

Feb. 11, 1930.

R. A. JONES

1,746,835

CARTON OPENING AND FEEDING DEVICE

Filed July 13, 1927

3 Sheets-Sheet 1

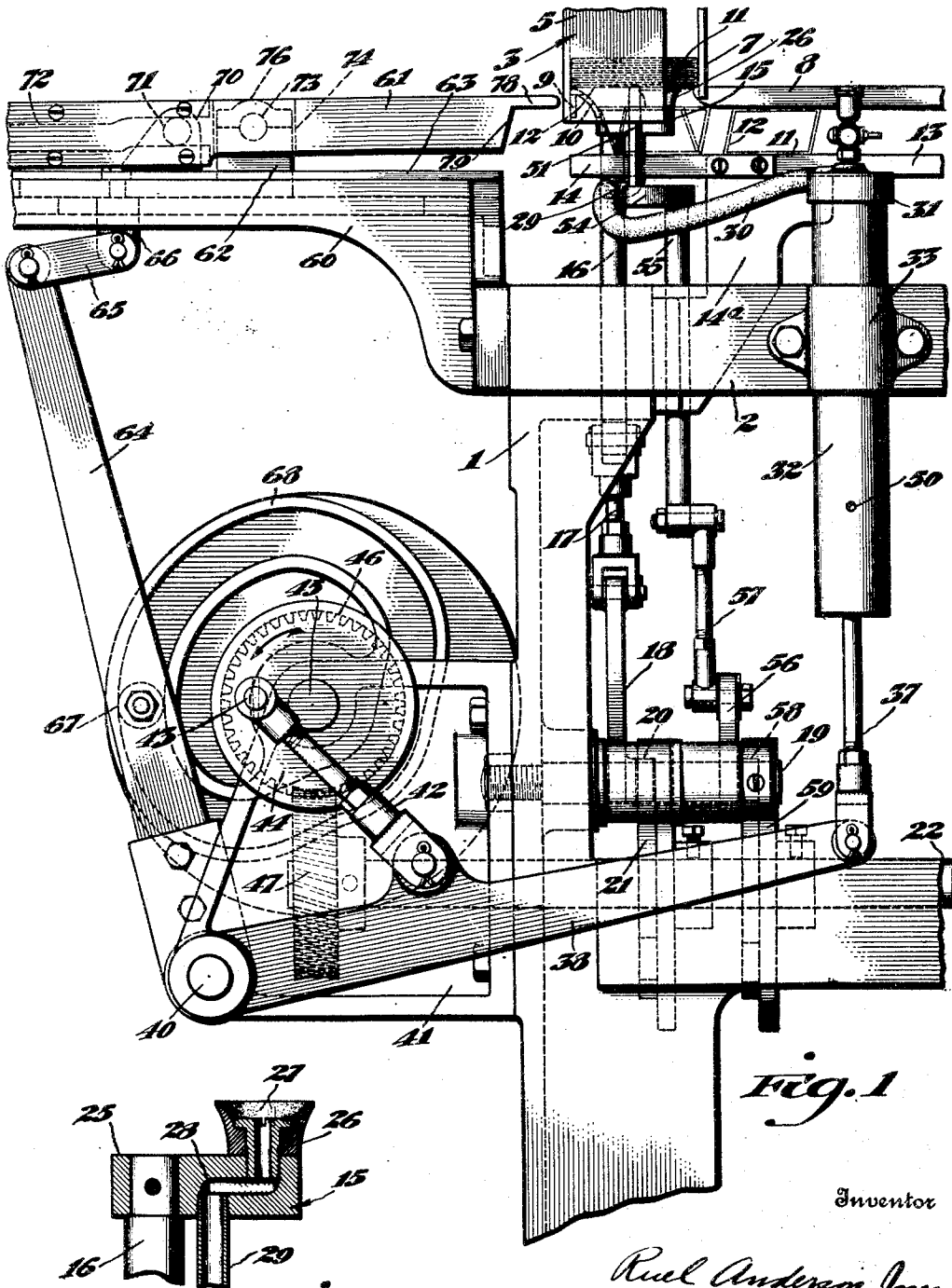


Fig. 1

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Fig. 6

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3 Sheets-Sheet 2

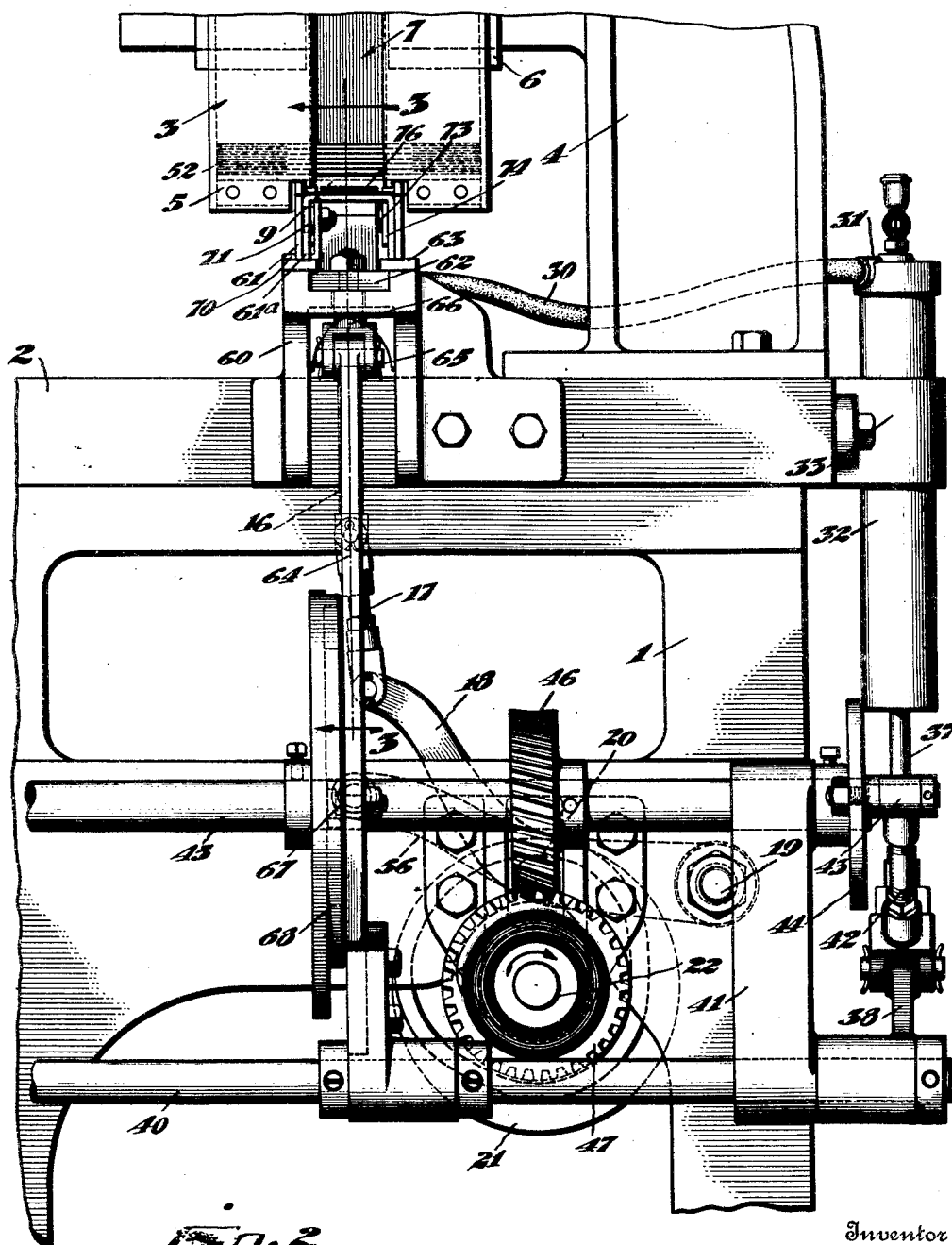


Fig. 2

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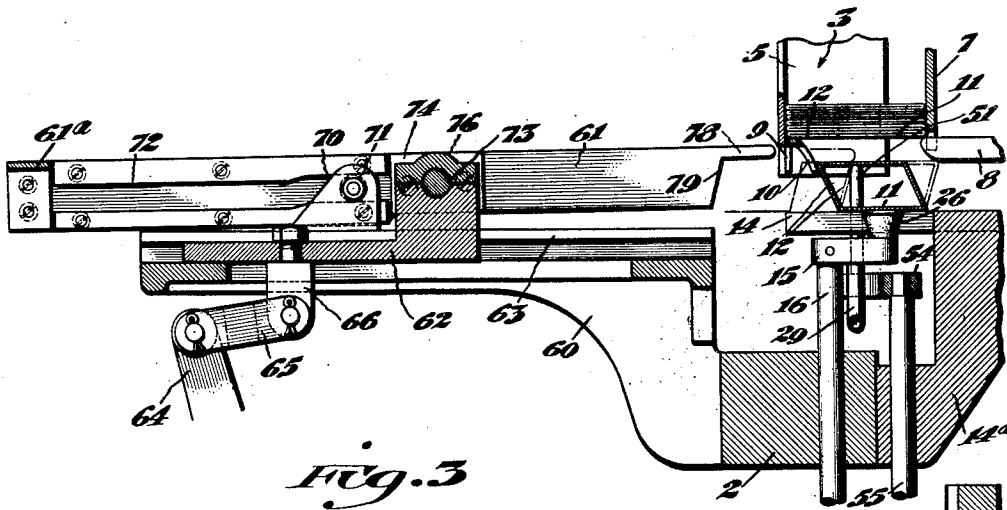


Fig. 3

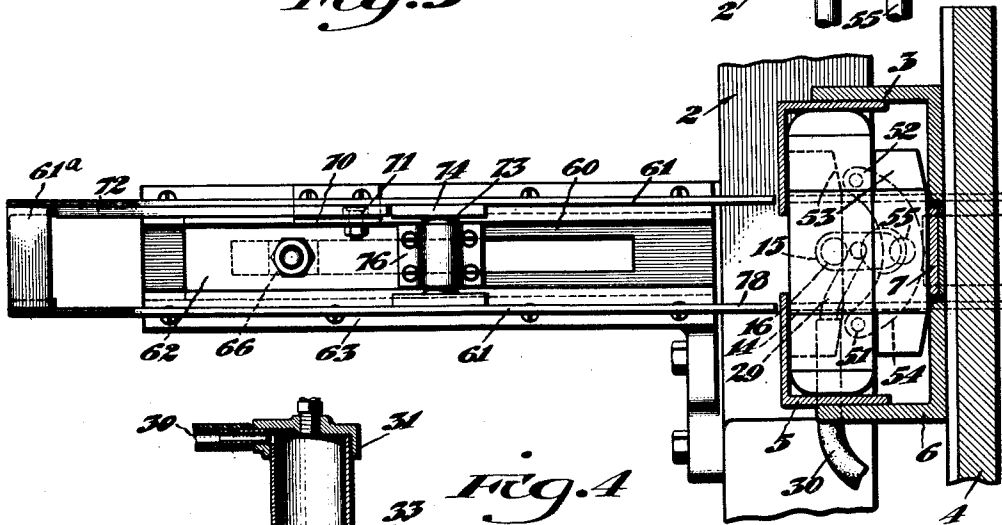
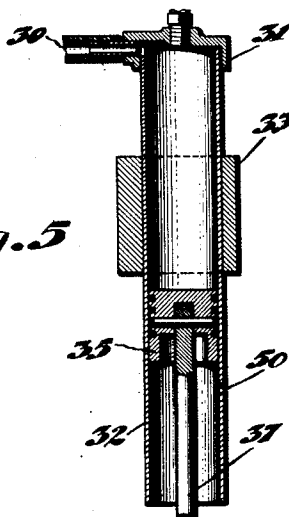


Fig. 4

Fig. 5



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UNITED STATES PATENT OFFICE

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CARTON OPENING AND FEEDING DEVICE

Application filed July 13, 1927. Serial No. 205,511.

This invention relates to carton filling machinery, and is particularly directed to the mechanism for withdrawing, setting up and feeding successive cartons from stacked knocked-down position in a magazine to a point for subsequent filling.

The cartons of commercial foldable structure in this type of filling machine are stacked in folded condition in a magazine arranged to permit the cartons to be withdrawn successively from the bottom thereof onto a table and then ejected by horizontally moving feed fingers. As disclosed in Patent No. 1,624,740, issued to me on April 12th, 1927, the lowermost cartons are successively drawn down in folded knocked-down position into position for separation from the stack, and for engagement by reciprocating feed fingers. The withdrawn carton is then ejected from beneath the stack still in folded condition and fed to a point beyond the magazine where it is later set up for filling. The pulling down of the lowermost carton into the path of the feed fingers and the separating of that carton from the stack are purely folded carton feeding movements, and the carton setting up mechanism does not act upon the fed carton until it had been completely ejected from beneath the magazine.

In the present device the movements which withdraw the carton from the stack and position it in the path of feed members also set up and open the carton for filling. It has also been arranged that the spring-like action of the opened carton, that is, the tendency to return to folded condition, may be used as a means for maintaining the carton in set up condition during feeding from beneath the magazine.

It is therefore an object of this invention to provide mechanism for drawing the lowermost carton down to a guide table and to so sustain the upper portion or flaps of the carton as to permit the withdrawing movement to unfold the carton and to position it in this

unfolded condition for engagement by a reciprocating feed finger.

It is another object of this invention to provide a setting up mechanism at the base of the magazine which conditions the withdrawn lowermost carton for engagement and feed by ejector means, the carton being initially set up by the withdrawing movement in a canted position and then sprung over and canted in the opposite direction by engagement of the ejector and with the ejector thereupon feeding the sprung carton between suitable guides which in combination with the ejector, hold the carton in sprung condition, the guides being non-parallel and suitably close enough to maintain the carton in this sprung condition, gradually spreading for the squaring up of the sprung carton upon approach to a filling station.

Another object is to provide a carton ejecting mechanism which depresses upon the carton upper surface when the carton is in initial canted set up position in such manner as to engage and grip the same for holding it firmly upon the table during the period when the carton is being sprung over into its reverse canted feed position.

Still another object is to provide a carton feeding mechanism which engages the upper surface of the open canted carton and forces the carton over into reverse sprung canted position prior to the time at which the actual carton feeding engagement takes place.

Other objects relate to the coordination of the various movements for withdrawing the carton, maintaining the upper portion of the carton in a certain relation so as to permit the opening of the carton through the withdrawal mechanism, and also to the release of the carton from the withdrawing mechanism at the moment the carton assumes the sprung position due to engagement by the feeding mechanism for ejection of the carton.

Further objects and advantages will be more fully set forth in the description of the

accompanying drawings forming a part of this specification, in which:

Figure 1 is a side elevation of the rear end of a carton filling machine showing the carton magazine and that portion of the mechanism which feeds the cartons from the magazine, various positions of a carton during feed being shown in dot and dash lines.

Figure 2 is an end view of the mechanism shown in Figure 1.

Figure 3 is a sectional view taken on line 33, Figure 2, detailing the ejector and showing the mechanism in position intermediate carton withdrawal from the magazine and ejection from beneath the magazine.

Figure 4 is a plan view of the ejector mechanism showing the magazine in section.

Figure 5 is a detail sectional view taken centrally of the suction pump.

Figure 6 is an enlarged central section through the suction nozzle.

Referring to the drawings, the general machine structure comprises a support frame 1 and table 2. The end of the machine to which the disclosure is directed will be hereinafter referred to as the rear end of the machine, and the cartons as being moved forwardly therefrom.

A magazine 3 is mounted on a bracket 4 bolted to the face of the table 2. The magazine is made up of vertical oppositely disposed pairs of angle irons 5, 6. The angle irons 5 forming the rear side of the magazine are secured to the pair of angle irons 6, the angle irons 6 in turn being attached to the bracket 4. The arrangement of the angle irons (as shown in Figure 4) makes up a rectangular casing, the interior corresponding with slight clearance to the outline of the cartons to be stacked therein. The forward side of the lower part of the magazine is formed of a flat bar 7 secured to the bracket 4 between the angles 6 and extending substantially to the lower end of the angle irons 5. The stack of cartons is sustained by means of an arrangement at the discharge opening (hereinafter described) which is sufficient to support the carton stack under normal conditions but to allow the withdrawal of a lowermost carton by means of the withdrawal mechanism.

A horizontally disposed upper guide rail 8 as a part of the guideway into which the cartons are ejected and of less width than the body of the carton, has its rear end slightly rounded and extending within the base of the magazine. The flat bar 7 of the magazine is notched so as to straddle the bar 8, the slight projection of the bar into the magazine serving as a rest for the forward end of the carton stack. The rear edge of the carton stack is supported on a cross piece or cam 9 extending across the width of the magazine and attached to the inner faces of the angle irons 5. This cross piece 9 is of inverted

V-shape with its inner flange 10 rounded for ease of carton withdrawal and for guiding the carton being withdrawn to an opened position.

The disposition of the cross piece provides an offset discharge opening, and the supporting of the carton stack in the described manner facilitates easy withdrawal of the lowermost carton, the offsetting of the opening aiding in the setting up of the carton as it is withdrawn.

The cartons are stack as shown in Figure 3 with the base panel 11 of the cartons disposed immediately over the discharge opening and a side panel 12 thereof over the cross piece 9. As the lower carton is drawn down, the cross piece 9 obstructs the movement of the carton side panel and forces it over thus canting the carton since the base is firmly held against lateral motion by the withdrawal mechanism.

The rest to which the carton is drawn down is mounted on a horizontally disposed lower guide rail 13 of the same width as the rail 8 and comprises a pair of rearwardly extending arms 14. These arms 14 extend directly below the magazine and are secured to the rail 13 at each side thereof, the bar in turn being mounted on a bracket 14'. The mounting for the rail 8 is not shown, it being secured to the intermediate portion of the machine. The rails 8 and 13 form a guide passage for the cartons horizontally ejected from below the magazine.

Means for withdrawing the lowermost carton, comprises, a suction member 15 mounted on the upper end of a vertically reciprocated plunger rod 16 slidably mounted in the frame 2. A link 17 connects the lower end of the rod 16 and the outer end of a lever 18, providing the flexible connection therebetween. The lever 18 is pivoted to the frame 1 on a stud 19. A cam roller 20 is attached to the lever 18 intermediate its ends, the roller being tracked in a closed cam 21 secured to a power driven shaft 22. The rotation of the cam gives the necessary timed carton withdrawal reciprocation to the suction member.

The suction member 15 comprises a laterally extending arm 25 attached to the plunger rod 16 and a suction cup 26 secured to the upper face of the outer end of the laterally extending arm. The rubber suction cup is secured to the arm 25 by means of a flanged nipple 27 screwed into the arm 25 and disposed centrally of the suction cup. The central bore of the nipple is in communication with a channel 28 extending to a pipe fitting 29 screwed in the underside of the arm 25, this pipe fitting extending downwardly and suitably bent so as to clear the path of movement of the various elements.

A rubber tube 30 is connected to the pipe 29 at one end, the opposite end of the tube connected to the cylinder head 31 of a pump

cylinder 32. The pump 32 is secured to the side of the table 2 by means of a bracket 33. A piston 35 is mounted within the cylinder in the customary manner, the piston being of the ordinary structure. The piston rod 37 for the piston 35 is pivotally attached to the outer end of a lever 38, the lever 38 being pivoted on a cross shaft 40 journaled in a pair of brackets 41 secured to the outer face of the frame 1. Movement is imparted to the lever 38 by means of a link 42 pivotally attached to the lever 38 intermediate of its ends and having its opposite end pivoted on a crank pin 43 extending from the outer face of a disk 44. The disk is attached to a secondary or cross power shaft 45. The shaft 45 has its ends journaled in the brackets 41 and is driven by means of an intermediately disposed bevelled gear 46 engaging a companion gear 47 on the outer end of the first mentioned power shaft 22.

The pump cylinder 32 is provided with a release aperture 50. The aperture is so disposed in the cylinder as to destroy the suction being created by the downward stroke of the piston at the proper moment to release and allow lateral ejection of the withdrawn carton from beneath the magazine. This release of the suction is timed so as to cut off the suction at the time that the carton has been drawn down against the fingers 14 and sufficiently engaged by the ejector.

In order that the carton may be properly opened during withdrawal, a pair of vertically disposed pins 51 are provided for engaging the opposite upper flaps 52 of the carton. As shown in Figure 4, the pair of pins 51 engage the underside of the end flaps 52 of the carton between the side tucking flaps 53 thereof, so as not to interfere with the downward movement of the base of the carton. The pins 51 are mounted at the opposite ends of a U-shaped yoke member 54 centrally attached to a plunger 55 slidably mounted for vertical reciprocation in the bracket 12.

The plunger rod 55 is flexibly connected to the outer end of a lever 56 by means of a link 57. The lever 56 is pivoted on the stud 19 adjacent the lever 18 and has a cam roller 58 engaged in a closed cam 59 also secured to the power shaft 22. The pins 51 through the mechanism described are given the proper reciprocation to suitably support the upper side of the carton during withdrawal so as to prevent collapse thereof prior to the time at which the ejector fingers engage the same, whereupon the pins are drawn downwardly out of the path of the ejector fingers.

The ejector mechanism for successively feeding the set up cartons from beneath the magazine is mounted on a bracket 60 bolted to the rear end of the table 2. The ejector arms 61 are secured together by means of a U-shaped member 61^a at the rear end thereof

and by means of a pivot member (hereinafter described) intermediate of the ends of the arms. The ejector arms 61 slidably mounted on this bracket 60 are mounted on a carriage 62 for horizontal reciprocation beneath the magazine and substantially parallel with the guide channel formed by the bars 8 and 13.

The carriage 62 supporting the ejector arms 61 is mounted in a guide channel in the upper face of the bracket 60 and maintained therein by means of plates 63. The carriage is reciprocated by means of a lever 64 pivoted upon the cross rod 40 having its outer or upper end connected to the carriage 62 by means of a link 65. The link is connected to the carriage through a member 66 depending from the carriage, and moving through a slot in the bracket 60. A cam roller 67 is provided at an intermediate point on the lever 64 and is tracked in a closed cam 68 rotatably secured to the secondary power shaft 45.

The movement of the ejector arms is substantially horizontal with means provided for slightly swinging the arms at the moment of carbon engagement. A bracket 70 is secured to the upper face of the slide bracket 60 and a roller 71 is rotatably mounted on the bracket. The roller 71 is tracked in a cam groove 72 formed on one side of the ejector arms assembly. The groove is formed by a pair of plates spaced apart with the intermediate space providing the necessary channel. The inner edges of the plates are configured relatively so as to provide the necessary cam groove. The ejector arms are pivotally mounted on the carriage 62 by a pivot rod 73 having attaching flanges 74 at each end thereof secured to the ejector arms and the rod extending therebetween. The pivot rod has bearings in the upper face of an upwardly extending portion on the carriage and suitably maintained in position by means of a bearing cap 76.

The cam groove 72 is formed so as to swing the ejector arm assembly from a slightly tilted position to a perfectly horizontal position at just the moment that the ejector arm is brought up to the carton to be ejected. This swinging movement of the ejector arms is an aid to the canting of the carton and provides the proper initial engagement of the ejector arms with the carton. The carton engaging ends of the ejector arms are notched to provide fingers 78 and an inclined forward end 79 extending downward from the fingers. As the carriage 62 is reciprocated in its slide-way carrying the ejector assembly, the cam groove 72 is moved in relation to the cam roller 71 and the desired swinging of the ejector is accomplished. The guide rails 8 and 13 are slightly non-parallel being closer together at the end adjacent the magazine. The purpose of this is to allow the sprung carton to gradually relax as it is fed from beneath the magazine to the load-

ing station. As shown in Figure 1, at the point where the carton is to be loaded it is substantially squared up. As the ejector arms in the course of their movement approach the withdrawn carton, as shown in Figure 3 (in dot and dash lines) and the fingers 78 reach the point slightly above the canted edge of the carton, the cooperation of the cam roller in the cam groove causes the ejector to be swung down upon the carton upper edge.

It can readily be seen that instead of forcing the fingers 78 across the carton they are brought to bear from above and upon continued movement of the ejector, in combination with this pressure from above, the carton is forced over to reversed carton position, also shown in dot and dash lines, Figure 3. This canting of the carton due to the engagement of the feed fingers therewith takes place before the inclined edges 79 of the ejector engage the rear side of the carton. The canting of the carton is accomplished by engagement across the top thereof and not by a crushing engagement of the edge 79 with the rear corner of the carton.

At the time when the inclined edges 79 engage the carton the ejector is moving in a line parallel with the guide channel through which the carton is forced and the entire underside of the fingers 78 and the canting edges 79 are in engagement with the carton until the carton begins to straighten out into a squared position as it approaches the loading station.

Operation of the mechanism

In the various views of the drawing the device is shown in what may be termed "the starting position" from which a complete cycle of operation will be described, the various dot and dash line positions of the cartons being indicative of positions intermediate of the cycle of operation. At the starting position a suction has been created in the suction cup in engagement with the lowermost carton, this suction being developed by the partial downward movement of the piston in the pump cylinder. As the piston continues downward for maintaining the suction created, the slide rod carrying the suction cup is moved downward through its cam and lever drawing the carton with it.

The pins engaging the flaps are moved downwardly through their described driving connection in timed relation to the withdrawal movement of the suction member. When the downward movement of the suction element has drawn the lower surface of the carton down against and in engagement with the fingers 14 the pins have retreated slowly so as to suitably sustain the upper portion of the carton being opened. The setting up of the carton is also aided by the construction of the discharge opening at

the base of the magazine, the rounded inner surface of the V-shaped member 9 camming against the carton side panel forcing over the upper panel of the carton, the carton rear edge still being in engagement with this rounded surface at the time when it is in engagement with the fingers 14. At this time the suction element is still acting upon the lower panel of the carton to hold it down on the fingers 14. At this time the ejector having moved forward, the finger portions thereof are brought to bear on the upper surface of the rear edge of the carton through the cam arrangement on the ejector.

The carton being held to the suction member the ejector engagement cants the carton over into reverse canted position before the inclined edge 79 of the ejector arms reach the upper edge of the carton. Prior to the engagement of the inclined edges 79 with the carton side the suction is released and the suction element is drawn completely away from the carton, whereupon the inclined edge 79 engages the carton side and upon further movement the ejector feeds the set up carton between the bars 8 and 13, to the loading station in which position the carton is shown in Figure 1. The support pins have, of course, during this time moved down below the surface of the fingers 14. After this feeding movement the ejector is rapidly retracted and the pins in such manner are returned to their starting position.

Having described my invention, I claim:

1. A device of the class described, comprising, a magazine for supporting a stack of folded knock-down cartons, said magazine having a discharge opening at its base end, a reciprocating element adapted to engage the end panels of the lowermost carton, said end panels being attached to the carton upper panel, and a reciprocating withdrawal element adapted to engage the lower panel of said carton whereby said elements moving in timed order sustain the upper panel and draw down the lower panel, opening the carton.

2. A device of the class described, comprising, a magazine for supporting a stack of folded knock-down cartons, said magazine having a discharge opening at one end thereof, a guide at one side of said opening, a support ledge of small dimension at the opposite side of the opening for allowing forcible withdrawal of the lowermost carton, the lowermost carton of the stack having its side panel disposed on the guide and its base panel over the unobstructed opening, a reciprocating withdrawal element engaging the base panel of the lowermost carton, and reciprocating pins adapted to engage the end flaps extending from the top panel for sustaining the carton upper panel as the base panel thereof is drawn down, whereby the carton is opened.

3. A device of the class described, compris-

ing, a magazine for supporting a stack of folded knock-down cartons, said magazine having a discharge opening at its base end, a reciprocating withdrawal mechanism adapted to engage and withdraw the lowermost carton of the stack, a guide in said discharge opening sustaining and laterally moving the carton upper panel and opening the carton as withdrawal takes place, a table beneath said magazine to which the respective cartons are drawn, and means for ejecting the withdrawn open carton laterally along the table from beneath the magazine.

In witness whereof, I hereunto subscribe my name.

RUEL ANDERSON JONES.

4. A device of the class described, comprising, a vertically disposed magazine for supporting knock-down cartons, a guideway extending laterally from the base of the magazine, a reciprocating element for drawing the lowermost carton down to the guideway, a guide in the magazine discharge opening for causing the carton to be set up during withdrawal, and a reciprocating ejector for engaging the carton and feeding it through the guideway.

5. A device of the class described, comprising, a vertically disposed carton magazine, a guideway extending laterally from the base of the magazine, a reciprocating element for drawing the lowermost carton down to the guideway, a guide in the magazine opening for causing the carton to be set up during withdrawal, a reciprocating ejector moving along the guideway, and adapted to engage the set up carton canted toward the ejector in incomplete open position, and said ejector adapted to force the carton over into sprung position whereby the carton is set up in the guide after ejection thereto against its spring-like tendency to return to collapse position.

6. A device of the class described, comprising, a frame, a magazine for supporting a stack of knock-down cartons, a guideway extending laterally from the magazine discharge opening, means for setting up the lowermost carton in canted incomplete open position on the guideway, a carriage slidably mounted in said frame and reciprocable in the direction of the guideway, an ejector pivotally mounted on said carriage, and a cam arrangement between the frame and ejector, said ejector having forwardly extending fingers and rearwardly inclined forward edges beneath said fingers, said fingers during carton ejection adapted to engage downwardly by means of the cam action against the canted carton top surface for reverse canting of the carton prior to the moment of inclined feeding edge engagement with the carton rear side.

7. A device of the class described, comprising, a frame, a magazine for supporting a stack of knock-down cartons, means for withdrawing and setting up the lowermost carton of the stack beneath the magazine, a guide-