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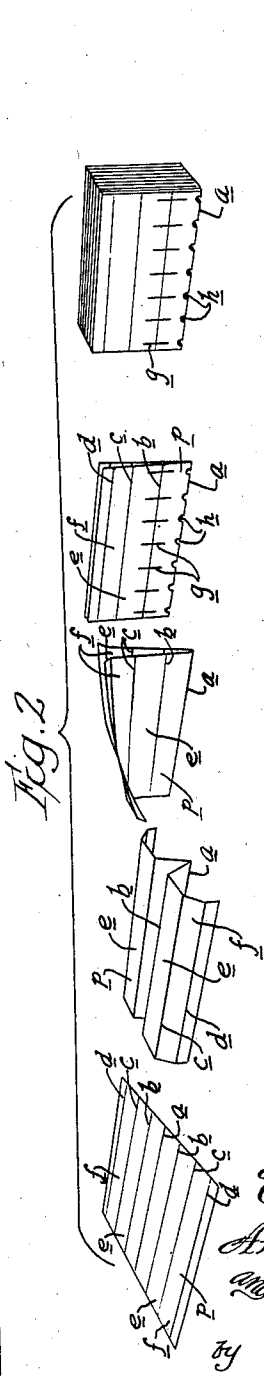
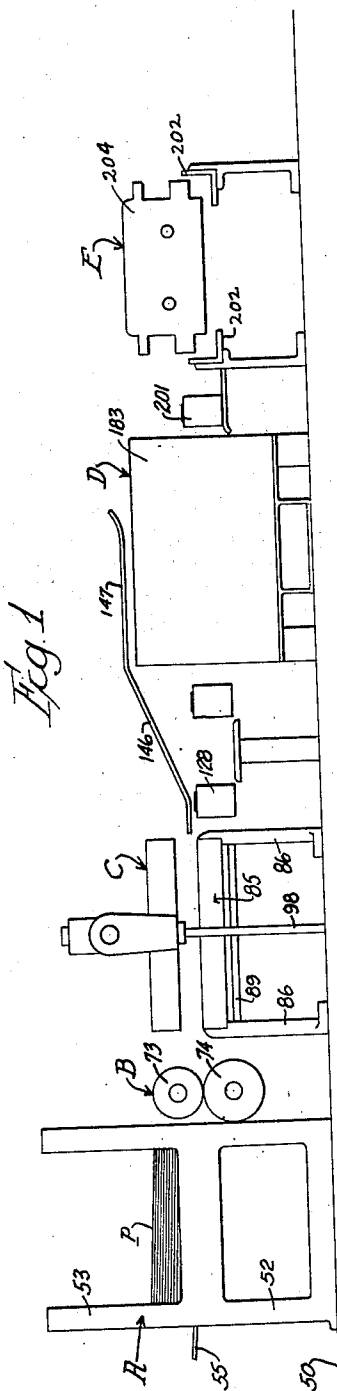
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

Filed March 1, 1933

17 Sheets-Sheet 1



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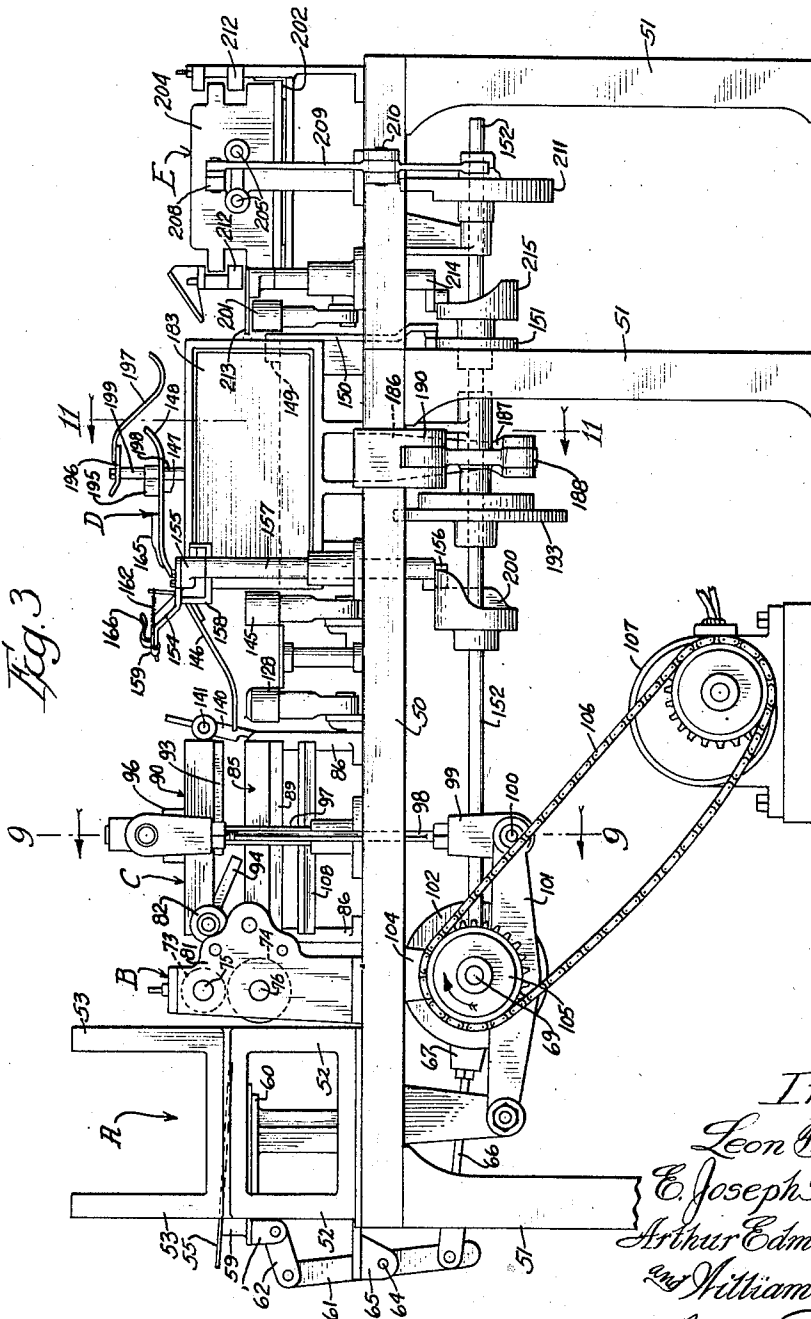
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 2



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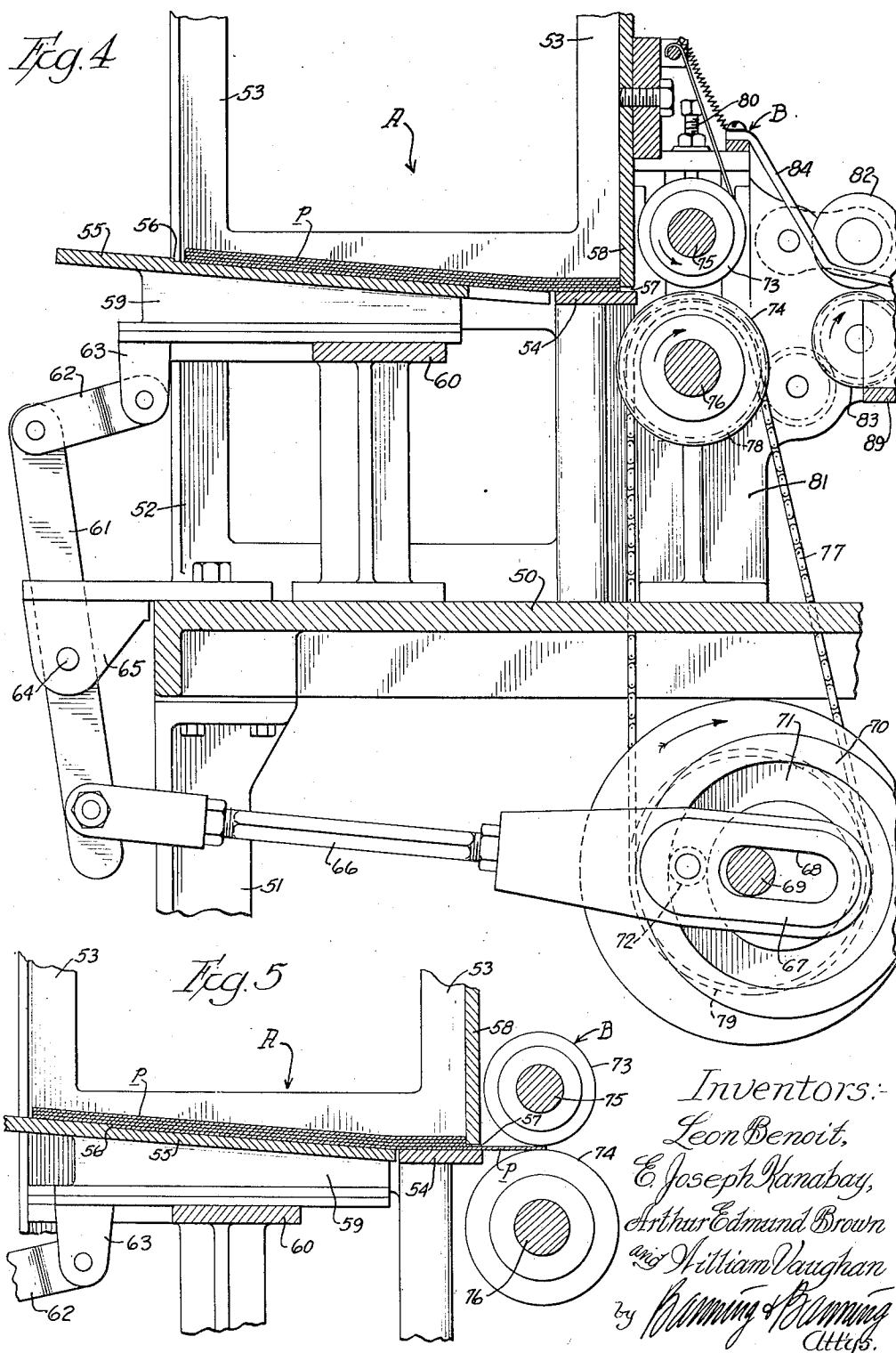
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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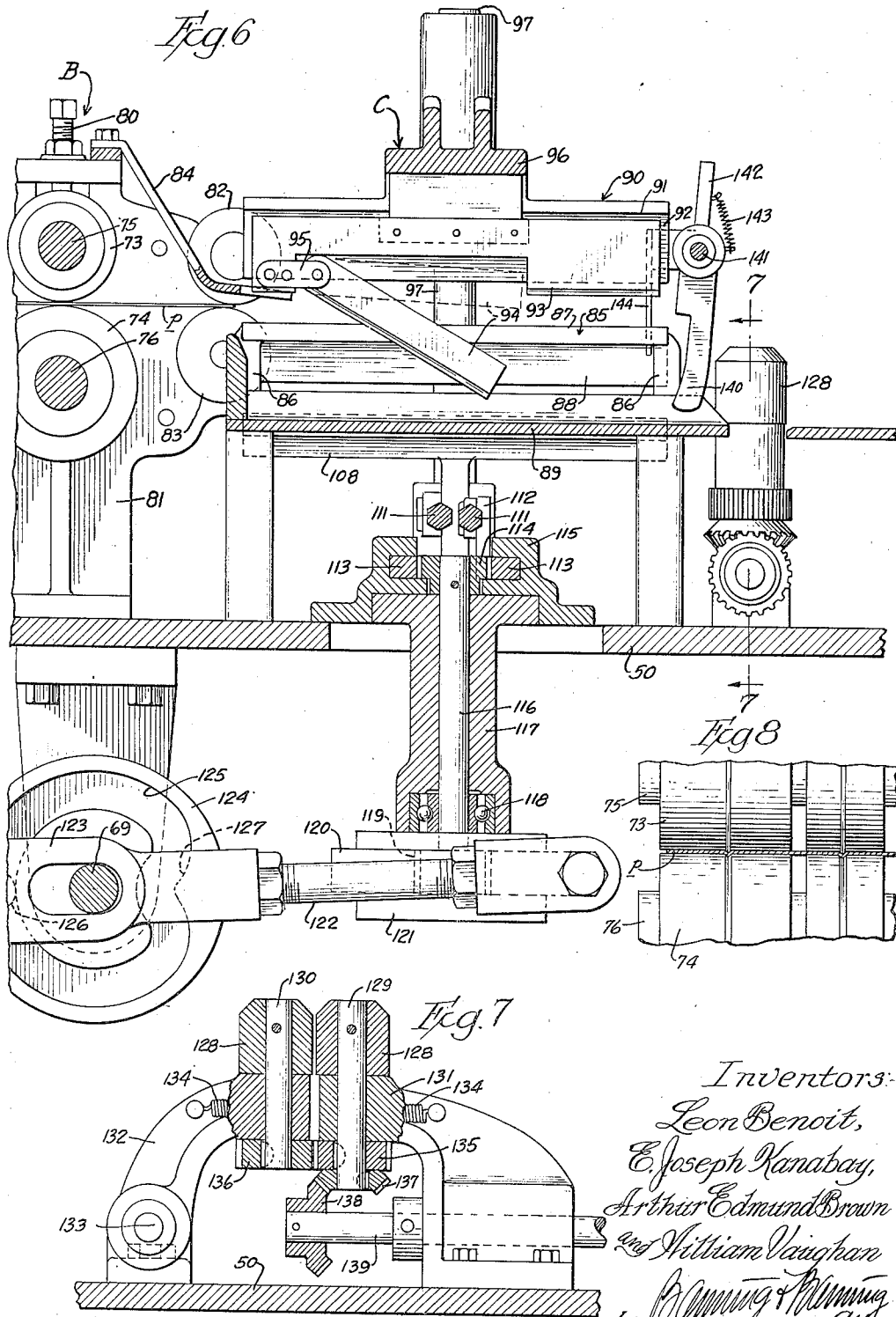
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 4



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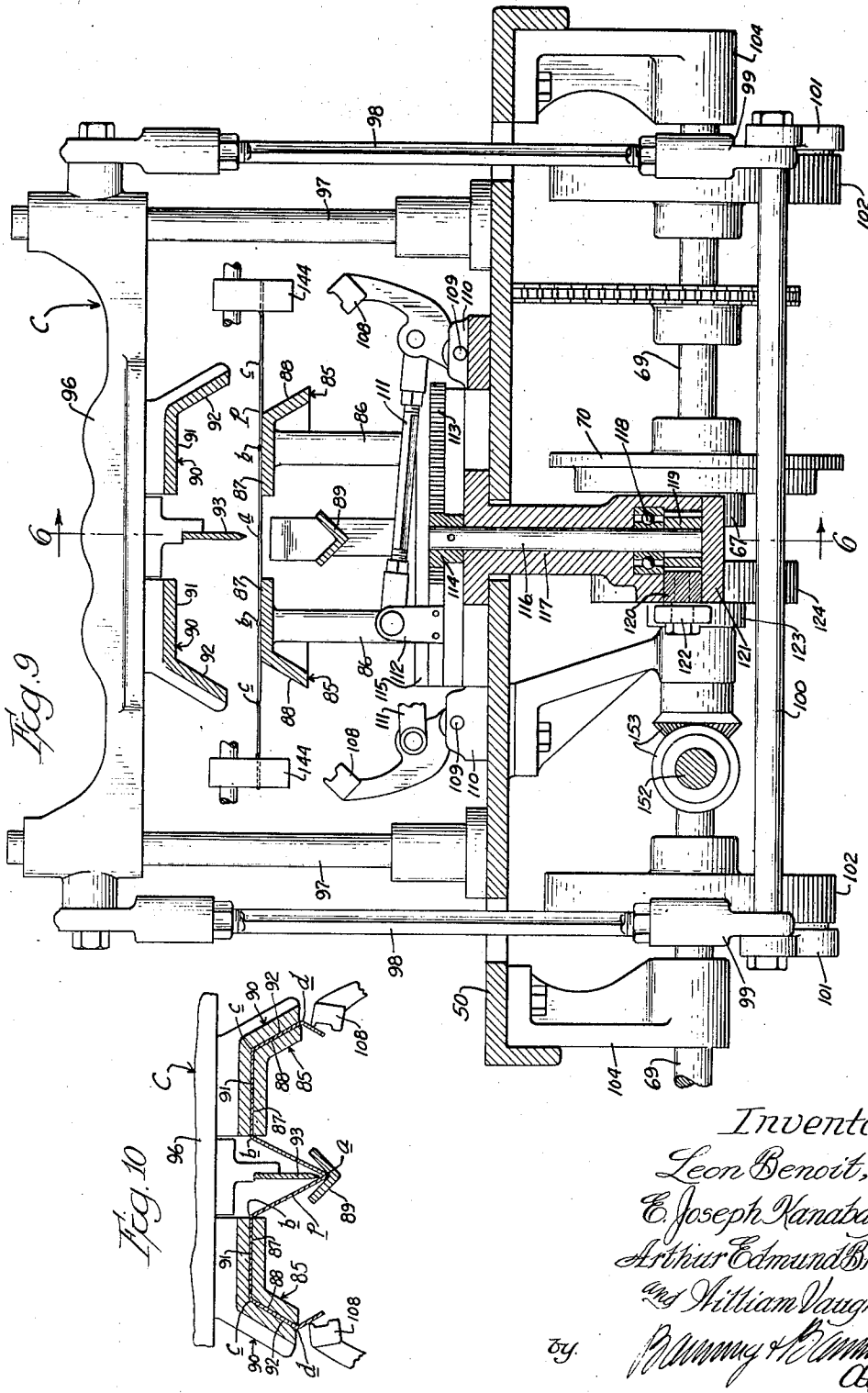
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 5



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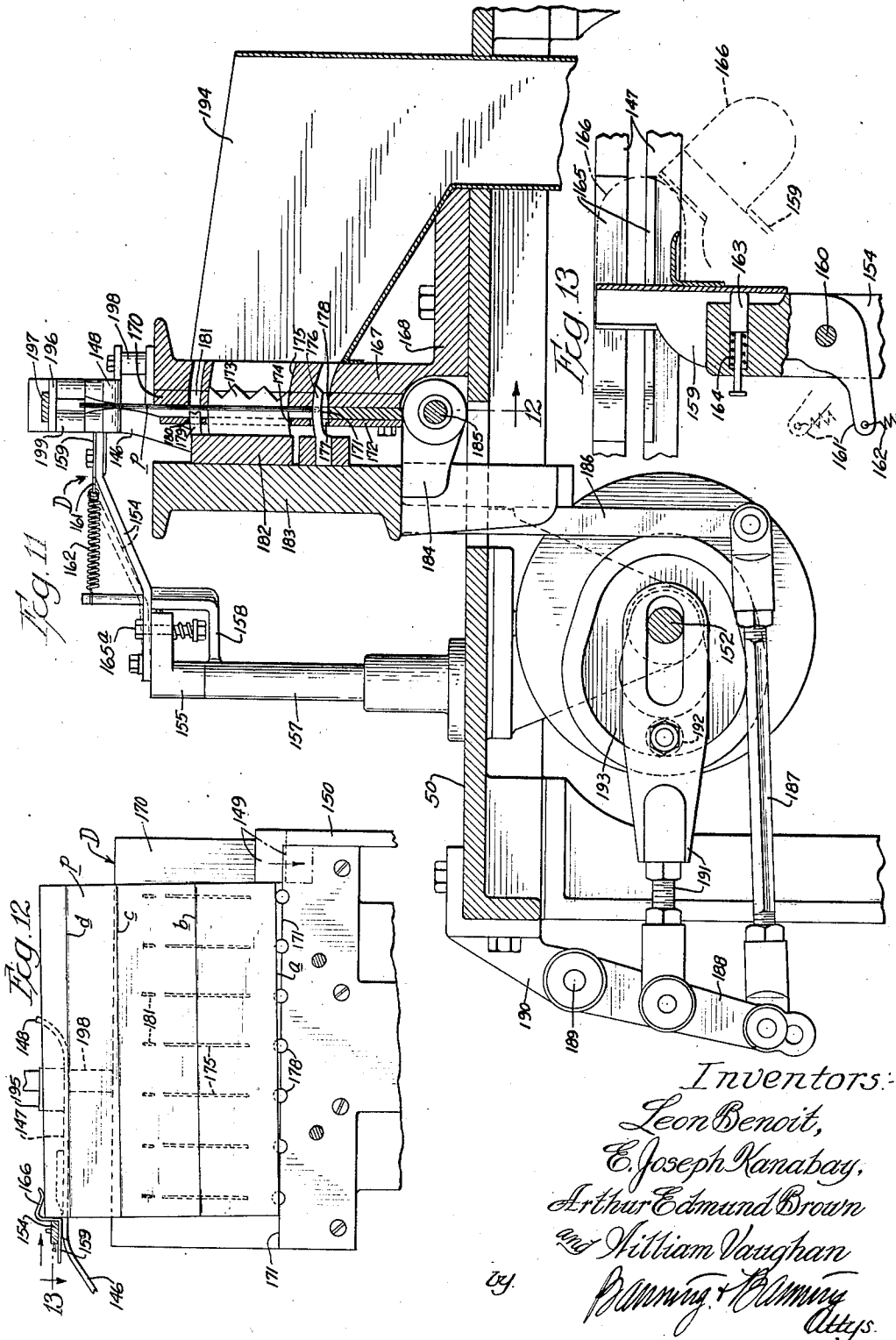
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 6



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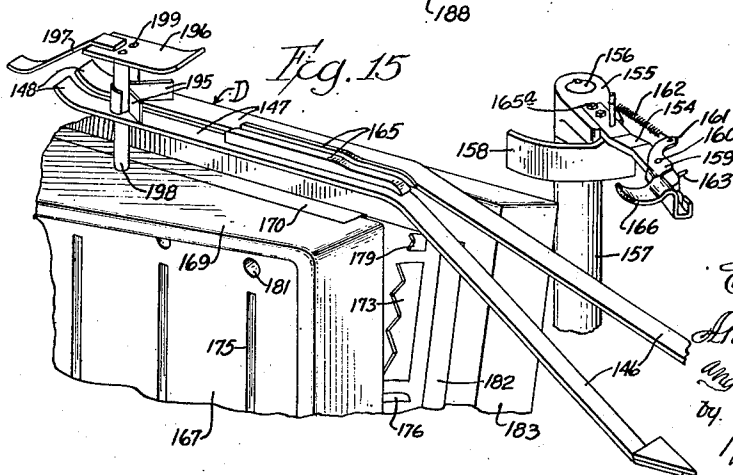
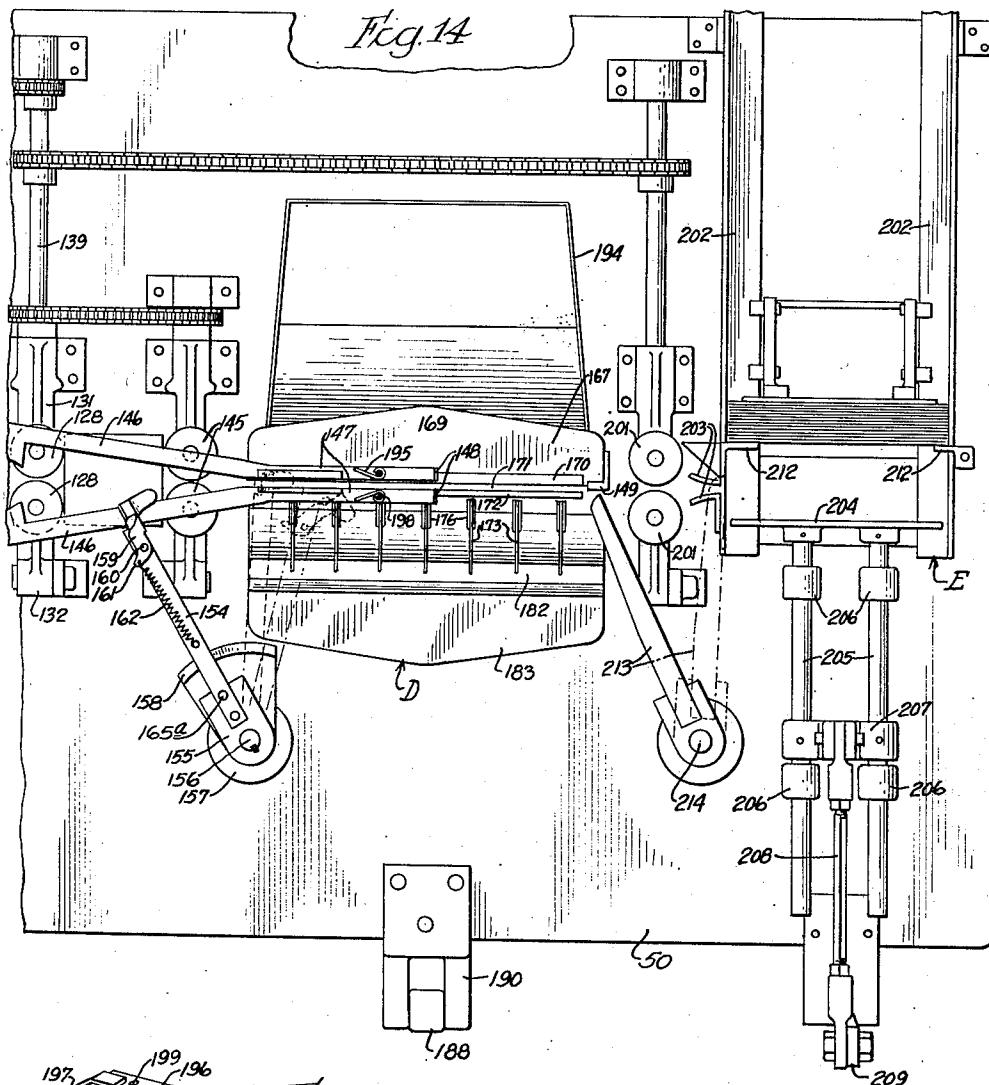
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 7



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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 8

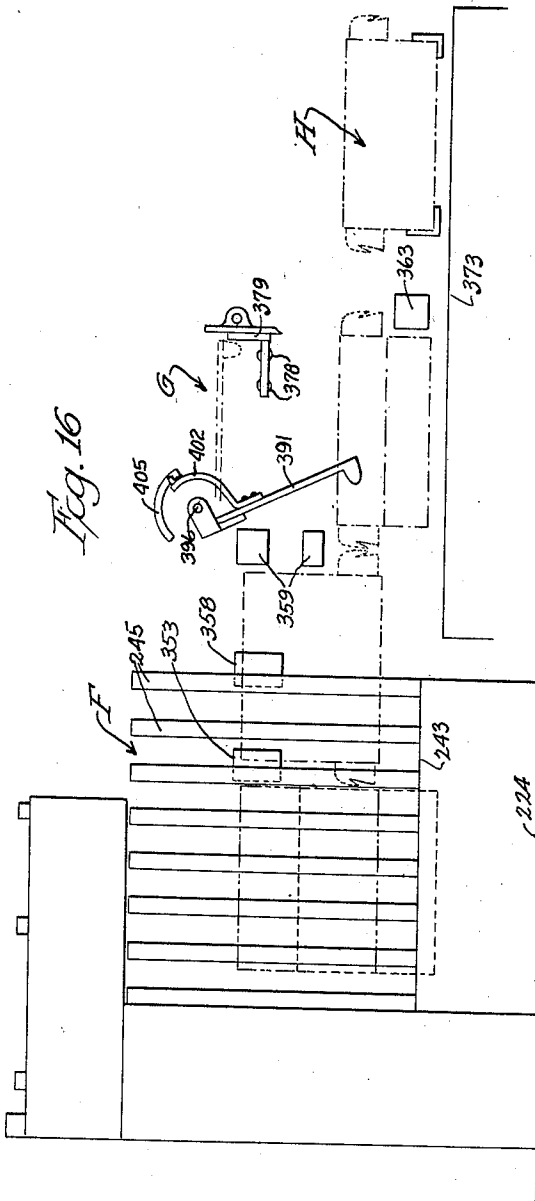


Fig. 16

Fig. 17

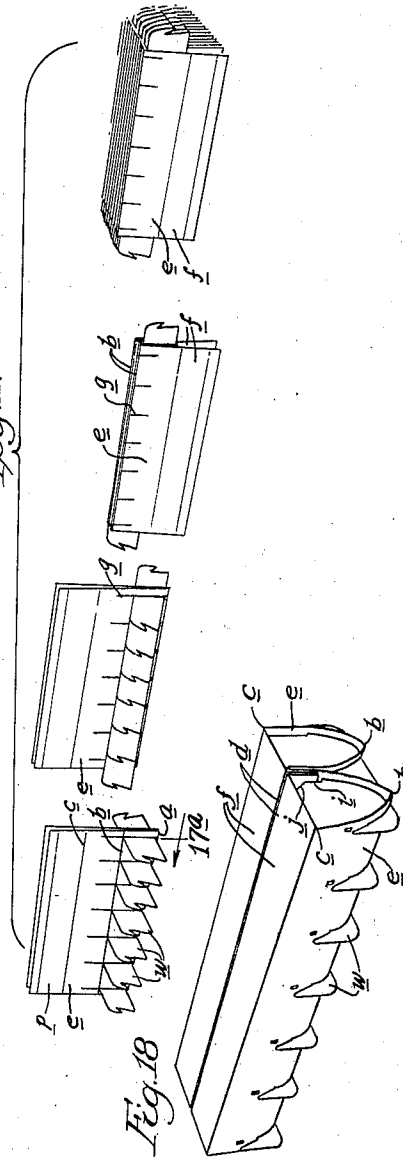
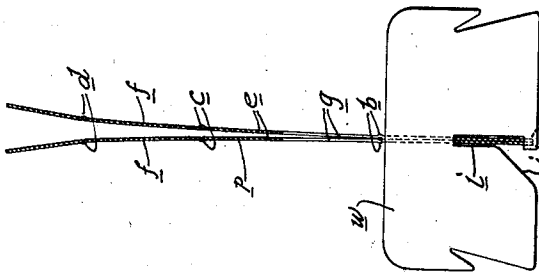


Fig. 18

Fig. 17a



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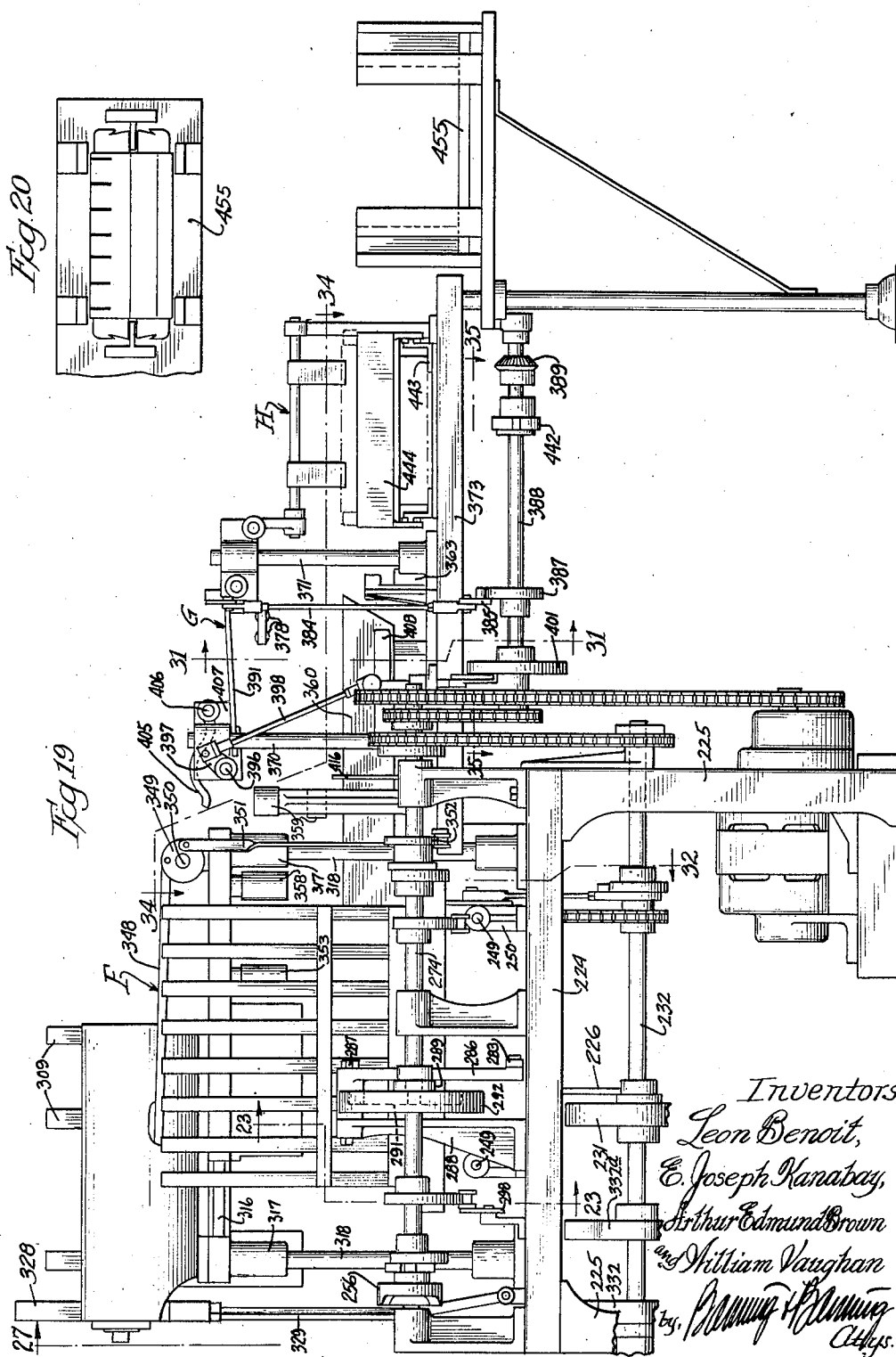
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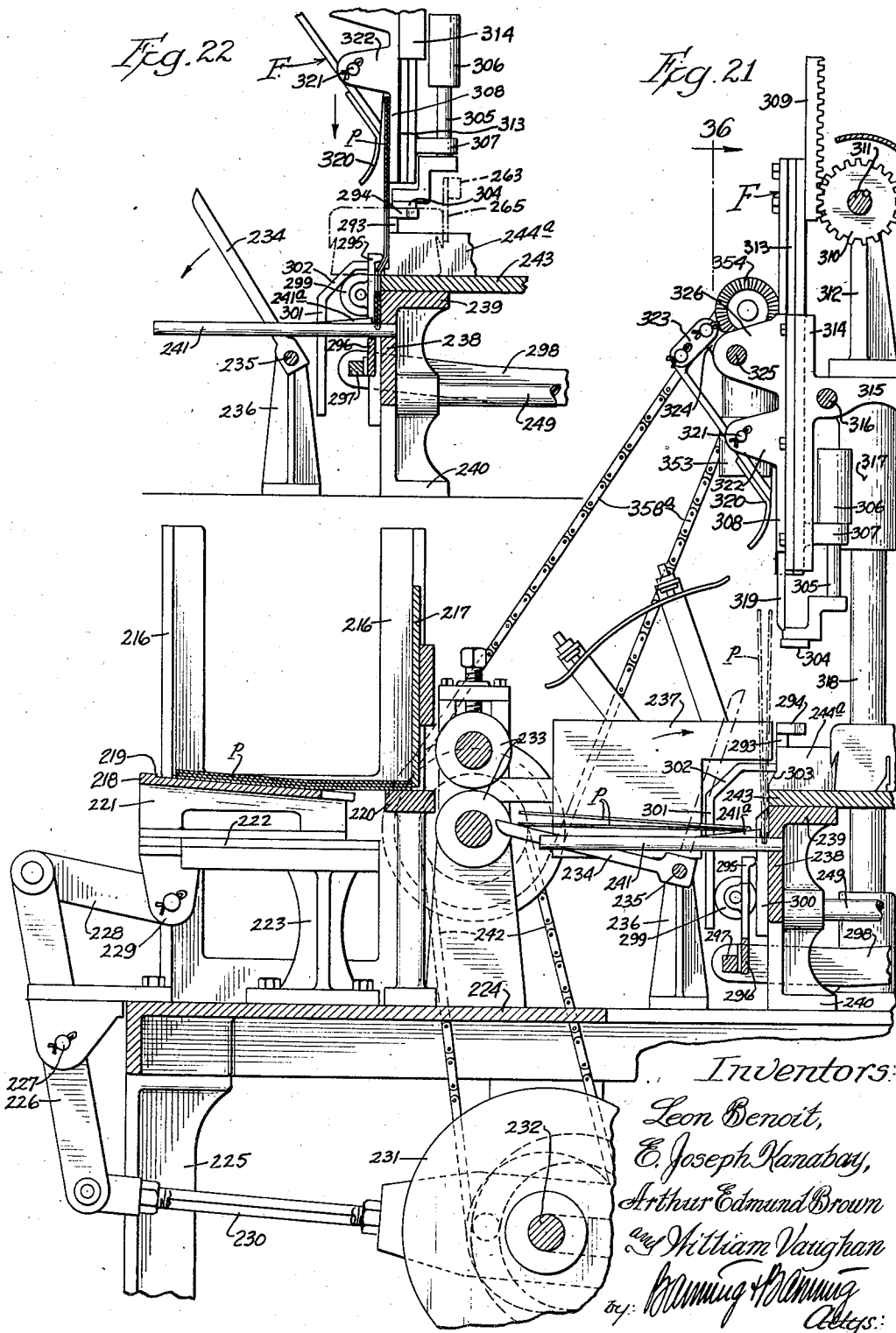
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 10



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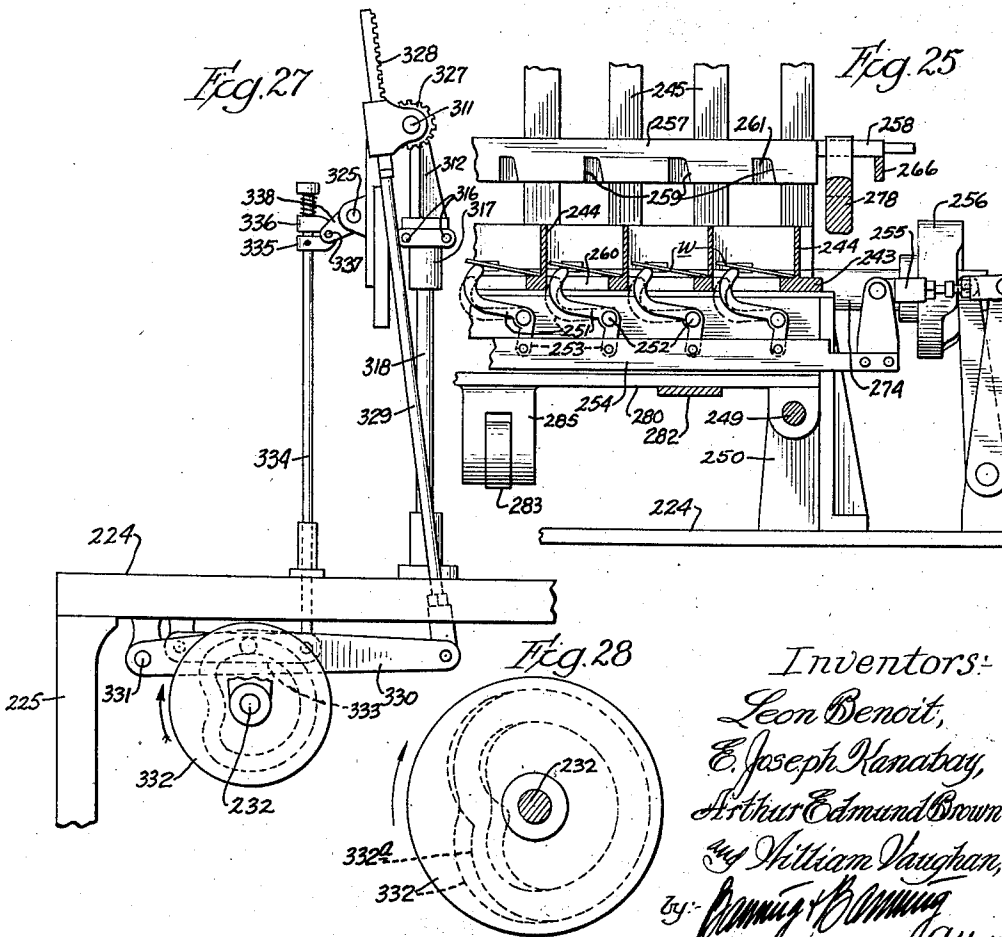
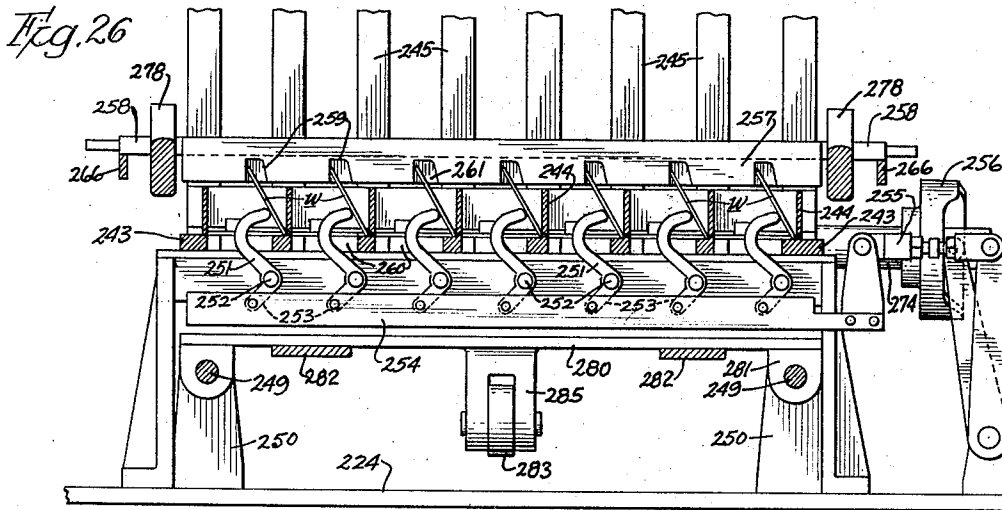
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17. Sheets-Sheet 12



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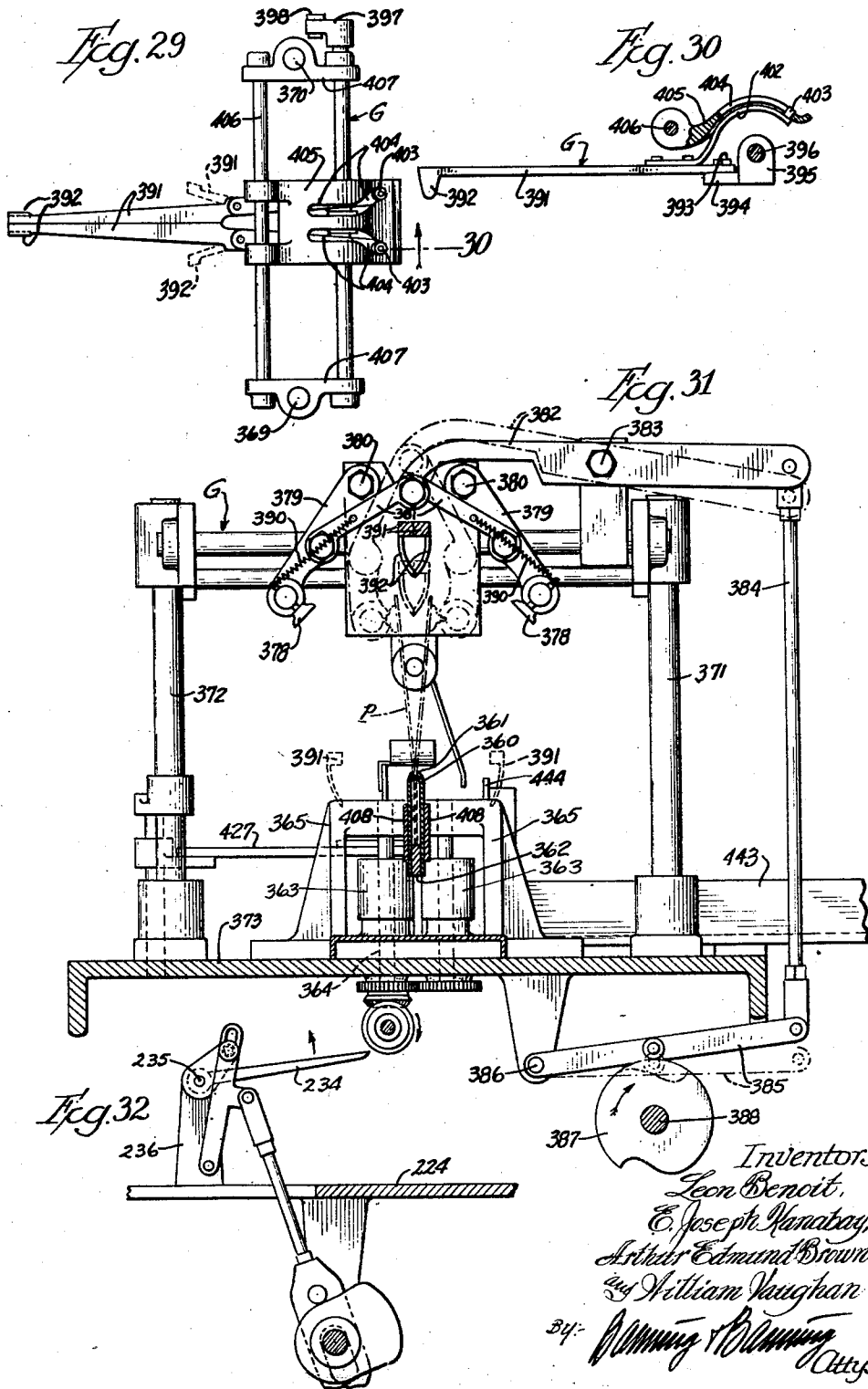
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 13



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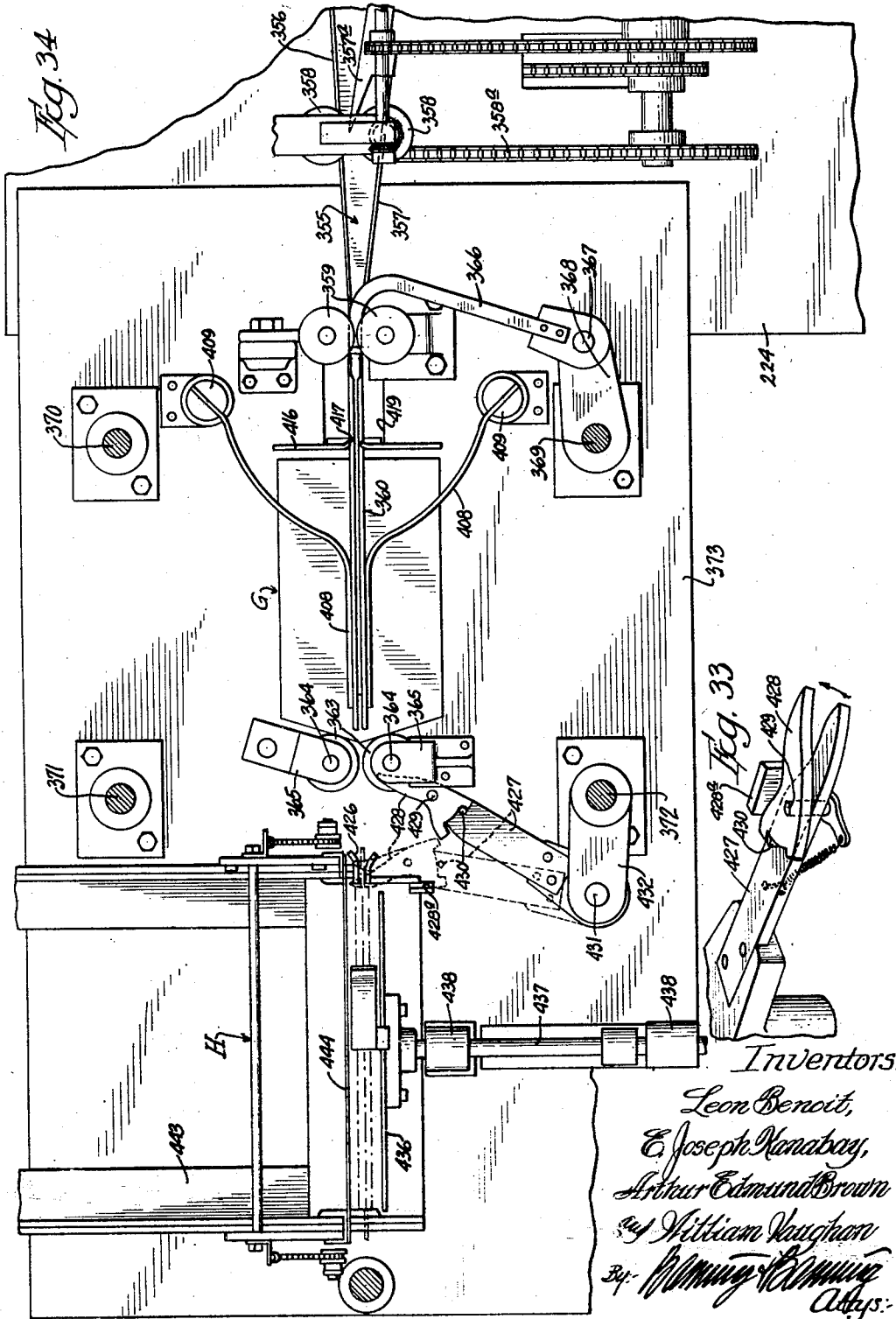
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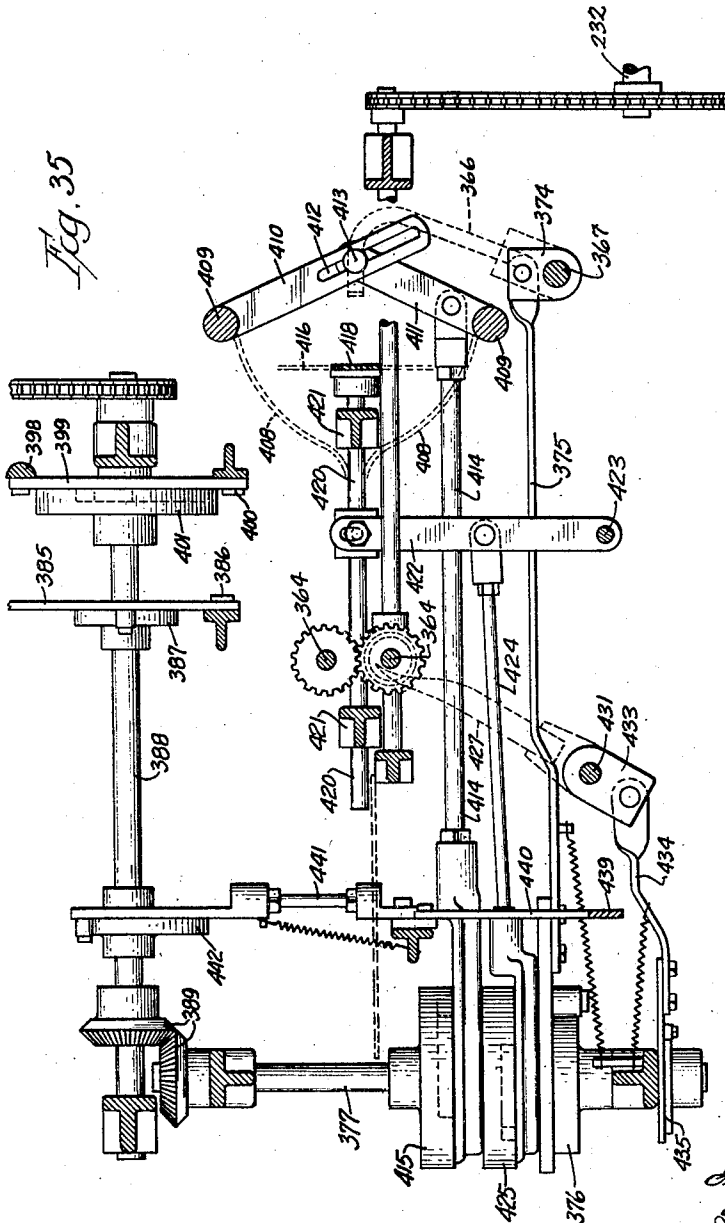
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 15



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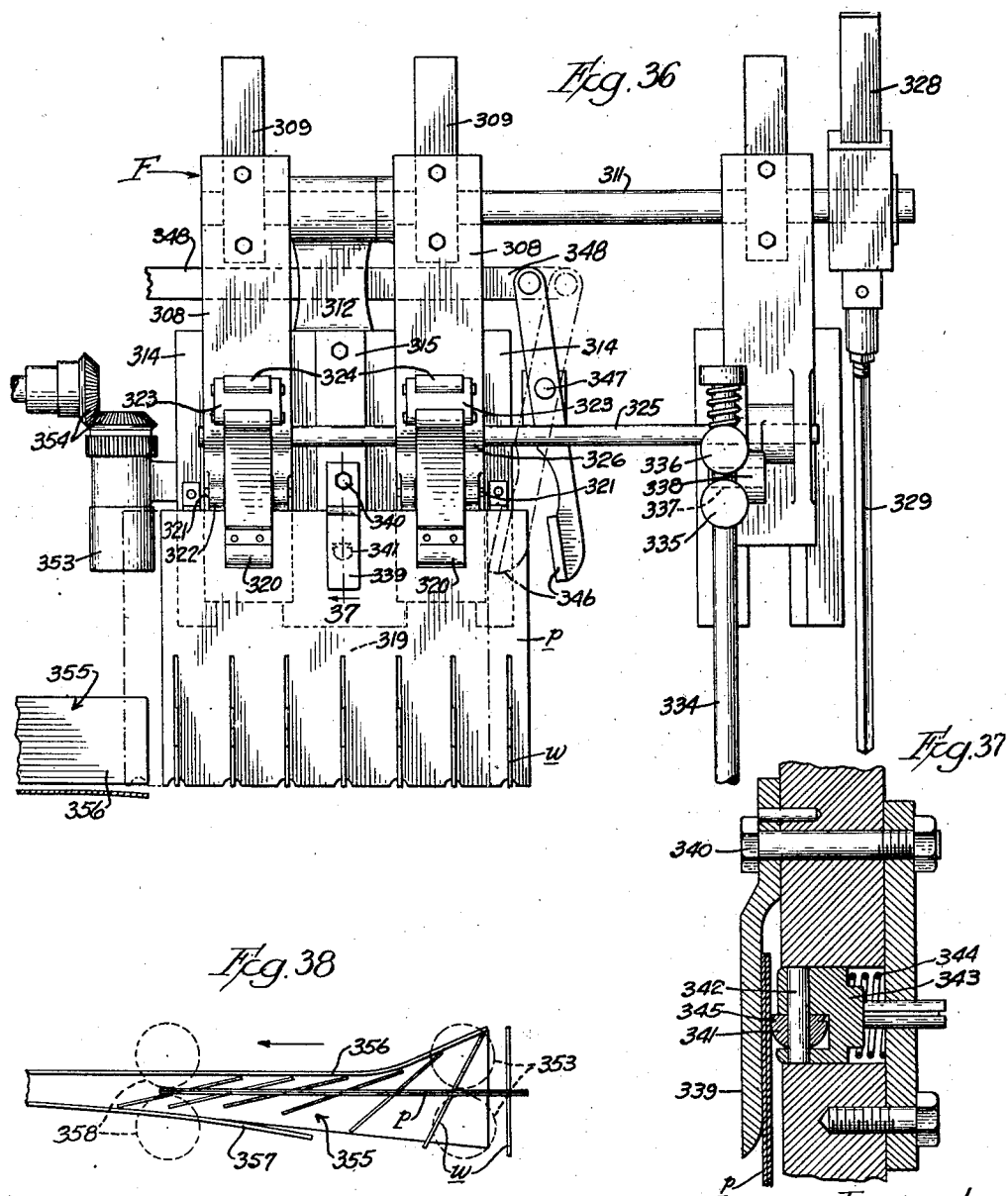
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 16



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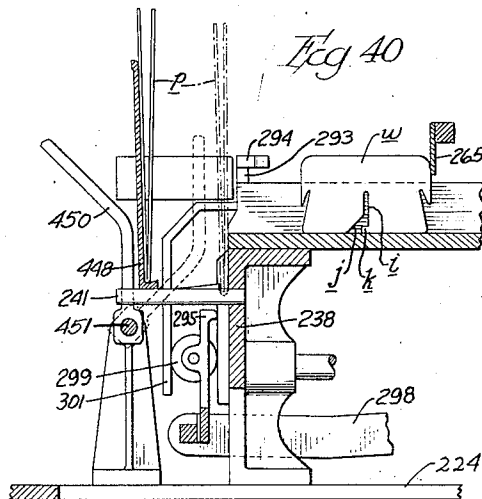
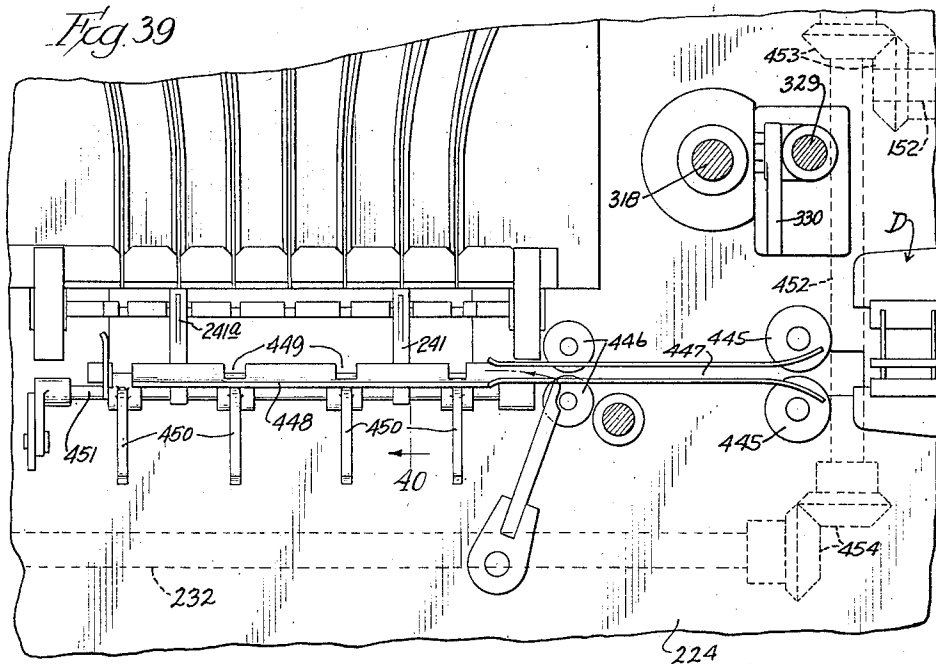
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METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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17 Sheets-Sheet 17



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UNITED STATES PATENT OFFICE

1,970,550

METHOD AND MECHANISM FOR ASSEMBLING CARTONS

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Application March 1, 1933, Serial No. 659,128

31 Claims. (Cl. 93—37)

The mechanism of the present invention is designed primarily for the purpose of assembling egg cartons of the style and character which when set up provide for two rows of separated compartments arranged on opposite sides of a medial double walled partition in conjunction with closing flaps which are adapted to be folded over the respective rows of compartments to provide separate covers for the rows of eggs.

In cartons of this character it is customary to construct the body of the carton from a single sheet of paper board, and to insert the separate cross walls constituting the cross divisions through registering slots formed in the medial double walled partition, so that each cross wall extends oppositely from the medial partition and serves to separate the compartments on opposite sides thereof. A carton of the general style involved is set forth and described in Letters Patent of the United States, No. 1,768,023, issued June 24, 1930, to Leon Benoit.

In the shipment of cartons of this general character it is customary to properly score the body of the carton and to insert therethrough a set of cross walls, and to nest the cross walls into flatwise or overlapping relation, and to turn down the upper portion of the carton body thereover into flatwise or knock-down relation, so that a consignment of cartons will occupy but a small space during shipment. In setting up such a carton, the cross walls are spread into transverse relation and hooked into the walls of the carton in the intended manner to provide the rows of compartments, after which the eggs are inserted and the cover flaps folded over the top to enclose the package.

The present invention relates to the method which includes the feeding forward of the carton blanks; breaking them down along the score lines; doubling the blanks along a medial folding line to present a double wall thickness for the formation of the registering slots; the slotting of the carton blanks; feeding out a set of cross walls, and advancing them in edgewise relation toward and through the registering slots; nesting the inserted cross walls to overlap one another; folding down the upstanding portions of the carton blank to overlie the nested cross walls; and finally feeding and stacking the cartons for packaging and shipment, and to the various manipulations involved in the sequence of operations above described.

In order to insert the cross walls, it is necessary to feed forward and manipulate the carton blanks with the utmost precision and to guide the cross

walls to the slots; and in view of the fact that the slots are but slightly wider than the thickness of the cross walls, it is necessary to accurately position and hold the parts during the inserting operation, and the mechanism of the present invention is designed to meet these requirements and to rapidly and accurately assemble and deliver the cartons and to automatically perform most of the operations involved without the necessity for human manipulation.

The invention further involves the use of synchronized mechanisms so constructed and arranged as to perform the several operations in sequence and in timed relation, and to at all times guide and hold the cartons and the partitions in such a way as to avoid the possibility of displacement or failure of registration even when operating at a high rate of speed.

Further objects and details will appear from a description of the invention in conjunction with the accompanying drawings, wherein,—

Figure 1 is a diagrammatic view of the several co-ordinated and combining mechanisms involved in the folding and die cutting of the carton blank in preparation for the later insertion of the cross walls;

Fig. 2 is a perspective view showing the formation assumed by the carton body at various stages of the operations involved in Fig. 1, and showing a carton in progress through the overlying mechanisms illustrated in Fig. 1;

Fig. 3 is a side elevation of the mechanism which is diagrammatically illustrated in Fig. 1;

Fig. 4 is a longitudinal sectional elevation through the blank feeding mechanism illustrated at the extreme left of Fig. 1;

Fig. 5 is a similar view in part showing the lowermost blank advanced to the bite of the feed roller;

Fig. 6 is a longitudinal sectional elevation of the mechanism for initially bending the carton blank along the scoring lines and folding the medial portion of the blank on itself to afford the double walled medial partition, the section being taken on line 6—6 of Fig. 9;

Fig. 7 is a sectional detail taken on line 7—7 of Fig. 6 showing the vertically disposed feed rollers for engaging the sides of the medially folded carton blank;

Fig. 8 is a fragmentary detail showing the provision of scoring ribs and co-operating channels in certain of the feeding rollers as a modification where it is desired to perform the scoring operations within the machine itself rather than in

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the preliminary operation of cutting and printing the carton blanks;

Fig. 9 is a cross sectional elevation of the bending mechanism shown in Fig. 6, the section being taken on line 9—9 of Fig. 3;

Fig. 10 is a detail showing the bending blade and associated parts in depressed position and with the corresponding cross configuration of the blank shown in cross section;

Fig. 11 is a cross sectional elevation through the die punching mechanism of Fig. 1, to the right of the bending mechanism which forms the slots in the carton blanks, the section being taken on the line 11—11 of Fig. 3;

Fig. 12 is a sectional detail taken on line 12 of Fig. 11, showing a blank positioned to be die cut;

Fig. 13 is a sectional detail taken on line 13 of Fig. 12, and looking down on the guideway in the die cutting mechanism through which the blanks travel;

Fig. 14 is a plan view of the die cutting mechanism taken from above and showing the means for feeding the blanks to and beyond the die cutting mechanism to the stacker shown at the right of Fig. 14;

Fig. 15 is a perspective detail from above showing the mechanism for guiding and positioning the blanks within the die cutting mechanism;

Fig. 16 is a diagrammatic side view of the mechanisms involved in the feeding and insertion of the cross walls through the folded carton blanks and in the final folding and stacking of the blanks;

Fig. 17 is a perspective view showing the formation of the blanks and cross walls at the several stages of progress through the mechanisms of Fig. 16;

Fig. 17^a is a cross sectional view on line 17^a of Fig. 17, showing a carton blank having a cross wall inserted therethrough;

Fig. 18 is a perspective view of a carton completely assembled and with the covers closed;

Fig. 19 is a side elevation of the mechanisms which are diagrammatically illustrated in Fig. 16;

Fig. 20 is a top or plan view of the stacker shown at the right of Fig. 19;

Fig. 21 is a cross sectional elevation taken through the assembling mechanism and showing the means for feeding the folded carton blanks into upstanding position to receive the cross walls;

Fig. 22 is a detail showing certain of the mechanisms of Fig. 21 in a different operating position;

Fig. 23 is a cross sectional elevation taken on line 23 of Fig. 19, showing the mechanism for feeding and advancing the cross walls for insertion through the carton blanks;

Fig. 23^a is a plan view of the mechanism shown in Fig. 23;

Fig. 24 is a detail of a portion of the same mechanism in a different position of operation;

Fig. 25 is a cross section taken on line 25 of Fig. 23, showing the mechanism for upwardly tilting the cross walls;

Fig. 26 is a similar view showing the parts in a different position of operation;

Fig. 27 is a detail showing the cam and connections for operating the clamping mechanism for lifting the carton blanks after insertion of the cross walls, the same being viewed on line 27 of Fig. 19;

Fig. 28 is an enlarged detail of the same cam mechanism;

Fig. 29 is a detail in plan of the mechanism for

spreading the upstanding portions of the folded carton blanks in preparation for the final folding operation;

Fig. 30 is a sectional detail taken on line 30 of Fig. 29;

Fig. 31 is a cross sectional view of the same mechanism taken on line 31 of Fig. 19;

Fig. 32 is a detail taken on line 32 of Fig. 19;

Fig. 33 is a perspective view of the kicker arm for forcing the folded cartons into the final stacker;

Fig. 34 is a plan view of the terminal portion of the machine, looking downwardly along the plane indicated by the line 34—34 in Fig. 19;

Fig. 35 is a plan view of the driving mechanism viewed from the plane 35—35 of Fig. 19;

Fig. 36 is a vertical sectional elevation taken on the line 36 of Fig. 21, showing a folded carton blank with the inserted cross walls in position;

Fig. 37 is an enlarged sectional detail taken on line 37 of Fig. 36;

Fig. 38 is an edge view of a carton blank in progress through the guideway which serves to progressively nest the cross walls on one another;

Fig. 39 is a plan view of the guides for feeding the cross walls edgewise toward the carton blank; and a modified arrangement for delivering blanks thereto; and

Fig. 40 is a sectional elevation taken on line 40 of Fig. 39.

Carton folding mechanism

The first group of operations involved in the present method has to do with the folding and dieing of carton blanks *p*, made desirably of a suitable paper material, in preparation for the reception of the cross walls in conformity with the scheme of operations diagrammatically indicated in Figs. 1 and 2. In these figures, the carton blanks in flat unfolded form are first introduced into the mechanism in the form of a vertical stack carried by a hopper *A*. It is customary to first print the carton blanks with the intended lettering and provide them with a series of longitudinal score lines or ribs, as indicated at the left of Fig. 2. The cartons in flatwise position are fed forward through rollers *B* into a bender *C* in the nature of a press which breaks down the blank along the score lines and gives it the configuration indicated in the second position illustrated in Fig. 2. In this condition, the medial portion of the blank is folded to V-form along a medial score line *a*.

The V-shaped medial section has outwardly extending on either side therefrom what may be termed a wing section bent along score lines *b*, *c* and *d*. These score lines divide the carton blank into two duplicate divisions, and when the carton is ultimately assembled, each section will assume a trough-shaped configuration with the score line *b* constituting the inverted ridge of the carton, with the section *e* subtended between the score lines *b* and *c* constituting the oblique outer wall, with the section *f* subtended between the score lines *c* and *d* constituting the top, and with the marginal section beyond the score line *d* constituting a flap to tuck in for the purpose of closing the carton, as clearly illustrated in Fig. 18.

After the carton blank has been broken down to the configuration just described, it is medially folded and fed forward to a die punching mechanism *D*, within which it is subjected to the action of dies which cut out the vertical slots *g* which traverse the score lines *b* so that each section of the carton blank on opposite sides of the medial

score line *a* will be similarly punched. Simultaneously, the medial score line *a* is died to cut out half-circular notches *h* which being cut along the medial line constitute circular holes in the complete carton blank.

From the die punching mechanism, the carton blanks are fed forwardly in edgewise relation to a stacker E within which the carton blanks are compressed into a horizontally extending stack with the folded carton blanks standing on their folded edges, as indicated at the right of Fig. 2.

All of the mechanisms, A, B, C, D, and E, are carried upon a table 50 supported upon corner legs 51 at a convenient height above the floor (see Fig. 3). The hopper A is elevated above the table upon a frame comprising corner standards 52 which support an open-work hopper having corner uprights 53 of angle formation, which are properly spaced to permit a stack of blanks to be arranged in vertical column form and supported in part upon a fixed floor plate 54 (see Fig. 4) and in part upon an obliquely disposed slide plate 55 provided near its rear edge with a shoulder 56 adapted to engage the rear edge of the lowermost blank of a column and feed the same forward through a narrow slot 57 formed between the fixed plate 54 and an adjustable forward cross gate 58.

The slide plate 55 is carried by a fin 59 which is slidably mounted upon a fixed plate 60, upon which it is suitably guided and actuated by means of a lever 61, to the upper end of which is pivoted the outer end of a link 62, the inner end of which is pivoted to a tongue 63 depending from the fin 59, so that as the lever is actuated a reciprocating motion will be imparted to the slide plate sufficient in amplitude to bring the lowermost blank into the bite of the roller feeding means B presently to be described.

The lever 61 is fulcrumed upon a pin 64 carried between brackets 65 mounted upon the table 50, and the lower end of the lever connects with a pitman 66 terminating in a head 67 provided with a slot 68 which embraces a cam shaft 69 carrying a cam 70 having a groove 71 which receives a roller 72 on the head 67, which arrangement serves to impart the timed movements of reciprocation required in feeding the blanks forwardly (see Fig. 4).

The roller feed means comprise an upper roller 73 and a lower roller 74 mounted upon roller shafts 75 and 76 respectively. The lowermost roller is power driven by means of a sprocket chain 77 which drives a sprocket 78 on the shaft 76. The chain 77 passes around a driving sprocket 79 carried by the cam shaft 69 which imparts constant rotation to the rollers. The upper and lower rollers are suitably entrained to impart positive rotation to the upper roller. The upper roller is pressed against the lower roller by springs at each end thereof (not shown), the pressure being adjusted by means of an adjusting screw 80 to accommodate carton blanks of varying thickness. The rollers just described are carried by standards 81, or in any other suitable manner.

The blanks fed through the rollers 73 and 74 are engaged by power driven spaced pairs of forwarding rollers 82 and 83, which deliver the blanks flatwise into the bender C shown in Fig. 6, and in order to prevent the rear edges of the blanks from springing upwardly, they are guided into and through the rollers 82 by obliquely disposed shoes 84, the forward ends of which extend into the bender C, which bender (see Fig. 9) comprises spaced anvil plates 85—85

mounted upon standards 86—86 suitably spaced upon opposite sides of the medial line of advance of the carton blanks. Each of the anvil plates 85 comprises a flat body section 87 and a downwardly flaring wing section 88. In the gap between the two anvil plates and below the level thereof is located a central trough-shaped plate 89 adapted to receive the inverted ridge formed by the pressing down of the carton blank along the medial score line during the operation of configuring the carton blank, as indicated in the second position of Fig. 2.

The anvil members above described coact with spaced presser members 90—90, each of which comprises a flat body portion 91 adapted to register with the flat body portion 87 and an obliquely disposed wing portion 92 adapted to register with the anvil wing portion 88. The trough-shaped anvil member 89 coacts with a blade-like folder 93, the center portion 94 of which is cut away from the body portion in the form of a blade which is pivoted to a link 95. The presser members are carried by a presser head 96, the ends of which are slidable upon vertical posts 97, and the presser head is actuated at each end by a pitman 98, the lower end of which is provided with a head 99 pivoted upon a cross rod 100, the ends of which are carried by rocker bars 101 actuated by cams 102 mounted upon the cam shaft 69 suitably journaled within hangers 104 depending from the table 50 (see Figs. 3 and 9). The cam shaft 69 is driven by a sprocket 105 and chain 106 driven by a motor 107.

As shown in Fig. 10, the mechanism above described serves to break down the carton blank along the score lines *a*, *b*, *c*, and serves to clamp the carton blank, save for the margins beyond the score lines *d* which project free beyond the anvil members. These projecting margins are bent by the action of bending fingers 108—108, each of which is in the form of a swinging lever pivoted upon a pintle 109 carried by a block 110. Each of the swinging fingers 108 is actuated by a pitman 111, the outer end of which is pivoted to the associated finger, and the inner end of which is pivoted to a lug 112 carried by a rack bar 113. The two rack bars stand in spaced relation to one another and on opposite sides of and in train with a driving pinion 114, so that the rotation of the pinion will cause the two rack bars to move in opposition to one another and hence cause the two folding fingers to advance and recede in opposition from the position shown in Fig. 10.

The rack bars 113 are guided within slots in a cross guide head 115 (Fig. 6) and the pinion is carried by a vertical shaft 116 which extends through a vertical sleeve 117 and has its lower end journaled within ball bearings 118. The shaft 116, at its lower end, has keyed thereon a driving pinion 119 which meshes with a rack 120 slidably mounted within a guide plate 121 and actuated by means of a pitman 122 bifurcated at its head end 123 to embrace the cam shaft 69, which shaft carries a cam 124 having a groove 125 which receives a roller 126 carried by the head 123 (see Fig. 6).

The cam slot is of circular concentric configuration throughout the major portion of its orbit and is provided with an abrupt inner turn 127 throughout a limited extent, with the result that the swinging folding arms 108 will be abruptly swung inwardly and restored to outlying

position at the proper time in the sequence of operations.

In the folding or breaking down of the carton blanks, the swinging blade 94, being unsupported at its forward end and standing in oblique relation to the advancing carton blank, will be lifted as the carton blank is fed forwardly and will ride upon the medial score line *a* of the blank until the same has been inserted, at which time the swinging blade 94 will be lifted as shown in dotted lines in Fig. 6. The presser head 96 will then descend and the swinging blade 94 will register with the blade 93 so that the two blades will be in alignment and deform the carton blank along the score line, as indicated in Fig. 10, and simultaneously the arms 108 will swing forwardly to break the margins of the blank along the score lines *d*. Thereafter, as the presser head lifts, the weight of the blade 94 will cause it to bear down within the trough-shaped medial portion of the carton, which thus holds the carton against springing upwardly and serves to maintain it in substantially the folded position given it by the action of the folding members. With the blank thus configured, it is ready to be discharged from the bender C and fed forwardly by the action of a pair of vertically standing forwarding rollers 128 mounted respectively upon a driving shaft 129 and a driven shaft 130. (See Fig. 7.)

The driving shaft 129 is journaled through a fixed bracket 131, and the driven shaft 130 is journaled through a swinging bracket 132 pivoted at its lower end upon a pintle 133, the two rollers 128 being pressed toward one another by the action of a spring 134. The shaft 129 carries a pinion 135 meshing with a pinion 136 on the driven shaft 130. Power is imparted to the driving shaft 129 through intermeshing bevel pinions 137 and 138, the latter of which is mounted upon the end of a drive shaft 139 suitably entrained with the driving mechanism.

It will be noted from Fig. 6 that in feeding the blanks into the bending mechanism they are fed downwardly to a slightly lower level and then deformed to press the medial portion downwardly to a considerably lower level, and the rollers 128 stand at a proper elevation to engage only the medial portion of the blanks, allowing the wing portions thereof to ride over the upper ends of the rollers and free from the bite thereof.

In order to assist in holding the forward portions of the blanks in the trough-shaped formation until they are caught by the rollers 128, a swinging finger 140 is provided which depends into the trough-shaped anvil member 89 and is pivoted upon a pintle 141. The finger 140 is provided with an upstanding tail piece 142 to which is connected a spring 143 which serves to yieldingly hold the finger in substantially vertical relation, but permits it to yield slightly. The finger 140 in co-operation with the blade 94 serves to prevent displacement of the carton and to guide it into the bite of the rollers. Each carton blank receives initial discharge movement from the bender to the feed rollers 128 by the contact of the next carton blank oncoming from the rear, and the feeding is so timed as to permit such discharge immediately after the presser head has lifted sufficiently to be free of the oncoming carton.

In order to properly center the carton blanks within the bender, a pair of stop bars 144 are provided which, as shown in Fig. 9, are positioned to engage the forward edge of the advancing

blank near the margins thereof while the blank lies in flatwise relation. The bending operation, however, draws the edges inwardly and thus releases them from contact with the stops 144, so that after the carton has been bent along the score lines, it is ready to advance as soon as it receives the necessary impetus from the rear to discharge it into the bite of the rollers 128.

The forwarding rollers 128 co-operate with secondary forwarding rollers 145 (Fig. 3) in delivering the carton blanks, once folded along the medial score line, into the die press D. It is necessary in feeding the blanks forwardly to lift the wing portions of the carton blanks as they advance into the die press, as indicated diagrammatically in Figs. 1 and 2, and to effect this result a pair of converging obliquely disposed guide bars 146 are provided (see Figs. 14 and 15). These guide bars extend obliquely upward to a plane above the level of the die press and terminate in horizontally extending guide portions 147, which are closely spaced and extend in parallel relation and are upturned at their forward ends 148. The advancing blanks are thus folded into flatwise relation as they enter the die press and stand vertically upon the medial score line *a* which constitutes the folding line for the blank. The rollers 128 and 145 serve to impart the necessary impetus to carry the folded blanks forwardly to substantially the position indicated in Fig. 12, but this impetus has a tendency to slightly tilt each blank into the oblique relation shown in Fig. 12, and in order to accurately position the blanks to receive the die cuts, the following mechanism is provided:

A stop block 149 is located in position to engage the folded blank near its forward lower corner when projected upwardly into the full line position shown in Figs. 3 and 12, and to release the blank when the block is depressed to the dotted line position. The stock block 149 is carried by a vertical bar 150, the lower end of which is actuated by a cam 151 on the longitudinally extending cam shaft 152 which is driven through bevel gearing 153 by the cam shaft 69.

The stop block 149 coacts with a swinging arm 154 carried by a head 155 mounted upon the upper end of a vertical shaft 156 (see Figs. 11 and 14) which extends through a stationary journal standard 157, which standard is provided near its upper end with an outstanding bracket segment 158 which affords a guide rest for the arm 154 which swings from the full line position to the dotted line position shown in Fig. 14.

The swinging arm 154 at its free end carries a finger 159 (see Fig. 13) of channel formation which embraces the tip end of the arm and is pivotally mounted upon a pintle 160. The finger extends beyond the arm, and its inner end terminates in a tail piece 161 to which is secured a coil spring 162 which normally serves to hold the channel shaped finger rearwardly into contact with a plunger 163 backed by a spring 164 (see Fig. 13). The finger is positioned to ride upon the horizontal guide bars 147, and on its advancing movement to ride upwardly upon a pair of elevated shoes 165, and the amplitude of movement imparted to the arm is sufficient to carry the finger 159 beyond the shoes 165, after which sufficient freedom of movement is afforded in the mounting for the arm 154 to permit the spring pressed draw pin 165^a to draw down the arm sufficiently to bring the finger below the level of the proximate shoe, so that on the return movement of the parts the finger will ride against the prox-

mate side wall of the shoe, as indicated in dotted lines in Fig. 13, thereby permitting the finger to return without bridging across the slot between the guide bars 147, so that, although the finger is positioned to assist, on its forward movement, in advancing a carton blank to position within the die press, it will not thereafter, on its return movement, interfere with the progress of the next oncoming blank between the guide bars 146—147.

As shown in Fig. 15, the guide finger 159 is provided with a prong 166 which on the forward movement overlies the upper exposed edge of the carton blank (see Fig. 12) at the same time that the finger presses against the rear edge, and these two contacts in unison serve to impart a downward and forward thrust at the upper rear corner of the carton blank, and this thrust together with the downward movement of the block 149 causes the carton blank to settle down from the tilted position shown in Fig. 12 into the level position occupied during the die cutting operation. While the blank is being punched, the block 149 is further moved downwardly to occupy a position below the line of movement of the blank after the same has been punched.

The die press comprises a vertically standing backing frame 167 provided with a base flange 168 and a top flange 169, and the backing frame has secured thereto a face plate 170 which is provided with a level shoulder 171 which furnishes a ledge upon which the base edge of the folded carton blank rests during the dieing operation. The base portion of the plate has bolted thereto an upstanding front plate 172, which above the shoulder 171 stands in spaced relation to the face plate 170 to afford a deep narrow channel for the passage of the carton blanks, and to strip the blank from the dies.

The dieing out of the slots in the folded carton blanks is performed by a group of vertically disposed spaced saw toothed die members 173 which operate through slots 174 and 175 respectively in the front plate 172 and the face plate 170. The resulting cutting is a shearing rather than a punching operation. The half-circular notches in the folded base edges of the carton blanks are cut by die members 176 operating through slots 177 and 178 respectively in the front plate and the face plate. If desired, upper cuts in alignment with the slots may be formed by a die member 179 operating through openings 180 and 181 respectively in the front plate and face plate (see Fig. 11).

In order to afford sufficient amplitude of movement to the die members, the backing frame 167 is likewise provided with openings which register with and constitute continuations of the openings in the face plate. The die members are carried by a block 182 secured to the inner face of a longitudinally extending rocking bar 183 provided with brackets 184 mounted upon a shaft 185, the axis of which lies within the plane occupied by the carton blanks during the dieing operation. As shown, the die members and slots through which they operate are arcuately configured to allow for the slight arcuate movement imparted by a rocking of the bar 183 on its shaft 185.

The bar 183 has depending therefrom an arm 186, the lower end of which has pivoted thereto the inner end of a pitman 187, the outer end of which is pivoted to a lever 188 pivoted on a pintle 189 carried by a bracket 190 on the forward side of the table, and a rocking motion is imparted to the lever through the medium of a pit-

man 191 slotted at its inner end to embrace the shaft 152. The pitman 191 is provided with a roller 192 which engages a cam 193 carried by the shaft 152, so that rocking motions are imparted to the bar 183 at timed intervals. The cuttings removed during the dieing operation are discharged into a chute 194 and removed from the machine.

In order to assist in guiding the carton blanks to position and in holding them during the die cutting operations, spaced wing plates 195—195 are mounted above the guide bars 147, and on opposite sides of the guide slot between the plates, and in order to prevent lifting or tilting of the blanks, an overhanging guide plate 196 having a tail piece 197 is provided (see Fig. 15), which members are carried by a post 198 upstanding from the backing frame 167. The post 198 also serves as a means for supporting the inner ends of the guide bars 147, one of the bars being supported directly by the post and the other being supported through a spacer pin 199 depending from the overhanging guide plate 196.

Fig. 14 shows the die bar 183 swung back to expose the inner face with the cutting die members 173 retracted sufficiently to permit the insertion of a carton blank. As the die closes, the bar 183 will swing from the oblique position indicated in Fig. 14 to the vertical position indicated in Fig. 11. During the dieing operation, the swinging arm 154 which carries the finger 159 occupies the intermediate position indicated in dotted lines in Fig. 14, but after the conclusion of the dieing operation, the arm 154 moves forwardly to the right hand dotted line position to feed the blank out of the dies. It will be noted that during this last feeding movement, the stop block 149 is at rest in a downward position indicated by the dotted line shown in Fig. 12. Thus the blank is permitted to move forwardly under the thrust of the swinging arm.

The movements of the arm 154 are controlled by the action of a cam 200 carried by the cam shaft 152 which operates on the lower end of the vertical rock shaft which carries the arm and imparts first a feeding movement into the die cutters, and after a period of rest a short terminal movement to discharge the died blanks and move them forwardly into the bite of a pair of power rollers 201—201, which feed them forwardly into the stacker E. The movement of the stop block 149 is likewise controlled by a cam 151 in timed relation to the feeding and discharging movements of the swinging arm. (See Fig. 3.)

The stacker E is horizontally arranged and comprises a pair of spaced rails 202 of angle formation, one of the rails being provided with a flared mouth 203 to receive the folded blanks standing edgewise in position to be actuated by a plunger 204 carried by guide rods 205 operating through guides 206. A cross head 207 connects the guide rods 205, and a pitman 208 serves to reciprocate the cross head. The pitman is pivoted at the upper end of a lever 209 (see Figs. 3—14) which is pivoted on a pintle 210 and is operated by a cam 211. The initial reciprocation of the plunger carries it past a pair of swinging spring pressed stops 212—212 which yield under the pressure of an incoming carton blank but prevent return thereof, so that by the repeated reciprocations of the plunger, a stack of cartons standing vertically edgewise is deposited within the guideway afforded by the rails 202.

In order to positively and evenly position the

carton blanks delivered from the rollers 201, a swinging arm 213 is provided, which is mounted upon a vertical rock shaft 214 and is actuated from the full line position shown in Fig. 14 to the dotted line position. The rock shaft 214 is actuated by a cam 215 on the cam shaft 152.

This completes the series of operations performed in that portion of the mechanism illustrated diagrammatically in Figs. 1 and 2, and in side elevation in Fig. 3, and stacks the cartons in form to be removed and delivered to the mechanism provided for inserting the cross walls through the slots and folding and delivering the cartons in completed knock-down condition.

The cross wall inserting mechanism

The operations now to be performed are those set forth in the mechanism which is diagrammatically illustrated in Fig. 16, and during the progress therethrough the cartons successively assume the formations illustrated in Fig. 17. The operations include the feeding forward and inserting of certain cross walls *w*, which operation is performed in the assembling mechanism F, and as the cartons are discharged from the assembling mechanism, the inserted cross walls are bent down or nested upon one another, as shown in the second position in Fig. 17, after which the carton blanks are fed through a folding mechanism G, which folds down the previously upstanding portions of the carton blanks, as shown in the third position in Fig. 17, after which the cartons are fed to a stacker H and ultimately delivered therefrom for final packaging and shipment.

The assembling mechanism is best illustrated in Figs. 19 to 27 inclusive, and this mechanism comprises two groups of instrumentalities in coacting relation with one another, one of which is provided for introducing the folded and slotted blanks taken from the stacker E, and for standing each of the blanks on its folded edge and clamping it in position to receive a group of transversely fed cross walls. The other instrumentality is concerned with the feeding and inserting of the cross walls through the slots, after which the assembled carton is advanced and the cross walls laid down into overlapping relation to one another in preparation for the folding operation performed by the folding mechanism G.

The folded carton blanks are laid flatwise within an open hopper comprising angular corner posts 216 and an adjustable gate 217. The floor of the hopper is provided in part by an obliquely disposed slide plate 218 shouldered at 219, and in part by a flat front floor plate 220.

The slide plate 218 is mounted upon a web 221 slidably mounted within a guide plate 222 carried by a standard 223 resting upon a table 224 supported upon legs 225. The slide plate is operated by a lever 226 pivoted at 227, the upper end of which is connected by means of a link 228 with an ear 229 depending from the web of the slide plate. A pitman 230 is pivoted at the lower end of the lever and the pitman is operated by a cam 231 carried by a shaft 232.

The folded and slotted carton blanks are fed singly from the bottom of the stack through the opening below the gate 217 into the bite of rollers 233, which advance the cartons inwardly from the side of the machine with the folded edge foremost, as indicated in full lines in Fig. 21. With the carton blank thus positioned and lying flatwise, it is tilted upwardly upon its folded edge by the action of a swinging finger 234 mounted upon a rock shaft 235 journaled upon standards

236. Side plates 237 furnish a trough-like receptacle for the cartons and hold them accurately positioned during the upending operation. Each carton is moved inwardly until its folded edge abuts against a stop plate 238, which is provided with a top flange 239 and a base flange 240 resting upon the table 224. The finger 234 is operated by a cam 234^a and connections shown in Fig. 32.

The stop plate 238 carries a pair of horizontally extending guide rods 241, which are widely spaced from one another the required distance to register with the end half-circular notches formed in the folded lower edge of the carton blanks, so that as the latter are upended, the notches will register with the upper rounded surfaces of the rods, which thus serve to accurately position the carton blanks with the slots in position to receive the cross wall blanks when fed transversely to the plane of the upended carton blank. Lugs 241^a extend from the upper surface of the rods providing stops to prevent the blank from falling from vertical position until it has been gripped by mechanism presently to be described.

The feed rollers 233 are power driven through the medium of chain and sprocket mechanism 242 driven from the shaft 232, the two rollers being in train with one another so that both are power driven.

The flange 239 supports a flat platform 243, which in turn has mounted thereon a series of pairs of guide plates, each pair comprising guide plates 244 and 244^a, standing edgewise, as shown in Fig. 23^a. Each pair of guide plates constitutes a guide or runway for one of the cross wall blanks, and the number of guides or runways thus constituted will be equal to the pairs of slots formed in the carton blank, and will thus determine the number of cross walls to be inserted during each assembling operation.

The guide plates of each pair are so spaced as to afford sufficient width at the outer end of the runway to permit the insertion flatwise of a cross wall blank, but as the guide walls approach the inner or delivery end, the walls converge toward one another, so that at the delivery end they are spaced in very close relation to one another to afford a narrow vertical slot for the edgewise delivery of the cross wall blank through the registered slot in the folded carton blank.

The guide plate 244^a of each pair is made shorter than its companion 244, so that at the outer or intake end the runways will be afforded only by the guide plates 244 standing in widely spaced relation to one another, as indicated in Fig. 23^a. Fig. 23^a shows the point of termination of the guide plate 244^a, which is indicated by X. The guide plates 244 of the respective runways, at the intake end, stand in register with vertical corner walls 245 of cross wall hoppers (see Figs. 23 and 26), the number of hoppers being equal to the number of runways supplied therefrom. Each hopper is of a size to support a column of cross wall blanks laid flatwise, and the floor of the hopper is afforded by a slide plate 246 which is carried by a cross bar 247 supported upon standards 248 which ride upon guide rods 249 extending from the stop plate 238 to brackets 250 located beneath the hoppers.

In view of the fact that a group of aligned hoppers are utilized, the bar 247 should be of sufficient length to mount the slide plates for the entire series of hoppers, so that all will move in unison, and it will be understood that the feeding mechanism now being described is universal to the entire series of hoppers, so that a full

set of cross walls will be advanced by stages and ultimately inserted as a set through the associated slots in the carton blank.

The feeding movements of the respective slide plates 246 advance a cross wall blank from each of the hoppers and position the same flatwise between the guide plates 244 of the respective runways, and in order to lift the carton blanks into the upright position required for their discharge to the ends of the runways, the mechanism shown in Figs. 25 and 26 is provided. This mechanism comprises a group of fingers 251, each of which is mounted upon a pivot 252 and is provided with a tail piece 253, which tail pieces are pivoted to a universal draw bar 254 actuated by a link 255 which is controlled by a double stepped cam 256, so that in the timed operation of the machine, the fingers will first be swung from the dotted line position shown in Fig. 25 to the full line position shown in that figure, and after an interval be again swung upwardly to the position shown in Fig. 26. These operations are so timed as to cause the initial uptilting movement of the cross wall blanks to occur immediately after the blanks have been fed inwardly by the reciprocation of the respective slide plates 246, and the initial uptilting of the blanks lifts them slightly from the respective slide plates, so that on the recession of the slide plates the blanks will be held against withdrawal. Immediately thereafter, a more extended swinging movement of the fingers will cause the blanks to be upended into a tilted position indicated in Fig. 26, with their upper edges sufficiently lifted to be engaged by the forward plate 257 of an outer feeding bar 258 which extends transversely of the entire group of runways and in position to engage the rear edges of the uptilted cross wall blanks preparatory to the initial step in the inward advance of the carton blanks by stages, as indicated in dotted lines in Fig. 23.

The forward plate 257 is provided with notches 259 into each of which the outer upper corner of a cross wall blank is received as the plate 257 is moved downwardly, and the notches are provided to positively engage the cross wall blanks and prevent them from falling back with the recession of the fingers 251 which operate through slots 260 in the platform 243.

The inner member 244^a of each pair of guide plates 244 terminates at the point X (see Fig. 23), so that in the initial uptilting of the cross wall blanks sufficient clearance will be afforded before the blanks are advanced to position to come within the compass of the more restricted runway afforded between the converging guide plates 244 and 244^a.

The feeding bar 258 is also provided with an unnotched outer feeding plate 261 which is adapted to engage the outer edges of the entire series of blanks when the same have been uptilted to the position shown in Fig. 26. The blanks are thus positioned in preparation for the initial advance of the outer feeding bar, which serves to move a set of blanks from the right hand position indicated in dotted lines in Fig. 23 to the intermediate dotted line position indicated in the same figure. The outer feeding bar co-operates with an intermediate feeding bar 262 and an inner feeding bar 263, the three bars being parallel to one another and spaced at a distance somewhat in excess of the overall width of a cross wall blank.

The intermediate feeding bar is provided with a depending feeding plate 264, and the inner

feeding bar is likewise provided with a depending feeding plate 265, the arrangement being such as to feed forward the sets of blanks by a step by step movement in which the three feeding bars advance and recede in unison through a four-way movement, which includes an inward advance of the three feeding bars while in lowered position to engage three sets of blanks, after which the bars will be lifted in unison to cause the feeding plates to clear the blanks on the outward or return movement of the respective bars. The mechanism for affording this four-way movement will now be described in detail.

The feeding bars 258, 262, and 263, extend transversely of the entire group of runways and are freely supported at their opposite ends upon lifting bars 266, which bars are supported upon depending standards 267—267, which in turn are pivoted to the outer ends of links 268—268, which links are pivoted upon pintles 269—269 carried at the outer ends of a T-shaped bracket 270, the lower leg 271 of which is bolted to the table 224. The outermost links 268 are provided with depending crank arms 272 to which are pivoted the inner ends of rocking arms 273, the outer ends of which are actuated by a cam on a shaft 274, which shaft also carries the cam 256. The rocking movements of the rocking arms, acting through the links 268, serve to give a rising and falling movement in unison to the bars 266 which support the feeding bars.

The ends of the feeding bars are guided within slots 275—276—277, formed at spaced intervals in guide plates 278 at each side of the group of runways, which plates are supported upon standards 279, which standards are connected by means of a cross plate 280, provided at its ends with sleeves 281 which ride upon the guide bars 249, and the plate 280 is connected with a similar plate 280 by means of strap bars 282. These strap bars are connected with the standards 248 which support the feeding slide plates 246, so that the group of slide plates 246 and the guide plates 278 all reciprocate in unison. This reciprocation is imparted by a pitman 283, the inner end of which is pivoted on a pintle 284 to a lug 285 depending from the cross plate 280, and the outer end of the pitman is pivoted to a rocking arm 286 hung on a pintle 287 carried by a standard 288. The arm is actuated by a link 289 which straddles the cam shaft 274 and is actuated by a roller 290 operating in a cam groove 291 in the face of a cam disk 292 on the shaft 274 (see Figs. 19 and 23).

As the cam shaft rotates, timed inward feeding movements will in unison be imparted to the entire group of feeding slide plates 246, and corresponding inward feeding movements will be simultaneously imparted to the feeding plates 261, 264 and 265, which latter, at this stage in the operation will be in lowered position to engage the rear edges of three sets of cross wall blanks, so that all will be advanced in unison to make room for the oncoming set of blanks concurrently being delivered from the respective hoppers. After the feeding movements have been consummated and before the recession of the parts occurs, the swinging fingers 251 will initially tilt the last delivered set of blanks to the position indicated in Fig. 25, after which the recession of the feeding mechanisms will occur.

On the restoring movement, the feeding bars 258, 262 and 263 will be lifted by the upswinging of the links 268, so that in this return movement the feeding plates will clear the tops of the groups

of blanks just positioned and be stepped back into position to severally engage the next oncoming group of blanks in preparation for the next feeding movement. In this manner, the groups of blanks will be stepped off and intermittently fed forward, and as they advance will be more and more closely confined between the guide plates of the respective runways, so that the most advanced group of blanks will be accurately and closely guided into position to register with the slots in the folded carton blank which stands ready to receive them.

The feeding bars 258, 262 and 263, being freely mounted within the slots in the plates 278, will be permitted to rise and fall under the control of the linkage, but will be advanced and restored by the reciprocations of the plates 278, so that a four-way feeding movement or stepping off movement will be imparted, and the cross wall blanks will be advanced in rank formation and in timed relation to the positioning of the folded carton blanks.

In order to insure accuracy in the delivery of the cross wall blanks into the carton blank slots, the following mechanism is provided:

The guide plates 244—244^a of each runway are secured at their inner ends, and in very closely spaced relation, to spacer blocks 293 (see Figs. 21, 22 and 40), which extend upwardly above the guide plates, and each of which is provided with a head 294. The adjacent heads are spaced to afford narrow slots, through which the upper edges of the cross wall blanks are guided at the instant of delivery into the slots in the carton blanks.

In order to better assist in holding the carton blanks firmly in upstanding position during the inserting operation, a plurality of pressure fingers 295 are provided, all of which are mounted upon and upstand from a universal bar 296, provided in each end with a lug 297, which is trunnioned into the inner end of a locker arm 298. The presser fingers are spaced to bear against the face of the carton blank at points intermediate the slots therein, and each end of the bar 296 is provided with a roller 299, which on one side rides upon an inner rail 300 and on the other side rides upon an outer rail 301. Each rail 301 is turned inwardly at its upper end 302 to furnish a groove or runway for the roller, which when lifted to the position shown in Fig. 22 will ride upwardly and inwardly to deflect or offset the carton blank along a line of beveled shoulders 303 formed in the forward edges of the plates 244—244^a and the spacer blocks 293. This offsetting of the carton blank occurs through the line of slots formed therein, and facilitates the introduction of the cross wall blanks and their ultimate positioning with their lower edges in flush alignment with the folded base edge of the carton blank after the insertion of a set of cross wall blanks, in a manner to be presently described.

Each of the cross wall blanks is provided with a center slot *i* which is beveled or throated at the corner *j* in opposed relation to a short tongue *k*, which when the parts are assembled hooks through the associated notch *h* in the folded base of the carton blank, and the bending or offsetting of the carton blank by the rolling up of the fingers 295 is to deflect the blank sufficiently to permit it to be lifted past the tongues *k* and through the mouth of the slots *i* without engaging the tongues *k*. This lifting movement of the carton blank is permitted by reason of the fact that the vertical slots in the carton blank are of greater length than the height of the cross wall blanks, so that

while the latter are held stationary in a manner to be described, the carton blank may be lifted until the parts are so related as to permit the tongues to snap into the base notches without interference.

During the final movement, which inserts the cross wall blanks through the slots, the upper edges of the inserted group of cross wall blanks are engaged by a presser bar 304 (Figs. 21 and 22) which is carried at each end by a stem 305 terminating in a weight 306. The stems 305 pass through guide lugs 307 formed on the outer face of a vertically reciprocating cross plate 308, which is mounted to move from the lowermost position shown in Fig. 22 to the elevated position shown in Fig. 21.

The reciprocating cross plate is provided at each end with a rack 309 meshing with a gear 310 on a shaft 311 journaled upon standards 312. The cross plate, at each of its side edges, is provided with a guide groove 313, which grooves engage vertical guide rails 314, each of which guide rails is supported from a bridge plate 315 carried by spaced tie rods 316 supported in head castings 317 which are carried at the upper ends of posts 318 spaced longitudinally of the machine, as shown in Fig. 19.

The vertical guide rails have depending therefrom a fixed prong 319, the inner faces of which align with the proximate upper margin of a carton blank on one side thereof to prevent lateral displacement of the same. Movable clamping fingers 320 are provided for clamping a carton blank against the cross plate 308. The clamping fingers are pivoted on pintles 321 carried by lugs 322 outstanding from and movable with the vertically reciprocating cross plate 308.

The movable clamping fingers 320 are flared outwardly to easily clear the upper edge of a positioned carton blank, as shown in Fig. 22, which illustrates the lowered position of the cross plate 308 with the movable clamping fingers in position when actuated to clamp the upper portion of the carton blank against the adjacent surface of the plate 308. Each of the clamping fingers at its upper end is pivoted to a link 323, which in turn is pivoted to the outer end of a short crank arm 324 outstanding from a rock shaft 325 journaled through lugs 326 outstanding from the cross plate 308. A slight rocking movement of the shaft serves to swing the lower ends of the fingers 320 into clamping position. Mechanism for actuating the clamping fingers is shown in detail in Fig. 27.

The shaft 311, which operates the racks 309 for vertically moving the plate 308, is provided with a pinion 327 which meshes with a rack 328 at the upper end of a rod 329 for imparting rotation to the shaft which through rack and pin connections imparts vertical movements to the plate 308 and the mountings for the clamping fingers. The lower end of the rod 329 is connected to the free end of a lever 330 pivoted at its outer end on a pintle 331 and actuated by a cam disk 332. The cam disk 332^a actuates a lever 333 to which is pivoted a rod 334 carrying near its upper end a fixed block 335 and a spring pressed block 336, which blocks between them engage a pin 337 on a crank arm 338 extending outwardly from the shaft 325.

The cam disks 332 and 332^a are so configured as to operate the rods 329 and 334 in unison throughout the major portion of the range of movement imparted to the plate 308, so that during such movement no rocking action will be

imparted to the rock shaft 325. At the lower terminus of the plate movement, however, the rod 334 will continue to move slightly, by reason of the cam configuration, and this terminal movement will rock the shaft 325 sufficiently to swing the clamping fingers 320 inwardly into clamping relation against the exposed face of the carton blank. With the clamping fingers thus engaged, the plate 308 will be lifted, thus elevating the carton blank while the weighted presser bar 304 continues to bear upon the upper edges of the cross wall blanks, so that the carton blank will be lifted and drawn or flexed around the shoulders 303 and under the compression of the presser fingers 295, and this movement will continue until the lower folded and notched edge of the carton blank has been lifted to the base plane of the transversely inserted cross wall blanks and into position to permit the tongue *k* to snap into the notches *h*. At this point in the upward movement, the weight 306 is engaged by the lug 307 to lift the presser bar 304 from the heads 294, thus permitting the cross walls of the carton to be removed vertically from between the guides 244 and 244^a and raised with the carton blanks to a height shown in Fig. 36, where the carton is gripped as shown in Fig. 37, after which the clamping fingers 320 will be released by the upward terminal movement of the rod 334 and the reverse rocking movement of the shaft 325.

Simultaneously with the seating of the tongues *k* in the notches *h*, the presser fingers 295 will move downwardly to release the base of the carton blank, permitting the blank with the inserted cross walls to be moved freely upward to the position shown in Fig. 36, but in order to suspend the blank in this position after the clamping fingers 320 are released from the blank, the fixed engaging finger 339 is provided. This finger is connected by a bolt 340 to the bridge plate 315, and is offset from the bolt to overhang the upper edge of the carton blank which is held between the engaging finger and the half ball roller 341 mounted on a pintle 342 carried by a block 343, which is spring-pressed by a spring 344. The exposed portion of the half roller is peripherally notched at 345 to afford an upwardly presented tooth which bears against the face of the carton blank with sufficient force to prevent displacement of the blank, but at the same time to permit it to be discharged edgewise from the assembling mechanism after the clamping fingers 320 have released it.

The discharge of the blanks from the assembling mechanism is effected by the mechanism particularly illustrated in Figs. 19 and 36, which will now be described. This mechanism comprises a kicker arm 346 pivoted on a pintle 347 and connected at its upper end to a draw bar 348, the opposite end of which is pivoted to a disk 349 mounted on a stub shaft 350 and oscillated by a vertically extending bar 351 actuated through suitable connections by a cam 352 on the shaft 274. At proper intervals, the kicker arm is swung from the full line position shown in Fig. 36 to the dotted line position, which serves to impel the lately assembled carton blank forwardly to the extent necessary to bring it into the bite of the vertical rollers 353 which are actuated by gearing 354.

The rollers are so placed as to engage the upper margins of the once folded blanks and carry them forward, and in so doing the inserted cross wall blanks are swept into the mouth of a converging runway 355 (see Fig. 38) having side

walls 356 and 357. The side wall 356 is rearwardly extended and flared to sweep back the projecting ends of the inserted cross wall blanks and to lay them down on one another until they are sufficiently compressed to enter the space between the side walls 356 and 357, after which the blank is engaged by a second set of rollers 358 (see Fig. 34), which project inwardly through the walls of the converging runway 355. The rollers are actuated through driving connections 353^a which are in train with the gear 354 for the first set of rollers. In order to properly guide the forwardly projecting ends of the inserted cross walls, a beveled shoe 357^a is provided, which terminates at a point close to the bite of the rollers 358.

After the assembled blanks have been advanced by the roller mechanism above described, they enter the folding mechanism G, best illustrated in Figs. 31 and 34. Up to this point the carton blanks have been medially folded but once, but it now becomes necessary to fold down the upstanding walls along the score lines *b*, as illustrated in the third position of the carton in Fig. 17. The position of the score lines *b* is such that when the upstanding wing portions of the carton blank are folded downwardly they will overhang and project below the base edges of the inserted and nested cross walls, and the mechanism now to be described is designed to effect this folding by three stages of operation, the first of which is performed by vacuum cups, which slightly spread the two walls of the blank to afford an opening for the entry of a folding blade, which descends between the blank walls and progressively spreads the same and ultimately downfolds them, after which a final folding mechanism compresses the downfolded wings into flatwise contact with the body of the carton and the cross walls assembled therein in preparation for the final delivery of the assembled and folded carton.

As shown in Fig. 34, the rollers 358 advance an assembled carton blank through the constantly converging runway until the base or body portion of the folded blank, with the compressed cross walls, is brought into the bite of power driven rollers 359 standing at a lower level to permit clearance of the wing portions when spread and bent. Beyond the rollers, the guide walls 356 and 357 come into closely convergent relation and extend parallel to furnish a restricted guideway 360, the upper edges of which are bent inwardly to afford lips 361, which constitute folding edges spaced far enough apart to permit the two contacting carton walls to pass between them, while affording a somewhat wider space for the passage of the body of the carton, which is distended somewhat by the inclusion of the folded down cross walls. The trough 360 at this point is closed at the base by a bottom plate 362 (see Fig. 31), and beyond the trough are located a pair of vertically standing rollers 363 mounted on vertical shafts 364 journaled at their upper ends within brackets 365. These rollers are positioned and spaced to engage the downfolded wing portions of the carton blank after the folding operation and after the wing portions have been folded down below the level of the body portion of the carton which rides along the bottom plate 362 of the trough.

The cartons are accurately positioned by the thrust of a kicker finger 366 mounted upon a rock shaft 367 journaled in part through a bracket arm 368 outstanding from a post 369 which is a companion to like posts 370, 371, 372, standing in

cornerwise relation to one another and supported upon a table 373. The rock shaft 367 (see Fig. 35) is provided with a crank arm 374 which pivots a draw rod 375 actuated by a cam 376 on a cam shaft 377.

With a carton standing upright within the guideway 360, vacuum cups 378 swing inwardly, as shown in Fig. 31, to engage the upper margins of the two wing portions to initially draw them outwardly to the dotted line position shown in Fig. 31. The vacuum cups are respectively mounted upon swinging arms 379 pivoted upon pintles 380, and the two arms are connected by a toggle 381 which in turn is actuated by a lever 382 pivoted on a pintle 383 and operated by a rod 384 connected at its lower end to a lever 385 pivoted at 386, and actuated by a cam 387 on a cam shaft 388 which is in train through bevel gearing 389 with the cam shaft 377.

The members of the toggle are connected with the respective arms by springs 390, and the arrangement is such that as the arm 382 lifts, the toggle is broken and serves to swing the arms 379 inwardly to bring the vacuum cups into compression contact with the opposite walls of the carton blank, after which a downward movement of the arm 382 serves to spread the arms and diverge the walls of the carton blank. Immediately thereafter, spreader arms 391 descend from the full line position shown in Fig. 31 to the dotted line position to bring the fingers 392 into position to engage the separated carton walls. The arms are widely spread and swung downwardly to continue the spreading and downfolding operation until ultimately the arms are brought downwardly into the dotted line position indicated in Fig. 31, which movement is of sufficient amplitude to fold down the wing portions of the carton blank over the folding lips 361 of the guideway in preparation for the final compressive folding action.

The spreader arms 391 are mounted in the manner shown in Figs. 29 and 30. The arms in initial position lie closely together, and each of the arms, at its rear end, is pivoted at 393 upon a lug 394 outstanding from a bracket 395, which is keyed upon a rock shaft 396 provided at one end with a crank 397 having pivoted thereto a draw rod 398, the lower end of which (see Fig. 35) connects with a lever 399 pivoted at 400 and actuated by a cam 401 on the cam shaft 388.

Each of the spreader arms is provided with an upstanding arcuate bracket 402 provided at its end with a roller 403 riding within an angular slot 404 in an arched plate 405 rigidly carried by a cross bar 406, the ends of which are anchored through bridge plates 407 supported upon the posts 369 and 370. The configuration of the angular slots 404 is such that as the spreader arms 391 are swung downwardly by the rocking of the shaft 396, the rollers 403 will follow the convergence of the slots 404 which will swing in the inner ends of the respective spreader arms at points beyond the pivotal mountings therefor, so that the outer or acting ends of the arms will be widely spread apart as the arms are swung downwardly, which will serve to open up and fold down the wing portions of the carton blank. With the wings thus down spread, they are in position to be finally folded by the action of folder fingers 408—408 (see Fig. 34), each of which is mounted upon a vertical rock shaft 409 and is of elbow formation with the two fingers, when closed, extending in convergent relation to one another, and with their acting ends in parallelism on either side

of the trough 360, against which the ends abut when in closed position.

The two vertical shafts 409 (see Fig. 35) stand in opposed relation to one another, and are provided respectively with arms 410 and 411, which extend across one another and the former of which is slotted at 412 to receive a pin 413 upstanding from the arm 411. The arm 411 is actuated by a draw rod 414 operated by a cam 415 on the cam shaft 377, and the arrangement is such as to rock the shafts 409 oppositely and in unison to swing the folder arms 408 from a widely distended position to the closed folding position illustrated in Fig. 34.

With the cartons thus folded, they are ready for discharge, and such discharge is effected by the reciprocating movements of a thrust plate 416 which is slotted in its upper edge 417 to embrace the guideway 360. The lower edge of the thrust plate extends below the guideway and in position to engage the wing portions of the carton blank when folded over and down by the folding mechanisms previously described. The thrust plate 416 is carried by a vertical leg 418 (see Fig. 35) operating through a slot 419 in the table 373, which leg is carried by a slide rod 420, guided within brackets 421 and operated by a lever arm 422 pivoted at 423 and actuated by a draw rod 424 operated by a cam 425 on the cam shaft 377.

Since the carton is delivered into the guideway 360 in upstanding position, it clears the plate 416, but after the wing portions are turned downwardly they will lie in front of the plate so that the forward reciprocation of the plate will deliver the downturned wing portions of the carton blank into the bite of the rollers 363, which serve to advance it to the final stacker H (see Fig. 34). The stacker receives the folded cartons through a flared throat 426, and the thrust of the rollers is supplemented by the action of a kicker arm 427, having at its end a finger 428 pivoted at 429 and mounted to have a rocking movement which is limited by a stop pin 430. The finger 428 engages a stop 428^a on the stacker H to completely advance the carton into the stacker in a manner shown by dotted lines in Fig. 34.

The kicker arm is mounted upon a vertical rock shaft 431, the upper end of which is journaled within a bracket 432, and the lower end of which carries a crank 433 (see Fig. 35) to which is connected a draw rod 434 actuated by a cam 435 on the shaft 377.

After the assembled cartons have been entered through the throat 426, they are acted upon by a plunger 436 carried by a plunger rod 437 guided within lugs 438 and operated by the upstanding leg 439 of an angle bar 440 (see Fig. 35), the inner end of which connects with a pitman 441 actuated by a cam 442 on the shaft 388. This serves to cause reciprocation of the plunger plate 436 to pack the folded cartons forwardly into a horizontal hopper 443 and against a plate 444 which yields as the stack is augmented by the incoming cartons.

The kicker arm 427 is provided with the spring pressed finger 428 to permit yielding of the finger as the arm is retracted, which prevents possible interference with an oncoming carton.

All of the mechanisms are operated in timed relation to one another to perform the operations described in their proper sequence, and to deliver the cartons in finally assembled and folded condition ready for removal.

In Fig. 39 we have shown a modified arrangement in which the mechanisms heretofore described are more intimately tied together, so that

it is unnecessary to first stack the scored, and punched cartons in the stacker E, and thereafter remove them and deliver them in column form into the hopper 216 in flatwise position, and thereafter upend them preparatory to the insertion of the cross walls.

In the simplified mechanism illustrated in Fig. 39, the blanks, after being die cut, are delivered directly from the die cutting mechanism D to the inserting mechanism while still in upstanding folded position. For this purpose two pairs of forwarding rollers 445 and 446 are provided which serve to advance the blanks standing edgewise through a channel 447 to the mechanism for holding the blanks vertically edgewise while the cross walls are inserted. The channel 447 delivers the blanks standing edgewise in front of a plate or shoulder 448 (Fig. 40) which is provided with slots 449 to afford clearance for the operation of fingers 450 carried by a suitably actuated rock shaft 451 which serves to move the fingers 450 from the full line position to the dotted line position in Fig. 40, and to thus advance the blanks flatwise against the ends of the runways through which the cross walls are delivered. From this point onwardly the mechanism is in all respects similar to that previously described, and the operations involved are in all respects similar, so that further description is deemed unnecessary. The drive or cam shafts 152 and 232 of the two units above described may be connected by a shaft 452 having suitable bevel gears 453 and 454 so that the units are driven in timed relation.

The assembled and flat folded carton blanks accumulating in the horizontal hopper 443 (H) stand vertically on edge, and after a group of such stacked cartons has accumulated to the desired number, they are removed and stacked in uniform relation within a hopper 455. A second group is stacked in reverse relation, as indicated in Fig. 20, to equalize the accumulation of the complete stack in the required numbers, after which they are taped or otherwise bound and removed for shipment.

Summary of operations

In operation, the printed blanks are successively fed from stack formation and are either preliminarily scored along the bending lines or are scored in their passage through the rollers B, which may be provided with coating scoring grooves and ribs, as indicated in Fig. 8. In any event, the individual blanks arrive at the breaking mechanism C in scored condition, and are at this point bent along the spaced parallel scoring lines to provide a medial V-shaped body portion with outstanding wing portions on either side thereof. During the breaking operation, the blanks will be guided and controlled during their forward advance by the weighted blade section 94 and finger 140 which ride within the medial groove in the V-shaped body section and prevent the blank from springing back to flatwise formation after the breaking operation and during its progress toward the rollers 128.

The bite of these rollers against the walls of the medial section will of course flatten the walls against one another with the wing portions projecting above and laterally from the tops of the rollers, and thereafter, during the advance of the blanks, these wing portions will be engaged by the converging guide bars 146 and progressively lifted or bent upwardly into flatwise relation to one another in preparation for the entry of the blank into the die mechanism D, so that, during the die

cutting operation, the blank will stand in once-folded relation to receive the corresponding die cuts through the two plies of the blank, as well as the half-circular notches in the folded base edge thereof.

In preparation for the die cutting operation, the blank will be properly positioned by the combined action of the stop block 149 and the spring-pressed finger 159, and after receiving the die cuts, the blank will be further advanced by the terminal swing of the arm 154 to bring the forward vertical edges of the blank into the bite of the rollers 201 which advance the folded and died blank to the stacker E, within which it is positively positioned by the swing of the kicker arm 213.

In the alternate form of construction shown in Fig. 39, the stacker E is omitted, and the blanks still in vertically standing folded condition will pass directly forward into the assembling mechanism, but in other respects the operations throughout are the same in either form of construction.

In the construction principally illustrated, the blanks stacked within the stacker E, in horizontal column formation, are removed therefrom and placed in vertical column formation within the hopper 216, which is located on one side of the medial center of the assembling mechanism F in preparation for the reception of a set of cross wall blanks fed inwardly from the opposite side of the machine into position to register edgewise with the registering slots cut through the companion walls of the carton blanks. With the blanks exactly positioned and clamped to prevent displacement, and with their lower portions flexed by the action of the presser fingers 295 against the offset shoulders 303, the died slots in the carton blanks will exactly register with the ends of the runways through which a set of cross wall blanks are progressively advanced by the intermittent four-way movements of the feeding bars, so that the forward rank of the procession of cross wall blanks will stand ready to slip through the slots upon the next movement of the feeding mechanism without danger of jamming by reason of the narrow character of the slots through which the cross walls are projected.

As soon as a set of cross walls is projected through the slots in a carton blank, the blank is lifted while the set of cross walls is held against lifting, so that, as the carton blank is lifted, it will be flexed through the throated slots in the cross wall blanks and in position to clear the line of inwardly presented tongues *k* on the cross wall blanks, until the notches in the base edge of the carton blanks are presented to the tongues *k*, which permits the tongues to snap into the notches and thus lock the set of cross walls in position, which completes the assembling operation. Thereafter, the assembled carton is moved upwardly, removing the cross walls from the runways, whereupon the upper wing portions of the carton blank are released by the clamping fingers 320, and are advanced by the kicker arm 346 into the bite of the rollers 353 which engage the upper wing portions of the carton blanks and feed the blanks through the converging walls of the runway into the folding mechanism G. The upstanding wing portions of the blanks are thereupon initially spread by the action of the suction cups, and more completely spread by the swing of the spreader arms which fold down the respective wing portions on either side of the lips 361, and the wings are finally folded to flatwise position and below the medial body portion of the

carton blank by the action of the folder fingers 408. With the assembled carton blanks thus folded, they are ejected by the action of the thrust plate 416 and ultimately fed to and assembled within the stacker H.

Numerous modifications in detail may be incorporated into the mechanism without departing from the spirit of the invention; and it will be understood that in the claims appended hereto, it is the intention, within the scope of each of the claims, to cover the invention either in the form shown or in any other form which substantially conforms to the principles of operation and to the method of handling and assembling the blanks hereinbefore described.

We claim:

1. The method of assembling carton blanks which consists in feeding forward the carton blanks in processional relation, bending each carton blank along bending lines to provide a medial body portion, the side walls of which are reversely folded with respect to one another along a medial base folding line, and the upper wing portions of which are bent downwardly with respect to the walls of the body portion along parallel folding lines, feeding the medially folded blanks singly and bringing them into flatwise relation, and subjecting them to a die cutting operation to provide registering slots through the opposed walls of each folded blank; feeding the died blanks singly and holding them positioned in assembling position; transversely feeding and guiding a set of cross wall blanks having in their base edges upwardly extending slots and projecting them through the registering slots in the walls of a positioned carton body blank, advancing the assembled blanks singly and nesting the inserted cross wall blanks into flatwise relation to the body blank during said advance; spreading and folding down the upstanding wing portions of each carton blank to bring their edges below the body portion of the blank and into flatwise relation with one another, and advancing and delivering the assembled and flat folded blanks.

2. The method of assembling carton blanks which consists in feeding forward the carton blanks in processional relation, bending each carton blank along bending lines to provide a medial body portion, the side walls of which are reversely folded with respect to one another along a medial base folding line, and the upper wing portions of which are bent downwardly with respect to the walls of the body portion along parallel folding lines, feeding the medially folded blanks singly and bringing them into flatwise relation, and subjecting them to a die cutting operation to provide registering slots through the opposed walls of each folded blank, and notches along the medial base fold; feeding the died blanks singly and holding them positioned in assembling position; transversely feeding and guiding a set of cross wall blanks having in their base edges upwardly extending slots formed with inwardly extending locking tongues, and projecting them through the registering slots in the walls of a positioned carton body blank, lifting each carton body blank with respect to the inserted cross wall blanks to interlock the tongues in the latter with the notches in the base of the carton body blank, advancing the assembled blanks singly and nesting the inserted cross wall blanks into flatwise relation to the body blank during said advance; spreading and folding down the upstanding wing portions of each carton

blank to bring their edges below the body portion of the blank and into flatwise relation with one another, and advancing and delivering the assembled and flat folded blanks.

3. The method of assembling carton blanks which consists in feeding forward the carton blanks in processional relation, bearing each carton blank along bending lines to provide a medial body portion, the side walls of which are reversely folded with respect to one another along a medial base folding line, and the upper wing portions of which are bent downwardly with respect to the walls of the body portion along parallel folding lines, advancing the medially folded carton blanks singly and bringing them to die cutting position, die cutting the walls of the folded carton blanks to provide therein a row of registering slots through the companion walls; bringing the folded blanks singly to assembling position; transversely feeding a set of cross wall blanks and projecting them through the slots in the carton blanks; and advancing the carton blanks singly and nesting down the cross wall blanks onto one another during said advancement.

4. The method of assembling carton blanks which consists in feeding forward the carton blanks in processional relation, bending each carton blank along bending lines to provide a medial body portion, the side walls of which are reversely folded with respect to one another along a medial base folding line, and the upper wing portions of which are bent downwardly with respect to the walls of the body portion along parallel folding lines, advancing the medially folded carton blanks singly and bringing them to die cutting position, die cutting the walls of the folded carton blanks to provide therein a row of registering slots through the companion walls; bringing the folded blanks singly to assembling position; transversely feeding a set of cross wall blanks and projecting them through the slots in the carton blanks; and advancing the carton blanks singly and nesting down the cross wall blanks onto one another during said advancement, and separating and folding down the wing portions of the carton blanks to overlie the nested cross wall blanks on either side thereof.

5. The method of assembling carton blanks which consists in feeding forward the carton blanks in processional relation, bending each carton blank along bending lines to provide a medial body portion, the side walls of which are reversely folded with respect to one another along a medial base folding line, and the upper wing portions of which are bent downwardly with respect to the walls of the body portion along parallel folding lines, advancing the medially folded carton blanks singly and bringing the walls thereof into flatwise relation to one another, and advancing the once-folded blanks singly to die cutting position; die cutting the walls of the folded carton blanks to provide therein a row of registering slots through the companion walls; bringing the folded blanks singly to assembling position; transversely feeding a set of cross wall blanks and projecting them through the slots in the carton blanks; and advancing the carton blanks singly and nesting down the cross wall blanks onto one another during said advancement.

6. The method of assembling carton blanks which consists in feeding forward the carton blanks in processional relation, bending each carton blank along bending lines to provide a medial

body portion, the side walls of which are reversely folded with respect to one another along a medial base folding line, and the upper wing portions of which are bent downwardly with respect to the walls of the body portion along parallel folding lines, advancing the medially folded carton blanks singly and bringing the walls thereof into flatwise relation to one another, and advancing the once-folded blanks singly to die cutting position; die cutting the walls of the folded carton blanks to provide therein a row of registering slots through the companion walls; bringing the folded blanks singly to assembling position; transversely feeding a set of cross wall blanks and projecting them through the slots in the carton blanks; and advancing the carton blanks singly and nesting down the cross wall blanks onto one another during said advancement, and separating and folding down the wing portions of the carton blanks to overlie the nested cross wall blanks on either side thereof.

7. The method of assembling carton blanks which consists in feeding forward the carton blanks singly in unfolded flatwise relation and positioning them for bending along parallel scored medial and outer bending lines, and dividing the carton into a medial body portion and outer wing portions; supporting the opposed wing portions with the medial body portion in unsupported relation; exerting pressure to bend the medial portion along the medial scoring line to V-shaped body formation and bending the wing portions outwardly with respect thereto along the outer scoring lines; engaging the body portion of the carton blank on opposite sides of the medial scoring line and advancing the same, and bringing the bent over wing portions into flatwise relation, and delivering the carton blanks in once-folded flatwise condition.

8. The method of assembling carton blanks which consists in feeding forward the carton blanks singly in unfolded flatwise relation and positioning them for bending along parallel scored medial and outer bending lines, and dividing the carton into a medial body portion and outer wing portions; supporting the opposed wing portions with the medial body portion in unsupported relation; exerting pressure to bend the medial portion along the medial scoring line to V-shaped body formation and bending the wing portions outwardly with respect thereto along the outer scoring lines; maintaining pressure along the medial scoring line to prevent springing up of the medial portion of the carton blank during advancement; engaging the body portion of the carton blank on opposite sides of the medial scoring line and advancing the same, and bringing the bent over wing portions into flatwise relation, and delivering the carton blanks in once-folded flatwise condition.

9. The method of assembling carton blanks which consists in feeding forward the carton blanks singly in unfolded flatwise relation and positioning them for bending along parallel scored medial and outer bending lines, and dividing the carton into a medial body portion and outer wing portions; supporting the opposed wing portions with the medial body portion in unsupported relation; exerting pressure to bend the medial portion along the medial scoring line to V-shaped body formation and bending the wing portions outwardly with respect thereto along the outer scoring lines; engaging the body portion of the carton blank on opposite sides of

the medial scoring line and advancing the same, and bringing the bent over wing portions into flatwise relation advancing the once-folded flat carton blanks to dieing position; die cutting the blanks to afford registering slots in the opposed walls of the once-folded carton blanks, and delivering the died once-folded carton blanks.

10. The method of assembling carton blanks which consists in feeding forward the carton blanks singly in unfolded flatwise relation and positioning them for bending along parallel scored medial and outer bending lines, and dividing the carton into a medial body portion and outer wing portions; supporting the opposed wing portions with the medial body portion in unsupported relation; exerting pressure to bend the medial portion along the medial scoring line to V-shaped body formation and bending the wing portions outwardly with respect thereto along the outer scoring lines; maintaining pressure along the medial scoring line to prevent springing up of the medial portion of the carton blank during advancement; engaging the body portion of the carton blank on opposite sides of the medial scoring line and advancing the same, and bringing the bent over wing portions into flatwise relation, and advancing the once-folded flat carton blanks to dieing position; die cutting the blanks to afford registering slots in the opposed walls of the once-folded blanks, and delivering the died once-folded carton blanks.

11. In mechanism of the class described, the combination of means for feeding carton blanks singly and in flatwise relation, bending mechanism to which the blanks are fed, said bending mechanism comprising anvil members separated from one another to afford a medial gap, a base member below said medial gap, a pressure member adapted to coast with the anvil members and including a medial blade member positioned to operate through the gap between the anvil members and toward the base member for bending the carton blank along a medial folding line to afford a V-shaped carton body portion, and along lateral folding lines to afford outstanding wing portions, the blade including a freely movable section adapted to ride upon the medial fold to prevent springing up of the carton blank after bending, and mechanism for advancing the cartons singly from the anvil mechanism.

12. In mechanism of the class described, the combination of means for feeding carton blanks singly and in flatwise relation, bending mechanism to which the blanks are fed, said bending mechanism comprising anvil members separated from one another to afford a medial gap, each of said anvil members including a flat body portion and angularly disposed marginal portions and a reciprocable presser member comprising flat body portions coacting with the flat anvil portions and wing portions coacting with the marginal anvil portions, and the presser member including a centrally disposed blade adapted to operate through the gap between the anvil members, and a trough shaped plate located below said gap for coaction with said blade member for bending the carton blanks to afford a V-shaped body portion and bent-down wing portions, the blade including a freely movable section adapted to ride within the V-shaped body portion of the carton blank to prevent upspringing thereof upon recession of the pressure member.

13. In mechanism of the class described, the combination of means for feeding carton blanks singly and in flatwise relation, bending mechanism

nism to which the blanks are fed, said bending mechanism comprising anvil members separated from one another to afford a medial gap, each of said anvil members including a flat body portion and angularly disposed marginal portions and a reciprocable presser member comprising flat body portions coacting with the flat anvil portions and wing portions coacting with the marginal anvil portions, and the presser member including a centrally disposed blade adapted to operate through the gap between the anvil members, and a trough shaped plate located below said gap for coaction with said blade member for bending the carton blanks to afford a V-shaped body portion and bent-down wing portions, the blade including a freely movable section adapted to ride within the V-shaped body portion of the carton blank to prevent upspringing thereof upon recession of the presser member, and swinging fingers located on opposite sides of the anvil member and movable to engage and inwardly bend the marginal portions of the carton blank beyond the edges of the anvil members.

14. In mechanism of the class described, the combination of means for feeding carton blanks singly and in flatwise relation, bending mechanism to which the blanks are fed, said bending mechanism comprising means for bending the blanks along a medial base folding line to afford a body portion and laterally bent wing portions, converging guide members adapted to straighten up the wing portions and bring the body and wing portions into once-folded flatwise relation, fixed and movable die members provided with dies adapted to punch a row of registering slots through the walls of the medially folded carton blanks, a feeding arm adapted to positively advance the once-folded carton blanks into position between the die members and adapted after the die cutting operation by supplemental movement to further advance the die cut blanks and initiate their discharge from the die cutting members, and roller means for gripping the initially discharged blanks and carrying them forward from the die cutting members.

15. In mechanism of the class described, the combination of means for feeding carton blanks singly and in flatwise relation, bending mechanism to which the blanks are fed, said bending mechanism comprising means for bending the blanks along a medial base folding line to afford a body portion and laterally bent wing portions, converging guide members adapted to straighten up the wing portions and bring the body and wing portions into once-folded flatwise relation, fixed and movable die members provided with dies adapted to punch a row of registering slots through the walls of the medially folded carton blanks, a swinging arm adapted to feed the blanks into position between the die cutting members and provided with a spring-pressed finger adapted to press the blanks into squared upstanding relation between the die members and adapted by a terminal supplementary movement to initiate the discharge of the die cut blanks from the die cutting members, and roller means positioned to receive the blanks upon the initial discharge and to complete the discharge thereof from the die cutting members.

16. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly

beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls.

17. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading.

18. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls.

19. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls.

20. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and swinging folding arms movable to en-

gage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to initiate the discharge of folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks.

21. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to initiate the discharge of folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks to complete the discharge thereof.

22. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to initiate the discharge of folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks, said roller means being located below the plane of the slot afforded by the walls of the guideway for the body of the carton blanks.

23. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, swinging vacuum cups adapted to initially separate the projected walls from one another, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to ini-

tiate the discharge of folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks to complete the discharge thereof, said roller means being located below the plane of the slot afforded by the walls of the guideway for the body of the carton blanks.

24. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blanks, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls.

25. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blanks, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading.

26. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blanks, and companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls.

27. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blanks, companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls.

28. In mechanism of the class described, fold-

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- ing mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blanks, companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to initiate the discharge of the folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks.
29. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blank, companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to initiate the discharge of folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks to complete the discharge thereof.
30. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blanks, companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to initiate the discharge of folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks to complete the discharge thereof, said roller means being located below the plane of the slot afforded by the walls of the guideway for the body of the carton blanks.
31. In mechanism of the class described, folding mechanism for carton blanks including a guide member having closely spaced walls positioned to receive and hold the base body portion of a folded carton blank with the portions of the blank required to be folded extending outwardly beyond the walls of the guide member, means for initially separating the projected walls of the carton blanks, companion spreading members adapted thereafter to enter between the separated walls of the carton blanks and movable to spread and bend the same along bending lines afforded by the edges of the guide member walls, and further movable to positions laterally adjacent said walls on either side thereof to complete said spreading, and swinging folding arms movable to engage the carton blank walls after spreading and to complete the folding thereof against the outer surfaces of the guide member walls, a feeding member movable to initiate the discharge of folded blanks from the guide member, and roller means positioned to engage the folded down marginal portions of the carton blanks to complete the discharge thereof, said roller means being located below the plane of the slot afforded by the walls of the guideway for the body of the carton blanks.
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