United States Patent [19]

Hopkins

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[45] **May 22, 1973**

[54] **OPENING MEANS FOR TETRAHEDRAL CONTAINER**

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[52] **U.S. Cl.** .....**229/7,** 229/22 R, 206/65 T, 156/461, 229/66

[51] **Int. Cl.**.....**B65d 83/00,** B65d 17/00

[58] **Field of Search**.....229/21, 66, 22, 17, 229/7; 222/107; 206/65 T; 156/461; 93/82

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3,482,491	12/1969	Gustafson	93/82
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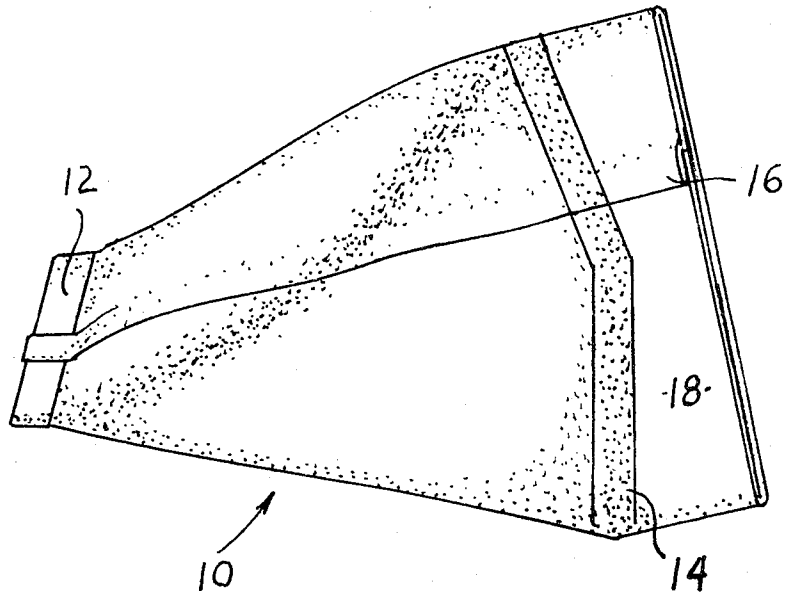
Primary Examiner—Davis T. Moorhead
Attorney—Sheldon H. Parker

[57] **ABSTRACT**

A tetrahedral shaped container is provided with a pair of tabs at one end. By pulling apart the tabs, an opening is formed at one end. The end seal at the tab end of the container is critically shaped so as to provide for the combination of ease of opening, strong seal which will not prematurely open or leak, and which will not distort the configuration of the container. The seal shape must deviate from a straight line normal to the longitudinal axis of the container by an extent great enough to permit the opening force to be applied to only a small region of the seal, but by an extent small enough to minimize distorts in the container.

16 Claims, 10 Drawing Figures



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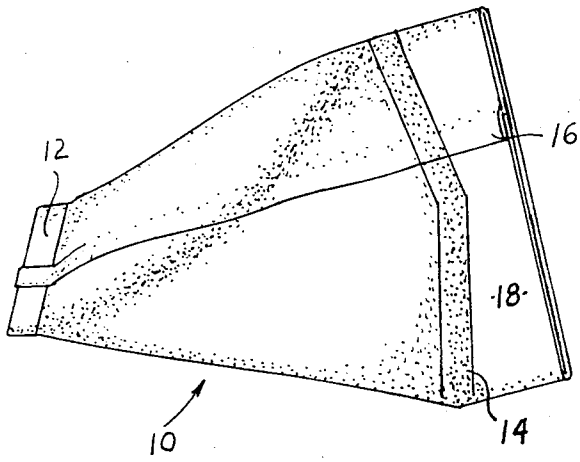


FIG 1

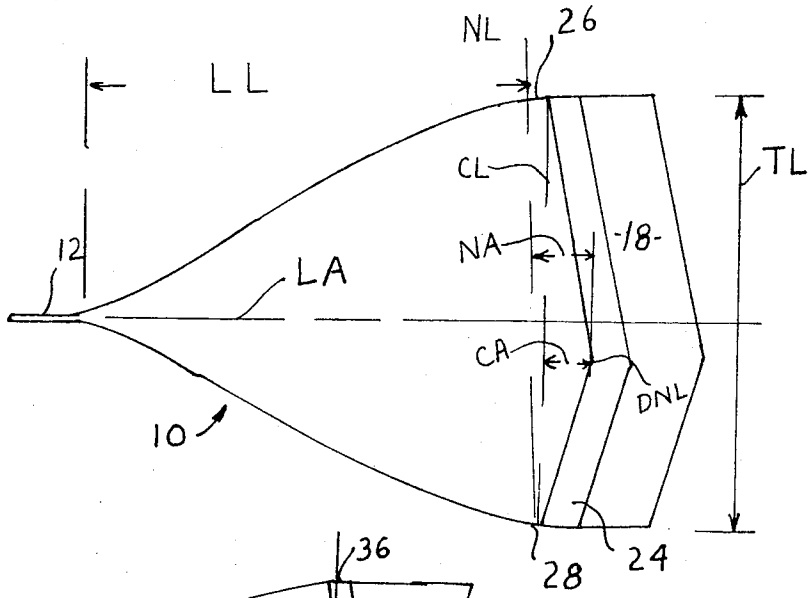


FIG 2

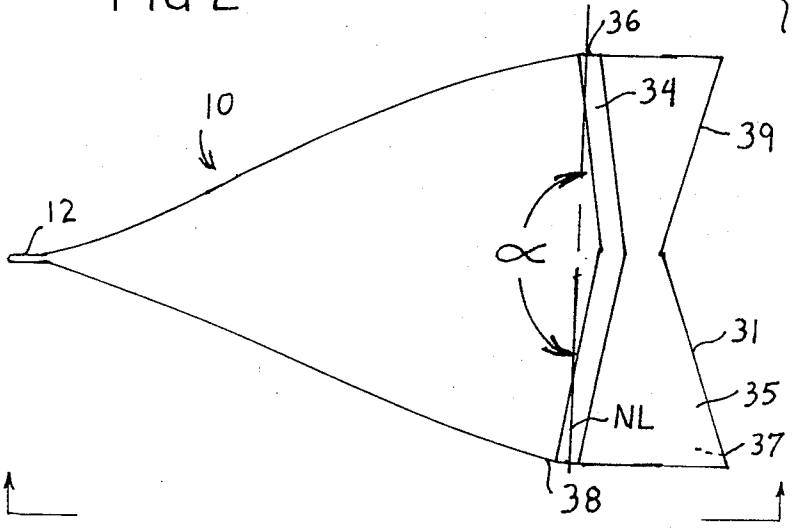


FIG 3

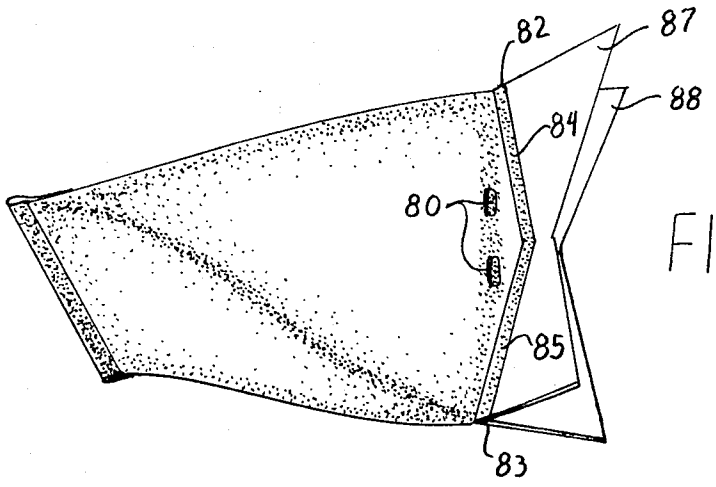


FIG 8

FIG 7

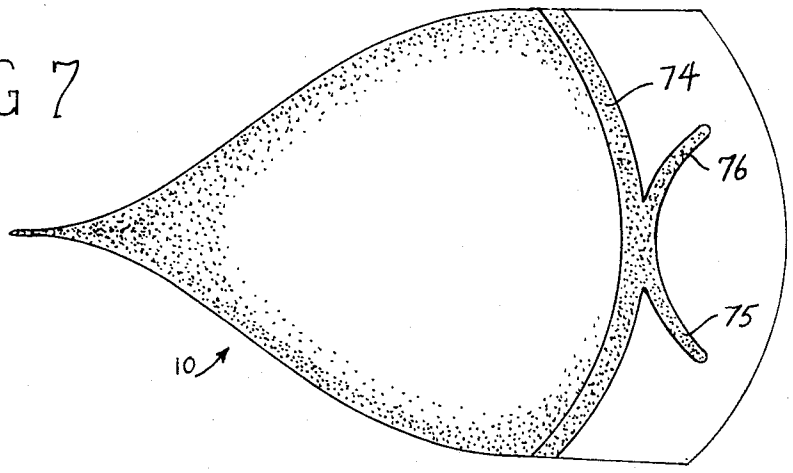
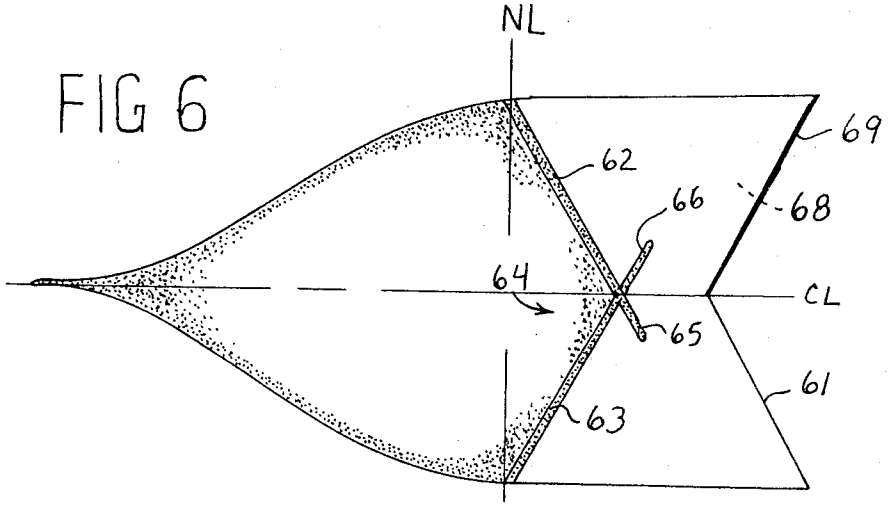


FIG 6



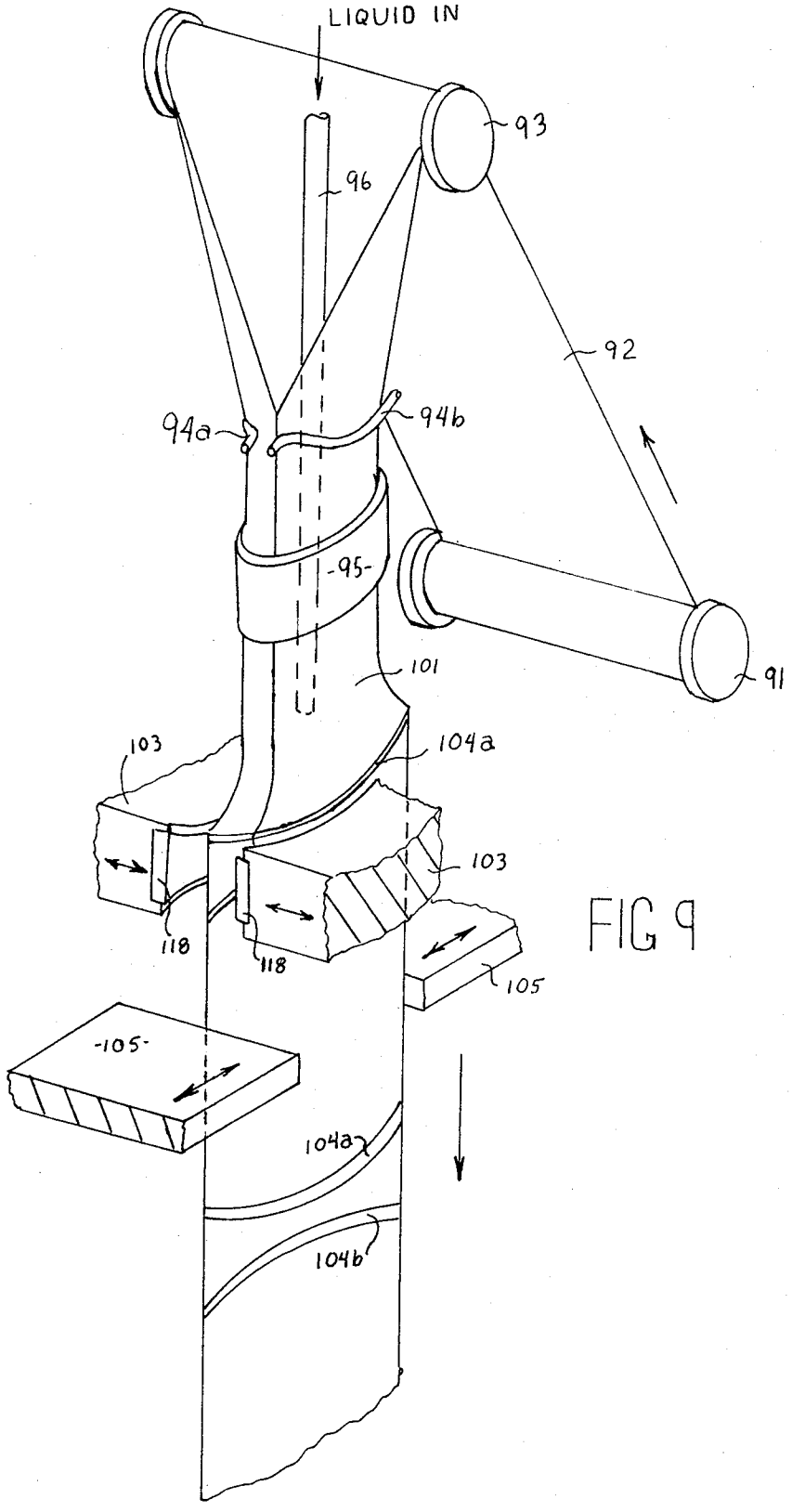

LIQUID IN
93
96
92
94a
94b
95
101
91
103
104a
103
118
118
105
105
104a
104b

FIG 9

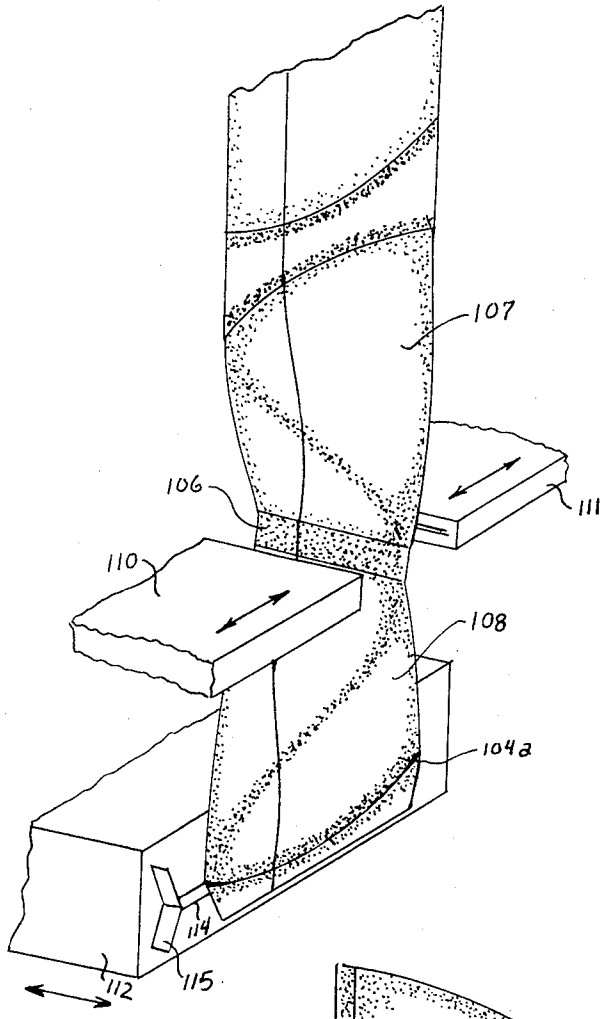


FIG 9A

FIG 4

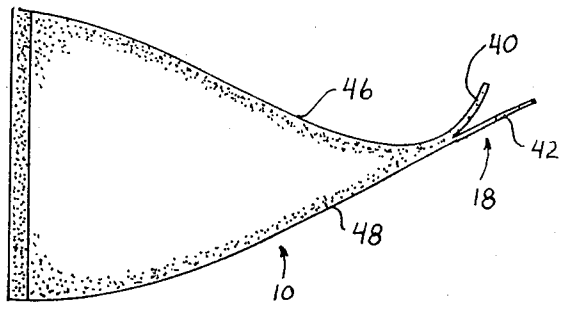
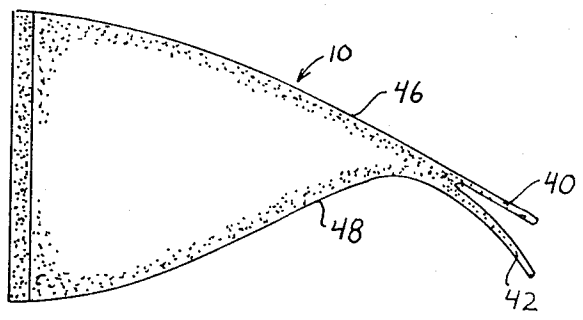


FIG 5



OPENING MEANS FOR TETRAHEDRAL CONTAINER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a tetrahedral shaped container, and more particularly to a dispensing structure for tetrahedral containers.

2. Description of the Prior Art

The low cost, rapid, continuous manufacture of tetrahedral shaped containers, of the type disclosed in U.S. Pat. Nos. 3,404,988, 3,244,274 and 2,919,800, coupled with low filling costs and low construction material costs, has contributed to the low per unit cost of tetrahedral containers.

There has been a persistent problem, however, with tetrahedral containers which are used for dispensing liquids. Typically, the container is provided with a dispensing hole which is covered with a tab. The tab is pulled away from the container, thereby uncovering the hole and permitting the discharge of the liquid from the container. It is necessary however, to hold the container body during the opening operation. Because of the pressure thus applied to the container and because of the unpredictability of the direction of exit of the liquid from the container, the user in too many instances is squirted with the liquid.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects of the invention will be evident and the invention will be more fully understood when the specification is read in conjunction with the following drawings wherein:

FIG. 1 is a perspective view of a container with opening means in accordance with the present invention;

FIG. 2 is a side view of a modification of the container of FIG. 1;

FIG. 3 is a side view of a further modification of a container of the present invention;

FIG. 4 is a side view, taken along lines 4—4, of FIG. 3;

FIG. 5 is a side view of the container of FIG. 4, shown in a flexed position;

FIG. 6 is a side view of a container showing another modification of an end seal;

FIG. 7 is a side view of a container showing a further modification of an end seal;

FIG. 8 is a perspective view of a further modification of a container and end seal; and

FIG. 9 is a schematic illustration of apparatus for forming containers of the instant invention, and

FIG. 9*a* is a continuation of FIG. 9.

SUMMARY OF THE INVENTION

It has now been found that the problems normally encountered in opening of tetrahedron containers can be overcome through the use of a novel seal configuration and end tabs which facilitate the opening of the container.

In accordance with the present invention, a tetrahedron shaped container is provided with seal ends, the ends lying at substantially right angles to each other. One sealed end is provided with a seal which extends transverse to the longitudinal axis of the container but deviates from a straight line. The seal can be in the form of two or more lines or a semi-circle, but the deviation from the straight line should not be such that the ratio of the maximum deviation from a straight line to the length of the transverse dimension of the container is in the range from 1:4 to 1:8.

DETAILED DESCRIPTION OF THE INVENTION

As shown in FIG. 1, a tetrahedral shaped container, indicated generally as 10, is provided with two sealed ends 12 and 14. The longitudinal seam 16 has no particular consequence in the instant invention, and is shown only for the purpose of completness. The sealed ends 12 and 14 line in planes which are at right angles to each other. The container has a region 18 which extends beyond the seal 14.

The longitudinal axis of the container is represented by the line LA, in FIG. 2. The seal 24 lies transverse or normal to the longitudinal axis of the container 10. It can be seen that the seal deviates slightly from the straight line NL which lies normal to the line LA. The point of maximum deviation from the normal line NL, is represented by DNL and the extent of the deviation is represented by NA.

As shown in FIG. 3, the end seal 34 may be formed in two parts which form an angle X. As will become evident from the following description, it is essential that the angle as great as possible, preferably as close as possible to 180° on the order of from 125° to 170°. More acute angles can be used in those cases where the apex of the angle is offset from the longitudinal axis, than in those cases where the apex falls on the longitudinal axis.

As seen in FIG. 4, the region 18, provides two tabs 40 and 42 which can conviently be held without holding the body of the container 10.

The container walls 46 and 48 have a tendency to collapse or fold-over, along the line which extends from the point at which the end seal 34 meets the edges 36 and 38 of the container 10.

As disclosed in U.S. Pat. No. 3,404,988 to Rausing the container material typically comprises an outer plastic or wax layer and a plastic layer facing the interior of the container. The plastic layer is relatively more expensive than the relatively rigid layer of paper or cardboard and therefore is made as thin as possible. The mechanical stability of the package is produced by the paper or cardboard layer in combination with the structural characteristics of the tetrahedron.

The plastic inner layer must be inert to the substance to be packaged, strong and durable. It is preferably heat sealable, although pressure or heat sensitive adhesives can be used. Typical plastics which can be used are polyvinyl chloride, polyvinyl acetate, vinyl copolymers, polypropylene, polystyrene, cellulose acetate and cellulose acetate butgrate. For packaging dairy products polyethylene is particularly desirable.

It is well recognized that it is critical that the container material be free of kinks, as explained in U.S. Pat. Nos. 3,482,491 and 3,577,301 to Gustafson. The kinks tend to cause breaks in the inner plastic layer and break down the structural rigidity of the container. This is particularly true where fluid seeps through cracks in the inner plastic layer and impregnates the paper layer causing the paper to soften and increasing the possibility of leakage and bacteria buildup in the paper.

It is thus seen that any tendency of the container to flex from the position shown in FIG. 4, to the position shown in FIG. 5, is extremely undesirable because the flexing tends to create kinks in the container material.

The criticality of the aforenoted problem prevents the "tear-open" technology as it relates to flat containers, from being directly applied to tetrahedral containers.

The tendency of the container to flex can be minimized or eliminated by means of controlling several dimensions.

The tendency to flex decreases directly with decreases in the distance from the point of maximum deviation DNL to the transverse line NL which includes the intersection of the end seal **24** with edge **26** or the edge **28.** In the event of an asymetric configuration such as shown in FIG. **2,** the distance NA which represents the longitudinal distance from the intersection of end seal **24** with container edge **26** to the point DNL is the critical dimension, since this distance is greater than the distance to the end seal **24** — edge **28** intersection. In an asymetric arrangement, the flexing may not occur along a line normal to the longitudinal axis, but rather, may occur along a line from the end seal **24** — edge **26** intersection to the end seal **24** — edge **28** intersection. The longitudinal distance of the connecting line CL to the point DNL is represented as CA in FIG. **2.**

The ratio of CA to TL (the transverse dimension of the container) or NA to TL should be less than about 1 to 4 and preferably less than 1 to 8.

The longitudinal length LL of the container need not be narrowly controlled because the ability of the container to absorb kinks or distortions is affected less by its longitudinal dimension than by its transverse dimension.

The minimum length of CA or NA is controlled by the need to apply the initial opening force to a restricted region of the seal rather than to the entire seal. A straight, longitudinal seal along the line NL, for example, would be at best, extremely difficult to open.

As shown in FIG. **6,** an end seal indicated generally as **64,** can be in the form of two intersecting lines, thus providing two primary seals **62** and **63,** and two secondary seals **65** and **66.**

The secondary seals **65** and **66** serve several functions, including protection of the primary seals **62** and **63,** tends to cause stresses which open the flaps or tabs **67** and **68,** inform the user of the power or effort required to open the seal and provide a smoother more gradual opening action.

The users of the containers typically may not have sufficiently frequent use to develope significant experience in opening of the container. Thus, the secondary seals provide a chance to practice before the main seal is opened.

The flaps may be provided with a non-straight outer edge, as seen in FIG. **3** and FIG. **6.** In the modification of FIG. **3,** the outer edges **31** and **39** extend away from the line NL which is normal to the longitudinal axis of the container **10.** Again, as seen in FIG. **6,** the outer edges **61** and **63** extend outwardly from the center line and away from the line NL. The butterfly configuration of FIGS. **3** and **6** tends to contribute to holding the container is a tetrahedral configuration.

FIG. **7,** shows a container **10,** which has an arcuate primary seal **74,** and an intersecting arcuate secondary seal **75, 76.**

As shown in FIG. **8,** a further means can be employed to prevent the container from flexing between the configuration of FIG. **4** and FIG. **5.** One or more auxillary seals **80** are employed to maintain the container in the closed position. The seals are positioned along the line which extends between the outer ends **82** and **83** of the primary seals **84** and **85.** The seals must not be extensive so that liquid flow is not impeded when the container is opened.

It should be noted that the various individual features can be used in any combination with each other. For example, the auxillary seals **80** can be employed with the structures of FIG. **6** or FIG. **7,** and the butterfly flaps **87** and **88** of FIG. **8,** could be used with the structure of FIG. **7.** The techniques used in the manufacture and filling of the tetrahedral container are well known in the art. For example, U.S. Pat. Nos. 3,299,605 relates to the making of containers from a web of material and 3,482,491 and 3,577,301 disclose the production of tetrahedral hollow articles.

A band-like web of material **92** is continuously withdrawn from a rotable supply roll **91,** which is mounted in fixed bearings. As previously noted, the material should possess a certain degree of stiffness combined with a minimum tendency to crease and to tear, because of the requirements in using the material for a container and because of the stresses which the web of material experiences during the forming operation. The material is therefore preferably a paper coated with polyethylene or the like.

The web **92** travels over a horizontal guide roller **93** from which it is drawn downwards to be formed into a tube. The material is deflected into the form of a tube by two deflecting rods **94***a* and **94***b* and a ring **95.** The two roughly horizontally and relatively angularly disposed rods preshape the web to enable it to easily slide through the ring **95** to from the completed tube. The deflecting rods **94***a* and **94***b* do not make contact and as illustrated in FIG. **9,** their converging ends are extended in the form of two relatively spaced parallel terminal sections. This arrangement permits the rear arch formed by the material during its deflection to freely expand without the formation of a permanent crease.

The tube is filled with a liquid such as a dairy product, through the filling tube **96** which extends down into the region in which the tube has been shaped into a tube. The seam must of course be sealed, as by heat sealing, in a region above the outlet end of the filling tube **96.** The seam sealing means can be positioned in the region between the deflecting rods **94***a* and **95***b,* and the ring **95.**

The formed tube continues to travel in the direction indicated by the arrows and at predetermined intervals the two heat sealing jaws **103** are brought together. The jaws **103** are heated, for example electrically, and upon being brought together transfer their heat to zones of the tube **101** trapped therebetween and thus cause welding together of the zones to form the seams **104***a* and **104***b.*

The tube **101** continues its downward travel at a further predetermined interval, the heat sealing jaws **105** are brought together to form a transverse seam **106** and create a pair of tetrahedral containers **107** and **108.**

At any desired point in time, the continuous strip of tetrahedral containers can be cut into a plurality of individual containers. The pair of cutting jaws **110** and **111** are brought together to form a straight cut across the seal **106.** Another pair of cutting jaws (one of which is shown) are brought together to form the cut between the seals **104***a* and **104***b.*

The cutting jaw **112**, has a complex cutting edge. The contour of the cutting edge is determined by the type of flap edge which is desired. The cutting blade **114** will produce a flap edge of the type illustrated in FIG. **1**. The wing like regions **115** of the cutting blade **114** are required in order to permit the flaps to be separated and pulled apart.

It is noted that the region between the heat seals **104***a* and **104***b* can contain trapped liquid. The use of resilient, compressible pads **118**, in the heat sealing jaws **103**, tends to force liquid out of the region between the heat seals **104***a* and **104***b*, but if required, the region can be further cleared of residual liquid. For example, a forced air or liquid stream can be used to both open the pair of flaps which have been formed and to remove the residual liquid.

What is claimed is:

1. A hollow container comprising:

a cylindical body portion having a pair of transversely sealed ends, each of said ends of said cylindrical body portion lying substantially in a plane, the plane of one of the ends of said cylindrical body portion being at a right angle to the plane of the other end of said cylindrical body,

one of said sealed ends having unsealed tab sections extending beyond the end seal, said seal deviating from a straight line by an extent such that the ratio of the maximum deviation from a straight line the length of the transverse dimension of said container is in the range from 1:4 to 1:8.

2. A hollow container having a cylindrical body portion and a pair of sealed ends,

each of said end seals being transverse to the longitudinal axis of said container and substantially offset with respect to the plane of the other of said seals, thereby causing said cylindrical body portion to be non-circular in cross-section,

one of said seals having at least a region which deviates from a straight line from the intersection of one of the seal and the edge of the container and the intersection of the other end of the seal and the other end of the container, the deviation being equal to less than one fourth of the length of said straight line but at least equal to one eighth of the length of said straight line, and

a tab region, said tab region being unsealed free ends of said container adjacent to said one of said seals.

3. The structure of claim **2**, wherein said cylindrical body portion is in the form of a tetrahedron.

4. The structure of claim **2**, wherein the planes of said seals are at right angles to each other.

5. The structure of claim **2**, wherein said one of said seals is formed by two lines having an intersection angle in the range from 125° to 170°.

6. The structure of claim **2**, wherein said one of said seals includes a region having a pair of lines intersecting at an angle in the range from 125° to 170°.

7. The structure of claim **2**, wherein said one of said seals is in the form of a curved line.

8. The structure of claim **5**, wherein said cylindrical body portion is in the form of a hexahedron.

9. The structure of claim **2**, wherein said one of said seals has a pair of sealed sections which extend into the tab region.

10. The structure of claim **2**, wherein a supplemental seal is provided in the region of maximum deviation from a straight line and substantially along only a portion of said straight line.

11. A hollow container having a cylindrical body portion and a pair of sealed ends, each of said sealed ends having end seals transverse to the longitudinal axis of said container and lying substantially in a plane, the plane of one of said seals being substantially offset with respect to the plane of the other of said seals, thereby causing said cylindrical body portion to be non-circular in cross-section,

one of said seals having at least a region which deviates from a straight line between the opposite ends of the seal, and

a tab region, said tab region being unsealed free ends of said container adjacent to said one of said seals, and a supplemental seal provided in the region of maximum deviation from a straight line and substantially along a portion of said straight line.

12. The structure of claim **11**, wherein said cylindrical body is in the form of a tetrahedron.

13. The structure of claim **11**, wherein the planes of said seals are at right angles to each other.

14. The structure of claim **11**, wherein said one of said seals is formed by two lines having an intersection angle in the range from 125° to 170°.

15. The structure of claim **11**, wherein one of said seals is in the form of a curved line.

16. The structure of claim **11**, wherein said one of said seals has a pair of seal sections which extend into said tab region.

* * * * *