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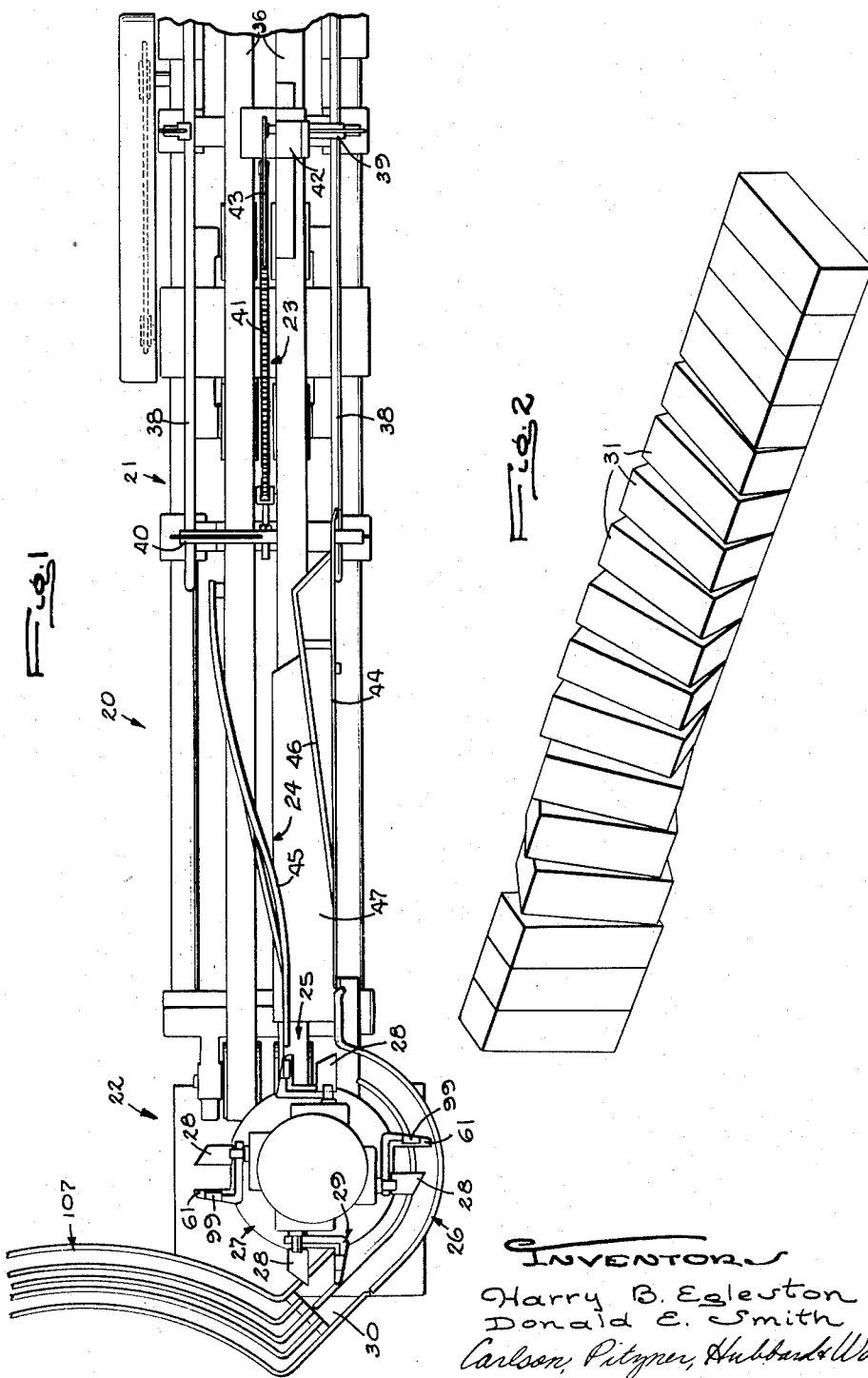
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2,852,900

FLAT TOP CARTON INFED UNIT FOR FILLING MACHINE

Filed March 24, 1955

7 Sheets-Sheet 1



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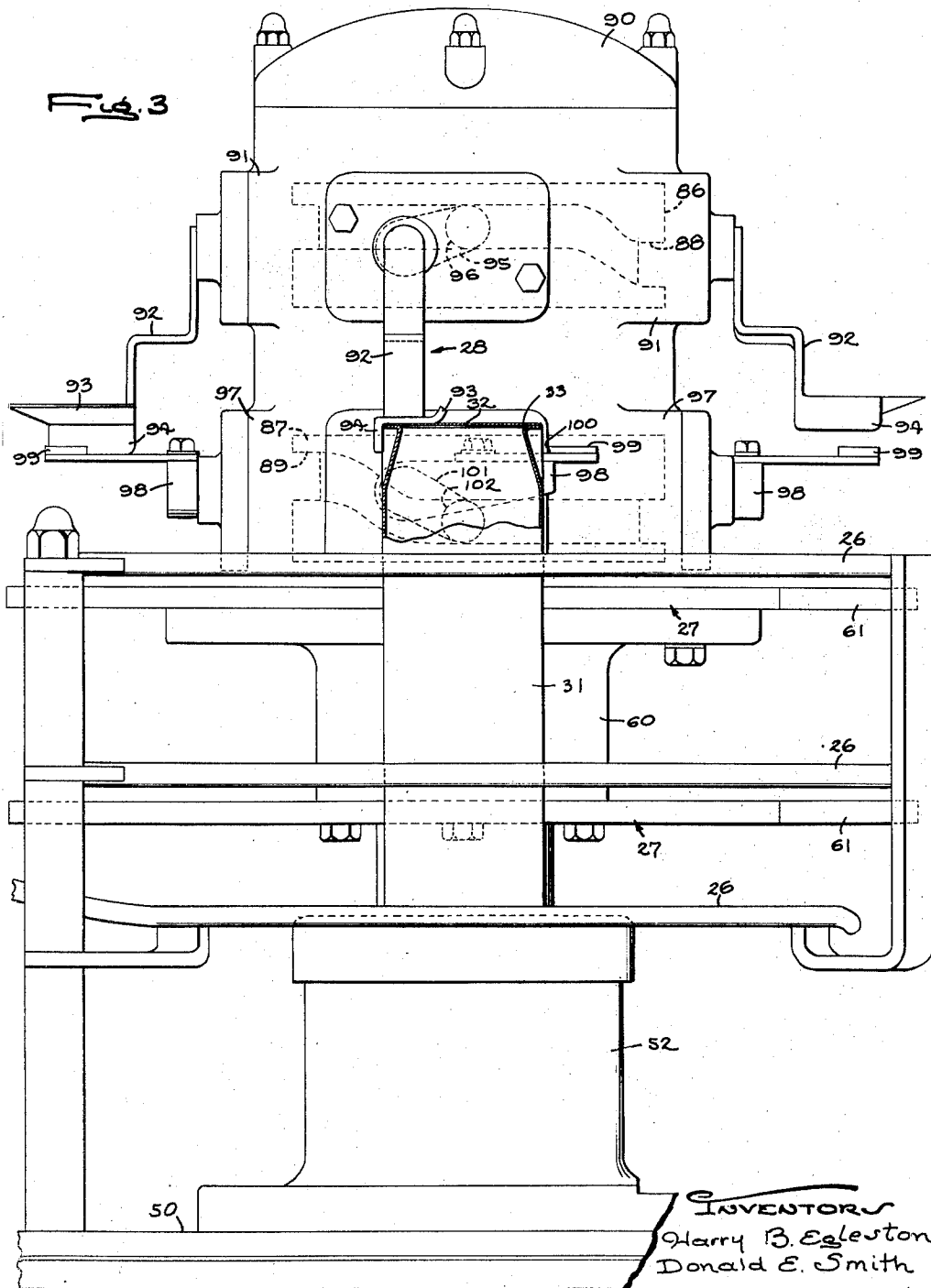
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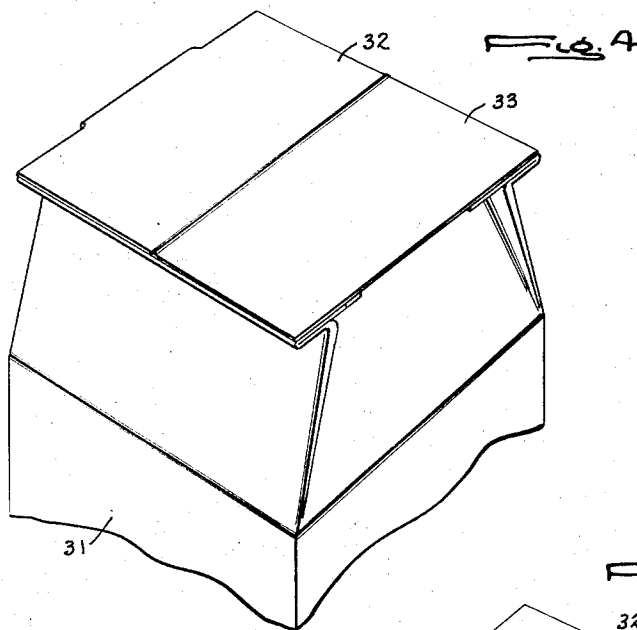
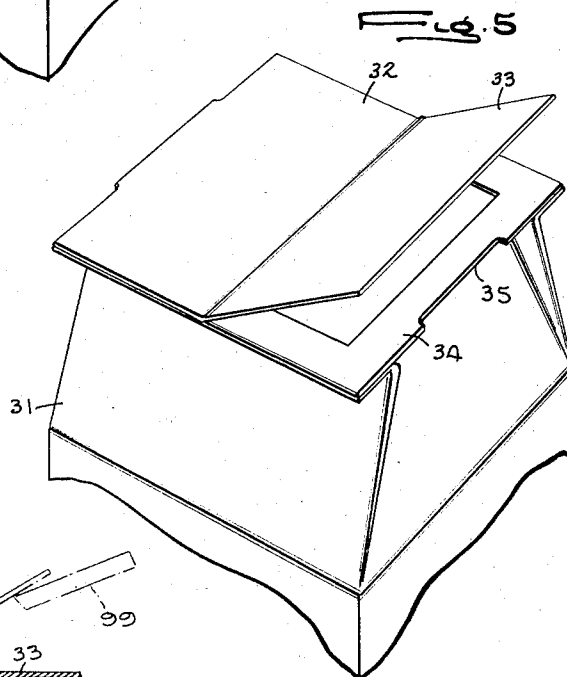
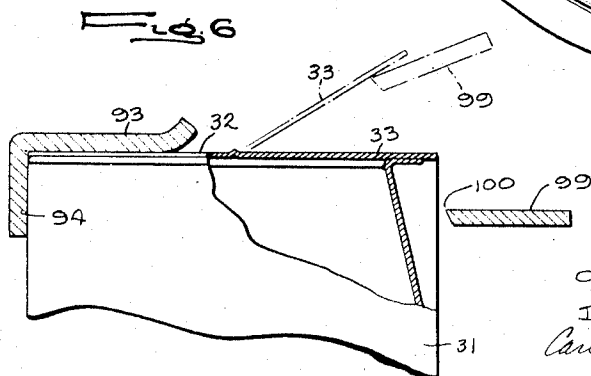
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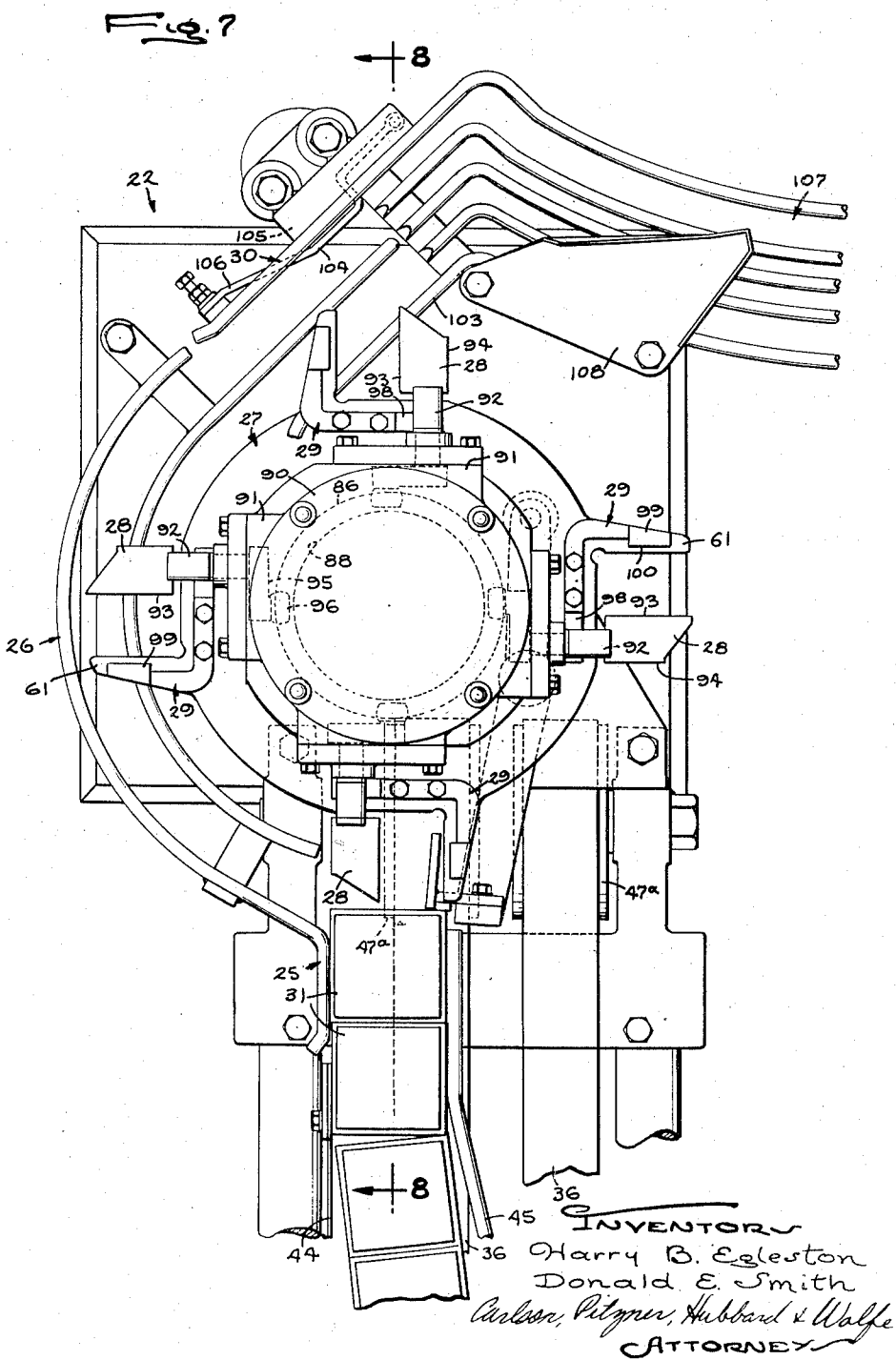
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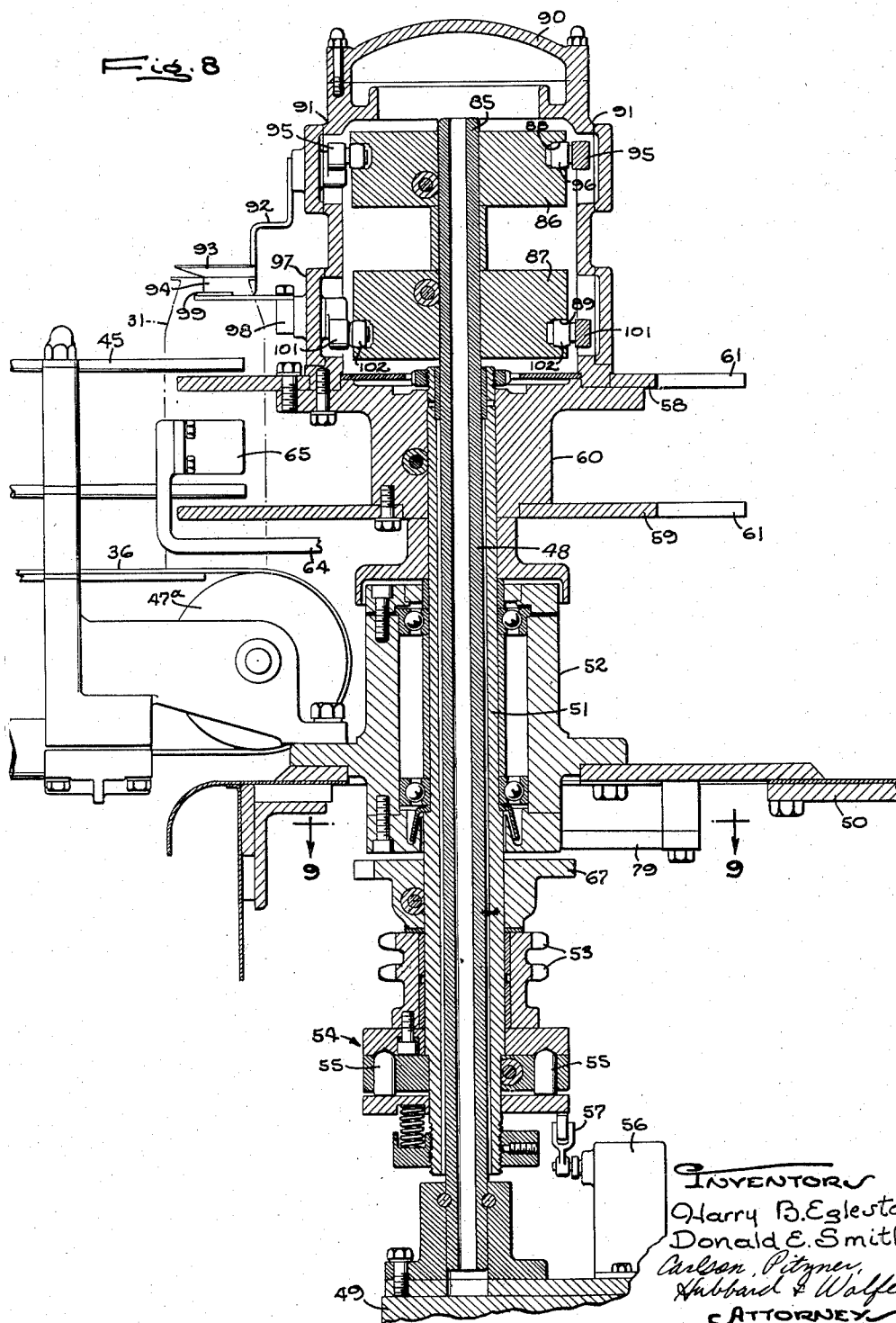
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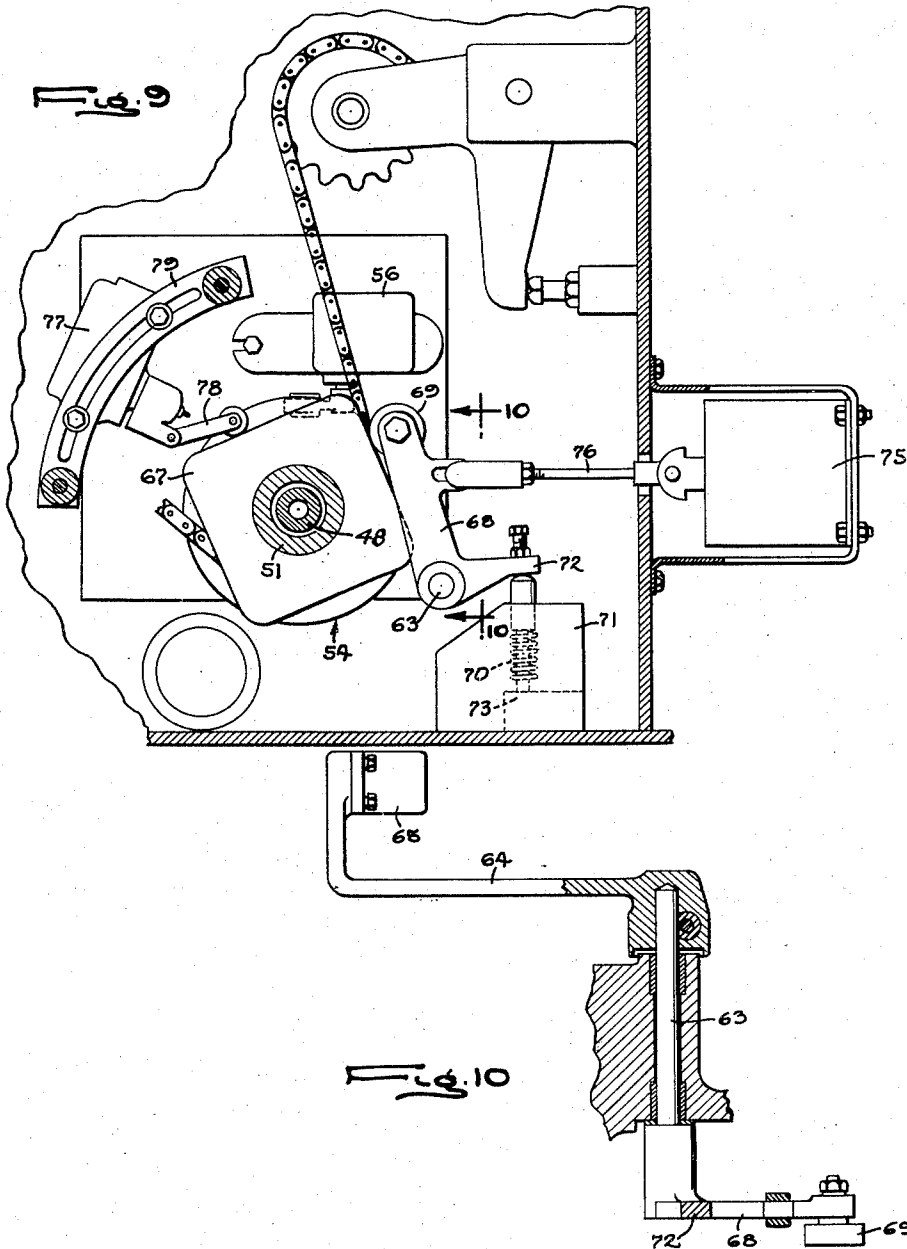
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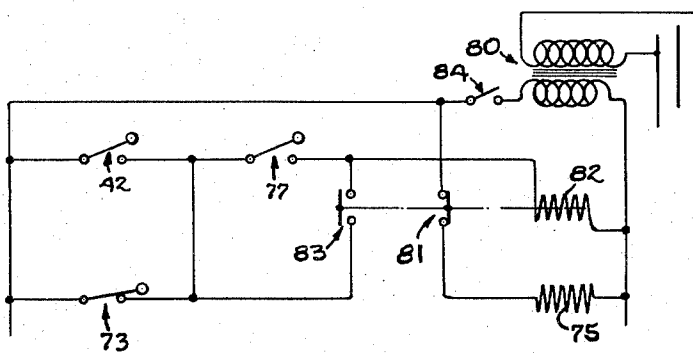
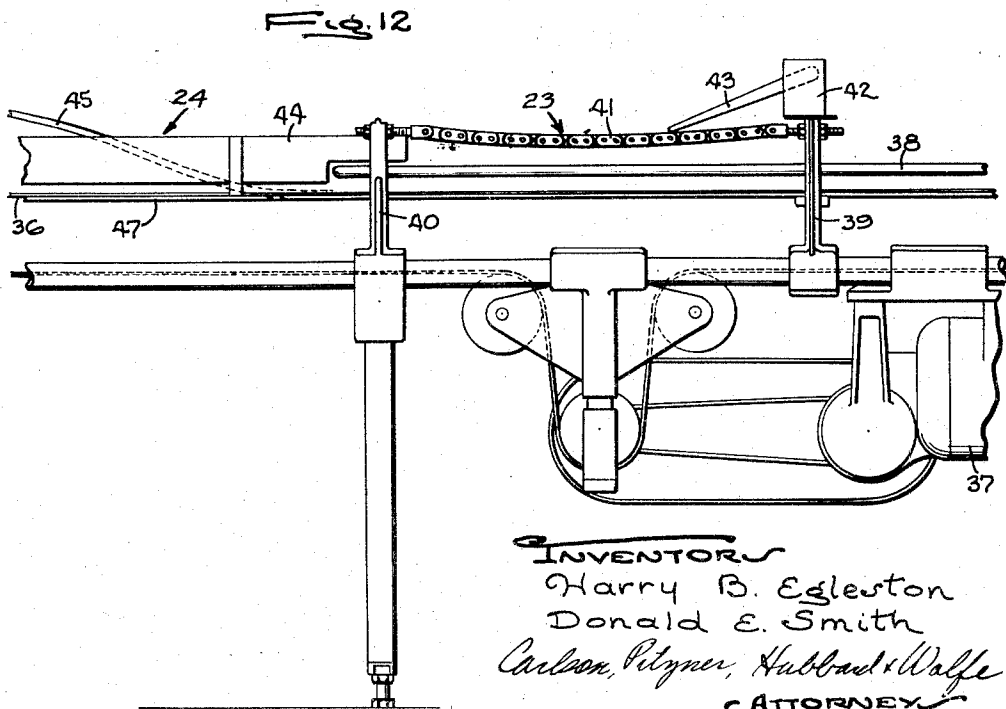


Fig. 11



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FLAT TOP CARTON INFEED UNIT FOR FILLING MACHINE

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Application March 24, 1955, Serial No. 496,452

10 Claims. (Cl. 53—382)

This invention relates to machines for handling flat top paper cartons and has particular reference to a carton infeed mechanism for an automatic filling machine.

Disposable cartons made of waxed paper board or other sheet material and commonly used for the distribution of milk are desirably supplied to a filling machine with minimum reliance on operating personnel. Speed, economic operation and strict sanitary standards prevail to make complete automation virtually a necessity. However, mechanization and centralization of the various filling and sealing operations often serve to transfer the critical or limiting conditions to the carton infeed means. The cartons themselves are light in weight and subject to toppling or crushing. Not only is it desired to transfer such cartons one by one at a rapid rate without jamming or rough handling from a supply source to the filling machine timed conveyor, but it is also in many cases desirable to avoid partial loading and operation of the machine when the cartons are supplied to the infeed unit at an irregular or very low rate.

A particular problem sometimes involved, especially where a dairy is not equipped to maintain its own machine for erecting cartons from blanks, is the provision of erected cartons in strictly sanitary condition to the filling machine. Accordingly, when the cartons must be stored or shipped prior to filling, it is often desirable to temporarily seal the filling flap. Flat top cartons having such a filling flap are disclosed in application Serial No. 135,430, filed December 28, 1949, by C. H. Dixon, now Patent No. 2,730,288 or in Patent No. 2,663,981, issued to R. S. Sanford. Such cartons should be reopened in readiness for filling without additional manual handling or reduction of the feed rate.

It is therefore a primary object of the invention to provide an improved infeed mechanism for supplying cartons to an automatic machine.

It is one important object to provide means for opening presealed flat top cartons while transferring the cartons to a filling machine.

It is another important object to provide a carton infeed mechanism for positively transferring cartons in timed sequence to an automatic machine independently of the rate the cartons are conveyed to the infeed mechanism.

It is an additional object to provide an infeed mechanism for transferring flat top cartons and opening their presealed flaps with a relatively simple and foolproof mechanism and with a minimum of handling of the carton itself.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawings in which:

Figure 1 is a plan view of a carton infeed mechanism incorporating the invention and showing both the infeed conveyor and the rotary unit.

Fig. 2 is a perspective view showing the positions of

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successive cartons upon accumulation in the infeed conveyor.

Fig. 3 is a front view of the rotary unit of the infeed mechanism of Fig. 1.

Fig. 4 is a perspective view of the upper portion of a flat top carton of a type advantageously employed in the apparatus of Fig. 1.

Fig. 5 is another view of the top carton portion similar to Fig. 4 but showing the top flap open.

Fig. 6 is a view partially in section, of the top portion of a carton showing the positions of the hold-down clamps and flap openers.

Fig. 7 is a top view of the rotary unit of the infeed mechanism.

Fig. 8 is a sectional view taken along line 8—8 of Fig. 7.

Fig. 9 is a sectional view of the rotary head gate actuating mechanism taken along lines 9—9 of Fig. 8.

Fig. 10 is a view taken along lines 10—10 of Fig. 9 showing the gate assembly.

Fig. 11 is a schematic diagram of the control circuit of the infeed mechanism; and

Fig. 12 is a front view of the input conveyor of the infeed mechanism.

While the invention is susceptible of various modifications and alternative constructions, a preferred embodiment is shown in the drawings and is herein described in detail. It is to be understood that it is not thereby intended to limit the invention to the specific form disclosed but it is intended instead to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as expressed in the appended claims.

To facilitate the explanation of the detailed description of the structure and function of the machine, reference is first made to its overall organization as seen in the plan view of Fig. 1. Thus the overall apparatus as a carton infeed mechanism 20 comprises an infeed conveyor 21 and a rotary unit 22. The conveyor has a first traction section 23 which receives cartons arriving on a conveyor extension from an unpacking point or from the erecting and coating machines. A second section 24 of the input conveyor positions the cartons upright before presenting them to the gate 25 of the rotary unit. Arcuate guides 26 adjacent the rotary unit define the path of cartons admitted by the gate and advanced by the rotary pusher or paddle wheel 27 of the unit 22. Clamp and flap opener assemblies 28 and 29 on the rotary unit perform the opening function on the cartons while they are being pushed along the arcuate guides 26 to an unloading station 30 which may suitably be along the timed moving conveyor of a carton filling machine or other processing machine.

A flat top carton 31 of a design with which infeed mechanisms incorporating the invention find extensive, although not exclusive, utility is shown in Figs. 4 and 5. Such cartons, usually made of paper board coated with wax, suitably have a flat top with one section 32 permanently sealed, leaving a remaining top section or flap 33 which is bent upwardly to open the carton for filling. After filling the top flap 33 is closed and adhesively secured to the underlying flange or ledge 34. A notched or cut-away portion 35 at the outer edge of the underlying flange 34 facilitates lifting and holding open of the filling flap 33. Between the time the carton is wax coated and the time it is filled it may be desirable or necessary for complete sanitation to temporarily seal the top flap 33 in place, the wax of the coating rather than a permanent adhesive being ample for this purpose. The wax seal is rather easily broken providing the carton itself is held in place during the opening operation. It might also be added that

such cartons are usually provided with another pouring opening for use by the ultimate consumer, this suitably being arranged by lifting a tab portion 32 of the carton top.

Referring now to the input conveyor 21 for supplying the cartons to the rotary unit 22, an endless belt conveyor 36, suitably as a split belt extending from the carton loading point to the rotary unit 22 is employed. Only the conveyor portions near the rotary unit and designated respectively as the traction accumulator section 23 and the uprighing section 24 are here described in detail since the length of conveyor extending beyond these sections may be entirely conventional. It is indeed an advantage that the conveyor extension need not be timed or regularly loaded. The conveyor is suitably driven by a motor 37 indicated in Fig. 12. For convenience in handling the cartons are laid flat on their sides at the loading station and carried transversely across upper runs of the conveyor belt, thus avoiding toppling and simplifying the loading care required. Side rails 38 extend to the uprighing section 24 to retain the cartons on the conveyor. In order to maintain a correct or predetermined alignment of the cartons in the rotary unit and the filling machine, the cartons are placed with the tops toward the rear side of the conveyor and their filling flaps 33 lowermost.

At the traction section 23 of the input conveyor means are provided for increasing the traction between the light, empty cartons and the conveyor belt 36. For this purpose first and second stationary arms 39 and 40 overhanging the conveyor carry between them a flexible weighting member 41 which rides over the top of cartons passing under it and biases them toward the larger friction surface of the conveyor belt 36. For this purpose a length of chain 41 slackly suspended is suitably employed, the chain in the preferred embodiment being of the link and roller type. Because the suspended weight is flexible the cartons entering the conveyor section 23 under the first overhanging arm 39 each bear the weight of a portion of the chain. Each carton in the central portion of the traction portion must displace upward a part of the chain. If desired, the height, weight and the amount of slack in the chain may be adjusted to increase the thrust required to bring a carton under the chain. In this way one or more cartons behind the leading carton may be accumulated before their cumulative unweighted traction is sufficient to thrust the first carton in line under the chain.

In order to detect the presence of cartons in the traction section 23 of the conveyor, an electrical switch 42, suitably comprising a pair of normally open contacts, is mounted on the first overhanging arm and has as an actuator a lever 43 with a lower end resting on the top of the chain 41. When the chain 41 is raised by the presence of an empty carton under it, the switch finger 43 is lifted to actuate the switch 42.

The cartons under the chain are next advanced and uprighing for filling. The second section 24 of the input conveyor at the front side of this section of the conveyor extending from the second overhanging arm 40 to the gate 25 of the rotary unit is a fence 44 along which the cartons may slide. The back rail 45 of this section of the conveyor is curved upward and toward the front fence so as to gradually lift one end of the carton as it is pushed along the conveyor and move it upright against the fence 44. An additional curved front rail 46 in this conveyor section has an initial portion positioned over the cartons lying on their sides and is gradually raised and converged with the front fence 44 to retain the cartons in alignment as they are raised. The cartons are thus effectively conveyed through or between the two curved camming surfaces while moving toward the rotary unit. The cartons as they are uprighing also slide onto a stationary bottom plate or guide 47. The forward pressure or thrust of the accumulated cartons behind those being uprighing

is sufficient to push the cartons forward to the gate 25 of the rotary unit. The conveyor belt 36 drops down over a supporting sheave 47a, the plate 47 suitably covering the forward end of the continuous conveyor belt top run in the carton path.

Before describing in detail the mechanism of the gate 25 which bars the further passage or movement of the uprighing cartons, reference is made to the rotary unit itself since it actuates and times the gate. As can be seen in Fig. 8, the rotary unit has an inner fixed vertical spindle 48 supported from a bottom plate 49 and passing upward through a table surface 50. A hollow shaft 51 fits over the spindle 48 and is rotatable on it, the hollow shaft being suitably journaled within a cylindrical housing 52 on the table surface 50.

To rotate the shaft 51 a shaft sprocket 53, driven suitably from the main conveyor motor of the filling machine or coupled to the timed conveyor system of any machine with which the infeed mechanism is to be used, is coupled through a safety overload device 54 to the shaft. As shown in Fig. 8, the overload device 54 may suitably take the form of a disk keyed to the shaft through which spring-biased pins 55 extend upwardly to engage shallow recesses in the lower face of the sprocket. When the shaft is overloaded, as may be due to a jammed carton, the pins slip downwardly and decouple the sprocket. A switch 56 having a limit actuating arm 57 is actuated by the depression of the pins 55 and may be employed to open the motor drive circuit so that the trouble causing the overload can be remedied.

The paddle wheel assembly 27 is also carried on the rotary shaft 51 above the housing. This paddle wheel suitably comprises a pair of spaced upper and lower annular plates 58 and 59 fastened to a collar 60 keyed to the upper end of the shaft. These plates are circular in form but have a plurality of aligned, angularly radial paddles or pusher fingers 61. Four are provided in the embodiment illustrated, so as to provide in effect a four-section paddle wheel. Each of the four sectors of the wheel is designed to accommodate one carton, which is engaged by the upper and lower projections 61.

The gate assembly 25 has a vertical oscillating spindle 63 (Fig. 9) positioned on the stationary cylindrical housing 52 of the rotary unit and toward the rear side of the infeed conveyor section. On the upper end of the spindle is a radially extending lever or arm 64 bent up at its end and having a stop block 65 fastened thereon. The front surface of the block 65 swings in front of the leading carton when the gate spindle is turned and thus functions as a closed gate. When the gate is retracted by reverse oscillation of the gate spindle the front carton is pushed forwardly toward the axis of the paddle wheel. The thrust is derived from the cartons traveling under the chain 41, their increased traction resulting in more certain movement of the cartons ahead of them sliding on the conveyor bottom plate 47. The forward carton is then engaged by the top and bottom wheel paddles 61 as the assembly rotates on the shaft 51. As oriented in Figs. 1 and 7, the rotation is clockwise, and bottom and outer side guides 26 provide an arcuate path along a portion of the paddle wheel periphery so that the carton engaged by the pushers 61 is carried upright along a confined path. The guides extend tangentially at the desired take-off point. In this way the cartons are given a positive individual drive from the input conveyor to a desired unloading platform 30, spaced some angular distance around the paddle wheel from the input gate.

In order to permit the cartons' entry to the paddle wheel one at a time without jamming, the gate spindle 63 is oscillated with the rotation of a cam 67 on the drive shaft 51 below the table surface 50. As best viewed in Fig. 9, the cam is essentially rectangular, thus having four corners or lobes corresponding to the four paddle wheel sectors. A lower crank arm 68 on the gate spindle 63 has a cam following roller 69 biased against the cam 67.

The biasing means may suitably take the form of a spring 70 in a stationary housing 71 having an end directed against an adjustable abutment on the crank arm. Thus it may be seen that the gate shaft oscillates angularly as the roller 69 of the cam following crank rides over the rotating cam. A pressure operated control switch 73 in the housing 71 has a pair of normally closed contacts which are opened when the crank arm 68 rides on a corner or high point of the cam.

The oscillatory motion of the gate 25 is adjusted with respect to the rectangular cam 67 so that when the lower gate crank arm 68 is spring-biased against a low point of the cam, the upper crank arm 64 moves counterclockwise to withdraw the block 65. Upon engagement of the lower crank arm 68 with each high point of the cam the gate block 65 moves into the closed position, closely following the paddle wheel pusher fingers 61 so that its front surface is presented to the next carton before the carton can move into the paddle wheel engaging position.

Under certain conditions, it is desirable to maintain the gate in a closed position, namely when there are no incoming cartons under the traction chain 41. Without a number of cartons behind those being uprighted, the cumulative forward pressure on the leading carton would be insufficient to move it positively and at a predictable rate into the paddle wheel when the gate is opened. At the same time the gate should not be returned to a closed position due to a lack of accumulated containers under the chain without completing the loading cycle which might then be in progress.

Accordingly, a solenoid 75 having a plunger 76 coupled to the lower gate crank arm 66 is energized to draw the arm 68 away from the cam and thus close the gate 25, regardless of the cam position. This retraction of the crank arm also opens the normally closed contacts of the switch 73 previously described.

For use in the solenoid control circuit is a pressure-actuated switch 77 having an actuating arm 78 which follows the cam 67. This switch is adjustably mounted on a slotted arcuate bracket 79 so that the period of closing of the switch contacts does not overlap or occur during the closed period of the switch 73.

The control circuit is shown in Fig. 11. In it the solenoid 75 is energized from a voltage source 80 through a pair of normally closed relay contacts 81. Thus it will be seen that the solenoid plunger 76 is withdrawn and pulls the lower gate arm 68 away from the cam to close the gate 25 when the control relay is not energized. The control relay coil 82 is connected to the voltage source by four sets of switch contacts arranged in two series-parallel sets. One of the parallel combinations is the normally open chain switch 42 and the normally closed gate switch 73. The other, in series with the first parallel combination, is the normally open cam switch 77 and a normally open set of relay contacts 83 of the same control relay. Any suitable off-on switch 84 may be employed to open or close the control voltage source circuit when the conveyor motor 37 is correspondingly off or on.

To de-energize the solenoid and thus allow the gate crank 68 to follow the timing cam 67, the cam switch 77 must be closed (which occurs when the switch actuating arm 78 rides across a high surface or corner of the cam 67) and the chain switch 42 must be closed (due to carton accumulated under the traction chain 41). When this happens the normally open relay contacts 83 close and seal in the relay despite the periodic opening of the cam switch 77. When absence of a carton under the traction chain opens the switch 42, the relay may be de-energized and the gate solenoid 75 energized again as the relay contacts 81 resume their normally closed position. However, in the event that the gate is open at the instant the chain switch 42 closes, the gate switch 73 will be in its normally closed position. The solenoid 75 will therefore remain energized until the gate switch 73 again opens, signaling the completion of a gate opening and closing cycle. In

this way the gate cannot prematurely close upon a carton in the process of entering the rotary unit.

Each carton entering the paddle wheel is prepared for filling while being carried by the paddle wheel. As previously described, the paddle wheel rotation is continuous, rather than intermittent, but each separately loaded carton has a predetermined position relative to the paddle wheel. Each carton is also oriented with the sealed top portion 32 leading (in the direction of rotation) the filling flap 33.

To actuate the clamps 28 and flap openers 29 previously mentioned with requiring a separate timed drive, a pair of stationary cams are positioned on the upper end portion 85 of the spindle 48 extending above the concentric shaft 51. These cams suitably take the form of spaced separate upper and lower disks 86 and 87, although a single cylinder may be substituted. The camming surfaces are provided by upper and lower grooves or channels 88 and 89 encircling the peripheral surfaces of the disks 86 and 87, respectively. A cylindrical dome or top housing 90 fastened to the rotary paddle wheel assembly encloses the cams and rotates with the shaft 51.

At each of the four carton positions, that is, just ahead of each upper and lower pusher finger 61 in the direction of rotation the clamp 28 is pivotally mounted on a pad 91 on the top housing 90. Each clamp has a depending arm 92, suitably made of strap steel with an out-turned flat horizontal shoe or plate. The leading edge (in the direction of the rotation) is bent down as a flange 94 and the trailing edge is flared upwardly. As viewed in Fig. 3, when the clamp arm 92 swings downward counterclockwise to a vertical position, the shoe 93 presses downwardly on the permanently closed carton top portion 32 to hold the carton down on the bottom guides 26. The flange 94 holds the carton back against the pusher fingers 61. Thus the carton, although light in weight and of waxed paper board construction, can be safely clamped in place.

In order to actuate the clamp 28, a crank arm 95 on the pivot end of the clamp extends on the other side of the pad 91 inside the rotary housing 90. A cam following roller 96 at the end of the crank arm rides between the upper and lower surface of the upper cam channel 89. With the clamp arm 92 extending forwardly and the crank arm 95 extending rearwardly from the vertical, it may be seen that a rise in the upper cam groove 88 will rotate the clamp arm in the desired manner—downwardly and rearwardly to hold down the carton. Accordingly, the cam groove 88 is elevated for over a substantial angular span between the rotary unit gate 25 and unloading platform 30. Each clamp 28 will thus be operated over that angular range as the top housing 90 rotates, but the clamp is raised to prevent interference with the cartons entering and leaving the paddle wheel arcuate path.

During the time each carton is held down its filling flap 33 is opened by the opening finger assembly 29. For this purpose each flap opener 29 includes a mounting pad 97 positioned below a corresponding clamp mounting pad 91 and which has an outer pivoted crank arm 98 extending rearwardly, that is, trailing in the direction of rotation, and below the carton tops. To the trailing end of the crank arm is bolted a bracket or finger 99 extending radially outwardly in substantial alignment with the upper and lower paddle wheel pusher projections 61. A pry edge 100 on the leading surface of the finger 99 is aligned to engage the top flap when the finger is raised underneath it through the carton notched or cut away portion 35.

To lift the finger edge 100 an inner crank arm 101 on the inner side of the pad trails the outer crank arm and has a cam following roller 102 at its end which follows the lower peripheral cam groove 89 of the stationary cam disk 87. This lower cam groove is also formed to rise at an angular position following the rise of the upper cam

groove so that the finger lifts the filling flap 33 after the carton has been clamped down. The cam groove is still elevated at an angular location near the unloading platform so that the carton flap is held open as the carton leaves the paddle wheel at the unloading platform 30. This opener cam groove does, however, return to its lower level in the region of the stationary cam near the gate 25 in order that the opening finger may be in its lowered position below the flat top of the next carton entering the paddle wheel.

At the unloading platform 30 the cartons follow the guides leading away from the rotary unit in a more or less tangential direction. An inner fence guide 102 prevents the cartons from being retained by the pusher fingers or paddles 61, each carton instead sliding ahead of the edge of the pusher as it increases its radial distance from the rotary unit. In order that the emerging cartons may be precisely positioned for pick-up by the filling machine conveying system, an outer fence rail 104 pivotally fastened at the unloading platform 30 is biased by a spring 105 so as to form a converging guideway for the cartons and also biasing them against the inner fence rail 103. An adjustable stop 106 on the otherwise free end of the pivoted rail 104 is preferably employed to limit the rail position. Each carton moved to the limit position provided by the paddle wheel pusher fingers 61 is thus held against further movement by the biased rail 104 until the next carton being ejected pushes that carton onto the guide path 107 defined by the rails or other receiving means of the machine being supplied by the infeed mechanism. A blade or shoe 108 above the unloading platform positioned above the carton top engages the open flap of the cartons entering the guide path 107 to keep the filling flap open pending the operations on the cartons in the filling machine.

We claim:

1. In a carton conveying mechanism for feeding upright opened cartons positively in timed sequence to an end station, means for conveying cartons having a sealed top flap on a conveyor belt to a transfer station along a first portion of the carton path, a rotary carrier having radially extending projecting members, guide means defining a second portion of the carton path from said transfer station to said end station, said projecting members extending into said second path portion, means for driving said rotary carrier at a given rate, a gate positioned in front of the transfer station, means for opening the gate in timed sequence with the rotary carrier drive to admit the leading carton into the path of a carrier projecting member, weighting means for increasing the traction of cartons on said belt to increase the forward pressure of the leading carton in front of the gate, means responsive to the absence of cartons under the weighting means for disabling the gate opening means, carton top flap opening means positioned on said carrier ahead of each projecting member, and means responsive to the rotation of the carrier to actuate each opening means along said second path portion.

2. A carton transfer mechanism comprising an infeed conveyor for presenting a file of upright flat top cartons with presealed top flaps to a loading station, a rotary carrier head having angularly spaced single carton carriers for picking up cartons one by one at the loading station and pushing them along a predetermined station path to an unloading station, and means at each carton station on the rotary head for opening the presealed top flap of each carton while it is traveling along said path, which comprises a clamping lever pivotally mounted on said rotary head above each carton carrier, cam means for lowering each clamping lever down on a portion of each carton top along a first portion of said path, a flap lifting lever pivotally mounted on said rotary head at each carton carrier, and cam means for lifting the flap lifting lever upward against a lower exposed edge of the carton presealed flap along a second portion of said path.

3. A carton infeed mechanism for supplying opened flat top cartons to a filling machine comprising a rotary head having a plurality of angularly spaced projections each defining a carton station, means for admitting cartons with presealed flat top flaps one by one into the path of said projections, means defining a carton guide path having a portion adjacent said rotary head, a pair of stationary cams positioned adjacent said rotary head, a clamping arm pivotally mounted on said rotary head above each carton station, a cam follower on the clamping arm lever engaging one of said cams for lowering the clamping lever down on a portion of each carton top as the carton station on the rotary head proceeds along said guide path portion, a lifting arm positioned on said rotary head at each carton station below the carton top, and a cam follower on the lifting arm engaging the other of said cams for raising the lifting arm against an exposed flap edge on the underside of another portion of each carton top to open the carton as the carton station further proceeds along said guide path portion.

4. A carton infeed mechanism for supplying opened flat top cartons to a filling machine comprising a rotary head having a plurality of angularly spaced carriers each defining a carton station, means for rotating said head on a stationary spindle at a predetermined rate, carton guide means for guiding cartons along a portion of the rotary head carrier path, means for admitting cartons with presealed flat top flaps one by one into said carrier path for positive engagement by each carrier, upper and lower stationary cams positioned on said spindle within said rotary head, a clamping arm pivotally mounted on said rotary head above each carton station having a clamping shoe on its free end, a cam following crank on the clamping arm within said head engaging the upper cam, said upper cam being shaped to lower each clamping shoe down on a portion of each carton top and raise the shoe again as each carton station on the rotary head proceeds along said carrier path portion, a lifting arm pivotally mounted on said rotary head at each carton station below the carton top, and a cam following crank on the lifting arm within said head engaging the lower cam, said lower cam being shaped to raise the lifting arm up against an exposed flap edge on the underside of another portion of each carton top while the clamping shoe is lowered.

5. In a conveying mechanism for positively feeding cartons in timed sequence, a first section comprising a conveyor belt for carrying cartons on their sides, a flexible chain disposed above a length of said first section conveyor and adapted to rest on cartons when in position below it, said chain having an appreciable weight to thereby increase the traction between each carton and said conveyor belt, and switch means operated by the presence of cartons below the chain, a second section comprising camming guides for raising the cartons from their sides to a vertical position as the cartons advance, a third section comprising a carrier paddle wheel having a vertical axis positioned in the carton path, means for driving the paddle wheel at a predetermined rate, gate means positioned across the carton path between the camming guides and the carrier wheel, means for opening the gate synchronized with the paddle wheel rotation, and means for disabling the gate opening means responsive to said switch means.

6. In a carton infeed mechanism having a conveyor for presenting a file of cartons to a loading station, a rotary unit for transferring cartons positively in timed sequence from the loading station to an unloading station, a gate positioned in front of the loading station, a rotary cam coupled to said rotary unit, a cam follower coupled to said gate for opening the gate as the cam follower moves toward the minimum diameter portions of the cam, means for maintaining the gate in a closed position comprising a solenoid for retracting the cam follower from the cam when the solenoid is energized, a control relay having a pair of normally closed contacts in the

solenoid energizing circuit whereby the gate remains closed when the relay is de-energized, and means for energizing the relay through a circuit including a pair of normally open switch contacts which close in response to the presence of at least one carton on the infeed conveyor behind the loading platform.

7. In a carton infeed mechanism having a conveyor for presenting a file of cartons to a loading station, a rotary unit for transferring cartons from the loading station to an unloading station, a gate positioned in front of the loading station, a rotary cam coupled to said rotary unit, a cam follower coupled to said gate for opening the gate as the cam follower moves toward the minimum diameter portions of the cam, means for maintaining the gate in a closed position comprising a solenoid for retracting the cam follower from the cam when the solenoid is energized, a control relay having a pair of normally closed contacts in the solenoid energizing circuit whereby the gate remains closed when the relay is de-energized, means for energizing the relay through a circuit having a first pair of normally open switch contacts, said switch contacts being closed in response to the presence of a carton on the infeed conveyor behind the loading platform, and alternate means for maintaining the relay energized for the completion of a gate opening cycle once started comprising a second pair of switch contacts closable by said cam simultaneously with the passage of a minimum diameter portion of the cam under said gate cam follower.

8. In a carton conveying mechanism for feeding upright opened cartons positively in timed sequence to an end station, means for conveying cartons having a sealed top flap on a conveyor belt to a transfer station along a first portion of the carton path, a hollow rotary carrier head having radially extending projecting members, guide means defining a second path portion from said transfer station to said end station, said projecting members extending into said carton path at said transfer station, means for driving said rotary carrier head at a given rate, a gate positioned in front of the transfer station, means for opening the gate in timed sequence with the rotary carrier drive to admit the leading carton into the path

of a carrier projecting member, means responsive to the absence of cartons on said conveyor belt for disabling the gate opening means, carton clamping means and carton opening means positioned on said carrier ahead of each projecting member, and stationary cam means positioned in said carrier head along said second path position to actuate each clamping and opening means.

9. Means for automatically transferring cartons from a conveyor belt to individual carton holders, comprising a conveyor belt for advancing a file of cartons frictionally engaging it, a normally-closed gate for restraining the lead carton from advancing due to the cumulative thrust of the carton file, a carrier with spaced individual carton holders for transferring cartons to an unloading station, means for advancing the carton holders at a timed rate past said gate, means synchronized with said timed rate for opening and closing the gate as each carrier carton holder passes the gate to permit the lead carton to be advanced into a holder, and means responsive to the absence of accumulated cartons behind the gate for disabling the gate opening means.

10. In a mechanism for feeding cartons positively in timed sequence, means for conveying cartons resting on a conveyor belt to a transfer station, a gate positioned in front of the transfer station for restraining the cartons against their frictional thrust, a rotary carrier having uniformly spaced carton holders for transferring cartons individually to an unloading station, means for driving the carton holders of the carrier at a given rate past the gate, means for opening and closing the gate in timed sequence with the passage of each carton holder of the carrier past the gate, means for disabling the gate operating means, means responsive to the absence of cartons on the conveyor belt behind the leading carton at the gate for actuating said disabling means, and means for overriding said actuating means while the gate opening and closing cycle is in process.

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