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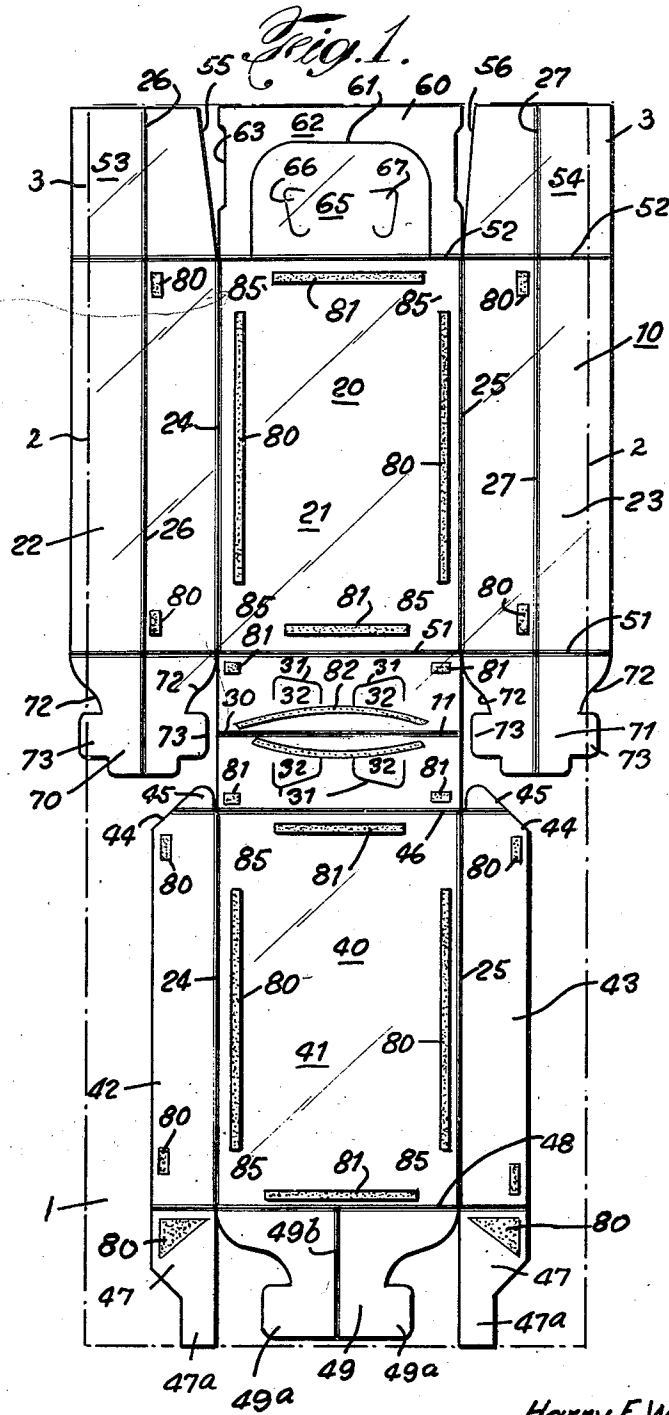
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2,432,052

CARDBOARD CARTON AND LINER THEREFOR

Filed Dec. 5, 1941

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

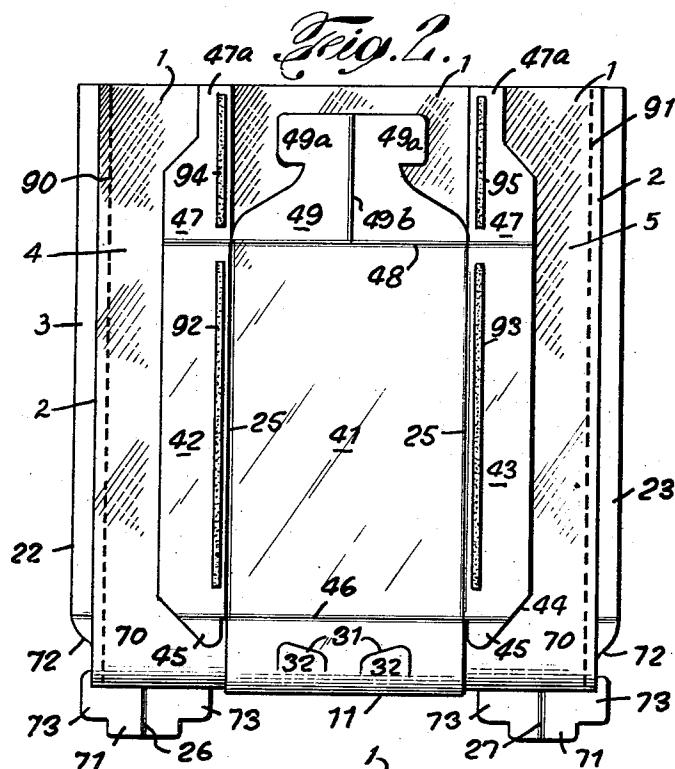
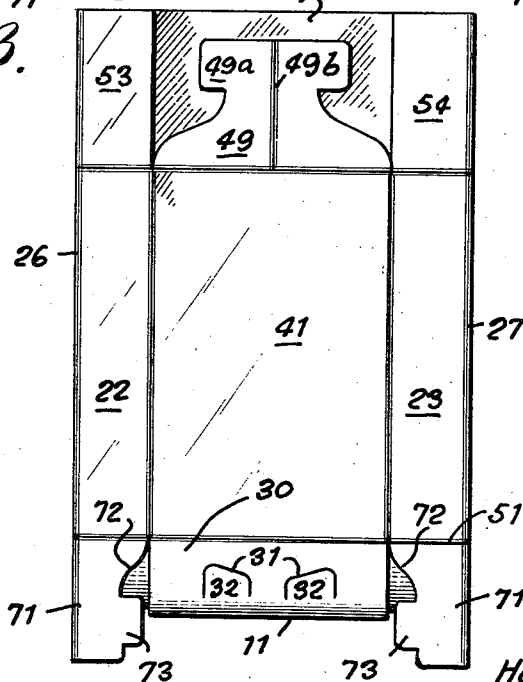


Fig. 3.



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Fig. 4.

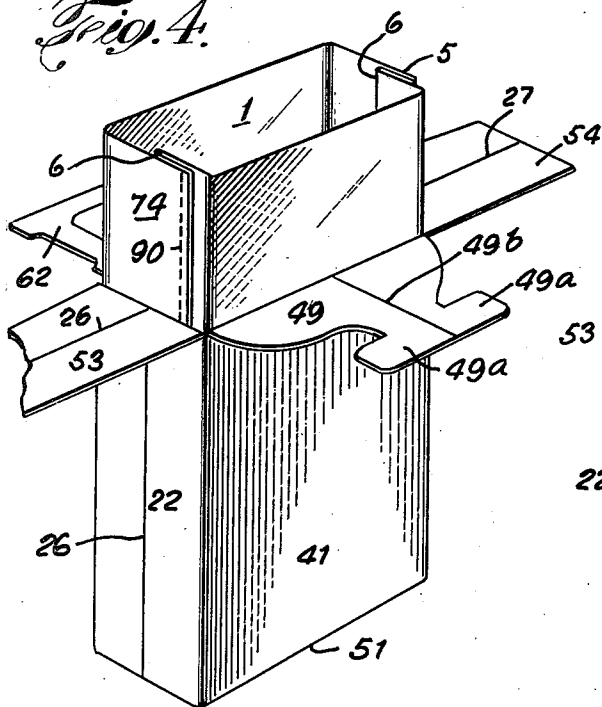


Fig. 6.

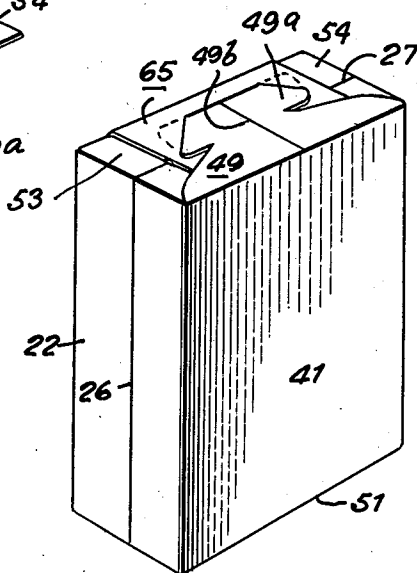


Fig. 5.

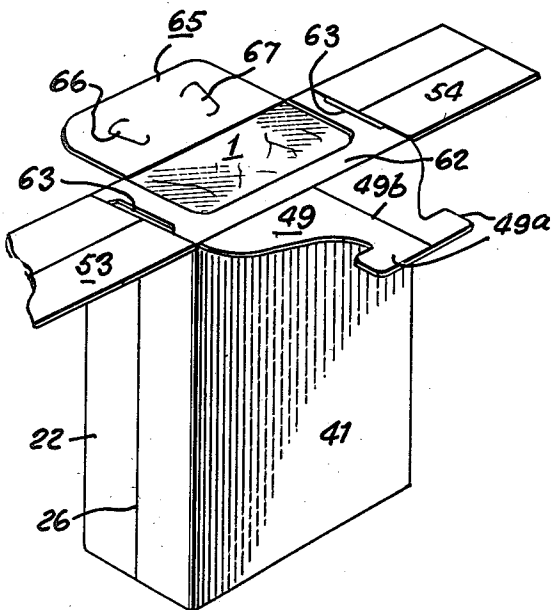
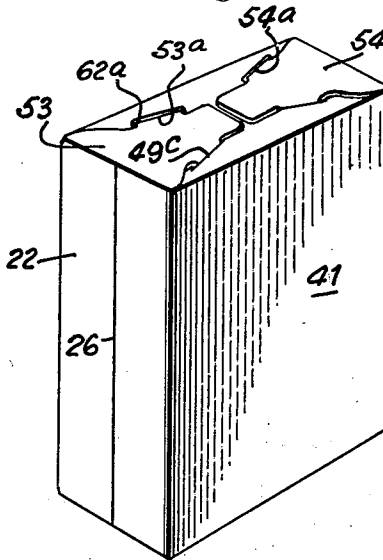


Fig. 7.



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2,432,052

CARDBOARD CARTON AND LINER
THEREFOR

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Application December 5, 1941, Serial No. 421,790

1 Claim. (Cl. 229—14)

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This invention relates to improvements in paper-board packages, and more particularly to a crush-proof liquid-tight package of laminated structure.

As is well known, the use of cardboard containers, with or without liquid-tight linings has not hitherto been possible due to the fact that the crush resistance or impact resistance of cardboard containers has been very low. The bursting tendency of paper-board packages containing an inner, liquid-tight bag adhered thereto so as to form a complete entity therewith is very marked to the point where substantially 100% failures are the ordinary expected result. This fact, has left the field of liquid packaging to sheet metal cans and glass bottles. While various attempts have been made to use liquid proof bags in paper-board boxes, the results have been uniformly inefficient.

It has now been found that cardboard containers or packages, including corrugated cartons, can be adapted for packaging liquids by providing the packages with liquid-tight liners which may be associated therewith under conditions such that the sections of the liner, which usually burst upon impact, are left unsupported or "floating" so as to be freely movable when displaced by crushing or distortion of any segment of the container resulting from impact.

It is a feature of novelty of the present invention to provide a novel, liquid-tight cellulosic container, which is capable of resisting crushing stresses due to impact and without bursting.

It is a further feature of novelty of this invention to provide novel, composite lined cartons and carton blanks adapted to be erected as a unit, and flat folded for easy shipment, and being further adapted for final erection, packaging and closure without requiring extraneous aids or materials.

Yet another feature of novelty of the present invention is a process for making burst-proof liquid-carrying lined paper-board cartons having liquid-tight bags or liners differentially supported on and by the package characterized by complete detachment of the liner at corners and free areas contiguous to the distortable areas of the carton.

These and other desirable features and advantages of the present invention will be described in the specification, and illustrated in the accompanying drawings, certain preferred embodiments being delineated by way of example only, for, since the underlying principles may be embodied in other specific package structures, it is not in-

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tended to be limited to the ones here shown, except as such limitations are clearly imposed by the appended claim.

In the drawings, like numerals refer to similar parts throughout the several views, of which

Fig. 1 is a plan view of a die-cut carton blank with a liquid-tight liner blank shown thereover in phantom view;

Fig. 2 is a plan view of the blank of Fig. 1 folded over on its median transverse axis to form a flat-folded lined package blank;

Fig. 3 is a plan view of the structure of Fig. 2 with the lateral edges of the carton folded over and juxtaposed to the cooperating panel wall;

Fig. 4 is an elevation of the flat-folded package of Fig. 3 erected into package filling position;

Fig. 5 is an elevation of the package of Fig. 4 in the initially closed position with a stiffening truss member in position; and

Figs. 6 and 7 are elevations of the package of Fig. 5 showing alternate methods of closing the end of the carton.

Referring now to the drawings, the carton blank, as shown in Fig. 1, comprises a continuous strip of paper-board material 10, divided along a transverse median fold line 11, into cooperating or mating sections 20, 40. These sections are provided with front wall panel sections 21, 41 joined by a bottom section 30 having a median fold line 11, previously described, and having four U-shaped slots 31, defining corresponding tongues 32. Panel 21 has two laterally appended side walls 22, 23, separated or delineated from the panel by score lines 24, 25. The side wall sections are further provided with longitudinal central score lines 26, 27. A pair of transverse score lines at the top and bottom of panel 21, and numbered 51, 52, respectively, set off a pair of upper tab members 53, 54, and a central tab and supporting section 60 and bottom tongued tabbed sections 70, 71. Tabs 53, 54, are generally square but have angular cut-out sections at the inner vertical edges thereof as shown at 55, 56. The length of tabs 53, 54, is predetermined by the length of liner which is to be heat-sealed. The central tab 60 is divided or separated by a wide U-shaped cut 61 into an outer truss section of generally U-shape, 62, having lateral cut-out or reentrant portion 63, to provide clearance, as will be described more in detail hereinafter. The central locking tab 65 defined and set off by the cut 61 is provided with opposed tab sections 66, 67 adapted to receive locking tongues of cooperating tab sections of blank section 40. The lower tab members 70, 71 are provided with curvilinear cut-out sections 72,

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which are symmetrically disposed on both sides thereof to provide a desired clearance, and each of these tab sections has opposed or symmetrical tabs or tongues 73.

The other half, 40, of the carton blank has a central panel section 41, as previously noted, and a pair of lateral side sections 42, 43, set off from the panel by the longitudinal score lines 24, 25, previously described. The inner ends of sections 42, 43, are chamfered as indicated at 44, and terminate in rounded tabs 45. A transverse score line 46 separates the panel 40 and tabs 45 from the bottom segment or panel 30. The terminal ends 47 of the side walls 42, 43, terminate in restricted finger portions 47a, and the sections are separated from the body of the panel by a transverse score line 48, which also sets off an end tab 49 having tongues 49a adapted to fit in and engage the slots forming tabs 66, 67, of cooperating end section 65. A central longitudinal score line 49b may be provided in end panel 49 to permit flexion of the tab when it is brought into mating locking engagement with the tab section 65.

As noted in Fig. 1, a liquid-tight sheet member 1 is superposed over and on the package blank 10. This liner sheet, which is adapted to form an internal liquid-tight bag, is appropriately cut to size, and, as shown, is of substantially the same length as the carton blank in extended, flat position, and the side edges 2 thereof extend completely over section 40 and over the main portion of section 20 leaving slight marginal sections 3 along lateral panel sections 22, 23 of blank section 20. These overlapping sections 3 serve to permit the folding over of the carton sides without bringing any portion of the thermoplastic-faced liner sheet thereunder.

To insure the proper maintenance or retention of the liner sheet in predetermined position, and to provide the necessary floating edges or corners in the finished carton, the carton blank 20, and particularly the panel sections 21, 41, and the side wall sections 22, 23, may be provided with strips or dots of adhesive 80, along the longitudinal edges, and at the transverse edges 81, while the bottom panel 30 may have transverse curvilinear sections 82 disposed on either side of the median fold line 11, as shown, to prevent undesired folds in the sheet. This feature is more clearly shown and claimed in my application Ser. No. 440,770, filed April 28, 1942. These strips of adhesive may be printed in place, or may constitute separate strips applied to the cardboard carton, or to the liner, the carton and the paper back of the thermoplastic sheet being thus permanently jointed by a strong bond. This adhesive may comprise any of the well-known glues used for such purposes.

A particularly novel and critical feature of the positioning and use of the adhesive strips resides in the formation of free corner sections on the several panels, which free corner sections are designated generally by the numeral 85, and may be from one-half inch on a side, up to 4 to 6 inches. It will be seen that the over sheet or liner 1, will be adhered to the carton blank, and held in position at the several panel and tab sections of the latter. It will be seen further that the free corners of the panels will also define the corners of the finished package or box, which corners, as indicated hereinabove, are the ones or points susceptible of greatest damage upon impacting of the finished package.

The complete lined or surfaced carton blank

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may be processed or manipulated to form a complete package in the manner delineated in Figs. 2 to 7, inclusive. Referring to Fig. 2, the carton blank is shown folded over along fold line 11, with the faces or panels 41 and 21 in juxtaposition, and the edges 2 of the liner sheet extending out over sections 22 of the side wall members. The folded over carton sheet is then subjected to heat and pressure along lines 90, 91, at the edges of the liner sheet 1, so as to interfuse and join the abutted thermoplastic edges of the liner sheet and form a bag of flat shape, having a folded over bottom along the seam or score line 11, and being permanently joined thereto by adhesive strips 82.

After the flat-folded bag section has been made, the side panels 42, 43, and corresponding top section 47, of panel 41, may have further strips of adhesive 92, 93, 94, 95, applied thereto in juxtaposition to the fold lines 25, previously described. With these adhesive strips, or sections, or lines in place, the side panels 22, 23 are severally folded along their median fold lines 26, 27, respectively, so that the free marginal edges 23, of the carton blank section 20 are folded over and into engagement with the adhesive strips 92, 93, 94, 95, being permanently secured thereto, as by pressing, to give a flat-folded carton blank having a liquid-tight bag liner formed in place, all as indicated in the showing of Fig. 3. It will be seen that in folding over the panel sections 22, 23 on their median fold lines 26, 27, the lateral sections 4, 5, of the bag liner are folded over, as shown in Fig. 4, to bring the seamed edges away from the central fold line of the bag, indicated generally at 6. The folding over of lateral sections 4, 5 of the bag liner give a bellows-construction to the bag liner and forms it as an essentially oversize liner or filler for the carton or container, which when filled with the material to be packaged and sealed will be rigidly held in the carton due to its substantial oversize. Furthermore, the expansion permitted by the bellows-like folds 76 permit a great deal of motility to the inner liner and enable it to adjust itself to all positions and conditions resulting from impact, so that any stresses or strains set up in the package are substantially self-compensating.

The blank of Fig. 3, which comprises a fabricated flat-folded carton having an integral, liquid-tight bag liner formed in place therein, will be adapted to be shipped in this folded, knock-down, condition, with a resultant saving of space, and transportation charges. It will be noted further, that given necessary aseptic conditions in the initial fabricating steps, or where the thermoplastic face of the liner sheet may be provided with applied or incorporated antisepticizing compositions, the package of Fig. 3 in its flat-folded condition, will provide a substantially sterile package, and, due to its flat-folded condition adapting it for packaging and shipment in flat-folded condition, the danger of contamination of the interior of the bag is substantially eliminated. To preclude any possibility of the infiltration or injection of contaminating matters into the interior of the bag liner in its flat-folded condition, the bag or box liner sheet 1 may be cut slightly oversize along its length to permit the sealing of the mating top edges in a transverse closed seam which would hermetically seal the bag liner. When ready for use the excess top edge of the liner could be cut off to permit opening and filling of the package.

When it is desired to erect the flat-folded pack-

age of Fig. 3 into open, material-receiving condition, it will only be necessary to pinch the flat-folded package along the fold lines 26, 27, to bring the carton into the substantially squared-up position shown in Fig. 4. By this action the liner is automatically erected into position, and being glued to the folded-over bottom panel section 30 erects the latter into its normal, flat position. With the wall sections 22, 23 now in flat-tened side wall-forming position, the end tabs 71 are folded along fold line 51, and the tongues 73 engaged in and held by slots 31 in the bottom panel 30, thus completing the forming and squaring up of the bottom of the package. The vertical walls of the package will erect the bag liner into the open mouth position shown in Fig. 4. This package may then be filled with any fluent material, either particulate solid, or liquid, and desirably while maintaining the package in pinched condition as set forth more fully and claimed in my application Ser. No. 338,852, filed June 5, 1940. Thereafter, the bag top may be hermetically sealed in any suitable sealing machines, such as disclosed in my Patents 2,262,480, of November 11, 1941; 2,252,105, of August 12, 1941; 2,239,133, of April 22, 1941; 2,220,873, of November 5, 1940, and, after suitably folding into and on top of the box as described in my prior Patents 2,228,647 of January 14, 1941, and 2,223,754 of December 3, 1940, the package is closed by folding over the truss section or member 62 of the top panel into gripping engagement with the front wall 41 and side walls 22, 23 of the package. It will be observed that, due to its truss shape the member 52 serves as a stiffening section for the top of the package without imparting any weight thereto. Thereafter the side tabs or panels 53, 54 may be folded over and onto the truss member 62 and on top of the bag 73, and locking tab 65 laid thereover and engaged in locking engagement by cooperating tab 49 whose ears or tongues 49a may be forced into and in locking engagement with tabs 63, 67 of tab 65. To facilitate the insertion of ears 49a into locking engagement in member 65, the tab may be pinched or slightly folded along the fold line 49b. After the insertion of the tongues 49a, the panel may be pressed flat into position as indicated in Fig. 6. It will be appreciated that the novel package, above described, requires no glue for sealing after filling.

Fig. 7 is an alternative form of top closure in which the side tabs 53, 54 are provided with locking tabs 53a, 54a, adapted to engage slots 62a and 49c in the corresponding top cover sections of the package.

It will now be appreciated that there has been provided a novel cardboard package having a self-contained and automatically erected liquid-tight bag liner, which is permanently joined to inner walls of the package, but is unconnected, or "floating," at the corners of the finished package, so as to provide a desirable flexibility or capacity for free movement of the corners of the

finished package, and particularly of the inner bag liner thereof, so that upon impact and crushing of the corners of the container, the free floating bag corners will be self-adjusting and will not burst. It will also be appreciated that the novel method herein permits the formation of a lined carton or package in which the complete package is formed from a composite laminated web or sheet, and folded over and adhered into a flat-folded carton having a unitary liquid-tight bag liner formed therein in flat-folded condition, the whole being adapted to be shipped and transported in such flat-folded condition and erected when it is to be filled. It is also to be noted that due to the fact that the liner sheet is adhered to the carton blank in a predetermined discontinuous manner so as to leave substantially free uncemented edge sections at the several panels, the completed package will have free floating corners of the inner bag, that is, the bag liner will not be adhered to the package at the corners with the result that the completed package, particularly when filled with liquid, will be capable of meeting all standard impact and barrel tests prescribed for shipping containers.

Having now particularly described and disclosed my invention, what I desire to claim is:

A paper-board container having an impermeable, oversize liner forming a bag, the corners of said bag being free of attachment to the container, the liner having expansible lateral seam sections, and a flat top seam folded onto and over the top of the bag, and a container closure comprising a truss section folded over into gripping engagement with the tops of the inner sides of the walls of the container, side tabs folded over the truss member, and cooperating locking tabs folded over the said side tabs and in locking engagement with each other.

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