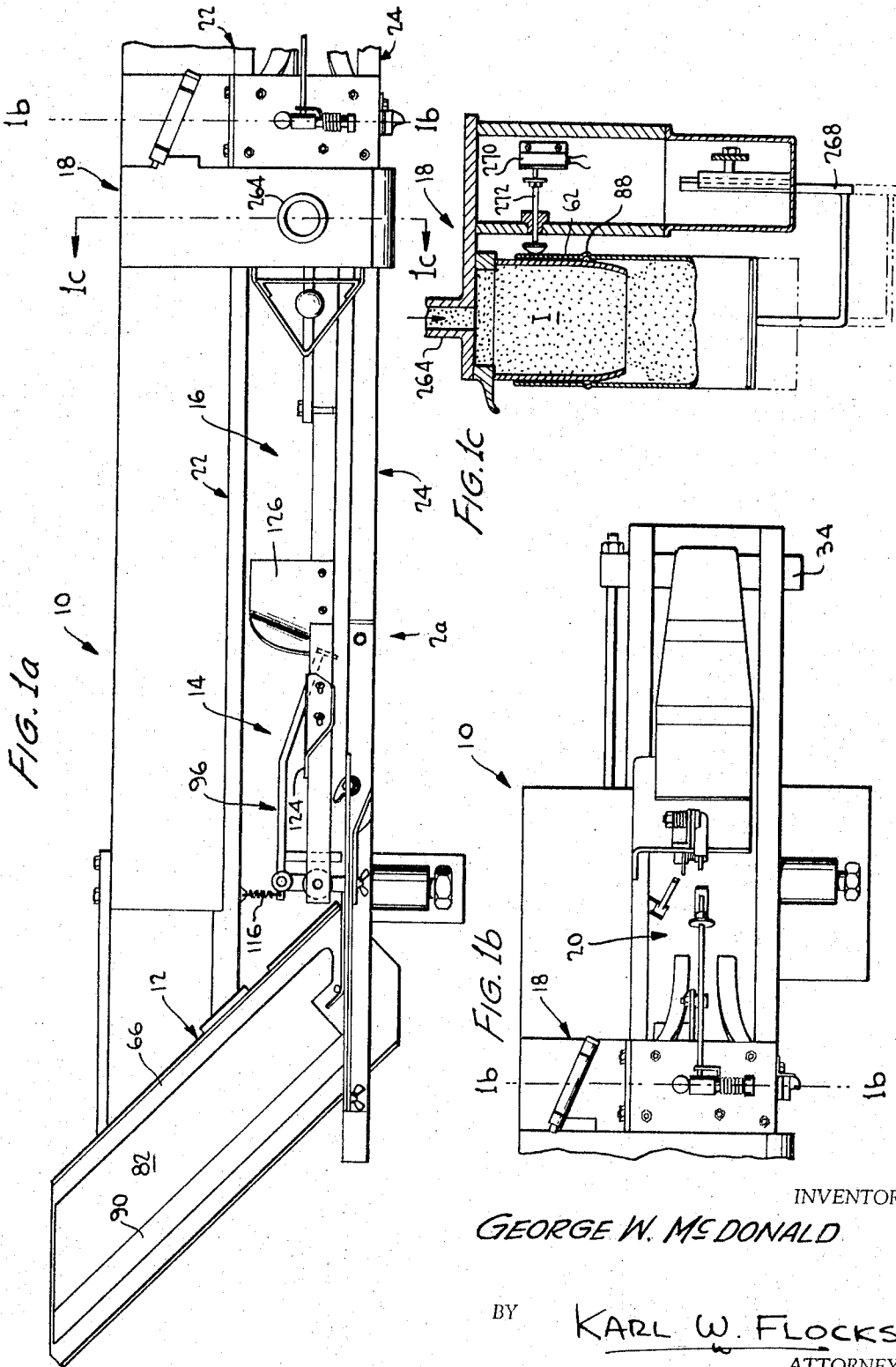
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3,350,841

CARTON FOLDING AND FILLING MACHINE

Filed Dec. 13, 1965

10 Sheets-Sheet 1



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Nov. 7, 1967

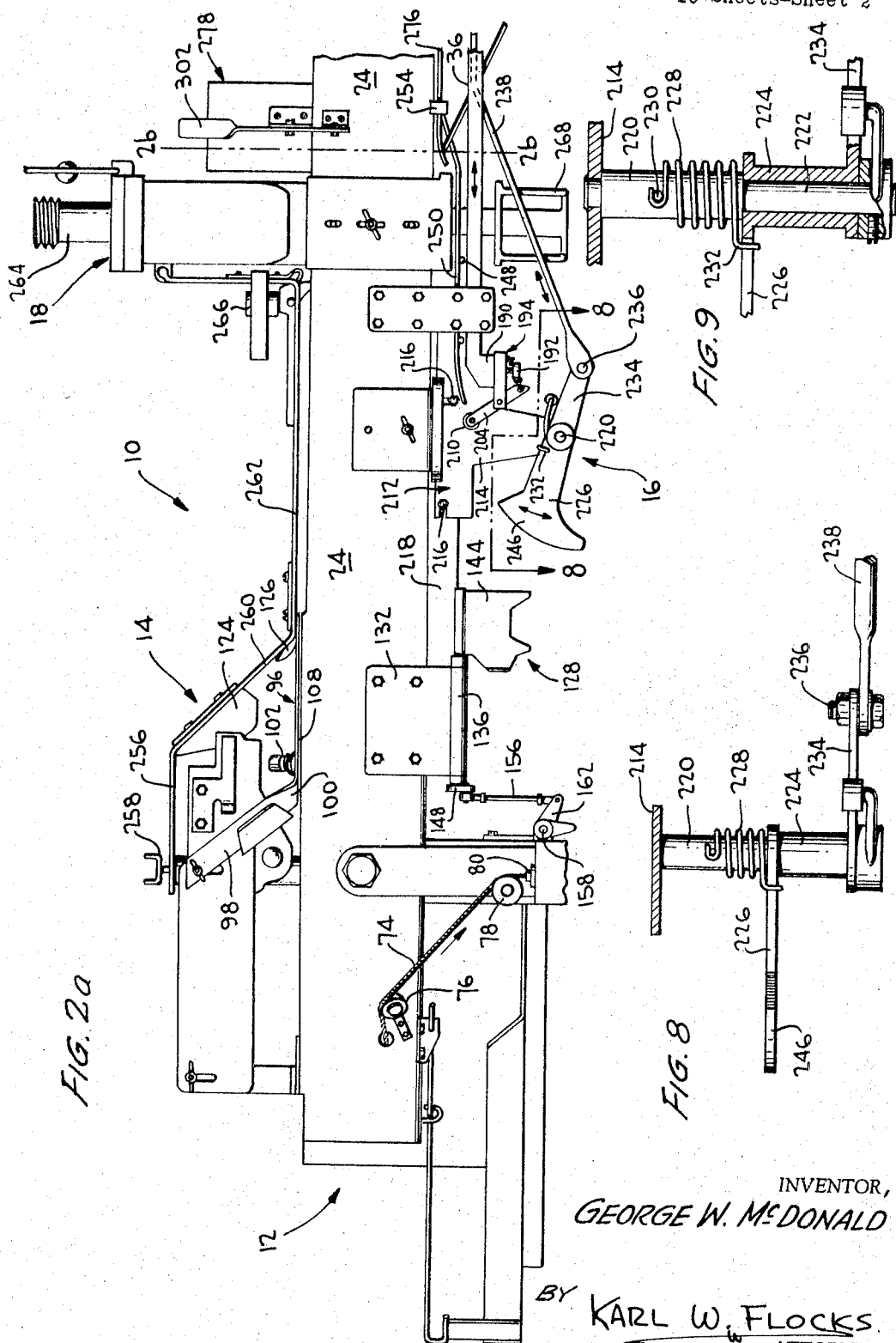
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CARTON FOLDING AND FILLING MACHINE

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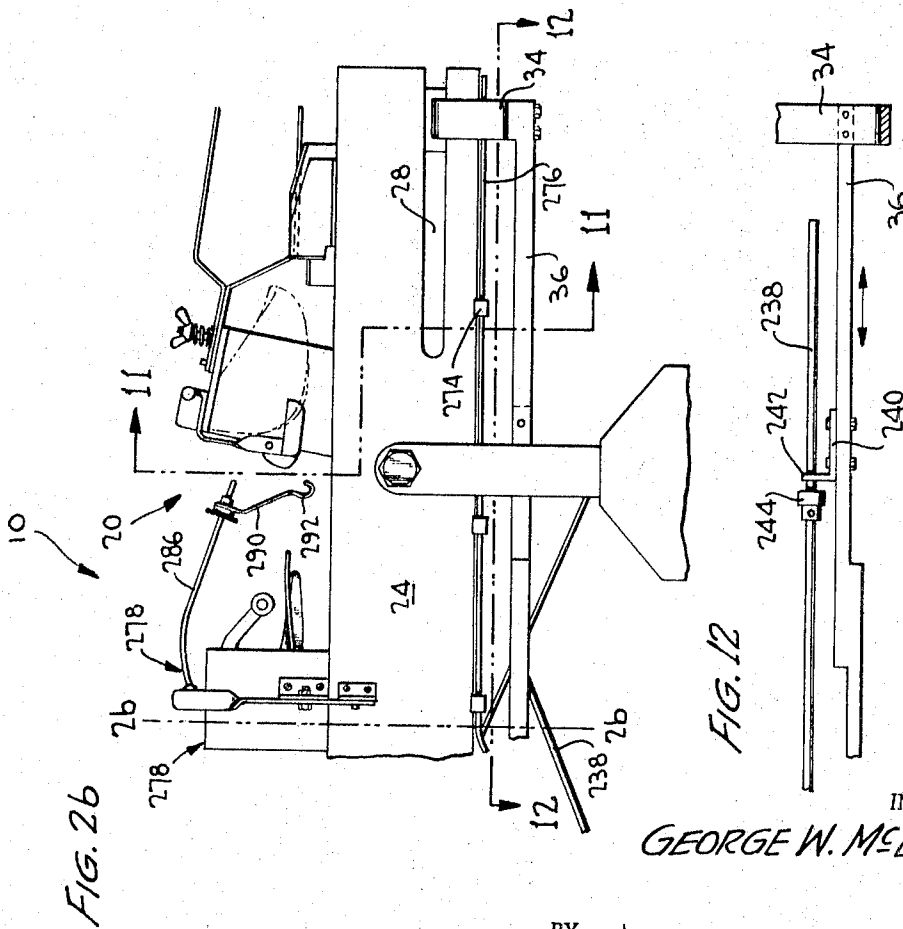
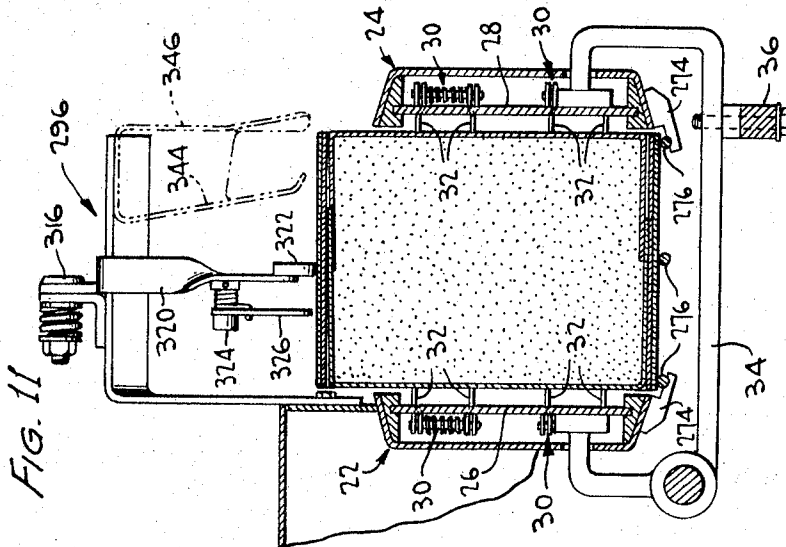
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CARTON FOLDING AND FILLING MACHINE

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10 Sheets-Sheet 3



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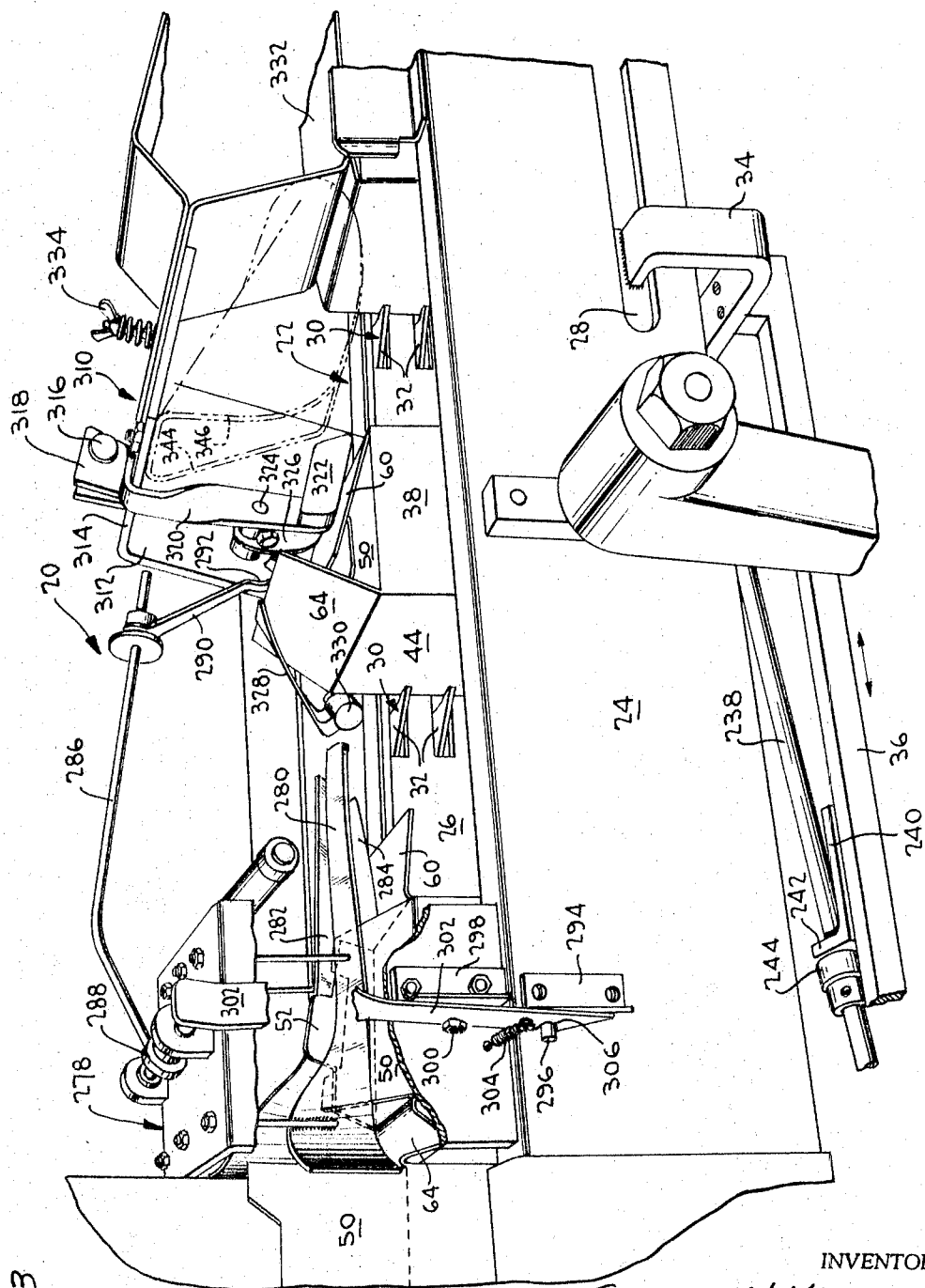


FIG. 3

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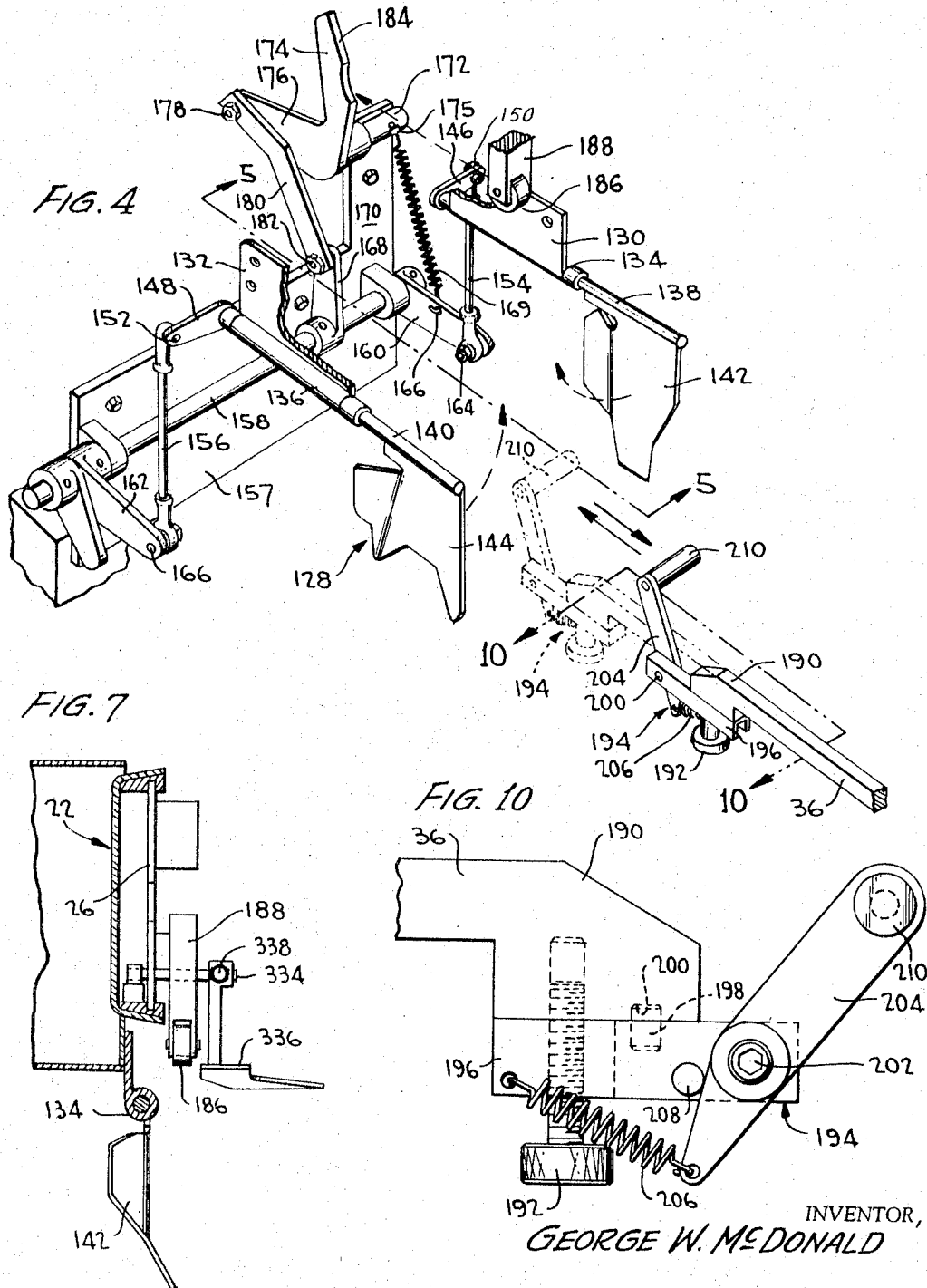
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CARTON FOLDING AND FILLING MACHINE

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FIG. 5

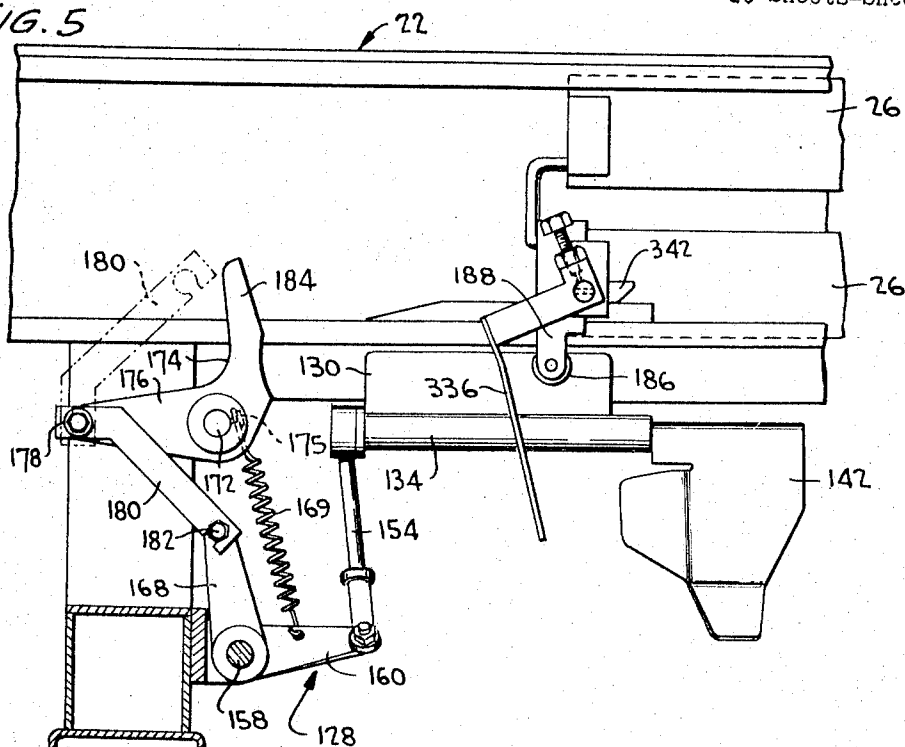
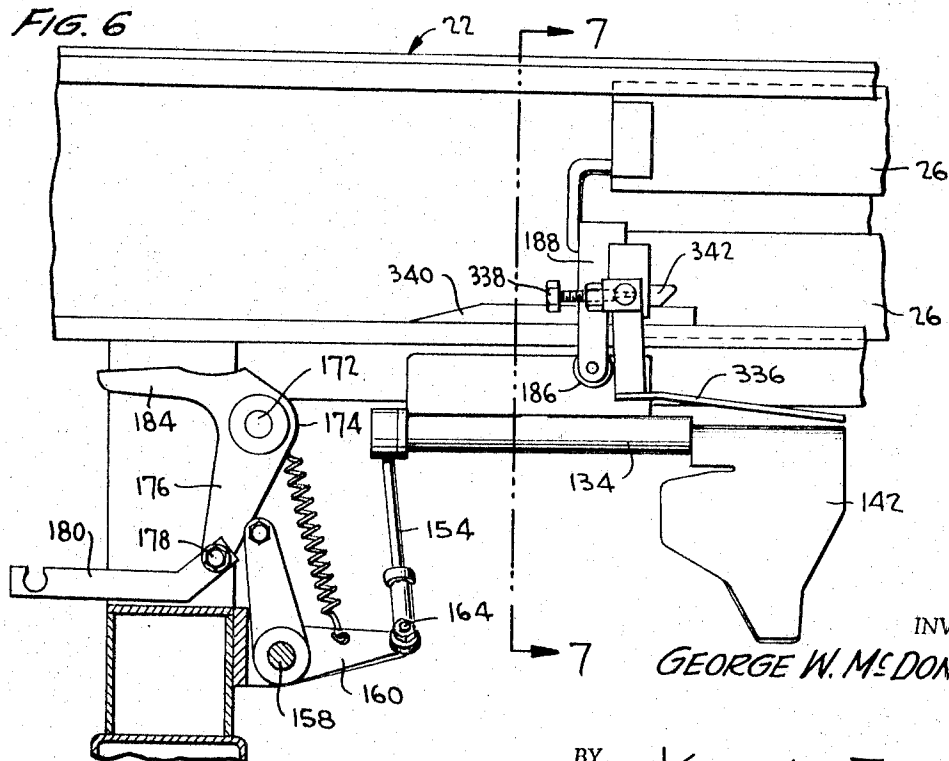


FIG. 6



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CARTON FOLDING AND FILLING MACHINE

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FIG. 13a

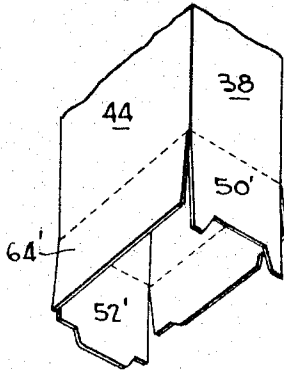


FIG. 13b

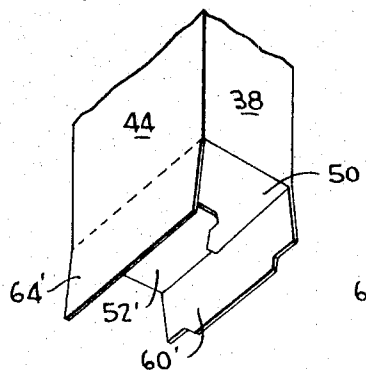


FIG. 13c

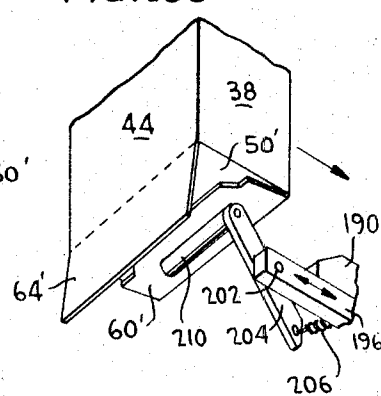


FIG. 13d

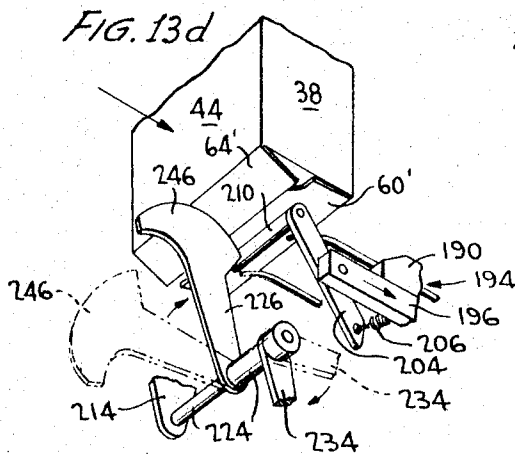


FIG. 13e

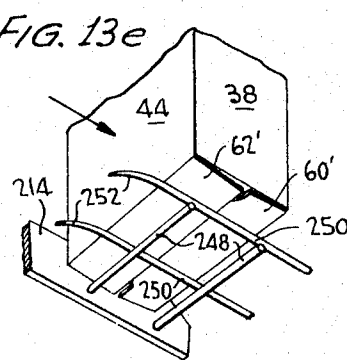
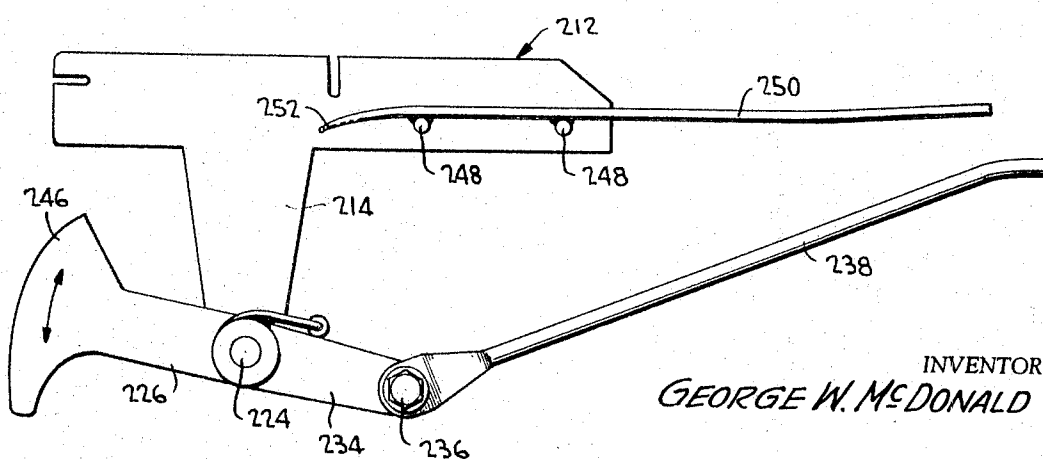


FIG. 14



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CARTON FOLDING AND FILLING MACHINE

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FIG. 15

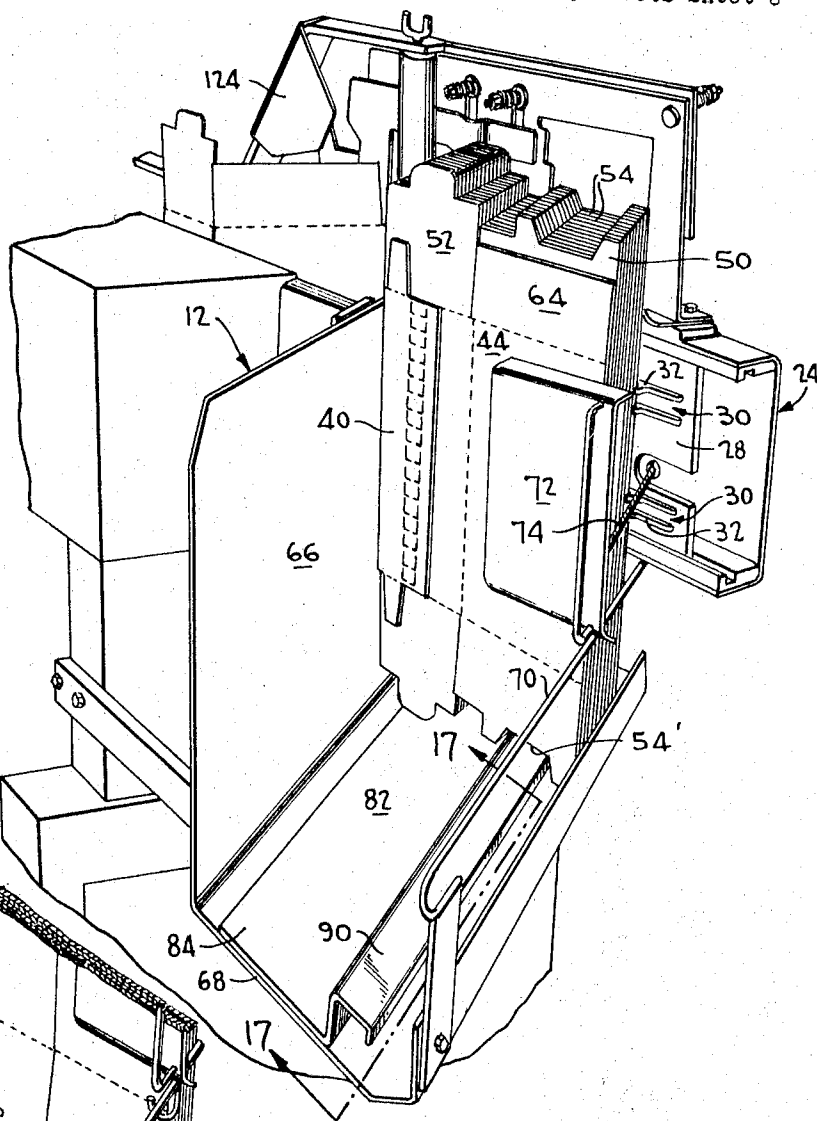


FIG. 16

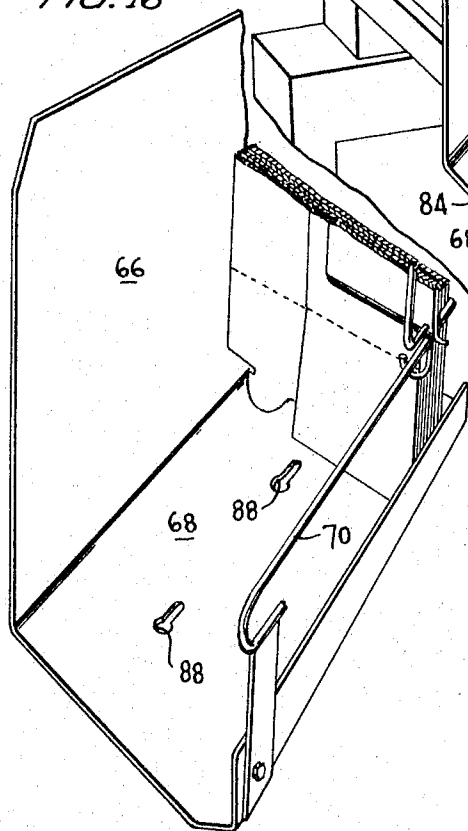
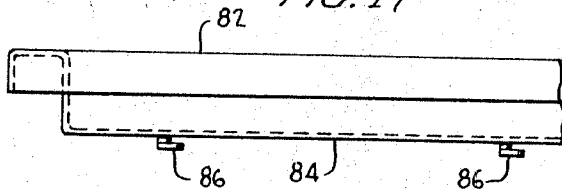


FIG. 17



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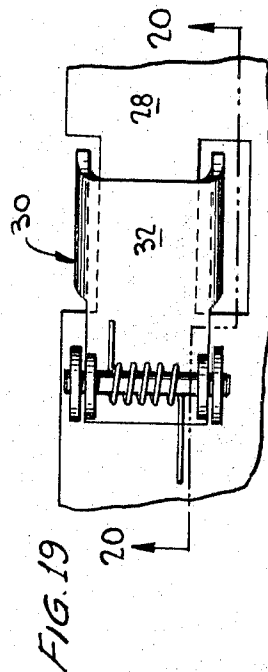
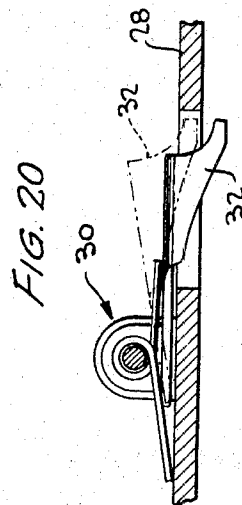
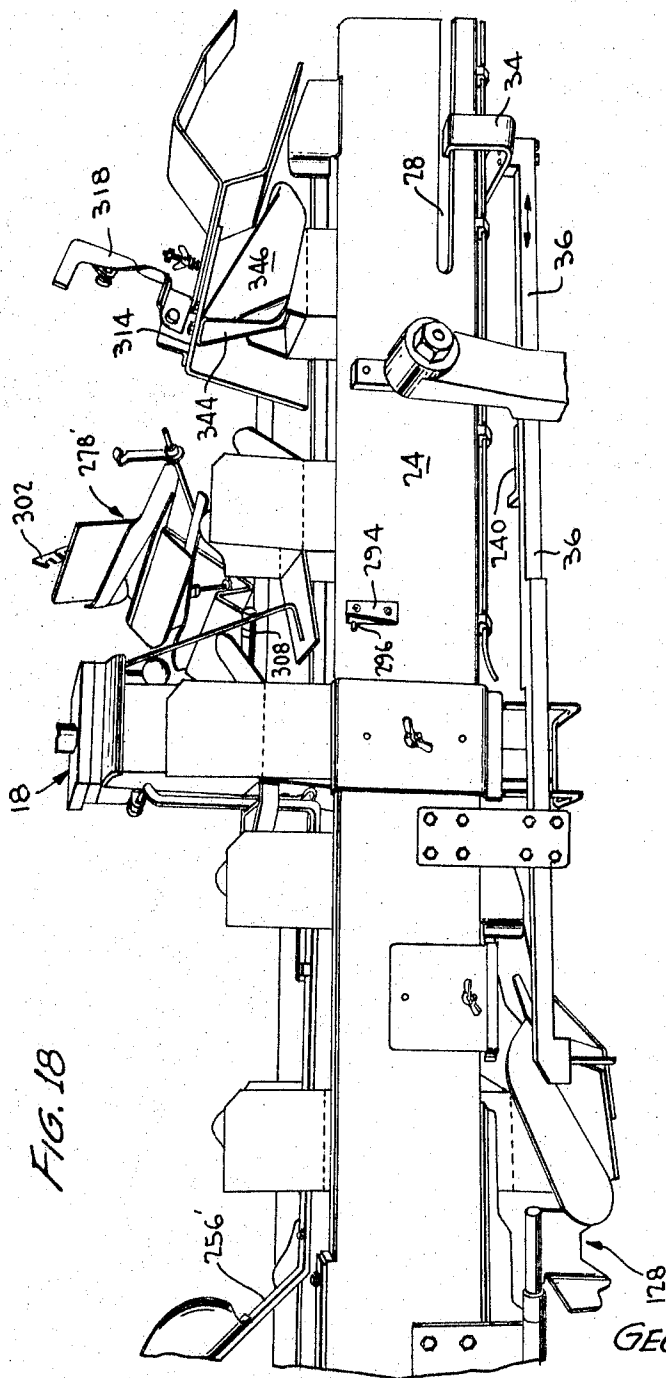
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CARTON FOLDING AND FILLING MACHINE

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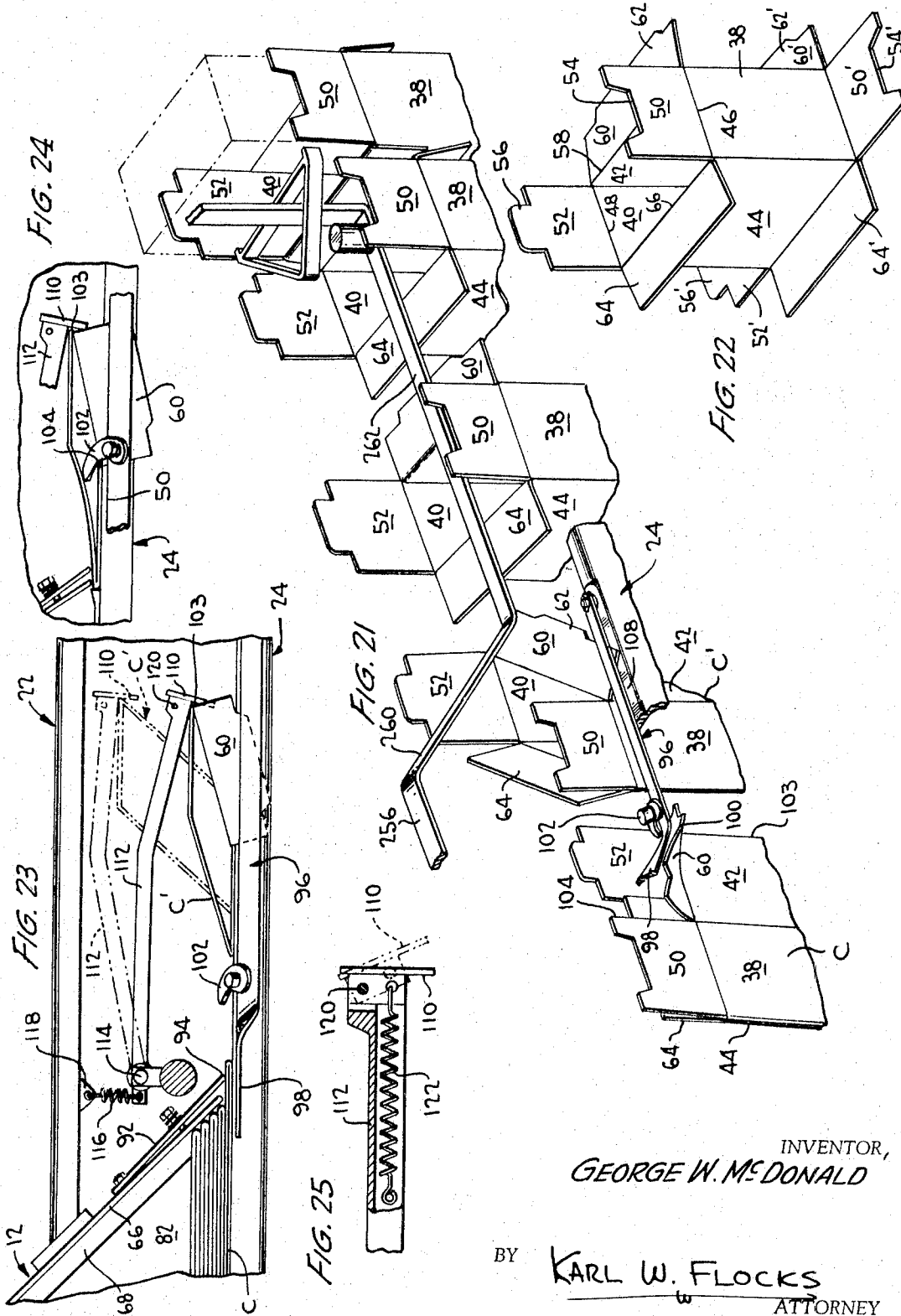
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CARTON FOLDING AND FILLING MACHINE

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10 Sheets-Sheet 10



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3,350,841

CARTON FOLDING AND FILLING MACHINE
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Filed Dec. 13, 1965, Ser. No. 513,450

11 Claims. (Cl. 53—186)

This invention relates generally to automatic folding and filling machines for the purpose of automatically opening or setting up cartons which are initially supplied to the machine in a flat or knock-down condition, folding and orienting the flaps at one end of the carton, filling the carton through the open end with a preferred material, and then folding and orienting the remaining flaps.

Cartons of the general character involved as well as apparatus for performing a similar function are disclosed in detail in United States Letters Patent to Anderson No. 2,612,016, issued Sept. 30, 1952 and United States Letters Patent to Taggart et al. No. 3,114,226, issued Dec. 17, 1963.

The prior art machine generally known to the art is identified as the Model 55, half gallon machine produced by Anderson Brothers Manufacturing Company of Rockford, Illinois.

Machines of the general character mentioned above are relatively expensive and as disclosed in the patent to Anderson, No. 2,612,016, were previously used for the purpose of operating on "lock-end" cartons as shown in FIGS. 24 and 25 of the just mentioned patent. The patent to Taggart et al., No. 3,114,226, discloses apparatus used in conjunction with heat sealing apparatus, and the carton disclosed in FIG. 15 of this patent has end closure flaps which are heat sealed and comprises a "glued-end" carton.

The present application is directed to improvements on the apparatus disclosed in United States Letters Patent to Anderson, No. 2,612,016, and a primary object of the present invention is to provide conversion attachments which facilitate using the apparatus for folding, filling and closing cartons having either "lock-end" or "heat-sealed" end closure flaps.

Another object of the present invention is to provide a means for utilizing the drive mechanism of a conventional carton folding and filling apparatus to permit the closing of the lower closure flaps of a "glued-end" carton in a folding sequence distinctly different from that required for the closure flaps of "lock-end" cartons normally used in the apparatus.

A further object of the present invention is to provide means utilized on a conventional carton folding and filling apparatus to close the upper closure flaps of a carton in a folding sequence distinctly different from that normally accomplished by the apparatus.

And yet another object of the present invention is to provide a supply hopper conversion attachment in a carton folding and filling apparatus which includes means whereby the supply hopper may accommodate a supply of folded flat cartons distinctly different from those for which the supply hopper was originally designed.

A more specific object of the present invention is to provide in a carton folding and filling machine, conversion attachments operated by the normal drive mechanism of the apparatus which foldably orient the lower closure flaps of a carton in a step-by-step movement through the conveyor ways of the apparatus and maintains the closure flaps in a closed unsealed condition while transporting them to a filling station of the apparatus.

These together with other and more specific objects and advantages will become apparent from a consideration of the following description when taken in conjunction with the drawings forming a part thereof, in which:

FIG. 1a is a fragmentary top plan view of the ap-

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paratus after it has been converted to handle "glued-end" closure flaps of a carton;

FIG. 1b is a fragmentary top plan view showing the right hand portion of the apparatus of FIG. 1a from line 1b—1b of FIG. 1a;

FIG. 1c is a vertical section taken substantially on the plan of line 1c—1c of FIG. 1a showing details of the filling station of the apparatus;

FIG. 2a is a side elevation of FIG. 1a from the side indicated at 2a on FIG. 1a;

FIG. 2b is a side elevation of the apparatus and comprising the right hand portion of FIG. 2a from line 2b—2b of FIG. 2a;

FIG. 3 is a fragmentary, enlarged perspective view, with portions broken away, showing details of the structure of 2b;

FIG. 4 is a substantially diagrammatic perspective view showing the elements of the conversion attachment for orienting the side and leading lower closure flaps of a carton, in the order mentioned, and illustrating by phantom lines the alternate position of the component for retaining the leading lower closure flap in a closed condition;

FIG. 5 is a vertical section taken substantially on the plane of line 5—5 of FIG. 4;

FIG. 6 is a view substantially the same as FIG. 5 and showing the manner in which the conversion attachment of the invention is de-activated to permit the apparatus to function with "lock-end" cartons;

FIG. 7 is a fragmentary vertical section taken substantially on the plane of line 7—7 of FIG. 6;

FIG. 8 is an enlarged, fragmentary horizontal plan view taken substantially on the plane of line 8—8 of FIG. 2a;

FIG. 9 is a view similar to FIG. 8 with portions broken away for the purpose of showing structural details;

FIG. 10 is an enlarged fragmentary elevation taken substantially on the plane of line 10—10 of FIG. 4;

FIG. 11 is an enlarged vertical section taken substantially on the plane of line 11—11 of FIG. 2b;

FIG. 12 is a fragmentary horizontal plan view taken substantially on the plane of line 12—12 of FIG. 2b;

FIGS. 13a—13e are fragmentary perspective views, essentially diagrammatic and sequentially showing the manner in which the lower closure flaps are folded into a closing position and retained therein until the carton moves onto a fixed support;

FIG. 14 is an enlarged fragmentary side elevation of a portion of the conversion attachment for folding and orienting the trailing lower closure flap in the manner illustrated in FIG. 13d;

FIG. 15 is an enlarged fragmentary perspective view of the supply-hopper of the apparatus with a conversion attachment installed;

FIG. 16 is a fragmentary perspective view similar to FIG. 15 with the conversion attachment removed;

FIG. 17 is a fragmentary side elevation of the conversion attachment shown in FIG. 15 removed from the supply-hopper of the apparatus;

FIG. 18 is a fragmentary side elevational view of the apparatus with the conversion attachments oriented to an inactive position to permit the apparatus to be used with "lock-end" closure flap cartons;

FIG. 19 is a fragmentary vertical elevation of a portion of one of the pusher plates of the apparatus showing the spring-loaded pusher fingers thereof;

FIG. 20 is a vertical section taken substantially on the plane of line 20—20 of FIG. 19 and showing by means of phantom lines the alternate position of the spring-loaded pusher fingers;

FIG. 21 is a fragmentary, substantially diagrammatic

view illustrating the manner in which the initially folded flat cartons oriented into a tubular condition;

FIG. 22 is a perspective view of the "glue-end" closure flap carton to be folded and filled through the utilization of the conversion attachments of the invention;

FIG. 23 is a fragmentary top plan view of a portion of FIG. 1a and illustrating by means of phantom lines the manner in which the initially folded-flat cartons are bucked into a tubular condition on the apparatus;

FIG. 24 is a fragmentary perspective view illustrating the manner in which the "carton breaker" initiates opening of the folded-flat carton prior to it being formed into a tubular or squared condition; and

FIG. 25 is an enlarged fragmentary plan view of the carton breaker with portions broken away.

Prior to describing the apparatus in detail, the structure which is generally shown in United States Letters Patent to Anderson, No. 2,612,016, will be generally described in this application, however, a detailed description of the conventional structure may be had by referring to the aforementioned patent.

Referring to the drawing in detail and the preferred embodiment of the invention, in FIGS. 1a, 1b the apparatus indicated generally at 10 comprises a suitable support stand or base including a hopper section in which folded-flat cartons are disposed as indicated generally at 12, an unfolding section 14 for unfolding the folded-flat cartons and squaring them into a tubular configuration, a lower closure-flap folding section indicated generally at 16 (see also FIGS. 2a, 2b), carton filling means indicated generally at 18, and upper closure-flap folding section indicated generally at 20. Suitably mounted on the apparatus and extending vertically from the upper surface of the base thereof are mutually parallel way members 22 and 24 which define the longitudinal path of travel of cartons through the apparatus; the way member 24 extends transversely with respect to one end of the hopper section 12 as clearly seen in FIG. 1a.

The way members 22 and 24 (see FIG. 11) have reciprocally supported therein pusher plates 26 and 28, respectively, which extend substantially the length of the way members and which have incorporated thereon inwardly extending, longitudinally spaced pusher lug assemblies indicated generally at 30. Details of the pusher lug assemblies 30 are also seen in FIGS. 19 and 20 and generally include spring-loaded, pusher fingers 32 which are normally biased into the longitudinal path of travel of cartons between the way members 22 and 24 as shown, for example, by solid lines in FIG. 20. During reciprocation of the pusher plates 26 and 28, from the hopper section 12 toward the section 22 for orienting the upper closure flaps of the carton, the fingers 32 are biased outwardly. The fingers 32 move outwardly as indicated by phantom lines in FIG. 20 during reverse movement i.e. movement of the pusher plates, "rearwardly" toward the hopper section 12. The pusher plates 26 and 28 in a sense have a shuttle-like movement, and explicit details and function of the pusher plates may be had by detailed reference to the patent to Anderson No. 2,612,016. The pusher plates engage the folded-flat carton (see FIG. 15 of this application), and tend to move them along the way member 24 through the various folding and filling sections of the apparatus.

The pusher plates 24 and 26 are coordinated in reciprocity movement by means of one or more yokes 34 (see FIG. 11) for example, connected to a reciprocatory, rearwardly extending rod 36 which is reciprocated by any suitable drive means, for example, the type of drive disclosed in detail in the aforementioned Anderson patent.

Referring to FIGS. 15, 16, 21 and 22 prior to describing details of the hopper section 12 unfolding section etc., the "glued-end" carton per se in its folded, flat condition and tubular or squared form will be described. Referring first to FIG. 22, and generally orienting the tubular or

squared carton in relation to its path of movement through the apparatus, the carton includes opposed mutually parallel side walls 38 and 40 hingedly connected and at right angles to mutually parallel wall panels 42 and 44; the wall panel 42 being conveniently described as the forward panel with reference to the movement of the carton through the apparatus. Hingedly connected on suitable fold lines at the upper edges of the wall panels 38-44 is an upper closure flap assembly which preferably will have thereon (not shown) a heat-activated adhesive to provide a glued-end closure flap assembly. The side walls 38 and 40 have hingedly connected at fold lines 46 and 48, respectively, inner closure flaps 50 and 52, respectively, including in this embodiment, a notch portion 54 and tongue portion 56. The inner closure flaps 50 and 52 are disposed in substantially coplanar relationship with the tongue 56 received in the notch 54 prior to manipulation of the outer closure flaps.

Hingedly connected at 58 at the upper edge of the forward wall 42 of the tubular carton is a leading outer closure flap 60 which includes in this embodiment a tab portion 62 which will be received beneath a trailing closure flap 64 hingedly connected at 66 to the trailing wall 44 of the tubular carton.

The walls 38-44 have hingedly connected to the lower margins thereof a lower closure flap assembly comprising inner and outer closure flaps identical with those described above and having a similar folding sequence in cooperating relationship to those at the upper edge of the walls. In order to facilitate identification of the corresponding closure flaps at the upper and lower margins of the tubular carton, the lower closure flaps are identified with the primed reference numerals the same as those used to identify the upper closure flaps. The cartons in their folded-flat condition can be clearly seen in FIGS. 15 and 21, for example, and it will be noted that the walls 38 and 42 are disposed in substantially coplanar relationship and overlying flat relationship to the walls 44 and 40. The leading flap 60 on both the upper and lower closure flap assemblies will be disposed beneath the trailing closure flaps 64, the folded-flat cartons will be placed in the hopper section 12 in the manner illustrated in FIG. 15.

The hopper section 12 has a relatively large L cross section including a vertical plate 66 and a horizontal base plate 68. Suitably mounted on the plate 68 is an upper guide rail 70 having reciprocally disposed thereon a pusher plate 72 connected to a flexible cable 74. The cable 74, as seen in FIG. 2a, is suitably supported over idler pulleys 76 and 78 and is connected at its terminal end to a weight 80 for imposing a biasing pressure on the stack of vertically disposed cartons in the hopper section.

Considering FIG. 16, a lower portion of a plurality of conventional folded-flat "lock-end" cartons are shown, and it will be noted that the glued-end cartons shown in FIG. 15 have a distinct closure flap profile as compared with that of the cartons in the hopper section of FIG. 16. In order to more satisfactorily accommodate the glued-end cartons in the hopper section, an insert plate 82 is removably mounted on the horizontal leg 68 of the hopper section. The insert plate 82 includes a flat base section 84 having projecting downwardly therefrom male key elements 86 removably received in transverse key hole slots 88 formed in leg 68 of the hopper section. The base plate 84 has extending vertically therefrom the channel portion 90 receiving thereon the notch portion 54' of the lower closure flaps 50.

As clearly apparent from FIG. 15, the pusher fingers 32 of the pusher plate 28 will engage the folded-flat carton forwardmost in the hopper section and move it forwardly through the longitudinal path of travel defined between the way members 22 and 24 of the apparatus. The pressure plate 72 engages the rearmost folded-flat carton in the hopper section.

The vertical leg 66 of the hopper section 12 (see FIG. 23) incorporates on the inner edge thereof an adjustable pressure plate 92 which is spring biased toward the way member 24 and which has an edge portion 94 urging the innermost carton C toward the way member 24 which extends transversely of the innermost end of the hopper section 12.

Indicated generally at 96 (see FIGS. 1a, 23-25) is an attachment for pre-breaking or initiating unfolding of the folded-flat cartons C. The attachment 96 is removably secured to the upper portion of the way member 24 in any suitable manner, and includes a guide plate portion 98 engageable with the leading outer closure flap 60 (see FIG. 21) which is engageable beneath the twisted portion 100 of the attachment 96 for disposing the leading outer closure flap 60 into a substantially horizontally disposed condition as indicated diagrammatically in FIG. 21 on the carton C'. Fixed to the attachment 96 downstream or substantially adjacent to the twisted portion 100 is a spring biased breaker element or a finger 102 which engages the leading edge of the carton flap 50 as it is moved forwardly adjacent the inner portion of the way member 24 to initiate movement of the panels toward the condition shown in FIG. 23, for example. The breaker-finger 102 engages the leading edge 104 of the closure flap 50 (see FIG. 24) and in a sense restrains its movement to initiate the prebreaking. As the carton C' moves longitudinally downstream along the longitudinal path of travel defined between the way members 22 and 24, the leading closure flap 60 will substantially support the carton by being disposed in a longitudinally extending groove 108 formed between the way member 24 and the attachment 96. As the carton C' is being moved forwardly, and the finger 102 initiates partial opening or breaking of the carton, the edge 103 of the tubular partially unfolded carton body will be engaged by an abutment lip 110 of a squaring arm 112. The arm 112 is pivotally mounted on a vertical pivot shaft 114 and includes a rear lever portion providing an anchor for one end of a biasing spring 116 which is anchored to an apertured mounting portion 118 on the way member 22. The abutment lip 110 is pivotally mounted at 120 on the arm 112 and is spring biased by a spring 122 into laterally projecting relation (see FIG. 25).

As the carton C' is moved from the hopper through the way members, and after it is pre-broken by finger 102, the leading edge 103 of the carton engages the abutment lip 110. Continued downstream movement of the carton C' results in the carton being formed into a rectangular tube; see C' shown in phantom lines in FIG. 23 as well as FIG. 21, and the arm 112 will pivot about the shaft 114 i.e. resisting movement of the blank C' to cause the blank to unfold. Continued pressure exerted on the carton C' by the pusher plates 26 and 28 and the finger 32 thereon results in the rectangular tubes being moved past lip 110 which will be pivoted at 120 against the tension of spring 122. The attachment 96 includes a suitably mounted depending, stationary parting sword or plow-type blade 124 which will be disposed in the path of travel of the carton being formed into a rectangular tube. The blade 124 functions to separate inner closure flaps 50 and 52 as the flaps are moved through the apparatus and the carton is being unfolded in the manner mentioned above (see FIGS. 1a, 2a and 15, for example). Additionally, a substantially horizontally disposed orienting blade 126 extends horizontally over the path of travel of the cartons and is effective to engage the trailing outer closure flap 64 and disposes it in a trailing, substantially horizontal position.

CLOSING OF BOTTOM CLOSURE FLAPS

Located at the position in the path of travel where the carton is opened into a rectangular tube, is the lower closure-flap folding section 16 comprising a lower inner flap folding portion indicated generally at 128

(see FIGS. 2a, 4 and 5). The folding portion 128 comprises a pair of opposed support plates 130 and 132 respectively mounted and depending from the way members 22 and 24. The support plates include lower horizontally disposed bearing sleeves 134 and 136 in which are journaled support shafts 138 and 140. The shafts have fixed thereto at the forward end thereof and extending radially from the axis of rotation of the shafts, suitably conformed, folding plates 142 and 144, respectively. The plates are normally disposed in vertically depending relationship as seen in FIG. 4, for example.

Fixed to the rear end of the shafts 138 and 140 are laterally projecting levers 146 and 148 which are pivotally connected at 150 and 152, respectively, to upper ends of adjustable force transmitting rods 154 and 156. Since the length of the rods 154 and 156 can be adjusted, this expedient will be utilized to control the timed pivotal relationship between folding plates 142 and 144, i.e. to insure that inner closure flaps 52', 54' are properly inter-engaged.

The inner flap folding portion 128 of lower closure flap assembly 16 includes a mounting plate 157 and a suitably journaled support shaft 158 which has fixedly secured in spaced relation thereon radially projecting levers 160 and 162 which are respectively pivotally connected at 164 and 166 to the upper ends of rods 154 and 156, respectively.

Fixed to the shaft 158 at one side of the longitudinal path of travel of cartons through the apparatus is an operating lever 168. The plate 157 includes an upper support portion 170 upon which a stub shaft 172 of a bell-crank lever 174 is journaled. The shaft 172 includes a pin 175 to which one end of a tension spring 169 is anchored, the other end being anchored to lever 160. The bell-crank lever includes one leg portion 176 pivotally connected at 178 to a connecting lever 180 detachably connectable at 182 (see FIGS. 4 and 5) to operating lever 168. The connecting lever 180 when disconnected as seen in phantom lines in FIG. 5, permits the apparatus to be altered to set up "lock-end" type cartons.

The upper leg 184 of the lever 174 is disposed in the path of travel of an abutment roller 186 journaled on a support portion 188 fixed to the pusher plate 26 (see FIGS. 4-7).

As the way members 24 and 26 are reciprocated, the roller 186 will engage the leg 184 of lever 174. When the parts are connected as seen in FIG. 4, upon engagement of the roller 186 with the lever leg 184, shaft 158 will be rotated clockwise as indicated by the direction arrows applied to FIG. 4, rods 154 and 156 will move downwardly and folding plates 142 and 144 will move inwardly toward each other in timed relation i.e. in the direction shown by the direction arrows on FIG. 4, whereby the lower inner flaps 50', 52' will be folded into overlapped relation as seen in FIG. 13b.

The reciprocable rod 36 includes an internally threaded terminal mounting portion 190 having detachably mounted by means of a screw 192 an attachment indicated generally at 194 which functions to fold the leading outer closure flap 60' (see FIGS. 4, 10 and 13c, for example). The attachment 194 comprises a mounting bar 196 through which the screw 192 extends, and an alignment pin 198 is received in a recess 200 of the mounting portion 190 (see FIG. 10). Pivotally mounted at 202 is a lever 204 which is spring biased rearwardly (see FIG. 4), by a tension spring 206. The bar 196 includes a laterally extending stop pin 208 disposed in the path of travel of a lower portion of the lever 204 (see FIG. 10). The lever 204 has journaled thereon in laterally extending relationship an elongated roller element 210.

The roller 210 is normally disposed in the rearwardly urged position shown in FIG. 4, for example and is reciprocated with the bar 36. After the inner sealing flaps 50', 52' are disposed in the condition shown in FIG. 13b, the roller 210 will engage the leading outer sealing flap

60' which is disposed in depending relationship as shown in FIG. 13b, and move it in overlying relationship with respect to the inner sealing flaps 50', 52' as seen in FIG. 13c. This, it will be observed, occurs when the pusher plates 26, 28 are moving rearwardly. During the forward movement of the pusher plates 26 and 28, the carton will be moving forwardly along the longitudinal path of travel between the way members 22 and 24, and at the same time the roller 210 will remain beneath the leading outer sealing flap 60' as illustrated in FIG. 13d.

Referring to FIGS. 2a, 2b, 8, 9, 12, 13d and 14, an attachment indicated generally at 212 is utilized to fold the trailing outer sealing flap 64' in the manner illustrated in FIG. 13d. The attachment 212 comprises a mounting plate 214 detachably mounted at 216 on a suitable mounting portion 218 on the way member 22. The plate 214 has fixed thereto lateral or transverse support shaft 220 which has journaled on a reduced diameter portion 222 thereof (see FIG. 9) a sleeve 224 of a folding lever 226. The shaft 220 has circumsposed thereabout a torsion spring 228 which is anchored on the shaft at 230 and which abuttingly engages the folding lever 226 at 232. The torsion spring 228 normally biases the lever 226 downwardly. The sleeve 224 includes a radially projecting portion 234 which is pivotally connected at 236 to a force transmitting rod 238. As seen in FIGS. 3, 2b and 12, for example, the operating rod 36 has mounted on the inner surface thereof an angle element 240 which has a transversely apertured leg 242 through which the force transmitting rod 238 extends. Adjustably secured in circumsposed relationship about the rod 238 is an abutment element 244 which is engaged by the apertured leg 242 to the rod 36 as the rod or bar 36 is reciprocated. The lever 226 includes an enlarged, arcuate camming portion 246 which will be disposed centrally of the path of travel of the cartons, and as the bar 36 is reciprocated, and after the leading outer sealing flap 60' is folded into horizontal relationship, through the adjusted position of the abutment 244, the lever 226 will be pivoted from the phantom line position shown in FIG. 13d to the solid line position, resulting in the trailing outer sealing flap 64' being folded into overlying relationship with respect to the inner sealing flaps and the portion 62' of the leading outer sealing flap 60'.

Briefly in review with respect to closing the bottom closure flaps in sequence, after the carton is formed into a rectangular tube, the inner closure flaps 50', 52' are disposed in overlying relation as seen in FIG. 13b through the operation of folding plates 142 and 144 which are operated by the camming wheel or roller 186 engaging the lever leg 184. The carton which has previously been formed into a rectangular tube, and during the positions shown in FIGS. 13a-13c, the carton is not being moved forwardly i.e. the pusher plates 26 and 28 are accomplishing a rearwardly or returned stroke. During this return stroke, the bar 36 through the attachment 194 and lever 204 which has roller 210 mounted thereon, accomplishes the function of folding the leading lower closure flap 60' into horizontal relationship as seen in FIG. 13c. During the terminal portion of the reciprocation of the bar 36, the lever 226 is pivoted to the solid line position shown in FIG. 13d, resulting in the trailing closure flap 64' being folded in overlying relationship to the inner closure flaps and the leading closure flap.

After the closure flaps have been folded into the condition shown in FIG. 13d, the attachment 194 will move together with the carton forwardly through the longitudinal path of travel of the carton between the way members.

The plate 214 has fixedly secured thereto forwardly of the portion to which the shaft 224 is secured (see FIGS. 2a, 13e and 14) laterally projecting support rods 248 which have secured thereon longitudinally extending support bars 250 having downwardly angled rearwardly extending ends 252. The forward ends of the longitudi-

nally disposed support rods (see FIG. 2a) check through suitably apertured supports depending from the way members 22 and 24 as indicated at 254. After the lower closure flaps have been finally folded as illustrated in FIG. 13d, the forwardly moving carton is moved onto the rods 250 and the pusher members 226, 228 toward the carton filling means 18 which includes an elevator or carton lifter.

FILLING THE CARTON

Referring to FIG. 21, the previously mentioned blades 124 and 126 will orient the leading and trailing upper outer closure flaps 60 and 64, respectively, to the positions shown in the central portion of FIG. 21. The blades 124 and 126 are fixedly connected to a support bar 256 detachably mounted at its rear end by a manually removable screw 258. The bar 256 includes a downwardly inclined portion 260 upon which the blade 124 is mounted and includes a horizontal guide or hold down portion 262 which will retain the flaps 60, 64 substantially horizontal as seen in FIG. 21.

It will be recalled, that the bottom closure flap assembly will have previously been folded into closing relationship, as previously described in detail, and the carton with the bottom closure flaps folded into closed relationship and the upper closure flaps disposed in the condition shown in FIG. 21 will now move beneath the carton filling means 18 as shown diagrammatically in FIG. 21, and as more clearly seen in FIGS. 1a and 1c.

Specific details of the filling means 18 will not be described inasmuch as this is a conventional portion of the apparatus, described for example, in United States Letters Patent to Taggart et al. No. 3,114,226. Briefly, as the upwardly opening carton nears the area under a nozzle or filling head 264 a flap weight 266 retains the leading and trailing outer closure flaps of a horizontal position. When the carton is under a nozzle head 264, it is raised by a carton lifter 268. The carton when arriving over the elevator 268, is raised in the conventional manner, and as it is being raised ice cream or a similar fluent material I is being deposited into the carton. A suitable control switch 270 includes a switch operator 272 having a portion engageable with the fold 58 of the leading outer closure flap 62 and when the operator 272 engages the fold, dispensing of the fluent material is stopped. The then filled carton descends due to the weight of the material therein, and will once more settle onto the guide rods 250.

Considering FIGS. 2a, 2b and 11, the way members 22 and 24 have secured therebeneath by means of mounting of elements 274 (see FIG. 11) a plurality of longitudinally extending support rods 276 which extends beneath the longitudinal path of travel of the now filled cartons.

CLOSING THE UPPER CLOSURE FLAPS

Referring to FIG. 3, it will be recalled that while the carton is being filled the leading outer closure flap 60 and trailing outer closure flap 64 will be in a horizontally disposed position while the inner closure flaps 50 and 52 will extend vertically. A displaceable flap folding attachment is indicated generally at 278 and comprises fixed, forwardly projecting folding blades 280 and 282 and a center blade 284, the blades 280 and 282 being effective to engage vertically extending inner closure flaps 50 and 52, respectively, and disposed the same in overlying horizontal relationship, while the center blade 284 retains the leading and trailing flaps 60 and 64, respectively in a horizontally disposed condition.

As the cartons are being moved forwardly as seen in FIG. 3, the trailing flap 64 is prevented from being folded before the leading folding flap 60. This function is accomplished through the medium of an abutment rod 286 pivotally mounted at 288 on the attachment 278, and including a depending abutment finger 290 at the forward

end. The finger 290 includes a terminal portion 292 which will be engaged by the upper edge of the trailing flap 64.

The way member 24 has mounted thereon a bracket 294 having a laterally projecting latch pin 296. Pivotaly mounted on the side of the attachment 278 is a support bracket 298 having pivotally mounted at 300 a latch bar 302 which is spring urged inwardly at its lower end by means of a suitably anchored tension spring 304. The latch bar 302 includes a lower inwardly directed notch portion 306 engageable over the pin 296 for retaining the attachment 278 in the position shown in FIG. 3. The housing or attachment 278 is hinged at 308 (see FIG. 18) and the latch bar 302 is disengaged in the manner shown in FIG. 18 when lock-end type cartons are being filled on the apparatus.

Indicated generally at 310 is an attachment for sequentially folding the leading and trailing outer closure flaps 60 and 64, respectively, to overlying relationship. The attachment 310 includes a support plate 312 suitably supported on the way member 22, for example, and having a laterally extending upper support plate portion 314 overlying the path of travel of the cartons between the way members. Pivotaly mounted on the support plate 314 as indicated at 316 is an abutment element 318 including a depending support portion 320 having a hold down shoe 322 fixed to the lower end thereof. Pivotaly mounted on a lateral support shaft 324 on the support portion 320 is a spring urged abutment or camming finger 326.

As the carton is moved forwardly through the way members the leading outer closure flap 60 will be oriented or folded into overlying relationship with respect to the inner closure flap. The abutment finger 292 restrains early folding of the trailing outer closure flap 64, and this flap is engaged by a folding blade or sword 328. The folding blade or sword 328 is removably secured at 330 to the inner surface of the way member 22. After the trailing closure flap 64 is folded into overlying relationship on the closure flap 60, the carton moves beneath a pressing shoe or foot 332 removably mounted at 334 on the upper surface of the plate 314.

Although not shown, the now closed upper and closure flap assemblies, which will have a heat-activated adhesive applied thereto will be sealed in any suitable manner; for example in the manner illustrated in detail in the patent to Taggart et al. No. 3,114,266.

The folding sequence of a lock-end carton as disclosed in United States Letters Patent to Anderson No. 2,612,016 (see FIGS. 24 and 25) for example is in a sense reversed with respect to heat-sealed carton i.e. the so-called inner closure flaps 50', 52' and 50, 52 at the respective lower and upper portions of the carton will be those which are last folded into overlying and locked engagement. In order to utilize the previously described equipment for "lock-end" cartons, the following procedures are effected:

The guide bar 256 is removed by means of the screw 258 and this attachment is inverted as partially seen in FIG. 18 and as indicated at 256'. The "lock-end" carton is formed into a rectangular tube as previously described in detail. The link 180 is detached as shown in phantom lines in FIG. 5 inasmuch as the folding plates 142 and 144 will be deactivated. The attachment 212 is removed, as well as the attachment 194. The attachment 278 is released by means of the latch lever 302 and the attachment 278 is pivoted to the side as indicated at 278' in FIG. 18.

Referring to FIGS. 14-17, the insert 82 is removed from the carton hopper. Additionally, the way members 22 and 24 have fixedly connected thereto support shafts 334 upon which are mounted inwardly projecting locking plates 336 (only one being shown) see FIG. 7, which are retained on the shaft by means of a lock screw 338. The folding plates 142 and 144 will be disposed in a dormant position, and the pusher plates 26 and 28 will have a

slot permitting the pusher plates to reciprocate relative to the shaft 334. The pusher plates (see FIGS. 5 and 6) for example, incorporate an operating cam 340 engageable with an abutment element 342 for locking the closure flaps of the "lock-end" cartons. Finally, the abutment lever will have been pivoted upwardly as indicated at 318', folding blades forming locking blades 344 and 346 will be mounted on the under surface of the support plate 314 for effecting final lock up of the "lock-end" closure assembly. The blades or folding plates 344 and 346 are shown by means of phantom lines in FIGS. 3 and 11.

Briefly there has been disclosed apparatus which will effectively handle and effect packaging of both "heat-sealed" packages as well as those incorporating a "lock-end" closure flap type assembly. The hopper is convertible for both types of cartons, the various attachments may be readily mounted and dismounted and afford an unusual versatility in a relatively expensive piece of equipment.

It will be obvious to those skilled in the art that various changes will be made without departing from the scope of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. In a packaging apparatus for automatically setting up, filling and closing the flaps of a carton supplied initially flat and having four side wall panels and an upper and lower pair of inner and outer closure flaps hinged at the end of each side wall, said apparatus comprising way members supported on a base and defining a longitudinal path of travel having an upstream inlet portion and a downstream outlet portion, a pusher plate reciprocally supported on each of said way members, said pusher plates including portions spaced longitudinally therealong and projecting into said longitudinal path of travel for engaging and moving cartons step-by-step through said longitudinal path of travel as said pusher plates are reciprocated, hopper means on said base for supporting vertically disposed, folded-flat cartons on edge and feeding them one-by-one into said inlet, means on said way members for engaging a folded-flat carton and orienting the side walls as a rectangular tube between said way members, lower flap-folding means on said way members below said longitudinal path of travel and operatively connected to said pusher plates for closing the lower flaps in sequence at the lower edges of said lower carton side wall panels, and closing the bottom of said tube, carton filling means downstream of said lower flap-folding means for filling said carton with a predetermined amount of material to be packaged, and upper flap-folding means downstream of said carton filling means and above said longitudinal path of travel for closing the upper carton flaps in sequence; the improvement wherein said lower flap-folding means comprises lower inner closure flap-folding members displaceably mounted on said way members at opposite sides of said longitudinal path of travel for folding the lower inner closure flaps into overlying relationship, first outer closure flap-folding means reciprocally supported beneath said longitudinal path of travel for engaging the leading, lower outer closure flap and folding it over the lower inner closure flaps and traveling downstream with said carton and retaining said inner closure flaps and leading outer closure flap in folded relationship, and second outer closure flap-folding means pivotally supported beneath said longitudinal path of travel for engaging the trailing outer closure flap and folding the same in overlying relationship with respect to said previously folded inner closure flaps.

2. In a packaging apparatus as claimed in claim 1 wherein said lower flap-folding means comprises a pair of folding plates pivotally mounted on longitudinal axes

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of rotation, force transmitting means operatively connected to said folding plates for pivoting said folding plates inwardly toward each other in relation to movement of said pusher plates.

3. In a packaging apparatus as claimed in claim 2 in which said force transmitting means comprises a pivotally mounted lever including a leg portion extending vertically from the pivotal axis thereof, and an abutment member connected to one of said pusher plates and movable therewith for engaging said vertical leg and operating said force transmitting linkage.

4. In a packaging apparatus as claimed in claim 3 in which said force transmitting linkage includes a detachable link for de-activating said folding-plates to permit said packaging apparatus to be converted for setting up, filling and closing the folded-flat carton having a closure flat folding sequence differing from that with which the folding-plates are normally used.

5. In a packaging apparatus as claimed in claim 1 in which said first outer flap-folding means comprises a force transmitting bar operatively connected to said pusher plate, an abutment member projecting vertically above said bar and extending transversely beneath said longitudinal path of travel.

6. In a packaging apparatus as claimed in claim 5 in which the said abutment member comprises a vertically extending support lever intermediately pivoted and spring biased rearwardly, and a mounting member detachably connected to said force transmitting bar for removal therefrom when said apparatus is converted.

7. In a packaging apparatus as claimed in claim 4 in which said second outer closure flap-folding means comprises a pivotal force transmitting rod disposed adjacent to said force transmitting bar, said force transmitting bar including an apertured leg reciprocally receiving said force transmitting rod therethrough, said force transmitting rod including an adjustable abutment element thereon for engagement by said apertured leg for movement

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of said force transmitting rod during a predetermined increment of travel of said force transmitting bar.

8. In a packaging apparatus as claimed in claim 6 in which said second outer closure flap-folding means is detachably mounted on said way members for removal therefrom when said apparatus is converted.

9. In a packaging apparatus as claimed in claim 7 in which said second outer closure flap-folding means includes longitudinally disposed support element extending beneath the longitudinal path of travel between said second outer closure flap-folding means and said carton filling means for receiving the oriented lower closure flaps thereon as they are moved downstream through said longitudinal path of travel.

10. In a packaging apparatus as claimed in claim 1 in which said hopper means comprises a horizontal support plate for receiving the lower edges of the folded-flat cartons therein, and an insert plate removably supported on said base plate and including an elongated vertically disposed channel portion for engaging a substantially conforming portion on the outer closure flaps of said folded-flat cartons.

11. In a packaging apparatus as claimed in claim 1 in which said upper flap-folding means comprises a first attachment displaceably mounted on said way members and including longitudinally extending folding blades for engaging the upper inner closure flaps and orienting the same in overlying relationship, and second attachment including folding members sequentially engageable with the leading and trailing outer closure flaps for folding the same in overlying relationship with respect to said upper inner closure flaps, and means for retaining the upper inner and outer closure flaps in overlying folded relationship.

No references cited.

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