

# United States Patent

Foster et al.

[15] 3,662,945

[45] May 16, 1972

## [54] CARTON END CLOSURE

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[22] Filed: **Aug. 3, 1970**

[21] Appl. No.: **60,341**

[52] U.S. Cl. .... **229/38, 229/51 TC**

[51] Int. Cl. .... **B65d 5/02**

[58] Field of Search .... **229/38, 37 R, 51 TC**

## [56] References Cited

### UNITED STATES PATENTS

|           |        |                 |          |
|-----------|--------|-----------------|----------|
| 3,166,231 | 1/1965 | Hickin.....     | 229/37 R |
| 2,124,868 | 7/1938 | Davidson .....  | 229/38 X |
| 1,539,677 | 5/1925 | Labombarde..... | 229/38   |

## FOREIGN PATENTS OR APPLICATIONS

533,515 2/1941 Great Britain .....229/37 R

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## [57] ABSTRACT

An end closure for a carton comprises adhesively treated major flaps and minor flaps hingedly connected to side and end walls of the carton, respectively. The inner major flap has cutouts formed at the ends thereof to at least substantially accommodate the minor flaps in substantial coplanar relationship therewith when the flaps are folded and sealed together. The outer major flap is adhesively secured over the other flaps and releasably attached to the carton by suitably arranged perforated tear lines to provide an easy opening feature on the carton. A tuck tab is hingedly connected to a free end of the inner major flap to provide means for fully reclosing the carton.

**17 Claims, 14 Drawing Figures**

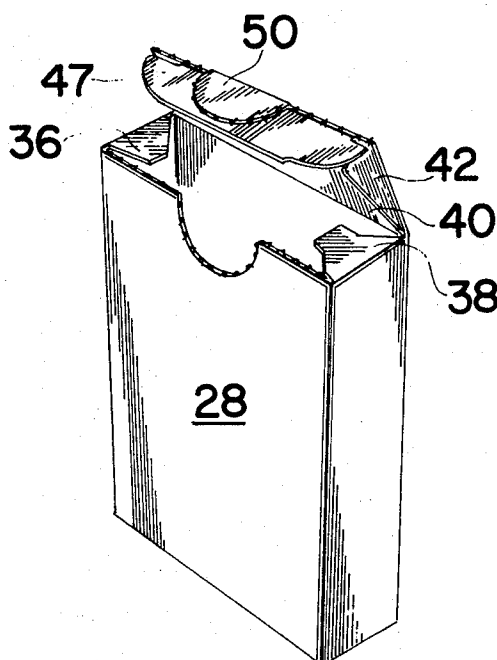


Fig. 1

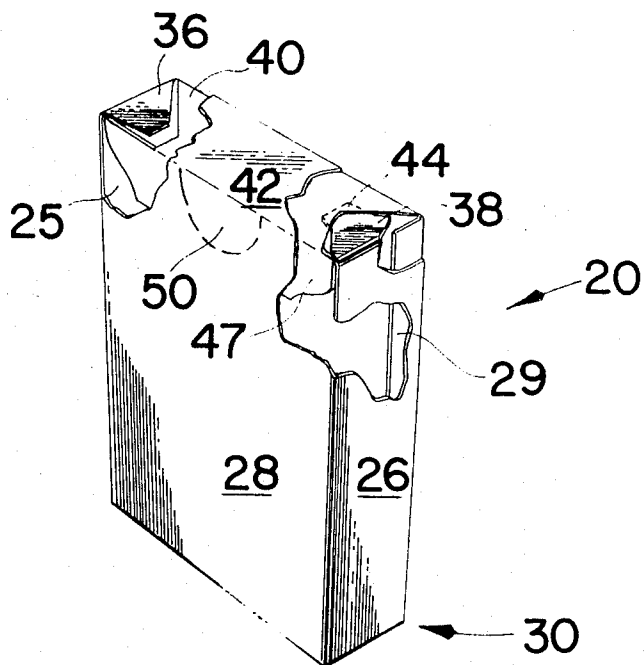
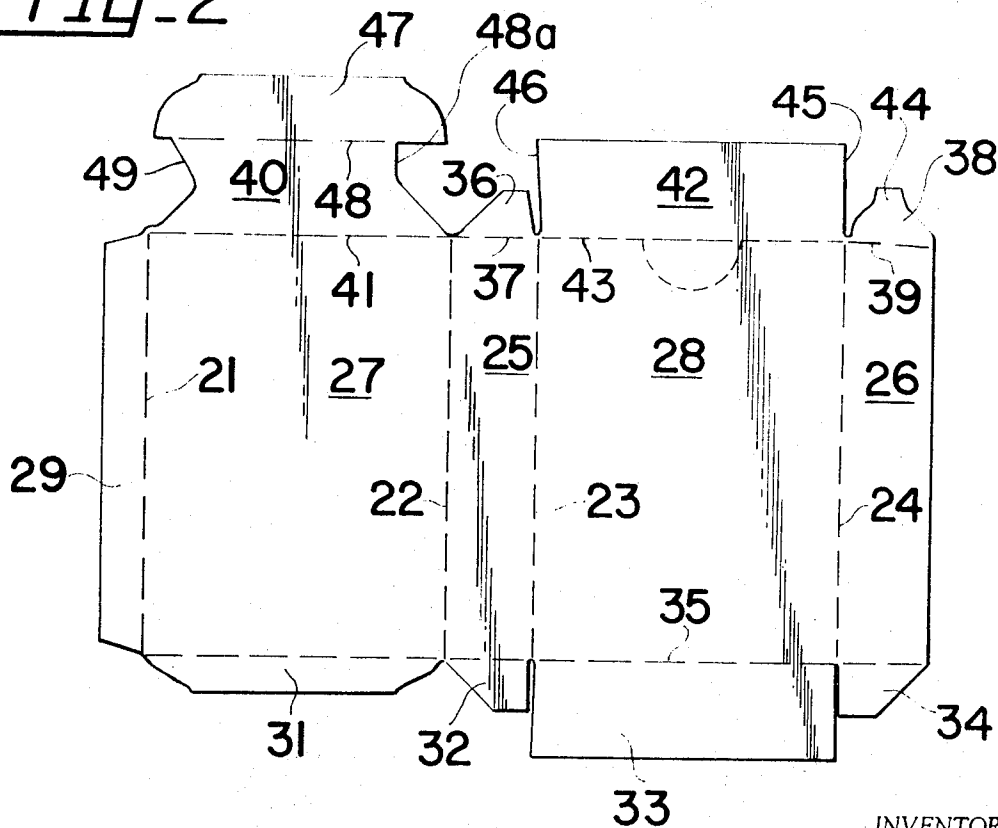


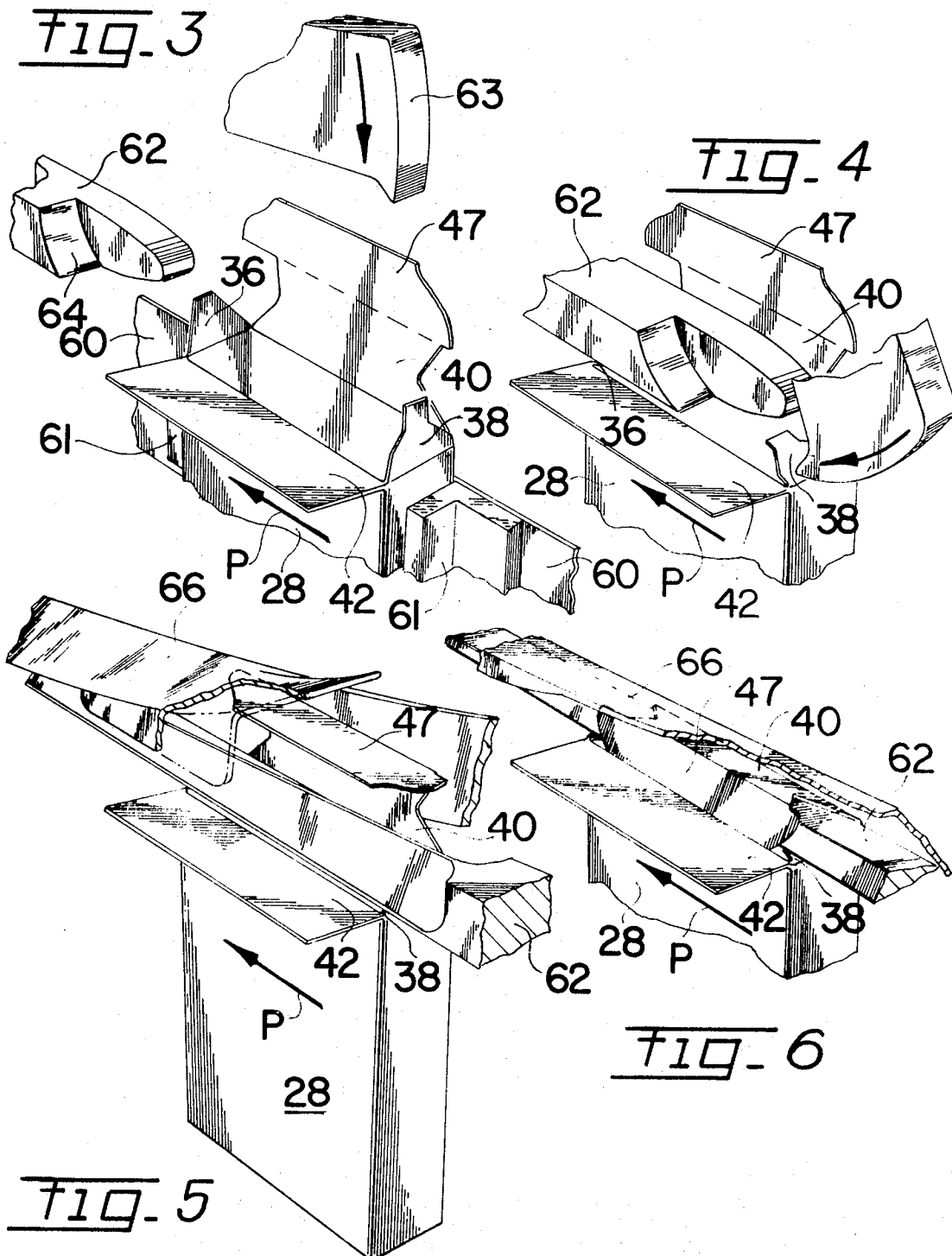
Fig. 2



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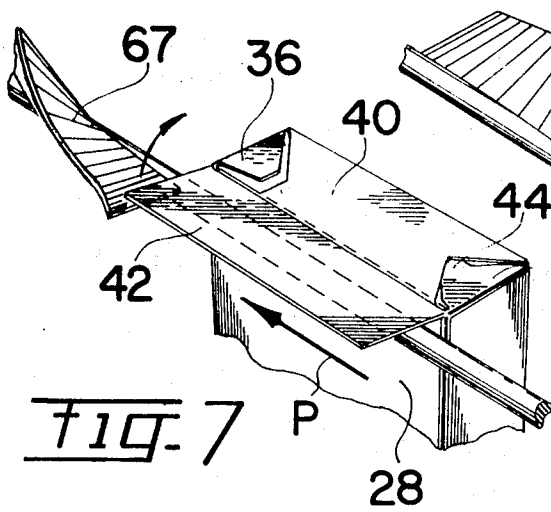


Fig. 7

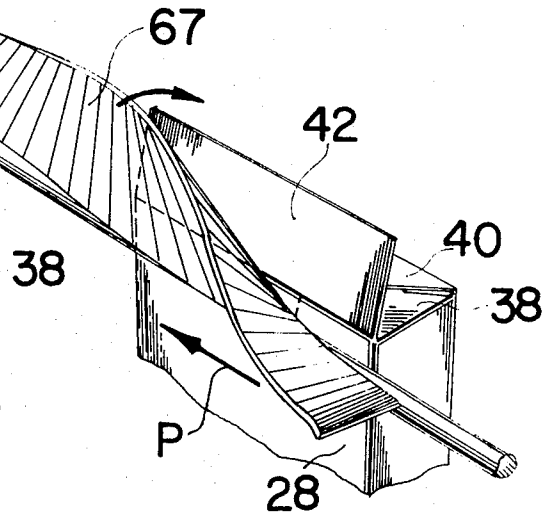


Fig. 8

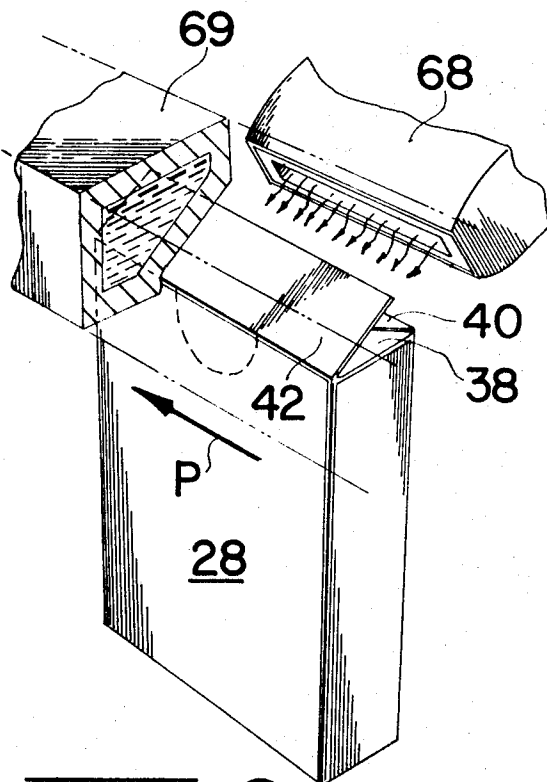


Fig. 9

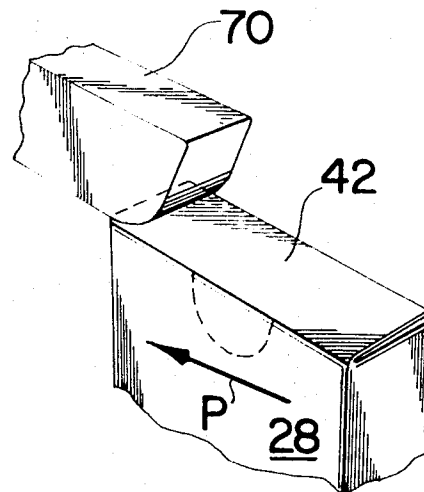
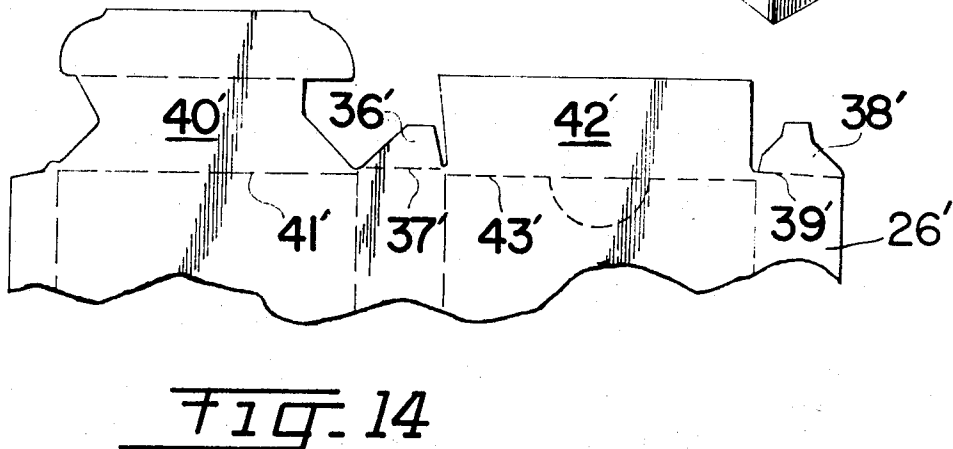
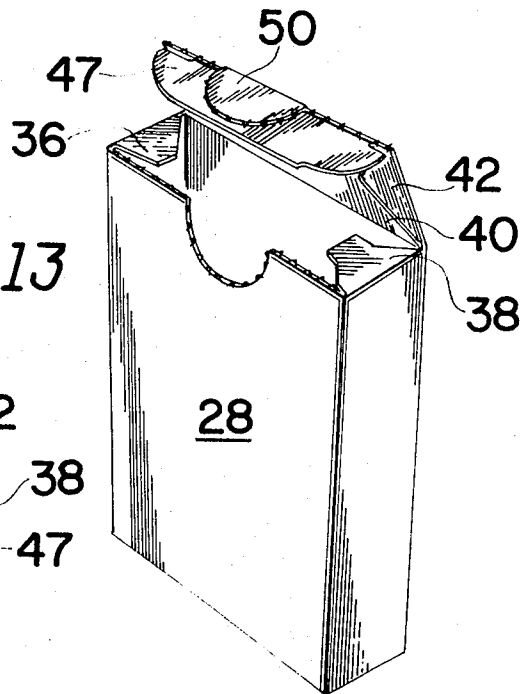
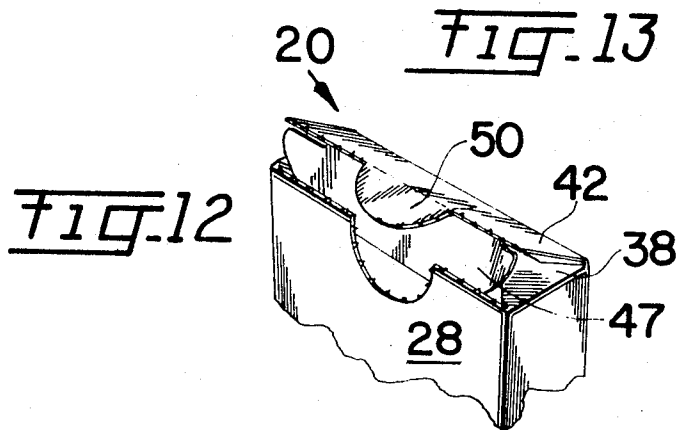
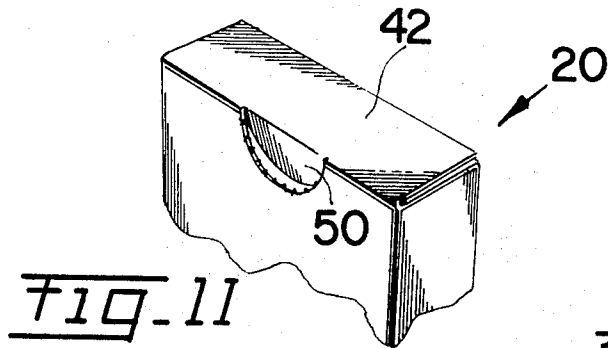


Fig. 10

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## CARTON END CLOSURE

## BACKGROUND OF THE INVENTION

Paperboard cartons, utilized to package raisins and like commodities, are normally combined with an inner liner or a cellophane overwrap for preventing vermin infestation and moisture loss. The advent of heat sealable coating, such as polyethylene, has suggested the feasibility of employing a single structured carton for such packaging purposes. However, various packaging problems have arisen therewith such as the inability to form a tightly sealed end closure which may be readily opened and reclosed.

## SUMMARY AND OBJECTS OF THIS INVENTION

An object of this invention is to provide a tightly sealed and impervious end closure which can be expeditiously opened and readily reclosed. The method employed for forming such end closure comprises the step of discharging a single stream of heated fluid, such as air, onto the adhesively treated carton flaps prior to application of final sealing pressures.

The end closure comprises a pair of major flaps hingedly connected to side panels of the carton and minor flaps hingedly connected to end panels thereof. The inner major flap has a cutout formed at each end thereof for at least substantially accommodating the minor flaps in substantial coplanar relationship therewith. The outer major flap is folded over and sealed to the other flaps to form a tightly sealed end closure.

In the preferred embodiment, opening means in the form of tear lines are suitably arranged to provide an easy opening feature. In addition, the inner major flap has a tuck tab hingedly connected to a free end thereof for reclosing purposes.

## BRIEF DESCRIPTION OF THE DRAWINGS

Other objects of this invention will become apparent from the following description and accompanying drawings wherein:

FIG. 1 is a perspective view of a closed and sealed carton embodiment of this invention with portions broken away for clarification purposes;

FIG. 2 is an outer plan view of a one piece blank utilized to form the FIG. 1 carton;

FIGS. 3-10 schematically and sequentially illustrate method steps employed for folding and sealing end closure flaps of the FIG. 1 carton together;

FIGS. 11-13 sequentially illustrate the procedure for opening the closed FIG. 1 carton; and

FIG. 14 is a partial, outer plan view similar to FIG. 2, but showing a modified blank for forming the type of carton illustrated in FIG. 1.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a closed and sealed carton 20 which is formed out of the one-piece paperboard blank illustrated in FIG. 2. The blank is preferably coated on both sides with a heat sealable coating or adhesive, such as polyethylene or polyvinylidene chloride, which may be softened or activated to exhibit adhesive characteristics at temperatures approximating 600° to 1,000° F. In certain applications, the coating may be applied to only the sealed portions of the carton and may be applied during manufacture of the blank or immediately prior to the carton closing and sealing operation. For purposes of this invention such conventional coatings will be hereinafter generally termed "heat sealable coatings" or "adhesives."

The FIG. 2 blank comprises parallel scorelines 21, 22, 23 and 24 dividing the blank into first and second end panels 25 and 26, first and second side panels 27 and 28 and a manufacturer's glue flap 29. Flap 29 is normally secured to interior surface portions of end panel 26 (FIG. 1) to form a flattened, tubular carton for shipping purposes. A bottom closure 30 may comprise flaps 31, 32, 33 and 34 hingedly connected to the carton at a scoreline 35. After the flattened, tubular carton

has been squared, the bottom closure flaps may be folded and sealed pursuant to the apparatus and method teachings disclosed in U.S. Pat. application Ser. No. 735,000, filed on June 6, 1968 by George Schafer et al. for "Apparatus and Method for Forming Cartons," assigned to the assignee of this application, and now U.S. Pat. No. 3,535,987.

The carton's top closure comprises a first minor flap 36 hingedly connected to panel 25 at a scoreline 37 and a second minor flap 38 similarly connected to panel 26 at a scoreline 39. A first or inner major flap 40 is hingedly connected to panel 27 at a scoreline 41 whereas a second or outer major flap 41 is connected to panel 28 at scoreline 43, which is co-linear with respect to scorelines 37, 39 and 42.

Referring to the FIG. 14 alternative embodiment it should be noted that scorelines 37' and 39' are preferably at least partially offset a slight distance from co-linear scorelines 41' and 43' and toward a free end of a respective minor flap. Such offset aids in forming a tightly sealed end closure and may approximate a distance equal to the thickness of the paperboard from which the carton blank is made, e.g., 0.018 in.

Whereas scoreline 37' is parallel to scorelines 41' and 43', scoreline 39' is tapered. As further shown in FIG. 14, a first end of scoreline 39' intersects the free edge of flap 26' at a point co-linear with scoreline 43'. Scoreline 39' extends toward and diverges away from scoreline 43' to be separated therefrom by the above mentioned distance, e.g., 0.018 in. Corresponding constructions are depicted by identical numerals with the FIG. 14 numerals being accompanied by a prime symbol (').

Referring again to FIG. 2, minor flap 36 is trapezoidally shaped and tapers inwardly from its base at scoreline 37 to a narrow portion remote from such scoreline. The free end of second minor flap 38, which is generally trapezoidally shaped, forms a tab portion 44 thereon. Major flap 42 is substantially rectangular and its area is substantially equal to the top of the set up carton. A first side edge 45 of major flap 42 is co-linear with scoreline 24 whereas a second side edge 46 thereof diverges outwardly relative to the first edge. The maximum degree of such divergence at the outer, free edge of flap 42 may approximate the thickness of the flap, e.g., 0.018 in.

A tuck tab 47 is hingedly connected by a scoreline 48 to major flap 40. A first side edge of flap 40 has a trapezoidally shaped cutout 48a corresponding to the shape of flap 36 but of slightly larger area. The opposite or second side edge of flap 40 has a triangularly shaped cutout 49 substantially conforming to the shape of flap 38.

Thus it can be seen in FIG. 1 that when minor flaps 36 and 38 are first folded to close the carton and inner major flap 40 is folded thereover, that tab portion 44 of flap 38 will be trapped under flap 40. However, the substantial remaining portions of flap 38 will be accommodated in cutout 49 to be exposed to contact with inner surface portions of outer major flap 42 when the closure is formed. Furthermore, minor flap 36 is entirely positioned in cutout 48a to be completely exposed to contact with flap 42 when that flap is folded thereon. The substantial positioning of minor flaps 36 and 38 in coplanar relationship with flap 40 results, upon heating and closure of the flaps, in a complete seal across the entire top of the carton.

Opening means, such as limited depth perforations, are formed on scoreline 43 and on side panel 28 to define a breakable opening tab 50. The perforations formed on scoreline 43 need only be formed on opposite sides of the opening tab.

FIGS. 3-10 schematically and sequentially illustrate method steps preferably employed for expeditiously folding and sealing the top closure flaps together at speeds approximating 700 cartons per minute. The squared carton is moved along a linear path P by a conventional conveying means shown in the form of an endless belt 60 having suitable lugs 61 attached thereto for capturing the carton therebetween. The bottom closure flaps have been folded and sealed together previously, pursuant to the teachings of the above referenced U.S. Pat.

application, and the carton has been filled with a product such as raisins.

Referring to FIG. 3, as the carton moves along a path P, first or leading minor flap 36 contacts the underside of a stationary folding and hold-down bar 62. Upon further movement of the carton, a rotating tucker arm 63 rotates clockwise to engage and fold the trailing or second minor flap 38 inwardly towards the first minor flap (FIG. 4). The two minor flaps are then held beneath the hold-down bar.

A recessed area 64 is formed in bar 62 so as not to interfere with rotary movement of the tucker arm. A stationary folding bar 66 (FIG. 5) then engages and folds tuck tab 47 inwardly to approximately form a 90° angle with respect to the first or inner major flap 40. A stationary folding bar 66 then engages and folds flap 40 over the tapered end of a stationary back-up bar 62 resulting in the insertion of tuck tab 47 against the inside surface of panel 28.

As the carton moves past bar 62, folding bar 66 completes the folding of flap 40 into its FIG. 7 position. Flap 40 is held in position by the friction of tuck tab 47 against the inner surface of panel 28. Tab 44 of flap 38 is trapped and held under flap 40 while flap 36 is free to "spring back" slightly about its scoreline.

As shown in the sequence of FIGS. 7-9, a stationary folding bar 67 folds flap 42 to an acute angle with respect to flap 40, preferably selected from the range of from 10° to 40°. The carton then moves past a gas burner type nozzle means or heater 68 (FIG. 9) which discharges heated fluid, preferably air heated to 600° to 1,000° F., between the major flaps to activate the adhesive thereon. Various types of nozzle means may be employed such as the one disclosed in U.S. Pat. application Ser. No. 869,193, filed on Oct. 24, 1969 by George Schafer et al. for "Apparatus and Method for Heat Sealing Cartons." Such application is assigned to the assignee of this application.

As shown in FIG. 10, the carton then moves under a compression bar 69 to compress and bond the flaps together. In particular, the interior inner surface portions of outer major flap 42 are pressed into intimate contact with outer surface portions of the underlying flaps to compress the adhesively treated flaps together to form a tightly sealed end closure.

Referring to FIGS. 1 and 7, it should be noted that cutouts 48a and 49 permit the minor flaps to be compressed into at least substantial coplanar relationship with respect to inner major flap 40. For example, if the minor flaps were to extend beneath flap 40 an appreciable amount, they would not be fully exposed to the heated air. Therefore, the unexposed adhesive would not be activated and three layers of paperboard would result thus affecting the seal.

In the packaging art, one of the most difficult sealing areas lies between the inner surface of outer major flap 42 and the outer surfaces of the minor flaps. In particular, normally there is insufficient backup support beneath the minor flaps to assure full sealing contact with flap 42. The aforescribed offset relationship of scorelines 37' and 39' (FIG. 14) substantially solves this problem by providing a firm base for pressing contact between flap 42' and the underlying minor flaps.

Referring now to FIGS. 11 through 13, the carton may be opened by first depressing tab 50 inwardly by thumb pressure to break it out of panel 28. Thereafter, an upward force applied against this area will break the weakened, perforated areas along scoreline 43 and will tear the seal between outer major flap 42 and the minor flaps. The reclosure structure, formed by flaps 40 and 42, and tabs 47 and 50, is then pivoted upwardly about scoreline 41 to expose the carton's contents. In order to reclose the carton, the reclosure structure is pivoted downwardly and tuck tab 47 is positioned inside panel 28 (FIG. 12) where it is held by frictional engagement therewith.

What is claimed is:

1. A closed, tubular carton comprising opposed first and second side panels, opposed first and second end panels, a bottom closure and a top closure, said top closure comprising

first and second minor flaps each hingedly connected at a scoreline to said first and second end panels, respectively, first and second major flaps each hingedly connected to said first and second side panels, respectively

means forming first and second cutouts at opposite ends of said first major flap, each cutout substantially conforming to the shape of a respective one of said minor flaps, said first and second minor flaps at least substantially positioned within said first and second cutouts, respectively, to be at least substantially coplanar with respect to said first major flap,

said second major flap being folded over and adhesively secured to said first major flap and to said minor flaps.

2. The invention of claim 1 wherein said second major flap completely covers said first major flap and said minor flaps.

3. The invention of claim 1 further comprising opening means formed at the scoreline connecting said second major flap to said second side panel and in said second side panel for opening said top closure.

4. The invention of claim 3 wherein the portion of said opening means formed in said second side panel comprises a breakable tab defined by perforations intersecting the scoreline connecting said second major flap to said second side panel.

5. The invention of claim 3 further comprising a tuck tab hingedly connected at a scoreline to said first major flap to normally abut inner surface portions of said second side panel.

6. The invention of claim 1 wherein the scorelines connecting said major flaps to said side panels are co-linear and wherein at least one of the scorelines connecting one of said minor flaps to one of said end panels is at least partially offset from said co-linear scorelines toward a free end of said one minor flap.

7. The invention of claim 6 wherein said offset scoreline is parallel with respect to said co-linear scorelines.

8. The invention of claim 7 wherein the distance of said offset is substantially equal to the thickness of said one minor flap.

9. The invention of claim 6 wherein a first end of said offset scoreline is co-linear with the scoreline connecting said first major flap to said first side panel, said offset scoreline extending toward and diverging away from the scoreline connecting said second major flap to said second side panel.

10. The invention of claim 1 wherein each of said minor flaps are generally trapezoidally shaped, said first minor flap positioned entirely within said first cutout and said second minor flap substantially positioned within said second cutout and having a tab portion on a free end thereof underlying a portion of said first major flap.

11. The invention of claim 1 wherein said second major flap is substantially rectangular to have a first side edge co-linear with a scoreline connecting said second side panel to said second end panel and a second side edge diverging slightly relative to said first side edge.

12. A one-piece blank consecutively comprising a first side panel, a first end panel, a second side panel and a second end panel, said panels connected together by parallel scorelines, first and second major flaps respectively connected to said first and second side panels by scorelines and first and second minor flaps respectively connected to said first and second end panels by scorelines and means forming a cutout in each end of said first major flap at least substantially conforming to the entire shape and area of a respective one of said minor flaps.

13. The invention of claim 12 further comprising a tuck tab hingedly connected at a scoreline to said first major flap, said last mentioned scoreline disposed in parallel relationship to the scoreline connecting said first major flap to said first side panel.

14. The invention of claim 12 wherein the scorelines connecting said major flaps to said side panels are co-linear and wherein at least one of the scorelines connecting one of said minor flaps to one of said end panels is at least partially offset

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from said co-linear scorelines toward a free end of said one minor flap.

15. The invention of claim 14 wherein said offset scoreline is parallel with respect to said co-linear scorelines.

16. The invention of claim 15 wherein the distance of said offset is substantially equal to the thickness of said one minor flap.

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17. The invention of claim 14 wherein a first end of said offset scoreline is co-linear with the scoreline connecting said first major flap to said first side panel, said offset scoreline extending toward and diverging away from the scoreline connecting said second major flap to said second side panel.

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