Dec. 10, 1940. J. L. COYLE 2,224,510

EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

Filed Nov. 12, 1938 8 Sheets-Sheet 1

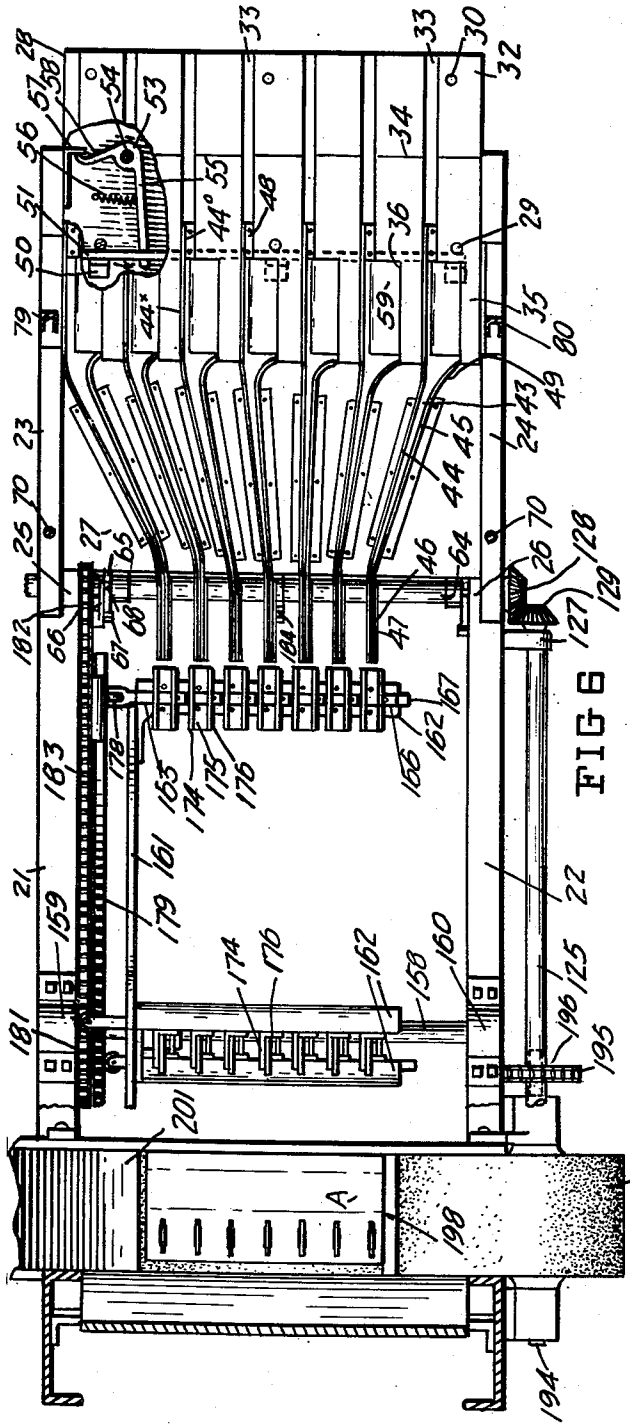


FIG 6

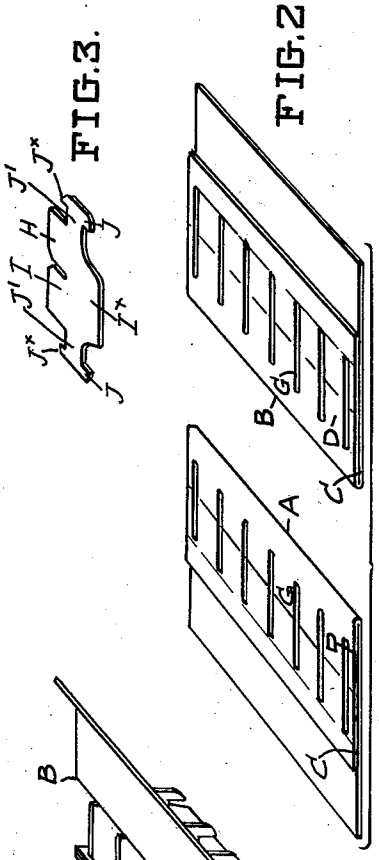


FIG. 3.

FIG. 2.

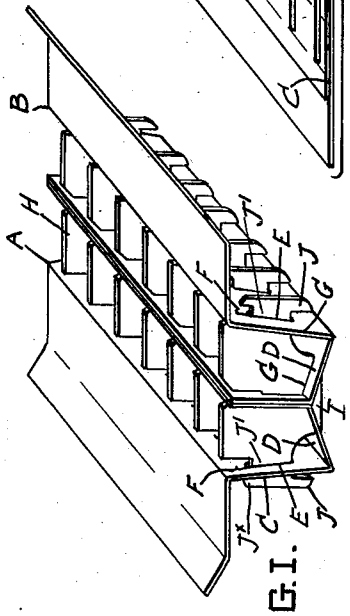


FIG. 1.

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Attorneys

Dec. 10, 1940. J. L. COYLE 2,224,510

EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

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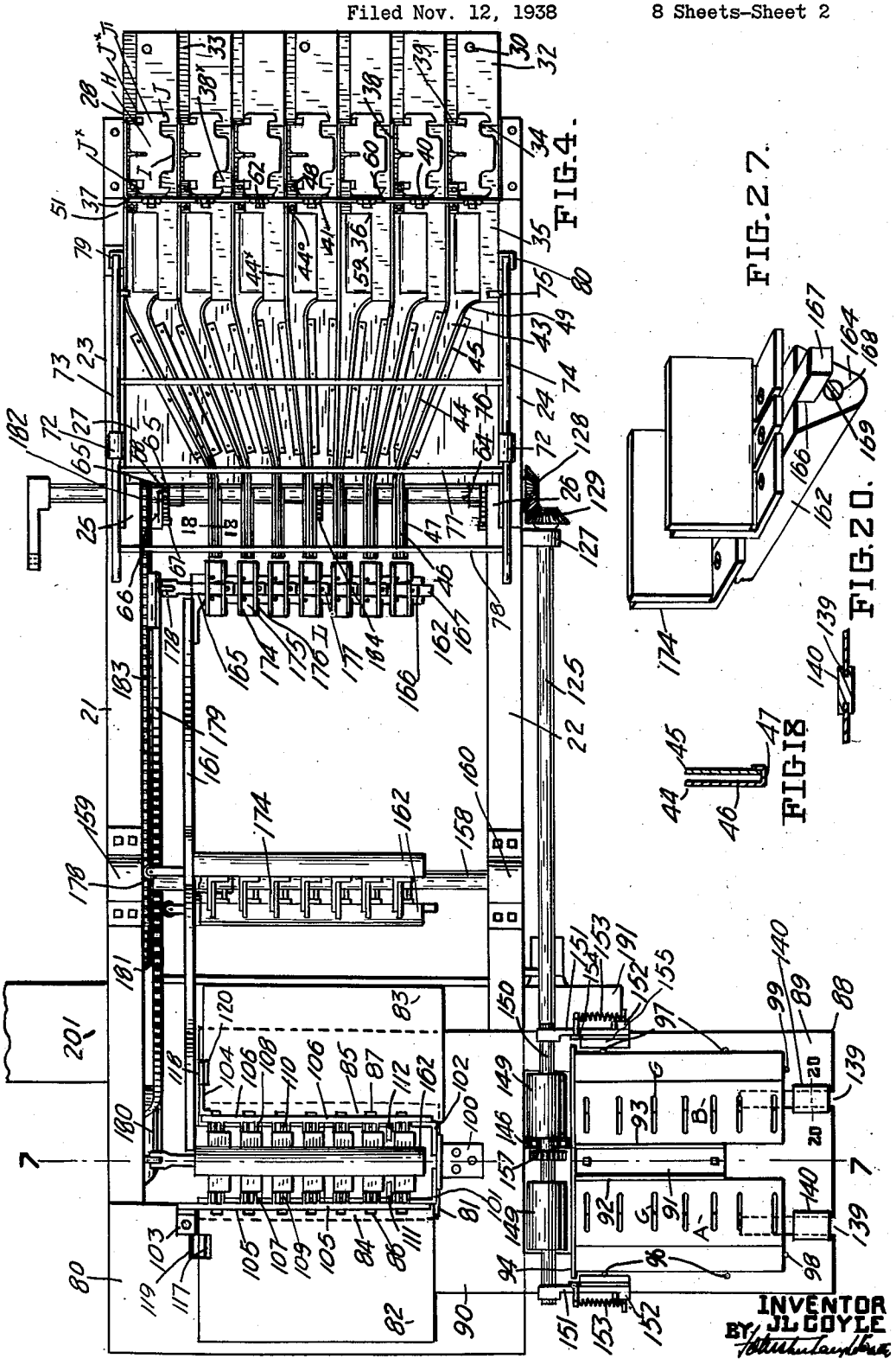


FIG. 4.

FIG. 27.

FIG. 20.

FIG. 18.

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EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

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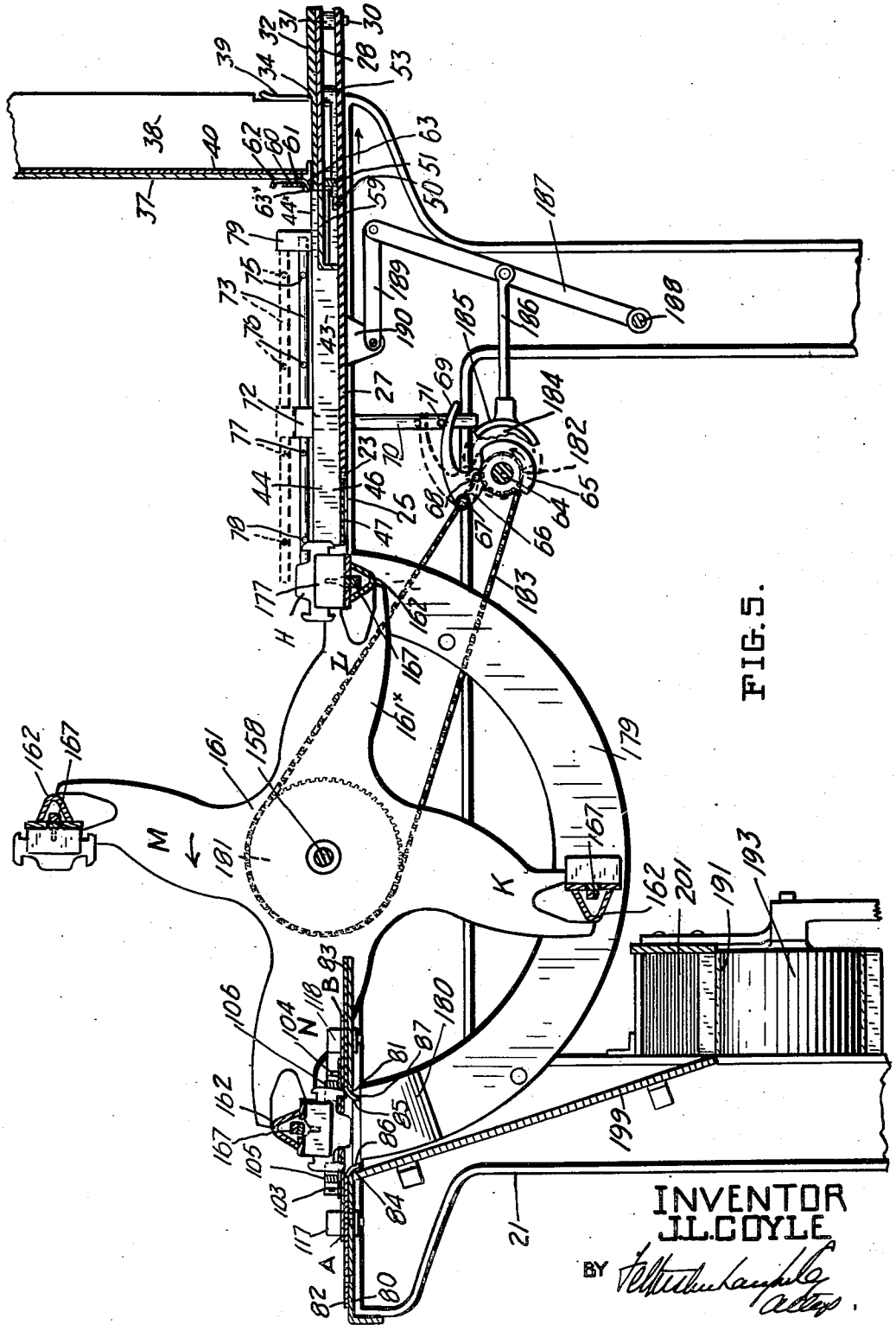


FIG. 5.

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EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

Filed Nov. 12, 1938 8 Sheets-Sheet 4

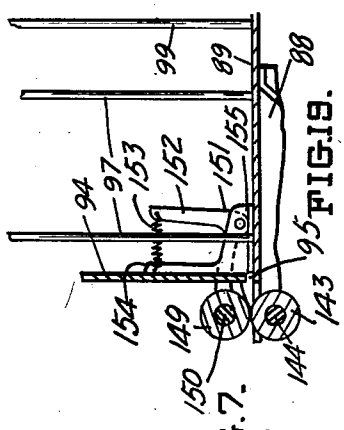


FIG. 7.

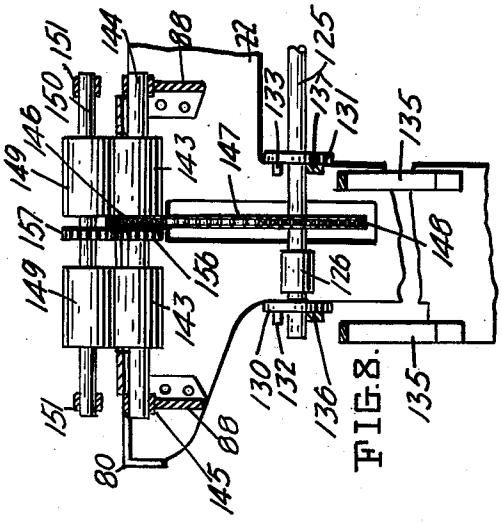


FIG. 8.

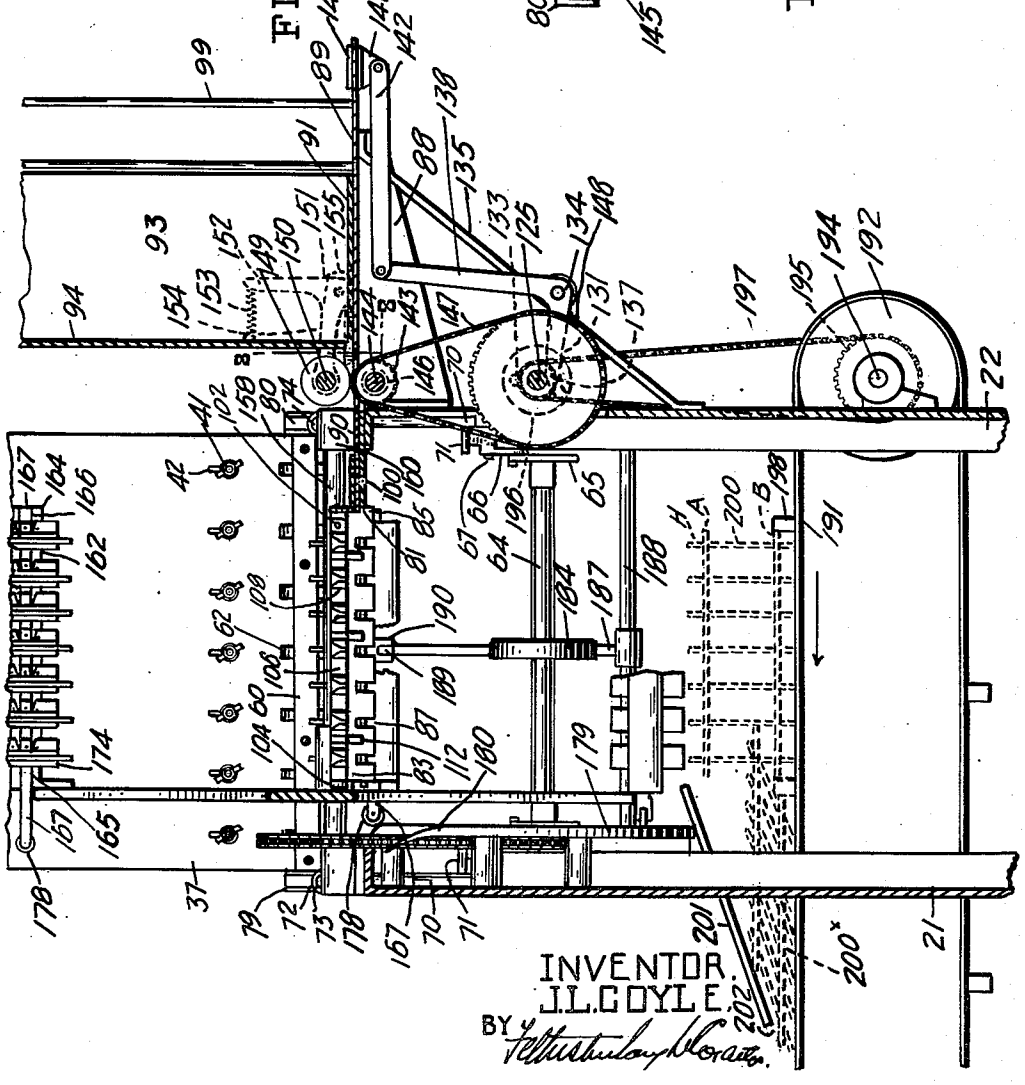


FIG. 9.

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EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

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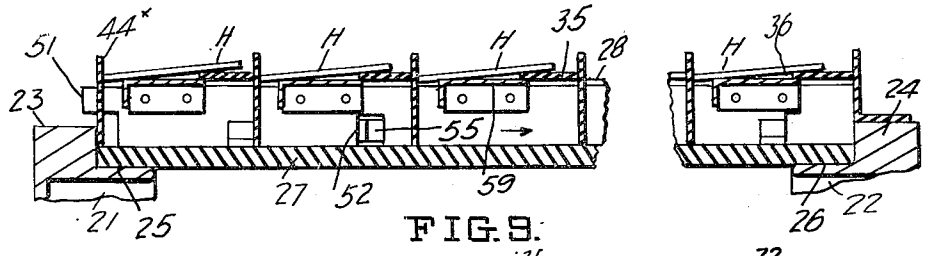


FIG. 9.

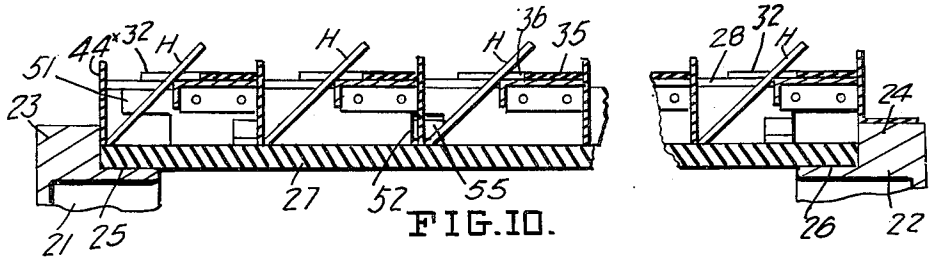


FIG. 10.

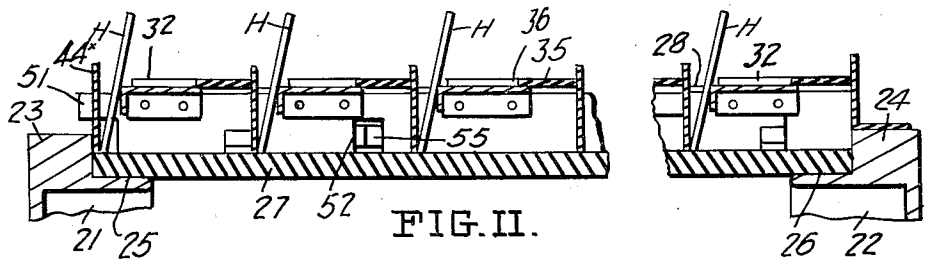


FIG. 11.

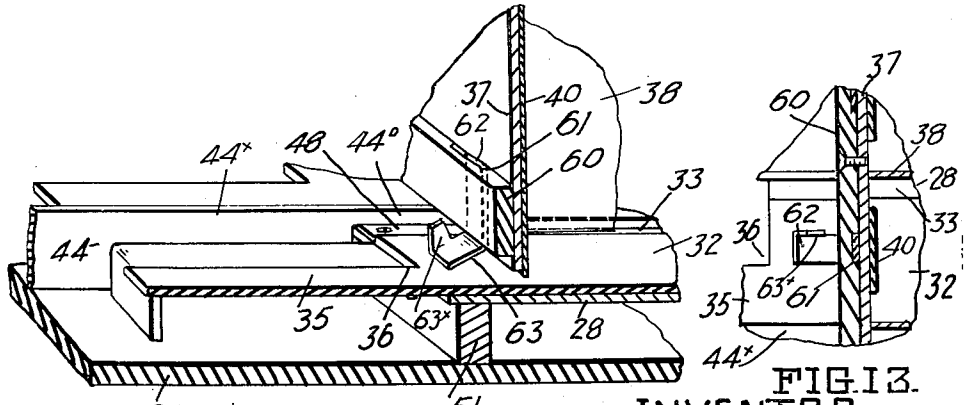


FIG. 12

FIG. 13.

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EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

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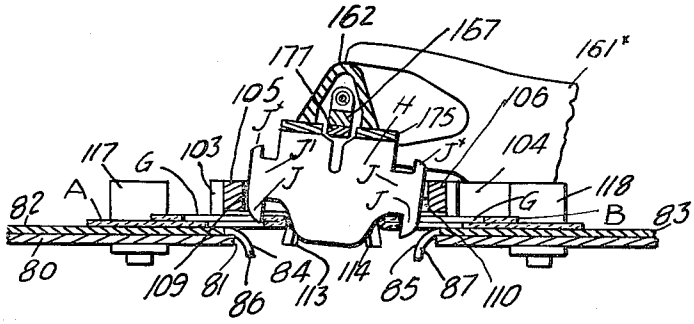


FIG.14.

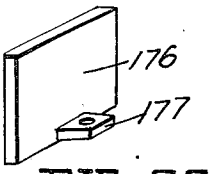


FIG. 23

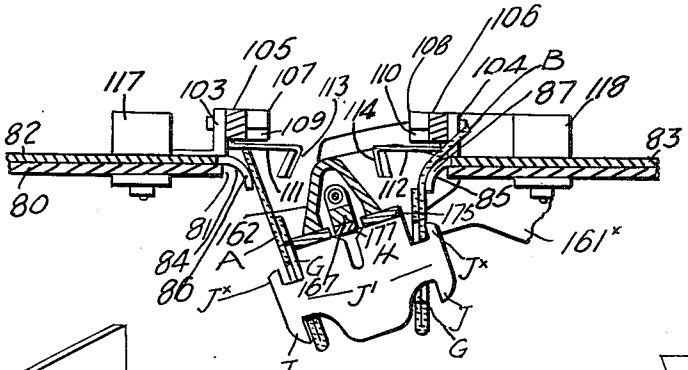
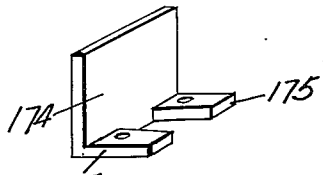


FIG.15.



175 FIG. 22.

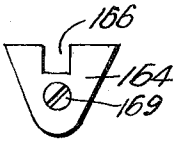


FIG.21.

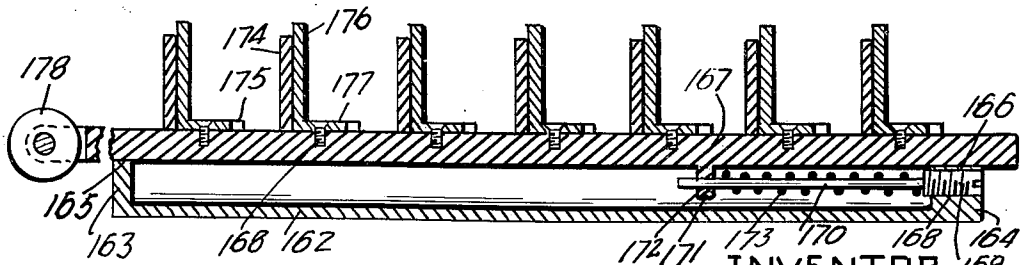


FIG.16.

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EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

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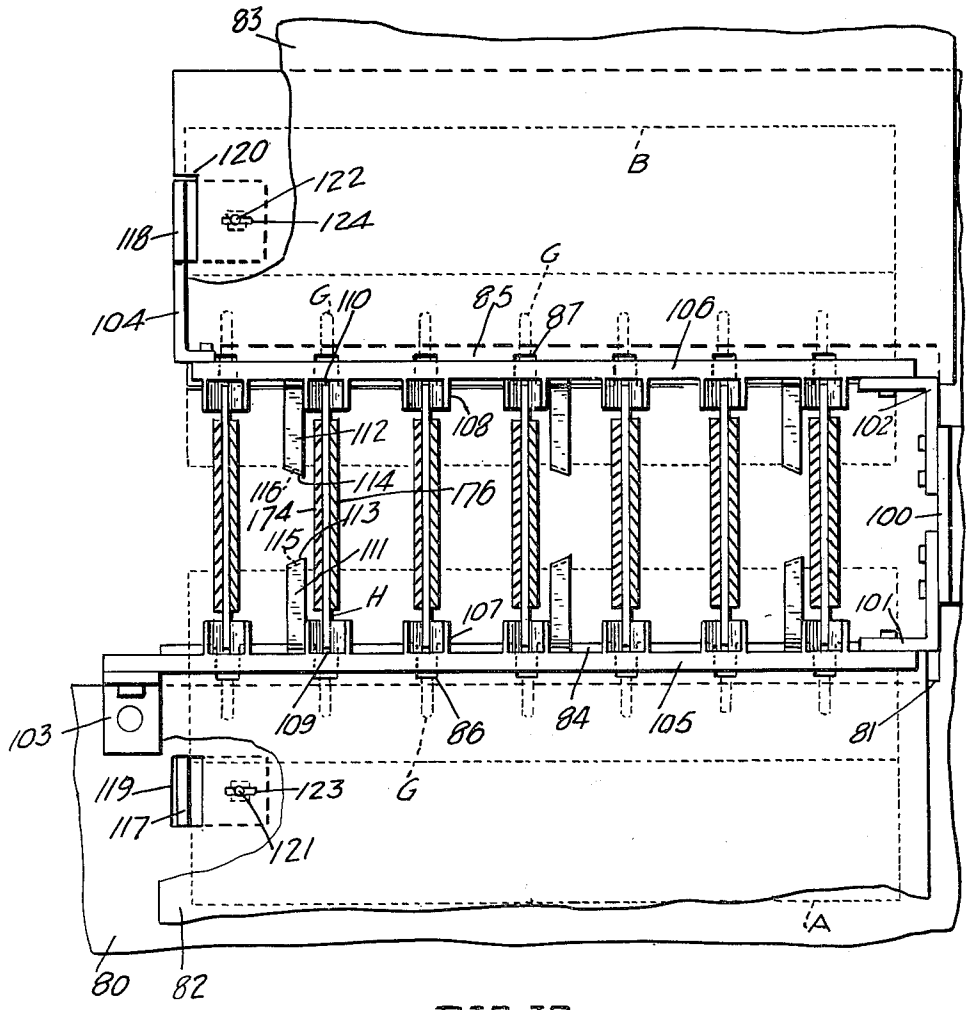


FIG. 17.

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Dec. 10, 1940. J. L. COYLE 2,224,510

EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

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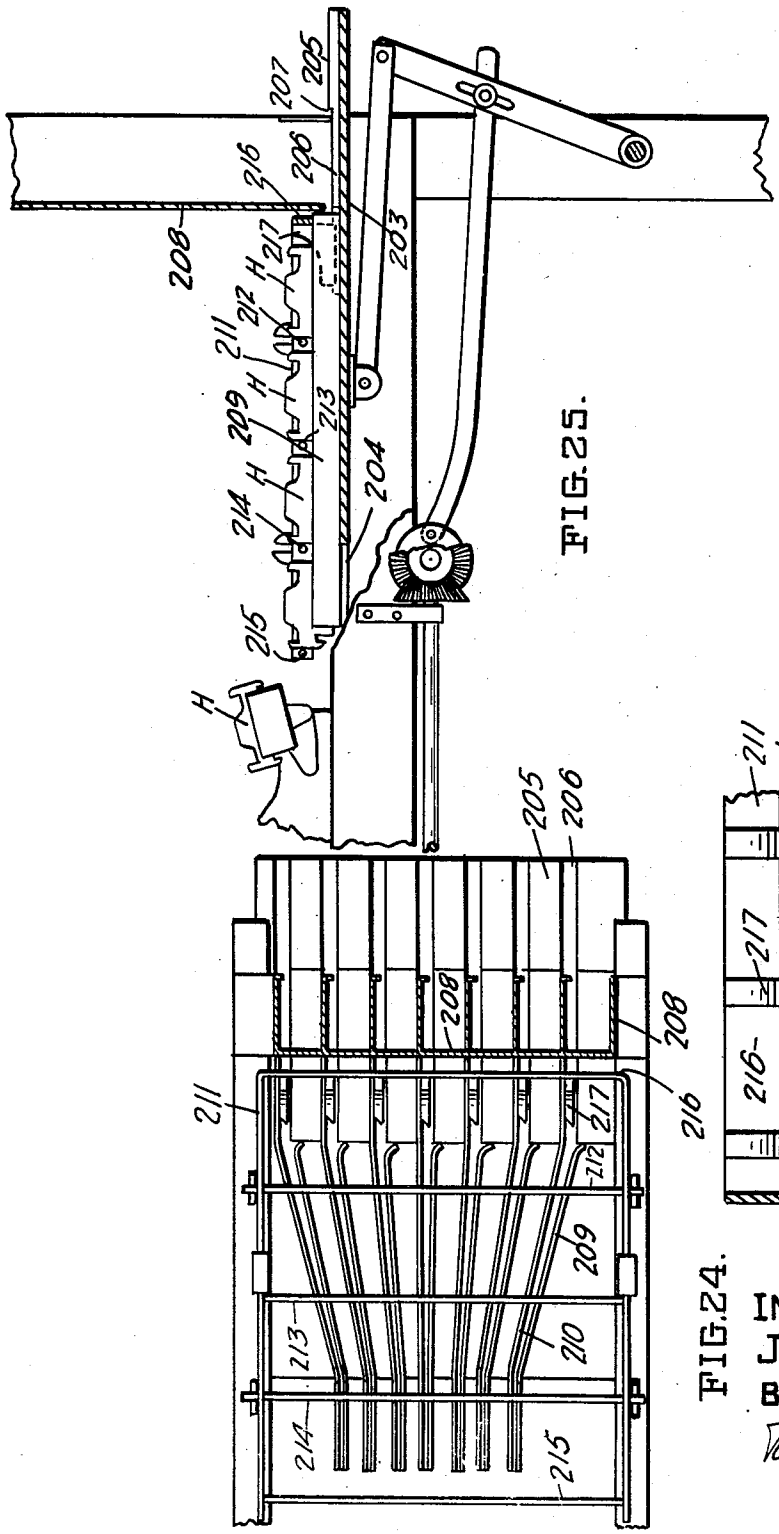


FIG. 25.

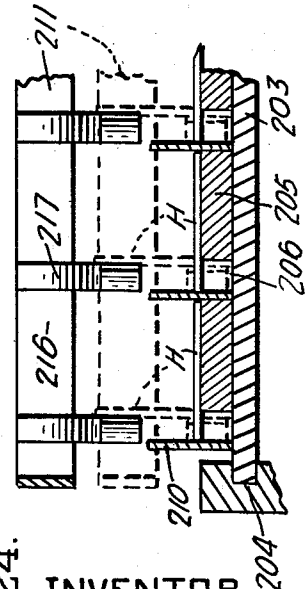


FIG. 26.

FIG. 24.

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BY

Patented Dec. 10, 1940

2,224,510

UNITED STATES PATENT OFFICE

2,224,510

EGG CARTON AND EGG FILLER ASSEMBLING MACHINE

Joseph Leopold Coyle, Toronto, Ontario, Canada

Application November 12, 1938, Serial No. 240,116

38 Claims. (Cl. 93—37)

My invention relates to improvements in egg cartons and egg filler assembling machines, and the object of the invention is to devise a machine which will automatically assemble parallel and cross wall members into a carton or filler of the type disclosed in my co-pending United States application Serial No. 146,024, filed June 2nd, 1937, and which will collapse the assembled carton or filler into flat form suitable for shipment, and it consists essentially of the arrangement and construction of parts all as hereinafter more particularly explained.

Fig. 1 is a perspective view illustrating the type of carton assembled by my machine.

Fig. 2 is a perspective view of the parallel side wall members of the carton separated apart in the general position they assume when in my machine.

Fig. 3 is a perspective view of one of the cross wall members of the carton.

Fig. 4 is a plan view of my machine.

Fig. 5 is a longitudinal section through Fig. 4.

Fig. 6 is a plan view similar to Fig. 4, the cross wall chutes and the parallel member feeding mechanism being removed and adjacent parts broken away to exhibit the carton collapsing mechanism and the mechanism for tilting the cross walls from a horizontal to a vertical position.

Fig. 7 is a cross sectional view on line 7—7 Fig. 4, the supporting arm of the cross wall gripping mechanism in the cross wall inserting position being removed.

Fig. 8 is a sectional view on line 8—8 Fig. 7 showing the feed rolls and driving mechanism in full.

Figs. 9, 10 and 11 are enlarged cross sectional views through the cross wall tipping mechanism broken away intermediately of their length.

Fig. 12 is an enlarged perspective detail of the tipping mechanism.

Fig. 13 is a plan sectional view of the major portion of Fig. 12.

Fig. 14 is an enlarged detail of the cross wall inserting mechanism and showing a cross wall in the position it assumes as it enters the slots of the parallel members of the carton.

Fig. 15 is a similar view to Fig. 14 showing cross wall inserted to draw the parallel carton members out of their holders.

Fig. 16 is an enlarged longitudinal sectional view through one member of the cross wall gripping mechanism.

Fig. 17 is a plan detail of the holder for the parallel carton members shown by fine dotted lines and showing the cross wall guides, cross walls, and their gripping members in section.

Fig. 18 is an enlarged sectional detail on line 18—18 Fig. 4.

Fig. 19 is a sectional detail of the chute containing the parallel carton members.

Fig. 20 is a sectional detail on line 20—20 Fig. 4.

Fig. 21 is an end view of one of the gripper arms.

Figs. 22 and 23 are perspective details of the gripping plates for the carton cross walls.

Fig. 24 is a plan view of the right hand portion of the machine showing a modified construction of cross wall tipping mechanism.

Fig. 25 is a sectional view through Fig. 24 showing one arm of the gripping mechanism in the position it assumes after gripping and lifting a cross wall.

Fig. 26 is an enlarged sectional detail of the tipping mechanism illustrated in Figs. 24 and 25 showing the cross walls in the horizontal position in full lines and in the vertical or tipped position by dotted lines.

Fig. 27 is an enlarged perspective detail of a fragmentary portion of the gripper arm and plates.

In the drawings like letters of reference indicate corresponding parts in the different views.

In Fig. 1, I have illustrated the type of carton which my machine is designed to assemble. In this figure the carton comprises parallel members A and B each including an outer wall C and a bottom wall D. The outer walls are provided with transverse slots E terminating at their upper ends in slits F and the bottom wall with transverse slots G. H are the cross walls of the carton provided with a central body I having bottom tongues I^x extending through the slots G and end tongues J and J^x extending through the slots E and carried by the portion J'.

The carton is not described further in detail as it does not form part of the present invention but is only illustrated to render the object and operation of my machine more clear.

I will now describe the construction of my machine which is the subject of the present application.

The main frame of the machine includes side members 21 and 22 provided with guide ribs 23 and 24 forming slideways 25 and 26 for a slidable base plate 27 reciprocated therein by mechanism hereinafter described. An upper plate 28 is mounted on the base plate 27 by means of

bolts 29 and 30 each having spacing sleeves 31 to space the plates 27 and 28 apart.

Feed plates 32 are suitably secured to the plate 28 in spaced apart position to form intervening longitudinal grooves 33. The plates 32 are provided with transverse feed shoulders 34 which are slightly less in height than the thickness of the cross walls H and with forward extensions 35 forming a rectangular recess 36 for a purpose which will hereinafter appear.

The chute containing the cross walls H of the carton is formed by a main front wall 37 from which extend dividing walls 38 forming a chute chamber 38^x over each feed plate 32 for holding a pile of cross walls H supported at its base on the corresponding feed plate 32. The lower portion of each pile is guided into position by the inturned lip 39. A gauge plate 40 is provided which is adjustable by the set screws 41 extending through slots 42 in the wall 37 to ensure that only the bottommost cross wall is fed forward at each feed stroke of the plate 32.

A channel 43 extends forward from the front end of each recess 36 and is formed by the spaced apart walls 44 and 45 secured to the base plate 27 which converge gradually towards the forward edge of the base plate 27 and then extend forward parallelly to overhang the base plate 27 as indicated at 46. The centres of the overhanging portions 46 are spaced apart a distance equal to the distance between centres of the slots G of the carton and in alignment therewith. The lower edge of each wall 44 of the overhanging portion 46 is extended as illustrated at 47 in Fig. 18 and bent around the bottom of the wall 45 to form a support for the cross wall H contained in the channel portion 46 and in which they are held in a vertical position.

As the cross walls are fed forward from the chute chambers 38^x in a horizontal position, it is necessary that mechanism be provided for tipping them to a substantially vertical position before entering the channels 43, which tipping mechanism I will now describe.

The wall 44 of the channel 43 extends rearwardly at 44^x along the edge of the feed plate extension 35 and is provided with a reduced portion 44^o (see Fig. 12) so as to enter the channel 33. The portion 44^o is provided with a flange 48 secured to the bottom of the channel 33. The corresponding end of the wall 45 is curved outwardly to meet the front end of the longitudinal edge of the recess 36 as indicated at 49.

Spaced in front of each bolt 29 is a bracket 50 (see Fig. 6). Between the brackets 50 and bolts 29 is mounted a slide bar 51 provided intermediately of its length with a notch 52. A lever 53 (see Fig. 6) is pivoted at 54 between the plates 27 and 28. The arm 55 of the lever extends at its end through the notch 52 and is spring-held at 56. 57 is a stop bracket secured to the frame member 21 and 58 is an arm extending from the lever 54 to engage the bracket 57 as the base plate 27 moves backward to tis rearward position.

Beneath each recess 36 is a plate 59. The plates 59 are secured to the bar 51 and are carried beneath the extensions 35 when the bar 51 is moved in the direction of arrow (see Fig. 9) to the position illustrated in Fig. 10.

A bar 60 is secured to the chute wall 37. The rear face of the bar 60 is grooved vertically at 61. Slidably contained in each groove 61 is a gravity stop 62. The lower ends of the stops 62 normally rest on the feed plates 32. The lower end of each stop 62 is inclined forwardly at 63 and is provided with a projection 63^x.

I will now describe the operation by which the cross walls are fed forward in their horizontal position from the chute chambers 38^x prior to their being tilted to a vertical position.

As the base plate 27 and mechanism carried thereby completes its rearward movement in the direction of arrow (see Fig. 5) the arm 58 of the lever 53 is swung forward on its pivot 54 swinging the lever arm 55 in the direction of arrow (see Fig. 6) to carry the bar 51 and the plates 59 in a corresponding direction. By the same movement of the plate 27, the feed shoulders 34 are carried rearwardly past the rear edges of the lowermost cross wall H in the chute chambers 38^x. As the plate 27 performs its forward or return movement in the opposite direction to arrow (see Fig. 5), the feed shoulders 34 engage the rear edges of the lowermost cross walls H carrying them forward.

As the cross walls H move forward their front edges engage the inclined edges 63 of the stop 62 forcing the stops upward in the grooves 61 to allow the cross walls to pass. After the cross walls H have passed the stops 62, they drop by gravity onto the feed plates 32. The feed plate 32 then again returns in the direction of arrow to feed the next cross walls forward. The rear edges of the cross walls already fed engage the forward lower edges of the stops 62 as they tend to travel rearwardly by frictional contact with the feed plates holding the cross walls stationary while the extension 35, recesses 36 and plates 59 are carried to beneath such cross walls by the rearward movement of the base plate 27. At this point in the operation, the parts assume the position illustrated in Fig. 9, the cross walls H lying substantially horizontal.

As the base plate 27 completes its rearward movement, the lever arm 58 engages the bracket 57 as above described forcing the arm 55 in the direction of arrow against the tension of the spring 56 and thereby forcing the bar 51 and the plates 59 carried thereby also in the direction of arrow allowing the heavy side of the cross wall to drop onto the base plate 27, the cross walls then assuming the inclined position illustrated in Fig. 10 and bearing at their lower edges against the base of the channel wall portion 44^x. The next forward movement of the base plate 27 carries the arm 58 away from the stop 57. The spring 56 then acts to return the arm 55, bar 51 and plates 59 to their normal position and thereby tilts the cross wall H to the substantially vertical position illustrated in Fig. 11.

I will now describe the mechanism by which the cross walls H are fed forwardly through the channels 43 formed by the walls 44 and 45.

A main driving shaft 64 is mounted in suitable bearings carried by the main frame members 21 and 22. A cam 65 is secured to the shaft 64 adjacent each frame member 21 and 22. A lever 66 is pivoted at 67 to each frame member 21 and 22. Each lever 66 is provided with a cam roller or projection 68 engaging the periphery of the cam 65. The lever 66 is provided with a substantially horizontally curved finger 69.

70 are posts mounted in the frame members 21 and 22 to move freely vertically. Each post 70 is provided with a radial pin 71 resting on each finger 69 as clearly shown in Fig. 5. The upper end of each post 70 is provided with a sleeve 72 in which are secured parallel rods or bars 73 and 74 between which extend cross rods 75, 76, 77 and

78 which are spaced apart a distance slightly greater than the length of the cross walls H. The rear ends of the rods 73 and 74 extend into vertical guides 79 and 80

I will now describe the operation of feeding the cross walls forward in the channels 43.

The cross walls H, it will be noted, have been tilted to the position illustrated in Fig. 11 during the first part of a forward movement of the base plate 27 on which the channel walls 44 and 45 are mounted. When the cross walls have assumed this substantially vertical position, the major radius of the cam 65 engages the roller 68 to tilt the lever 66 upwardly to the dotted position shown in Fig. 5 and thereby, by means of the fingers 69 and pins 71, raise the posts 70 vertically carrying the parallel rods 73 and 74 and cross rods 75, 76, 77 and 78 to the dotted position shown in Fig. 5, that is above the level of the vertically set cross walls H.

When the rods 75, 76, 77 and 78 are in the dotted position, the base plate 27 completes its forward movement carrying the walls H when in the position shown in Fig. 11 to between the guide walls 44 and 45 and between the cross rods 75 and 76. The cams 65 then operate to carry the rollers 68 onto their minor radii of the cams 65 and the finger 69 back to its full line position allowing the rods 75 and 76 to drop and extend adjacent each end of the fed cross wall H. The base plate 27 carrying the channel walls 44 and 45 then makes its return movement, the rods 75 and 76 holding the fed cross walls stationary so that they are pushed to an advanced position in the channels 43. The cross rods 75 to 78 are then again raised to the dotted position by the cam 65. As the next forward feeding movement of the base plate 27 takes place, the cross wall which has been fed forward by the rods 75 and 76 is carried to a position beneath and between the rods 76 and 77 which are then carried to the full line position at each end of the fed wall H. The same operation is repeated on the next reciprocating movement of the plate 27 carrying the cross walls between the rods 77 and 78 which carries the walls H again forward onto the bottoms 47 of the parallel portions 46 of the channels 43 holding the cross walls in vertical position. The next forward movement of the base plate 27 carries the fed cross walls ahead of the cross rod 78 ready for the next forward feeding movement.

I will now describe the mechanism by which the side members A and B are fed into the machine and held in position ready for engagement by the cross walls H.

On the opposite end of the frame members 21 and 22 is secured a table 80 in which is formed an open ended slotted opening 81. Feed plates 82 and 83 lie upon the table 80 with their inner adjacent edges curved downwardly at 84 and 85 over the longitudinal edges of the opening 81, such curved edges having notches 86 and 87, the centres of which are spaced apart equal to the distance of the centres of the slots G of the carton members A and B.

A bracket 88 is secured to the frame member 22 to extend at right angles thereto, the upper face 89 of the bracket forming a table extension flush with the upper face of the feed plates 82 and 83. A filling plate 90 is secured to the table top 80 between the adjacent edges of the feed plates 82 and 83 and the extension table 89 so that the surface of the feed plates 82 and 83, filling plate 90 and extension table 89 are all flush.

A double chute or container is mounted on the extension table 89 for containing the parallel side members A and B of the carton. The chute comprises a U-shaped central member 91 forming the inner walls 92 and 93 of the chutes. The front of the chutes is formed by a single wall 94 which may be adjustable vertically to control the depth of the feed orifices 95 through which the blanks A and B are fed. Vertical rods 96 and 97 extend upwardly from the table extension 89 to form the sides of the chutes. The ends of the chutes are formed by the vertical rods 98 and 99.

A bracket member 100 is secured to the filling piece 90 and extends upwardly therefrom to carry the angle bars 101 and 102. 103 and 104 are bracket members extending up from the table 80 on that side which is adjacent to the frame member 21. Bars 105 and 106 extend respectively between the angle bar 101 and bracket 103 and between the angle bar 102 and bracket 104. From the opposing faces of the bars 105 and 106 extend aligned guides formed by projections 107 and 108, each projection being centrally slotted at 109 and 110 to receive the ends of a cross wall H as indicated in Fig. 17. The upper ends of the slots 109 and 110 are flared outwardly to permit the easy entrance of the cross walls into the slots. The slots 109 and 110 are spaced apart to correspond with the spacing of the carton slots G.

Fingers 111 and 112 extend inwardly from the bars 105 and 106, their inner ends being downturned at 113 and 114 and inclined laterally, to ensure of the easy passage of the members A and B as they pass from the feed orifice 95 to the position indicated by dotted lines in Fig. 17, at 115 and 116.

Adjustable stops 117 and 118 are provided to limit the inward movement of the members A and B, such stops comprising angle pieces, the vertical portions of which extend up through orifices 119 and 120 in the table top 80 and the horizontal portions secured to the table top 80 by set screws 121 and 122 extending through slots 123 and 124 also formed in the table 80.

A counter shaft 125 is journalled in bearings 126 and 127 carried on the frame member 22 and driven through the intermeshing bevel gears 128 and 129 from the driving shaft 64. On the shaft 125 are secured discs 130 and 131 from which extend pins 132 and 133. Bell crank levers 134 are pivotally mounted on the braces 135. The horizontal arms 136 and 137 of the bell cranks extend beneath the shaft 125 into the path of the crank pins 132 and 133. Each bell crank 134 is provided with an upwardly extending arm 138. 139 are slots formed in the table extension. 140 are blocks slidable in the slots 139 and provided with depending lugs 141. 142 are links connecting the lugs 141 with the upper end of the bell crank arm 138.

Lower feed rollers 143 are provided mounted on a shaft 144 journalled in bearings 145 forming part of the bracket 88. A sprocket 146 is secured to the shaft 144 and connected by a sprocket chain 147 to a sprocket gear 148 secured to the shaft 125. 149 are upper feed rollers secured to a shaft 150 journalled in pivoted arms 151 having upward extensions 152 connected by tension springs 153 to the upwardly extending portion 154 of the stationary bracket 155. By this means the rollers 149 and 143 are held in contact. The shafts 144 and 150 rotate in unison by means of the intermeshing gears 156 and 157.

The shaft 125 in rotating rotates the sprocket wheel 148 which rotates the lower feed rollers

through the sprocket chain 147 and sprocket 146 and the upper feed roller through the intermeshing gears 156 and 157.

Simultaneously the pins 132 and 133 engage the lever arms 136 and 137 to depress them and swing the arms 138 inwardly sliding the blocks 140 inwardly in the slots 139 against each lowermost carton member A and B. The lowermost carton members A and B are thus forced forwardly from the full line position shown in Fig. 4 to between the feed rollers 143 and 149 which carry the members forward to the dotted line position shown in Fig. 17 against the end stops 119 and 120 and the side stops 113 and 114 which position the slots G of the members A and B in a line with the parallel end portions 46 of the channels 43 and with the cross carton walls held therein. The slots G when in this position are in vertical alignment with the guide slots 109 and 110.

I will now describe the means by which the cross walls are carried from the channel portions 46 and entered into the cross slots G of the side members A and B after they have been fed to the receiving position.

A transverse shaft 158 is journalled in bearings 159 and 160 carried on top of the frame members 21 and 22. A disc or spider wheel 161 is secured to the shaft 158. Arms 162 extend perpendicularly to the face of the wheel 161. The ends 163 and 164 of the arms 162 are provided with rectangular grooves 165 and 166. A rod 167 rectangular in cross section is slidable in the grooves 165 and 166. 168 is a threaded orifice in the end 164 of the arm 162. 169 is a threaded plug screwed into the orifice 168 and carries a stem 170.

The rod 167 is provided with a lug 171 having an orifice 172 through which the stem 170 freely extends. A compression spring 173 is mounted on the stem 170 between the lug 171 and the inner end of the screw plug 169.

Stationary gripping plates 174 extend transversely of the face of each arm 162 and are spaced apart and located at one side of the channel ends 46. The plates 174 are each provided with base lugs 175 at each end of the plate as clearly shown in Fig. 22 through which screws or other securing means extend into the arms 162.

Movable plates 176 are provided with base lugs 177. The plates 176 normally bear against the plates 174 and the lugs 177 fit between the lugs 175 are secured to the bar 167 by screws or other securing means 168.

The end of the bar 167 adjacent the frame member 21 projects beyond the arm 162, such projecting end being provided with a cam roller 178 coacting with a cam plate 179 secured to the frame member 21. The cam plate 179 is in the form of a segment of a circle concentric with the shaft 158 so that the cam rollers 178 coact with the face thereof as the wheel 161 revolves. The face of the cam 179 at its rear end or the end in a line with the table opening 81 is inclined at 180.

The disc or spider 161 is rotated in the direction of arrow (see Fig. 5) from the drive shaft 64 by means of the sprockets 181 and 182 and sprocket chain 183.

The base plate 27 is operated from the drive shaft 64 by means of the eccentric 184, eccentric band 185 pivotally connected by the rod 186 to the lever 187 which is pivoted on the rod 188 extending between the side members 21 and 22 of the main frame. The upper end of the lever 187 is pivotally connected to a link 189 pivoted to the lug 190 depending from the base plate 27.

When an arm of the wheel revolves from the position K towards the position L, the gripping plates 174 and 176 are held apart in the position shown at L, Fig. 4, a sufficient distance to allow of the channel ends 46 passing therebetween. The plates 174 and 176 are held in their separated position by means of the rod 167 and cam roller 178 bearing against the cam plate 179 against the pressure of the spring 173.

Simultaneously with this movement the base plate 27 and channel walls 44 and 45 travel forwardly towards the L position of the arm 161^x so that when the separated plates 174 and 176 arrive at the position L, a channel portion 46 with the cross walls H contained therein extends between each pair of plates 174 and 176. The cross rod 78 in this position bears against the rear edges of the cross walls H. As the base plate 27 again recedes, the cross walls H are held stationary by the rod 78 between the plates 174 and 176.

Immediately after the channel portions 46 have cleared the arm 162 as the plate 27 recedes, the cam roller 178 passes off the cam plate 179 freeing the plates 176, the spring 173 then acting to grip the carton cross walls between the plates 176 and 174. The gripped carton cross walls are then carried through the position M (Fig. 5) to the position N (Fig. 5) or the position in which the hook portions J of the cross walls H engage the slots G of the side members A and B as illustrated in Fig. 14. The side members A and B have, as previously described, been fed into the position illustrated in Figs. 5, 14 and 17.

In Figs. 5 and 14 the hooked portions J of the cross walls H have entered the guide slots 109 and have passed into engagement with the slots G. As the wheel 161 continues to revolve the inner edge portions of the members A and B are drawn down free of the finger ends 113 and 114 towards the position illustrated in Fig. 15 so that portions J' pass through the slots G and E of the carton members A and B, the projection J^x passing through the slits F at the upper end of the slots E, thus completely assembling the carton.

As the assembled carton passes down from position N, the corresponding cam roller 178 engages the inclined portion 180 of the cam plate 179 forcing the rod 167 longitudinally inward to separate the plates 174 and 176 and free the carton allowing it to drop.

I will now describe the means by which the assembled carton is collapsed into flat form ready for shipment.

An endless belt 191 extends transversely of the main frame and is mounted on pulleys 192, and 193, 192 being a driven pulley and 193 an idler pulley. The pulley 192 is secured to a shaft 194 journalled in suitable bearings and to which is also secured a sprocket wheel 195. 196 is a sprocket wheel secured to the shaft 125 and connected to the sprocket wheel 195 by a chain 197. The belt 191 is provided with cross cleats 198 spaced apart a distance greater than the length of a carton.

As the carton is released and dropped, it strikes the inclined wall 199 thereby throwing it on its side as it strikes the belt 191 assuming the position illustrated by dotted lines 200 (Fig. 7).

201 is an inclined board located directly over the belt 191, the upper end extending above the carton wall and the lower end extending in

proximity to the belt 191 forming a mouth 202 sufficiently wide to let the cleats 198 pass through. As the belt 191 revolves in the direction of arrow, a cleat 198 engages the end of the carton member B as illustrated in Fig. 7. The carton is then carried in the direction of arrow until the opposite end of the member A engages the inclined wall 201 forcing the carton towards the collapsed position as illustrated by dotted lines at 208^x. When the members A and B are brought into contact to allow the carton to pass through the mouth 202, the carton is completely collapsed.

In Figs. 24, 25 and 26 I have illustrated an alternative form of mechanism for tilting the cross walls H from a horizontal to a vertical position.

In these figures 203 is a base plate slidably mounted in guide ways 204. 205 are feed plates secured to the base plate and spaced apart a distance sufficient to form longitudinal grooves 206, the depths of which are equal to their width in front of the feed shoulder 207. 208 is the carton cross wall chute. 209 and 210 are the guide channel walls. 211 is the vertically movable frame having cross rods 212, 213, 214 and 215 for feeding the cross walls H forward in a similar manner to that previously described.

The side bars of the frame 211 are connected by a cross bar 216. Over each groove 206, a cam piece 217 is secured to the cross bar 216.

When the cross walls H of the carton are fed forwardly from the chutes 208 by the forward movement of the feed plate 203 in the manner previously described, they assume a position illustrated in Fig. 26 overhanging the grooves 206. When the frame 211 is lowered to the feeding position, the cam pieces 217 are carried down striking the portions of the carton cross wall H overhanging the grooves 206 to force the overhanging portion down into the groove to assume the dotted position shown in Fig. 26. The base plate 203 then makes its return movement, the bar 216 engaging the rear edge of the cross walls so that they are pushed into the channels formed by the walls 209 and 210. The frame 211 and cam pieces 217 then rise leaving the cross walls free in the channels to be fed forward successively by the cross rods 212 to 215 in the manner previously described.

From this description it will be seen that I have devised a machine whereby the parts of an egg carton of the type disclosed may be automatically assembled into a complete carton and then automatically collapsed into flat form suitable for shipment.

Although I have described my machine as applied to the assembling of egg cartons it will be readily understood the fillers for egg cartons formed by transversely slotted parallel side walls and cross walls of the form hereinbefore described may be assembled by the same device and in the same manner as described in connection with the cartons.

If found desirable a jogger may be used to carry the blanks A and B definitely against the stops 117 and 118. This device, however, is commonly used for similar purposes and I do not lay any claim to the same.

What I claim as my invention is:

1. In a machine for assembling egg cartons of the type described, a supporting table having a central opening and on which the carton side wall members are adapted to be laid with their inner faces uppermost and their slotted lower edge portions overhanging opposite sides of the table opening, means for holding the carton side wall members in position to be withdrawable therefrom, a carrier having movement in a vertical plane, cross wall gripping members mounted on the carrier for holding the cross walls in alignment with the slots of the carton side wall members, and means for imparting movement to the carrier to carry the gripping devices centrally between the side wall members and through the table opening whereby the hooked ends of the cross walls engage the slots of the side wall members to draw such side wall members downward through the table opening into the assembled position with the cross walls.

2. In a machine for assembling egg cartons of the type described, a supporting table having a central opening and on which the carton side wall members are adapted to be laid with their inner faces uppermost and their slotted lower edge portions overhanging opposite sides of the table opening, means for holding the carton side wall members in position to be withdrawable therefrom, a carrier having movement in a vertical plane, cross wall gripping members mounted on the carrier for holding the cross walls in alignment with the slots of the carton side wall members, means for imparting movement to the carrier to carry the gripping devices centrally between the side wall members and through the table opening whereby the hooked ends of the cross walls engage the slots of the side wall members to draw such side wall members downward through the table opening into the assembled position with the cross walls, and means for automatically opening the gripping members to release the assembled carton.

3. In a machine for assembling egg cartons of the type described, a supporting table having a central opening and on which the carton side wall members are adapted to be laid with their inner faces uppermost and their slotted lower edge portions overhanging opposite sides of the table opening, means for holding the carton side wall members in position to be withdrawable therefrom, a carrier having movement in a vertical plane, cross wall gripping members mounted on the carrier for holding the cross walls in alignment with the slots of the carton side wall members, means for imparting movement to the carrier to carry the gripping devices centrally between the side wall members and through the table opening whereby the hooked ends of the cross walls engage the slots of the side wall members to draw such side wall members downward through the table opening into the assembled position with the cross walls, means for automatically opening the gripping members to release the assembled carton, means for automatically inserting the cross walls in the open gripping members, and means for automatically closing the gripping members to grip the cross walls.

4. In a machine for assembling egg carton of the type described, a supporting table having a central opening and on which the carton side wall members are adapted to be laid with their inner faces uppermost and their slotted lower edge portions overhanging opposite sides of the table opening, means for holding the carton side wall members in position to be withdrawable therefrom, a carrier having movement in a vertical plane, cross wall gripping members mounted on the carrier for holding the cross walls in alignment with the slots of the carton side wall

members, means for imparting movement to the carrier to carry the gripping devices centrally between the side wall members and through the table opening whereby the hooked ends of the cross walls engage the slots of the side wall members to draw such side wall members downward through the table opening and into the assembled position with the cross walls, means for automatically opening the gripping members to release the assembled carton, and means for automatically collapsing the assembled carton when released.

5. In a machine for assembling egg cartons of the type described, a supporting table having a central opening and on which the carton side wall members are adapted to be laid with their inner faces uppermost and their slotted lower edge portions overhanging opposite sides of the table opening, means for holding the carton side wall members in position to be withdrawable therefrom, a carrier having movement in a vertical plane, cross wall gripping members mounted on the carrier for holding the cross walls in alignment with the slots of the carton side wall members, means for imparting movement to the carrier to carry the gripping devices centrally between the side wall members and through the table opening whereby the hooked ends of the cross walls engage the slots of the side wall members to draw such side wall members downward through the table opening into the assembled position with the cross walls and in which the carrier comprises a suitably driven vertically set wheel member, arms extending perpendicularly from the wheel in position to pass successively centrally through the table orifice, and cross wall gripping members carried by the arms and adapted to hold the cross walls in alignment with the slots of the carton side members supported on the table.

6. In a machine for assembling egg cartons of the type described, a supporting table having a central opening and on which the carton side wall members are adapted to be laid with their inner faces uppermost and their slotted lower edge portions overhanging opposite sides of the table opening, means for holding the carton side wall members in position to be withdrawable therefrom, bar like members or arms extending horizontally, cross wall gripping devices carried by the bar like members and spaced apart to hold the cross walls in a line with the side wall member slots when supported on the table, and means for successively carrying the bar like members centrally through the table opening and the hooked ends of the cross walls into engagement with the slots of the carton side wall members.

7. In a machine for assembling egg cartons of the type described, holding means for the carton side wall members adapted to withdrawably hold such members horizontally inner side up and having adjacent ends of the slots of such members spaced apart a distance substantially equal to the distance between the hook portions of the cross walls, and means carrying the cross wall downward to enter such side wall member slots and engage the ends thereof to withdraw the side members from their holders and into assembled position with the cross walls.

8. In a machine for assembling cartons of the type described, the combination with a cross wall feeding mechanism adapted to discharge the cross walls in a vertically set position, of a carton side wall member holder from which the side wall members are withdrawable inwardly towards each other and downwardly, a cross wall carrier, and means thereon for gripping each cross wall as it is discharged from the feed mechanism and carrying such gripping means over to between the carton side wall members and downward to carry the hook portions of the cross walls into engagement with the slots of the side wall members to impart to the side wall members the aforesaid inward and downward movement.

9. In a machine for assembling of cartons of the type described, a holder in which the transversely slotted side wall members of the carton are held inner side up, means for spacing the lower edges of side members apart, a plurality of chute chambers each containing a pile of cross walls having hooked ends, means for feeding the cross walls horizontally from the chute chambers, means for tipping the cross walls from a horizontal to a vertical position, channels in which the vertically set cross walls are held, means for feeding the vertically set cross walls along the channels and discharging them at the opposite end of such channels, means for individually gripping the cross walls as they are discharged, and a carrier for the gripping means adapted to convey the gripped cross walls from the above point of discharge to between the parallel carton side wall members and downward as the hooked ends of the cross walls and the slots of the side wall members engage to carry them to the assembled position.

10. In a machine for assembling cartons, the combination with a main frame provided with opposed guideways, of a cross wall feed device comprising a base plate slidable in the guideways, means for reciprocating the base plate, feed plates secured to the base plate and having a transverse feed shoulder, a chute structure carried by the main frame and forming a chute chamber above each feed plate, a channel extending forwardly from each feed plate adapted to hold the cross walls in a vertical position, means for tipping each cross wall from a horizontal to a vertical position, and means for feeding the vertically set cross walls into the channels and longitudinally thereof to discharge at their opposite ends.

11. In a machine for assembling cartons, the combination with the main frame provided with opposed guideways, a base plate slidable in the guide ways, an upper plate secured to but spaced above the base plate and feed plates secured to the upper plate having transverse feed shoulders, of a cross wall tipping device comprising extensions to the feed plates extending forwardly of the upper plate to form side recesses, a channel carried by the base plate one wall of which opposes the open side of the recess and the other wall extends from the end of the extension, a plate forming the bottom of the recess and slidable laterally beneath the extension, a stop device for preventing the return of the cross walls fed forward by the feed shoulders as the feed plate returns whereby the cross walls are carried onto the extensions and laterally slidable plates, and means for reciprocating the slidable plates to up-end the cross walls as the feed plate completes and commences its reciprocating movement.

12. In a machine for assembling cartons, the combination with the main frame provided with opposed guideways, a base plate slidable in the guideways, an upper plate secured to but spaced above the base plate and feed plates secured to

the upper plate having transverse feed shoulders, of a cross wall tipping device comprising extensions to the feed plates extending forwardly of the upper plate to form side recesses, a channel carried by the base plate one wall of which opposes the open side of the recess and the other wall extends from the end of the extension, a plate forming the bottom of the recess and slidable laterally beneath the extension, a stop device for preventing the return of the cross walls fed forward by the feed shoulders as the feed plate returns whereby the cross walls are carried onto the extensions and laterally slidable plates, means for reciprocating the slidable plates to up-end the cross walls as the feed plate completes and commences its reciprocating movement, such means comprising a transverse bar slidably held between the base plate and upper plate and on which the laterally slidable plates are mounted, a spring held bell crank lever one arm of which engages the slide bar, and a stationary stop with which the other arm engages as the base plate completes its rearward movement.

13. In a machine for assembling cartons, reciprocating feed plates spaced apart, channels reciprocating with the feed plates and extending from such interspaces and tapering to the thickness of the cross walls, means for up-ending the cross walls to enter the channels, means coacting with the reciprocating channels for feeding the up-ended cross walls longitudinally thereof to the discharge end, such means comprising side members and transverse rods extending between such members and spaced apart a distance slightly greater than the length of the cross walls, and means for raising the transverse rods above the level of the up-ended cross walls during the forward movement of the channels and lowering them to the rear of each cross wall during the return movement of the channels.

14. In a machine for assembling cartons, the combination with the main frame, reciprocating cross wall feed channels, a holder for the carton side members and the main driving shaft, of a carrier shaft driven from the drive shaft, a wheel member mounted thereon, a semi-circular face cam secured to the main frame concentrically with the carrier shaft and having its entrance end inclined, horizontal arms extending from the face of the wheel member, a spring pressed slidable bar extending longitudinally of each arm and slidable therein, stationary cross wall gripping plates secured to the arms and movable gripping plates secured to the bar, the stationary and movable plates being carried together by the aforesaid spring pressure to grip the cross walls, and a cam roller at the inner end of each bar coacting with the face cam to separate the plates to release the cross walls after their engagement with the carton side members.

15. In a machine for assembling cartons, a holder for the side members of the carton comprising a table having an opening therein, a feed plate having a down-curved notched inner edge extending over each longitudinal edge of the table opening, guide bars supported above such notched edges and having inwardly extending projections having aligned guide slots therein into which the ends of the cross walls fit as they pass downwardly to engage the slots of the carton side members, fingers carried by each bar and having depending ends against which the adjacent edges of the carton side members fit, and adjustable stops carried by the table and against which the ends of the carton side members fit to align the slots of the carton side members with the notches and slots of the holder.

16. In a machine for assembling cartons, the combination with mechanism for releasing a complete carton, of a carton collapsing device comprising an endless conveyor provided with cross cleats, means for directing the released carton so as to bear sideways against the conveyor with the adjacent parallel carton side wall member at one end of the cross walls into the path of the cleat, a board inclined towards the conveyor to form a restricted mouth for the passage of the cleat and against the lower inclined face of which the opposite end of the other parallel carton side wall member at the opposite end of the cross walls engages to force it longitudinally to carry the cross walls and last mentioned parallel side wall member into contact with the opposing face of the first mentioned parallel carton side wall member to collapse the carton.

17. In a machine for assembling cartons, reciprocating cross wall feed plates spaced apart to form intervening longitudinal grooves and on which the cross walls are supported flatwise to overhang the grooves at their upper edges, channels reciprocating with the feed plates and extending from the grooves and tapering to the thickness of the cross walls, means coacting with the grooves for tilting the cross walls to a vertical position to enter the channels, and means coacting with the reciprocating channels for feeding the vertically set cross walls longitudinally thereof to the discharge end.

18. In a machine for assembling cartons, a main frame, feed plates mounted in the main frame to reciprocate horizontally and spaced apart to form intervening grooves and on which the cross walls are supported flatwise to overhang the grooves at their upper edges, channels extending from the grooves and tapering to the thickness of the cross walls and means coacting with the grooves for tilting the cross walls to assume a substantially vertical position in the grooves for entering the channels.

19. In a machine for assembling egg cartons of the type described, means for holding flatwise a pair of independent parallel transversely slotted side wall members with the slots of each pair in longitudinal alignment, and means for feeding cross walls having a slot engaging portion at one end into engagement with one slot of each pair of aligned slots of one side wall member and the slot engaging portion at the opposite end of each cross wall into engagement with the other slot of each pair of the aligned slots of the other side wall member.

20. In a machine for assembling egg cartons of the type described including a pair of side wall members having transverse slots and cross walls having slot engaging ends, a carrier having movement in a vertical plane, a series of cross wall gripping members mounted on the carrier, means for automatically opening and closing the gripping members receiving the cross walls, means for automatically inserting a cross wall in each open gripping member to grip the cross walls when closed whereby they are carried to the slot engaging position by the movement of the carrier.

21. In a machine for assembling cartons, the combination with the discharge end of the cross wall feed mechanism, and the holder for the slotted carton side walls of a suitably driven rotatable carrier, bar members carried by the carrier at one end and arranged concentrically to the

centre of rotation, and a series of cross wall gripping devices carried by each bar member so as to be in alignment with the gripping devices of the other bar members and with the slots of the side walls held in the side wall holder.

22. In a machine for assembling cartons, the combination with the main frame, of a movable carrier, bar members extending from the face of the carrier, stationary cross wall gripping plates secured to the bar members, a spring pressed slide bar extending longitudinally of each carrier bar, gripping plates secured to the slide bar to coact with the stationary plates to grip a cross wall, a cam plate secured to the main frame and having its entrance end inclined to receive the end of each slide bar to move it longitudinally to carry the gripping plates thereof away from the stationary gripping plates to release the carton cross walls allowing the completed carton to drop as the carrier is moved.

23. In a machine for assembling cartons, reciprocating cross wall feed plates spaced apart to form intervening longitudinal grooves and on which the cross walls are supported flatwise to overhang the grooves at their upper edges, and means coacting with the grooves for tilting the cross walls to a vertical position within the grooves by depressing the aforesaid upper edge to the bottom of the groove and into contact with a side wall of the groove.

24. In a device for assembling cartons or fillers comprising transversely slotted side walls and cross walls separated from the side walls and having hooked ends, gripping devices engaging the centre portion or body of each cross wall in spaced position to correspond to the spaced position of the transverse slots of the side walls, and means for carrying the cross walls towards the side walls and the hooks of the cross wall simultaneously into engagement with the slots.

25. In a machine for assembling cartons comprising transversely slotted side walls and cross walls having hooked ends for engaging the slots, a table having a transverse opening overhung at its opposite edges by the inner ends of the slots of the side walls, means for carrying the hooked ends of the cross walls into engagement with the slots of the side walls and the cross walls through the table opening thereby drawing the side walls through the opening and into a position parallel with the ends of the cross walls.

26. In a machine for assembling cartons comprising transversely slotted side walls and cross walls having slot engaging hooks at each end of each cross wall, a table having a transverse opening equal in width to the distance between the hooks of the cross walls and the opposite edges of which are overhung by the inner ends of the side wall slots, means for carrying the hooked ends of the cross walls into engagement with the slots of the side walls and the cross walls downwardly through the table opening thereby drawing the side wall over the edges of the table opening to carry them into a parallel position with the ends of the cross wall as the cross walls pass downward from the table opening.

27. In a machine for assembling cartons comprising transversely slotted side walls and cross walls having a slot engaging hook at each end of each cross wall, a table having a transverse opening equal in width to the distance between the slot engaging hooks of the cross walls and having notched opposite edges which are overhung by the inner ends of the side wall slots, means for carrying the hooked ends of the cross wall downward into engagement with the slots of the carton side walls and through the notches of the table opening thereby drawing the side walls downward over the edges of the table opening to carry them into a parallel position with the ends of the cross walls as the cross walls pass downward from the table opening.

28. In a machine for assembling cartons comprising transversely slotted side walls and cross walls having hooked ends for engaging the slots, a holder for the cross walls including a series of stationary and movable gripping members held together, a support for such members, and means for moving the gripped cross walls and slotted side walls relatively one to the other to carry the slots of the side walls into engagement with the hooks of the cross walls.

29. In a machine for assembling cartons comprising transversely slotted side walls and cross walls having hooked ends for engaging the slots of the side walls, a holder for the cross walls including a series of stationary and movable gripping members held together to hold the cross walls in such a position that the hook ends of the cross walls will simultaneously engage the slots of the side walls when the hooks and slots are brought into engaging position.

30. In a machine for assembling cartons comprising transversely slotted side walls and cross walls having hooked ends for engaging the slots of the side walls, a holder for the cross walls including a series of stationary and movable gripping members spring held together to hold the cross walls with their hooked ends exposed and spaced apart equal to the spacing of the slots of the cross walls, and means for holding the side walls in a horizontal position at each end of the cross walls whereby when the hooked ends of the cross walls engage with the adjacent ends of the slots of the side wall such side walls swing inward towards the ends of the cross walls to assume a position parallel thereto.

31. In a machine for assembling egg cartons of the type described, means for holding flatwise in the same plane a pair of independent parallel transversely slotted side wall members with the slots of one side wall member of the pair in longitudinal alignment with the slots of the other side wall member of the pair and with their adjacent edges spaced apart, and means for feeding cross walls having a slot engaging portion at each end of each cross wall centrally between the adjacent edges of the side walls so that a slot engaging portion at one end of each cross wall engages a slot of one side wall and a slot engaging portion at the other end of each cross wall engages a slot of the other side wall.

32. In a machine for assembling cartons, a cross wall transferring means comprising a rotatable element, bar members secured rigidly at one end to the face of the element and arranged concentrically, and a series of cross wall gripping devices carried by each bar member.

33. In a machine for assembling cartons of the type described, the combination with a movable assembly mechanism including the parallel arms thereof and the cross wall gripping members carried on the arms in spaced apart and normally open position, of a reciprocating plate, cross wall guides carried by the plate and projecting forwardly of the plate, means for reciprocating the plate to carry the projecting portions of the guides to a position between the open gripping members by their forward movement, means holding the cross wall stationary during

the return movement of the guides, whereby such cross walls are left in position between the open gripping members, and means for closing the gripping members to grip the cross walls as the guides recede from the gripping members.

34. In a machine for assembling cartons of the type described, the combination with mechanism for feeding forward a set of cross walls, of a rotating device having a plurality of arms adapted to travel on a circular path each arm carrying a set of cross wall gripping devices in which each cross wall of each set is individually gripped in a line with the slots of the side walls, and means located in the circular path of the arms and their gripping devices for holding a pair of side walls with their slots in position to be engaged by the gripped cross walls as the rotating device revolves.

35. In a machine for assembling cartons having side walls having spaced apart parallel slots extending in a row longitudinally thereof, a cross wall transferring means comprising a rotatable element, bar members extending longitudinally from the face of the rotatable element and arranged concentrically thereof and approximately equal in length to the length of the carton side walls, and a series of spaced apart cross wall gripping means carried by each bar member and spaced apart so as to be in line with the carton side wall slots.

36. A method of assembling cartons of the type described consisting in taking a pair of carton side walls each folded on a longitudinal medial line to form a bottom wall portion and an outer wall portion successively feeding the folded side walls in pairs with their medial lines of fold adjacent, simultaneously feeding cross walls in sets towards a point of assembly with the side walls, then picking up the fed cross walls a set at a time, and assembling without interruption lost or backward motion the ends of each cross wall of the set simultaneously with the bottom and outer wall portions of the pair of side walls as they meet at the point of assembly to form a completed carton.

37. In a machine for assembling cartons of the type described comprising mechanism for successively feeding carton side walls in pairs each wall formed by a bottom wall portion and an outer wall portion folded upon each other and mechanism for simultaneously successively feeding cross walls in sets towards a point of assembly and mechanism for picking up each set of cross walls successively and simultaneously assembling each end of each wall of the set by a continuous operation with the bottom and outer wall portions of a fed side wall.

38. In a machine for assembling cartons of the type described comprising mechanism for successively feeding carton side walls in pairs each wall comprising a bottom and outer wall portion folded upon each other and mechanism for simultaneously and successively feeding cross walls in sets towards a point of assembly and mechanism for picking up each set of cross walls successively and simultaneously assembling each end of each wall of the set with the bottom and outer wall portions of a fed side wall to form a set-up carton and means for collapsing the carton from the aforesaid set-up position to a flattened position for shipment.

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