United States Patent [19]

Pearson, deceased

[11] **3,739,696**

[45] **June 19, 1973**

[54] **CARTON DELIVERY AND EXPANDING APPARATUS**

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[22] Filed: **Apr. 21, 1972**

[21] Appl. No.: **246,256**

[52] **U.S. Cl.** ..... **93/53 SD,** 93/53 R
[51] **Int. Cl.** **B31b 1/76,** B31b 5/02
[58] **Field of Search** ..... 93/53 R, 53 SD, 53 M, 93/53 BF, 55, 39 R, 49 R

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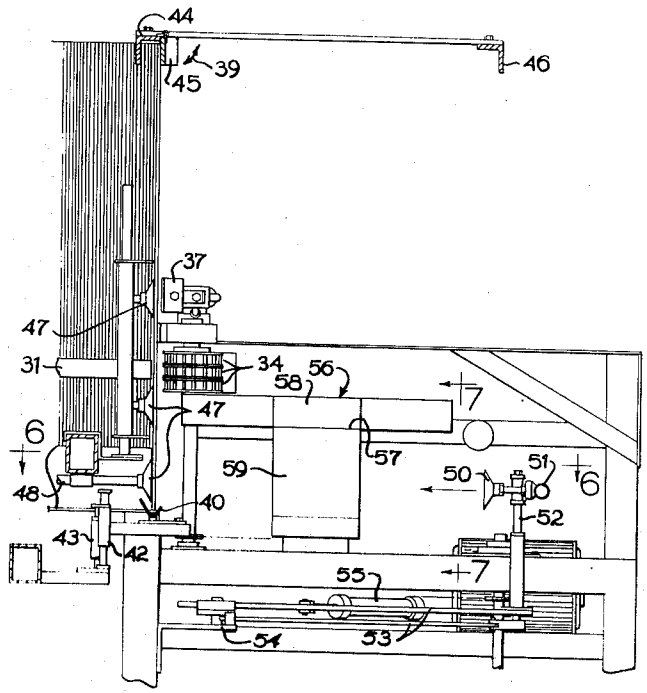
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Primary Examiner—Andrew R. Juhasz
Assistant Examiner—James F. Coan
Attorney—Wells, St. John and Roberts

[57] **ABSTRACT**

An apparatus for setting up cartons, including a magazine that holds a horizontal stack of vertically oriented collapsed cartons. A receiving station accepts the cartons as they are fed thereto from the magazine by a moving conveyor lug and pushing bracket. Stationary vacuum cups and cooperative moving vacuum cups engage opposed panels of each carton and expand it to a rectangular open configuration laterally adjacent to the receiving station. A vertically moveable trough initially receives the collapsed carton at the receiving station and is subsequently moved downwardly clear of the carton prior to expansion. The lower rear flap of each carton is engaged by an inclined pushing element upon carton expansion, and the carton is subsequently pushed forwardly as the rear flap and a subsequently engaged front flap are bent to horizontal positions inward of the carton. Each carton is subsequently received between moving belt flights and carried through guide rods that fold the side flaps. The cartons are delivered to a horizontal receiving table where a vertical mandrel exerts pressure on the bottom flaps to secure an adhesive bond between them.

15 Claims, 12 Drawing Figures



6 Sheets-Sheet 1

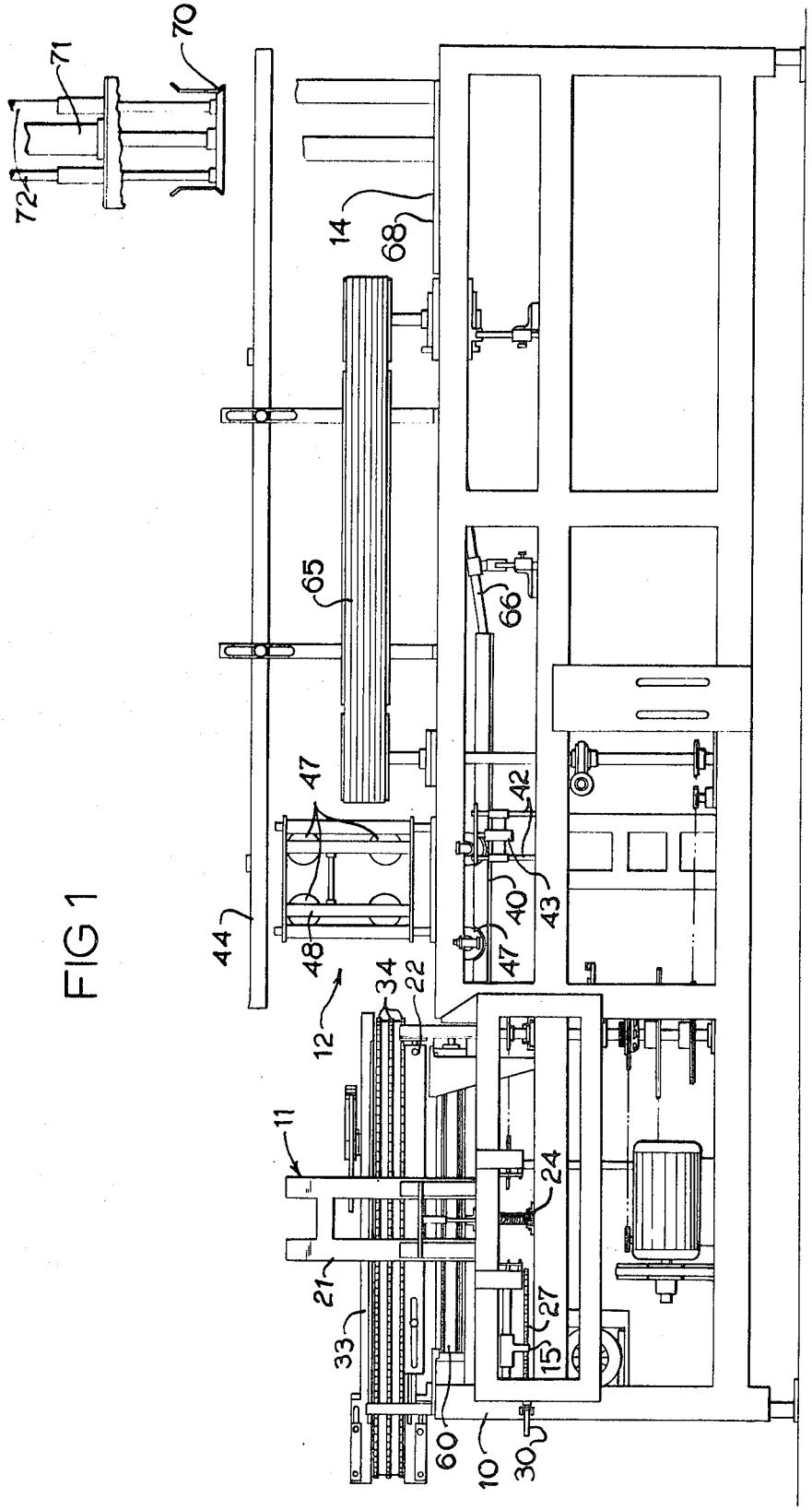


FIG 1

FIG 2

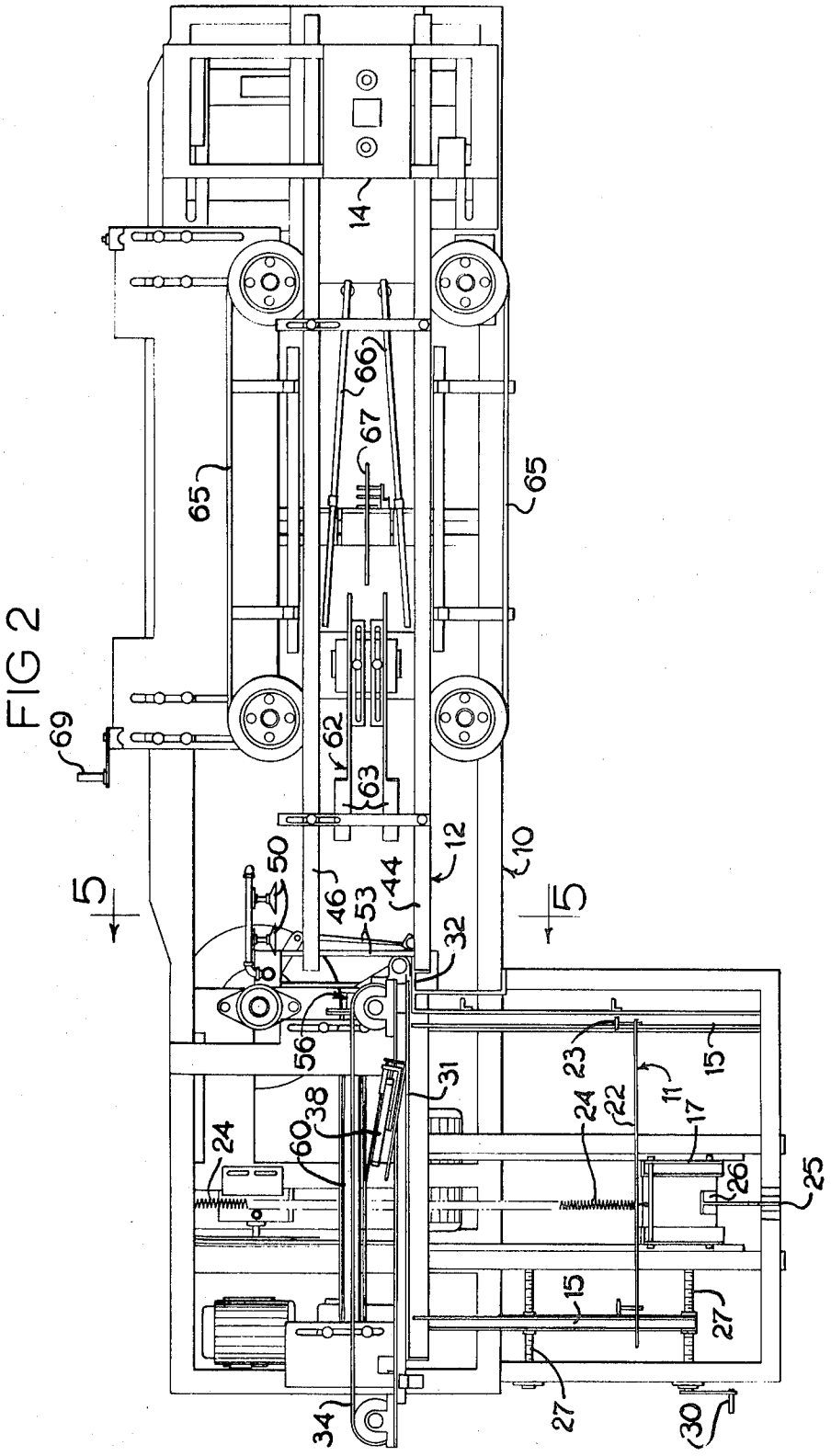

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FIG 3

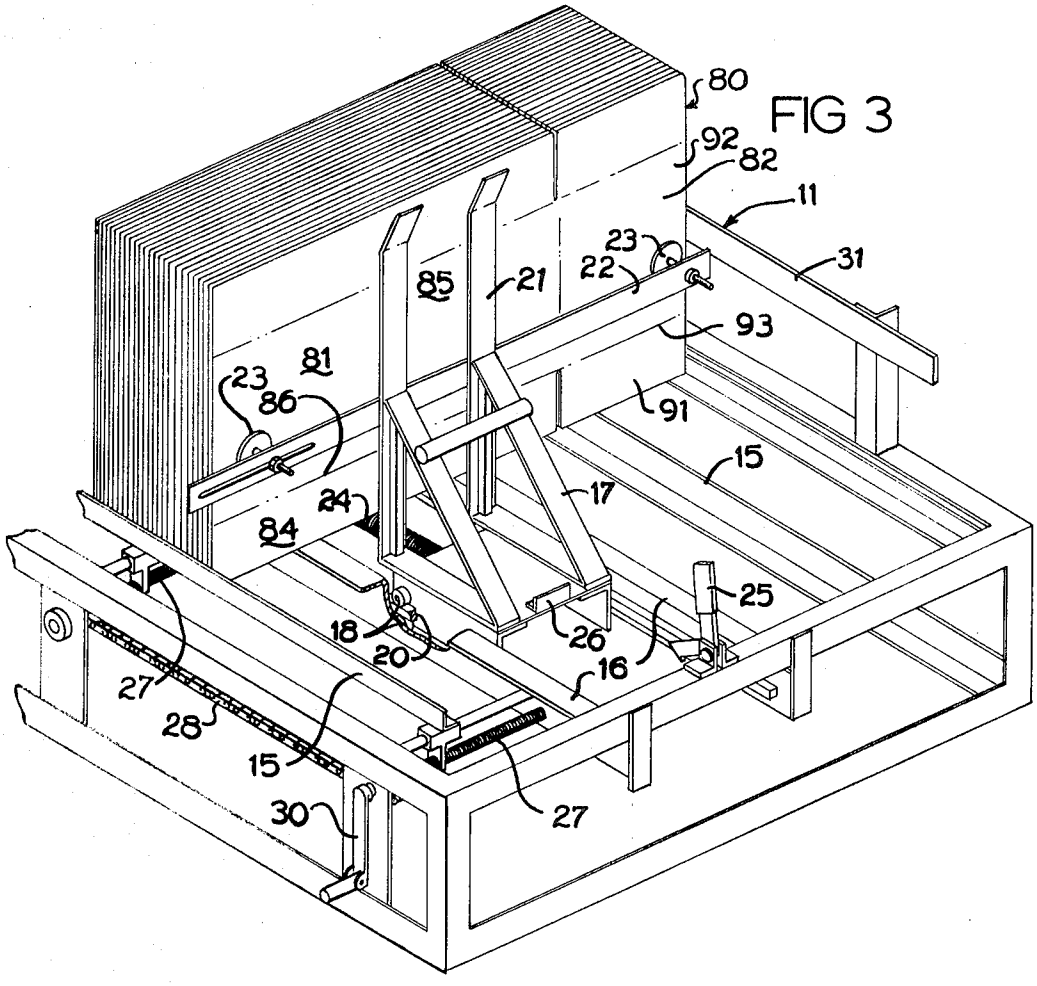
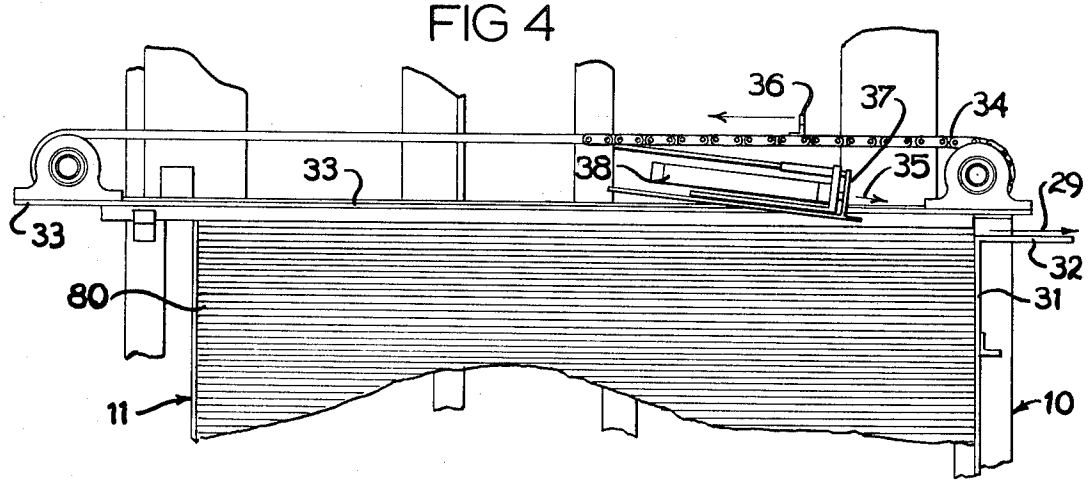

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FIG 4


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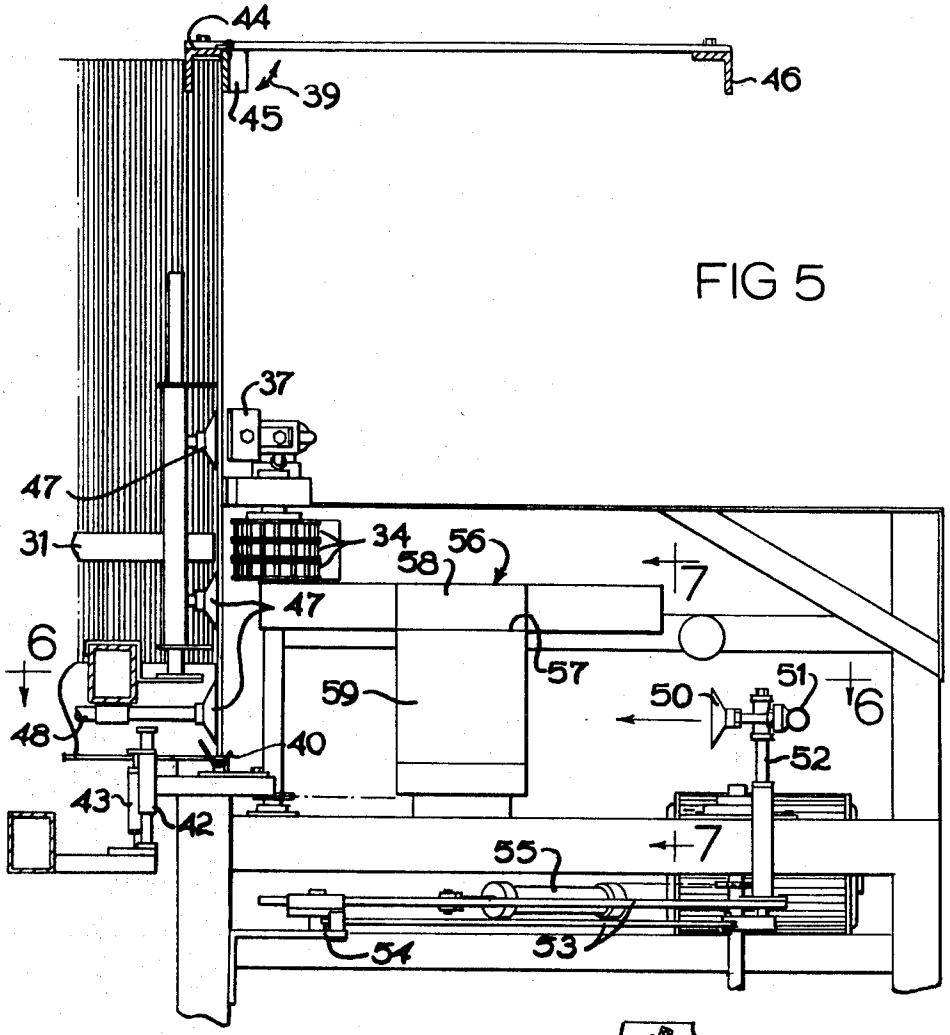

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FIG 5

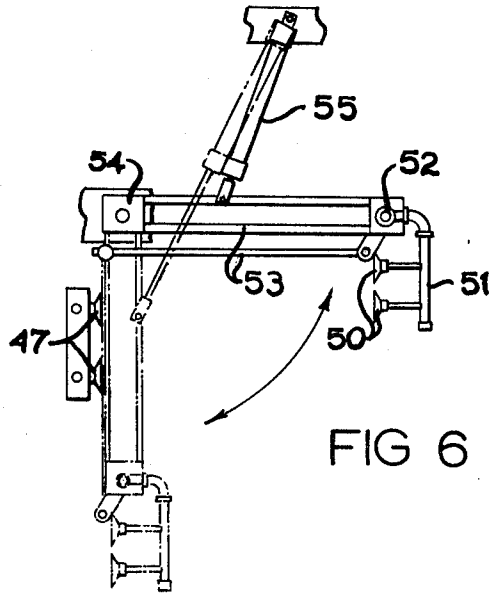
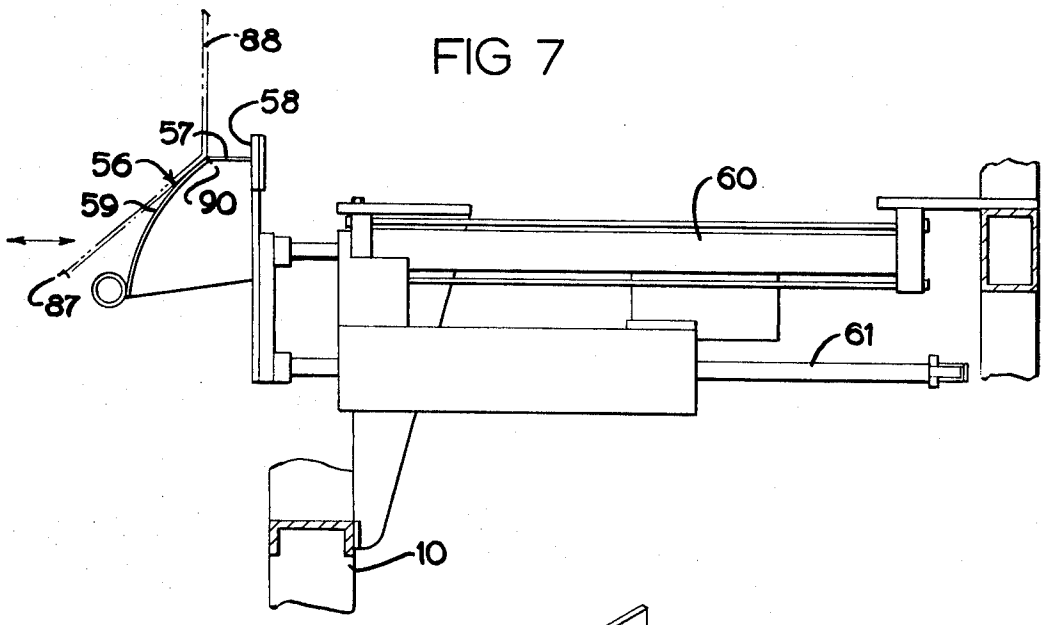

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FIG 6

FIG 7



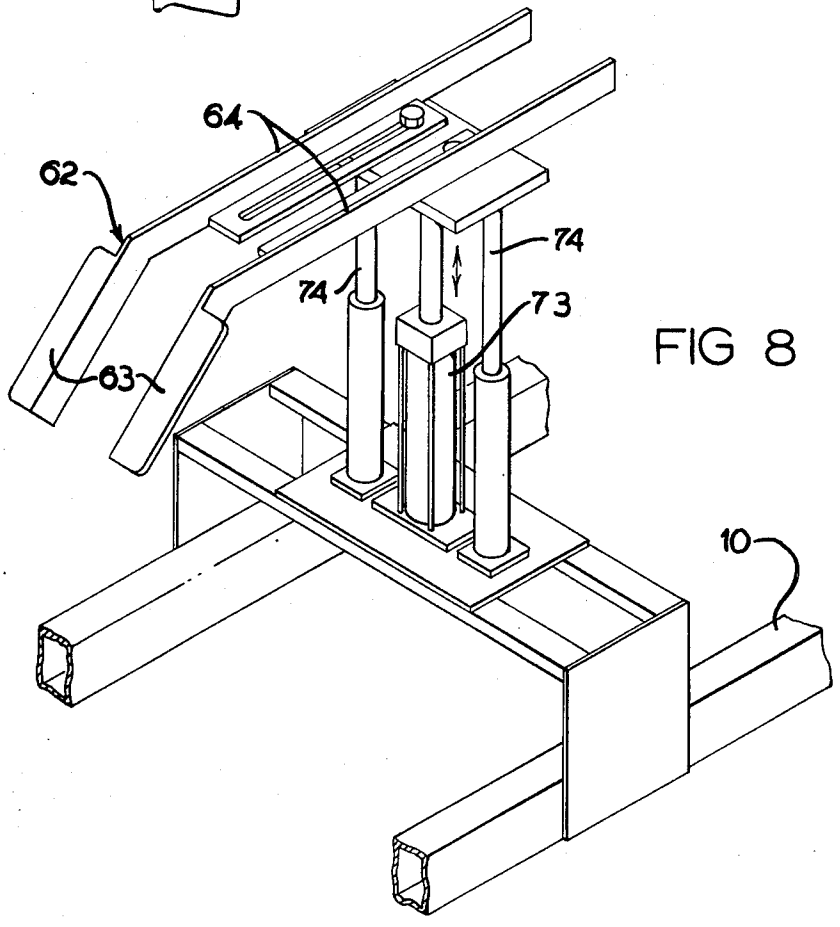


FIG 8

FIG 9

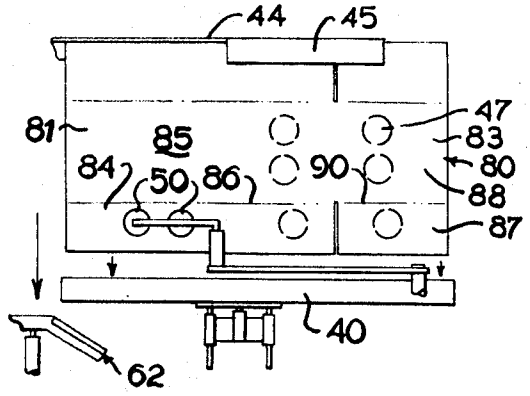


FIG 10

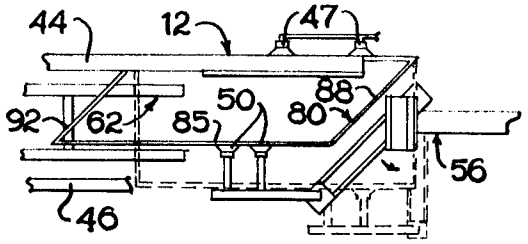


FIG 11

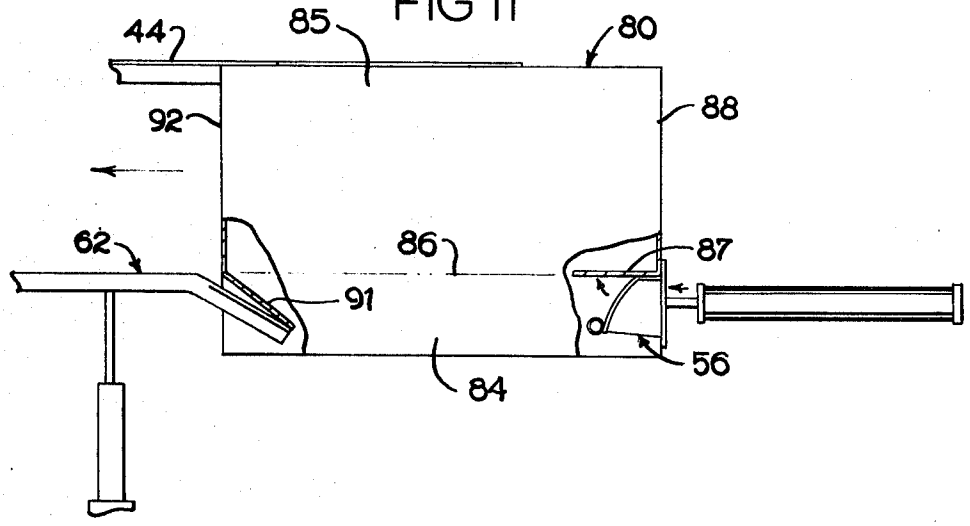
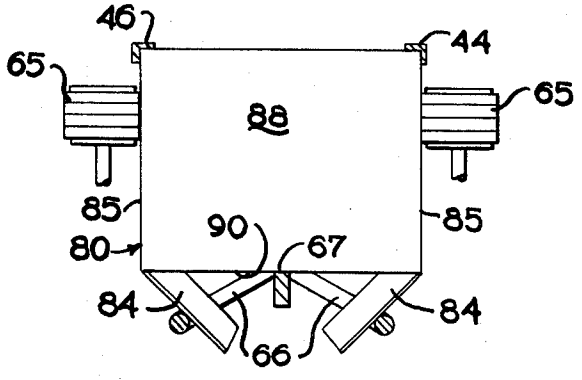


FIG 12



CARTON DELIVERY AND EXPANDING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates basically to the field of machinery for setting up corrugated cartons. It is concerned with a relatively simple apparatus for folding and sealing the bottom flaps of cartons. To provide a compact and economical folding apparatus, the flaps are partially folded in the vicinity at which each carton is expanded, and the folding of the flaps is continued during delivery of each expanded carton to a sealing mandrel. The apparatus eliminates the need for a carton to be maintained at a stationary position during several folding operations, which slows such a machine, and furthermore reduces the number of stations along the machinery so that each carton needs only to be stopped twice during travel between its collapsed condition and the sealing of its bottom flaps.

SUMMARY OF THE INVENTION

The invention basically relates to the apparatus disclosed herein for feeding and folding the carton elements. It is directed to the use of a horizontal receiving trough that is elevationally moveable to clear the lower edges of a collapsed carton after a carton panel is gripped for expansion purposes. Vacuum means is used to bend and expand the carton to a rectangular configuration while subsequently initiating the folding of the carton lower flaps. The lower rear flap folding device is used also to push the carton forwardly into engagement between opposed belt flights for further manipulation. A lower front flap folding surface is movably mounted on the framework to move clear of an expanding carton while being alternately positionable in the path of the lower front flap of an expanded carton during pushing movement caused by said rear flap folding device.

It is a first object of this invention to provide an economical and practical apparatus for folding the flaps of a corrugated carton from an upright magazine position without requiring subsequent turning of the carton prior to sealing of the bottom flaps.

Another object of this invention is to provide such equipment which is adaptable to a horizontal magazine to minimize the height requirements at the storage end of the machine.

Another object of the invention is to minimize the longitudinal length requirements of the machinery by integrating the flap folding components at locations in the area at which the collapsed carton is initially placed in the machine and along the conveyor devices which propel an expanded carton to a bottom sealing mandrel.

These and further objects will be evident from the following disclosure, taken together with the accompanying drawings which illustrate one embodiment of the invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of the complete machine for setting up cartons;

FIG. 2 is a top view of the machine shown in FIG. 1;

FIG. 3 is a perspective view of the magazine for holding collapsed cartons;

FIG. 4 is a top view of the collapsed carton feed apparatus;

FIG. 5 is an enlarged cross-sectional view looking along line 5—5 in FIG. 2;

FIG. 6 is a fragmentary top view looking downward on the vacuum cup assemblies substantially along line 6—6 in FIG. 5, the carton engaging positions of the moveable vacuum cup apparatus being shown in dashed lines;

FIG. 7 is an enlarged elevational view taken alongside the lower rear flap pushing apparatus as seen along line 7—7 in FIG. 5;

FIG. 8 is a perspective view looking toward the lower front flap folding apparatus;

FIGS. 9–12 are a series of schematic views illustrating operation of the carton expanding and flap folding devices;

FIG. 9 is a schematic view showing engagement of a collapsed carton in elevation;

FIG. 10 is a schematic view showing expansion of a carton in a plan view;

FIG. 11 is an elevational schematic view illustrating the folding of the lower rear and front flaps of an expanded carton; and

FIG. 12 is a transverse elevational schematic view showing the inward folding of the lower carton side flaps.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. 1–8 illustrate the essential details of the present machinery. FIGS. 9–12 schematically illustrate the specific functions accomplished by the apparatus disclosed herein. Conventional devices, such as control switches, motors, drive units, pumps and pneumatic devices are generally illustrated but not described in detail. Their selection and specific application are believed to be clear from the general disclosure.

The present machinery is concerned with the setting up, folding and sealing of a rectangular cardboard carton **80**, which is manufactured, shipped and stored in the collapsed configuration shown in FIG. 3. Each carton comprises essentially identical side panels **81** and joining front and rear panels **82, 83.** The side panels each include a carton side wall **85** and integral lower side flaps **84**, which join the lower edge of the respective side walls **85** along a scored line **86.** The flaps **84** are coplanar with side walls **85** and are adapted to be folded inwardly toward the interior of the expanded carton. Rear panel **83** includes a lower rear flap **87** formed integrally with a rear carton wall **88** and adapted to be folded along a scored line **90.** Front panel **82** includes a lower front flap **91** joined to a front carton wall **92** along a scored line **93.** The scored lines **86, 90** and **93** are coplanar. The outer or lower edges of the respective flaps **84, 87** and **91** are also coplanar with one another. The cartons **80** further include upper carton flaps at the opposite sides of the respective carton walls, but their presence is immaterial to the present disclosure, as they remain coplanar with the carton walls throughout operation of the present equipment.

The operations with which this disclosure is concerned involve the expansion of each carton to an open rectangular configuration, with the respective side panels **81** parallel to one another and defining right angles relative to the front and rear panels **82, 83.** Following carton expansion the front and rear lower flaps **91, 87** are folded inwardly to positions perpendicular to the carton walls, and the lower side flaps **84** are then folded

inwardly over the front and rear flaps. Finally, pressure is applied against opposite surfaces of the folded lower flaps to seal them to one another by use of conventional adhesives.

The present machinery is located along a supporting structural framework generally indicated at **10.** The machinery elements include a carton magazine **11** which holds a horizontal stack of collapsed cartons and feeds them singly in a longitudinal path along framework **10** to a carton receiving station **12.** Each collapsed carton is located at a fixed position at the carton receiving station **12** in a vertical orientation. The carton panels are gripped and moved relative to one another to bend the carton to an expanded position laterally adjacent the carton station **12.** As each carton leaves the carton receiving station, the lower carton flaps are folded inwardly in a progression. Each carton is moved longitudinally to a flap sealing station **14** at which pressure is applied to the inner and outer lower flap surfaces to secure an adhesive bond between the respective lower flaps.

The collapsed carton storage magazine **11** is best understood from the perspective view afforded in FIG. **3.** A horizontal stack of collapsed cartons **80** is elevationally guided between the inner surfaces of elongated transverse corner guides **15.** The lower edges of the cartons are further supported by intermediate elongated transverse guide rails **16.** The outermost carton is engaged by a transversely moveable carriage **17** supported by rollers **18** that engage transverse guide bars **20.** The carriage **17** includes an upright frame **21** that carries a forward cross member **22** with projecting adjustable pads **23** that abut the outer carton surfaces and urge them inwardly across the left hand end of the machine as viewed in FIGS. **1** and **2.** A tension spring **24** is connected between carriage **17** and framework **10** to yieldably urge the carriage against the stack of cartons. A manually operable latch **25** is provided on framework **10** to selectively lock carriage **17** in a fully open condition for reception of incoming cartons. Latch **25** cooperatively engages an upstanding bracket **26** on carriage **17.**

The present apparatus is adjustable for cartons of differing dimensions. In the magazine **11,** differing widths of collapsed cartons are accommodated by moving the left hand corner guide **15.** Threaded adjustment shafts **27** engage guide **15** and movement is effected through a manual crank **30** and motion transmitting chain **28.**

The carriage **17** pushes the stack of parallel collapsed cartons **80** alongside a forward transverse guide wall **31** presented on framework **10.** The innermost carton **80** abuts an upstanding longitudinal conveyor frame **33** on framework **10.** The inner corner bracket **32** (FIG. **4**) at the inner end of wall **31** provides a gap between the longitudinal conveyor frame **33** and wall **31** through which a single collapsed carton can pass in a longitudinal direction as indicated by arrow **29** in FIG. **4.** This movement is accomplished by endless conveyor chains **34** which carry an upright lug **36.** The forwardly moving flights of chains **34** is recessed slightly along conveyor frame **33.** Lug **36** projects outward from the surface of frame **33** a distance sufficient to insure engagement of the rear edge of one collapsed carton during each pass of lug **36** along the operative flight of chains **34.**

The individual cartons **80** are moved longitudinally from magazine **11** to the carton receiving station **12,** which can be best understood from FIGS. **1** and **5.** The carton receiving station basically comprises an upwardly facing open trough **40** together with a vertically spaced longitudinal upper corner guide **44** and a cooperative longitudinal guide flap **45.** Each incoming carton is elevationally located by trough **40** and held in a fixed position thereon while maintained in a vertical orientation.

To insure accurate longitudinal placement of each carton, a moveable pushing bracket **37** is mounted on the conveyor frame **33** (FIG. **4**). Bracket **37** is longitudinally powered in the direction shown by arrow **35** by a cylinder assembly **38** to abut the rear edge of each collapsed carton and move it forwardly in a timed relation to the movement afforded by lug **36.** Bracket **37** pushes the rear edge of the carton forward and clear of the moving lug **36** to enable lug **36** to clear the carton for movement along the return flights of chains **34.** Bracket **37,** because of its defined longitudinal stroke, insures that each carton will be located along trough **40** at an identical fixed position for further manipulation.

Trough **40** is vertically moveable relative to framework **10.** Its carton receiving position is illustrated in FIG. **5.** Trough **40** is carried by vertical guide posts **42** journalled within bearing sleeves fixed to framework **10.** The trough **40** can be recessed elevationally from the position shown in FIG. **5** by operation of a pneumatic cylinder assembly **43.**

The longitudinal inner corner guide **44,** which extends along framework **10,** has inwardly and downwardly facing guide surfaces for slidably engaging the upper edge of each carton and the outer carton panel surfaces to maintain the desired vertical orientation of each collapsed carton along framework **10.** A short longitudinal flap **45** is pivotally mounted along the carton receiving station **12** to prevent inward tipping of a vertically positioned carton prior to its expansion. Flap **44** is pivotally connected along a longitudinal axis for free movement as indicated by arrow **39** (FIG. **5**). This pivotal movement permits horizontal expansion of the carton without damage to the upper carton edges or flaps. A second longitudinal corner guide **46** is spaced across framework **10** from guide **44,** and is adapted to engage the upper carton surfaces of each carton **80** after expansion thereof at the carton receiving station **12.**

Each incoming collapsed carton is initially gripped by a set of stationary vacuum cups **47** seen in FIGS. **1** and **5.** The vacuum cups **47** are arranged vertically above trough **40** and are longitudinally positioned so as to grasp the outer surfaces of the outwardly-facing side panel **81** of each carton **80** when located at the carton fixed position along trough **40.** To prevent undesired folding or bending of the side flaps **84,** it is preferrable that at least one set of vacuum cups **47** be elevationally positioned immediately adjacent to trough **40** so as to insure that the side flap **84** maintains its coplanar relation to the remainder of the engaged side panel **81.** The vacuum cups **47** are shown in the drawing as being supported by connecting vacuum conduits **48,** which are in communication with a vacuum pump or other suitable source of vacuum pressure through an intermediate control capable of selectively exhausting the vacuum pressure to relieve the gripping action at the inwardly facing cups **47.**

The vertically moveable trough **40** can be elevationally recessed to clear the lower edge of each carton

after the carton is gripped by action of the vacuum cups **47.** In this manner, the lower edges of the carton are clear for the horizontal movement necessary to expand the carton to its desired configuration. Such horizontal expansion is accomplished by moveable vacuum cups **50** carried on supporting vacuum conduits **51** arranged in a frame pivoted about an upright support post **52.** The angular position of the vacuum cups **50** about the axis of post **52** is controlled by horizontal parallel arms **53** which present a parallelogram assembly mounted on a base pivot bracket **54** movably pivoted on framework **10.** The action of arms **53** maintains the parallel relationship of vacuum cups **50** to keep them in positions facing oppositely to vacuum cups **47.** Vacuum cups **50** are longitudinally located so as to engage the inwardly facing side panel **81** of each collapsed carton while at its fixed position at the carton receiving station **12.** The illustrated vacuum cups **50** are also adapted to engage the lower side flap **84** opposite to that engaged by vacuum cups **47.** Again, the lower flaps are engaged to insure that they do not move inwardly during carton expansion. As can be seen in FIG. **6,** the movement afforded to vacuum cups **50** through the pneumatic cylinder assembly **55** is such as to expand the carton **80** to a rectangular open configuration with the respective carton side panels parallel and opposed to one another. The inward movement of the upper carton edges is not restrained by the upper guides since flap **45** is freely movable upward to a horizontal position resting lightly on the upper surfaces of the expanded carton. When expanded, the upper portion of the carton spans the separation between the vertically and laterally adjustable corner guides **44, 46** which prevent later upward elevational movement of the expanded carton.

To provide a longitudinally compact machine, the flap folding devices are integrated along framework **10** together with the expansion arrangement discussed above.

As each carton is expanded by movement of vacuum cups **50,** its lower rear flap **87** engages a reciprocating rear flap folding member **56.** The member **56** includes a curved forwardly facing surface **59** that merges upwardly and rearwardly with a horizontal ledge **57.** The upper face of ledge **57** is coplanar with the scored lines **86, 90, 93** of each carton at the carton receiving station **12** along framework **10.** An upright or vertical shoulder **58** protrudes from ledge **57** and serves as a pushing element intersecting the location of the rear wall **88** and lower rear flap **87** of an expanded carton. The member **56** is reciprocated longitudinally by means of a horizontal pneumatic cylinder assembly **60** and is longitudinally guided by a sliding rod **61** journalled by a bearing on framework **10.**

Forwardly adjacent to the carton receiving station **12** is a front flap folding element **62,** having forwardly and upwardly inclined surfaces **63** meeting two extended horizontal ledges **64.** The element **62,** best seen in FIG. **8,** is vertically moveable by means of an upright cylinder assembly **73** and is guided by vertical sliding rods **74.**

To reduce the length of the apparatus, the front flap folding element **62** is mounted to framework **10** so as to be retracted elevationally below the pivotal path of the lower flaps of each carton **80** while being bent by operation of the supporting structure for vacuum cups **50.** After the carton flaps have passed over element **62,** it is raised to an operative position wherein the horizontal ledges **64** are also coplanar with the scored lines **86, 90, 93.** The front lower flap **91** of the expanded carton then engages the inclined surfaces **63** when element **62** is raised, the folding of flap **91** being completed upon movement of the carton.

The cooperative placement of the rear and front flap folding elements **56, 62** provides vertical support for the lower surfaces of each expanded carton **80** laterally adjacent the carton receiving station **12** and permits release of vacuum pressure at the vacuum cups **47, 50.** The expanded carton is restricted against elevational movement by the surfaces of members of **56, 62,** as well as by the longitudinal guides **44, 46.**

Forward movement of member **56** brings the shoulder **58** into contact with the carton rear wall **88** and pushes the expanded carton forwardly along framework **10.** This forward movement completes folding of the carton lower front flap **91,** which rides over surfaces **63, 64.** The forward extension of member **56** overlaps the length of member **62,** surfaces **63, 64** being formed of laterally spaced elements between which the surface **59** and ledge **57** can be freely received.

The forward movement imparted to each carton by operation of member **56** brings the carton side walls **85** into engagement between laterally spaced longitudinal belt flights **65** which grip the carton and carry it forwardly. The lateral spacing of flights **65** is adjustable through a crank **69.** The resulting forward movement causes the carton lower side flaps **84** to engage upwardly and forwardly converging rods **66,** which progressively fold the respective side flaps **84** inwardly to a horizontal position overlapping the previously folded rear and front flaps **87, 91.** A center horizontal ledge **67** (FIG. **2**) is fixed on framework **10** immediately forward of the member **62** in order to prevent undesired unfolding of the carton front or rear flaps until they are held by the folded side flaps.

Adhesives may be applied to the abutting surfaces of the carton flaps prior to the folding of the surfaces. The mechanism for adhesive application is not illustrated, but can be in the form of a suitable spray applicator or nozzle well known in this industry. The folded flaps are directed onto a horizontal plate **68** at the exit end of the belts **65.** An elevated rectangular mandrel **70** is then lowered against the inside flap surfaces by means of a vertical cylinder assembly **71** and guide rods **72** to apply compressive force between plate **68** and mandrel **70** to aid in the bonding of the adhesive. Each carton is then ejected from the machine by an incoming carton fed to plate **68** by belts **65.**

It is believed that the functions of the machine are basically developed in detail in the above machine description. However, they can be briefly recapped with reference to schematic drawings in FIGS. **9-12.**

FIG. **9** shows the fixed position of a carton **80** and the relative positions of the retracted front flap folding member **62** and retracted trough **40.** The carton **80** has been gripped by the stationary vacuum cups **47** and by the moveable vacuum cups **50,** and is illustrated just prior to horizontal bending of the carton walls.

In FIG. **10,** the carton is being expanded by the pivotal movement of the moveable vacuum cups **50,** which bend the carton to a rectangular configuration between the upper guides **44, 46.** FIG. **10** shows the initial longitudinal relation that exists between the expanded car-

ton **80** and the members **56, 62,** which then provide lower elevational support for the expanded carton.

FIG. **11** illustrates the forward movement imparted to the carton **80** by actuation of member **56,** and the resulting folded positions of lower rear flap **87** and lower front flap **91.**

FIG. **12** is a view looking toward carton **80** as it moves forwardly and is engaged by the converging rods **66,** showing the lower side flaps **84** partially folded and the side walls **85** engaged between the opposed belt flights **65.**

Minor changes might be made in the specific structure of the apparatus shown herein, consistent with the general skill of those in this field. For these reasons, only the following claims are intended to set out the definition of the invention disclosed herein.

Having thus described my invention, I claim:

1. In an apparatus for expanding and folding initially collapsed cartons having opposed side panels and end panels, each including lower flaps extending from the carton walls and foldable about scored lines between the flaps and respective walls:

a supporting framework;

horizontal upwardly open trough means on the framework moveable between a first position at which the trough receives and elevationally locates the lower flap edges of a vertically oriented collapsed carton and a second position at which the trough is clear of such cartons;

first vacuum means along side and above said trough operable to selectively grip one carton panel; and

means on said framework operatively connected to said trough means for moving said trough means to its second position following actuation of said first vacuum means.

2. The apparatus set out in claim **1** further comprising:

second vacuum means movably mounted on said framework for selectively gripping a panel of each carton opposite to said one panel and moving it apart from said one panel to expand to the carton horizontally.

3. The apparatus set out in claim **2** further comprising:

rear flap folding means in the path of each carton as it is expanded by operation of said second vacuum means to partially fold the lower rear flap of each carton during horizontal expansion of the carton.

4. The apparatus set out in claim **3** further comprising:

front flap folding means on said framework movably mounted so as to be positioned partially under each carton after horizontal expansion thereof and to engage the front lower flap to partially fold said flap inwardly prior to forward movement of the expanded carton.

5. In an apparatus for expanding and folding initially collapsed cartons having opposed side panels and end panels, each including lower flaps extending from the carton walls and foldable about scored lines between the flaps and respective walls:

a supporting framework;

carton magazine means on the framework for storing a stack of collapsed cartons;

a carton receiving station on the framework comprising horizontal support means for engaging the upper and lower edges of an upright collapsed carton in a vertical orientation;

carton feed means on said framework for individually transferring collapsed cartons from the carton magazine means to said carton receiving station;

first carton gripping means on said framework at said carton receiving station for engaging one carton panel while engaged by said horizontal support means to thereby fix the position of the carton panel relative to said framework;

power means operatively connected between the framework and said horizontal support means for selectively freeing the lower edge of each carton at said receiving station from engagement by said support means subsequent to engagement of the carton panel by said first carton gripping means;

and second carton gripping means movably mounted to said framework adjacent to said carton receiving station for selectively gripping a second panel of each carton opposed to the first panel thereof and subsequently moving the second carton panel apart from its first panel to horizontally expand the carton adjacent to the carton receiving station.

6. In an apparatus for expanding and folding initially collapsed cartons having opposed side panels and end panels, each including lower flaps extending from the carton walls and foldable about scored lines between the flaps and respective walls:

a supporting framework;

a carton receiving station on the framework;

feed means for directing individual collapsed cartons to a fixed position at the receiving station in a vertical carton panel orientation;

carton expanding means laterally adjacent to the carton receiving station for gripping and horizontally expanding each carton;

rear flap folding means on said framework at a location rearwardly and transversely adjacent to the receiving station, said rear flap folding means being movably mounted to the framework for forward movement across the carton receiving station and engagement of each expanded carton at an elevation such that the rear lower flap thereof is bent upward to a horizontal position, said rear flap folding means further including an element intersecting the location of each carton rear wall to thereby push the expanded carton forwardly from the carton receiving station;

front flap folding means on said framework forwardly and laterally adjacent to the carton receiving station in the path of movement of expanded cartons, said front flap folding means being vertically moveable to clear the path of an expanding carton at the carton receiving station and for location in the path of an incoming forward lower carton flap moved along with an expanded carton in response to operation of said rear flap folding means.

7. The apparatus set out in claim **6** where the path of forward motion of said rear flap folding means longitudinally overlaps the front flap folding means.

8. In an apparatus for expanding and folding initially collapsed cartons having opposed side panels and end panels, each including lower flaps extending from the carton walls and foldable about scored lines between the flaps and respective walls:

a supporting framework;

an upwardly open longitudinal trough mounted to the framework;

longitudinal guides mounted to the framework at positions above the trough;

carton feed means on said framework for individually positioning collapsed cartons in said trough and between said guides at a fixed position on the framework;

first vacuum means upwardly adjacent to said trough for selectively gripping a first panel of each carton when at said fixed position;

first power means operatively connected to said trough for moving the trough clear of each carton while gripped by said first vacuum cup means;

and second vacuum cup means at an elevation upwardly adjacent to that of said trough for selectively gripping a second panel of a carton when at said fixed position and for subsequently moving said second panel relative to said first panel of the carton to thereby bend the carton to a stationary expanded position on the framework located laterally adjacent to said fixed position.

9. The apparatus set out in claim **8** wherein said guides include:

a moveable member engageable with the carton side opposite to that gripped by said first vacuum means, said member being moveable so as to be clear of the upright surfaces of the carton upon expansion thereof.

10. The apparatus set out in claim **8** further comprising:

rear flap folding means on said framework for moving the lower rear flap of each carton forwardly and upwardly to a horizontal folded position, said rear flap folding means comprising:

a forwardly-facing surface leading upwardly and rearwardly to a horizontal ledge that is coplanar with the scored lines between the carton walls and lower flaps at said stationary expanded position;

an upright shoulder projecting upwardly from said surface adapted to engage a carton wall above the lower rear flap folded thereby;

and second power means connected between the framework and said surface for moving said surface and shoulder forwardly in a longitudinal direction through the machine area occupied by a carton while at said stationary expanded position.

11. The apparatus set out in claim **10** further comprising:

downwardly facing guide means extending longitudinally along the framework at an elevation immediately above the carton stationary expanded position, such guide means being adapted to prevent upward elevational movement of an expanded carton relative to the framework.

12. The apparatus set out in claim **11** further comprising:

front flap folding means for moving the lower front flap of each carton rearwardly and upwardly to a horizontal folded position, said front flap folding means comprising:

a rearwardly-facing surface extending upwardly and forwardly to a horizontal forward ledge coplanar with the scored lines between the carton walls and lower flaps at said stationary expanded carton position, said rearwardly facing surface being longitudinally located along the framework at a position forwardly adjacent to the carton stationary expanded position.

13. The apparatus set out in claim **12** further comprising:

third power means on said framework operatively connected to said rearwardly-facing surface for selectively moving it clear of the path of the moving panels of a carton being expanded by operation of said second vacuum means.

14. The apparatus set out in claim **10** further comprising:

laterally opposed belt flights along the framework for receiving and engaging the side panels of expanded cartons directed there between in response to forward movement of said rear flap folding means.

15. The apparatus set out in claim **14** further comprising:

a pair of upwardly and forwardly converging longitudinal guides fixed to said framework in the path of the respective lower side flaps of an expanded carton between said belt flights for progressively folding the side flaps inwardly and upwardly to a horizontal configuration during movement of a carton along said belt flights.

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