

[54] METHOD FOR CLOSING AND SEALING
CARTON HAVING INTEGRAL CARRYING
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53/284, 93/49 M

[51] Int. Cl..... B65b 43/42, B65b 7/20

[58] Field of Search 53/29, 37, 47, 284;
93/49 M; 229/52 B

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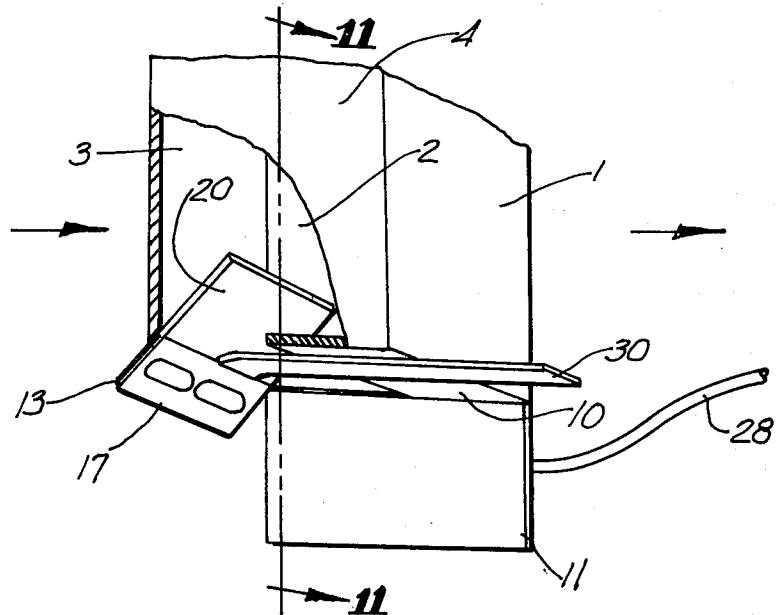
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ABSTRACT

A continuous method for closing and sealing a carton having a tubular body and end closure flaps hingedly connected to the opposite ends of the body walls. One of the end closures includes a panel which is cut and scored and folded upon itself to define a double thickness carrying handle immediately adjacent the body wall to which such panel is connected, together with a closure flap portion extending in prolongation of the reversely folded part of the handle. The tubular body of the carton is vertically disposed and advanced in a path of travel with the panel incorporating the carrying handle rearmost. A single stationary sweep means is utilized to first infold the leading closure flap of the handle forming end closure and then outfold the handle parts relative to the carton body, the outfolding of the handle parts acting to automatically infold the attached closure flaps, whereupon the remaining closure flaps at the handle forming end are infolded with the interposition of adhesive between the juxtaposed flaps. The carton is then filled and its remaining end closure flaps closed and sealed.

9 Claims, 16 Drawing Figures

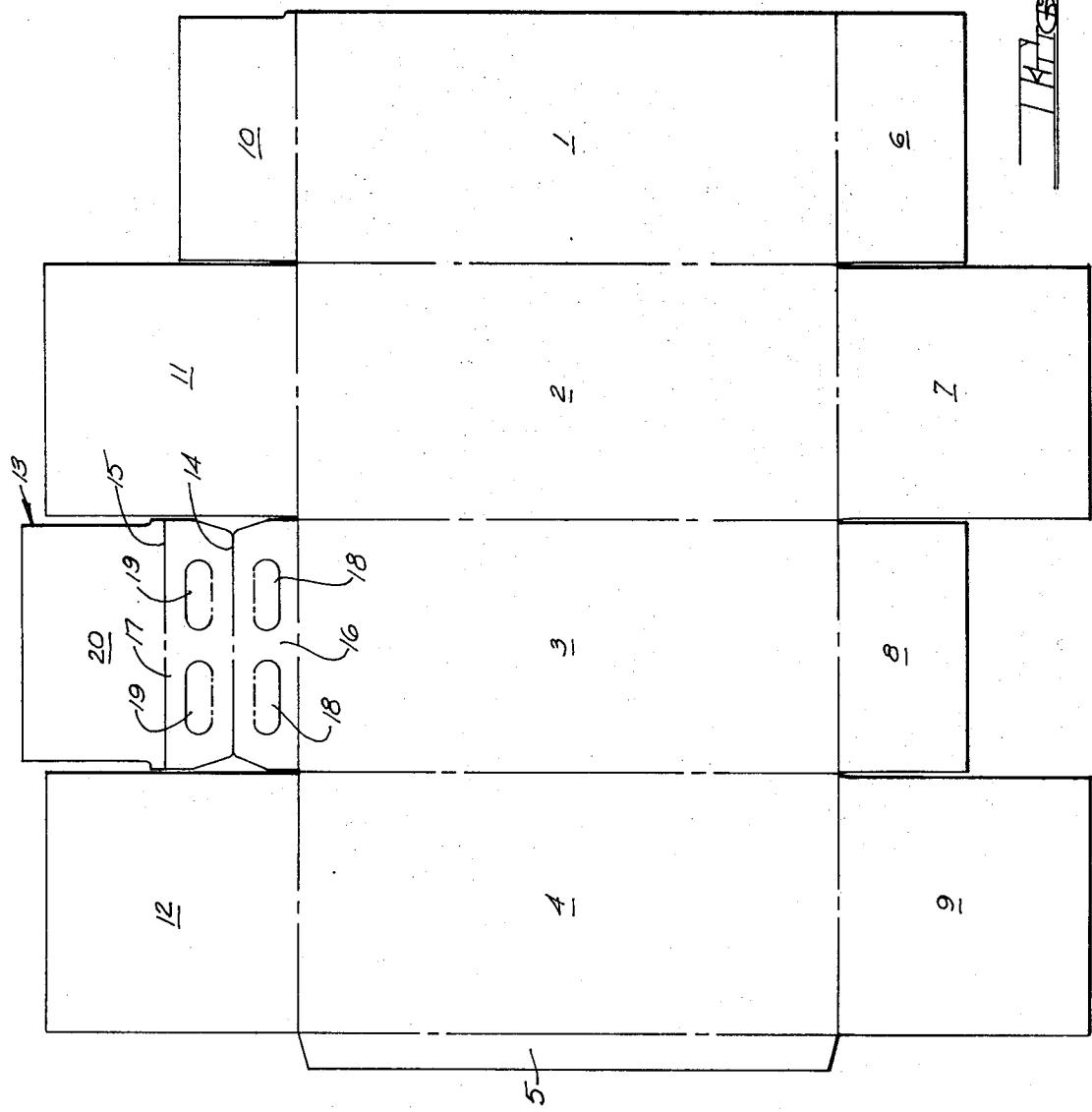
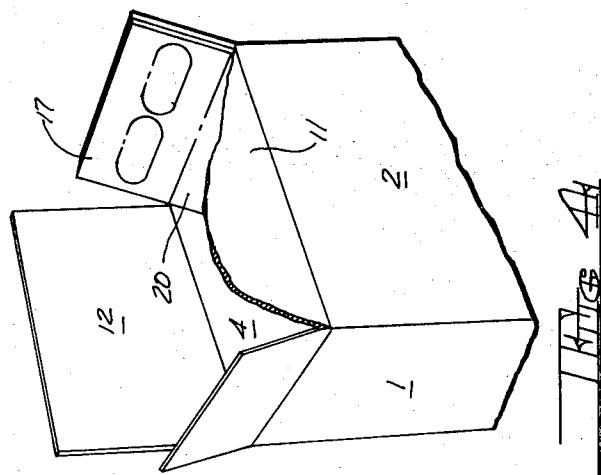
Primary Examiner—Travis S. McGehee
Attorney, Agent, or Firm—Melville, Strasser, Foster &
Hoffman



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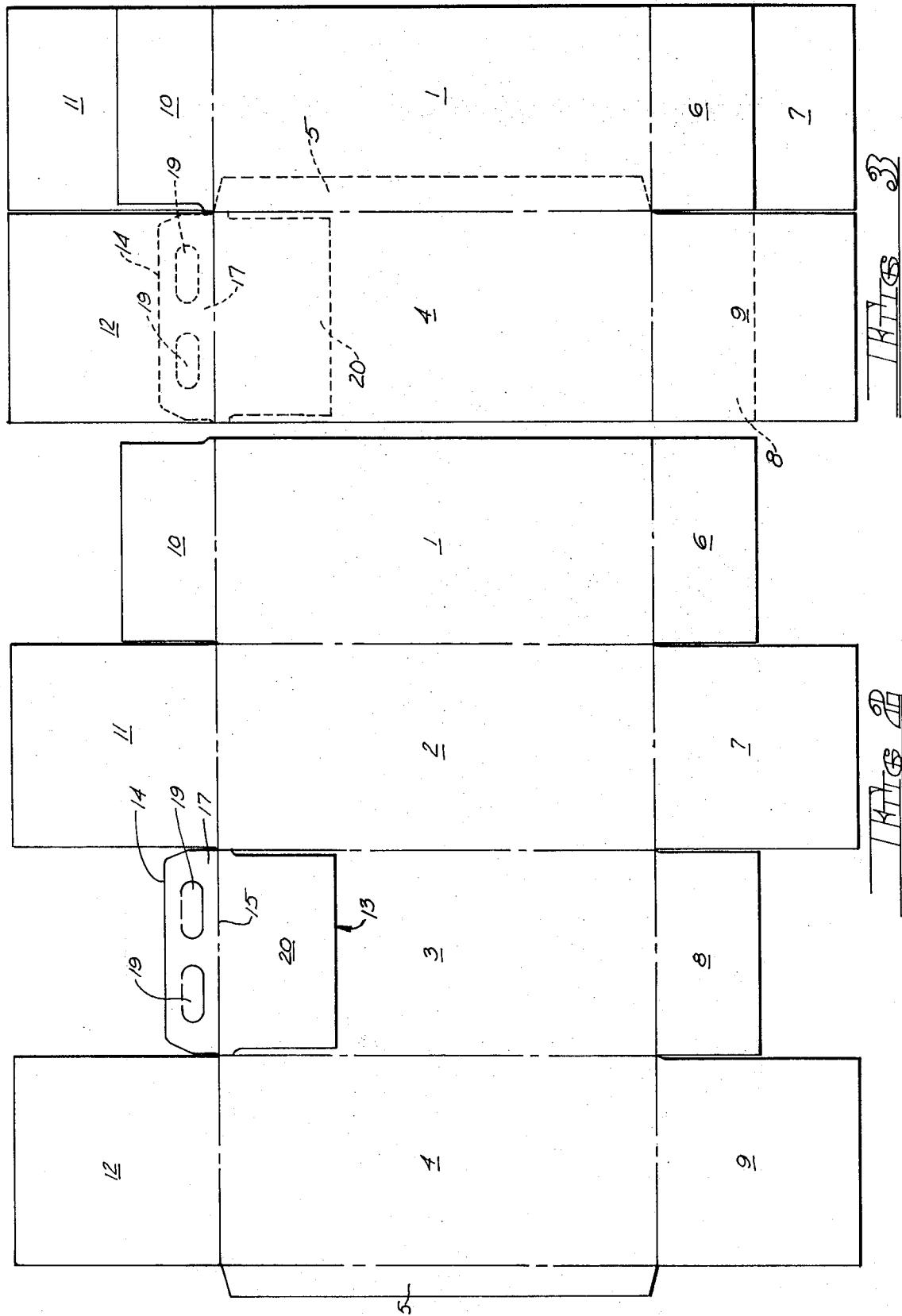
SHEET 1 OF 6



PATENTED FEB 4 1975

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SHEET 2 OF 6



PATENTED FEB 4 1975

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SHEET 3 OF 6

PRESSURE
SEAL OF
BOTH ENDS

D

FOLD & SEAL UPPERMOST
END CLOSURE (BOTTOM
OF CARTON)

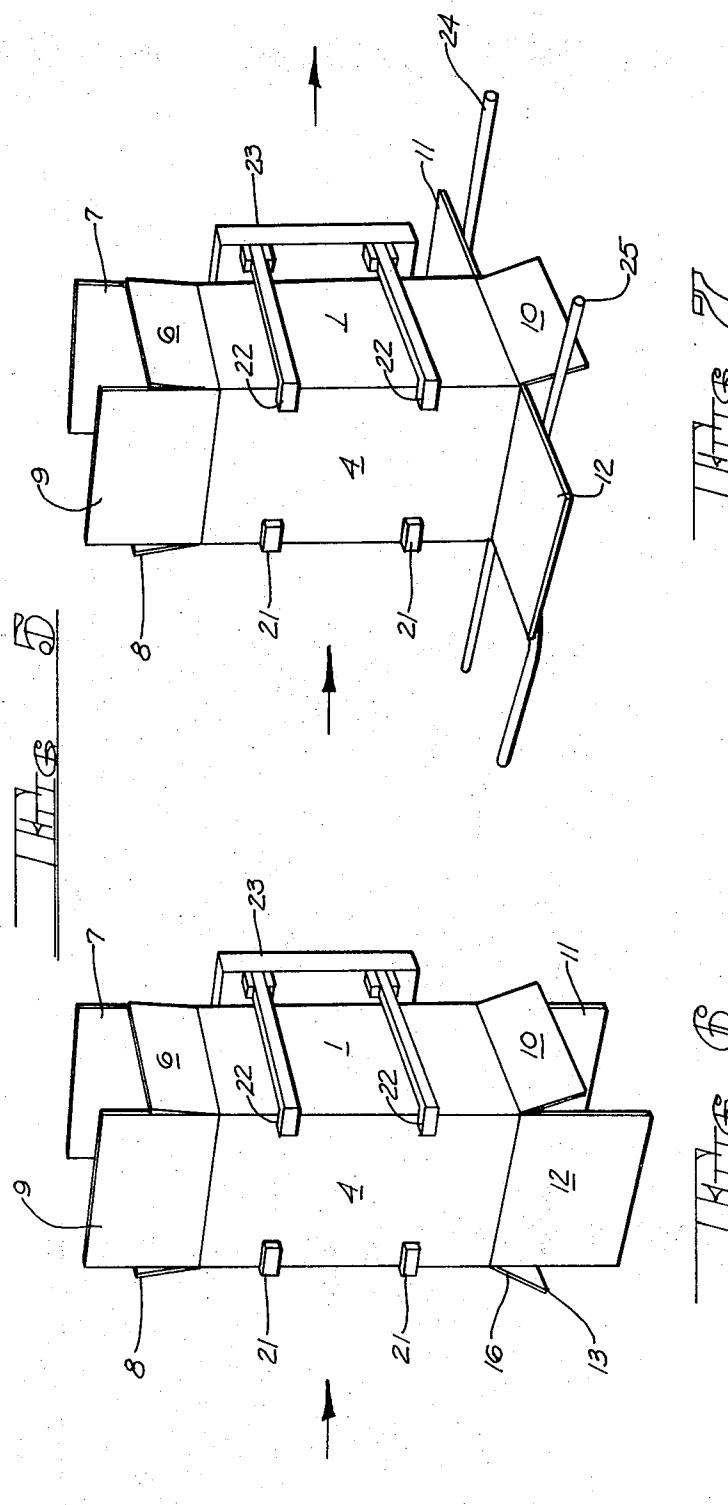
C

FILL CARTON THROUGH
OPEN UPPERMOST
END

B

FOLD & SEAL LOWERMOST
END CLOSURE - (TOP
OF CARTON)

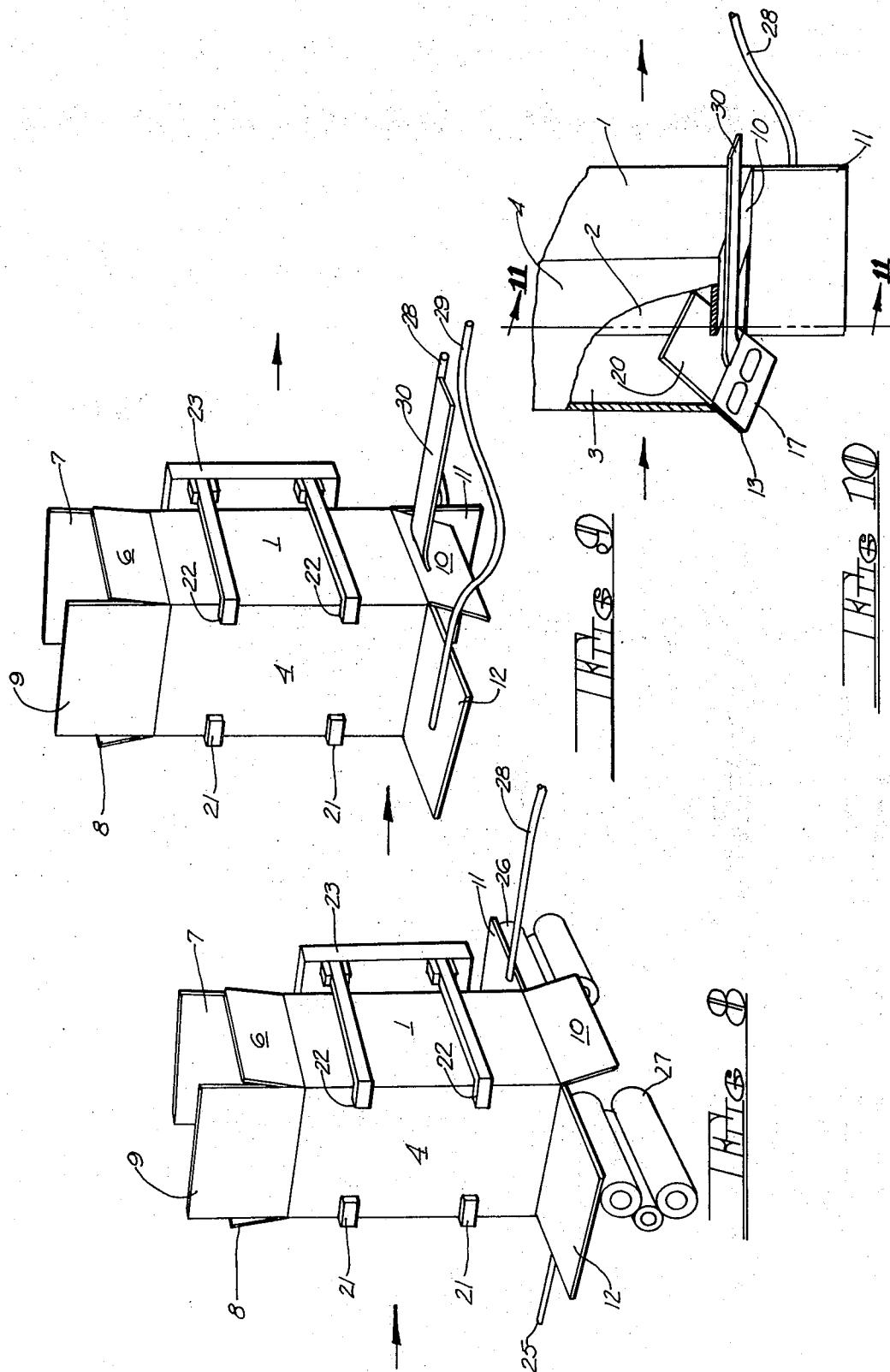
A



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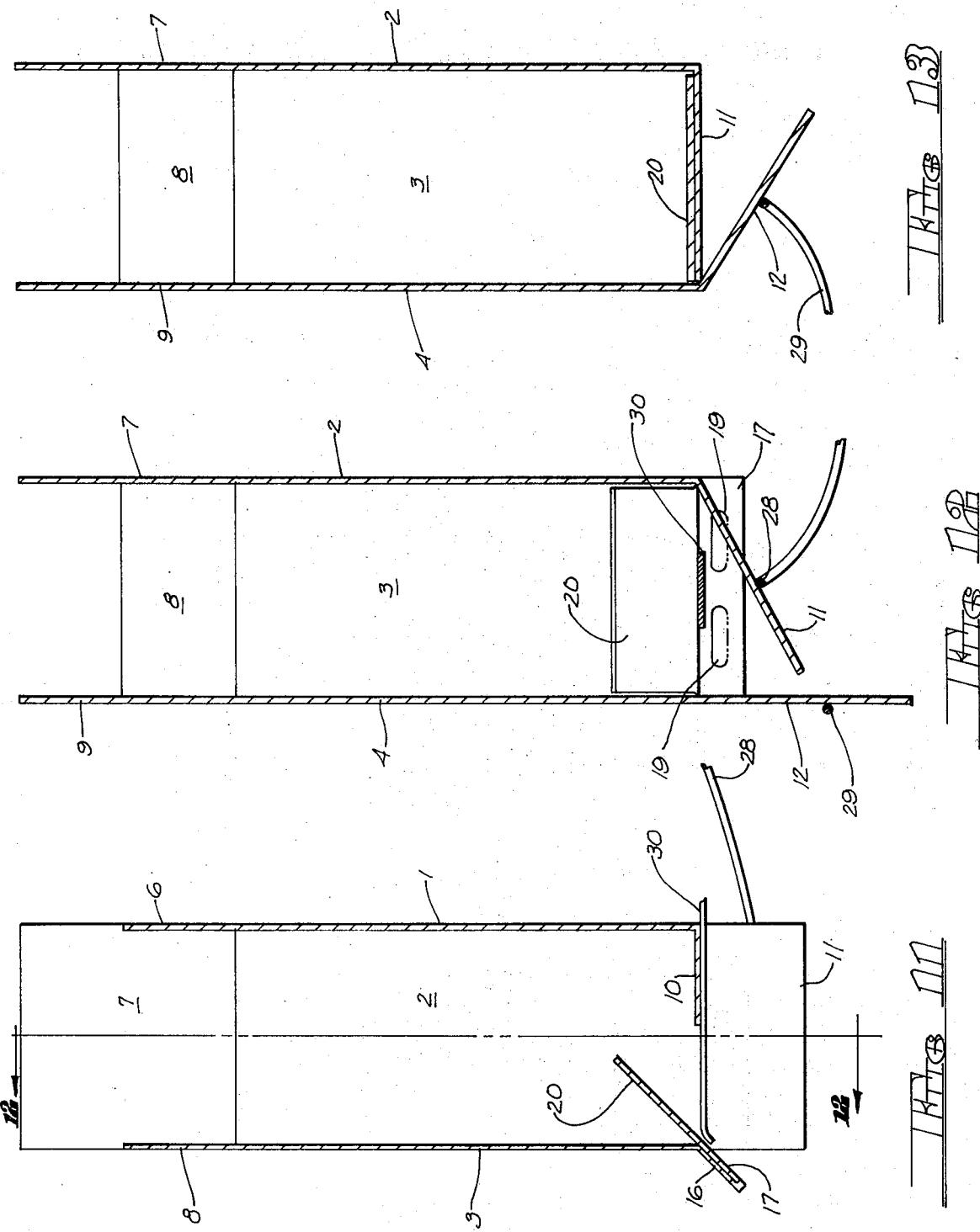
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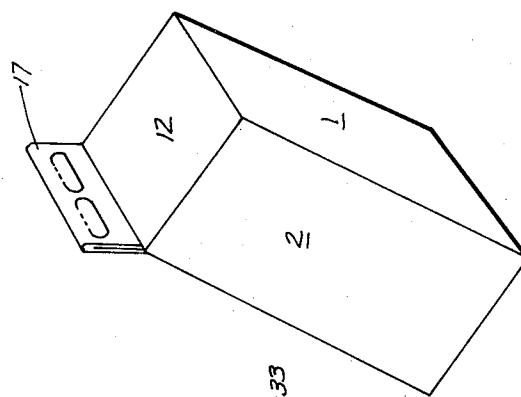
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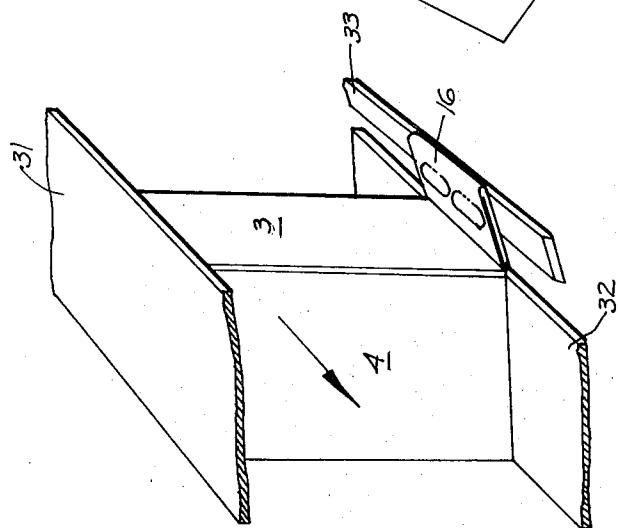
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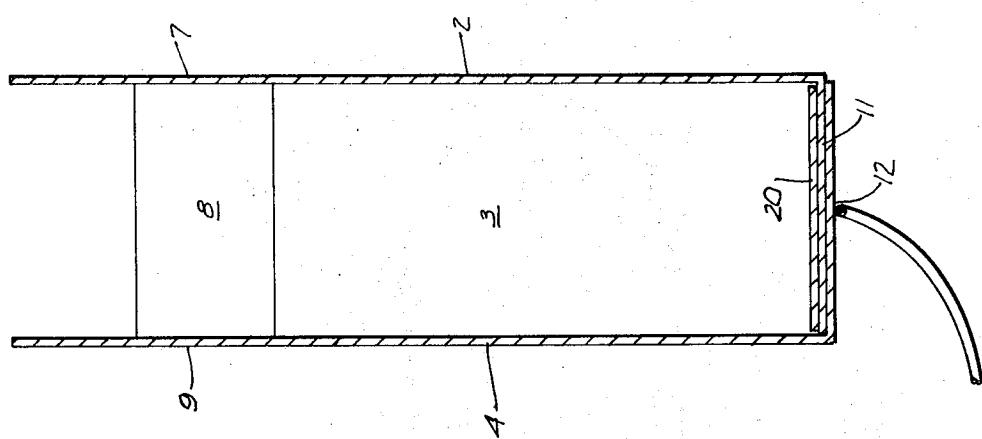
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THICKNESS 116



THICKNESS 115



THICKNESS 114

METHOD FOR CLOSING AND SEALING CARTON HAVING INTEGRAL CARRYING HANDLE

BACKGROUND OF THE INVENTION

The present invention has to do with the manufacture of paperboard cartons, and relates specifically to a continuous method for closing and sealing carton structures of the type taught in co-pending application Ser. No. 264,934, in the name of Chester F. Walters, filed June 21, 1972, and entitled "Carton With Integral Reinforced Handle", now U.S. Pat. No. 3,815,809, issued June 11, 1974. In accordance with that invention, the entire carton structure, including its handle, is formed from a one-piece paperboard blank which requires only slightly more paperboard than a conventional seal-end carton. The carton blank is cut and scored to define body walls in side-by-side articulation together with a longitudinal glue flap for joining the body walls together to form a tubular body. Conventional and closure flaps are provided at the bottom ends of the body walls, such flaps usually comprising a pair of full-width outermost closure flaps and a pair of essentially half-width innermost closure flaps. The top closure, on the other hand, is defined by an opposing pair of full-width flaps, with a third of the top closure flaps formed from a panel cut and scored to define a pair of handle forming parts lying immediately beyond the body wall to which the panel is connected, together with a closure flap portion extending beyond the handle parts and preferably of a length to extend only partially across the end of the carton. A fourth closure flap is hingedly connected to the remaining carton body wall, and it is preferably of a width such that the combined widths of the third and fourth closure flaps will be no greater than the width of the carton.

The construction of the carton blank is such that it may be readily fabricated into knocked-down condition utilizing conventional folding and gluing equipment. As an incident of such fabrication, the handle forming parts are reversely folded relative to each other and adhesively secured together to form a double thickness handle, such folding and gluing operation resulting in the juxtaposition of the closure flap portion of the panel to the inner surface of the carton body wall to which the handle is hingedly connected.

When the carton body is erected and the various end closure flaps infolded and adhesively secured together, a carton structure is provided in which the carrying handle extends along one side edge of the carton top closure. Preferably, the sequence of folding is such that the third and fourth closure flaps are innermost, with the two full-width top closure flaps overlying the innermost flaps, thereby serving to effectively anchor the handle in a manner which resists forces tending to tear or peel the handle when the filled carton is being carried.

While it was contemplated that the carton could be erected and its bottom closure flaps sealed in conventional fashion, and that the top closure also could be sealed in essentially conventional fashion involving the sequential infolding of the various closure flaps, it has now been found that the end closure including the carrying handle lends itself to a simplified closing and sealing procedure which makes it possible to close and seal the handle end of the carton, fill the carton with contents, close and seal the opposite end of the carton and, if desired, thereafter apply sealing pressure to the car-

ton ends, all in a high speed, continuous, in-line operation.

RESUME OF THE INVENTION

5 In accordance with the invention, the knocked-down cartons are first erected, i.e., the carton body walls squared-up, the carton structures then being advanced, in vertical position, in a straight-line path of travel, preferably with the end closures including the carrying handles lowermost. Each carton is positioned with the panel incorporating the carrying handle rearmost, and a stationary sweep is positioned to sequentially contact and infold the leading closure flap at the lowermost end of the carton and thereafter outfold the handle parts 10 which extend along the trailing edge of the carton. The outfolding of the handle parts automatically serves to bring the closure flap portion of the trailing panel to an infolded position, the dimensions of the leading closure flap and the closure flap portion of the trailing panel 15 preferably being such that their combined widths are substantially equal to the front-to-rear dimension of the carton body.

20 Sweep means are also provided to initially outfold the remaining opposing pair of closure flaps at the lowermost end of the carton, which are preferably full-width closure flaps, the out-folding of these flaps positioning them for contact by adhesive applicator means which apply adhesive to the innermost or underlying surfaces of the flaps, whereupon the flaps are engaged by sweep 25 means arranged to sequentially infold and juxtapose the opposing pair of closure flaps.

30 Following the closing and sealing of the lowermost end of the carton, which is actually the top closure, the carton is next passed to a filling station at which the 35 contents are introduced through the open remaining end of the carton, which is uppermost. Thereafter the closure flaps at the remaining end are closed and sealed in conventional fashion, the leading and trailing narrower flaps being first infolded, followed by the application of adhesive to the inner surfaces of the remaining flaps, whereupon they are sequentially infolded to 40 complete the end closure.

45 In order to insure positive sealing of the end closures, it is sometimes desirable, particularly where relatively large-area flaps are involved, to apply sealing pressure to the end closures. This may be conveniently done by passing the cartons between pressure belts which exert pressure against the end closures. In addition to the pressure exerted by the pressure belts, the extending 50 handles of the cartons may be utilized to deflect the closure flap portions to which the handles are connected in opposition to the pressure exerted by the belts, i.e., urge the underlying closure flap portions outwardly into contact with the overlying closure flaps, 55 thereby insuring an all-over tight bond between the juxtaposed flaps which further serves to strengthen the end closures and their integral carrying handles.

DESCRIPTION OF THE DRAWINGS

60 FIG. 1 is a plan view of a cut and scored paperboard blank for forming a carton structure incorporating an integral carrying handle.

65 FIG. 2 is a plan view of a carton blank of FIG. 1 illustrating the initial folding of the closure flap incorporating the carrying handle.

70 FIG. 3 is a plan view showing the carton blank in the knocked-down, flat-folded condition.

FIG. 4 is a fragmentary perspective view with parts broken away illustrating the positions of the closure flaps when the carton body is initially erected.

FIG. 5 is a diagram illustrating the successive stages in the closing, sealing and filling of the carton structures.

FIGS. 6 through 9 are fragmentary perspective views illustrating successive stages in the folding and gluing of the full-width closure flaps at the handle end of the carton.

FIG. 10 is a fragmentary perspective view with parts broken away and taken from a different angle illustrating the successive infolding of the trailing closure flap which includes the carrying handle.

FIG. 11 is a fragmentary vertical sectional view taken along the line 14—14 of FIG. 10.

FIG. 12 is a fragmentary vertical sectional view taken along the line 12—12 of FIG. 11.

FIGS. 13 and 14 are fragmentary vertical sectional views similar to FIG. 12 but illustrating successive stages in the in-folding of the full width closure flaps.

FIG. 15 is a fragmentary perspective view illustrating the application of sealing pressure to the end closures, including the deflection of the carrying handle to apply sealing forces to the closure flap portion secured to the handle.

FIG. 16 is a perspective view of the completed carton.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a paperboard blank for forming a carton incorporating an integral carrying handle, the blank comprising body walls 1, 2, 3 and 4 in side-by-side articulation in the order named, the body wall 4 having a longitudinal glue flap 5 extending along its outermost side edge. In the embodiment illustrated, the body walls 1 through 4 are of equal width so that the resultant carton is essentially square in cross-section, although it will be understood that the cartons may be rectangular in cross-section, having an opposing pair of relatively wide body walls with the remaining pair of opposing body walls of lesser width.

Along their bottom edges, the body walls are provided with conventional end closure flaps 6, 7, 8 and 9, the closure flaps 7 and 9 preferably being full-width flaps which completely cover the end of the carton, whereas the closure flaps 6 and 8 are preferably one-half width flaps, as is conventional in seal-end cartons. The top closure, on the other hand, comprises a relatively narrow top closure flap 10 hingedly connected to the upper edge of body wall 1, full-width closure flaps 11 and 12 hingedly connected to body walls 2 and 4, respectively, together with a preferably greater than full-width handle and closure flap forming panel 13 hingedly connected to body wall 3.

The panel 13 is provided with spaced apart score lines 14 and 15 which define equal width first and second handle parts 16 and 17, respectively, each of the handle parts being provided with a plurality of U-shape finger hole forming tabs, such as the mating sets of tabs 18 and 19. A closure flap portion 20 lies beyond and is hingedly connected to the second handle part 17. Preferably, the dimensions of closure flap 10 and closure flap portion 20 will be such that their combined width is substantially equal to the width of the carton body, although it will be understood that the widths of

these flaps may vary as desired depending upon the relative widths of the carton body walls.

In forming the knocked-down carton structure, the panel 13 will be first infolded along score line 14, thereby juxtaposing the first and second handle parts 16 and 17, with the interposition of adhesive therebetween, thereby bringing the blank to the condition illustrated in FIG. 2. Body wall 4 is then infolded along its line of articulation to body wall 3, followed by the in-

10 folding of body wall 1 along its line of articulation to body wall 2, thereby juxtaposing the free side edge of body wall 1 to the glue flap 5 to which it is adhesively secured, the parts thus assuming the knocked-down, flat-folded condition illustrated in FIG. 3. It will be

15 noted that the handle parts 16 and 17 define a double thickness carrying handle projecting upwardly from the uppermost end edge of body wall panel 3, with the closure flap portion 20 projecting downwardly within the carton body.

20 When the knocked-down structure is initially erected, i.e., squared-up, the end closure which includes the carrying handle will assume the condition illustrated in FIG. 4. Essentially, the end closure flaps 10, 11 and 12 extend in prolongation of the body walls to which they are connected, as do the handle forming parts of the panel 13. However, due to the fact that the handle part 17 and closure flap portion 20 are reversely folded, with the handle parts juxtaposed and adhered together, the resiliency of the scored and folded handle

25 tends to incline the handle outwardly, with a corresponding inward inclination of closure flap portion 20. At the opposite end of the carton, the closure flaps 6 through 9 will normally extend in prolongation of the body walls to which they are connected.

30 In accordance with the invention, it is preferred to process the cartons in inverted condition, i.e., with the handleforming end closures lowermost, the cartons being subjected to the sequence of operations illustrated in FIG. 5. Thus, as the erected cartons are ad-

35 vanced in a horizontal path of travel while oriented with their handle forming or normally top end closure lowermost, the lowermost end closure flaps are first folded and adhesively secured together, as indicated generally at A, whereupon the cartons pass a carton

40 filling station B for introduction of the contents through the remaining uppermost open ends, which are actually the bottom ends of the cartons. Following filling, the remaining end closure flaps, which are of con-

45 ventional seal-end variety, are infolded and adhesively secured together in conventional fashion, such opera-

50 tion being indicated at C in FIG. 5. If desired, following the closing and sealing of the remaining ends of the cartons, they may be conveyed to a pressure station D for the application of sealing pressure to the opposite end closures of the cartons to insure an allover positive seal between the flaps. This pressure sealing operation may be accompanied by the deflection of the extending handle of each carton in a direction which will urge the articulated closure flap portion 20 outwardly against the next adjacent full-width closure flap, i.e., the closure flap portion 20 is urged into contact with the inner surface of the innermost of the two full-width closure flaps.

55 As will be understood by the worker in the art, the entire sequence of steps may be performed in a continuous straight-line operation or on rotary type units having opposing straight-line flight portions intercon-

nected by curved translation portions, with the various operations performed either on the straight-line or curved portions of the unit, or both. A conventional way of conveying the erected cartons is by means of conveyors which mount carriers or cages having arms engageable about the carton body walls. Thus, as seen in FIG. 6, the carton may be engaged by the opposing pairs of arms 21, 22 of a carriage 23 which, it will be understood, is operatively connected to a continuously moving conveyor means. Such carriage arrangements are well-known and range from simple spring finger arrangements to sophisticated arrangements which may include means for withdrawing the flat-folded cartons from a feed hopper and erecting the carton body walls as an incident of engagement of the carton by the arms of the carriage mechanism.

The cartons are advanced with the folded handle defining panel 13 rearmost, as also will be evident from FIG. 6. As the carton advances in its path of travel, the opposing full-width closure flaps 11 and 12 may be engaged by sweep members 24 and 25, respectively, which, as seen in FIG. 7, outfold the full-width closure flaps to an essentially horizontally disposed condition, whereupon the under or inner surfaces of the flaps 11 and 12 are coated with adhesive by means of applicators 26 and 27. Thereafter, the flap 11 is first engaged by a sweep 28 (FIG. 8) and thereafter the flap 12 by a sweep 29 (FIG. 9), both of which are configured to sequentially infold and juxtapose the flaps 11 and 12. FIG. 9 also shows the leading end of a stationary sweep 30 positioned to contact and infold the leading closure flap 10 as the carton continues its forward movement. Once the flap 10 has been infolded by the sweep 30, the sweep next contacts the handle part 17 of panel 13 and folds the parts 16 and 17 outwardly, the outward movement of the handle parts causing inward movement of the attached closure flap 20, as will be evident from FIGS. 10 and 11. At the same time, the infolding of the full-width closure flaps 11 and 12 continues under the influence of sweeps 28 and 29, as will be evident from FIG. 11. Prior to the time the flap 11 is juxtaposed to the innermost closure flaps 10 and 20, the sweep 30 will terminate, and once the flap 11 is juxtaposed and adhered to the underlying flaps, the sweep 28 will also terminate, so that there remains only the sweep 29 which, as seen in FIGS. 13 and 14, completes the infolding of full-width flap 12. This completes the end closure and the carton next passes to section B of the machine, which comprises conventional filling apparatus for introduction of contents, whereupon in section C the end closure flaps at the uppermost end of the carton are sequentially infolded and adhered together. These operations are of conventional character and will be well understood by the worker in the art.

An arrangement is illustrated in FIG. 15 for subjecting the end closures of the cartons to pressure by means of belts 31 and 32 which effectively compress the end closures between them as the cartons are advanced. This may be done as an in-line operation while the cartons are still being advanced by the carriages or, in the alternative, the cartons may be discharged from the carriages prior to their engagement by the pressure belts 31 and 32.

FIG. 15 also illustrates the flexing of the handle parts to apply additional sealing pressure between the closure flap 20 and the next adjacent closure flap 11. Thus, if the cartons are rotated 90° relative to their ini-

tial direction of movement so that the handle parts now extend in the direction of movement, a sweep 33 may be utilized to flex the handle parts upwardly, such flexing movement effectively causing the closure flaps 20 to be pressed downwardly into tight sealing contact with the closure flap 11. Such expedient gives further assurance that the closure flaps will be tightly adhered together in the critical areas, thereby insuring the integrity of the carrying handle and the ability of the end closure to resist tearing and peeling forces when the filled carton is carried by its handle.

The completed carton is illustrated in FIG. 16 in its position of use, namely, with the carton body effectively suspended from the carrying handle. When so suspended, the carton body assumes a tilted position with the weight load distributed on opposite sides of the handle.

As should now be evident, the instant invention provides a simplified procedure and technique for folding and gluing a carton end closure which incorporates a carrying handle, and additionally permits the complete folding, gluing and filling of the carton without having to invert it, as well as providing for the pressure sealing of the end closures after initial closing to insure tight sealing engagement of the flaps, particularly in the critical areas adjacent the handle.

Modifications may be made in the invention without departing from its spirit and purpose. For example, while it is preferred to advance the carton structures with the handle forming end closure lowermost, it will be evident that the same folding technique could be applied if the handle forming end closure were uppermost, although this usually requires that the carton be inverted and ultimately filled through its opposite end since it is difficult to fill the carton through the handle forming end closure due to the presence of the closure flap portion 20 which extends downwardly within the carton body. It should also be evident that there is some leeway in the sequence in which the various closure flaps are folded. For example, while a preference is expressed for outfolding and applying adhesive to the opposing full-width closure flaps prior to the folding of the leading closure flap and the trailing handle forming panel, it will be evident that the latter two parts may be folded first and followed by the application of adhesive and infolding of the full-width flaps, depending in some measure upon the space available for the various folding instrumentalities. Other modifications will be readily apparent to the worker in the art upon reading this specification, and accordingly it is not intended that the invention be limited other than as set forth in the claims which follow.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a method for closing and sealing a carton having a tubular body and end closures at its opposite ends, one of said end closures comprising end closure flaps hingedly connected to the end edges of three of the carton body walls and a panel hingedly connected to the end edge of the remaining carton body wall, the panel being cut and scored and folded upon itself to define a double thickness carrying handle immediately adjacent the remaining carton body wall and a closure flap portion extending in prolongation of the reversely folded portion of the handle, the steps of positioning the tubular body of the carton in vertically disposed position

with the closure flaps and carrying handle extending in prolongation of the carton body walls and with the closure flap portion of the handle forming panel extending inwardly within the carton body, advancing the carton in a path of travel and, as the carton advances, sequentially infolding the leading closure flaps and outfolding the carrying handle, the outfolding of the carrying handle acting to infold the attached closure flap portion into essentially planar relationship with the leading closure flap, and thereafter infolding and adhesively securing the remaining end closure flaps to the leading closure flap and the closure flap portion of the handle forming panel.

2. The method claimed in claim 1 including the step of advancing the carton in its said path of travel with the end closure including the carrying handle lowermost.

3. The method claimed in claim 2 including the step of introducing contents into the carton body through its uppermost end subsequent to the closing and sealing of the lowermost end closure.

4. The method claimed in claim 3 wherein the uppermost end closure is composed of a plurality of end closure flaps, including the step of infolding and adhesively securing together the last named end closure flaps subsequent to the introduction of contents into the carton body.

5. The method claimed in claim 4 including the step of applying sealing pressure to both end closures subsequent to the closing and sealing of the uppermost end closure.

6. The method claimed in claim 5 including the step of deflecting the carrying handle upwardly relative to the lowermost end closure, thereby causing the closure flap portion connected to the handle to be pressed downwardly into tight sealing engagement with the next adjacent end closure flap.

7. The method claimed in claim 1 wherein said remaining end closure flaps comprise full-width flaps, including the steps of applying adhesive to the inner surface of each said remaining end closure flap, and thereafter sequentially infolding said remaining closure flaps to complete the end closure.

8. The method claimed in claim 7 including the step of outfolding said remaining closure flaps relative to the carton body walls to which they are attached, and applying adhesive to their inner surfaces while said flaps are in the outfolded condition.

9. The method claimed in claim 1 wherein the infolding of the leading closure flap and the outfolding of the handle are effected by means of a stationary sweet positioned to sequentially contact said closure flap and handle as the carton advances in its path of travel.

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