

March 29, 1966

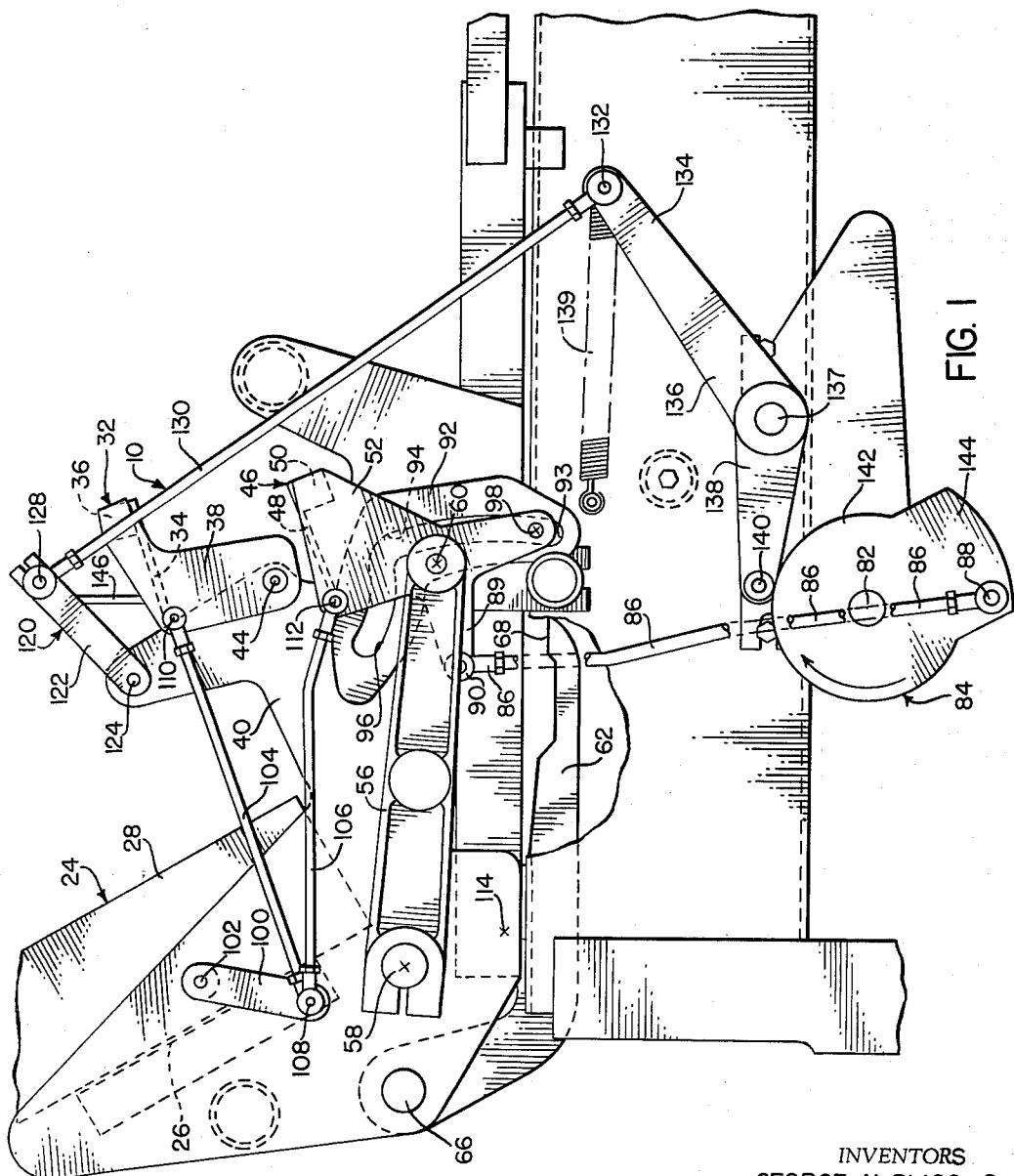
G. N. BLISS ET AL

3,243,077

## CARTON SEPARATING MECHANISM

Filed Aug. 24, 1964

5 Sheets-Sheet 1



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## CARTON SEPARATING MECHANISM

Filed Aug. 24, 1964

5 Sheets-Sheet 2

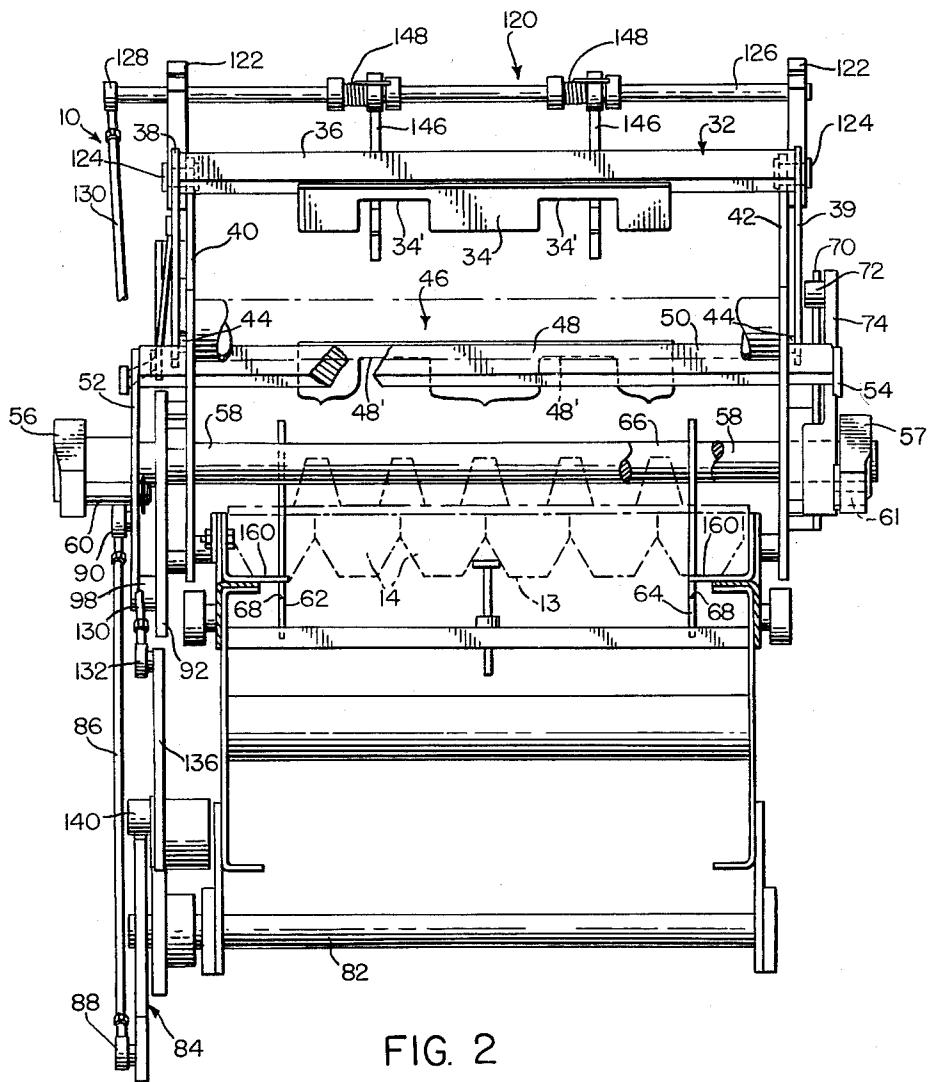


FIG. 2

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CARTON SEPARATING MECHANISM

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5 Sheets-Sheet 3

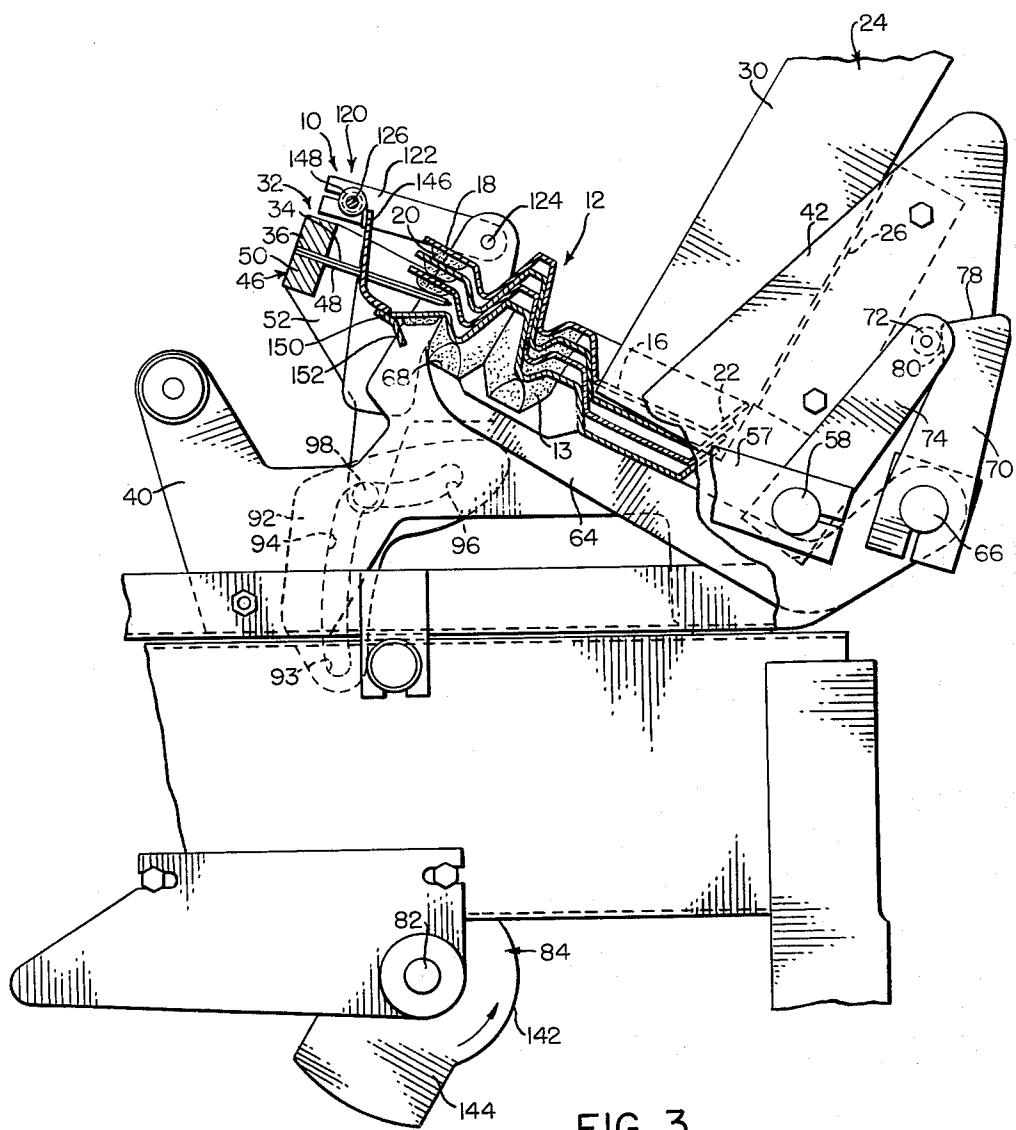


FIG. 3

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## CARTON SEPARATING MECHANISM

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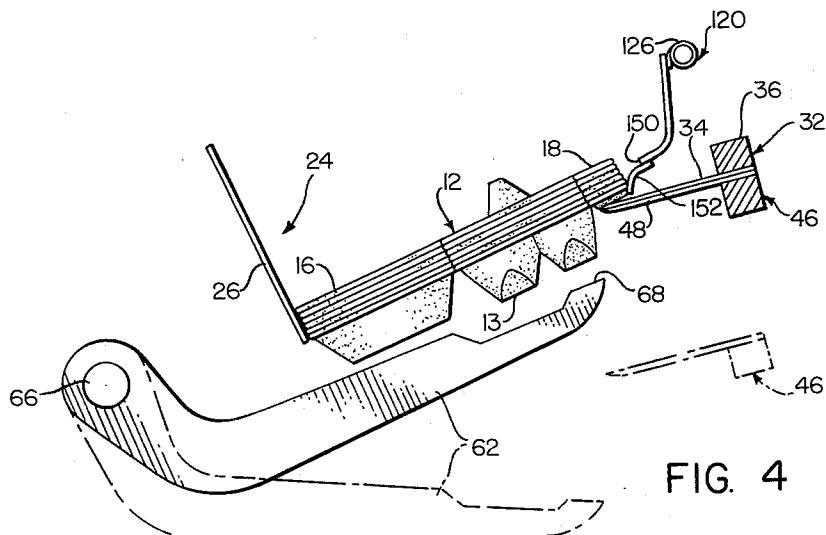


FIG. 4

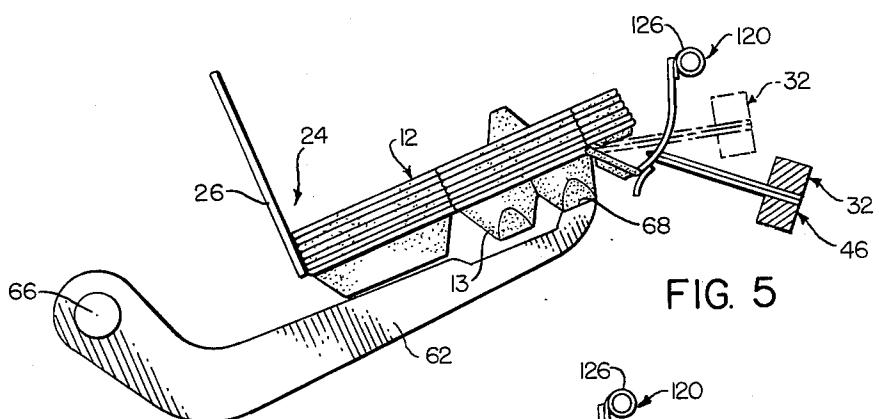


FIG. 5

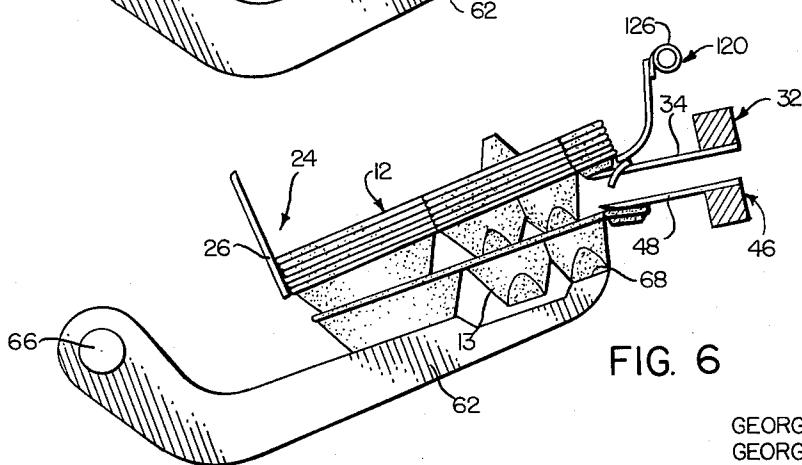


FIG. 6

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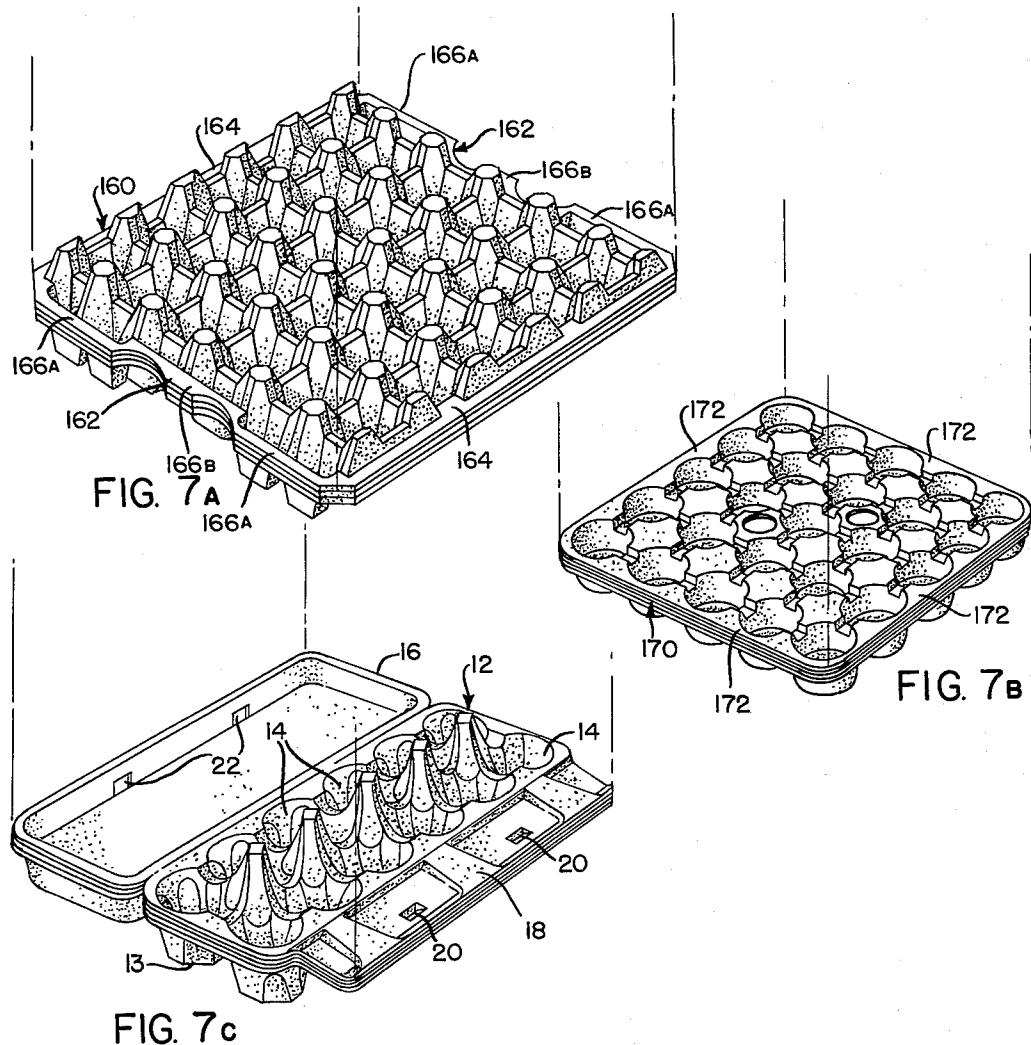
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CARTON SEPARATING MECHANISM

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5 Sheets-Sheet 5



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3,243,077

## CARTON SEPARATING MECHANISM

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Filed Aug. 24, 1964, Ser. No. 393,471  
11 Claims. (Cl. 221—33)

This application is a continuation-in-part of applicants' earlier filed parent application No. 185,135 filed April 4, 1962, entitled "Carton Separating Mechanism."

This invention relates to carton separating mechanism and more particularly to mechanism which separates nested stacked cartons by bending an edge of the lowermost carton away from the stack and prying the lowermost carton apart from the stack. The invention involves the primary concept of providing an enlarged opening at an edge of a nested stack of cartons, trays or other containers having a recess or recesses, so as to permit a facile and smooth entry into such opening of one or more blades or separating devices. The difficulty experienced in separating nested cartons, trays or containers has been that the edges of relatively thin molded pulp or paperboard containers are so closely spaced and the spaces are so varied in height between adjacent edge portions that it is practically impossible for separating blades or devices to accurately enter such limited spaces. Oftentimes, in production processing, where the apparatus of this invention is designed to be used, carton and tray separating devices have caused multiple cartons to be dispensed, or have torn such cartons in the separating step, or have missed separating the carton, for the principal reason that the separating means did not and could not accurately enter into the space between the edge of the endmost carton and the carton edge next thereto adjacent. This invention makes such entry facile and smooth, and with a minimum of failures in a relatively high speed production operation.

The invention has been applied to egg cartons of the molded pulpboard type. It can also be employed with other similar stackable nestable cartons or containers. One form of apparatus of the invention which has been tested and found satisfactory involves a supporting chute for the nested cartons, a mechanism that supports the stack of cartons while an outer lip of the lowermost carton is bent downwardly apart from the lip of the carton next above, a pair of blades which are inserted into the enlarged opening between the carton edges provided by the bent-down lip, one of the blades supporting the stack of cartons above while the other of the blades peels the lowermost carton from the stack and it drops to a plane below the stack and the chute.

A principal problem in the use of molded pulp cartons, especially egg cartons having twelve (12) recesses or cups to receive a dozen eggs, is the substantial amount of land contact engagement between stacked nested cartons. Many square inches of carton material are indirect, intimate engagement with corresponding portions of next adjacent cartons, both above and below. The nature of molded pulp paperboard is such that the rough fibers, pressed and matted together in a paperboard mass, cling to similar fibers of adjacent paperboard with considerable tenacity and resist easy separation. When egg cartons of such material are nested and stacked for storage, and are stored in areas where they expand and contract from changes of temperature and moisture in the atmosphere, separation of such cartons in automatic equipment becomes a serious problem for the egg packer. Much time can be lost in separating these cartons, particularly when mechanism in an egg packing machine is called upon to perform such task automatically and fails to function efficiently.

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The invention provides a means for dispensing molded pulp cartons one at a time from one end of the stack. In order to accomplish this purpose, in one form of the apparatus utilized according to the invention one or more fingers are used to bend the edge flap of a carton down and away from the next adjacent flap, a pair of cooperating blades entering the enlarged space provided by the bent-down flap, spreading apart and prying the endmost carton from the stack.

It is a principal object of the invention to provide a method and apparatus for separating nested stacked cartons, trays or containers one at a time by the generation at adjacent edges or edge portions of such nested stacked containers of an enlarged opening therebetween for the facile and smooth entry of elements which define and/or separate an endmost container from the remainder of the stack. It is another object to provide such elements to perform the function primarily of assisting in the separation of the endmost container from the nested stack of containers of which it has been a member. Another object is to provide such enlarged opening by one of several elements including a finger or blade having a rough or serrated or abrasive edge that seeks and finds the edge of the endmost container and to bend it away from the stack, one or more suction cups which engage and grip container portions adjacent edges and edge portions to be bent away from corresponding edges and edge portions of the containers next adjacent the endmost container, and clamp or gripping means that find and deflect such edges and edge portions from corresponding edges of containers next adjacent the endmost container.

It is an object of the invention to provide means of separating an endmost carton from a nested stack of such cartons. Another object is to provide means for spreading a bendable portion of a carton from a corresponding bendable portion of a next adjacent nested stacked carton. Still another object is to provide means entering into the enlarged space provided by the bent away carton portion to hold and/or to pry the adjacent cartons apart.

Yet a further object is to utilize apparatus means for bending away the edge of an endmost container, thereby providing the desired enlarged opening between edge portions of adjacent containers, and to separate the endmost container from the nested stack by the insertion of a stack holding element or elements and by the continued movement of such apparatus means in engagement upon the endmost container.

These and other objects of the invention and features of construction will become more apparent from the description given below in which the terms employed are used for purposes of description and not of limitation. Reference is here made to the drawings annexed hereto and made an integral part thereof, and in which

FIGURE 1 is a side elevational view of a carton dispensing mechanism constructed according to the invention.

FIGURE 2 is a front elevational view of the assembly shown in FIGURE 1.

FIGURE 3 is an elevational view of the opposite side of the assembly, with parts broken away and in section.

FIGURES 4, 5 and 6 are fragmentary diagrammatic views showing parts of the assembly in different positions.

FIGURES 7A through 7C are perspective views of stacked nested containers representing several forms of such containers as would be dispensed from the mechanism and by the process of this invention.

Referring now more particularly to FIGURES 1 through 6 inclusive of the drawings, the carton magazine assembly 10 is designed to support a stack of cartons 12, similar to that shown in FIGURE 7C, and to dispense the cartons one at a time from the bottom of the stack. The cartons 12 are egg cartons provided with a base 13 hav-

ing individual egg cells 14, a lid 16 and a front lid-locking flap 18. The cartons are formed of a molded pulpboard material which is bendable so that the carton lid 16 can be folded over the top of the egg cells and the locking flap 18 can be bent up so that the projections 20 on the flap will enter and engage in holes 22 of the lid to hold the lid in closed position. As shown in FIGURES 3, 4, 5 and 6, the cartons nest one within the other in their open position to provide a tightly wedged stack of cartons in the chute. In the open position, the carton lid 16, body 13 and flap 18 lie substantially in a plane.

The assembly 10 includes an inclined chute 24 for the stack of cartons. The chute comprises a rear wall 26, and two side walls 28 and 30 which extend out from the rear wall.

Inasmuch as the cartons when nested and stacked form a relatively solid unitary rigid mass, a support blade assembly 32 is provided for supporting the stacked cartons in the chute 24 by their front lid-locking flaps. The assembly 32 comprises a straight, thin, flat blade 34 which is carried by a transverse bar 36 secured at its ends to the brackets 38 and 39. The brackets are pivoted near their lower ends to the fixed side frame members 40 and 42 by the transversely aligned pivots 44 for swinging movement toward and away from the chute 24. The assembly 32 is shown in FIGURES 1, 3, 4, 5 (dotted lines) and 6, in its stack supporting position and in which the blade 34 extends under the locking flap 18 of the nested stack of cartons. The nesting or wedging of the pulpboard cartons including their locking flaps makes them fairly rigid so that the stack of cartons is easily supported at the flap end in the inclined chute.

A stripper blade assembly 46 is provided to forcibly pry the bottom carton from the stack. The stripper assembly comprises a straight, thin, flat blade 48 which extends transversely of the assembly 10 and is secured to a bar 50 connected at its opposite ends to the brackets 52 and 54. The blade 48 is parallel with the blade 34 and, in its normal inoperative position shown in FIGURES 1, 2 and 3 (dotted lines), is positioned in spaced relation beneath the supporting blade 34.

The brackets 52 and 54 of the stripper assembly are pivoted to the front ends of the arms 56 and 57 by the transversely aligned pivots 60 and 61. The rear ends of arms 56 and 57 are fixedly secured to shaft 58 which is journaled for rotation in the frame members 40 and 42 extends transversely of the chute on an axis parallel to the aligned axes of pivots 60 and 61.

A pair of auxiliary support arms 62 and 64 are secured at their rear ends to a transverse shaft 66 journaled in the fixed frame members 40 and 42. The front ends of the arms 62 and 64 terminate in rests 68 adapted to engage and support the bottom carton of the stack when the support blade assembly 32 is withdrawn. A cam arm 70 is secured to shaft 66 outwardly of the side frame member 42 and is engaged by a follower 72 on an arm 74 secured to shaft 58. When the arms 56 and 57 are in the FIGURE 1 position, the follower 72 engages the upper straight surface 78 of the cam 70 to locate the arms 62 and 64 in the retracted position of FIGURE 1, and when the arms 56 and 57 are elevated to the FIGURE 3 position, the follower moves along the surface 78 to the surface 80 to raise the auxiliary support arms 62 and 64 into the operative stack-supporting position of FIGURES 3-6 for supporting the stack from below at the carton base 13. The surface 78 is the fast surface of the cam and produces a more rapid up or down movement of support arms 62 and 64 than the corresponding movement of the arms 56 and 57. Surface 80 effects a slow movement of support arms 62 and 64 and serves to position them in proper stack-supporting position when arms 56 and 57 have completed their upward movement.

A shaft 82 (FIGURES 1 and 2) is power driven from a source not shown to provide the means for operating the carton separating and dispensing mechanism of the carton

magazine assembly. A cam 84 is secured on the shaft, and a rod 86 has one end pivoted to the cam at 88 and the other end pivoted to an extension arm 89 of the bracket 52 of the stripper assembly by pivot 90.

5 A cam plate 92 is provided for determining the angular position of the stripper 46 and has a cam slot 93 formed to provide a generally vertical arcuate slot portion 94 and a generally horizontal arcuate slot portion 96 extending in continuation of the portion 94 from the upper end thereof. 10 The center of arc 94 is indicated at 114 and the center of arc 96 coincides with pivot 44. The bracket 52 has a follower 98 engaged in the cam slot.

Motion to rock or pivot the support blade assembly 32 between its FIGURE 1 and FIGURE 5 positions is provided by mechanism including the arm 100 pivoted at its upper end to the frame member 40 by pivot 102 and connected at its lower end to rods 104 and 106 by the pivot 108. The rods 104 and 106 are respectively connected to the brackets 38 and 52 by pivots 110 and 112.

20 The axis of shaft 58 and the aligned axes of pivots 60 and 61, together with the center of follower 98 and the center 114 of the arc defining the cam slot portion 94 form a parallelogram. Hence when the stripper assembly 46 is moved up to the FIGURE 3 position (also the solid line position of FIGURE 4), during which time the follower 98 engages the upright cam slot portion 94, the stripper assembly 46 will not rotate or move angularly but will maintain the same position of rotation as illustrated in FIGURE 1, in which the line connecting pivots 60 and 30 98 will be parallel to a line connecting the center of shaft 58 and center 114. Under these conditions, blade 48 remains parallel to blade 34.

Referring again to FIGURE 1, the center of shaft 58 and pivot 108, together with the aligned pivots 60, 61 and pivot 112 likewise define a parallelogram, and since the stripper assembly 46 does not rotate during that part of its movement in which follower 98 engages the upright cam slot portion 94, pivot 108 will not move and hence no motion will be transmitted to the support blade assembly 32.

40 A finger assembly 120 is provided for separating and bending the front locking flap 20 of the bottom carton away from the locking flap of the carton next above. The assembly 120 comprises a pair of parallel arms 122 pivoted to the frame members 40 and 42 by aligned pivots 124. The arms 122 are connected by a rotatable shaft 126 pivoted at 128 to a rod 130 which is also pivoted at 132 to the arm 134 of a bellcrank lever 136. The bellcrank lever 136 is pivoted at 137 and its other arm 138 has a follower 140 held in engagement with the periphery of cam 84 by spring 139. When the follower 140 is in engagement with the circular periphery 142 of the cam 84, the finger assembly 120 assumes the FIGURE 1 retracted position, rotating downwardly to an advanced position when the follower rides over the periphery of the projecting cam portion 144.

45 The finger assembly further includes a pair of fingers 146 which extend down from the shaft 126 and are biased or urged in the direction toward the carton stack, or clockwise in FIGURE 3, by the torsion springs 148. The fingers are formed with carton flap engaging shoulders 150 adapted to catch the outer transverse edge of the flap 20 of the bottom carton. Extending beneath the shoulder 150 is a curved portion 152 which normally engages the flap of the bottom carton in the retracted position of the finger assembly shown in FIGURE 4.

50 The egg cartons 12 shown in the drawing FIGURES 3-6 inclusive and 7C are made of molded pulp material. They can also be made of paperboard or plastic materials. 55 Similar containers having a recess or recesses to receive articles and made of molded pulp or paperboard, and which have nesting and stacking features, are those shown in FIGURES 7A and 7B.

The trays 160 of FIGURE 7A are designed to receive 70 30 eggs each, for use in egg crates. Such trays have

bendable edges 162 and 164 projecting laterally therefrom. Edges 162 comprise the end portions 166a and the intermediate portion 166b of two parallel sides. Adjacent edges 164 extend longitudinally for the entire length of the other parallel sides of the tray. Any of these edge portions 166a, 166b or 164, or combinations of such edge portions of the endmost tray can be bent or deformed out of the normal plane of such edges to provide the enlarged opening or openings between such edge portions and similar corresponding edge portions of next adjacent trays for smooth and easy entry of elements that will pry such endmost tray from the nested stack of which it has been a member.

Similarly, the tray 170 of FIGURE 7B is provided with bendable edges 172 that can be deformed and bent away from similar corresponding edges of next adjacent trays to provide the desired enlarged opening therebetween. The trays 170 can be used for packing fruit such as apples, pears, oranges and similar unit articles.

The apparatus herein disclosed have been designed to operate upon nested stacks of the containers illustrated in FIGURES 7A through 7C and described above. The inventive concept of creating an enlarged opening or openings between corresponding edge portions of adjacent containers is utilized for each of such nested stacks by components in the apparatus, whereby prying or separating elements or components enter such enlarged opening or openings to complete the step of separating an endmost container from the nested stack.

In most instances, the nature of molded pulp materials and paperboard and plastic materials includes the property of partial recovery. Because of the character of these materials and the binders used for the fibers comprising the bulk of the material, the planes of formed containers have a tension value sufficient to produce a partial recovery of the edges or edge portions after bending or deforming to the limited extent described in this specification, permitting a return to attitudes and positions adjacent their original posture, if such bending or deformation has not been excessive.

#### Operation

In the operation of the carton magazine assembly 10, FIGURES 1 through 6 inclusive, the stack of cartons 12 is supported in the inclined chute 24 by the stack support blade 34, when the latter is in its stack-supporting position shown in FIGURE 1 and in solid lines in FIGURE 4. Since the cartons are well nested the stack is relatively rigid and the blade 34 provides sufficient support for the stack at the flap of the bottom carton so that the stack leans back against the chute. The cam 84 is rotated in a clockwise direction (FIGURE 1) elevating the stripper assembly 46 from the inoperative or lower position, shown in FIGURE 1 and in dotted lines in FIGURE 4, to an intermediate position shown in FIGURE 3 and in solid lines in FIGURE 4, in which the blade 48 contacts the underside of the blade 34. During this movement, the stripper assembly 46 does not rotate and hence the blade 48 remains parallel to the blade 34. The stripper assembly is held from rotation by the upright cam portion 94 engaging follower 98 of the stripper assembly. During this movement, the support blade assembly 32 is stationary.

When the blades are thus in contact, the follower 98 is at the junction of the cam slot portions 94 and 96. The pivots 44 and 60 coincide and the pivots 110 and 112 coincide.

Movement of the stripper assembly 46 from the FIGURE 1 to the FIGURE 3 position produces a movement of the auxiliary support arms 62 and 64 from the lower retracted position of FIGURE 1 to the upper support position shown in FIGURE 3 and also in FIGURE 4, the stack being supported by the blade 34 at the flap end, and the arm rests 68 disposed about  $\frac{1}{4}$ " below the bottom carton.

Upon continued rotation of cam 84, the stripper assembly 46 is caused to rotate counter-clockwise from the FIGURE 3 position (clockwise in FIGURE 5), about aligned pivots 60 and 61, the follower 98 now substantially moving horizontally in cam slot portion 96. This motion in the reverse direction is simultaneously transmitted to the support blade assembly 32 by pivot 108 through arms 104 and 106 so that the contacting blades 34 and 48 move as a unit laterally outwardly and away from the stack to a withdrawn non-supporting position shown in solid lines in FIGURE 5, allowing the released stack to drop upon the rests 68 of the auxiliary support arms 62 and 64.

When the blades 34 and 48 are withdrawn, the follower 140 engages the projecting peripheral portion 144 of cam 84 causing the fingers 146 to move down and catch the front edge of the locking flap 18 of the bottom carton bending it down to the position shown in FIG. 5. The fingers may actually commence their movement before the blades are fully withdrawn, although the finger shoulders 150 do not catch the flap 18 until the stack is released by blades 34 and 48.

The blades 34 and 48, during continued rotation of cam 84, will return to a stack-supporting position as shown in dotted lines in FIGURE 5, and will enter the space formed between the bent-down flap of the bottom carton and that of the carton next above. At this point the follower 98 again returns to the junction of the vertical and horizontal cam slot portions 94 and 96 so that further rotation of cam 84 lowers the stripper assembly to the FIGURE 1 position without further moving the support blade assembly 32. This vertical downward movement of the stripper assembly 46 causes its blade 48 to engage the turned down flap of the bottom carton and forcibly pry its body 13 from the bottom of the stack. Preferably the blade 48 extends inwardly as far as the hinge connection of the flap to the body of the carton, as seen in FIGURES 3 and 5 to apply its prying action at a transverse edge of the body 13. The auxiliary support arms 62 and 64 move down simultaneously with the stripper, and actually somewhat faster than the stripper because of the shape of surface 78 of cam arm 70. Following return of the blades to the dotted line position of FIGURE 5, the follower 140 returns to the circular portion of the cam to withdraw the finger assembly 120 to the FIGURE 1 position.

In the retracted position of the auxiliary support arms 62 and 64, shown in FIGURE 1, the supporting rests 68 are beneath the trackway 160 onto which the released carton is deposited. Suitable mechanism may be employed for advancing the released carton along the trackway to clear the magazine assembly and dispenser for the release of the next carton.

The blades are formed to provide cutouts 34' and 48' along their rear edges to clear the fingers 146. The stripper blade 48 is shaped between the cutouts as shown in FIGURE 2. The pointed rear edge portions of the stripper blade between the cutouts permits entry thereof between the cells of the carton and beyond the hinge connection of the lid-locking flap. Thus the points along the rear edge are aligned with the spaces between the egg cells 14, and the rounded contour on either side of each point conforms to the cell configuration.

The fingers 146 are urged rearwardly at all times by springs 148 to bear against the bottom flap, as in FIGURE 4, and the curved portion or lip 152 of each finger is shaped to guide the shoulder of the finger to the edge of the bottom flap to bend it down, as in FIGURE 5, when operated.

Having described the invention in its simplest terms, it will be understood that the features of the inventive process and the several inventive constructions described may be changed, varied and modified in greater or lesser degree without departing from the essence of the invention defined in the appended claims.

We claim:

1. In a carton dispensing device for cartons having a front bendable lid-locking flap, the combination comprising  
an inclined chute,  
a movable first thin blade for intermittently supporting a stack of cartons in said chute at their front flaps, a second thin blade normally spaced from and below said first blade and movable to and from a contiguous position with said first blade,  
means for simultaneously moving said two blades laterally away from and toward said stack of cartons adjacent their bendable flaps, and releasing said first blade from its stack supporting position when said blades are withdrawn,  
means temporarily supporting said stack when said two blades are simultaneously withdrawn,  
a separator engaging and bending the front flap of the bottom carton in said stack down from the flap next above thereto while said blades are withdrawn, so that upon return of said blades to said stack said blades easily enter between said lowermost flap and said flap next above thereto,  
and means for moving said second blade upon its return into engagement with said bottom carton in a direction away from said stack and separating said bottom carton from said stack.
2. The combination defined in claim 1, and in which said separator comprises at least one finger having a surface adapted to engage said flap of said bottom carton to bend said flap downwardly away from said flap next above thereto  
and means moving said finger so as to bend said flap.
3. In a carton dispensing device for cartons arranged in a nested stack,  
a chute for said stack of cartons, the combination comprising  
a first movable member intermittently supporting said stack of cartons,  
said first member being movable from a stack-supporting position beneath a projecting bendable portion of the bottom carton in said stack to a non-supporting position withdrawn from said stack,  
a temporary support for said stack when said first member is withdrawn,  
a separator movable into engagement with said bottom carton portion to bend said portion rotatably away from a like portion next thereto above to provide an enlarged space between adjacent cartons so that upon return of said first member to stack-supporting position it will easily and smoothly enter said space, and a second member movable into said space beneath said first member, movable into engagement with said bottom carton and movable in a direction separating said bottom carton from the remainder of said stack.
4. The combination defined in claim 3, and in which said separator comprises at least one finger having a surface adapted to engage said bottom carton portion and to bend said latter portion away from the like portion of the carton next thereto above, and means moving said finger so as to bend said bottom carton portion.
5. In a carton dispensing device for cartons arranged in a nested stack,  
a chute for said stack of cartons, the combination comprising  
a first blade intermittently supporting said stack of cartons in said chute,  
said first blade being movable from a stack-supporting position beneath a projecting bendable edge portion of the bottom carton to a non-supporting position withdrawn from the stack and back to a like stack-supporting position,

- 5  
a temporary support for said stack when said first member is withdrawn,  
a separator movable to engage and bend said edge of said bottom carton portion rotatably away from a like edge portion of the carton next adjacent thereto,  
to provide an enlarged space between said edge portions for facile re-entry of said first member to stack-supporting position,  
and a second blade movable into said space beneath said first blade, movable into engagement with said bottom carton, and movable in a direction disengaging said bottom carton from the remainder of said stack.
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6. The combination defined in claim 5, and in which said separator comprises at least one finger having a surface adapted to engage and bend said bottom carton edge portion away from the like edge portion of the carton next thereto above, said finger is spring biased toward said bottom carton edge portion.
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7. In a carton dispensing device for cartons arranged in a nested stack,  
a chute for said stack of cartons, the combination comprising  
a movable blade for intermittently supporting said stack of cartons in said chute,  
said blade being movable from a stack-supporting position beneath a bendable edge flap of the bottom carton to a withdrawn non-supporting position,  
a movable support alternating with said blade for supporting said stack beneath said bottom carton, means for moving said blade from and into a stack-supporting position,  
means for moving said support into and from a stack-supporting position,  
a movable separator for bending said bendable flap rotatably down and away from the flap of the carton next thereto above to provide an enlarged space between said flaps,  
means for operating said separator when said blade is withdrawn and said carton stack is supported by said support,  
a second movable blade for entering said space between said spaced flaps and movable downwardly into engagement with said bottom carton and separating it from the remainder of said stack,  
and means for moving said second blade into said space and downwardly against said bottom carton.
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8. The combination defined in claim 7, and in which said bendable flaps are hinge connected with the main body portion of said cartons, and said second blade is adapted to engage said hinge connection of the bottom carton upon downward movement thereof.
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9. In apparatus for separating cartons one at a time from a nested stack of such cartons, the combination comprising  
a support for said stack of cartons arranged thereon in an attitude permitting access to edge portions thereof, apparatus means adapted to engage and bend said accessible edge portion of the endmost carton in a direction away from its normal position in said stack so as to provide an enlarged spaced opening between said endmost and next adjacent cartons at said edge portions,  
dual carton separating means adapted to enter said enlarged spaced opening in a smooth and facile manner so as to engage said adjacent cartons, one of said carton separating means adapted to move said endmost carton in a direction away from a complementary carton separating means,  
whereby said endmost carton is pried away from said stack upon movement of said one carton separating means relative to said complementary carton separating means.
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10. In apparatus for separating cartons one at a time from a nested stack of such cartons, the combination comprising

a support for said stack of cartons arranged thereon in an attitude permitting access to edge portions thereof in consecutive sequence, 5

apparatus means adapted to engage and bend said accessible edge portion of the endmost carton in a direction away from its normal position in said stack so as to provide an enlarged spaced opening between said endmost and next adjacent cartons at said edge portions, 10

dual carton separating means adapted to enter said enlarged spaced opening in a smooth and facile manner so as to engage said adjacent cartons, 15

one of said carton separating means adapted to move said endmost carton in a direction away from said stack, 20

a complementary carton separating means adapted to restrain said stack upon engagement of said next adjacent carton against movement in the direction of said endmost carton, 25

whereby said endmost carton is pried away from said stack upon movement of said one carton separating means relative to said restraining complementary carton separating means.

11. In apparatus for separating cartons one at a time from a stack of such cartons the combination comprising a support for said stack of cartons arranged thereon in an attitude permitting access to edge portions thereof in consecutive sequence, 30

apparatus means adapted to engage and bend said accessible edge portion of the endmost carton in a direction away from its normal position in said stack so as to provide an enlarged spaced opening between said endmost and next adjacent cartons at said portions,

dual carton separating means adapted to enter said enlarged spaced opening in a smooth and facile manner so as to engage said adjacent cartons,

one of said latter means engaging said endmost carton, another of said latter means engaging said next adjacent carton, in said stack,

said carton separating means adapted to pry said endmost carton from said stack upon movement of either of said carton separating means in a direction relatively away from the other of said carton separating means.

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