May 22, 1962 D. B. KAUFFELD 3,035,750

CLOSED-END CONTAINERS

Filed Feb. 15, 1960

Fig. 1

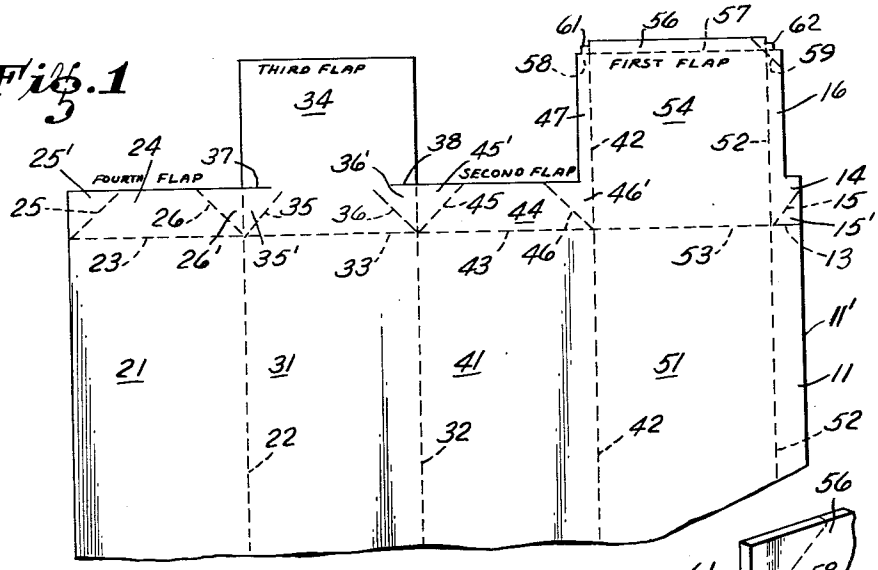


Fig. 2

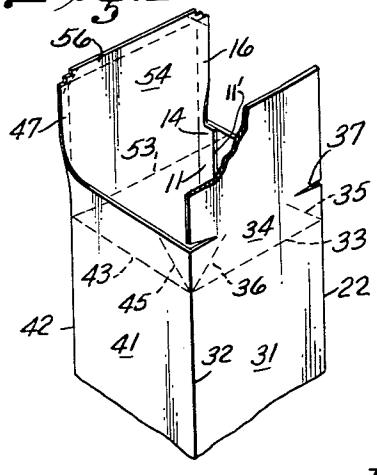


Fig. 3

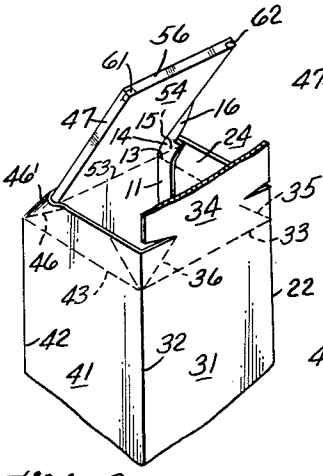


Fig. 7

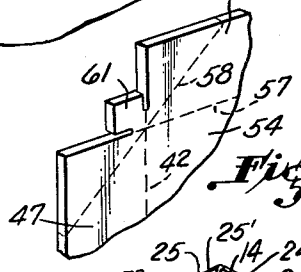


Fig. 4

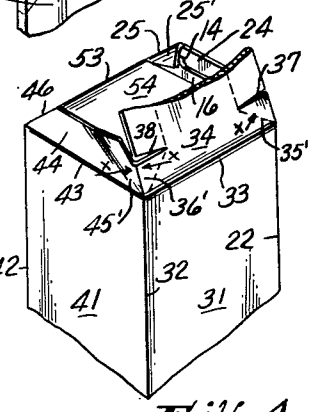


Fig. 6

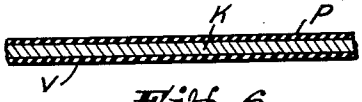
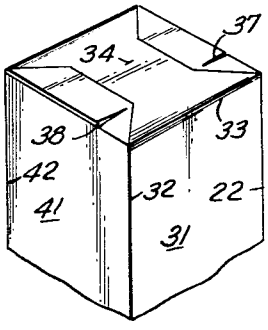


Fig. 5



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3,035,750
CLOSED-END CONTAINERS

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8 Claims. (Cl. 229—37)

This invention relates to a blank and to a container to be made therefrom, and more particularly relates to an improved end closure structure therefor.

It is an important object of this invention to provide an improved end closure which is leakproof, and especially to provide an improved end structure made from a blank having plastic surfaces, said end structure lending itself to heat-sealing techniques wherein plastic surfaces are welded as distinguished from glued, although the present structure can be glued, if desired, or assembled by using any other adhesive.

Another important object of the invention is to provide an improved end closure for a container made from a laminated blank having a liquid absorbent core wherein most of the cut edges of the blank are faced outwardly of the finished container to prevent absorbing of the contents of the container by the core, known in the art as "wicking." One side seam of the container, however, faces inwardly and the cut edge thereof is treated with a waterproofing material, i.e. polyethylene sprayed on the edge either before or after the container is set up.

It is another very important object of the invention to provide an inexpensive and easily set-up container and end closure which is especially adapted for packaging liquids such as milk or other food products since the container and closure structure will meet the requirements of government food packaging regulations. However, the present container is also suitable for the packaging of other products such as oils, jellies, syrups, acids, alkalies, detergents, bleaches, or other solid or liquid products either hot, cold or frozen.

Still another major object of the invention is to provide a container and closure therefor which lies substantially flat to form a rectangular container when the latter is closed and sealed, the end structure having no recesses to catch and hold foreign matter falling on the sealed container.

A further major object is to provide an end structure especially adapted to be made from a one-piece die-cut blank which blank is also novel per se, and the end structure being at least double thickness to prevent corner damage if the container is dropped.

Further objects and advantages of the invention will become apparent during the following discussion of the drawings, wherein:

FIG. 1 is a plan view of the end portion of a blank according to the invention, this illustrated portion including part of the length of the side panels, and further including the end closure structure for the container including embossed crease lines shown as dashed lines prior to folding and sealing the blank, the other end structure of the blank not being illustrated in view of the fact that any suitable closure may be employed at the other end of the container;

FIG. 2 is a perspective view showing the blank of FIG. 1 set up to provide the sidewalls of the body, the end closure flaps being open and lying substantially in the plane of the side panels to which they are integrally attached;

FIG. 3 is a perspective view similar to FIG. 1 but showing one of the end closure flaps partially closed with the flange portions at the edges of this flap bent upwardly;

FIG. 4 is a perspective view similar to FIG. 3 but showing the end closure flaps closed to a further extent;

FIG. 5 is a perspective view similar to FIG. 4 but showing the end of the container fully closed and sealed;

FIG. 6 is an enlarged cross-sectional view showing a preferred lamination from which the blank and the container shown in the other figures may be made; and

FIG. 7 is an enlarged perspective view of one of the corners of the blank shown in FIG. 1.

Referring now to FIGS. 1 and 2, it will be seen that the blank includes four side panels **21**, **31**, **41** and **51**, these side panels being arranged side by side and mutually separated by four longitudinal embossed bend lines **22**, **32**, **42** and **52**, these bend lines extending the full length of the blank. To the right of the bend line **52** is a side seam tab **11**, this tab being bent at right angles to the side panel **51** along the bend line **52** and sealed to the inside surface of the leftmost side panel **21**, as illustrated in FIG. 2 wherein the blank is set up to form a hollow body. The blank is divided by a transverse embossed crease line which includes the crease line portions **13**, **23**, **33**, **43** and **53**, and which crease line portions divide the blank into side panels **21**, **31**, **41** and **51** and end closure flaps **24**, **34**, **44** and **54** as well as a tab portion **14** which however is not sealed to the adjacent end flap **24** for reasons which will presently become apparent. The flap **24** is provided with two diagonal embossed crease lines **25** and **26**; the flap **34** is provided with two diagonal crease lines **35** and **36**; and the flap **44** is provided with two diagonal crease lines **45** and **46**. In addition, slits **37** and **38** are provided in the flap **34** for the purpose hereinafter explained. The tab portion **14** is provided with a diagonal crease line **15**, and joins a narrow flange portion **16**. Finally, the flap **54** also includes two more flange portions **47** and **56** joined to the flap **54** at embossed crease lines **42** and **57**, respectively. As can be seen in FIGS. 1 and 7, the corner structures at the outer ends of flap **54** include diagonal crease lines **58** and **59** and small square pieces **61** and **62** separated from the flange portions by lines which are partly slit and partly embossed.

When the blank is set up as shown in FIG. 2 to form a hollow body of rectangular cross section, the tab **11** being secured to the side panel **21**, the next step is to fold the tab **54** along its transverse crease line **53** while at the same time folding the upper portion **14** of the tab outwardly along its transverse crease line **13** and its diagonal crease line **15** while bending the flange portion **16** upwardly, as shown in FIG. 3. The triangular tab portion **15'**, FIG. 1, bulges outwardly of the container and extends upwardly to lie adjacent the side of the tab portion **14** and above the plane of the flap **54** as seen in FIG. 4. The tab portion **14** and the flange **16** lie parallel to and adjacent the flap **24** just above its crease line **22**, and flange portions **56** and **47** respectively lie against the flaps **34** and **44**, the flange portions **16**, **47** and **56** then being all sealed to the adjacent flaps in the position shown in FIG. 4. When the sealing of the flange portions of panel **54** is accomplished, the cut edges of the flanges face outwardly of the container away from its contents. The small square portions **61** and **62** are sealed in the joints in the corners between the flaps and the flange portions and tend to serve as filets to prevent leaking at the corners.

Next, the small triangular member **25'**, FIG. 1, is bent downwardly around the crease line **25** and over the tab portions **14** and **15'** so that it lies parallel with the side flap **24**. At this point, it may also be desirable to seal the triangular member **25'** against the inside surface of the tab **14** so as to make a more liquid-tight corner joint. The flap **44** bends outwardly about the crease line **46** so that the triangular portion **46'** extends upwardly and lies flat against the flap **44** and is sealed thereto.

After the flap 54 has been bent inwardly and the flange portions sealed in position as described above and as shown in FIG. 4, the two shorter side flaps 24 and 44 are bent inwardly to overlie the panel 54, while at the same time the panel 44 is bent along the crease line 45 and the panel 34 is bent along the crease line 36 so as to provide a triangular web comprising the panels 45' and 36' as shown in FIG. 4. These two triangular portions 45' and 36' are squeezed together by the application of pressure at the arrows X—X, FIG. 4, these triangular portions 45' and 36' being tightly sealed together and the slit 38 permitting the panel 34 to be warped so that pressure sealing means can be applied as shown at the arrows. Likewise, on the other corner which is common to the end flap 34, a triangular portion 35' and another triangular portion 26', the latter being only visible in FIG. 1, are squeezed together and sealed, the slit 37 permitting the panel 34 to be warped sufficiently that a pinching and sealing tool can be applied to the triangular portions 26' and 35'. When these triangular portions have all been sealed together, the flaps 24 and 44 can then be bent all the way inwardly around their respective transverse crease lines 43 and 23 so that the flaps 24 and 44 will lie flat over the top surface of the flap 54, and the panel 34 at that time will be in partly closed position to overlie the flaps 24, 44 and 54.

The final step is to seal the inside surface of the flap 34 tightly to the upper surfaces of the flaps 24, 54 and 44 so as to provide a reasonably flat end closure as shown in FIG. 5. If possible, it is desirable to insert a mandrel inside the open end of the container body and to then tightly compress the flaps together by exerting interior and exterior pressure until a tight seal is secured. This, however, is not considered absolutely necessary.

With respect to FIG. 6, this figure illustrates a preferred laminated material of which the present carton may be made. If the carton is to hold dry material such as birdseed, it could be made of reclaimed Kraft or other paper board and merely glued closed, but the present disclosure seeks to place particular emphasis on a carton structure and on materials from which a satisfactory milk carton could be manufactured. In this event, a preferred embodiment of the invention would be made of virgin Kraft K coated on both sides with a plastic. This plastic should be a heat-sealable material such as polyethylene P at least on the inner surface, and the outer surface of the container should also be coated with a plastic material which may also be polyethylene, or which may alternatively comprise some other plastic such as vinyl V, it merely being necessary that the outer coat V will bond to the polyethylene P of the inner coating when heat is applied thereto so that the container may be heat-sealed by a step closely resembling welding. Any cut edges of the laminated blank which face inwardly of the finished container, such as the edge 11' in FIG. 2, should also be treated by spraying, dipping or otherwise impregnating them with the plastic coating material or with some other easily applied waterproofing material. This disclosure is not to be limited, however, to any particular materials and, as stated above, it is only necessary that at least one of the plastics be of a weldable type which can be fused at a temperature low enough that the Kraft K will not be damaged. It is also contemplated that other materials may be added to the laminate for the sake of improving the appearance, rigidity or heat-conductive properties. It is to be noted that the laminate need not be limited to a core of Kraft.

Referring now to FIG. 4, the first heat-sealing step is carried out just after closing of the end flap 54, this heat sealing serving to secure the flange portions 16, 47 and 56 to the respective flaps 24, 44 and 34 and at the same time securing the tab portion 14 and the triangular portion 25' together and to the inside surface of the side flap 24. For this purpose, it is necessary that a clamping and sealing head be applied around the end of the container so that both heat and pressure may be applied to the exposed surfaces of the flange portions 16, 47 and 56 and the flaps 24, 44 and 34, respectively, just above the transverse crease lines.

The next sealing step is performed at the arrows X—X shown in FIG. 4. The triangular webs 36' and 45' are pinched together and heat is applied thereto so as to mutually seal the panels and at the same time a similar pressure and heat is applied to the panels 26' and 35', whereupon the flap 34 will be tightly closed against the flaps 24 and 44 which overlie the flap 54. Finally, heat and pressure is applied against the upper surface of the flap 34 in the closed position shown in FIG. 5, the pressure being preferably opposed by a heated mandrel located within the container body and abutting the inside surface of the flap 54.

I do not limit my invention to the exact form shown in the drawings, for obviously changes may be made therein within the scope of the following claims.

I claim:

1. A container and end closure made from a single blank and comprising four panels and a tab interconnected at four longitudinal bend lines, the blank having a transverse crease line crossing the bend lines at right angles and longitudinally dividing the blank into side panels and end flaps, the tab and one side panel being lapped and sealed together to form a hollow body of rectangular cross-section; the first end flap comprising an inside flap contiguous with a longitudinal portion of said tab and shaped to close the end of said hollow body and having flange portions around its periphery; a third end flap located opposite said first flap and comprising an outside flap shaped to cover the end of the body; and second and fourth end flaps each of length no greater than sufficient to lie halfway across the end of the body, the second and fourth end flaps both having diagonal crease lines extending convergently outwardly from the intersections of the bend lines with the transverse crease lines, the outer portion of the tab beyond the transverse crease line having a diagonal crease line extending from the intersection of its transverse crease line with its bend line, said tab portion in the vicinity of its diagonal crease line being folded outwardly around said bend line and joining the adjacent flange portion of the first flap and the latter being folded at right angles around its transverse crease line to close the end of the body with said flange portions parallel with and sealed to adjacent flaps, the triangular portion of the tab between its diagonal crease line and the transverse crease line folding outwardly of the container and being overlapped and sealed to a triangular portion of the adjacent fourth end flap, and the corner portion of the second flap located between its diagonal crease line and the adjacent edge of the first flap folding outwardly of the container and then over the first flap; the second and fourth flaps being folded inwardly at right angles about their transverse crease lines to overlie the first flap, and the triangular portions of the second and fourth flaps adjacent the edges of the third flap and defined by respective diagonal crease lines being folded inwardly against the third flap and the latter then being folded about its transverse line to overlie the first, second and fourth flaps and being sealed thereto.

2. A container and end closure made from a single blank having surfaces of heat-fusible plastic material and comprising four panels and a tab interconnected at four longitudinal bend lines, the blank having a transverse crease line crossing the bend lines at right angles and longitudinally dividing the blank into side panels and end flaps, the tab and one side panel being lapped and heat-sealed together to form a hollow body of rectangular cross-section; the first end flap comprising an inside flap contiguous with a longitudinal portion of said tab and shaped to close the end of said hollow body; and having flange portions around its periphery; a third end flap located opposite said first flap and comprising an out-

side flap shaped to cover the end of the body; and second and fourth end flaps each of length no greater than sufficient to lie halfway across the end of the body, the second and fourth end flaps both having diagonal crease lines extending convergently outwardly from the intersections of the bend lines with the transverse crease lines, and the outer portion of the tab beyond the transverse crease line having a diagonal crease line extending from the intersection of its transverse crease line with its bend line, said tab portion in the vicinity of its diagonal crease line being folded outwardly around said bend line and joining the adjacent flange portion of said first flap and the latter being folded at right angles around its transverse crease line to close the end of the body with said flange portions parallel with and sealed to adjacent flaps, the triangular portion of the tab between its diagonal crease line and the transverse crease line folding outwardly of the container and being overlapped and sealed to a triangular portion of the adjacent fourth end flap, and the corner portion of the second flap located between its diagonal crease line and the adjacent edge of the first flap folding outwardly of the container and then over the first flap; the second and fourth flaps being folded inwardly at right angles about their transverse crease lines to overlie the first flap, and the triangular portions of the second and fourth flaps adjacent the edges of the third flap and defined by respective diagonal crease lines being folded inwardly against the third flap and heat-sealed thereto and the latter then being folded about its transverse crease line to overlie the first, second and fourth flaps and being heat-sealed thereto.

3. A container and end closure comprising four side panels and a longitudinal tab closed to form a hollow body of rectangular cross section and divided transversely at a crease line to form four end closure flaps and a tab portion adjacent one side of the first end flap, the latter being shaped to close the end of said body and having flange portions around the periphery, the first end flap and tab portion being bent across said end along said transverse crease line and the tab portion having a triangular portion at its crease line bulged outwardly of the container and said tab portion and said triangular portion being sealed to the adjacent end flap; second, third and fourth end flaps sealed to the said flange portions, the second and fourth flaps being bent at right angles along their crease lines to at least partly overlie said first flap, and said third end flap being located opposite said first end flap and comprising an outside flap shaped

to cover the end of the body, the second and fourth end flaps having triangular corner portions folded flat over the first flap, and the third end flap being bent at right angles along its crease line to overlie the first, second and fourth flaps and said triangular corner portions and sealed thereto.

4. In a container as set forth in claim 3, the second and fourth flaps being of length no greater than half the width of an adjacent flap.

5. In a container as set forth in claim 3, said panels and flaps comprising a single blank having surfaces of heat-fusible plastic material and being thermo-welded together.

6. A one-piece blank for making a container and an end closure therefor comprising four transversely aligned panels and a longitudinal-seam closing tab respectively defined by four longitudinal embossed bend lines, the blank having a transverse embossed crease line crossing the bend lines at right angles and longitudinally dividing the blank into side panels and end flaps, the distances from said transverse crease line to the outer transverse edges of two opposed shorter flaps being no greater than one-half the width of an adjacent panel, and said distances on the two longer opposed flaps substantially equaling the width of an adjacent panel, and one of the longer flaps having flange portions around three of its sides and one of the flange portions joining said tab, and two diagonal embossed crease lines extending in two directions from each of the inner corners of both of the shorter flaps outwardly on the flap and on the other one of the longer flaps, and a diagonal crease line extending from one of the inner corners of the first of the longer flaps away therefrom on said tab portion.

7. In a blank as set forth in claim 6, the lengths of the shorter flaps being less than one-half the width of an adjacent panel.

8. In a blank as set forth in claim 7, a slit cut into each side of said second of the longer flaps in line with the outer transverse edges of the adjacent shorter flaps and each extending partway thereacross for a distance approximately equaling the length of the adjacent shorter flap.

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