

June 30, 1953

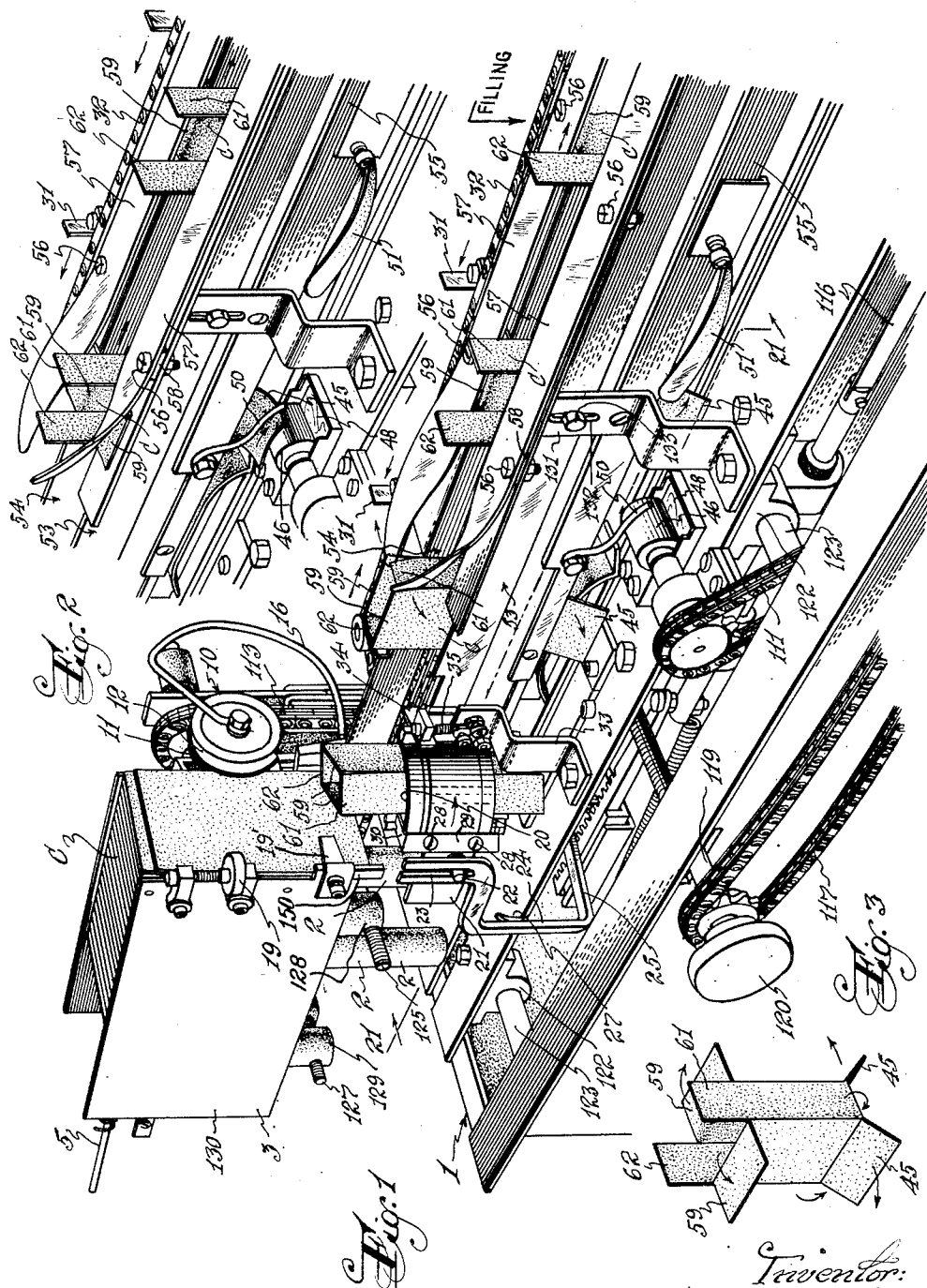
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2,643,497

CARTON OPENING, FILLING, AND CLOSING MECHANISM

Filed Oct. 8, 1949

9 Sheets-Sheet 1



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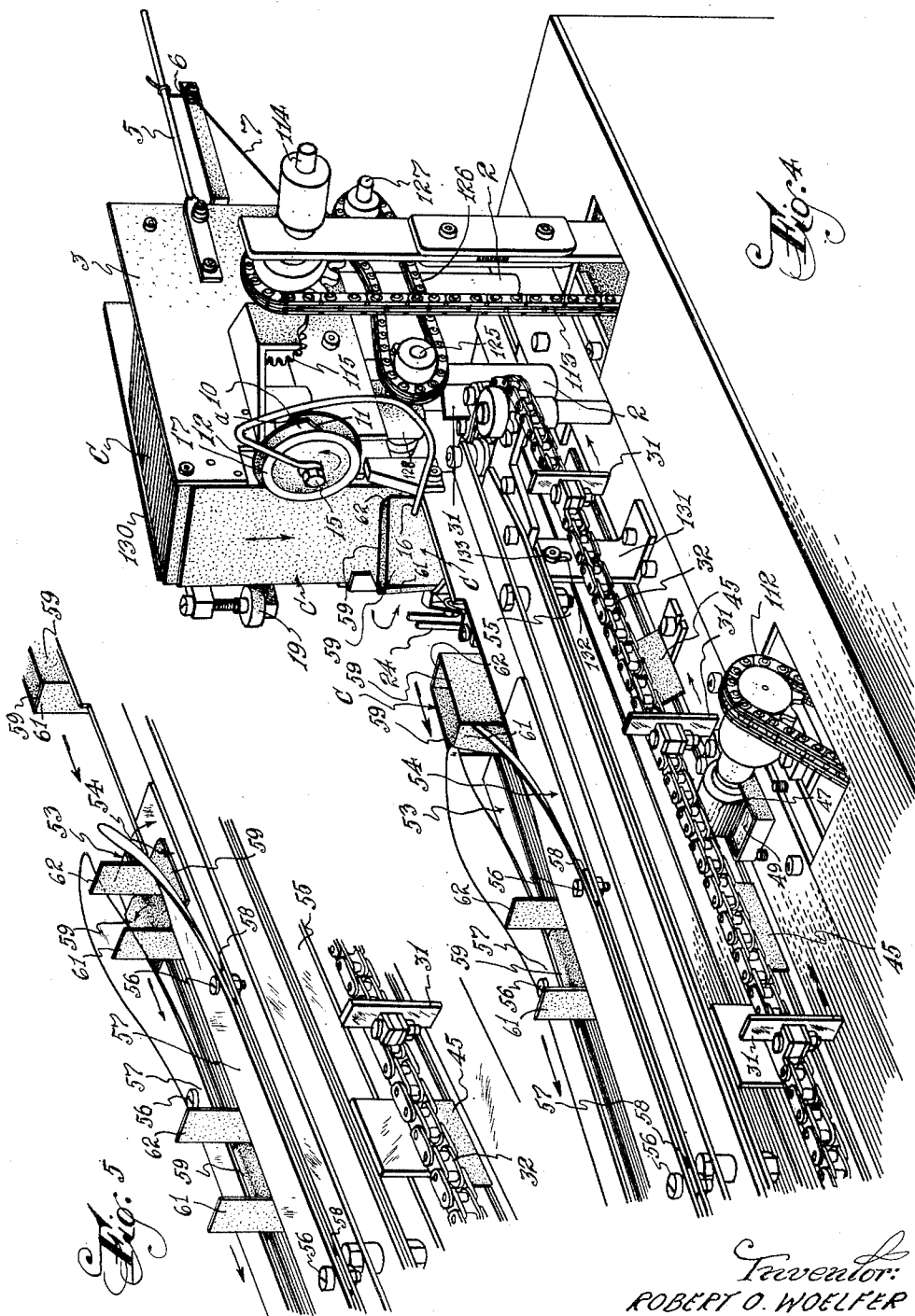
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CARTON OPENING, FILLING, AND CLOSING MECHANISM

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CARTON OPENING, FILLING, AND CLOSING MECHANISM

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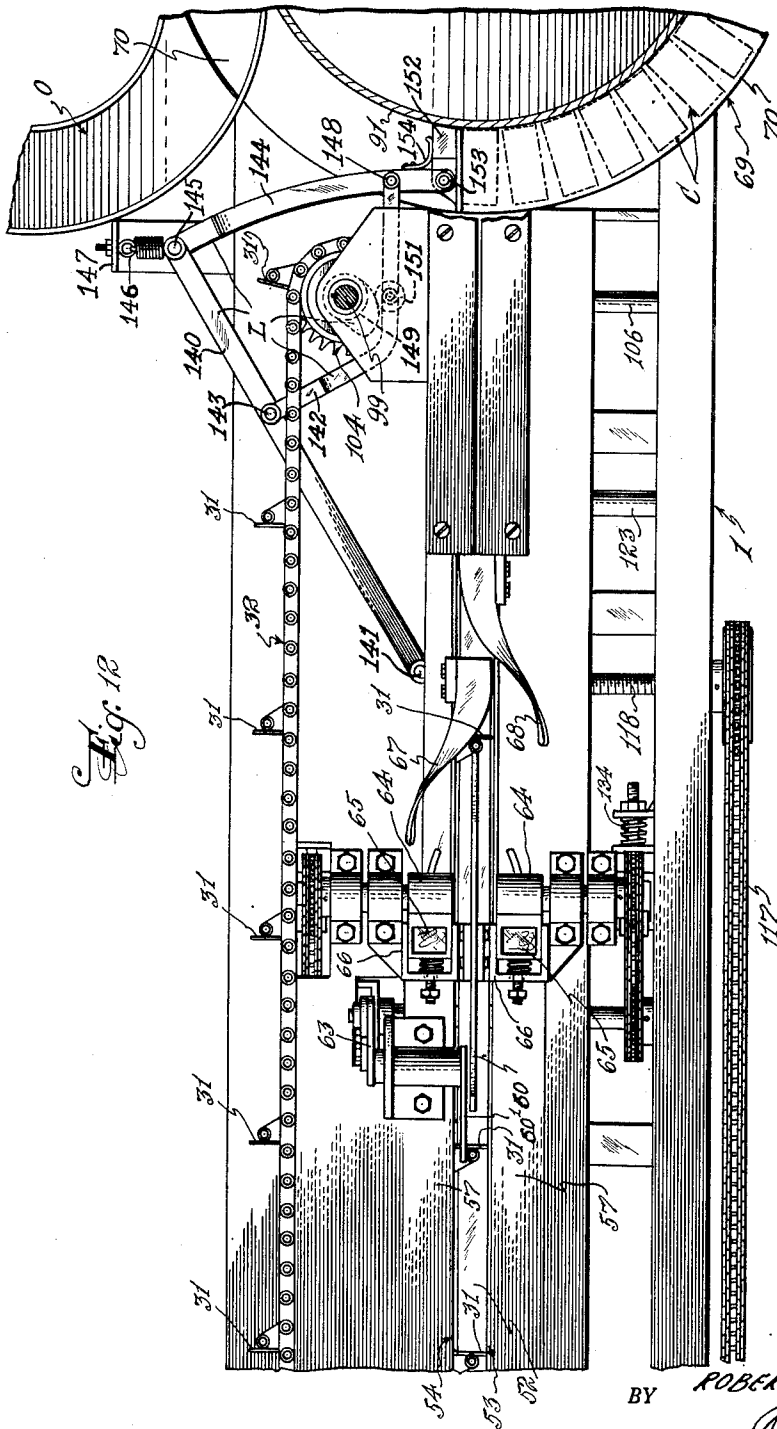


Fig. 12

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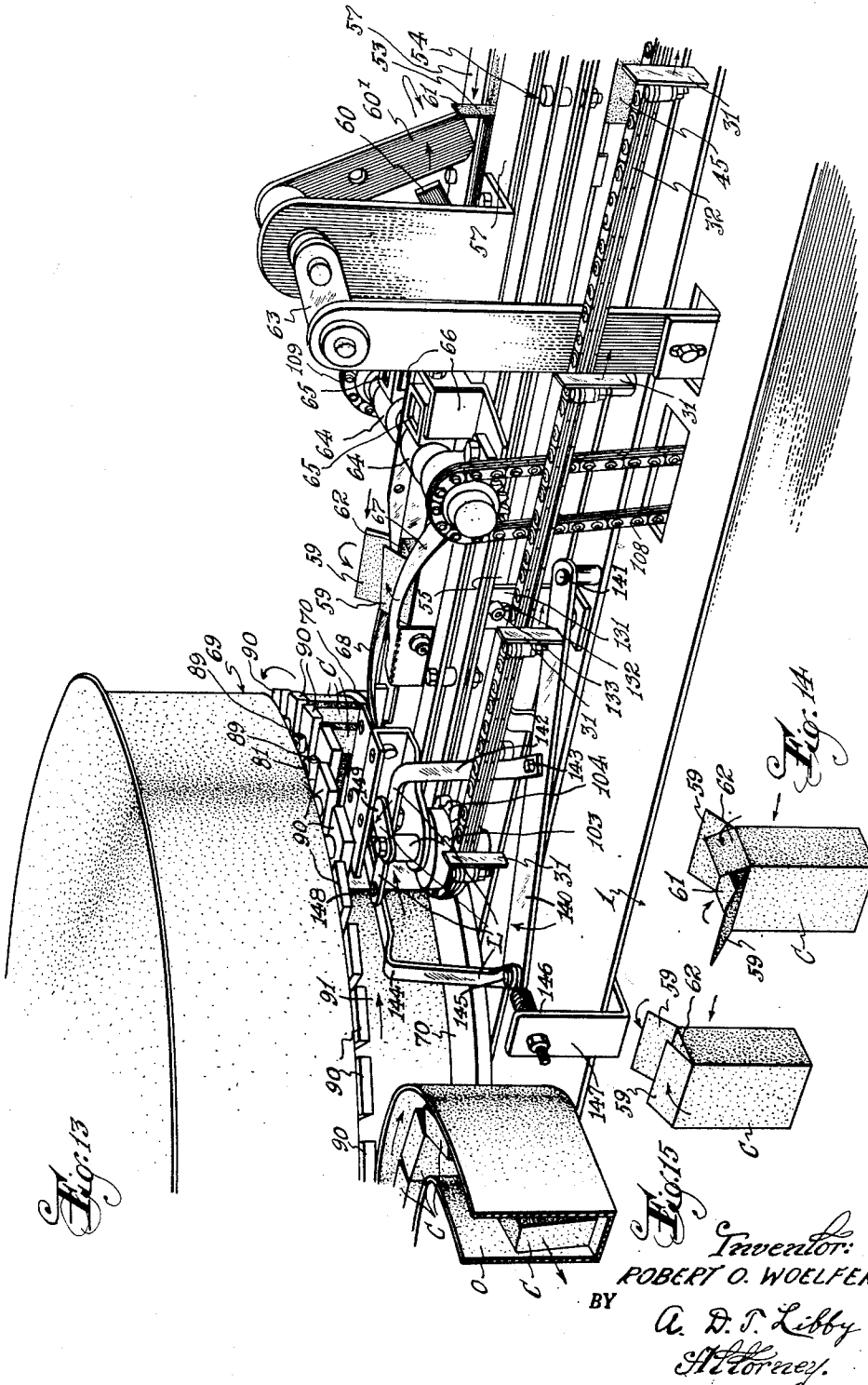
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CARTON OPENING, FILLING, AND CLOSING MECHANISM

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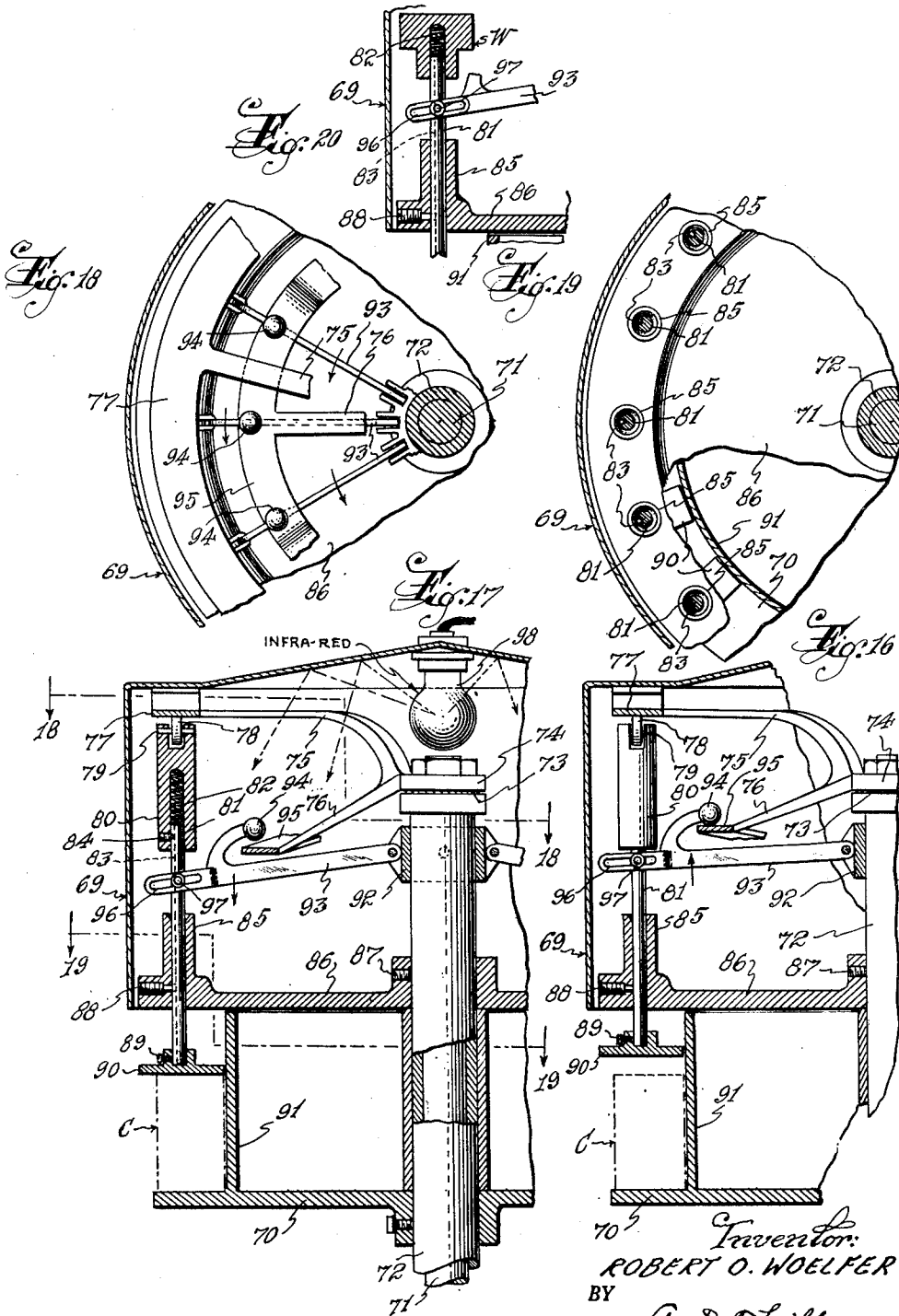
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CARTON OPENING, FILLING, AND CLOSING MECHANISM

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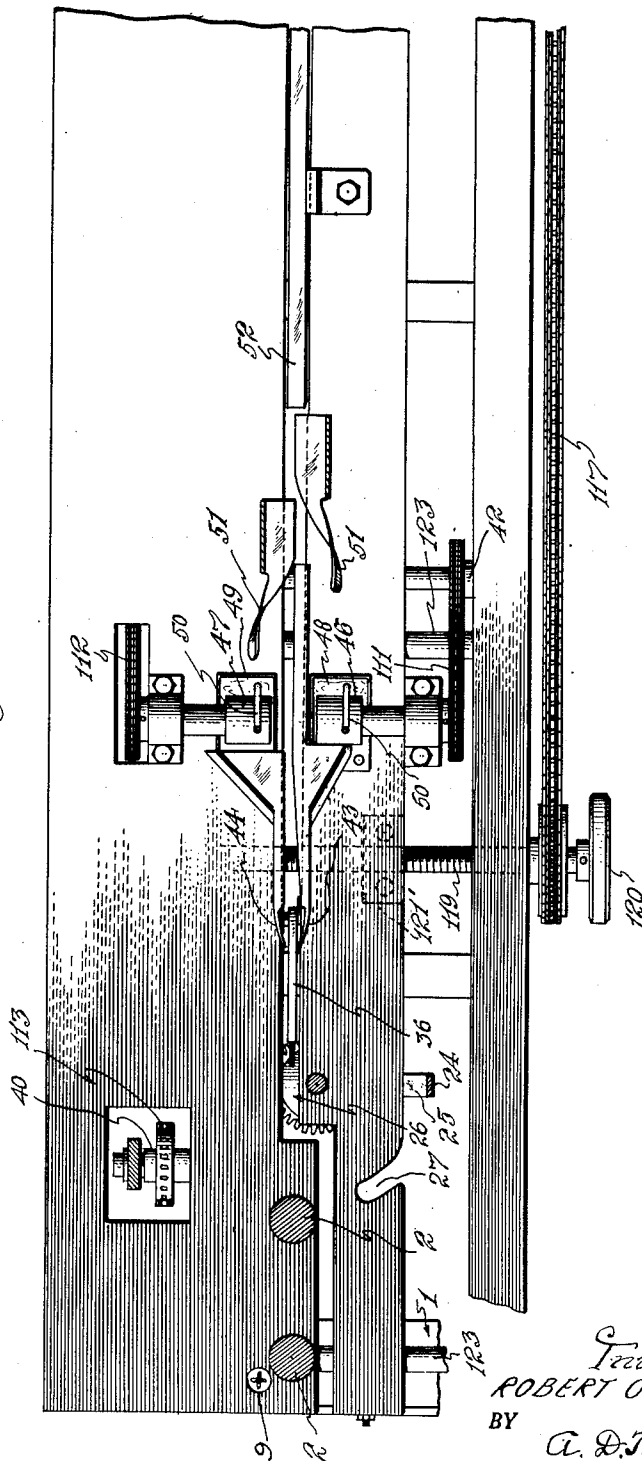
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CARTON OPENING, FILLING, AND CLOSING MECHANISM

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Fig. 21



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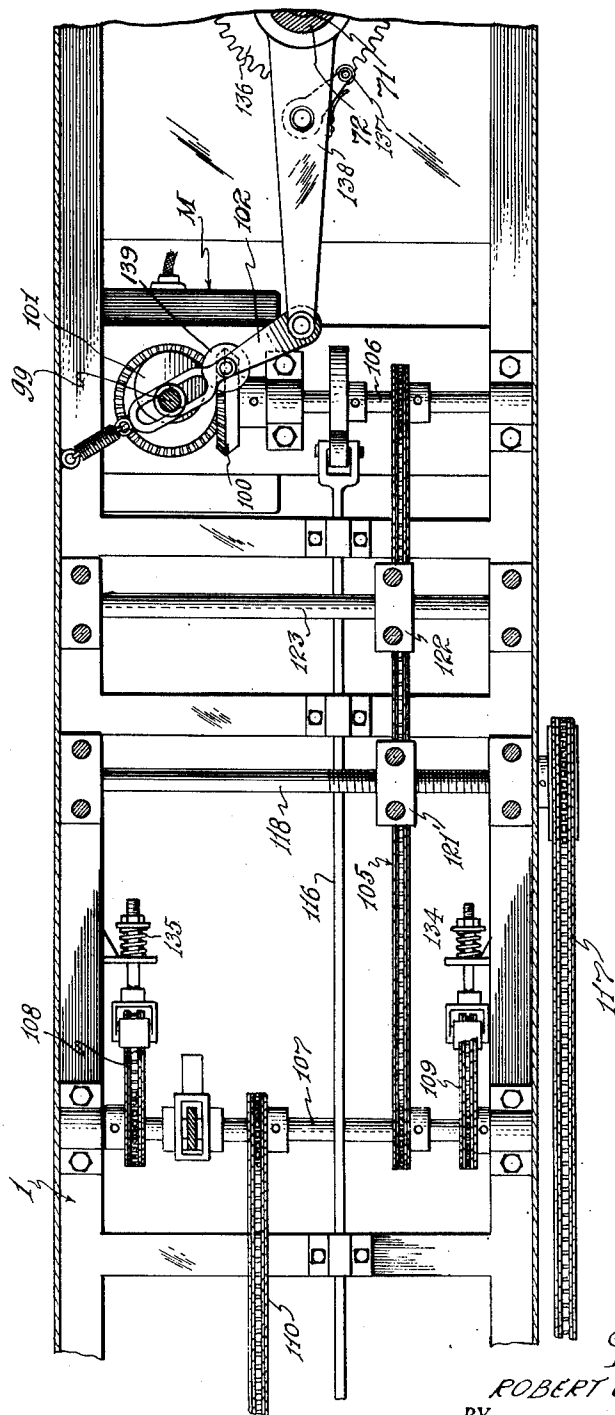
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CARTON OPENING, FILLING, AND CLOSING MECHANISM

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Fig. 23



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UNITED STATES PATENT OFFICE

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CARTON OPENING, FILLING, AND CLOSING
MECHANISM

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19 Claims. (Cl. 53—91)

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This invention is directed to a mechanism for handling cartons, that come in a compact collapsed condition, whereby the cartons may be opened, filled, sealed and delivered in a new and improved manner. One of the general objects of my invention is to provide a mechanism that is relatively simple yet highly efficient in its operation.

Another object is to provide a mechanism that can be quickly adjusted to handle cartons of different dimensions and do it equally effectively for such different sizes.

A further object is to provide a new and positive way of opening up the cartons and passing them along to the filling section of the mechanism.

A still further object is to provide a new and better way of insuring that the cartons are securely sealed. Other objects will appear to one familiar with this class of mechanism as the specification and drawings are studied together with the appended claims.

In the drawings,

Figure 1 is a perspective view of carton approach end of the mechanism.

Figure 2 is a view of a portion of Figure 1 showing cartons in a different position of movement through the mechanism.

Figure 3 shows one of the cartons shortly after it enters the passageway leading to the filling position.

Figure 4 is a view similar to Figure 1 but looking from the opposite side.

Figure 5 is a view similar to Figure 2 but from the opposite side.

Figure 6 is a plan view of Figures 1 and 4.

Figure 7 is a view of the carton handling devices in a different position than shown in Figure 6.

Figure 8 is a view of the carton handling devices in the next step.

Figure 9 is a view on the line 9—9 of Figure 6.

Figure 10 is a view on the line 10—10 of Figure 6.

Figure 11 is a view on the line 11—11 of Figure 9.

Figure 12 is a plan view of the mechanism to the right of Figure 6.

Figure 13 is a perspective view of the mechanism shown in Figure 12 but looking from the same side as Figure 4.

Figure 14 is a view of a carton after filling and showing the top flaps during the closing operation.

Figure 15 is a view of a carton after filling and

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showing the final stage of closing the top side flaps.

Figure 16 is a part sectional and elevational view showing a carton in dotted lines just after it has been moved to the final sealing and delivery chamber.

Figure 17 is a part sectional and elevational view similar to Figure 16 but with its part in different position.

Figure 18 is a view on the line 18—18 of Figure 17.

Figure 19 is a view on the line 19—19 of Figure 17.

Figure 20 is a fragmentary view of a modified form of applying pressure to the top of a filled carton.

Figure 21 is a partial plan view on Figure 1 just below the passageway through which the cartons move to be filled as indicated by line 21—21.

Figure 22 is a plan view below the plane 21—21 (see Fig. 1).

Figure 23 is a plan view showing an extension to the right of Figure 22 (Fig. 1).

Referring now to the details wherein like numbers refer to corresponding parts, in the various views, 1 is a framework of any suitable construction for carrying the various parts of the mechanism which is utilized for handling cartons which may vary somewhat in size. On the framework 1 is mounted as by studs 2, a holder 3 for carrying a stack of cartons C, which are held in their collapsed state under some compression by the member 4 (see Fig. 6), the outer end of which is slidably attached to a support arm 5 through an attachment 6 having a flexible member such as a rope 7 which passes over a pulley 8, the lower end of which is attached to a weight 9. With this arrangement a continuous and uniform advancing pressure is applied to the cartons C. Mounted adjacent one side of the forward end of the holder 3 is a selector device 10 (see Fig. 11) made up of discs 11 and 12 separated by a spacer 13 and held to an operating shaft 14 by means of a screw stud 15 which also holds in place a guide member 16 that is positioned between the head of the stud 15 and washer 17. As the shaft 14 turns, the disc 11 has a cutaway portion a (see Fig. 9) which insures that the front carton will be properly started outwardly from the stack and then the full radius of the disc will complete the separation and the carton will come into engagement with disc 12 until it turns to the place where its cutaway portion b (see Fig. 10) will completely free this edge of the carton from the selector. As the selector or separating

means 10 is turned the front carton is moved out of the holder and dropped down by its own weight into a receptacle 20' positioned below the plane of holder 3, being guided on its way by an adjustable offset finger 19' which normally bears lightly on each carton being released and a downwardly extending part 150 and an adjustable roller 19 and a guide arm 16 which co-operatively act to guide and supply some pressure to the narrow sides of the carton carrying the flaps 61 and 62 as the carton drops into the receptacle 20', it being understood that the tendency of the carton is to open up by itself after being released from the stack pressure and the extending part 150 acts especially to apply some pressure to one narrow side of the carton (see Figure 4) which shows the carton free from the finger 19'. The inner side wall of the receptacle 20 for receiving the displaced carton has a curved or concave surface 20 against which one edge of the carton engages with sufficient force to start it opening, it being understood that when released from the stack there is an inherent tendency for the carton sides, when the stack pressure is removed, for the sides to spread apart. Associated with the curved member 20 is an outer portion 21 (see Fig. 6) preferably integral therewith. As shown particularly in Figure 1 stud 22 is located in a slot 23 of an upwardly bent arm 24 that has one end 25 (see Figure 22) connected to a gearing arrangement 26 that gives to the arm portion 25 an oscillating movement whereby the amount of its swing is controlled so as to move the member 29 a certain specified distance which will be directly explained. When the arm 24 is in its non-working position it is located in a slot or notch 27 (see Figure 21) which allows the arm 24 to move to fully retracted position. Riding on the outer plate 21 is the member or carriage 29 having a pin 22 located in slot 23 of arm 24. Attached to the carriage 29 as by screws 28 is a member 30 the end of which is bent over inwardly so its end will engage the displaced carton and will start moving it in the direction indicated by the arrows in Figure 6 wherein it is seen that, due to even the little pressure applied to its opposite corners, the carton has been opened up and is about to be moved into the position shown in Figure 7 wherein the small plate member 31 is in engagement with one of the narrow sides having the end flaps 61 and 62 of the carton. By reference to Figures 1, 2 and 12 it will be seen that the plate 31 is fastened to and engaged by the chain drive 32 in suitable spaced and equal intervals. Pivotaly mounted on a frame support member 33 is an arm 34 held in the position shown in Figure 7 by a spring 35 (Fig. 1). As one of the plates 31 moves the carton forward to a position shown in Figure 8, the carton engages the arm 34, whereby due to the spring tension thereon, a small amount of pressure is applied to the opposite end of the carton. This serves to increase its rigidity somewhat so that the means for moving the lower flaps of the carton will act thereon without disturbing its position into which it has been moved as shown in Figure 8, wherein the member 30 reaches the end of its stroke and has what may be termed a dwell action at this point following which it and its associate parts are moved back to starting position to which reference has already been made.

At about the same time the cartons are in the position as shown in Figures 7 and 8, a lever 36 (see Figures 21 and 22) is actuated by an arm 37 pivoted at 38 and a crank arm 39 operated by

shaft 40 that is turned by chain 41 driven by drive shaft 42 to which reference will be made later. The lever 36 acts to close the two bottom end flaps of the carton at about the time the fingers 43 and 44 (see Fig. 6) act to move the bottom side flaps 45 outwardly as shown in Figure 1 just as the carton is moved into the passageway to bring the carton to filling position. As the bottom side flaps of the carton designated as 45 on Figure 3 are moved outwardly, they are in a position to be carried over rollers 46 and 47 positioned on opposite sides of the passageway construction. These rollers are positioned in small receptacles 48 and 49 held to the framework in a suitable manner. The receptacles 48 and 49 contain adhesive material that is carried by the rollers into contact with the inner surfaces of the flaps 45 which are held down by spring fingers 50 into good engagement with the rollers.

After the carton is advanced by the carrier chain 32 and the plate or plates 31, the flaps 45 are engaged by closing members 51 there being one on each side of the passageway. From here on, the bottom of the carton runs on a track member 52 centrally located in the passageway. As soon as the bottom flaps are closed as just described, the carton passes to the filling position as indicated in Figure 1 where they are filled, in any satisfactory manner by any suitable material; but, since the filling operation forms no part of my invention, no further description seems necessary. The side members 53 and 54 form a substantial part of the passageway for the cartons. These two members are preferably L-shaped and on the base portions 55 thereof there is fastened as by screws 56, guide plates 57, there being separators 58 between the guide plates 57 and the base portions 55 to allow the top side flaps 59 to pass in this space between the guide members 57 and the base portions 55 as is shown in Figure 1. It is to be noted that Figure 1 shows the ends of the guide members 57 pointing upwardly and inwardly to engage the top side flaps 59 to bend them over onto the base members 55. After the filling operation has been performed the carton is carried forward to the top closing position as shown in Figure 13, wherein the arm 60' first flips the edge flap 61 as it moves arcuately above and back of flap 62 after which it immediately changes its direction, by reason of a crank arm 63 and moves the flap 62 in the direction of the arrow to closing position, it being understood that as the carton moves forward the flap 61 is moved to closed position and held there by member 60. Then as the carton is moved forward, the flaps 59 move under the two rollers 64 that are supplied with adhesive by the receptacles 65 adjustably held in position by support devices 66. After leaving the rollers 64 the flaps 59 are engaged in proper sequence by guide and closure members 67 and 68 after which the carton is carried forward by the chain 32 onto an enclosure 69 with the aid of a combination of levers L (Fig. 13) so that the bottom of the carton will come to rest on a circular plate or disc 70. The combination of levers L of Figures 12 and 13 includes, a lever 140 pivoted at 141 to a member of the framework 1. The opposite end of the lever 140 is pivoted at 145 to an upwardly bent lever 144 (see Fig. 13) and a returning spring 146 is adjustably connected between the pivot 145 and a frame bracket 147. Pivotaly connected at 143 and 148 between the levers 140 and 144 is an upwardly bent arm 142. The shaft 99 has an extension 103 (see Fig. 13) which carries a cam 149

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that engages a member 151 carried on the lever 142 whereby when it is engaged by the cam 149 the levers L as described are moved to cause the free end of lever 144, to which is flexibly attached a push block 152 through the medium of a pivot 153 and a resilient member 154, to engage the sealed cartons and assist in moving them off the conveyor onto the plate 70.

The mechanism within the enclosure 69 is illustrated more in detail in Figures 16-20 wherein 71 is a fixed standard on which is rotatably mounted a sleeve 72, which is rotatably held to the standard 71 as by an anti-friction bearing 73. On the top part of the standard 71 is slidably mounted a member 74 having a plurality of fixed arms 75 and 76 arcuately spaced around the standard 71. Around the outer extremity of the arms 75 there is positioned plate 77 having a smooth flat surface on which rollers 78 run. Each roller is pivoted at 79 to the upper end of a block 80 which is mounted on a rod 81, the end of which engages a spring 82 carried within the block 80. Each of the rods 81 has a channel 83 therein to receive a stud 84 carried by the block 80 and entering the channel 83 to prevent the block 80 from turning on the rod 81. The lower end of the rod 81 passes through a guide stud 85 carried by disc 86 fastened in any satisfactory manner to the sleeve 72 as by one or more set screws 87. The disc 86 carries a screw 88 the end of which, also enters the channel 83 to prevent the rod from turning in the disc 86. To the lower end of the rod 81 is fastened as by a screw 89 a plate 90 that is adapted to engage the top of the carton C shown in the broken lines as the cartons are fed onto the plate 70 which preferably has a circular stop member 91 fastened thereto. Carried by the sleeve 72 is a collar 92 to which is pivotally attached a plurality of levers 93 each of which has a ball 94 attached thereto in a manner as shown in Figure 17 for engagement with a circular cam plate 95 carried by the arms 76. The outer extremity of each of the levers 93 is provided with a slot 96 in which is positioned a stud 97 that is fastened to the rod 81. The function of these parts shown in Figures 16-20 inclusive are as follows, when a carton is moved onto the plate 70 as heretofore described, the cam 95 (which is, prior to that time for holding the plate 90 in a raised position as shown in Figure 16 and immediately the carton is deposited on the plate 70) releases the lever 93 and due to the tension of the spring 82, the rod 81 is moved downwardly and forces the plate onto the top of the carton C and as the plate is revolved by the turning of the sleeve 72, the cartons are carried around the enclosure 69 which is circular in form and this constant pressure on the carton on the move from within the enclosure 69, the adhesive has plenty of time to dry and keep the carton closed. If desired, a heat lamp 98 may be utilized in the top of the casing to apply any desired amount of heat to further insure the drying of the adhesive before the cartons C are moved from the enclosure 69 out of the orifice O.

In place of the block 80 the roller 78 and associated parts, a weight W may be substituted for application to the rod 81.

The main drive shaft 99 shown in Figure 23 is connected to motor M through suitable reduction gearing and the gears 100, cam 101, and link member 102 are so correlated with the other mechanisms so as to produce the necessary timing relationship, but it may be mentioned in passing

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that the shaft 99 carries the gear 104 (see Fig. 13) that moves the carton driving chain 32.

Other gear drives are shown on the drawing and may be referred to briefly for example, chain 105, is driven from the shaft 106 and geared to the shaft 107 that supplies power to the rollers 64 through the chain drives 108 and 109, from the shaft 107. A chain 110 transmits power to the shaft 42 to which reference has already been made. In addition the shaft 42 operates the chain drives 111 and 112 for turning the adhesive application rollers 46 and 47. Shaft 49 already referred to carries a gear that drives a chain 113 with an operating shaft 114 (Fig. 6) which carries a gear 115, Fig. 4, that is suitably meshed with a gear (not shown) on the shaft 14 (Figs. 6 and 11) that operates the carton selector. A rod 116 operated by a shaft 106 is connected to operate the combination gear mechanism 26. A chain 117 connects two threaded shafts 118 and 119 the latter of which has an operating knob 120. The shafts 118 and 119 are operatively connected to members 121 and 121' which are fastened to side bar 53 which forms (see Figs. 21 and 22) one side of the passageway through which the cartons move. On turning the knob 120 the side bar 53 and its associated parts are moved laterally with respect to the corresponding bar on the opposite side. An additional support 122 slidable on the rod 123 (Fig. 23) is fastened to the side bar 53. The lateral shifting of the bar 53 and parts carried thereby is for the purpose of taking care of cartons of different thickness as defined by the width of the flaps 61 and 62 (see Fig. 14).

The width of the carton hopper can be varied by turning the collar or knob 124 that is fastened to shaft 125 (see Figs. 4 and 6) carrying a gear and a chain 126, the latter of which is connected to a gear carried on a shaft 127 (see Fig. 4). The shaft 125 carries a member 128 and the shaft 127 carries a member 129 to which the side plate 130 of the holder is attached so that by the means just described, the width of the holder can be varied. The knob 124 has been omitted from Fig. 1 in order to better show the stud 2 and member 128 but it is shown as above noted in Fig. 6.

From reference to Figures 1, 2 and 4, it will be seen that the bar 53 is also adjustable in a vertical direction as well as laterally as has been described on the support brackets 131, by slots 132 therein and lock studs 133. This adjustment is to take care of cartons having a different length or height, it being understood that the bar 53 on the opposite side of the structure is likewise adjustable as will be seen from Figure 13.

The springs 134 and 135 and associated parts serve as tensioning means for the chains 108 and 109 when the height is varied.

Since the structure or mechanism shown and described herein has many different parts it is obvious that the details entering into the entire construction may be varied considerably without departing from the spirit of my invention or the scope of the appended claims, for example, the speed at which the cartons are carried through the apparatus can be readily varied to suit conditions without changing parts, as by the use of variable speed pulleys. As shown in Figure 23 the shaft 71 and its associated parts (Figs. 16-20) is operated by the ratchet wheel 136 that in turn is operated by the pawl 137 carried by the arm 138 which is connected to the link member 102 that carries a roller 139 in engagement with the

cam 101 to give the required rotary movement to shaft 71.

I claim:

1. Carton handling mechanism including, a holder for carrying a quantity of folded cartons with means for pressing them toward the discharge end of the holder, a receptacle positioned directly below the bottom plane of the holder at its discharge end, rotary means laterally displaced from the holder at its discharge end for moving one carton at a time from the holder, in a manner whereby the cartons will drop by their own weight into said receptacle, a longitudinal passageway, having entrance and exit ends as a filling position between said ends with means for moving the cartons along said passageway, means movable within said receptacle for opening up the cartons and moving them into the entrance end of said passageway, means near the beginning of the passageway for closing the lower ends of the cartons before they reach the filling position, means just beyond the filling position for closing the upper ends of the cartons after they are filled, a rotary structure positioned at the exit end of said passageway, means for moving the loaded cartons from said passageway exit end onto said rotary structure having means for applying pressure to the closed ends of the cartons for a predetermined length of time before discharging them.

2. A carton feeding mechanism as defined in claim 1 further characterized in that said rotary means for selecting and moving one carton at a time from the hopper comprises, a pair of relatively thin discs positioned on an operating shaft, one of said discs having preferably a beveled edge which will readily pass between an exposed carton and the next behind it and move the carton out of the hopper, while the other disc acts as a stop to prevent the carton from tipping over but has one edge cut away to finally release the carton so it may drop down to opening position, an adjustable rotary member attached to the side of the hopper for assisting in properly directing the carton from the hopper and a guide finger fastened to said operating shaft for assisting in moving the carton to a position where it is opened.

3. A carton feeding mechanism as defined in claim 1 further characterized in that said rotary means for selecting and moving a carton comprises an upwardly bent lever having a forked end, a curved member mounted for circular motion and having a pin located in said forked end and also having an arm extending above and inwardly to engage a carton when it is dropped from the hopper and power operated means for moving said lever and associated parts to open the carton and move it to the opening into said passageway and further lever means for closing the bottom edge flaps at about the time the bottom side flaps are opened for having the adhesive material applied to their inner surfaces.

4. A carton feeding mechanism as defined in claim 1 further characterized in that said means for applying pressure to the carton after the top flaps are closed comprising a rotatable plate and means for moving the closed cartons thereonto, said plate having a plurality of angularly positioned plungers located above it and having heads to engage the top of said cartons as they are moved onto the plate, means for moving the plungers in sequence so the heads thereof will engage and apply pressure to the top of the cartons, means for rotating the plate and plungers

as a unit and means for discharging the cartons therefrom after a predetermined time.

5. A carton feeding mechanism as set forth in claim 1 further characterized in that said rotary structure includes a plate onto which the cartons are moved from the exit end of said passageway, a plurality of angularly arranged pressure plungers mounted above said plate with automatic means for moving them in sequence and holding them onto the tops of said cartons as delivered to the plate.

6. A carton feeding mechanism as set forth in claim 1 further characterized in that said rotary structure includes a plate onto which the cartons are moved from the exit end of said passageway, a plurality of plungers angularly arranged on a support member above the plate in co-ordination with the position at which the cartons are to be delivered to the plate, a fixed cam member, a lever operatively connected to each plunger and having a part adapted to engage the cam at a predetermined position to lift the plunger from engagement with the carton to be delivered from the mechanism and then a short time later release the lever so the plunger can move into engagement with the top of a carton just coming onto the plate.

7. A carton feeding mechanism as set forth in claim 1 further characterized in that said rotary structure includes a plate onto which the cartons are moved from the exit end of said passageway, a plurality of plungers angularly arranged on a support member above the plate in co-ordination with the position at which the cartons are to be delivered to the plate, each plunger having its upper end engaging a spring located in a recess of a pressure controlling member, the upper end of said member having a roller located therein with a fixed surface on which the roller runs and means responsive to the angular movement of the plungers for controlling their vertical movements.

8. A carton feeding mechanism as set forth in claim 1 further characterized in that said rotary structure includes a plate onto which the cartons are moved from the exit end of said passageway, a plurality of plungers angularly arranged on a support member above the plate in co-ordination with the position at which the cartons are to be delivered to the plate, each plunger having means at its upper end to apply a downwardly acting force to the plunger and means responsive to the angular movement of the plungers for controlling their vertical movements.

9. A carton feeding mechanism as set forth in claim 1 further defined in that the said passageway has a pair of spaced longitudinally extending members between which the cartons move and means for at least moving one of said members laterally to accommodate cartons of different thickness.

10. A carton feeding mechanism as set forth in claim 1 further defined in that the said passageway has a pair of spaced longitudinally extending members between which the cartons move, each of said members having an L-shaped part which is vertically adjustable to accommodate cartons of different lengths or heights.

11. A carton feeding mechanism as set forth in claim 1 further defined in that the said passageway has a pair of spaced longitudinally extending members between which the cartons move, said members having adjustable parts for accommodating cartons of different dimensions in at least two directions.

12. A carton feeding mechanism as set forth in claim 1 further defined in that the said passageway has a pair of spaced longitudinally extending members between which the cartons move each of said members having an L-shaped part, positioned with the bases uppermost and extending in opposite directions to act as supports for the upper side flaps of the cartons and guide members for said side flaps carried in spaced relation above and on the bases of said L-shaped member.

13. A carton feeding mechanism as set forth in claim 1 further defined in that the said passageway has a pair of spaced longitudinally extending members between which the cartons move, each of said members having an L-shaped part, positioned with the bases uppermost and extending in opposite directions to act as supports for the upper side flaps of the cartons, guide members for said side flaps carried in spaced relation above and on the bases of said L-shaped member, said guide members having their ends, at the carton entering end of the section upwardly and inwardly curved to engage the top side flaps and cause them to bend outwardly and then under the flat part of said guides.

14. A carton feeding mechanism as set forth in claim 1 further defined in that said carton opening means includes an inwardly curved member positioned so when the carton is released from the holder it will engage this curved member and another device mounted to be power driven so as to follow said curved member and push the carton from one side corner against a movable stop at the opposite side corner to thereby cause the collapsed carton to open up, an endless power belt having push plates attached thereto at predetermined intervals for engaging the carton at said stop corner to move the carton through the said passageway and a resiliently mounted lever for engaging the end of the carton opposite the push plate to give the carton some rigidity while being moved into the said passageway.

15. A carton feeding mechanism as set forth in claim 1 further defined in that said carton opening means includes an inwardly curved member positioned so when the carton is released from the holder it will engage this curved member and another device mounted to be power driven so as to follow said curved member and push the carton from one side corner against a movable stop at the opposite side corner to thereby cause the collapsed carton to open up, an endless power belt having push plates attached thereto at predetermined intervals for engaging the carton at said stop corner to move the carton through the said passageway, a resiliently mounted lever for engaging the end of the carton opposite the push plate to give the carton some rigidity while being moved into the said passageway, and means located below the lower region of the edge of this curved surface for first closing the lower edge carton flaps and further means positioned on this lower region for applying an adhesive to the inner surfaces of the lower

side flaps and then closing them before the cartons reach the filling position.

16. A carton feeding mechanism as set forth in claim 1 further defined in that the said passageway has a pair of spaced longitudinally extending members between which the cartons move and a pair of screw threaded rods spaced near opposite ends of one of said extending members and fastened thereto, said rods being interconnected by a belt drive preferably of the chain type with means on at least one of said rod ends for turning both through said drive to laterally move one of said extending members for the purpose described.

17. A carton feeding mechanism including a hopper for carrying a stack of folded cartons with means for applying a continuous pressure to the rear end of the stack, rotary means for selecting and moving one carton at a time from the front end of the stack and dropping it down into a receptacle below the front end of the stack, said receptacle having a concave inner side wall against which the carton is projected, a device associated with said concave side with means for moving the device into contact with the carton to turn and open it and move it against a conveyor plate for transmission through the rest of the mechanism.

18. A carton feeding mechanism as set forth in claim 17 further defined in that means are provided for moving the bottom end edge flaps of the carton into closed position directly after the conveyor plate engages the carton and further means acting directly thereafter to move the bottom side flaps outwardly to engage means for applying an adhesive to these side flaps and further successively positioned means for closing these flaps.

19. A carton feeding mechanism as set forth in claim 17 further defined in that means are provided for moving the bottom end edge flaps of the carton into closed position directly after the conveyor plate engages the carton and further means acting directly thereafter to move the bottom side flaps outwardly to engage means for applying an adhesive to these side flaps, further successively positioned means for closing these flaps, means acting coincident with the outward movement of said lower side flaps, for moving the upper side flaps to open position and for holding them in this open position until the filling of the carton is done.

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