Oct. 4, 1966 F. C. GROSS 3,276,659

CARTON

Original Filed Dec. 17, 1962 4 Sheets-Sheet 1

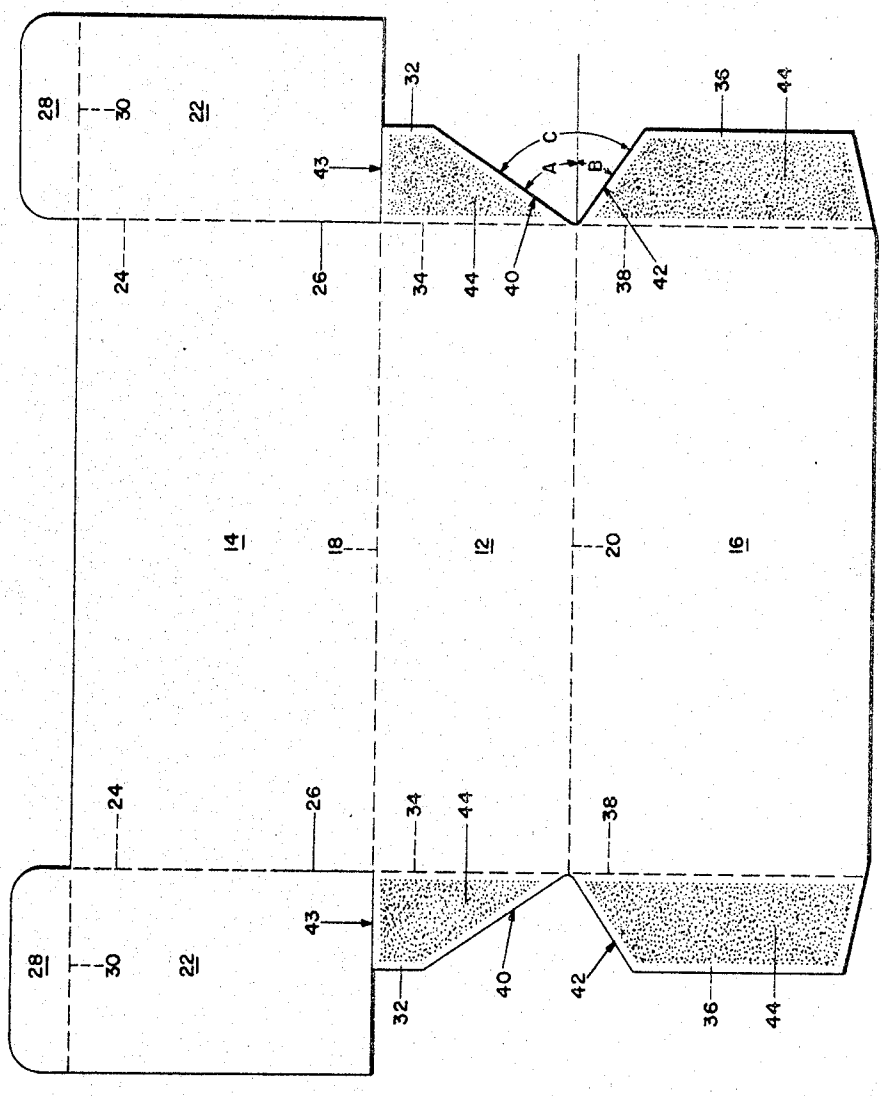


Fig. 1.

10

INVENTOR.
FRANK C. GROSS
BY Kenwood Ross
ATTORNEY.

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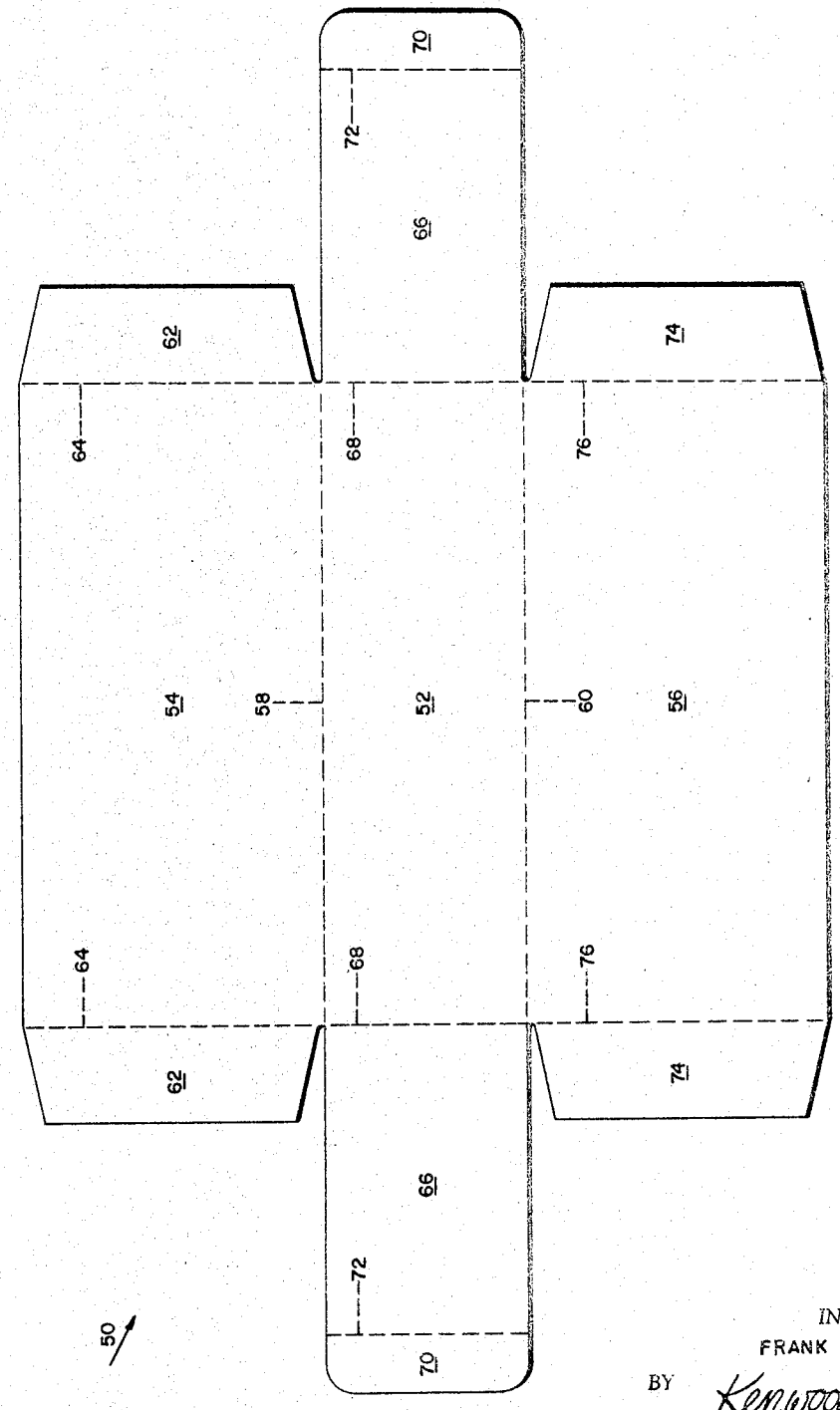


FIG. 2

INVENTOR.
FRANK C. GROSS
BY Kenwood Ross
ATTORNEY.

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CARTON

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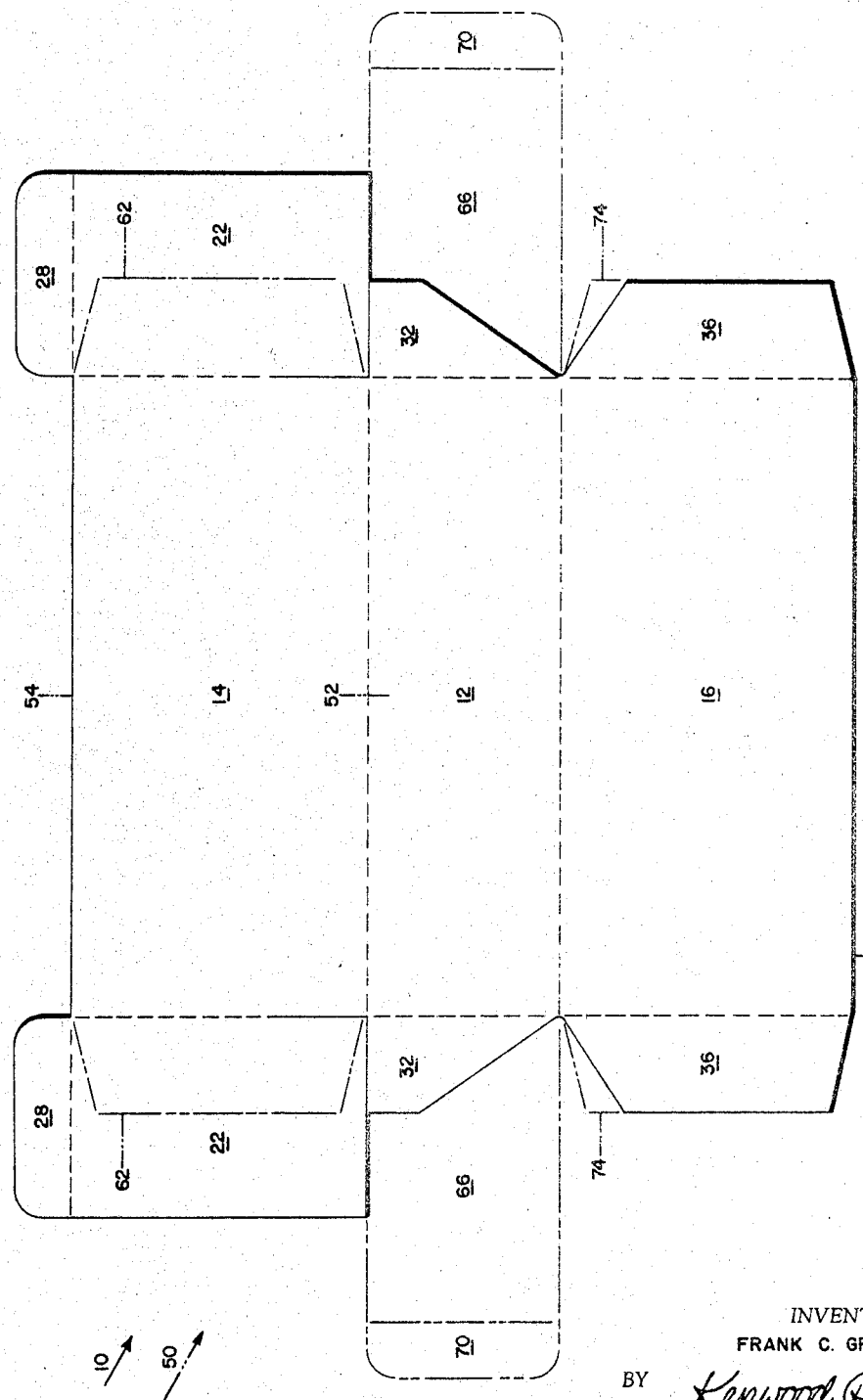


FIG. 3.

INVENTOR.
FRANK C. GROSS
BY Kenwood Ross
ATTORNEY.

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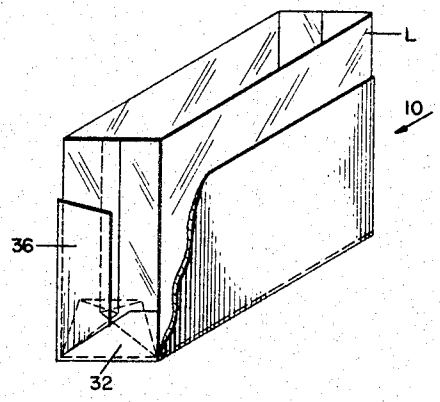


Fig. 8.

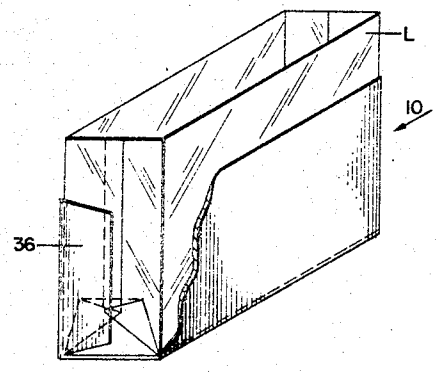
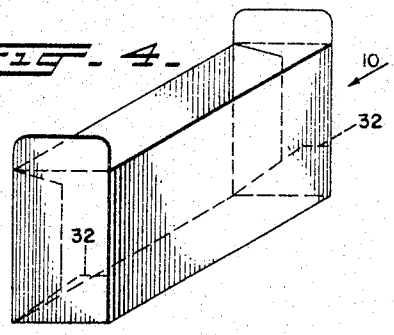


Fig. 9.

Fig. 4.



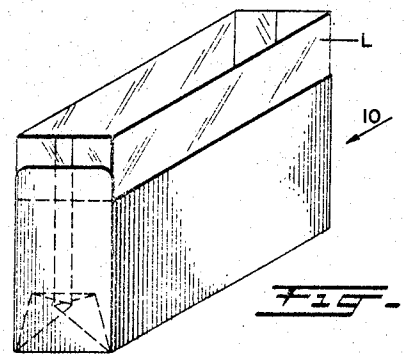


Fig. 7.

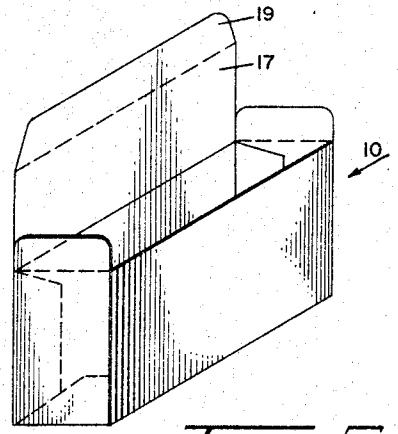


Fig. 6.

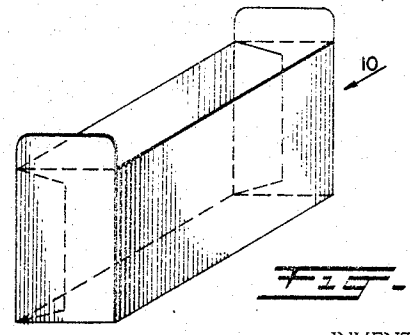


Fig. 5.

INVENTOR.
FRANK C. GROSS

BY Kenwood Ross
ATTORNEY.

United States Patent Office

3,276,659
Patented Oct. 4, 1966

3,276,659

CARTON

Frank C. Gross, 863 Ridge Road, Wilbraham, Mass.

Original application Dec. 17, 1962, Ser. No. 245,948, now Patent No. 3,185,046, dated May 25, 1965. Divided and this application Mar. 31, 1965, Ser. No. 444,233

9 Claims. (Cl. 229—16)

This application is a division of co-pending application, Ser. No. 245,948, filed December 17, 1962, now Patent No. 3,185,046.

The present invention relates to new and useful improvements and structural refinements in a unique design and configuration of economy style carton and blank from which same is erected.

The invention resides in the construction, arrangement, location and relationship of the various elements, components, and configuration of an economy style container blank, as exemplified in the detailed disclosure hereinafter set forth.

A primary object of the invention is to teach a form of carton wherewith the sequential steps of the carton-erecting technique of the parent application may be successfully performed.

The present invention comprehends an erectable style carton blank, same being of a type wherein appreciable savings of material, in the area of 15 to 25%, depending on the blank size, are attained in the blanking operation by virtue of the fact that more blanks may be formed from a single sheet of stock than is now possible with conventional style blanks.

The novel features which I consider as characteristic of my invention, as to its principles of design and erection, will become apparent from a consideration of the following detailed description when read in conjunction with the drawings in which:

FIG. 1 is a top plan view of an economy style, tray or carton type blank;

FIG. 2 is a top plan view of a conventional style, tray or carton type blank for purposes of comparison with the blank of the invention illustrated in FIG. 1;

FIG. 3 is a top plan view of an economy style blank as shown in FIG. 1 and shown in solid lines, superimposed upon a conventional style blank, as shown in FIG. 2 and shown in phantom lines;

FIG. 4 illustrates, in perspective view, an economy style blank, with bottom panel glue tabs incorporated therewith, in erected position as a tray;

FIG. 5 illustrates, in perspective view, an economy style blank, without bottom panel glue tabs, in erected position as a tray;

FIG. 6 illustrates, in perspective view, an economy style blank, with bottom panel glue tabs incorporated therewith, in erected position as a carton with a hinged cover;

FIG. 7 illustrates in perspective view, an economy style blank, in erected position as a tray, with a liner cooperant therewith;

FIG. 8 illustrates, in perspective view, an economy style blank, with bottom panel glue tabs incorporated therewith, in erected position as a tray, and with a liner cooperant therewith, with portions of the blank being broken away for purposes of clarity; and

FIG. 9 illustrates, in perspective view, an economy style blank, without bottom panel glue tabs, in erected position as a tray, and with a liner cooperant therewith, with portions of the blank being broken away for purposes of clarity.

With continued reference now to the drawings, which illustrate typical embodiments of the invention for the purpose of disclosure, I have provided figures in simplified form showing the essentials of the invention as may be

advantageously incorporated within the rudiments of the specific apparatus envisioned in the parent application, all in order that the general relationship of components and their interaction may be better understood.

The economy style carton blank comprehended herein may be formed of any foldable material, although preferentially, it is formed of paperboard.

Further preferentially, the carton blank will carry spot coatings or overall coatings of a heat-sealable medium on certain surfaces of certain of its panels, which panels may be subjected to heating and pressure sealing during certain of the sequential steps in a carton-erecting operation whereby the fully-erected end product is fully-sealed in certain contacting and permanently-bonded areas or portions thereof.

The liners comprehended for use herein may be formed of any sheeting of a suitable film, paper or foil or laminated combinations thereof, and preferably may have an overall heat sealable coating on one surface thereof. A material found particularly suitable for such purpose has been made commercially available by Reynolds Aluminum Co. under the proprietary name "Reyseal." Such heat sealable surface of the liner would usually contact the inside surfaces of the container.

In FIG. 1, I have shown, in top plan view, an economy style tray or carton type blank, generally indicated by numeral **10**, which is die cut and prescored, its component elements comprising a bottom panel **12**, front and rear panels **14** and **16** respectively which are hingedly connected to the bottom panel at opposite side edges thereof along score or folding lines **18** and **20** respectively, with an end panel **22** at each opposite end edge of the front panel which is hingedly connected thereto along the respective score line **24**, **26**, with a dust flap **28** at the upper edge of each end panel which is hingedly connected thereto along the respective score line **30**, with a bottom panel glue tab **32** at each end edge of the bottom panel which is hingedly connected thereto along the respective score line **34**, and with a rear panel glue tab **36** at each end edge of the rear panel which is hingedly connected thereto along the respective score line **38**.

Bottom panel glue tabs **32** are each provided with one end edge **40** which is angularly-disposed relative to the longitudinal axis defined by score line **20**, the angle being delineated by the letter A, and rear panel glue tabs **36** are each provided with one end edge **42** which is angularly-disposed relative to said longitudinal axis, the angle being delineated by the letter B, angle A being equal to or greater than angle B and preferentially, the sum of the angles A and B, repesented by the letter C, being 90° or slightly greater than 90°, for reasons as will appear in due course.

It is to be explained that, herein, the score or folding crease lines are indicated by broken lines in flat representation and in full lines in folded or partially folded representation, except in the case of cut score **26**, which is a part of score line **24** between front panel **14** and each end panel **22**. All other score lines may be crease or cut scores or combinations thereof to suit the particular needs of a specific container or of a specific type of material.

In the design of a blank of such a configuration that a slit **43** is provided so as not to require the removal of stock between end panel **22** and glue tab **32**, it is imperative that score **26** which is a portion of score line **24** be cut score so as to permit the formation of a square tray or carton, a cut score eliminating the usual interference which a crease score would create. Such score **26** should be of length equal to or greater than the width of the adjacent glue tab **32** although conceivably the cut score may be provided throughout the full length of each front panel-end panel interconnection.

With further reference to the economy style carton

blank of FIG. 1, bottom panel glue tabs **32** and rear panel glue tabs **36** may be provided, on their respective outer surfaces, as same operationally are rotated into confrontation with an inner surface of adjacent end panel **22**, with a coating of a heat sealable medium **44**, according to any desired and suitably-arranged glue pattern. Reversely. such coating may be provided on the inner surfaces of end panels **22**, same not being shown in said FIG. 1 for purposes of clarity.

Such heat sealable medium may be in the form of an overall coating on the panels or glue tabs in question or in the form of spaced, strategically-located spots, it being not necessary that both of the confrontable surfaces be so conditioned to effectuate successful heat sealing of one member to the other.

If otherwise desired, in preference to preconditioning the blanks with a heat sealing medium as aforedescribed, such medium conceivably could be applied to the appropriate surfaces of the panels or glue tabs in situ at the carton-erecting station or adjacent thereto by way of suitable instrumentation.

For purposes of comparison, I have shown in FIG. 2, in top plan view, a conventional style tray or carton type blank, generally indicated by numeral **50**, and comprising a bottom panel **52** and front and rear panels **54** and **56** respectively which are hingedly connected to said bottom panel at opposite side edges thereof along score lines **58** and **60** respectively. Additionally, at each opposite end edge of said front panel, a front panel glue tab **62** is hingedly connected thereto along the respective score line **64**, and at each end edge of said bottom panel, an end panel **66** is hingedly connected thereto along the respective score line **68**. Still further, at the opposite end edge of each said end panel, a dust flap **70** is hingedly connected thereto along the respective score line **72**, and at each end edge of said rear panel, a rear panel glue tab **74** is hingedly connected thereto along the respective score line **76**.

Attention is directed to the usual removal of segments of stock between end panels **66** and respective adjacent glue tabs **62** and **74**, the necessity for which is obviated in the case of the economy style blank carton of FIG. 1.

With conjoint reference to FIGS. 1 and 2, I have shown in FIG. 3 an economy style tray or carton type blank **10** in superposed relation upon a conventional style tray or carton type blank **50**, to dramatize the markedly appreciable savings of material realizable with the economy style blank. Savings of material from between 15 and 25%, depending on blank size, are achievable.

Whereas the blanks under comprison are shown as allowing containers of identical size, the overall length of the economy style blank will be observed to be shorter than the conventional style blank.

It will be apparent that an economy style blank may be identified as one wherein the depth, or height of the carton, inclusive of the dust flaps, exceeds the width of the erected carton. Such is possible when the width of the carton, whether it be of the tray or carton type, is less than the overall height of the end panel thereof.

In the first stage of the progression of sequential steps of a carton-erection program the economy style blank **10** will be understood to be in proper register with the cooperant instrumentalities, with the bottom panel glue tabs **32**, in the second stage of the progression, being preliminarily folded to assume planes approximately at 90° angles relative to the plane of bottom panel **12** along respective score lines **34**.

In cases where an economy style blank and a cooperant liner are erected conjointly, it is necessary to prefold the front and rear panels **14** and **16** respectively for effecting a control of the end folds of the liner, and this is so whether or not the carton blank is of the normal type incorporating bottom panel glue tabs or of the type not necessitating same.

In the third stage of the progression, the aforedescribed initial folding is followed by the allowance of bottom panel glue tabs **32** to spring back slightly so as to assume somewhat angular positions.

With bottom panel glue tabs **32** having so sprung backwardly, front and rear panels **14** and **16** respectively and end panels **22** and rear panel glue tabs **36** and bottom panel glue tabs **32** are partially folded with the folding of front panel **14**, preceding the folding of rear panel **16** in point of time.

In the fourth stage of the progression, front panel **14** will have been fully folded or erected to a position where it is disposed in a plane at substantially 90° relative to the plane of bottom panel **12** and end panels **22**, bottom panel glue tabs **32** will have been almost completely folded, and rear panel **16** and rear panel glue tabs **36** will have been partially folded.

Conceivably, front panel **14** could be disposed in a plane greater than 90° to the plane of bottom panel **12** to suit certain conditions as may be required for a container with tapered sides.

In the sequence of steps, rear panel **16** and rear panel glue tabs **36** are desirably not folded beyond a certain position so as to allow the other panels to remain in their respective positions, thereby to insure proper deflection of rear panel glue tabs **36** inwardly of their respective end panels **22**.

By such positions of confronting relationship of panels and glue tabs, rear panel glue tabs **36** and bottom panel glue tabs **32** may be folded and rotated into their finally-erected positions before the respective end panels **22** assume their finally-erected positions relative thereto, whereupon the fully erected carton condition is attained.

Thus, it will be appreciated that the sequential steps of folding the carton blank comprise: first, prefolding the bottom panel glue tabs; second, deflecting the front panel; third, allowing the bottom panel glue tabs to spring backwardly during front panel deflection for the retaining engagement of each bottom panel glue tab behind its respective end panel; fourth, folding the end panels and bottom panel glue tabs and rear panel glue tabs simultaneously while the front panel is rotated into completely formed position and while the rear panel and associated rear panel glue tabs are partially rotated with the rear panel glue tabs being deflected inwardly of the adjacent end panels; fifth, completing the rotation of the rear panel and its associated glue tabs; and sixth, bringing the end panels and the associated bottom and rear panel glue tabs into sealing engagement.

Where a carton blank and a liner are formed simultaneously, it will be appreciated that the sequential steps comprise: first, prefolding the bottom panel glue tabs and the portions of the liner cooperant therewith and simultaneously deflecting the front and rear panels and the portions of the liner cooperant therewith; second, allowing the bottom panel glue tabs to spring backwardly for the retaining engagement of each bottom panel glue tab behind its respective end panel; third, simultaneously folding the end panels and bottom panel glue tabs and the rear panel glue tabs and the portions of the liner cooperant therewith while the front panel and portions of the liner cooperant therewith are rotated into completely formed position and while the rear panel and the associated rear panel glue tabs and the portion of the liner cooperant therewith are partially rotated with the rear panel glue tabs being deflected inwardly of the adjacent end panels; fourth, completing the rotation of the rear panel and its associated glue tabs and the portions of the liner cooperant therewith; and fifth, bringing the end panels and the associated bottom and rear panel glue tabs and the cooperant liner into overlapping and sealing engagement.

Conceivably, the carton blank might not employ the bottom panel glue tabs, in which instance, the sequential steps will be understood to comprise: first, folding the end panels and rear panel glue tabs simultaneously while

the front panel is rotated into completely formed position and while the rear panel and associated rear panel glue tabs are partially rotated with the rear panel glue tabs being deflected inwardly of the adjacent end panels; second, completing the rotation of the rear panel and its associated glue tabs; and third, bringing the end panels and the rear panel glue tabs into sealing engagement.

Where such a carton blank, absent bottom panel glue tabs, is employed and the liner is simultaneously formed therewith, the sequential steps will be understood to comprise: first, simultaneously deflecting the front and rear panels and the portions of the liner cooperant therewith and the prefolding of portions of the liner extending outwardly of the opposite ends of the bottom panel; second, simultaneously folding the end panels and the rear panel glue tabs and the portions of the liner cooperant therewith while the front panel and portions of the liner cooperant therewith are rotated into completely formed position and while the rear panel and the associated rear panel glue tabs and the portion of the liner cooperant therewith are partially rotated with the rear panel glue tabs being deflected inwardly of the adjacent end panels completing the rotation of the rear panel and its associated glue tabs and the portions of the liner cooperant therewith; and third, bringing the end panels and the rear panel glue tabs and the cooperant liner into overlapping and sealing engagement.

In the erection program, style blank **10** and a liner L will be understood to be feedable simultaneously, or in seriatim, to their respective positions of registry at the so-called registration position of the carton-erecting apparatus, whereat they are disposed in substantial face-to-face relationship with each other.

Suitable rear panel prefolders first will function operationally to initiate prefolding of rear panel **16** of the carton blank, and liner L when and where used, delivered to the registering station and in the process of being pushed forwardly therefrom by a forming mandrel.

Simultaneously, suitable front panel and liner prefolders will function operationally to initiate prefolding of front panel **14** of the carton blank, and liner L when and where used.

Strategically-positioned bottom panel glue tab folders will assure confrontation each with the respective bottom panel glue tab and the deflection thereof as the forming mandrel moves forwardly through the registration station, in a forward carton-erecting direction from a position rearwardly of the registration station to a position forwardly thereof, driving blank **10**, or blank **10** and liner L, therewith, and reversely in a retrograde carton-sealing and pressurizing and erected-carton ejection direction.

As the forward face of the forming mandrel projects through the registration zone, bottom panel **12** of the blank and the adjacent portion of liner L will be in registration with forming mandrel forward face so as to be projected forwardly therewith, with the bottom panel glue tab folders serving to deflect the respective bottom panel glue tabs **32** and adjacent liner portions rearwardly, and with the front panel and liner prefolders serving to deflect the front panel **14** and adjacent liner portion rearwardly, and with the rear panel and prefolders serving to deflect the rear panel and adjacent liner portion rearwardly, such simultaneous prefolding feature being essential properly to control the initiation of the liner folds, particularly in the corner areas at the opposite ends of the liner in the process of erection.

Blank **10** and liner L having so been motivated forwardly of the registering and prefolding instrumentation, bottom panel **12** of the blank will next confront an erecting, or forming and sealing, assemblage aligned with the forming mandrel and disposed forwardly thereof.

The forming mandrel, so actuated in its carton-erecting direction so as to embrace, with its forward face, the bottom panel of the carton, or the liner adjacent the bottom panel of the carton where a liner is employed, urges

the carton blank, or the liner and carton blank, toward a blank retainer plate, and means for deflecting the end panel glue tabs and the front and rear panels from their coplanar relationship with the bottom panel as the bottom panel is clamped between the forward face of the mandrel and the opposed face of the blank retaining plate.

Suitably provided end panel and glue tab folding and sealing plates and the aforesaid front and rear panel folding plates are so strategically positioned to each other as to allow such sequential actuation thereof that the front panel folding plate will first effect a full folding of front panel **14** (i.e. a fold of 90° between front panel **14** and bottom panel **12**) while each end panel folding and sealing plate will effect an almost complete folding of its associated end panel **22** and bottom panel glue tab **32** and rear panel glue tab **36**, and suitably provided rear panel glue tab deflector plates will have deflected their respective glue tabs forward of end panels **22**, all while the rear panel folding plate will have achieved only a partial folding of rear panel **16**.

Continued carton-erecting motion of the forming mandrel will next assure the full folding action of the rear panel folding plate and consequent erection of the rear panel and the rear panel glue tabs therewith, while the end panel and glue tab folding plates will have continued their respective movements to bring the end panels and glue tabs into sealing position.

The preheating time of the end panels and glue tabs, and of the overlapping end folds of the liner when a liner is simultaneously formed therewith, is represented as the total time during which the end panels and glue tabs are sufficiently close to the end panel folding and sealing plates as to be heated thereby; the heat sealing time of the end panels and glue tabs and of the overlapping folds of the liner when used, is represented as the total time during which the end panels and glue tabs and overlapping folds of the liner are subjected to the pressure of the end panel folding and sealing plates during the sealing portion of the carton-erecting travel of the forming mandrel and during the sealing portion of the retrograde travel thereof.

By the coaction of the blank retainer plate and bottom face of the prime mover, bottom panel **12** of the carton blank will be deformed inwardly, under pressure, so as to overbreak along carton blank score lines **18**, **20** and **34** beyond 90°, wherefore a more-squarely formed carton results.

By provided heat sealing means, the interengagement of the outer face of each glue tab and a portion of the inner face of the related end panel is realized.

The forming mandrel is then withdraw outwardly, so that the now-erected carton will travel therewith until acted upon by suitably-positioned strippers.

By such program, I provide for the forming of a carton or tray from an economy style blank by itself or simultaneously with a cooperant liner.

In FIGS. 4–9, I have illustrated formed containers or trays erected from the economy style blank of the invention with and without cooperant liners.

In FIG. 4, I have shown the economy style blank **10** of FIG. 1 erected as a tray incorporating the bottom panel glue tabs **32**.

In FIG. 5, I have illustrated an economy style blank erected as a tray wherein the bottom panel glue tabs have been eliminated, a sometime-desired arrangement.

In FIG. 6, the economy style blank erected as a carton and modified to include a cover **17** and cover flap **19** has been illustrated.

In FIG. 7, I have shown the economy style blank, with liner L cooperant therewith, in erected position as a lined tray.

In FIG. 8, I have shown a lined tray with certain panels of the tray being broken away for the sake of clarity wherein the rear panel glue tab **36** and the bottom panel glue tab **32** at the exposed end are clearly shown.

The lined tray of FIG. 9 is similar to the lined tray of FIG. 8 except that the bottom panel glue tab **32** has been omitted, as is sometimes desired.

By the blank hereof, I am able to attain the simultaneous folding and sealing of a liner with a tray or carton wherein the liner is completely sealed so as to allow a moisture-proof dust-proof arrangement according to the specific types of liner materials being employed, and further wherein the folds of the liner are interlocked with each other and the liner is adhered to the inside of the tray or carton in certain areas so as virtually to offer a one-piece construction.

I claim:

1. A die cut and prescored economy style carton blank formed of a foldable material and constituted by a bottom panel, front and rear panels hingedly connected to said bottom panel at opposite side edges thereof, an end panel at each opposite end edge of said front panel and hingedly connected thereto, a dust flap hingedly connected to one edge of each of said end panels, a rear panel glue tab at each end edge of said rear panel and hingedly connected thereto, and a bottom panel glue tab at each opposite end edge of said bottom panel and hingedly connected thereto, the hinge connection between said front panel and each of said end panels being inclusive of a cut score of a length at least equal to the width of the adjacent of said bottom panel glue tabs cooperant with a slit between the end panel and associated bottom panel glue tab for obtaining the erection of a squared container.

2. In the die cut and prescored economy style blank as set forth in claim **1**, with said bottom panel glue tabs each having an end edge angularly-disposed relative to the longitudinal axis defined by the hinge line between said bottom and rear panels and said rear panel glue tabs each having an end edge angularly-disposed end edges facing toward each other with the angle of the said end edge of each of said bottom panel glue tabs being disposed at an angle relative to the said longitudinal axis equal to the angle of the said end edge of the adjacent of said rear panel glue tabs and the said longitudinal axis.

3. In the die cut and prescored economy style carton blank as set forth in claim **1**, with said bottom panel glue tabs each having an end edge angularly-disposed relative to the longitudinal axis defined by the hinge line between said bottom and rear panels and said rear panel glue tabs each having an end edge angularly-disposed relative to the said longitudinal axis, said angularly-disposed end

edges facing toward each other with the angle of the said end edge of each of said bottom panel glue tabs being disposed at an angle relative to the said longitudinal axis greater than the angle of the said end edge of the adjacent of said rear panel glue tabs and the said longitudinal axis.

4. In the die cut and prescored economy style carton blank as set forth in claim **2**, the sum of the said angles being greater than 90°.

5. In the die cut and prescored economy style blank as set forth in claim **3**, the sum of the said angles being greater than 90°.

6. In the die cut and prescored economy style carton blank of claim **1**, the hinge connection between said front panel and each of said end panels being inclusive of a cut score of a length greater than the width of the adjacent of said bottom panel glue tabs cooperant with a slit between the end panel and associated bottom panel glue tab for obtaining the erection of a squared container.

7. In a die cut and prescored economy style carton blank of claim **1**, wherein the depth of the carton erected therefrom and inclusive of the dust flaps thereof exceeds the width of the erected carton.

8. In the die cut and prescored economy style carton blank as set forth in claim **2**, the sum of the said angles being 90°.

9. In the die cut and prescored economy style carton blank as set forth in claim **3**, the sum of the said angles being 90°.

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GEORGE O. RALSTON, *Primary Examiner.*