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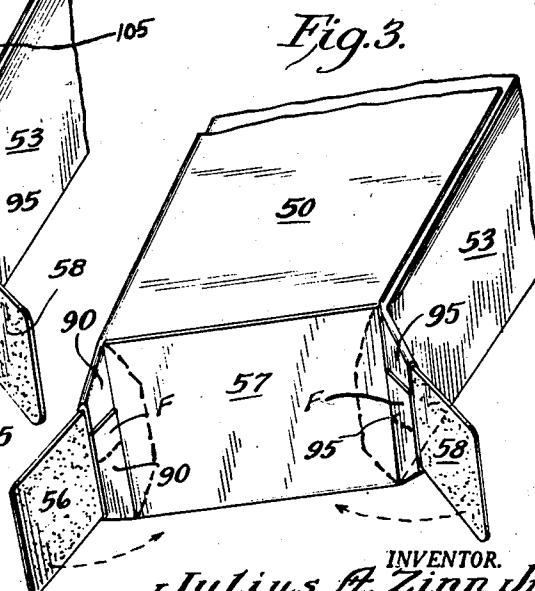
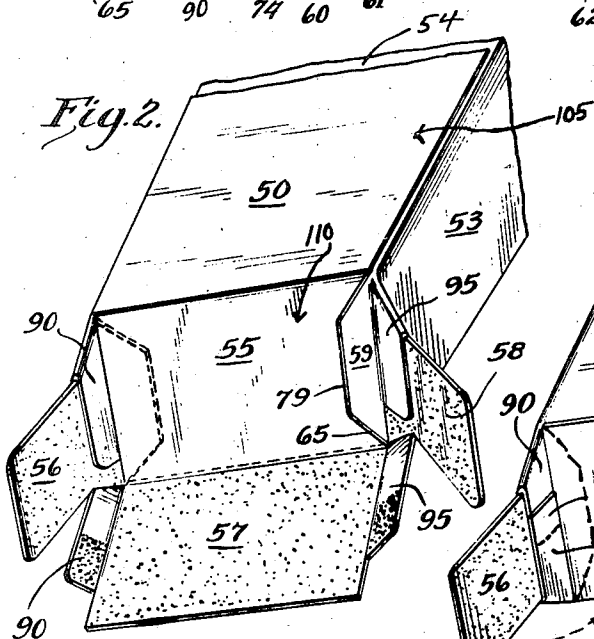
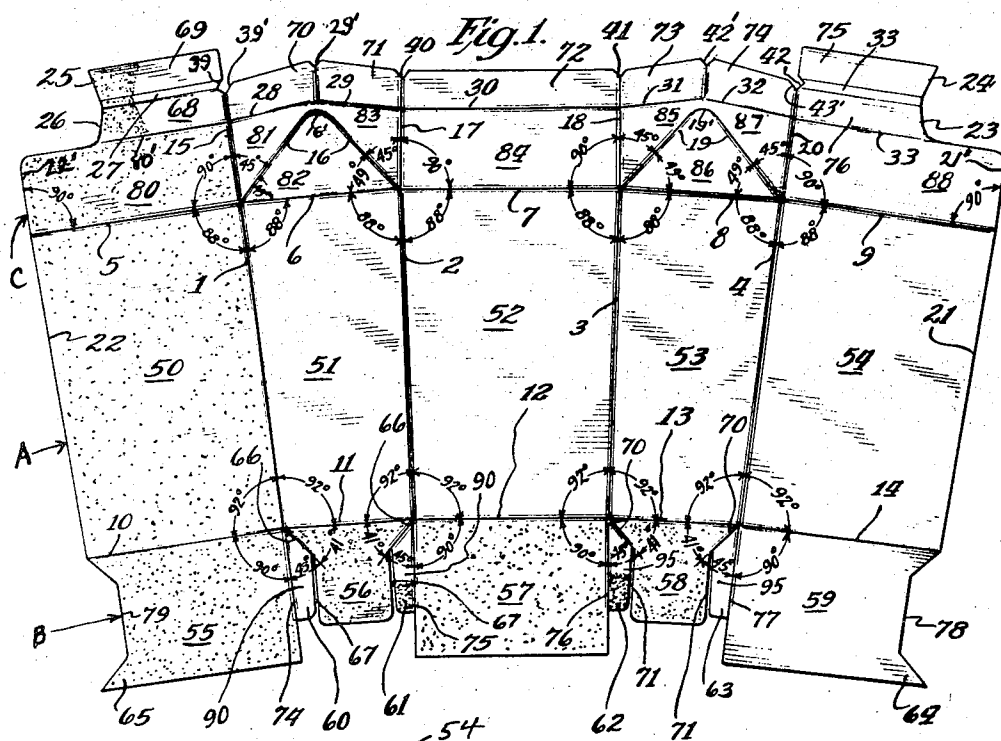
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2,412,666

LIQUIDPROOF FIBERBOARD CARTON WITH BELLOWS CLOSURE

Filed Feb. 22, 1944

2 Sheets-Sheet 1



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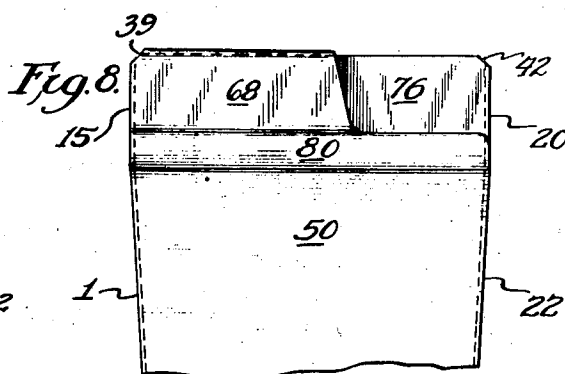
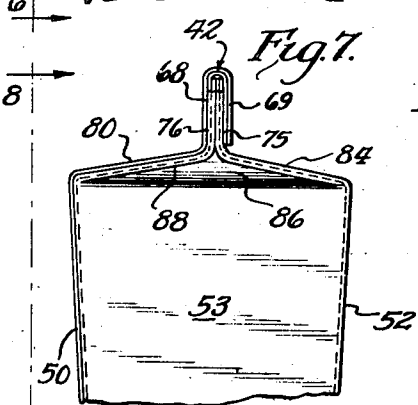
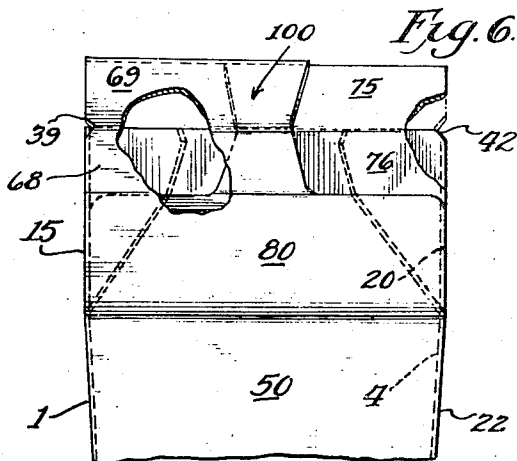
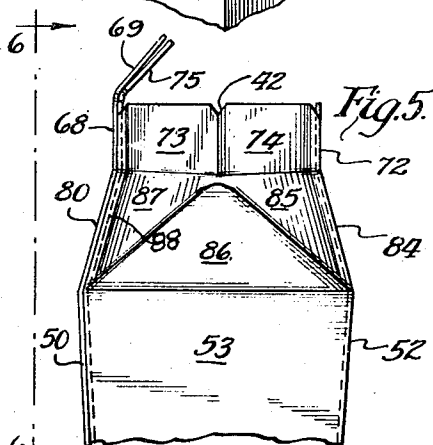
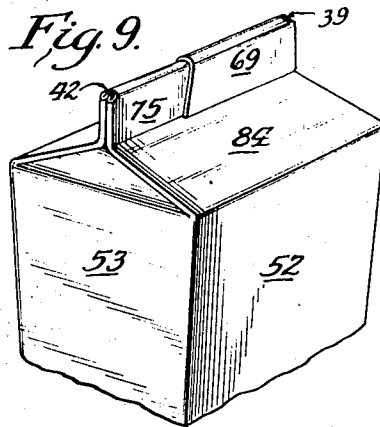
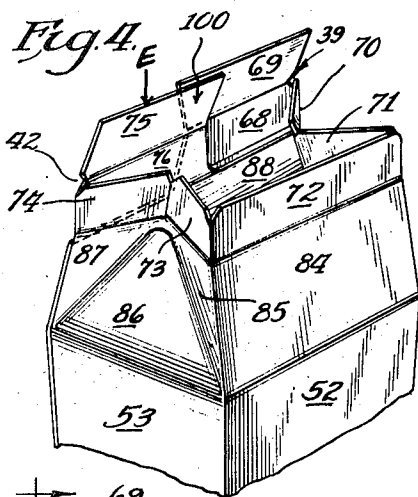
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2 Sheets-Sheet 2



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LIQUIDPROOF FIBERBOARD CARTON WITH
BELLOWS CLOSURE

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Application February 22, 1944, Serial No. 523,447

3 Claims. (Cl. 229-16)

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This invention relates to a carton. More particularly this invention relates to a leakproof carton adapted for packaging liquid materials.

The invention herein disclosed constitutes an improvement of application Serial No. 426,795, filed January 15, 1942, now matured into Patent No. 2,390,909. The present carton construction embodies a similar construction of the bottom and top closures of the carton with the additional novel features hereinafter more fully disclosed.

Referring to the drawings wherein an exemplary embodiment of the invention is illustrated:

Figure 1 is a blank from which the carton may be formed.

Figure 2 is a perspective fragmental view of the partially formed carton illustrating a step in forming the bottom.

Figure 3 is a similar view illustrating a later stage in forming the bottom.

Figure 4 is a fragmental perspective view of the formed carton showing the top closure in open position.

Figure 5 is a side elevational view of the carton shown in Figure 4.

Figure 6 is an elevational rear view of the carton taken along the lines 6-6 of Figure 5.

Figure 7 is a side elevational view of the sealed carton.

Figure 8 is an elevational view of the rear of the sealed carton taken on lines 8-8 of Figure 7, and

Figure 9 is a perspective view of the sealed carton.

In general, the present invention contemplates a carton particularly adapted for use as a liquid dispensing container whose construction is such as to provide an efficient and superior container which may be readily and economically produced by automatic machinery. The container is preferably produced from a moisture proofed and preferably paraffin coated or impregnated cardboard.

The invention, as herein illustrated, is shown as embodied in a rectangular carton of the so-called "nesting" type, being wider at the top than at the bottom. In practice the carton may be formed from a cutout blank of the carton forming material and is preferably wrapped about a forming block of the carton forming machine upon which the side seam and the bottom of the carton are firmly sealed to produce a carton open at the top. The cartons in this condition may be nested together for convenience in shipping and storing, the top closure being made after the

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carton has been filled with the commodity being packaged. The present construction also permits de-nesting or ready separation of the individual nested cartons as the upper portion of the carton is squared-up and does not continue the taper of the side walls.

In accordance with the present invention, the blank from which the carton is formed is cut in a manner such as to enable superior end closures to be formed in the assembled carton. In the illustrated embodiment of the invention, one of the end closures, herein shown as the bottom closure, includes side flaps comprising the first folded flaps of the carton which are provided with connected wing portions formed from parts of the adjacent end flaps, said wing portions being arranged to be folded in with the side flaps and to be adhesively secured to the extended end flaps during the carton closing operation in order to effectively seal the bottom of the carton.

In the embodiment of the invention illustrated in the drawings the end closures are characterized by arrangement of the overlapping and folded portions thereof in a manner such as to provide a substantially uniform thickness of such portions of the end closures in the assembled carton and to provide an efficient and tightly sealed package. With this construction excessive bulk is eliminated and possible leakage areas are reduced to a minimum. These features of the bottom construction are covered in co-pending application Serial No. 426,795, filed January 15, 1942.

The top closure in the illustrated embodiment of the invention preferably comprises a bellows-fold type of closure in which the end walls of the mouth portion are tucked inwardly and then folded flat to form an elongated closure with the side walls of the mouth portion. The elongated closure thus formed is preferably closed or covered by a folding flap formed as an extension of one of the side walls of the mouth portion. Such folding flap may be held in assembled relation in any usual or preferred manner such as by adhesive and/or by stitching.

Difficulty has been experienced previously with the bellows-fold type of closures due to liability of leakage through the space formed between the inner folded edges of the bellows-folds. That is, when the usual closing tab was folded over the multiple thickness presented by the bellows fold, the space between the inner folded edges of the latter was difficult to seal due to the bulk present by such multiple thickness. In such construction it was also difficult to retain the carton in

a definite shape, either of a tapered or straight-sided body and having either a squared-up or tapered top portion. In accordance with the present construction provision is made for evenly plugging or filling up such space to present a substantially uniform thickness of the elongated closure in the assembled carton. The present closure is thus adapted for use in any type of contoured body portion square or rectangular in cross-section, having tapered sides or straight sides, including tapered or squared-up upper portions. To this end, the closing tab is formed of a double thickness at the area corresponding to such open space whereby upon closing of the folding tab and compression thereof, the double thickness of the tab will substantially compensate for and cause such space to be filled up, thus providing an efficient and substantially leakproof closure. These features are fully covered in co-pending application Serial No. 479,703, filed March 19, 1943.

A further difficulty has been experienced with the bellows-fold type of closures due to the fact that the outer folded edges of the bellows extended beyond the side walls of the carton thus preventing the cartons from being packed closely together when filled with the upper lateral edges of the carton bodies in contact. Furthermore, the folded outer points of the bellows presented very sharp points which often punctured or injured adjacent cartons during handling or delivery. The bellows-folds also offered considerable resistance to folding or creasing during the formation of the carton. A further difficulty encountered in prior bellows type closures such as disclosed in Patent No. 2,047,891, was that any downward vertical pressure or weight applied to the sealed bellows would tend to break the seal and cause leakage as the bellows structure was supported internally by a rigid or truss-like structure that has little strength to resist downward stresses. In the present construction the bellows-fold is yieldingly supported so that a downward force or weight will permit the bellows-fold to move clear down to the body portion without in any way breaking or disturbing the carton itself or the seal at the mouth portion. Further advantages of the present invention will be apparent from the following specification and drawings.

Referring now to the drawings and particularly to Figure 1, the invention is herein illustrated as embodied in a so-called "nesting" type of carton formed from a single integral blank comprising a body portion A, a bottom closing portion B and a top closing portion C. The body portion A of the blank includes a side wall panel 52, end wall panels 51 and 53 and panel members 50 and 54 arranged to be adhesively joined to form a two-ply side wall panel 105 illustrated in Figure 2. Adhesive is applied to the blank at the stippled areas indicated in Figure 1.

The bottom closing portion B of the blank comprises a side flap member 57, end flap members 56 and 58 and side flap portions 55 and 59 arranged to be overlapped and adhesively joined as shown in Figure 2 to form a two-ply flap 110. As herein shown the side flap members 57 and 110 are each provided with integral wing portions 90 and 95 and 90 and 95 respectively, formed from adjacent portions of the end flap members 56 and 58 by slits 67 and 71 respectively cut in the latter, and crease lines 66 and 70 extending from the end of such slits to the intersection of the fold lines 11 and 13 in the body portion of

the carton. In the bottom closing operation, the integral wing portions are folded in with the side flaps 57 and 110 to present the wing portions in sealing engagement with the extended end flaps 56 and 58 as shown in Figures 2 and 3. The overlapping portions F of the wing members are also preferably adhesively joined as illustrated in Figure 3. In practice, the wing portions are firmly pressed into engagement with their respective extended end flaps to set the adhesive and to provide a tight seal along the lower edges of the end walls of the carton. Thereafter, the end flap members 56 and 58 are folded flat against the bottom of the carton to complete the bottom closure.

In the operation of folding down and adhesively securing the end flaps 56 and 58 it will be seen that the bulk presented by such wing portions would ordinarily interfere with an efficient seal between the end flaps and the underlying surface of the side flap. However, provision is made for compensating for such multiple thickness and to present the end flaps in efficient sealing engagement with the underlying flaps by forming the latter in a manner such as to permit the wing portions to be compressed into substantially flush relationship to the major portion of the underlying side flaps. It will be noted that the outer margins of flaps 55 and 59 are recessed, respectively, at 79 and 78 and terminate in extended tip portions 65 and 64 respectively. The tip portions 64 and 65 serve to make tight contact with the adjacent walls 51 and 53, respectively, when the bottom is formed. At the same time the recessed portions provide space for receiving and compensating for the folded over flaps 90 and 95 so that the completed bottom is of substantially uniform multi-ply thickness throughout. Flaps 56 and 58 can thus be effectively sealed thereagainst.

As previously stated, the carton is preferably formed by wrapping the blank about a forming block in a carton forming machine, sealing the side seam, and then folding in and adhesively securing the bottom flaps as described while the carton is supported upon the block. In practice, the carton blank is preferably provided with a coating of adhesive at the areas indicated in Figure 1 prior to wrapping the blank about the form. The preferred sequence of closing the bottom flaps comprises first folding in the two-ply flap 110, as shown in Figure 2, then folding in the opposing adhesively coated flap 57 to present the carton as illustrated in Figure 2. Thereafter, the end flaps 56 and 58 are folded down as described whereupon substantial pressure is brought to bear against the flaps and the bottom of the forming block in order to compress and force the wing portions and the underlying flaps.

The top closing portion of the blank, as herein shown, comprises a bellows-fold type of top closure, formed by folded extensions of the body portion A, including an upper side wall portion 84, connected end wall portions 83 and 85 provided with crease lines 16 and 19 respectively, for forming bellows-folds, and upper side wall members 80 and 88 having connected end wall portions 81 and 87, arranged to be adhesively joined to form a two-ply upper side wall in the assembled carton as illustrated in Figure 5. The side and end wall portions of the top closure are each provided with mouth closing panels 72, 70, 71, 73, 74, 68 and 76 arranged to be folded and brought together to form an upstanding and elongated mouth portion as shown in Figure 4.

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Extended tab portions 68 and 75, extending from the panel members 68 and 76, respectively, are likewise arranged to be adhesively joined to form a folding or covering flap E arranged to enclose the elongated mouth portion of the carton.

Referring to Figure 1, it will be noted that downwardly tapered body panels 50, 51, 52, 53 and 54 are provided in the blank by score lines 1, 2, 3 and 4, respectively, lower intersecting score lines 10, 11, 12, 13 and 14, respectively, and upper intersecting score lines 5, 6, 7, 8 and 9, respectively. Score lines 15, 16, 17, 18, 19 and 20 and score lines 80', 28, 29, 30, 31, 32 and 33 define the upper closing flaps of wall members 80, 81, 82, 83, 84, 85, 86, 87 and 88. It will be noted that the substantially V-shaped continuous score line 16 is curvilinear or rounded at the vertex 16' which is spaced a short distance below score lines 28 and 29 and does not intersect them. Similarly, V-shaped continuous score line 19 is rounded at the vertex 19' which is also spaced away and does not intersect score lines 31 and 32. When the upper closure panels are folded to form a bellows-fold the presence of the curved score lines 16' and 19' facilitates folding and also provides a yieldable cushion-type of bellows so that the sealed upper bellows-closure can be readily depressed toward the body of the carton without disrupting the closure seal because the closure seal is of uniform thickness throughout and the components thereof are in locked or mated relation independently of the bellows-fold structure.

Mouth closing panels 68, 69, 70, 71, 72, 73, 74, 75 and 76 are hingedly connected to the upper closing flaps 80, 81, 83, 84, 85, 87 and 88, respectively, along score lines 80', 28, 29, 30, 31, 32 and 33, respectively. It is to be noted that lines 22', 15, 17, 18, 20 and 21' are not straight line continuations of lines 22, 1, 2, 3, 4 and 21, respectively, but are positioned at angles thereto as indicated in Figure 1. As a result the score lines 17 and 18 defining upper closing panel 84 converge or extend inwardly in relation to score lines 2 and 3, respectively, of panel 52. Score lines 15 and 17 diverge or extend outwardly in relation to score lines 1 and 2. Score lines 18 and 20 also diverge or extend outwardly in relation to score lines 3 and 4 for a purpose to be explained later. Lines 22' and 15 converge inwardly in relation to lines 22 and 1, respectively. Lines 20 and 21' converge inwardly in relation to lines 4 and 21, respectively. As a result of this arrangement of the pairs of converging and diverging score lines, the upper closure panels provide a squared-up upper portion for the carton and the vertical edges of the upper closing panels extend substantially perpendicularly to the bottom wall of the carton without extending beyond the body of the carton.

Panels 68 and 69 are hingedly connected by a score line 27. Panels 75 and 76 are similarly hingedly connected along score line 33. Notch portions 39, 39', 29', 40, 41, 42', 42 and 43' are provided in the upper closing panels for a purpose to be explained later.

In the operation of closing the top of the carton the opposed upper end wall portions 82 and 86 are tucked inwardly and at the same time the opposed side wall portions 88, 80 and 84 brought together to form an elongated mouth portion having a pleat in each end. As herein shown, the inner folded edges of the pleats do not meet in the middle of the mouth portion thereby leaving a relatively wide space therebetween, equal

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in thickness to the pleated portions of the bellows-folds. It will thus be seen that when the usual single thickness covering flap is used, the bulk presented by the bellows-folds makes it difficult to form a tight closure at the spaced portions of the mouth of the carton.

In order to overcome this difficulty and to provide an efficiently sealed closure in a bellows-fold type of top closure, the folding flap E is arranged to be of double thickness at the point 100 where the space between the pleats occurs in the top closure. This double thickness, indicated at 100, preferably comprises the overlapping portions of the flap members 75 and 69. If desired, the closing flap E may be formed of a single flap having adhered thereto a small tab portion at the region 100, the tab being of suitable contour so as to function as a plug or stopper for closing up the space between the pleats. As illustrated in Figure 1, the edges 23, 24, 25 and 26 of the flap portions 75 and 76 and 68 and 69, respectively, are preferably cut in the blank in the manner shown so that the overlapping or double thickness portion 100 will be of such shape in the assembled carton so as to fill up or completely and evenly plug the gap or open space between the inner folded edges of the pleats previously mentioned and conform to the shape of the space in the mouth of the carton. Thus, upon folding over of the flap portion 100 and subjecting the closure to pressure, the underlying portions of the closure will be forced into the space and as a result thereof an efficient closure of substantially uniform thickness throughout is provided. The closure thus formed may then be fastened in its closed position across the entire length and height by stitching arranged to pass through and entirely across the folded over portions of the elongated closure or by heat-sealing by means of a thermoplastic adhesive applied to the suitable portions of the blank.

By virtue of the previously described pairs of outwardly and inwardly converged score lines when the upper mouth of the carton is closed, the bellows-folds will not extend beyond the side walls, but as shown in Figure 8, the edges of the folded bellows 15 and 20 will extend vertically upwards and not in continuation of the taper of edges 1 and 22 respectively. Similarly, vertical edges 17 and 18 of the opposing bellows-fold will also extend vertically upward and not in continuation of the taper of edges 2 and 3. The vertical edges of the upper closing flap will thus not extend beyond the body portion of the sealed carton. The arrangement of the previously described outwardly and inwardly converged score lines also serves to form the upper portion of the carton in squared-up condition so that it will extend in this region substantially perpendicularly to the bottom of the carton and not in continuation of the tapered sides of the body portion.

The provision of the series of notches in the closing panels, previously described, facilitates folding of the upper panels and reduces the resistance of the score lines to folding and bending operations during the closing and sealing of the carton. As shown in Figure 9, the corner portions 39 and 42 of the closure are not sharp but cut away and bevelled so that no sharp points are present, as in prior constructions that may puncture or injure adjacently positioned cartons during shipping or handling of the filled cartons. Notches 39 and 42 also coact with the curved score portions 16' and 19' of score lines 16 and 19 to facilitate proper folding and sealing of the

top closure. When the top is closed, the continuous curved score lines 16' and 18' allow the inner bellows points to seat into the correct position and the spaces therebetween to be properly filled in by the overlapped portions 100 of the closure. The shape of these overlapped portions 100 can be readily altered to fill completely the space between the inner folded edges of the pleats, depending upon the dimensions or degree of taper of the body portion of the carton and the structure of the upper portion, whether squared-up or in continuation of the body taper.

It is also to be understood that any convenient covered pouring spout opening may be provided if desired in the top closing portion of the container.

The novel features of the present invention are not restricted to the specific embodiment shown but may be applied to any other tapered carton construction having any other desired bottom and top construction such as shown in patents, Nos. 1,157,462 or 2,047,891. It is thus to be understood that the features of this invention can be embodied in many different types of carton constructions and it is intended to include such constructions within the scope of the appended claims.

I claim:

1. A sealed top carton, formed from a single blank, said carton having a rectangular tapered body portion and a squared-up upper closure portion, comprising tapered body portions formed of panels shaped to taper downwardly, two opposed body panels being provided with integrally connected upper closing flaps separated therefrom by a scored hinge, the vertical side edges of said hinged upper closing flaps being defined by parallel scored lines making angles of ninety degrees with scored hinges of the flaps to form rectangular closing flaps, the intermediate body panels having integrally connected bellows fold top flaps with the side edges of said flaps integrally connected to the first named rectangular closing flaps, said closing flaps forming a squared-up upper closure portion with its edges located within the area of the upper end of the tapered body of the carton.

2. A sealed top carton, formed from a single blank, said carton having a rectangular tapered body portion and a squared-up upper closure portion, comprising tapered body portions formed of panels shaped to taper downwardly, two opposed body panels being provided with integrally connected upper closing flaps separated therefrom by a scored hinge, the vertical side edges of said hinged upper closing flaps being defined by parallel scored lines making angles of ninety degrees with scored hinges of the flaps to form rectangular closing flaps, the intermediate body panels having integrally connected bellows fold top flaps separated therefrom by a scored hinge with the side edges of said flaps making angles of greater than ninety degrees with said scored hinge and being integrally connected at their side edges with the first named rectangular closing flaps, said top flaps forming a squared-up upper closure portion with its edges located within the area of the upper end of the tapered body of the carton.

3. A sealed top carton having a rectangular tapered body portion and a squared-up upper closure portion, comprising tapered body portions formed of panels shaped to taper downwardly, two opposed body panels being provided with integrally connected upper closing flaps separated therefrom by a scored hinge, the vertical side edges of said hinged upper closing flaps being defined by parallel scored lines making angles of ninety degrees with scored hinges of the flaps to form rectangular closing flaps, the intermediate body panels having integrally connected bellows fold top flaps, all said top closing flaps forming a squared-up upper closure portion with its edges located within the area of the upper end of the tapered body of the carton and being each provided with mouth closing flaps separated therefrom by a scored hinge, the upper edges of said mouth closing flaps being notched at the score lines separating the flaps to facilitate folding and sealing of the top closure and provide beveled corners of the top seal of the carton.

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