

June 24, 1952

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2,601,481

MEANS FOR OPENING AND LOADING CARTON BLANKS
ON THE CONVEYER OF A PACKAGING MACHINE

Filed Feb. 28, 1949

5 Sheets-Sheet 1

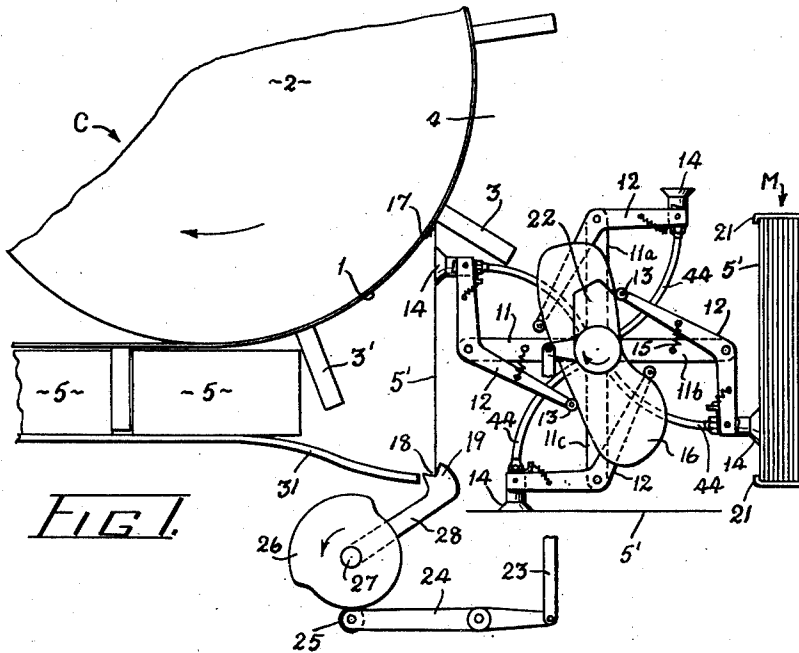


FIG. 1.

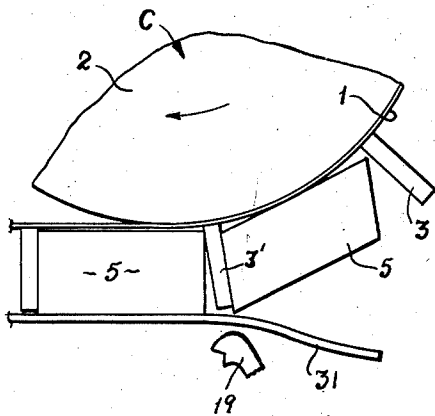


FIG. 2.

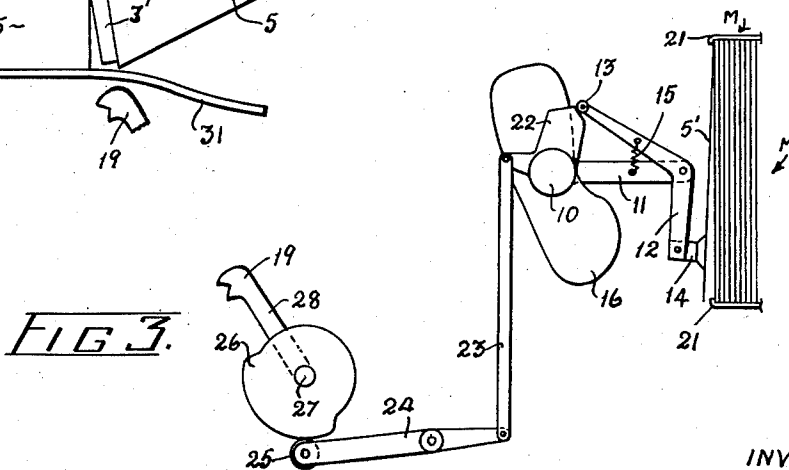


FIG. 3.

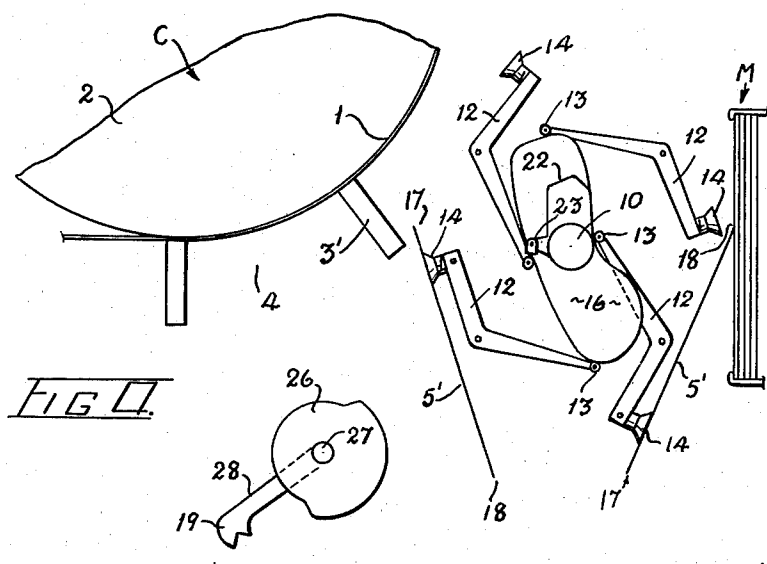
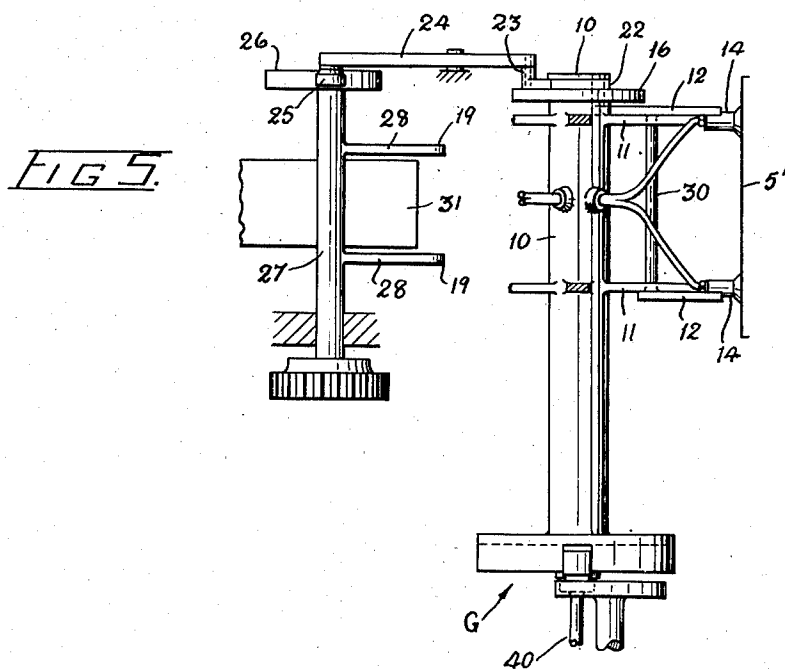
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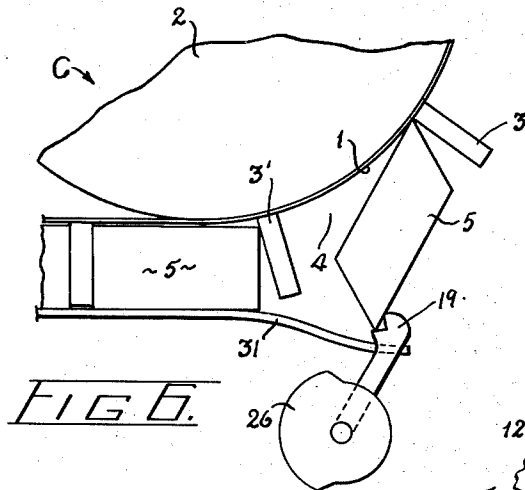


FIG. 6.

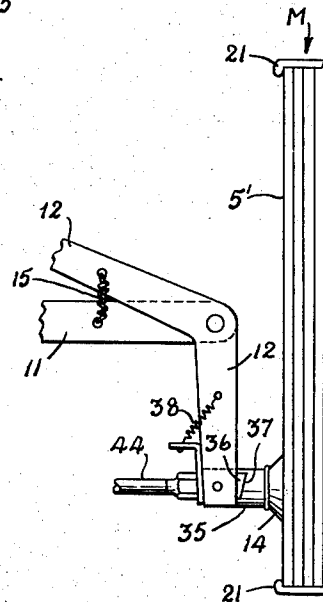


FIG. 7.

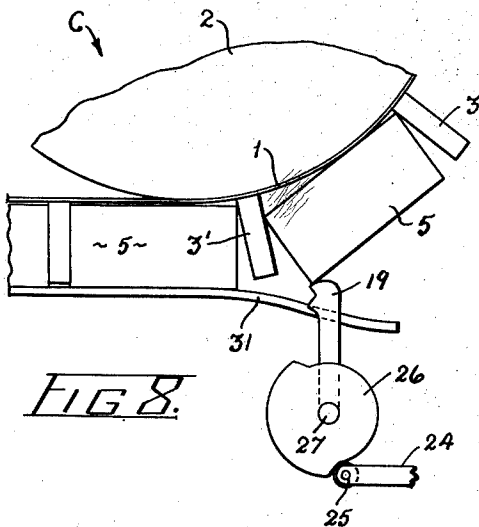


FIG. 8.

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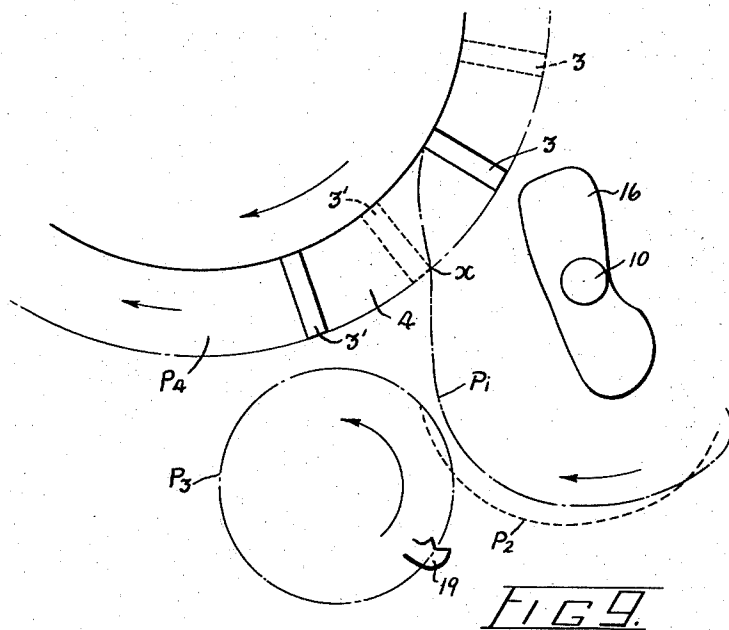
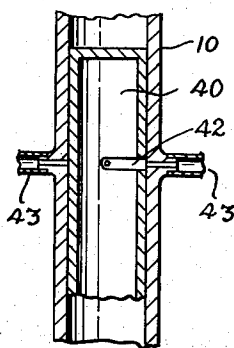
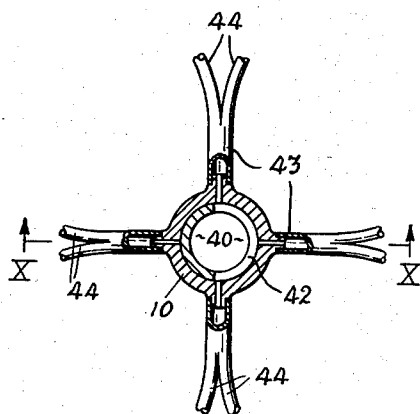
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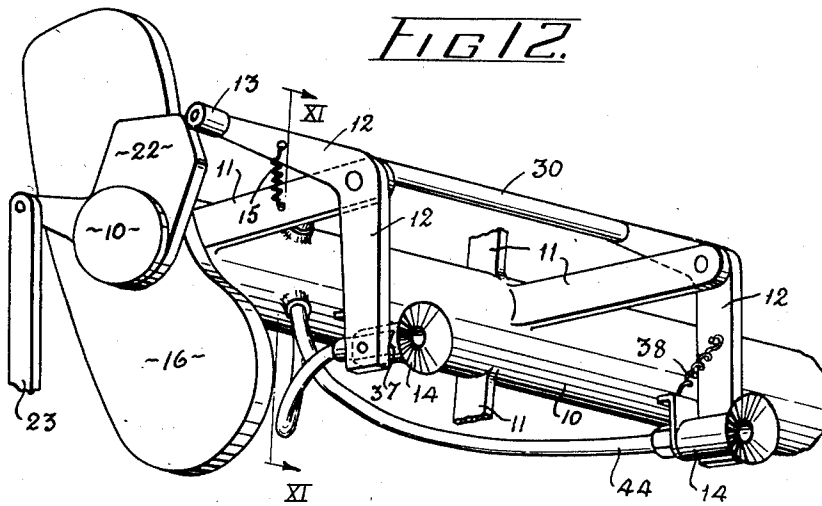
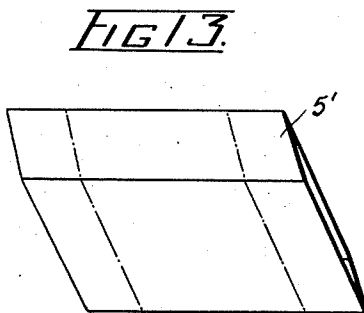
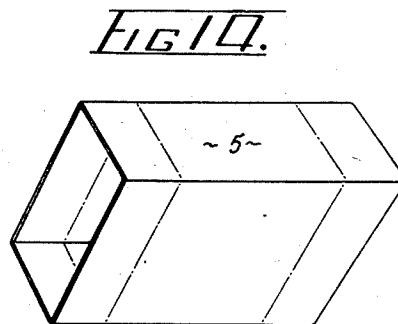
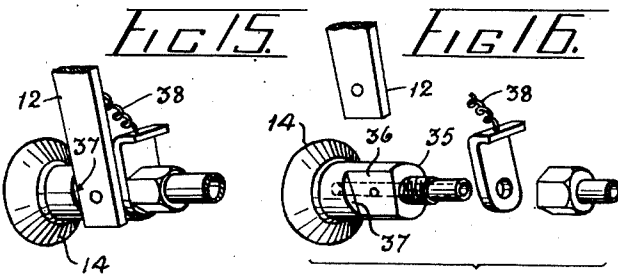
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UNITED STATES PATENT OFFICE

2,601,481

MEANS FOR OPENING AND LOADING CARTON BLANKS ON THE CONVEYER OF A PACKAGING MACHINE

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Application February 28, 1949, Serial No. 78,788

6 Claims. (Cl. 93-53)

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The invention related to new and useful improvements in carton feeding mechanism for high-speed automatic packaging machines; such mechanism being required to transfer cartons from an adjacent magazine to the conveyor of a packaging machine and co-incidentally to open them for filling purposes; they being originally supplied in the conventional collapsed or folded form.

Packaging machines have had heretofore to be run below peak efficiency because hitherto available carton feeding mechanisms were incapable of operating safely at high speeds. In most cases this was due to the employment of reciprocating elements therein which had to be returned to neutral position after each carton was loaded on the conveyor. In addition thereto, such hitherto available mechanisms were also complicated affairs requiring fine timing and adjustment to ensure consistent and even moderately satisfactory operation.

Having regard thereto, the foremost object of the invention is to provide mechanism capable of feeding cartons to the conveyor of a packaging machine at a higher rate of speed than was hitherto attainable and to do so without endangering the cartons.

It is also an important object of the invention to provide mechanism of the character described which is of simple and economical construction and substantially fool-proof and efficient in operation.

It is a more specific object of the invention to provide such mechanism wherefrom the use of reciprocating elements and their attendant disadvantages are substantially eliminated.

The structure designed to serve the foregoing purposes is based on a novel method of handling cartons which also constitutes one of the objects of the invention.

Other objects will appear from the hereinafter following description of the elements, parts and principles constituting the invention, whereof a selected embodiment is illustrated, by way of example only, in the annexed drawings, wherein:

Fig. 1 is a substantially schematic view of the invention in plan and includes fragmentary portions of a packaging machine,

Fig. 2—a plan view of a part of the conveyor of the packaging machine during a stage in the loading of a carton thereon,

Fig. 3—a schematic plan view of the invention at a stage in the operation thereof,

Fig. 4—a schematic plan view of the invention and the conveyor during a stage in the operation thereof,

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Fig. 5—an elevational view of the invention as shown in Fig. 1, with certain parts broken away,

Fig. 6—a view corresponding to Fig. 2 at a preceding operative stage,

Fig. 7—an enlarged plan view of a detail of the invention,

Fig. 8—a view corresponding to and showing the structure of Figs. 2 and 6 at an intermediate operative stage,

Fig. 9—a schematic view of the paths followed by certain parts of the invention,

Fig. 10—a section along the line X—X of Fig. 11,

Fig. 11—a section along the line XI—XI of Fig. 12,

Fig. 12—an enlarged perspective view of one assembly of the invention,

Fig. 13—a perspective view of the collapsed carton visualized by the invention,

Fig. 14—a perspective view of the expanded carton visualized by the invention, and

Figs. 15 and 16—assembled and exploded views, respectively, of certain parts of the invention.

In all of the foregoing views, like parts of the invention are identified by like reference devices.

While the invention is adaptable for use with practically any packaging machine now known, that disclosed in U. S. 1,527,030 to R. D. Delamere and the instant applicant is herein selected for exemplary purposes. This machine includes a conveyor C generally consisting of an endless belt 1 arranged to travel in a horizontal plane around a pair of spaced pulleys whereof one is shown fragmentarily at 2 in the drawing. The belt 1 carries a series of regularly spaced fins 3 projecting radially therefrom which define stalls 4 for the cartons 5.

The cartons 5, hereby visualized, are of a well-known type including a tubular body portion divided by axial score-lines into a four-walled structure. The said score-lines being also capable of functioning as hinges, the said structure may thus be selectively collapsed into a flat parcel for delivery purposes or expanded into a rectangular container for filling purposes. For the sake of clarity, the collapsed or flattened carton will hereinafter be referred to as the blank 5'.

In this embodiment of the invention the magazine M, wherein the blanks 5' are stored, is shaped somewhat like a chute and is positioned on a level with and facing the belt 1 where it rounds the pulley 2. Vertically interposed therebetween is a hollow rotatable column 10 with a radially projecting arm 11 on whose extremity is pivotally mounted the elbow of a bell crank 12 having a cam follower 13 at one end, a suction cup 14 at the other end, and a tension spring 15

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also interconnected to the arm 11 to urge the cam follower 13 into contact with a fixed cam 16 mounted over the column 10 whose function will be duly described.

The parts are so constituted and spaced that the terminal blank 5' in the magazine M is adapted to be seized by the suction cup 14 and to be transported thereby through a 180° arc to a point where its leading edge 17 meets and enters into the angle formed by the belt 1 and an approaching fin 3 while its trailing edge is more or less simultaneously engaged by a revolving claw 19 substantially as shown by Fig. 1 of the drawings. The interception of the blank 5' by the fin 3 and the claw 19 is timed to occur while these parts are approaching each other. Thus the blank 5' is thereafter squeezed open in the manner shown progressively by Figs. 6 and 8 of the drawing; the claw 19 also co-incidentally pressing the blank 5', now the carton 5, into the stall 4 formed by the said fin 3 and its immediate predecessor fin 3'.

The foregoing action is schematically illustrated in Fig. 9 wherein P1 denotes the path of the leading edge 17 on its journey from the magazine M to the conveyor C, P2 the path of the trailing edge 18, and P3 the path of the claw 19.

As will be seen therein, the paths P1 and P2 are not entirely circular in contour. This effect is manifestly achieved by the use of the fixed cam 16 and is necessitated by several factors. For example, when the leading edge 17 enters the fin orbit P4 (Fig. 9) it is exposed to collision with the fin 3' at the point X unless, as is done in this instance, the blank 5' is rotated slightly to avoid such collision. Similarly, as is best shown in Fig. 4, when a blank 5' is removed and being carried away from the magazine M, its trailing edge 18 will tend to bear rather heavily and may even crease against the remaining blanks 5' unless it, too, is suitably rotated. However, such rotation, in this instance, is not the only means utilized for precluding the creasing of blanks 5'; the suction cup 14 being also yieldable on the bell crank 12 for this purpose.

The contour of the fixed cam 16 is governed by other considerations as well as the foregoing. For example, it guides the suction cup 14 on its return to the magazine M for another blank 5' and ensures positive and intimate connection therebetween at the proper place and time. However, in this instance, the said fixed cam 16 is not by itself capable of procuring the withdrawal of the blank 5' from the magazine M in the requisite manner. As will be seen, the edges of the magazine M at its discharge end are slightly returned to form blank retaining lips 21-21, past which each blank 5' has initially to be more or less axially pulled.

For this specific purpose, the invention contemplates a second cam 22 oscillably mounted over the column 10 and adapted to apply a direct thrust to the cam-follower 13 whereby to displace it with respect to the fixed cam 16 and thus rock its associated bell crank 12 so as to cause the leading edge 17, at least, of a blank 5' to be withdrawn from the magazine M past the adjacent lip 21 in the manner illustrated by Fig. 3 of the drawings. The oscillable cam 22 is motivated by a connecting rod 23 attached to one end of an intermediately pivoted lever 24 whose other end also carries a cam follower 25 in association with a cam 26 rotating with the spindle 27 which carries the finger 28 terminating in the said claw 19.

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In order to simplify the foregoing portion of this disclosure, mention was omitted of the fact that the column 10 carries three other arms, namely 11a, 11b, 11c, in addition to that first described; all four arms being identical to each other, similarly equipped with blank seizing apparatus, and being positioned at the same height on the column 10 although regularly spaced apart. Thus it will be seen (in Fig. 1) that when the arm 11b (and its equipment) is in blank seizing position, the arm 11c will be substantially midway between the magazine M and conveyor C, while arm 11a will be transferring its blank 5' to the said conveyor C and arm 11a will be en route back to the magazine M for another blank 5'.

It should also have been heretofore stated that the column 10 may be rotated intermittently instead of continuously by the so-called "internal Geneva movement" G of Fig. 5 by which it is driven. In that case, the column 10 may be halted after each 90° turn for a short period during which the claw 19 moves from the position of Fig. 1 to the position of Fig. 8 in which latter case its associated rotating cam 26 will trip the lever 24 to institute the train of action culminating in the withdrawal of a blank 5' from the magazine M; this occurring substantially co-incidentally with the resumption of movement by the column 10. Thus it will be apparent that each quarter-turn of the said column 10 will position one blank 5' for transfer to the conveyor C, at a commensurate rate, while another blank 5' is prepared for removal from the magazine M. Similarly one complete rotation of the column 10 will procure the successive placement of four blanks 5' on the conveyor C; the claw 19 revolving at a commensurate rate of speed.

In addition to those noted above, several other details of the invention were heretofore omitted for the sake of simplicity. For example, the arms 11, 11a, 11b and 11c each have a lower, similarly numbered, counterpart arm with which it is vertically aligned and which carries substantially the same equipment namely: bell crank 12 and suction cup 14. Instead of a cam follower 13, however, each lower bell crank 12 has a pillar 30 by which it is linked to its upper counterpart whereby the two are adapted to co-act in unison. Incidentally, the spacing of the upper and lower arms 11-11 is such that their suction cups 14-14 respectively grasp the upper and lower portions of the blank 5' and also such as to enable a fin 3 to pass therebetween for reasons which will be obvious on examination of Fig. 1.

Likewise, the claw 19 and its associated finger 28 are duplicated at a lower level on the spindle 27; they being also spaced to pass the guard rail 31 which maintains the cartons 5 in their stalls 4 after the release thereof by the claw 19.

Some mention should also be made of the herein visualized yieldable mounting of the suction cup 14 on the bell crank 12. As is best shown in Fig. 16, the normally round stem 35 of the suction cup 14 has a flattened seat 36 for the bell crank 12. The wall 37 of the seat 36 is made diagonal to limit the swivable scope of the suction cup 14 on the bell crank 12 while a tension spring 38 resiliently maintains it in the position required for the initial seizing of a blank 5' and the subsequent presentation thereof to the conveyor C. Although it was previously stated that the swivability of the suction cup 14 was provided in order to avoid creasing the blank 5' while it is being removed from the magazine M, as illustrated in

Fig. 4, it serves a further useful purpose when the suction cup 14 releases the blank 5' following its delivery to the conveyor 3.

Also remaining to be described is the presently contemplated means for applying suction to the suction cups 14. As is best seen from Figs. 10 and 11, the column 10 is fitted with a stationary sleeve 40 which is closed at its upper end and adapted to be connected by its lower end to a suitable vacuum source which is not illustrated in the drawings. A valve is provided at a suitable height thereon, consisting of a semi-circular slot 42 cut into the sleeve 40; the height of the slot 42 corresponding substantially to the height at which communicating ports 43 are formed in the column 10. Each port 43 terminates in a Y-coupling to which each pair of suction cups 14—14 are connected by the tubes 44. Thus by a proper positioning of the sleeve 40 in the column 10, suction may be applied to the suction cups 14 when they are required to hold or grasp cartons and relieved when they are required to release the same, or while each is en route back to the magazine or for another blank 5'.

What I claim as my invention is:

1. Mechanism for transferring cartons from a magazine to a conveyor having fins including a column; a bell crank pivotally carried thereby; a cam associated with the column; carton seizing means carried at one end of the bell crank and a cam-follower at the other end in engagement with the said cam; means for moving the said column to present the seizing means to one of the cartons in the magazine and thence to transport the said carton to the conveyor during which transportation the said cam follower and bell crank are guided by the said cam to rotate the carton from time to time whereby to avoid obstacles in its path and to position it in intercepting relation to one of the conveyor fins, and a member adapted to cooperate with the said fin in the engagement and opening of the carton and, coincidentally, to wedge the carton between two adjacent fins.

2. Mechanism for transferring cartons from a magazine to a conveyor having fins including, a column; carton seizing means carried thereby; means for moving the column to present the seizing means to one of the cartons in the magazine and thence to position the seized carton in intercepting relation to one of the conveyor fins; a second carton seizing means carried by the column being so disposed thereon as to be presented to the magazine when the first carton is positioned relative to the said conveyor fin as aforesaid; a member adapted to cooperate

with the said fin in the engagement and opening of the said carton and, coincidentally, to wedge the carton between two adjacent fins; an element capable of acting on the second carton seizing means for procuring the withdrawal of a second carton from the magazine, and means associated with the said co-operating member for motivating said element contemporaneously with the installation of the first carton on the conveyor.

3. Mechanism for opening flattened cartons comprising, a magazine for said flattened cartons, a continuously moving flexible endless conveyor having spaced fins defining pockets approximately the size of an open carton, rotatably mounted moveable means for seizing one of the cartons in said magazine and for bodily supporting and transporting the same, along a curved path, to a position where one folded edge of said flattened carton intercepts a fin on said conveyor, a moveable member operable in timed relation to said moveable means arranged to engage the opposite folded edge of said carton as said one folded edge engages a fin and to press said carton edgewise toward said fin to open said carton, and means for thereafter causing said moveable means to release said carton to said conveyor.

4. Mechanism as defined in claim 3 wherein said moveable means is mounted for orbital movement along a non-circular path to facilitate movement of said one folded edge into a space between adjacent fins on said conveyor.

5. Mechanism as defined in claim 3 wherein said moveable means is carried by a rotatable column, and means for intermittently rotating said column to position said moveable means successively at said magazine and adjacent said conveyor.

6. Mechanism as defined in claim 3 wherein said moveable means comprises a carton seizing structure mounted on a rotatably mounted support for yieldable limited rotation thereon whereby to yield to pressure applied thereto by said carton during movement to said conveyor and engagement therewith.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

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1,527,030	Delamere et al.	Feb. 17, 1925
2,217,784	Bennett et al.	Oct. 15, 1940
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