Sept. 20, 1966 F. DOLLHEIMER 3,273,471

APPARATUS FOR SETTING UP FOLDED CARTONS

Filed Jan. 21, 1964 4 Sheets-Sheet 1

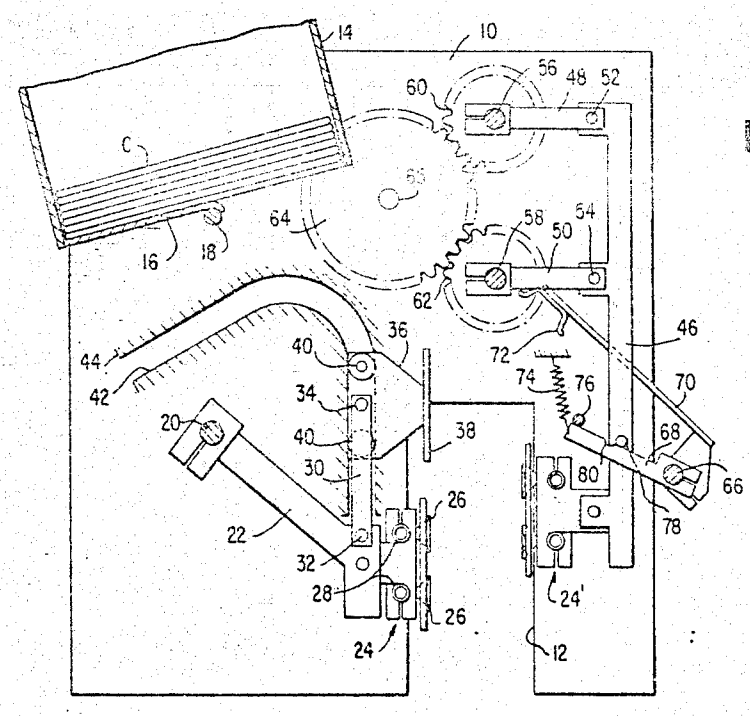


FIG. 1

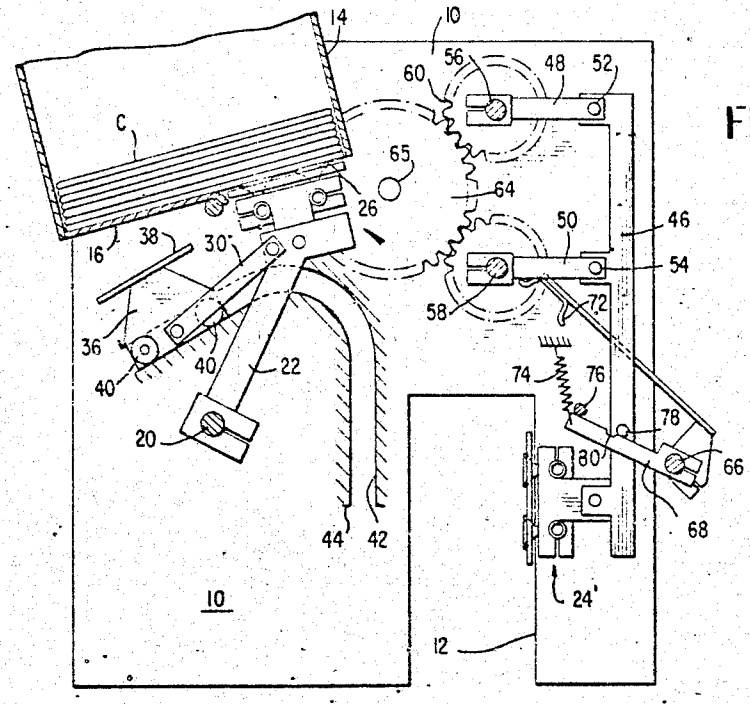


FIG. 2

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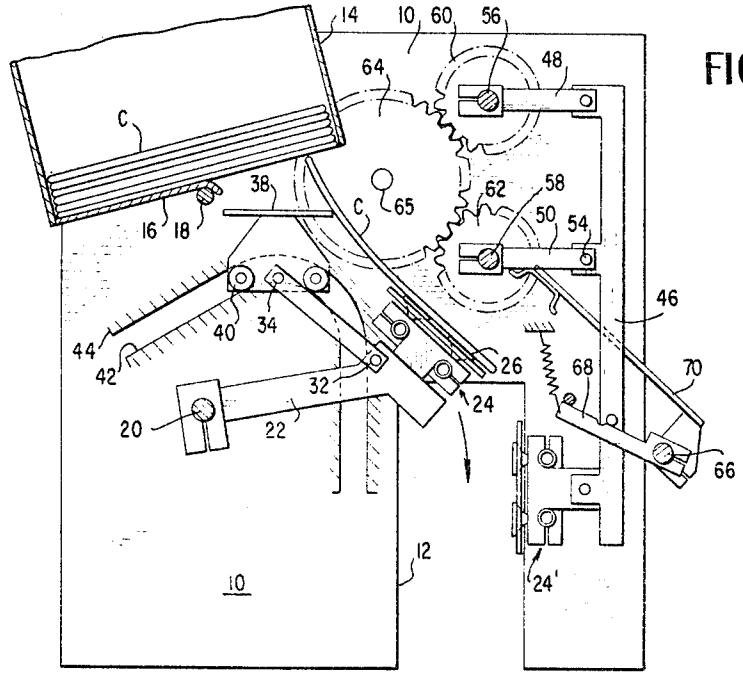


FIG. 3

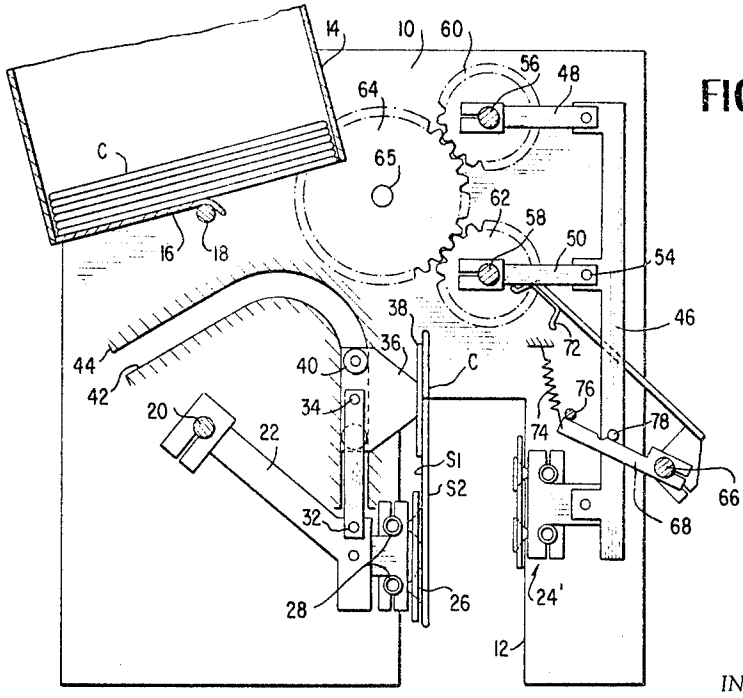


FIG. 4

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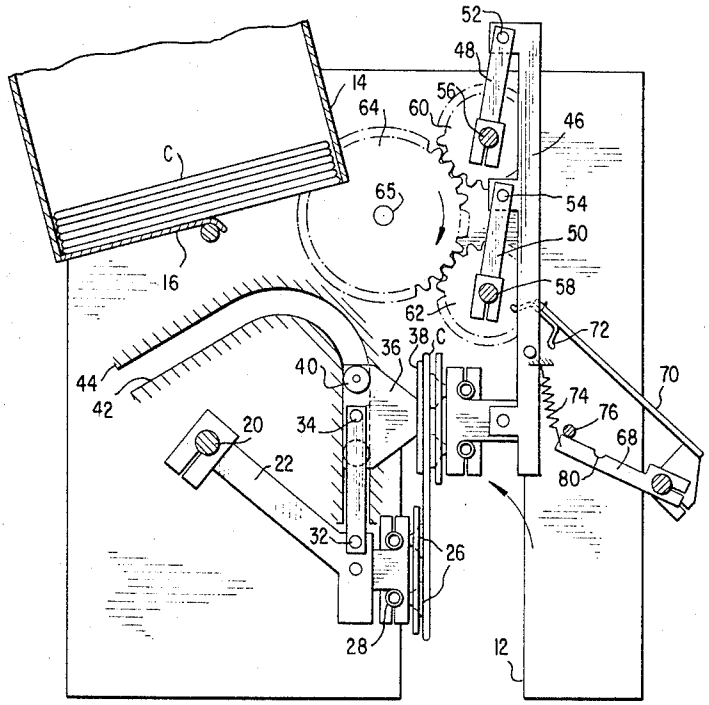


FIG. 5

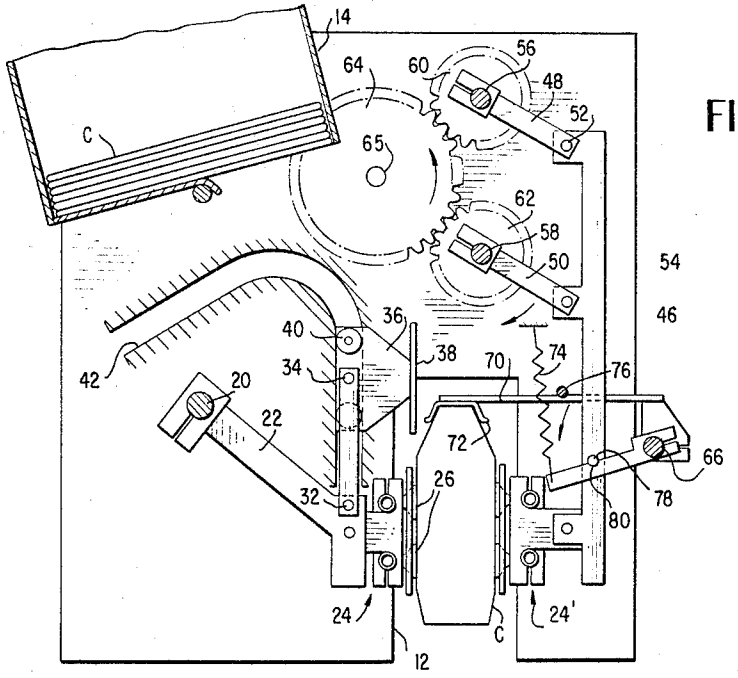


FIG. 6

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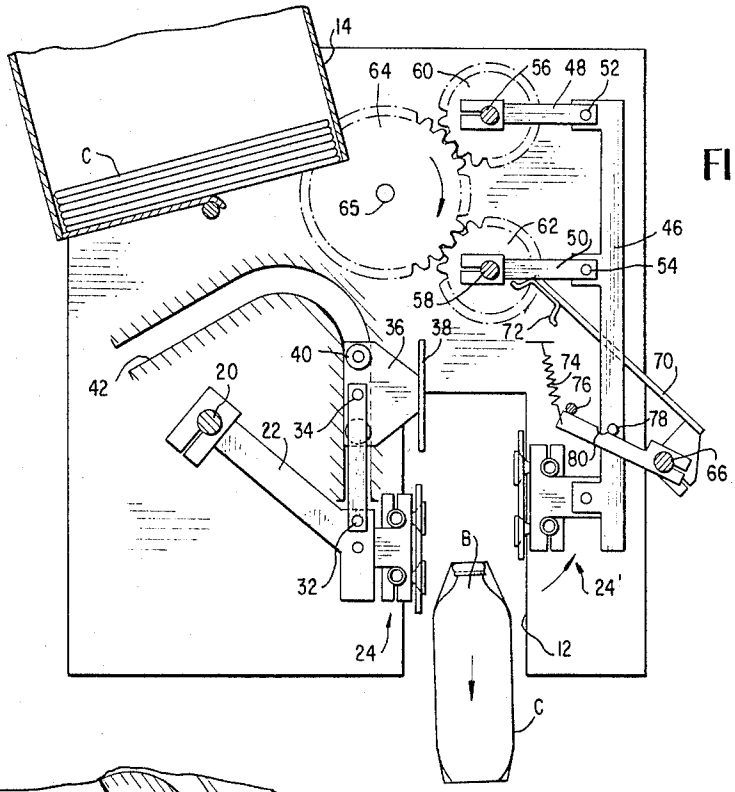


FIG. 7

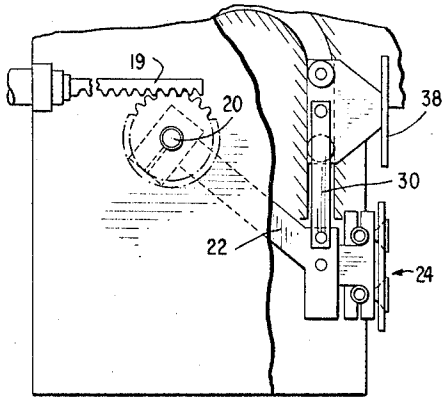


FIG. 8

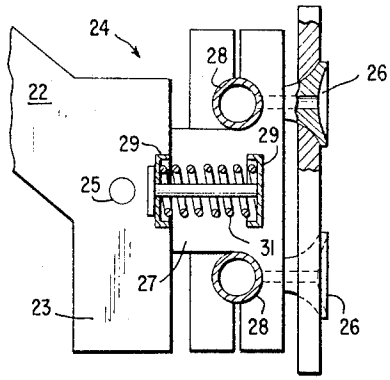


FIG. 9

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United States Patent Office 3,273,471 Patented Sept. 20, 1966

3,273,471

APPARATUS FOR SETTING UP FOLDED CARTONS

Franz Dollheimer, Valdosta, Ga., assignor to Owens-Illinois Glass Company, a corporation of Ohio

Filed Jan. 21, 1964, Ser. No. 339,291
6 Claims. (Cl. 93—53)

This invention relates to improvements in apparatus for setting up, or expanding cartons of paper board and the like from a folded or flattened condition and placing them in position to be loaded with articles. The invention is particularly concerned with packaging a plurality of canned or bottled articles in a convenient package, such as the type of package commonly referred to as "six-packs."

An object of this invention is to provide an efficient apparatus for erecting open-ended cartons from a flattened or collapsed condition to their final erect form for receiving articles.

Still another object is to provide improved apparatus for sequentially removing flattened cartons from a magazine containing a stack of the flattened cartons and transferring them to a loading station where the cartons are thereafter expanded to their erect form to be loaded with the articles.

A further object lies in the provision of apparatus for sequentially feeding individual flattened cartons from a magazine containing a stack of the collapsed cartons to a carton expanding and loading station, and thereafter expanding the cartons to their final erect form for receiving articles to be packaged in the cartons at an output rate commensurate with present day production requirement.

In achievement of the foregoing and other objects, a stack of the flattened cartons are placed in a magazine having a discharge end in which is exposed a portion of one side of the lowermost flattened carton. For successively removing the cartons from the magazine, a feed lever mounted at one end on a rotatable shaft carries a suction head on its free end, and rotates about the axis of the shaft between a feed position and a loading position. In the feed position, the suction head engages the exposed side of the flattened carton at the discharge end of the magazine adjacent one end of the carton and is carried by the lever to a carton expanding and loading station as the feed lever moves to its loading position. When the feed lever reaches it loading position with a carton supported on the suction head, a second suction head mounted on parallel links for movement parallel to the flattened carton is actuated to engage the opposite side of the flattened carton from the first suction head, and adjacent the opposite end of the flattened carton, and is thereafter actuated to move in parallel relation with the first suction head to a position in spaced, opposed relationship with the first suction head, which movement expands the carton.

Other features, objects and advantages will become apparent from the following description taken in connection with the accompanying drawings in which:

FIGS. 1 through 7 are elevational views with some of the parts shown in section, of apparatus embodying the invention and illustrating the position of the various parts in successive steps in the sequence of operation;

FIG. 8 is a detailed view schematically illustrating a drive arrangement for the feed lever; and

FIG. 9 is an enlarged sectional detailed view showing the internal construction of the suction heads.

With reference to FIGS. 1 through 7, reference numeral **10** designates a supporting partition or wall which is formed with a rectangular slot **12**. Slot **12** defines a carton expanding and loading station. Mounted adjacent the upper left corner of partition **10** on suitable supporting structure (not shown) is a hopper or magazine **14** containing a supply of flattened or folded cartons C. The

illustrated machine embodying the invention is particularly adapted to, although not limited to, the packaging of a single row of up to six cans or bottles within an open-ended, sleeve-like wrapper or carton C. The walls of the cartons are scored such that the shape of the erect carton or wrapper will conform generally to the outer contour of the bottles or cans. In FIG. 6, carton C is foldable into a collapsed form in which the inner surface of the bottom panel or wall as well as a portion of the right side panel lie against the inner surface of the left side panel. Accordingly, when the folded or collapsed carton is expanded, the bottom panel pivots approximately 90 degrees about the lower left-hand corner of the carton in a clockwise direction as viewed in FIG. 6.

The delivery end of magazine **14** is partially closed by a plate or panel member **16** supported at one end on a rod **18**. Consequently, the right end of the lower side of the bottom flattened carton C is exposed at the discharge end of the magazine.

For successively removing and transferring cartons from magazine **14** to the loading station defined at slot **12**, a feed lever **22** is mounted at one end on a rotatable shaft **20**, the axis of which extends perpendicularly to the plane defined by partition **10**. Lever **22** is caused to oscillate between a feed position illustrated in FIG. 2 in which the outer end of feed lever **22** is disposed adjacent the discharge end of the magazine, and a loading position as shown in FIGS. 1 and 4 through 7 in which the free end of lever **22** is disposed adjacent the loading station conventional means such as a rack and pinion **19** and **21**, respectively (FIG. 8). Cartons are removed from the magazine and supported at the loading station by means of a suction head **24** mounted on the end of feed lever **22**.

With reference to FIG. 9, suction head **24** is mounted on an extension **23** formed at the free, outer end of feed lever **22** by means of a pin **25** which extends through extension **23** and a leg portion **27** formed on suction head **24**. Pin **25** preferably engages a slot in leg **27** to permit limited relative movement between suction head **24** and feed lever **22**. Mounted on suction head **24** and extension member **23** are spring support brackets **29**, between which are mounted a suitable compression spring **31**. A flanged stem secured to bracket **29** on leg **27** and extending through an aperture in the bracket **29** on extension member **23** permits relative axial movement between suction head **24** and extension **23** to accommodate differences in the positions of the cartons and variations in the sizes of the bottles or cans to be loaded in the carton.

Suction head **24** is provided with a pair of suction cups **26** which communicate through connectors **28** with a source of vacuum pressure (not shown). Suction cups **26** may be metal, or rubber coated metal. Pivotally connected at one end of feed lever **22** by a pin **32** is a link **30**, the other end of which is pivotally connected by pin **34** with a carrier **36**. Carrier **36** supports a backing plate **38**, the outer surface of which is in alignment with the outer surfaces of suction cups **26** when feed lever **22** is in its loading position as shown in FIGS. 1 and 4 through 7. Carrier **36** is supported by rollers **40** in a cam track **42** formed in a plate member **44**, only a portion of which is shown. As feed lever **22** moves from its loading position of FIG. 1 to its feed position of FIG. 2, carrier **36** and backing plate **38** are moved to the opposite end of cam track **42** due to the connection of link **30** with the carrier and feed lever.

As shown sequentially in FIGS. 2, 3 and 4, when feed lever **22** moves from its loading position of FIG. 1 to the feed position of FIG. 2, suction cups **26** on suction head **24** engage the exposed portion of the bottom flattened carton C in magazine **14** and upon return movement of the feed lever **22** to the loading position, carton C is carried by the suction head to the position adjacent slot **12**,

and backing plate **38** supports the upper end of the flattened carton. Suction head **24** engages the left side of the flattened carton as shown in FIG. 4 near its lower end, and backing plate **38** supports the upper end of the same side of the carton.

When a flattened carton C is carried by suction head **24** to the loading station as shown in FIG. 4, a second suction head **24'** is operated to expand the carton. Suction head **24'** is identical in construction to suction head **24** and is mounted on the end of parallel bar **46**. Bar **46** is pivotally connected with the free ends of a pair of parallel links **48** and **50** by pins **52** and **54**, respectively. Parallel links **48** and **50** are secured at their other ends to a pair of parallel, rotatable shafts **56** and **58**, respectively, on which are mounted driven gears **60** and **62**, respectively. Gears **60** and **62** are meshed with an oscillating drive gear **64** mounted on a shaft **65**. Driven gears **60** and **62** are simultaneously operated by drive gear **64** which oscillates between two extreme positions as shown in FIGS. 5 and 6. In FIG. 5, drive gear **64** actuates links **48** and **50** to move parallel bar **46** inwardly toward backing plate **38** to cause suction head **24'** to engage the right side of the flattened carton adjacent the opposite end of the carton from that which is engaged by suction head **24**, with suction head **24'** in opposed relationship with backing plate **38**. Subsequent counterclockwise rotation of the drive gear **64** actuates links **48** and **50** to shift suction head **24'** into spaced, opposed relationship with suction head **24** as shown in FIG. 6. The latter movement causes carton C to expand due to the opposed forces of suction heads **24** and **24'**.

In the illustrated embodiment, the carton C, when expanded, assumes the form of an open-ended tubular sleeve or wrapper having spaced side panels, a bottom panel joining the lower ends of the side panels, and a top portion having inclined side portions joining the upper edges of the side panels. The latter shape of carton C is suitable for receiving bottles B as shown in FIG. 7, the final shape of the carton conforming generally to the outer contour of bottles B.

Fixedly mounted on a rotatable shaft **66** is an actuating arm **68** for a carton forming assembly including a carton top former **72** mounted on the end of a bar **70**. Bar **70** is also fixed to shaft **66**, and actuating arm **68** is resiliently biased into engagement with a stop pin **76** on partition **10** by a spring **74** mounted between the free end of arm **68** and an abutment on partition **10**. Oscillation of parallel bar **46** about the axes of shafts **56** and **58** is transmitted to operating arm **68** by means of a pin **78** projecting from bar **46** into the path of arm **68**. As parallel bar **46** moves from the position shown in FIG. 5 to expand the carton, pin **78** engages a notch **80** formed in arm **68** when suction head **24'** reaches the position of FIG. 6.

Rack **19** and shaft **65** of drive gear **64** are powered by suitable power mechanism (not shown) in timed sequence with respect to each other to carry out the operations of the machine.

With reference to FIG. 1, a stack of collapsed or flattened cartons C are placed in magazine **14**. When the power plant is started into operation, feed lever **22** is caused to rotate in a counterclockwise direction by shaft **20** from the position of FIG. 1 to the feed position shown in FIG. 2 where suction head **24** engages the lower or right end of the left or bottom side of the exposed flattened carton. Shaft **20** then rotates in a clockwise direction from the position of FIG. 2 as shown in FIGS. 3 and 4 to remove the flattened carton from the magazine, and during the travel of suction head **24** from the feed position of FIG. 2 to the loading position of FIG. 4, backing plate **38** moves into engagement with the upper or left end of the left or bottom side of the flattened carton to cooperate with suction head **24** in laterally supporting the carton at the loading station. As soon as feed lever **22** reaches the loading position of FIG. 4, drive gear **64** is rotated in a clockwise direction to cause gears **60** and **62** to rotate in a counterclockwise direction and

move parallel bar **46** inwardly causing suction head **24'** to engage the flattened carton opposite backing plate **38**. Subsequently, drive gear **64** is reversed to change the directions of parallel links **48** and **50** and carry bar **46** to the position shown in FIG. 6 where it is in opposed, spaced relationship with suction head **24**. The latter movement expands the carton to the configuration shown.

As bar **46** approaches the opening position, pin **78** causes bar **70** to rotate in a counterclockwise direction and bring carton former **72** into engagement with the inclined and top portions of the upper panel of the carton to steady and center the upper panel with respect to the side panels. When the carton takes the position shown in FIG. 6, a plurality of bottles B or other articles are inserted into the open-ended carton after which the suction is released from suction heads **24** and **24'** and the filled carton C is dropped onto a take-off conveyer or the like (not shown) beneath the loading station. Simultaneously, drive gear **64** rotates in a clockwise direction to return bar **46** to its position shown in FIGS. 1 and 7, and the operation is then repeated.

While I have described and illustrated one embodiment of my invention, I wish it understood that I do not intend to be restricted solely thereto, but that I do intend to cover all modifications thereof which would be apparent to one skilled in the art and which come within the scope and spirit of this invention.

What is claimed is:

1. In packaging apparatus having a magazine for containing a stack of flattened cartons each expandable to form an open-minded, sleeve-like wrapper having a pair of spaced, parallel side panels joined at their upper and lower ends by top and bottom panels, respectively;

a first suction head movable between a feed position to engage the flattened carton at the discharge end of the magazine adjacent the lower end of one of the side panels, and a loading position in which it supports the carton at a carton expanding and loading station,

a second suction head mounted for parallel, oscillating movement relative to the position of the first suction head in its loading position between a first position in which it engages the other side panel of the carton adjacent its upper end, and a second position in which it is disposed in spaced, opposed relationship relative to the first suction head,

said first suction head remaining stationary in its loading position during movement of the second suction head from its first to second positions to thereby expand the carton.

2. In packaging apparatus having a magazine for containing a stack of flattened, open-ended cartons,

means defining a carton expanding and loading station,

mechanism for sequentially removing and transferring the flattened cartons from the magazine to the loading station and thereafter expanding the flattened cartons to their erect positions, said mechanism comprising;

a feed lever rotatable between a feed position in which one end thereof is disposed adjacent the discharge end of the magazine, and a loading position in which said one end is disposed adjacent the carton expanding and loading station,

a first suction head mounted on said one end of said feed lever for engaging one side of a collapsed carton near one end thereof at the discharge end of the magazine when the feed lever is in the feed position, and thereafter transferring said collapsed carton to said carton expanding and loading station upon movement of the feed lever from its feed position to its loading position,

a pair of parallel links rotatable about fixed, parallel axes at one of their ends between first and second positions,

and a second suction head carried by the other end of said parallel links for engaging the collapsed carton

at the loading station on the opposite side of the carton from said first suction head adjacent the opposite end thereof when said parallel links are in their first position, and operative thereafter to move into spaced, opposed relationship relative to said first suction head to expand the collapsed carton as said parallel links move from said first to second positions.

3. In packaging apparatus having a magazine for containing a stack of flattened open-ended cartons,

means defining a carton expanding and loading station,

mechanism for sequentially removing and transferring collapsed cartons from the magazine to the carton expanding and loading station and thereafter expanding the cartons, said mechanism comprising;

a feed lever rotatable between a feed position in which one end thereof is disposed adjacent the magazine, and a loading position in which said one end is disposed adjacent a carton expanding and loading station,

a first suction head carried by said one end of said feed lever for engaging one side of the collapsed carton at the discharge end of the magazine when the feed lever is in its feed position, and thereafter transferring the collapsed carton to the carton expanding and loading station as the feed lever moves from its feed position to its loading position,

a backing plate pivotally connected with said one end of the feed lever for movement between an inoperative position when the feed lever is in its feed position to an operative position in which it supports said one side of the carton adjacent its other end in cooperation with the first suction head when the feed lever is in its loading position,

a pair of parallel links mounted for rotation about parallel axes at one of their ends between first and second positions,

a bar pivotally connected with the other ends of said parallel links,

a second suction head carried by said bar for engaging the other side of the collapsed carton opposite the backing plate when said parallel links are in their first position, and thereafter movable into spaced, opposed relationship with said first suction head as the parallel links move from their first to second positions to expand the carton.

4. The construction defined in claim 3 further including;

a carton top former operable in response to movement of said bar from said first to second positions to engage and support the top panel of the expanded carton at the loading station.

5. In packaging apparatus,

a magazine for containing a stack of flattened, open-ended cartons,

a partition having an elongated slot formed therein,

mechanism for successively removing and transferring flattened cartons from the magazine to the slot and thereafter expanding the collapsed carton, said mechanism comprising;

a first suction head mounted for oscillation between a first position in which it engages one side of the flattened carton at the discharge end of the magazine end thereof, and a second position at which said suction head is exposed at one side of said elongated slot to position the flattened carton adjacent said one side of the slot,

a backing plate carried by said first suction head for engaging said one side of the flattened carton adjacent its other end,

a second suction head mounted for parallel, oscillating movement relative to said first suction head when said first suction head is in its second position between a first position in which it engages the other side of the flattened carton opposite the backing plate and thereafter moves to a second position in opposed spaced relationship relative to said first suction head to expand the carton.

6. In packaging apparatus having a magazine for containing a stack of flattened cartons each expandable to form an open-ended, sleeve-like wrapper having a pair of spaced, parallel side panels joined at their lower ends by a bottom panel and joined at their upper ends by a top panel having inclined portions extending from the upper edges of the side panels,

a first suction head movable between a feed position to engage the flattened carton at the discharge end of the magazine adjacent the lower end of one of the side panels, and a loading position in which it supports the carton at a carton expanding and loading station,

a second suction head mounted for parallel, oscillating movement relative to the position of the first suction head in its loading position between a first position in which it engages the other side panel of the carton adjacent its upper end, and a second position in which it is disposed in spaced, opposed relationship relative to the first suction head,

said first suction head remaining stationary in its loading position during movement of the second suction head from its first to second position to thereby expand the carton,

and a carton top forming assembly including;

a rotatable shaft disposed perpendicularly with respect to the plane of movement of said suction heads,

an actuating arm fixed to said rotatable shaft and engageable by said second suction head as it moves from its first to second positions to cause rotation of said shaft,

and a top former mounted on said rotatable shaft for movement into engagement with the top panel of the carton to receive the inclined portions thereof upon movement of the second suction head from its first to second position.

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BERNARD STICKNEY, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,273,471 September 20, 1966

Franz Dollheimer

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

Column 4, line 31, for "open-minded" read--- open-ended

Signed and sealed this 26th day of September 1967.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents