

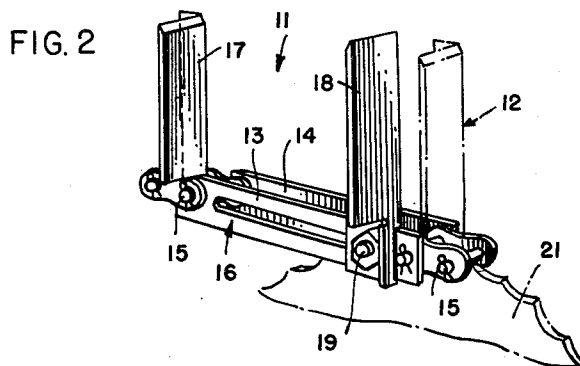
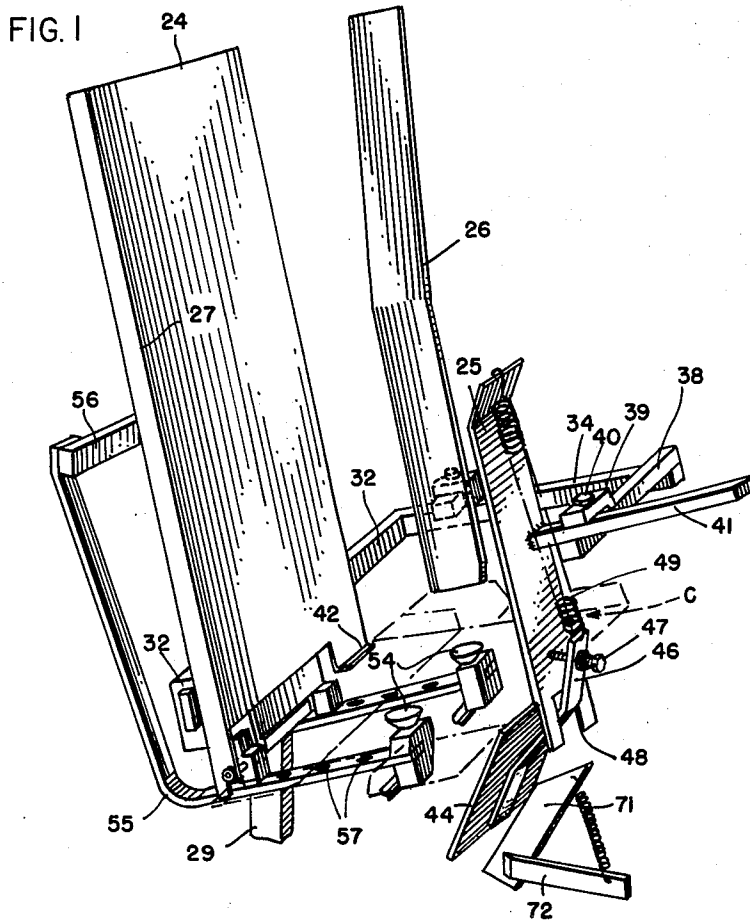
Oct. 18, 1960

E. A. HARTBAUER
MAGAZINE STRUCTURE AND CARTON OPENING
DEVICE FOR PACKAGING MACHINES

2,956,483

Filed Aug. 27, 1957

4 Sheets-Sheet 1



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Oct. 18, 1960

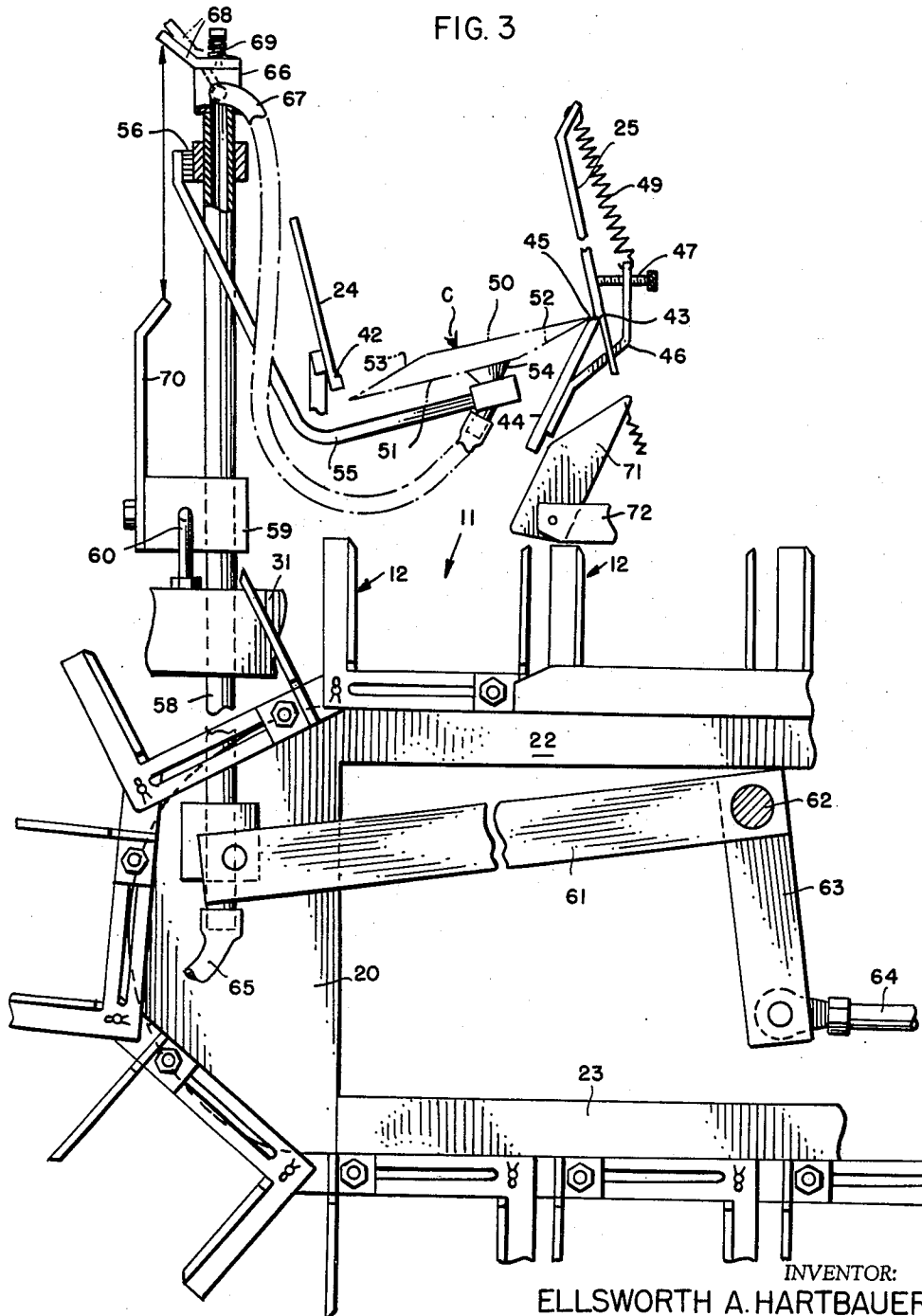
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FIG. 3



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FIG. 4

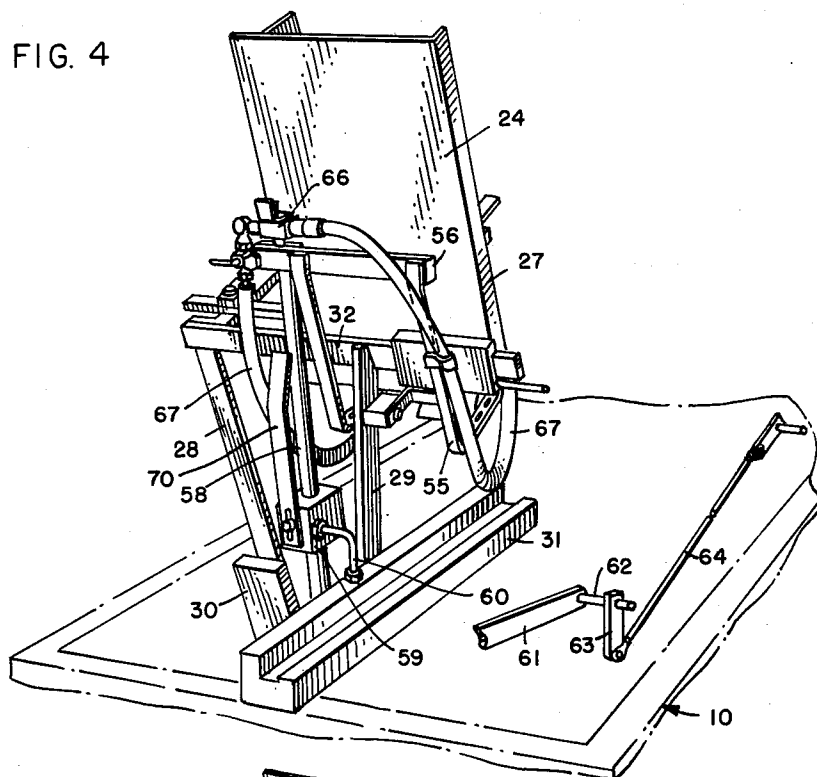
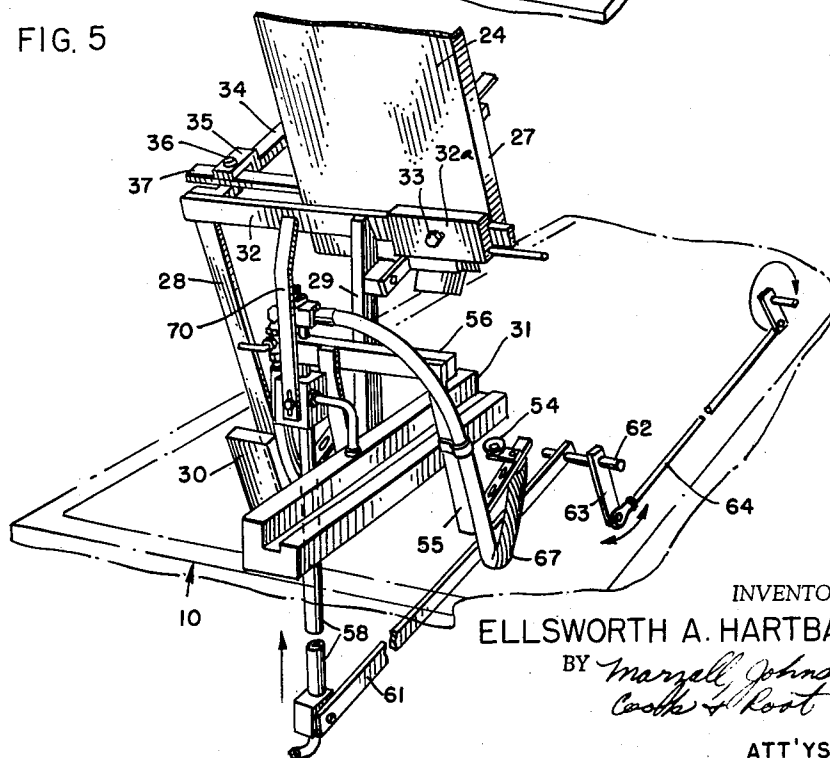


FIG. 5



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4 Sheets-Sheet 4

FIG. 6

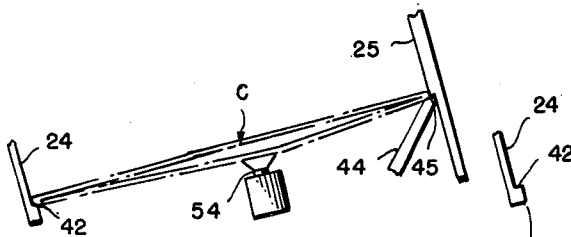


FIG. 7

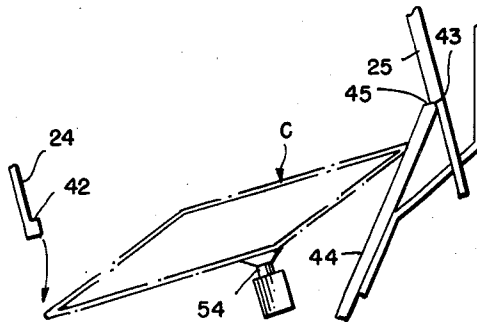


FIG. 8

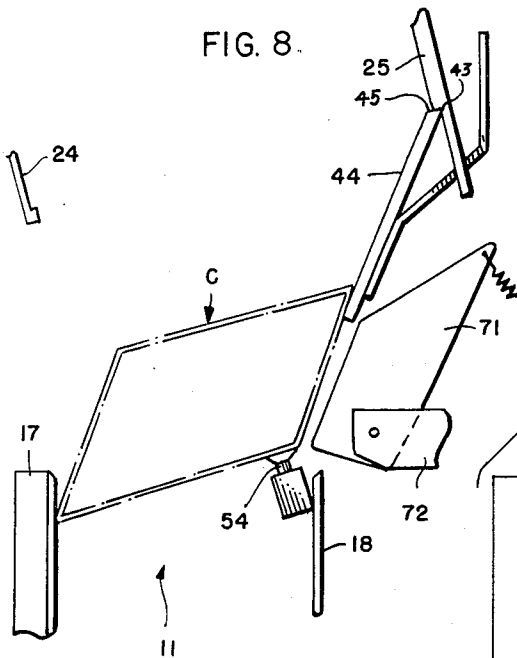
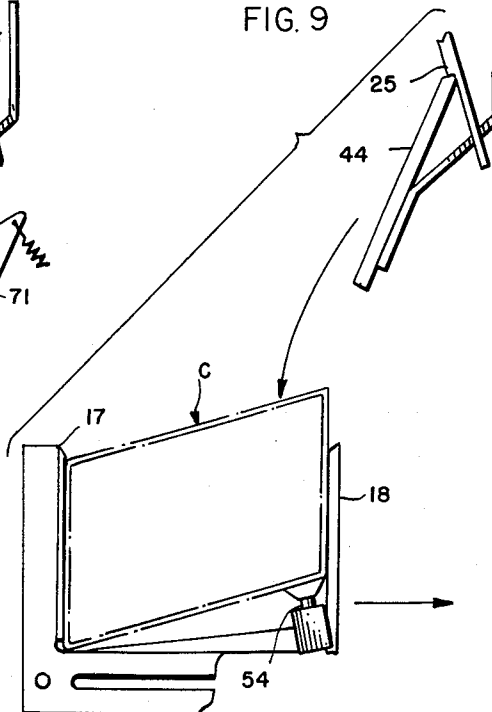


FIG. 9



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1

2,956,483

MAGAZINE STRUCTURE AND CARTON OPENING DEVICE FOR PACKAGING MACHINES

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6 Claims. (Cl. 93—53)

This invention relates generally to a carton opening or expanding device and magazine structure for a packaging machine for holding cartons in a flattened condition, and more particularly to a machine for setting up collapsed cartons in connection with carton-filling machines.

The machine of the present invention includes a magazine structure arranged to hold a stack of cartons in flattened condition, wherein the stack is inclined from the vertical so that the weight of the carton is shifted in a direction away from an expander block associated with the magazine. This arrangement relieves the pressure on the front edge of the cartons and therefore permits only the front edge of the carton to engage the expanding block and thereby avoid marking of the front panel of the carton during the expanding operation. The expanding block is mounted on a magazine in adjustable fashion so that it may accommodate cartons of various sizes. Further, the magazine structure and the necessary operating components of the expanding device are adjustable to accommodate cartons of various sizes.

It is therefore an object of this invention to provide an improved magazine structure and expanding device for expanding cartons from a flattened condition to their open position, wherein marking of the panels of the carton is eliminated.

Another object of this invention resides in the provision of a carton expanding device including a magazine inclined rearwardly from the vertical and having an expander block associated therewith at the forward end so as to shift the weight of the cartons rearwardly and relieve the pressure at the forward edge of the cartons thereby eliminating the necessity of using a carton clamp when removing the cartons one at a time from the magazine.

Still another object of this invention is in the provision of a carton expanding device which is adjustable to accommodate cartons of various sizes.

A further object of this invention is to provide a combination magazine structure and an expander block for expanding cartons from a flattened condition, wherein the magazine structure and the expander block are adjustable so that they may accommodate cartons of various sizes.

Other objects, features and advantages of the invention will be apparent from the following detailed disclosure taken in conjunction with the accompanying sheets of drawings, wherein reference numerals refer to like parts, in which:

Fig. 1 is a front perspective view of a magazine structure and carton expanding device embodying the invention, with some parts omitted for purposes of clarity;

Fig. 2 is a fragmentary perspective view of the conveyor employed in connection with the magazine structure and expander device of the invention;

Fig. 3 is a fragmentary elevational view of the magazine structure and expander device and illustrating a portion of the conveyor chain as it is mounted relative thereto as well as some of the other operating components of the machine;

Fig. 4 is a rear perspective view of the magazine and

2

expander device showing the suction heads in their up position;

Fig. 5 is a rear perspective view similar to Fig. 4 showing the suction heads of the expander device in the lower position; and

Figs. 6, 7, 8, and 9 are sequential diagrammatic views illustrating the opening of the cartons as it is removed from the magazine and urged against the expander block and the depositing of the open carton into a pocket of the conveyor.

Referring now to the drawings, particularly to Figs. 3, 4, and 5, the magazine structure and carton expander are mounted at one end of a cartoning machine generally designated by the numeral 10, wherein cartons such as the carton C of Fig. 3 are stacked in their flattened condition in the magazine structure and removed from the magazine structure and expanded one at a time by the carton expander and deposited in a pocket 11 of an endless carton conveyor 12.

The endless carton conveyor 12 is constructed to provide a plurality of spaced pockets 11 therealong each adapted to receive an expanded carton and carry it through the cartoning machine to be filled and closed in accordance with filling and closing mechanism not shown since it does not form a part of this invention. Each pocket is defined by a pair of parallel extending bars 13 and 14 held together at their opposite ends in spaced relationship and connected to an adjacently spaced set of bars by connecting links 15. A longitudinally extending slot 16 is provided in each of the bars 13. At one end of the bar 13 is an upstanding pocket forming plate 17 transversely arranged relative to the bar, while at the other end an upstanding pocket forming plate 18 is arranged to be adjustably secured to the bar along the slot 16 by a nut and bolt assembly 19; thus, each pocket is completely adjustable to accommodate cartons of various widths. The endless carton conveyor 12 is trained about a guide plate 20 at one end as seen in Fig. 3 and a power driven sprocket 21 at the other end as seen in Fig. 2; and upper and lower guiding and supporting rails 22 and 23, Fig. 3, serve to maintain the path of travel of the conveyor along a predetermined path as well as to support the conveyor between the end supporting guide plate and sprocket.

Referring now particularly to Fig. 1, the magazine includes a rear wall 24, a front wall 25 spaced parallel from the rear wall and end wall 26 all arranged in inclined relationship to the vertical to as to support a stack of cartons in flattened condition therein along a longitudinal axis tipped rearwardly from the head of the conveyor 12. The rear wall 24 at its edge opposite the side wall 26 is provided with a longitudinal flange 27 facing the front wall 25 for further confining the cartons in their flattened condition in a manner as seen by the carton in phantom and designated by the letter C in Fig. 1.

The entire magazine structure is supported on the machine base by upstanding arms 28 and 29, Figs. 4 and 5, which are, in turn, mounted on the framework of the machine. The upstanding support 28 is secured at its lower end to a plate 30 on the cabinet structure of the machine, while the support 29 is rigidly secured to a longitudinally extending beam 31. A cross bar 32 is secured to the upper ends of the supports 28 and 29. The rear wall 24 of the magazine is adjustably mounted for movement along the portion of the cross bar 32 extending from the support 29 on the side thereof remote from the support 28 by a clamping device 32a including a set screw 33, Fig. 5. It is only necessary to adjust the rear wall 24 for accommodating a carton of different thickness or length. Extending forwardly from the end of the cross bar 32 at the support 28 is a forwardly extending arm 34 having a clamp 35 detachably secured

thereto by a stud bolt 36 for the purpose of adjustably clamping the side wall supporting arm 37 thereto which supports the side wall 26, whereby depth adjustment of the magazine for a change in carton length may be accomplished by adjusting the positioning of the side wall 26. At the free end of the forwardly extending support bar 34, a supporting leg 38 extends parallel to the cross bar 32. A clamp 39 is held on the leg 38 by a stud bolt 40 to adjustably clamp a supporting arm 41 of the front wall 25 to the leg 38, whereby the width of the magazine may be adjusted accordingly for accommodating variations in carton thickness or width.

The upper ends of the side wall 26 and the front wall 25 are beveled outwardly to facilitate insertion of a stack of cartons in the magazine as well as to guide the cartons as they move downwardly. At the lower end of the rear wall 24, inwardly extending projections or lugs 42, Figs. 1 and 3, serve to support the rear edge of the lowermost carton.

Adjacent the lower end of the front wall 25 and on the inner side thereof, a notched portion 43 defines a pivot point for the upper edge of an expander block or plate 44 which is of such width as to provide an inwardly extending ledge 45, Fig. 3, extending inwardly from the inside surface of the front wall 25 for supporting the forward edge of the lowermost carton in the stack of cartons. A substantially Z-shaped plate 46, Fig. 3, has one end suitably secured to the outside surface of the expander block 44 and is provided at the other end with an adjusting bolt or screw 47, the inner end of which bears against the outside surface of the front wall 25. The Z-shaped plate 46 is received in a bifurcated end 48 of the front wall 25 to preclude lateral movement of the expander block relative to the front wall 25 during operation of the machine, Fig. 1. To maintain the expander block in position, a spring 49 is connected at one end to the free end of the Z-shaped plate 46 and at the other end to the upper end of the front wall 25 to thereby resiliently bias the expander block 44 to a position whereby the inner end of the adjusting bolt 47 bears against the outside face of the front wall 25. Accordingly, the expander block 44 is adjustable to any desired inclination relative to the front wall 25 necessary to give the proper expanding action of a carton as it is removed from the magazine.

As seen in Fig. 3, a carton C is partially removed from the magazine and this carton includes an upper panel 50, a lower panel 51, a front panel 52, and a rear panel 53. The front panel 52 will engage the face of the expander block 44 as the carton is drawn thereby, this action precluding the engagement of the front panel 52 for opening of the carton and the possible marking of the front panel. Since the stack of cartons is in effect tilted rearwardly, the weight of the cartons is shifted rearwardly and away from the expander block 44; or in other words, the center of gravity of the stack of cartons in the magazine is displaced rearwardly by tipping the cartons upwardly at the front edges thereof. This relieves the pressure at the front edges of the cartons thereby enabling only the front edge of the carton to engage the expanding block and thereby avoid marking of the front panel 52 of the carton during the expanding operation thereof. Since pressure at the front edge of the carton has been relieved by tipping of the magazine and the stack of cartons therein, it is not necessary to use a carton clamp which generally serves to hold the main portion of the stack of cartons while a carton is being removed from the magazine. Accordingly, a more simply and economically constructed magazine and expanding block arrangement is provided.

The cartons are removed from the magazine one at a time and expanded against the expander block 44 by means of a pair of spaced suction heads 54, although it may be appreciated with smaller sized cartons only a single suction head may be employed. Each suction head 54 is mounted on a substantially right angle supporting

bar 55 which extends rearwardly of the magazine and beneath the rear wall 24 and upwardly to be connected to a transversely extending rod 56. The arm of the right angle supporting bar 55 on which each suction head 54 is mounted is provided with a plurality of spaced slots 57, Fig. 1, for the purpose of mounting the suction heads adjustably therealong to accommodate various sizes of cartons. As seen in Fig. 3, the suction heads 54 are preferably arranged to grip the lower panel 51 of a carton slightly behind but close to the score line or fold between the lower panel 51 and the front panel 52.

The transversely extending rod 56 is secured to the upper end of a hollow slide rod 58 which is slidably received in a pivot block 59 that is pivotally secured to the longitudinally extending beam 31 by a right angle bolt 60, Fig. 4. As seen in Fig. 3, one end of an actuating lever 61 is pivotally secured to the lower end of the slide rod 58, while the other end of the lever is secured to a cross shaft 62 rotatably carried by the framework of the machine. At right angles to the lever 61, a second actuating lever 63 has one end secured to the shaft 62 and the other end pivotally connected to a reciprocating drive link 64 which upon being reciprocated serves to drive the slide rod 58 up and down and the suction heads 54 up and down.

A vacuum is supplied to each suction head 54 from a suitable source such as a vacuum pump to a flexible line 65, Fig. 3, connected to the lower end of the hollow slide rod 58, upwardly through the slide rod through a control valve 66, and to each suction head through flexible lines 67. The control valve 66 includes a flapper plate 68 normally held over an exhaust aperture in the control valve 66 by a spring assembly 69. The flapper plate 68 includes a cam engaging leg which engages an upstanding cam bar 70 adjustably mounted on the pivot block 59 when the suction heads are moved downwardly a sufficient distance to deposit the cartons into the pockets 11 of the conveyor 12. Camming of the flapper plate 68 upwardly opens the aperture in the control valve 66 to the atmosphere thereby permitting the flexible line 57 leading to the suction heads to be bypassed and the suction grip of the suction heads to be released. When the flapper plate 68 is out of engagement with the cam bar 70, it will be biased to a closed position, such as seen in Fig. 3, by the spring assembly 69 to thereby connect the suction heads to the vacuum source.

A sequential operation of the removal of a carton from the magazine and the expanding of the carton against the expander block is seen in Figs. 6 to 9. As the suction heads 54 engage and grip the lower panel 51 of the lowermost carton, the carton will take the position as seen in Fig. 6 wherein its front edge is supported on the ledge 45 at the upper end of the expander block 44 and the rear edge is supported on the ledges 42 at the back wall 24. As the suction heads move downwardly, the front and rear edges of the carton leave the corresponding restraining means of the magazine and the front edge is drawn against the inclined expander block 44 as seen in Fig. 7. The suction heads continue downwardly along a path which brings the rear edge of the carton initially into engagement with the rear pocket folding plate 17 of a pocket 11 of the conveyor 12. In order to prevent the carton from popping out of the pocket after the suction heads have positioned it therein, a carton trigger 71, Figs. 3 and 8, is resiliently pivotable on a supporting member 72 and arranged at a point slightly behind the front edge of the conveyor pocket. As seen in Fig. 8, the lower end of the front panel of the carton engages the carton trigger 71 pushing it out of the carton path before the carton is drawn further into the pocket of the conveyor by the suction heads, and after the top forward edge of the carton is taken below the trigger, the spring loaded trigger repositions to lock the carton in the pocket. The completed operation wherein the carton is fully received with-

in the pocket is seen in Fig. 9, at which time the flapper plate 68 will be unseated from the aperture in the control valve 66 by engagement with the cam bar 50 in order to break the vacuum to the suction heads and allow the suction heads to continue downwardly away from the cartons and out of the conveyer path. After the conveyer has been advanced a step in order to move the expanded carton from below the magazine, the suction head will move upwardly again to engage a successive carton. Of course, suitable guide means will be provided in order to hold the cartons within the pocket and at a predetermined location.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention, but it is understood that this application is to be limited only by the scope of the appended claims.

The invention is hereby claimed as follows:

1. In a packaging machine, an upstanding magazine having front and back parallel guide walls adapted to receive therebetween a stack of cartons in flattened condition, said walls being slightly inclined from the vertical about a horizontal axis parallel to said front and back walls thereby inclining the stack of cartons and shifting the center of gravity accordingly, means extending inwardly from said back wall at the lower end thereof for supporting the back edge of the lowermost carton, an expander block extending downwardly and rearwardly from the lower edge of the front wall and having means for supporting the front edge of the lowermost carton, said back wall supporting means being spaced below said expander block supporting means, and vertically reciprocable means for engaging and removing one carton at a time from the magazine so that each carton moves along a line angularly related to the upright axis of the magazine and the front to back axis of the carton remains substantially normal to the upright axis of the magazine.

2. The packaging machine of claim 1, wherein said engaging and removing means comprises pneumatic gripping members.

3. The packaging machine of claim 1, wherein said

engaging and removing means comprises at least one resilient suction gripping head.

4. The packaging machine as defined in claim 3, wherein said gripping head is adjustably mounted for accommodating cartons of various sizes.

5. The packaging machine as defined in claim 4, and means for controlling suction supply to said suction head for selectively gripping a carton.

6. In a packaging machine having a supporting framework, an upstanding magazine adapted to hold a stack of cartons in flattened condition, a substantially U-shaped frame mounted on said supporting framework, said U-shaped frame including parallel spaced front and back bars and an end connecting gear between said front and back bars, said magazine including a back wall adjustably mounted on said back bar for lateral movement, a front wall parallel spaced from said back wall and adjustably connected to said front bar for movement toward or away from said back wall, an end wall adjustably mounted on said end bar for movement inward and away from said front and back walls, all of said walls being slightly inclined from the vertical and said front and back walls being inclined from the vertical about a horizontal axis parallel to said front and back walls, means extending inwardly from said back wall to support the rear edge of the lowermost carton, and an adjustable carton expander plate extending downwardly from said front wall and rearwardly toward said rear wall, said plate having a ledge at the end engaging said front wall for supporting the front edge of the lowermost carton, said back wall supporting means being spaced below said expander plate ledge, means for engaging and removing one carton at a time from the magazine so that each carton moves along a line angularly related to the upright axis of the magazine.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,956,483

October 18, 1960

Ellsworth A. Hartbauer

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 23, for "carton" read -- cartons --; column 2, line 7, for "cartons" read -- carton --; line 48, for "to", second occurrence, read -- so --; column 6, line 14, for "gear" read -- bar --.

Signed and sealed this 11th day of April 1961.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

ARTHUR W. CROCKER
Acting Commissioner of Patents