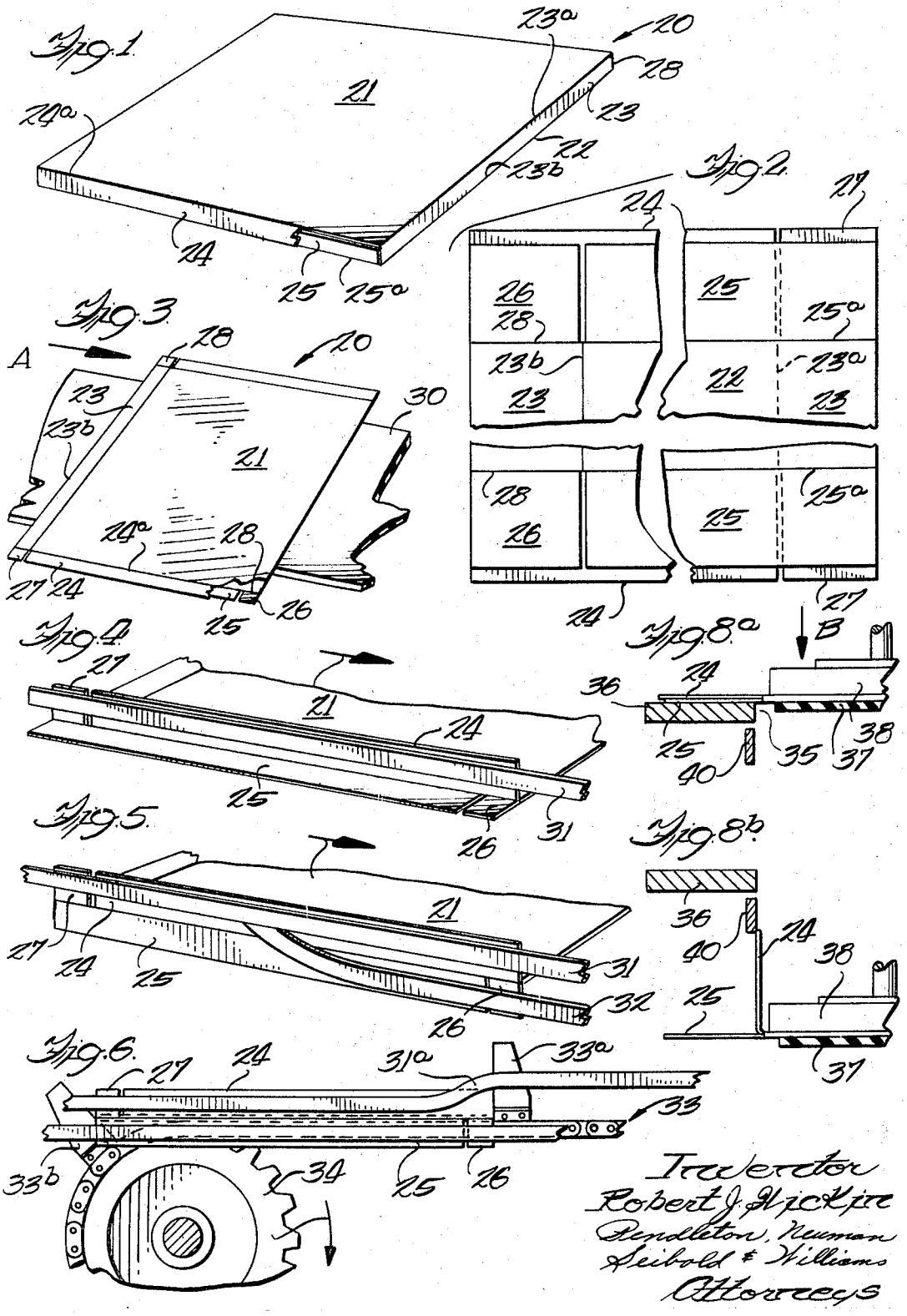
April 4, 1967 R. J. HICKIN 3,312,155

METHOD AND APPARATUS FOR ERECTING A CARTON

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METHOD AND APPARATUS FOR ERECTING A CARTON

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Fig. 7

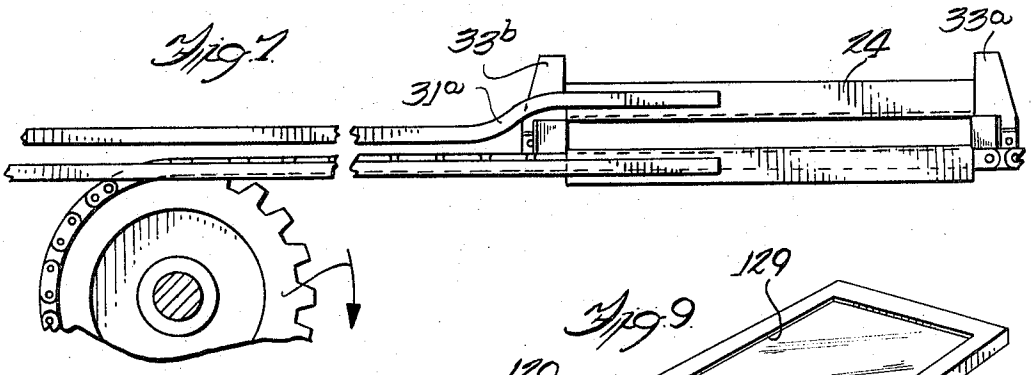


Fig. 9

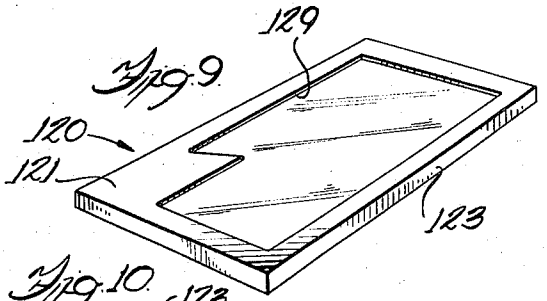


Fig. 18

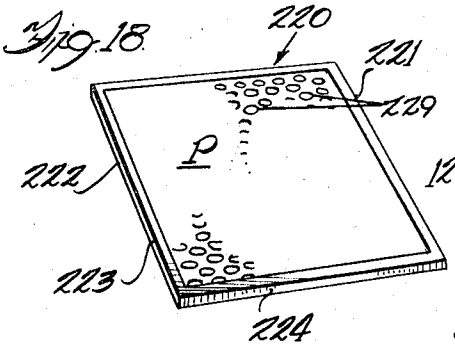


Fig. 10

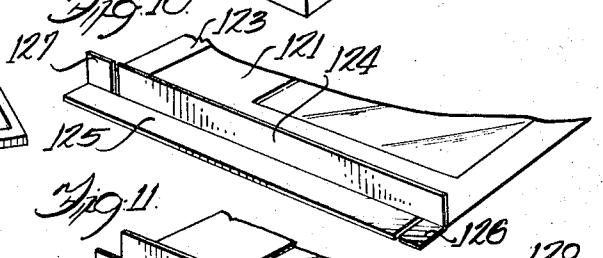


Fig. 11

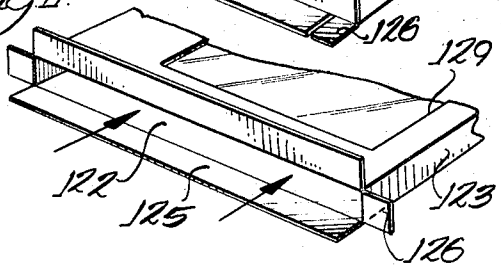


Fig. 12

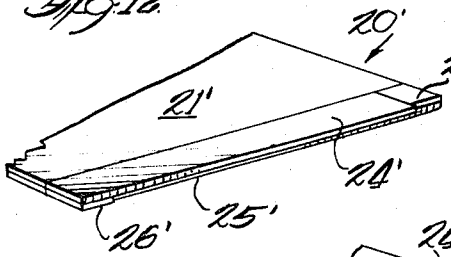


Fig. 13

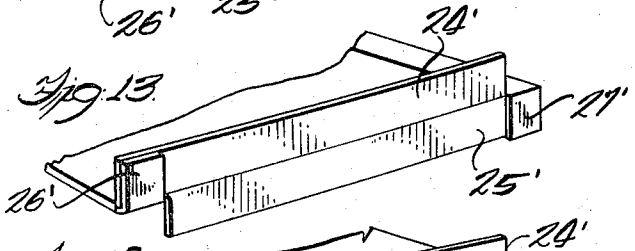
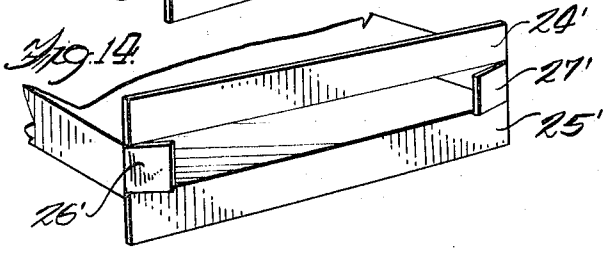


Fig. 14



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Fig. 15.

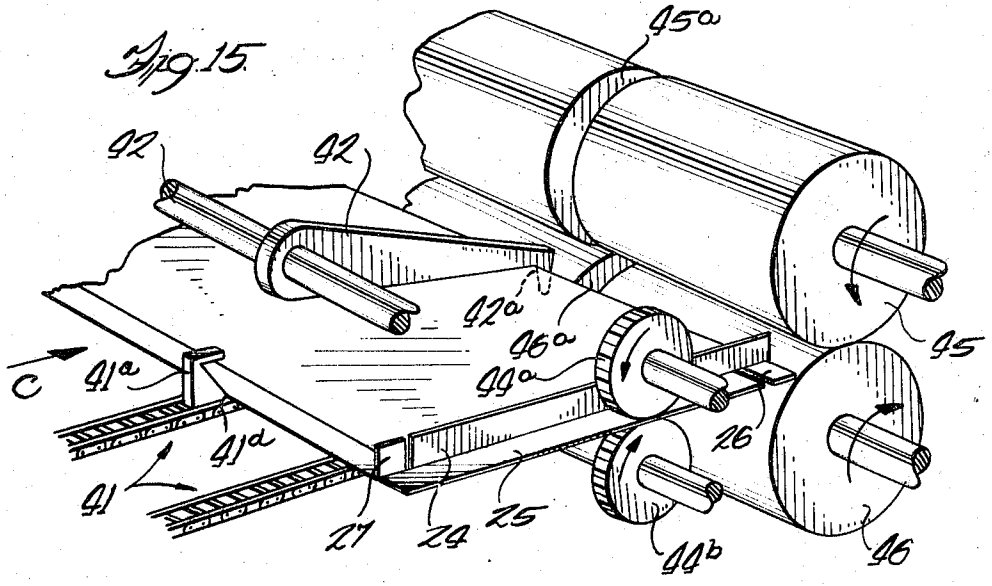


Fig. 16.

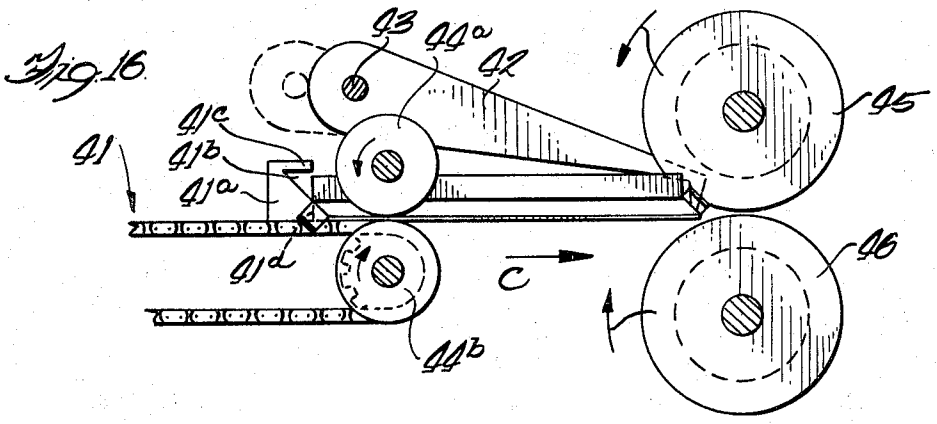
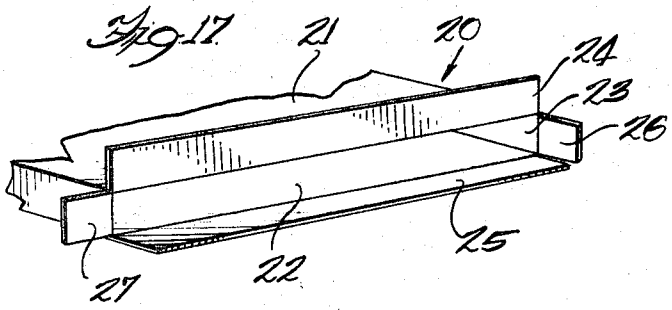


Fig. 17.



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METHOD AND APPARATUS FOR ERECTING A CARTON

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Filed Dec. 1, 1964, Ser. No. 415,042
12 Claims. (Cl. 93—53)

This invention relates to a method for erecting a carton, and to the carton and apparatus utilized in the practicing of such method.

In the packaging field, it has become common practice to erect or set up a flat folded paperboard carton, sometimes referred to as a collapsed tubular member, by squeezing or exerting a compressive force on opposed peripheral portions thereof, so as to cause the opposed panels of the carton to assume spaced registered relation. One well known mechanical means for exerting such a compressive force is to utilize a flighted conveyor upon which the carton is placed with one of the flat folded sides of the carton resting against the conveyor. The flights are disposed in longitudinally spaced relation on the endless conveyor belt, and the spacing between consecutive flights exactly corresponds to the outside dimension of one side panel of the carton when erected. With such apparatus, the flat folded carton is initially fed onto the conveyor belt with the foldline connection between a pair of carton panels abutting a leading flight. As the trailing or complemental flight moves about the end of the conveyor, the opposite peripheral portion of the carton is engaged thereby, and as such flight approaches the horizontal plane, the engaged flat folded carton is squeezed between the two flights causing such carton to assume an erected position.

In commercial operations this setting up procedure is carried on rapidly and is fully automatic. After the carton is set up it is normally moved directly to the loading station where the filling operation occurs.

In instances, however, where the flat folded carton is of flimsy construction or has broad top and bottom panels and narrow connecting side panels, or has the panels thereof in warped condition, the erection of such carton in the aforedescribed manner is extremely difficult. The cause of such difficulty is that when the compressive force is exerted on the carton periphery, the top and bottom surfaces of the flat folded carton will simultaneously bulge upwardly together rather than separate into spaced registered relation as desired.

In the past, several attempts have been made to remedy these problems. These solutions to the problems, however, have been beset with serious shortcomings. Two such approaches are (1) to increase the stiffness of the paperboard being used by increasing materially the caliper thereof; and (2) to modify the machine by the addition of various complex mechanical devices arranged to operate in carefully timed sequence so as to spread apart the top and bottom panels of the flat folded carton as the compressive force is applied. When utilizing approach (1) the increase in cost of the carton material is significant and the improvement resulting from the use of the higher caliper board is confined solely to increasing the stiffness of the carton. In high volume cartons the increase in material cost is particularly noticeable. In utilizing approach (2) the apparatus is readily susceptible to frequent breakdown requiring an inordinate amount of maintenance.

Thus, it is one of the objects of this invention to provide a method and apparatus which is not beset with the above-enumerated shortcomings.

It is a further object of this invention to provide an

improved carton, the construction of which will facilitate the expeditious erecting thereof.

It is a still further object of this invention to provide a method of erecting a flimsy carton which is quick and simple and is adapted to be performed with cartons which vary widely in size and shape.

It is a still further object of this invention to provide a method of erecting cartons which will enable smaller caliper paperboard to be used without adversely affecting the primary functions of the erected carton.

Further and additional objects will appear from the description, accompanying drawings and appended claims.

In accordance with one embodiment of this invention, a method of erecting a flat-folded carton is provided wherein the carton is provided with a pair of broad top and bottom panels having opposed first peripheral portions thereof foldably interconnected by a pair of narrow end panels. Opposed second peripheral portions of the top and bottom panels, which are disposed normal to the first peripheral portions, are of substantially greater length than the corresponding peripheral portions of said narrow end panels. Flaps are foldably connected to the second peripheral portions of at least the top panel. The improved method includes the steps of supporting one flat side of the flat-folded carton in a predetermined plane whereby one of the narrow end panels and the top panel overlie the other end panel and the bottom panel of the carton; folding the flaps to angular positions with respect to the plane of support; and, while said flaps are in folded positions, exerting a compressive force on the periphery of said flat-folded carton in a direction substantially parallel to the axes of fold of said folded flaps whereby the top and bottom panels assume spaced registered positions.

For a more complete understanding of this invention reference should be made to the drawings wherein:

FIGURE 1 is a perspective view of one form of the improved carton shown in a fully set-up condition and with a portion of one of the end flaps cut away.

FIG. 2 is a fragmentary enlarged plan view of the carton shown in FIG. 1 when in a flat-folded condition.

FIG. 3 is a fragmentary perspective view of the flat-folded carton of FIG. 2 shown disposed on a conveyor prior to the carton end flaps being folded relative to the plane of support.

FIG. 4 is a fragmentary enlarged perspective view similar to FIG. 3 but showing one method whereby certain of the end flaps of the flat-folded carton are folded relative to the plane of support.

FIG. 5 is similar to FIG. 4 but shows one method of folding certain of the end flaps in one direction and folding the remainder of the end flaps in the opposite direction prior to a compressive force being exerted on the periphery of the flat-folded carton.

FIG. 6 is a fragmentary side elevational view showing a compressive force commencing to be applied to the periphery of the flat-folded carton in a direction substantially parallel to the axes of fold of the carton end flaps.

FIG. 7 is similar to FIG. 6 but showing the erected carton at a loading station.

FIGS. 8*a* and *b* are fragmentary enlarged vertical sectional views of successive steps of a modified method of folding the end flaps of a flat-folded carton.

FIG. 9 is a perspective view of a second form of an improved carton shown in fully set-up condition.

FIGS. 10 and 11 are enlarged fragmentary perspective views showing successive steps in the setting up of the carton shown in FIG. 9.

FIGS. 12–14 are fragmentary perspective views of suc-

cessive steps of another modified method of folding the end flaps of a carton, such as shown in FIG. 9.

FIG. 15 is a fragmentary perspective view of a second modified form of apparatus for setting up a flat-folded carton.

FIG. 16 is a fragmentary side elevational view of the apparatus shown in FIG. 15.

FIG. 17 is an enlarged fragmentary perspective view of an improved carton subsequent to passing through the modified apparatus shown in FIG. 16.

FIG. 18 is a perspective view of a second modified form of the improved carton shown in a fully set-up condition.

Referring now to the drawings and more particularly to FIG. 1, one form **20** of an improved carton is shown which is formed from a blank of low caliper paperboard, said caliper being dependent upon the ultimate use of the carton. The illustrated carton **20** is a type suitable for the packaging of frozen pizza pies and the like. The carton **20** in this instance has broad top and bottom panels **21** and **22** which are of like configuration and have corresponding first peripheral portions thereof foldably interconnected by narrow end panels **23**. To second peripheral portions of the top and bottom panels are foldably connected end closure flaps **24** and **25**, respectively. The flaps are coextensive with the sides of panels **21** and **22** to which they are connected. The foldline connections **24***a* and **25***a* of flaps **24** and **25** to the top and bottom panels, respectively, are disposed at right angles with respect to the foldline connections **23***a* and **23***b* between the end panels **23** and the top and bottom panels **21** and **22**, respectively.

As seen in FIGS. 2 and 3, end closure flaps **26** and **27** are connected by foldlines **28** to opposite ends of narrow end panels **23**. When carton **20** is in its flat-folded condition, FIG. 2, foldlines **25***a* and **28**, or **24***a* and **28** are in coaxial alignment.

It will likewise be noted in FIG. 2 that foldline connections **23***a* and **23***b* are disposed perpendicular with respect to foldline **25***a* or **24***a*. The difficulty heretofore experienced in erecting a flat-folded carton to an erected position such as shown in FIG. 17, for example, has been caused primarily by the fact that the length of foldlines **24***a* and **25***b* are substantially greater than the length of foldlines **28**. Without practicing the method, to be hereinafter discussed, the flat-folded carton would tend to bow or warp during erecting of the carton by conventional means.

In FIG. 2, it will be noted that when carton **20** is in flat-folded condition the end closure flaps **24** and **27** project beyond the outer or distal edges of flaps **25** and **26**; that is to say, the dimensions of flaps **24** and **27** taken normal to the lines of fold thereof are greater than the corresponding dimensions of flaps **25** and **26**. The importance of this dimensional differential will become apparent from the discussion to follow hereinafter.

A variation in this novel concept is to be seen in a modified carton **20'**, see FIGS. 12–14, wherein flaps **24'** and **26'** each have a longer dimension taken normal to its foldline connection than either flap **25'** and **27'**. In all other respects cartons **20** and **20'** are substantially the same. The reason for the difference in the flap dimensions will become evident hereinafter when the method of erecting the various flat-folded cartons will be described in detail.

In FIGS. 9–10 a second modified carton **121** is shown wherein parts thereof corresponding to carton **20** are identified with like numbers in the 100 series. The principal distinction between cartons **20** and **120** is that in carton **120** the top panel **121** is provided with a large window **129**, whereby the product disposed within the carton may be readily observed without opening the carton. Carton **120** is of a style commonly used in the packaging of sliced bacon or the like. Because of window **129**, the top panel **121** is extremely flexible and prone to

bending. The configuration of the end closure flaps **124**, **125**, **126**, and **127** may be akin to either those found on carton **20** or **20'**.

In FIG. 18 there is shown a third modified carton **220**. The various parts of carton **220** corresponding to carton **20** will be identified with like numbers in the 200 series. Carton **220** is particularly suitable for use as a frame in a furnace filter. In the illustrated embodiment, carton **220** has a top panel **221** and a bottom panel **222** which are of like configuration and substantially open throughout. The openness of the top and bottom panels is provided by enlarged openings **229** and thus enables either cold or warm air to circulate through the filter pad P which is accommodated within the carton (frame) **220**. The width and length of the carton and pad will depend upon the size of the air duct with which the filter is to be used. As in the previously described cartons **20**, **20'** and **120**, the top and bottom panels **221** and **222** are foldably interconnected by narrow end panels **223**. The end closure flaps, only one flap **224** being shown, close the open ends of the carton subsequent to the pad P being moved endwise into the frame. The closure flaps, when in closed position, and the end panels **223** cooperate with one another and with the portions of the top and bottom panels circumjacent the openings therein to form a stiff framelike member for the pad, notwithstanding that the material, when in sheet form, from which the carton is made is relatively flexible.

Various methods, all of which embody the novel concept to be hereinafter discussed, may be utilized in erecting the various cartons previously discussed. Each method, as will be noted, includes the following basic steps: (a) supporting in a plane the flat side of a flat-folded carton whereby the top (or bottom) panel and one of the narrow end panels overlies the bottom (or top) panel and the other end panel; (b) folding at least one of the end closure flaps of the overlying top panel to an angular position with respect to the plane of support; and (c) while such end closure flap is in said folded position, exerting a compressive force on the periphery of the flat-folded carton in a direction parallel to the axis of fold of the folded flap while the overlaid bottom panel remains in the plane of support.

Details as to various ways of practicing the aforenoted method steps are to be found in the drawings.

In FIGS. 3–7, there is shown one form of practicing the aforedefined method. In FIG. 3, the carton **20** (or carton **20'**; **120**, or **220** whatever the case may be) is fed onto a moving conveyor belt **30**. The direction of movement of the belt is indicated by arrow A. It will be noted that the flat-folded carton is placed upon the belt so that the top panel **21**, one end panel **23**, and the corresponding end closure flaps **24** and **27** are disposed in overlying relation wtih respect to the remaining panels and flaps. It is important that the longer closure flaps **24** connected to the top panel be exposed or positioned face up.

After the flat-folded carton has been conveyed a predetermined distance in direction A, the overhanging or projecting portions of longer flaps **24** and **27** are engaged by elongated plow bars **31** which are disposed on opposite sides of the conveyor belt **30**. As seen in FIG. 4, bars **31** (only one being shown) cause the flaps **24** and **27** to assume upright folded positions with respect to the plane of the supporting conveyor belt **30**. Once the flaps **24** and **27** have been folded as indicated, the remaining flaps **25** and **26** are engaged by second plow bars **32**, only one being shown, which cause the latter flaps to be folded downwardly at substantially right angles with respect to plane of belt **30**.

Upon both sets of closure flaps assuming the aforementioned folded positions, the carton is then fed onto a flighted conveyor **33**, see FIG. 6. The conveyor **33** is supported at its infeed end by a sprocket wheel **34**. The upper run of the conveyor **33** is in coplanar relation with

respect to the upper run of the conveyor belt **31** upon which the flat-folded carton previously rested.

It should be noted that the leading edge of the fed carton, that is the peripheral edge formed by the foldline **23***a* connecting panels **21** and **23**, abuts the lead flight **33***a* forming a part of the conveyor **33**. As the trailing flight **33***b*, also forming a part of conveyor **33** moves about the periphery of sprocket wheel **34**, the trailing peripheral edge of the carton, such edge being defined by the foldline **23***b*, see FIG. 3, between bottom panel **22** and the end panel **23**, is engaged by the flight **33***b*. Upon flight **33***b* approaching the horizontal plane, a compressive force is exerted on the carton by the flights **33***a* and **33***b* causing the carton to assume an erected position, as seen more clearly in FIG. 7. The compressive force is caused by the fact that the spacing between the leading and trailing flights **33***a* and **33***b* is equal to the length of the side of bottom panel **22** to which flaps **25** are foldably connected. It is important to note that the compressive force is applied by the flights in a direction parallel to fold lines **24***a* and **25***a*.

By reason of the fact that the folded flaps cooperate with the planes of both the top and bottom panels **21** and **22** to form members having substantially channel-shaped cross-section, optimum stiffness results in the carton to the applied compressive force and thus no bulging, bowing, or warping action of the carton occurs which would otherwise interfere with the erection of the carton.

It will be noted in FIG. 7 that plow bar **31** bends upwardly at **31***a*, so as to compensate for the raising of flap **24**, as the carton is erected. When the carton has reached the position, shown in FIG. 7, it is ready to be loaded by sliding the product endwise through the open end by mechanical means, not shown. Such mechanical means is well understood by those skilled in the art and does not form a part of the herein disclosed invention.

In FIGS. 8*a–b*, a modified way of initially folding the closure flaps **24**, **25**, **26** and **27** is shown. In this instance the flat-folded carton **20** is positioned over a die opening **35**. The opening **35** has a configuration which is akin to the area defined by the combination of the bottom panel **22** and the one end panel **23** both of which are overlaid by the remaining panels when the carton is in its flat-folded condition. It will be noted in FIG. 8*a*, that flaps **24** and **25** extend beyond the perimeter of the die opening **35** and are supported by shoulders **36**, only one being shown. The carton **20**, when supported by the shoulders **36**, is in a substantially horizontal plane.

Working in combination with the die opening **35**, is a retractable platform **37**, which engages the underside of the carton, see FIG. 8*a*, and a reciprocating plunger **38** which engages the upperside of the flat-folded carton. The plunger and platform are movable in a vertical direction. As the plunger and platform move in the direction B, as shown by the arrow, the flaps **24**, **25**, **26** and **27** are all simultaneously folded to upright positions by reason of shoulders **36**.

Positioned beneath shoulders **36** and extending horizontally therefrom are a pair of plow bars **40**, only one being shown. The downward stroke of plunger **38** is such that when the plunger and carton carried thereby reaches its lower terminus, bar **40** will only engage the projecting portions of the longer flaps **24** and **27** of carton **20** and thus retain the flaps **24** and **27** in their upright folded positions. Once flaps **25** and **26** have cleared the underside of bar **40**, the flaps will automatically return to their original flat-folded positions. This action by flaps **25** and **26** is due to the inherent characteristics of the paperboard material of which the carton is made.

Upon the carton reaching its lower terminus by reason of the movement of plunger **38**, the carton with flaps **24** and **27** folded upright is moved in a horizontal direction between bars **40**, similar to the manner as previously described and shown in FIGS. 5–7.

FIGS. 15 and 16 show an alternative way of exerting the compressive force on the flat-folded carton, after certain of the closure flaps thereof have been folded to upright positions. In FIG. 15, the carton **20** is moved in direction C by a flighted conveyor **41**. The flights **41***a*, forming a part of the conveyor, engage only the trailing peripheral edge of the carton. Upon the conveyed carton reaching a predetermined station of travel, the leading peripheral edge of the carton is engaged by a hook-shaped end **42***a* formed on an arm **42** which is pivotally mounted on a shaft **43**, the latter being disposed above the conveyor **41**. The shaft **43** is supported at its opposite ends by bearings, not shown, which are mounted for limited reciprocatory movement in a horizontal direction. The limited horizontal movement of shaft **43** and arm **42** is shown in dotted lines in FIG. 16. The speed of shaft **43** moving in the horizontal direction is controlled relative to the speed of the flights **41***a* in the same direction so that the hook end **42***a* of arm **42** will produce a drag on the conveyed carton thereby causing the latter to assume an erected position.

To insure more positive movement of the carton **20** in direction C, a pair of driven rollers **44***a* and **44***b* are provided at each side of conveyor **41**. Flaps **25** and **26** are caused to pass between the respective pair of rollers **44***a* and **44***b*. The periphery of each of the rollers may be roughened or knurled so as to effect a slip-proof contact between the rollers and the unfolded flaps. In instances where the carton being conveyed is similar to that shown in FIG. 18, the rollers **44***a* and **44***b* will be relied upon to move the flat-folded carton in direction C rather than the flights **41***a*. Furthermore, in such a situation, the arms **42** would be more closely aligned with the foldlines between the top panel **221** and the flaps **224**.

The apparatus, shown in FIGS. 15 and 16, includes a second pair of rollers **45** and **46**. The function of these rollers is to fold back, or collapse, the erected carton in the opposite direction. The reason for the reverse folding or collapsing of the erected carton is to overcome any tendency of the erected carton to return to its original flat-folded condition. Subsequent to the carton having passed between rollers or cylinders **45** and **46**, the carton will automatically spring back to its erected position whereupon it is ready for loading. It is to be noted that rollers **45** and **46** only engage panels **21**, **22**, and **23** and do not flatten out folded flaps **24** and **27**. Where there is not problem with the erected carton tending to return to its original flat-folded condition, the rollers **45** and **46** may be omitted.

Each roller **45** and **46** is provided with one or more peripheral grooves **45***a* and **46***a*, each of which is adapted to accommodate a portion of the hook end **42***a* of arm **42** when the latter has shifted to the position shown in full lines in FIG. 15. As the erected carton is collapsed by rollers **45** and **46**, the hook end **42***a* will walk off, or automatically disengage from the leading peripheral edge of the carton.

To accomodate the trailing edge of the erected carton when it is collapsed in the opposite direction by rollers **45** and **46**, the carton engaging surface of flight **41***a* is provided with a notch **41***b* having a rearwardly inclined surface against which the rear end panel will engage. A lip **41***c* is provided at the top of the flight which prevents the rearwardly inclined end panel of the carton to ride over the flight. The lower portion **41***d* of the carton-engaging surface of the flight is substantially vertically inclined and is adapted to engage the trailing peripheral portion of the flat-folded carton as it is moving on conveyor **41** and prior to the carton being erected.

FIGS. 12–14, as previously mentioned, show a modified form of carton **20'** and the various steps involved in folding the flaps thereof during erecting the carton. Flaps **24'** and **26'** which are in face to face contact with one another, when the carton is flat-folded, have the same dimension taken normal to their respective foldlines but such dimension is greater than the corresponding dimen-

sion of the other two flaps 25' and 27'. In FIG. 13, flaps 24' and 26' are simultaneously folded upwardly by suitable plow bars and flaps 25' and 27' are subsequently folded downwardly by additional plow bars. By reason of the relative folded positions of flaps 26' and 27', said flaps will extend inwardly toward one another, when the carton is erected, as shown in FIG. 14. By having flaps 25' and 27' automatically assuming such positions, the subsequent folding of the closure flaps to seal, or close, the end of the erected carton is facilitated.

In FIG. 17, the open end of carton 20 is shown subsequent to the carton having passed through the apparatus illustrated in FIGS. 15–16. It will be noted that by reason of the flaps 25 and 26 not being folded prior to erection that flap 26 remains in substantially coplanar relation with end panel 23 and thus in no way interferes with the product, not shown, being fed into the carton through the open end thereof.

In the various apparatus above described, the number, shape, and arrangement of the flights and arms may be varied from that illustrated without departing from the scope of this invention.

Thus, it will be seen that a carton, and method and apparatus for erecting same have been provided which overcome effectively a serious problem that has plagued the packaging industry for many years. By reason of the improved method, substantial savings in material costs can be realized. Furthermore, cartons heretofore deemed incapable of being mechanically erected can now be readily erected mechanically.

While several embodiments have heretofore been disclosed and claimed, the invention is not intended to be limited thereto as further modifications are contemplated, and the submitted claims are deemed to be of sufficient scope to cover such further modifications.

I claim:

1. A method of erecting a collapsed flat-folded tubular member having a pair of first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, second peripheral segments of said first panels disposed normal to and interconnecting the foldline connections between said first and second panels being of greater dimension than the corresponding peripheral segments of said second panels, and an elongated flap foldably connected to the second peripheral segment of a least one of said first panels; said method comprising supporting one flat side of the collapsed tubular member in a predetermined plane whereby the first panel to which said flap is connected and one second panel overlie the other panels, folding said flap to an angular position with respect to the plane of support, and exerting a compressive force on the periphery of said collapsed tubular member in a direction substantially parallel to the axis of fold of said folded flap while the overlaid first panel remains in said plane of support to effect spaced substantially registered relation of said first panels.

2. A method of erecting a collapsed flat-folded tubular member having a pair of first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, second peripheral segments of said first panels disposed normal to and interconnecting the foldline connections between said first and second panels being of greater dimension than the corresponding peripheral segments of said second panels, and elongated flaps foldably connected to the second peripheral segments of at least one of said first panels; said method comprising supporting one flat side of the collapsible tubular member in predetermined plane whereby the first panel to which said flaps are connected and one second panel overlie the other panels, folding said flaps to angular positions with respect to the plane of support, and exerting a compressive force on the periphery of said collapsed tubular member in a direction substantially parallel to the axes of fold of said folded flaps while the overlaid first panel remains in said plane of support to effect spaced substantially registered relation of said first panels.

3. A method of erecting a collapsed flat-folded tubular member having a pair of first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, second peripheral segments of said first panels disposed normal to and interconnecting the foldline connections between said first and second panels being of greater dimension than the corresponding peripheral segments of said second panels, and elongated flaps foldably connected to the second peripheral segments of said first panels, said method comprising supporting one flat side of the collapsed tubular member in a predetermined plane whereby one first panel and one second panel overlie the other panels, folding said flaps to angular positions with respect to the plane of support, and exerting a compressive force on the periphery of said collapsed tubular member in a direction substantially parallel to the axes of fold of said folded flaps while the overlaid first panel remains in said plane of support to effect spaced substantially registered relation of said first panels.

4. A method of erecting a collapsed flat-folded tubular member having a pair of first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, second peripheral segments of said first panels disposed normal to and interconnecting the foldline connections between said first and second panels being of greater dimension than the corresponding peripheral segments of said second panels, and elongated flaps foldably connected to said second peripheral segments of said first panels and the corresponding peripheral segments of said second panels; said method comprising supporting one flat side of the collapsed tubular member in a predetermined plane whereby a first panel and a second panel overlie the other panels, folding the flaps connected to the overlying first and second panels to corresponding angular positions whereby said folded flaps and the overlying first and second panels cooperate to form a substantially channel configuration, folding the flaps connected to the overlaid first and second panels in corresponding opposite directions with respect to said first folded flaps, and exerting a compressive force on the periphery of said collapsed tubular member in a direction substantially parallel to the axes of fold of said folded flaps while the overlaid first panel remains in said plane of support to effect spaced substantially registered relation of said first panels.

5. The method recited in claim 4 wherein the folded flaps assume substantially right angle positions with respect to the plane of support.

6. A method of erecting a collapsed flat-folded tubular member having a pair of first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, second peripheral segments of said first panels disposed normal to and interconnecting the foldline connections between said first and second panels being of greater dimension than the corresponding peripheral segments of said second panels, and elongated flaps foldably connected to said second peripheral segments of said first panels and the corresponding peripheral segments of said second panels; said method comprising supporting one flat side of the collapsed tubular member in a predetermined plane whereby a first panel and a second panel overlie the other panels, folding the flaps connected to the overlying first panel and the overlaid second panel to corresponding angular positions whereby said folded flaps and the overlying first panel cooperate to form a substantially channel-shaped configuration, folding the flaps connected to the overlying second panel and the overlaid first panel in corresponding opposite directions with respect to said first folded flaps, and exerting a compressive force on the periphery of said collapsed tubular member in a direction

substantially parallel to the axes of fold of said folded flaps while the overlaid first panel remains in said plane of support to effect spaced substantially registered relation of said first panels with the flaps connected to said second panels at each end of the erected tubular member projecting toward one another and disposed within the space between said registered first panels.

7. An apparatus for erecting a collapsed flat-folded tubular member having a pair of first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, the first and second panels having second peripheral segments disposed normal to and interconnecting the foldline connections between the first and second panels, the second peripheral segments of the first panels being of greater dimension than the second peripheral segments of the second panels, and flaps foldably connected to the second peripheral segments of the panels; said apparatus comprising first means for supporting one flat side of the collapsed tubular member whereby one first panel and one second panel overlie the other panels, second means for folding at least the flaps connected to the overlying first panel to angular positions with respect to the plane of support of the collapsed tubular member, third means for retaining the folded flaps in folded position, and fourth means cooperating with said third means for exerting a compressive force on the periphery of the collapsed tubular member in a direction substantially parallel to the axes of fold of the folded flaps while the overlaid first panel remains in a plane of support.

8. The apparatus recited in claim 7 wherein said second means includes a pair of fixed flap-engaging elements arranged in spaced relation, and an actuating member for moving the collapsed tubular member between said pair of fixed elements to effect folding of at least the flaps connected to the overlying first panel to substantially right angles with respect to the plane of the overlying first panel.

9. The apparatus recited in claim 7 wherein the fourth means includes a first protuberance for engaging a peripheral segment of the collapsed tubular member formed by the foldline connection between the overlying second panel and the overlaid first panel, and a second protuberance for engaging a peripheral segment of the collapsed member opposite that engaged by said first protuberance, said first and second protuberances, when in predetermined member-engaging positions, exerting compressive force on the collapsed member in a direction substantially parallel to the axes of fold of the folded flaps.

10. An apparatus for erecting a collapsed flat-folded tubular member having a pair of first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, the first and second panels having second peripheral segments disposed normal to and interconnecting the foldline connections between the first and second panels, the second peripheral segments of the first panels being of greater dimension than the second peripheral segments of the second panels, and flaps foldably connected to the second peripheral segments of the panels; said apparatus comprising a pair of fixed flap-engaging elements arranged in spaced relation and supporting the margin of a flat side of the collapsed tubular member, said fixed elements being disposed in aligned relation with respect to the flaps foldably connected to the member first panels, an element engageable with said collapsed tubular member and movable relative to said fixed flap-engaging elements to effect folding of said engaged flaps to angular positions with respect to the plane of support of the collapsed tubular member, and means engageable with the collapsed tubular member while the flaps thereof are folded for exerting a compressive force on the collapsed tubular member in a direction substantially parallel to the axes of fold of said folded flaps to effect movement of the overlying first panel to a spaced registered position with respect to the other first panel while the latter panel remains in the plane of support.

11. An apparatus for erecting a collapsed flat-folded tubular member having a pair of flexible first panels foldably connected to one another along corresponding opposed first peripheral segments by a pair of second panels, the first and second panels having second peripheral segments disposed normal to and interconnecting the foldline connections between the first and second panels, the second peripheral segments of the first panels being of greater dimension than the second peripheral segments of the second panels, and flaps foldably connected to the second peripheral segments of the panels; said apparatus comprising a pair of spaced support elements upon which the collapsed tubular member rests with the flaps thereof in alignment with said support elements, a reciprocating plunger movable between said support elements in a direction transverse to a plane including said support elements, said plunger, when moving in one direction, engaging the supported collapsed tubular member and causing same to pass between said support elements whereby the flaps of the tubular member are folded to angular positions with respect to the plane including said support elements, transfer means disposed adjacent the terminus of movement of said plunger in said one direction for engaging the collapsed tubular member with folded flaps and moving the engaged tubular member in a direction angular with respect to the direction of movement of said plunger and in a direction substantially parallel to the axes of fold of the folded flaps, first means disposed in the path of movement of the tubular member caused by said transfer means for contacting the leading peripheral edge of the collapsed tubular member, and second means for engaging the trailing peripheral edge of the collapsed tubular member and cooperating with said first means when in a predetermined relative position with respect thereto, to effect the exertion of a compressive force on the collapsed tubular member between the leading and trailing peripheral edges thereof whereby the overlying first panel of the tubular member is moved to a spaced registered position with respect to the other first panel to effect an erected tubular member.

12. The apparatus recited in claim 11 including third means for engaging the erected tubular member and causing such erected tubular member to be folded to a collapsed condition which is opposite to the original collapsed condition of the tubular means, and fourth means adjacent said third means for effecting the collapsed tubular member upon being disengaged from said third means to return to an erected condition.

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