Sept. 13, 1960 W. S. SCHNEIDER 2,952,394

SELF CLOSING DISPENSING CONTAINER

Filed Jan. 27, 1958 2 Sheets-Sheet 1

FIG. 1.

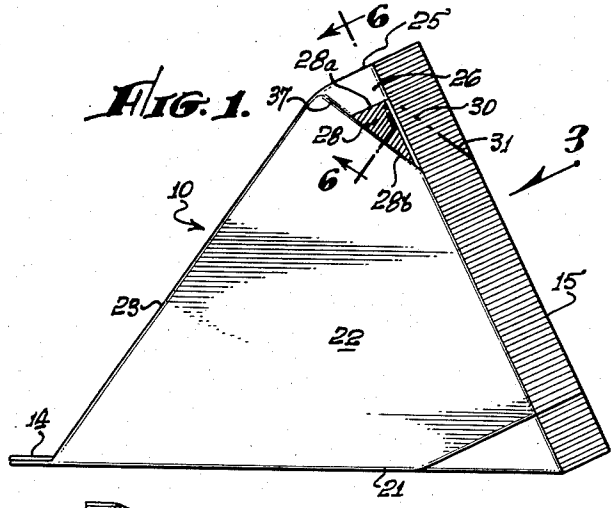
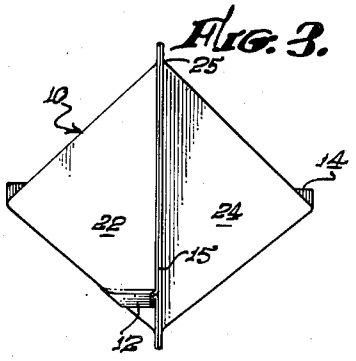


FIG. 3.



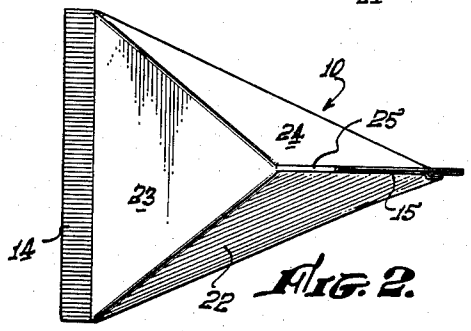


FIG. 2.

FIG. 4.

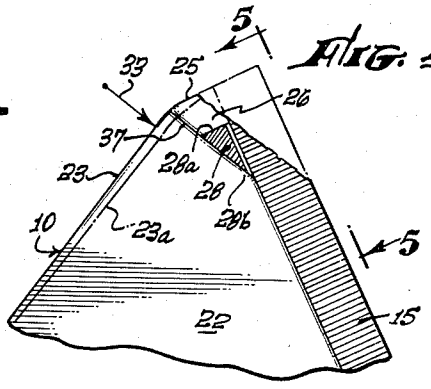


FIG. 5.

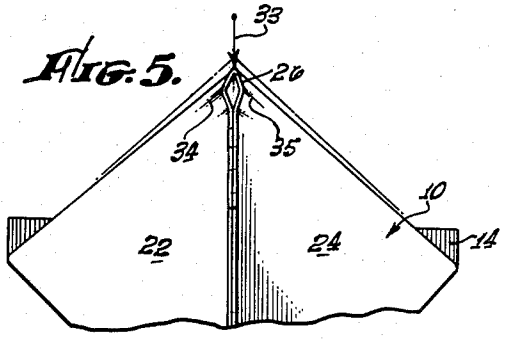
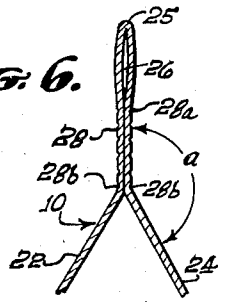


FIG. 6.



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Sept. 13, 1960 W. S. SCHNEIDER 2,952,394

SELF CLOSING DISPENSING CONTAINER

Filed Jan. 27, 1958 2 Sheets-Sheet 2

FIG. 7.

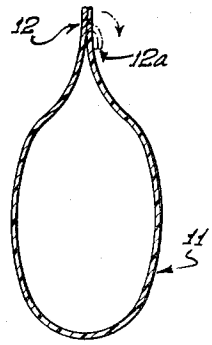


FIG. 8.

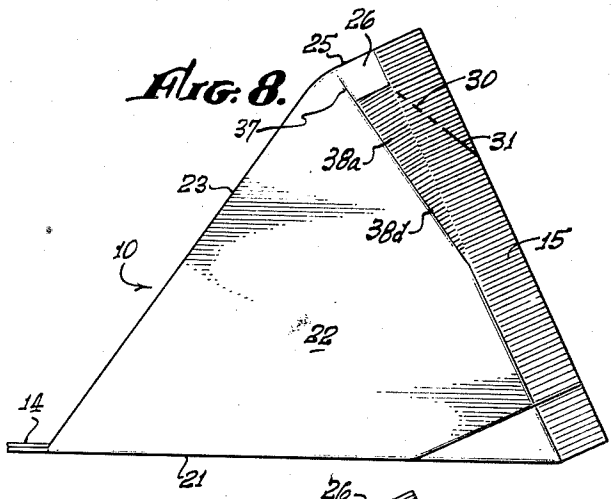


FIG. 9.

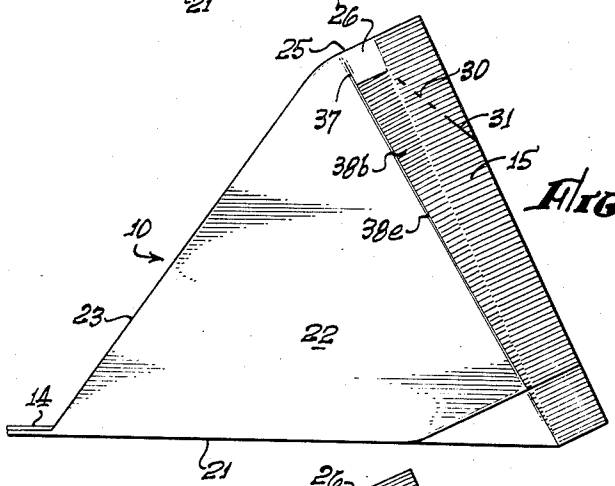
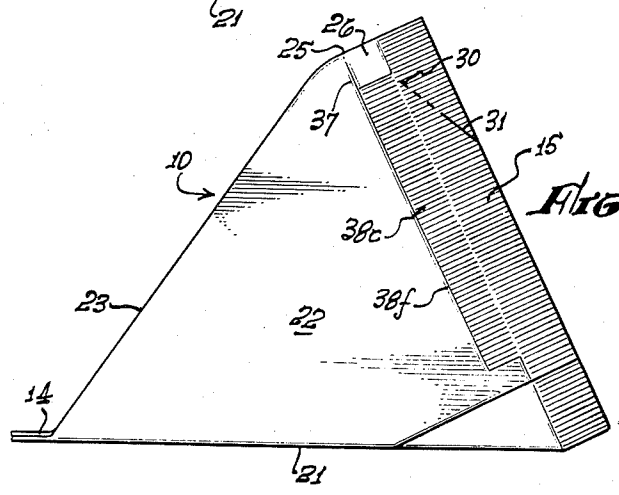


FIG. 10.



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SELF CLOSING DISPENSING CONTAINER

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4 Claims. (Cl. 229—17)

The present invention relates generally to containers for fluid or similar substances, and more especially to flexible containers that are made from thin sheets or webs of paper or similar materials which are capable of being sealed together by the application of heat and pressure.

The present invention is especially concerned with containers which hold a larger amount than is intended to be dispensed at a single time, as opposed to containers which hold a measured amount of a substance to be dispensed all at one time so that the containers are immediately emptied upon being opened. The former are commonly referred to as multi-use packages and the latter as single-use packages. When a package holds more of the substance than is to be dispensed at one time, the container preferably has certain characteristics not ordinarily present in a container that is immediately emptied. These characteristics make it possible for the container after opening to serve satisfactorily as a temporary storage container for that portion of the original contents which is to be dispensed at subsequent times. For example, it is desirable that the package have a shape such that a dispensing opening in the container is at or close to the highest point of the container when the container is set down with one of its flat sides on a supporting surface and the container is stable in this position. As a result, the contents are maintained below the level of the opening and do not spill or leak out accidentally. It is also desirable that the container have one side which is more or less obviously the base upon which it rests. This side is preferably flat and so disposed that the container is not likely to tip or turn over when resting on that side.

It is also advantageous in a multi-use container of this character that the walls of the container around the opening through which the material is removed can be brought together to close the opening against accidental entrance of dirt or other undesirable material, and that when in this position the walls at the opening will of themselves tend to remain in the closed position. This is an obvious advantage in keeping the contents from being contaminated by dirt or other materials which it is desired to exclude. Containers of the kind with which the present invention is concerned do not lend themselves well to the use of a stopper or the like to fill the opening. Furthermore any such extrinsic means of closing the opening is an extra article which must be furnished in addition to the original package and which suffers from the disadvantage that it can be easily lost, even before the container is opened, unless in some way attached to the container.

It is also advantageous in a multiple use container that the container construction be such that the opening through which the contents are dispensed can be enlarged at will by the user by separating the container walls at the opening in order to permit free flow of the contents when the container is inverted to pour out the contents or a portion thereof. Separation of the container walls

makes it possible for the size or shape of the opening to be such that material flows freely, an obvious convenience to the user. If the container walls remain relatively close together, the narrow opening is so restricted that flow of the contents is slow or irregular; and the opening must then be made so long in order to obtain sufficient flow that it cannot be conveniently closed during a storage period.

Thus it becomes a general object of my invention to provide a container with advantageous constructional features which enable the container to be used conveniently to store an unused portion of the contents between the time of opening the container and the time that all of the contents are dispensed.

It is also an object of my invention to provide a container having a shape such that the container has a stable rest position and that it is possible, by tearing or cutting away a portion of the container to provide an opening through which the contents are dispensed, said opening being in the highest portion of the container when the container is in said rest position.

A further object of my invention is to provide a multiple use container having a dispensing opening that can be enlarged or opened widely at will by the user and which can be returned to substantially closed position and remain in this closed position without the use of a separate closure member.

Another object of my invention is to provide a multiple use container of the general character described that is provided with a pouring channel through which the contents can be dispensed and having means associated with the channel to insure that the channel is opened substantially at a predetermined position by any user of the container in order that the advantageous features of the container construction may be used.

These objects of my invention have been achieved in a container that typically and preferably has a tetrahedral shape. This container can be formed from a tube; and the tube can be formed from a flat sheet or web of material by sealing the longitudinal edges of the sheet together to form a tube open at the ends. The ends of the tube are then closed by bringing opposing marginal portions of the tube walls together in face-to-face relation and sealing them, thus forming at each end of the tube a substantially flat sealed area. The sealed area at one end of the tube is disposed in a plane generally at a right angle to the plane containing the sealed area at the other end of the tube, thus forming the finished container into a four sided figure of which each side is generally triangular; but more especially three walls of the container have triangular portions converging to a common apex. The container includes means defining a pouring channel located adjacent a fold common to two sides near the common apex of these three sides of the container and communicating with the interior of the container. This pouring channel is closed at its outer end by one of the end sealed areas. Closure means for the channel is provided in the form of a secondary sealed area, adjoining the channel that is also the means defiining the pouring channel. The secondary sealed area is so located and shaped that it produces a bend accompanied by inherent stresses in the walls of the container at the inner end of the pouring channel of such a character that the stresses tend to hold the walls together along a predetermined line when they are once brought into mutual contact. These stresses can be overcome by applying an external force to the container walls at the channel to spread apart the walls for easy discharge of the contents.

How the above objects and advantages of my invention as well as others not specifically referred to, are

attained will be more readily apparent from the following description and the annexed drawing in which:

Fig. 1 is a side elevation of a multi-use container embodying a preferred form of my invention;

Fig. 2 is a plan view of the container at reduced scale;

Fig. 3 is an elevation of the container at reduced scale as viewed in the direction of arrow **3** in Fig. 1;

Fig. 4 is a fragmentary elevation similar to Fig. 1 with the top corner of the container removed to open the pouring channel;

Fig. 5 is a side elevation indicated by arrows **5**—**5** in Fig. 3 showing the sides of the pouring channel spread apart prior to dispensing the contents;

Fig. 6 is a fragmentary section on line **6**—**6** of Fig. 1; at a larger scale.

Fig. 7 is a cross-section of the tube formed as one step in the manufacture of my improved container; and

Figs. 8, 9 and 10 are views similar to Fig. 1 of modified forms of my invention.

Referring now to the drawing, there is shown in Figs. 1, 2 and 3, a finished container **10** constructed according to my invention. The novel features and the advantages of this container are most easily described and understood by referring to the several steps involved in making the container, and consequently it will be described in this manner.

The container may conveniently be considered as made from a tube of sheet material, but in its broad aspect, my invention is independent of how the tubular member is produced. The original stock could be a seamless tube cut to length. Usually the tube is formed by sealing together, by the application of heat and pressure, the longitudinal margins of a strip of flat stock. If the stock is sealable on both faces, the margins may be overlapped to form a flat seam for the length of the tube. However, as will be apparent from the following description, the container may be made from stock which is sealable on one face only; and this type of stock involves certain steps in the manufacture of the container with consequent structure peculiar to this type of stock as will be explained. Reference may also be had to my copending application, Serial Number 606,349, filed August 27, 1956, on "Dispensing Container" for a more complete description of a container and its manufacture from stock of this character sealable on one face only. It will be understood clearly from the following how stock which is sealable on either face may also be used, such stock being well known in the art. This makes it possible to use a wide range of materials in the practice of my invention without limitation as to whether the stock can be sealed on one or both faces.

The preferred types of sheet materials are laminated or coated, and typically include paper sheets coated on one or both sides with a synthetic resin or plastic substance. Another example is a paper sheet coated on one side and having on the other side a metal foil. Various combinations of these and other substances are used in making flexible containers.

A preferred stock for making my improved container is a paper board of .005 in. thickness coated on one side with a layer of polyethylene of .002 in. thickness and on the other side with aluminum foil having a thickness of .00035 inch. The total thickness is about .007 inch. The stock is flexible but at the same time has a desired degree of stiffness, the utility of which will become apparent later. It has been found that several laminated stocks in the range of about .004–.009 inch that are moderately stiff and crisp are satisfactory, with thicker stock being used for larger containers to obtain the desired degree of stiffness and definition in the walls of the container. The advantages of my invention are not fully realized unless the stock has a moderate degree of stiffness equivalent to that of the stock just described. Moderate stiffness enables the container walls to assume and retain certain positions in the vicinity of the pouring opening as will be explained. Without this characteristic the walls cannot hold the desired positions or shapes.

It is well known in the art that the stock is normally supplied in a roll from which the stock is unrolled as a continuous web that is severed at regular intervals to form the individual containers. The initial stage is to form a tubular member **11** shown in cross-section in Fig. 7. It is assumed in this case that the web is of stock which is sealable on one side only and that this side is the face which becomes the inside surface of the container. The tube **11** is formed by bringing the two longitudinal edges of the web together as at **12** so that the inside faces of the longitudinal marginal portions are in contact with each other. These edge portions indicated at **12** are sealed together by the application of heat and pressure in a suitable manner, and are then folded over against an unsealed part of the tube to the position **12***a* as indicated in dotted lines. The result is the tubular member **11**.

The operation so far described leaves the tubular member open at both ends; and these ends are closed one after the other. Normally the free end is closed first, the second end being closed after the container is filled. The end closures are made by bringing together marginal portions of the tube walls at each end, the opposing marginal portions then being sealed together at their inside faces in the same manner as used in connection with the portions at **12**. Finally the container is severed from the web. The result is that the container has at each end a sealed area, indicated at **14** and **15** in Figs. 1–5. These areas are both normally rectangular in shape and they are more or less uniform in width. It is to be understood that the sequence or method of performing these several operations may be varied, using suitable methods and machines known in the art, because the invention is not necessarily limited to a particular sequence or method of forming the container. As may be seen clearly by reference to Figs. 1, 2 and 3, the sealed area **14** lies substantially in a plane which is disposed generally at right angles to the plane in which sealed area **15** lies. For practical reasons these two sealed areas are preferably disposed at 90° with respect to each other, but a satisfactory package can be obtained with a somewhat lesser angle, though it is preferred that the angle be in excess of about 75°. Location of these two end sealed areas at right angles to each other produces the tetrahedral shape of the finished package, the package having four generally triangular sides of similar size. Each side of the container is substantially flat and can be used as a base upon which to rest the container in a position which is stable and in which the container resists tilting or tipping.

When resting on any side of the container, the other three sides have triangular upper portions converging toward a common apex which is at the top of the container. Thus when the side **21** is employed as the base upon which the container rests, the three sides **22**, **23** and **24** of the container slope inwardly and upwardly toward a common apex **25**. This apex is the highest point of the container, except for end seal **15**, and is located at one end of the sealed area **15**. Because of the presence of the secondary seal described below, the apex **25** differs slightly in final shape from an apex formed by any other group of three sides. As will be pointed out, there is a fold at the physical apex rather than a blunt point.

At apex **25** there is located the pouring channel **26** through which the contents of the container are dispensed. One of the longitudinal sides of the channel is at and defined by a fold in the container wall at the apex **25**. The opposite longitudinal side of the channel is defined by the edge **28***a* of the secondary sealed area **28** (Fig. 6) formed by sealing together, face-to-face, walls **22** and **24** over a small area. This sealed area **28** creates a fold in the container wall at apex **25** and, in effect, shifts the top corner of side **23** away from apex **25** by the length

of this fold, as seen in Fig. 1. The channel **26** is always open at its inner end to the interior of the container, and in the completed package the outer end is closed by end sealed area **15**, as may be seen especially in Fig. 1. The sealed area **28** is preferably triangular in shape and has a side **28***b* that is a straight line that, if projected, crosses the pouring channel at its base or inner end. Sealed area **28** is here shown as separate or spaced from end sealed area **15**, so that the third side of the triangular area is preferably parallel, or substantially so, to the inner edge of the end seal.

As an alternate construction, the secondary sealed area **28** may adjoin or be continuous with the end seal; and in that event the sides **28***a* and **28***b* are extended to meet the end seal, the third side disappearing as a physically separate edge. However, such physical merger of the two sealed areas does not change the novel separate functions of the secondary seal.

In order to facilitate breaking the seal at the end of the pouring channel substantially at a predetermined location, there is provided a line of weakness that, when projected crosses channel **26** at or near its outer end. This line of weakness may take one of several forms but is here shown as a row of perforations **30** extending diagonally across end seal **15** from a tear cut **31** that intersects one edge of container as shown in Fig. 1. This construction not only makes it easy to open the container manually by tearing off the corner of the container along the line **30—31**, after which the opened container appears as in Fig. 4, but the line of tearing is properly located with respect to the pouring channel. It is of course possible to cut off the corner of the package with shears along the line **30—31**. Where it is intended to cut off the corner with shears, the proper location of the cut can be indicated by indicia printed on the container.

After the corner has been removed as shown by dotted lines in Fig. 4 the pouring channel is open at its outer end and the contents can be dispensed through this channel. However, the walls of the channel tend to remain in contact with each other as seen in Fig. 6, leaving only a long, narrow discharge orifice. To spread the walls apart, light pressure is applied to one side of the channel at the top of the container. This pressure may be applied by pressing near the inner end of the channel in the direction indicated by arrow **33** in Fig. 4. The pressure moves a portion of the top side **23** of the container downwardly to some lower position as indicated by the dotted line **23***a*. This deformation causes the side walls of the channel **26** each to bow outwardly, spreading the walls to provide a relatively wide orifice at the outer end of channel **26**, as shown in Fig. 5, through which the contents may pass freely. If downward pressure at **33** is now removed the walls of the channel remain bowed out to some extent as at **34** and **35**, especially at the outer end of the channel. This aids greatly in dispensing the contents, whether liquor or powdered, in a free flowing and controlled manner.

After pouring out some of the contents, if the remainder of the contents is to be stored in the container and if it is desired to close the pouring channel, the side walls of the channel are pressed together between the thumb and forefinger. When pressure from the fingers is removed the side walls tend to remain in contact, or nearly so, closing the channel **26** to the entry of dirt and the like from outside the container. The side walls of the channel remain together because the stresses in the container wall produced by the secondary sealed area and the stiffness of the stock used cause the bend along line **28***b* to extend itself entirely across the inner end of the channel at **37**. When crisp, stiff packaging material of the type described is used the tendency of the fold line **28***b* to extend itself across the channel is so marked that the user can feel a click or snap when he presses the walls of the channel together.

The stresses in the container wall that produce this

result are best understood from a study of Figs. 1 and 6. The walls forming sides **22** and **24** of the container are sealed together over the secondary seal area **28** and are thus flat and parallel to each other over this area. At the straight edge **28***b* of this area there is a clearly defined bend because along this line **28***b* the walls **22** and **24** diverge, sloping outwardly and downwardly to their junction with bottom surface **21**. The external angle created by the bend at **28***a* is designated *a* in Fig. 6. It is the same at each side of the container. Since the stock from which the container is made has a degree of stiffness as described, the bend in the wall naturally extends itself from the established bend line **28***b* of the sealed area **28** along line **37** to the edge of the package. Bend line **37** holds the sides **22** and **24** close together where they are the walls of channel **26**, especially at the inner end of the channel; and it causes the walls to diverge below bend **37** at nearly the same external angle *a* at the base of the pouring channel as at the edge **28***b* of the sealed area. In other words the strength employed to keep the channel shut is the known structural strength or rigidity of a bend as compared with a flat surface. The strength of a bend increases as the bend angle increases reaching a theoretical maximum strength if bend angle reaches 90 degrees.

With reasonable handling, the channel will remain closed until pressure is applied as indicated at point **33** and the side walls of the channel are spread apart. This pressure is applied near the vertex of triangular top side **23**; and this pressure progressively moves the vertex toward the outer open end of the channel, thus spreading the channel walls. This pressure is applied in the general direction of the length of the bend at **37** and **28***b* and causes the bend at **37** to buckle and the side walls bow outwardly at **34** and **35** (Fig. 5). The typical shape of the orifice so produced is roughly diamond shaped. New bends at **34** and **35** are transverse to and extend across line **37**; and because of the stiffness of the material it tends to hold the new position of the walls. As the two walls buckle at **37** and bow outwardly their stiffness makes the walls "pop" out to the new position as the channel is opened. The channel can be closed again by pressing the walls together, as mentioned above, erasing the folds **34** and **35** and restoring the bend at **37** in each wall, the latter bend closing the channel.

The stock has sufficient resiliency to go through this cycle of opening and closing many times. As a result the container may be used as an efficient storage container with contents being dispensed in a number of portions. This intrinsic device of "push button" opening and closing without separate or extrinsic closing members represents a maximum in economy and convenience.

Both the size and shape of sealed area **28** have an influence on the stresses produced in the container walls. As the sealed area extends farther into the normal cavity and away from the end seal, the angle *a* decreases. This makes a sharper bend at **28***b* and at **37**, thus making more pronounced the strength and the effect of this bend in closing the pouring channel. The proportions shown in Fig. 1 are satisfactory, the length of side **28***a* of the sealed area varying with the size of the package; but in general it has been found that a length of about ¼ in. to ½ in. achieves satisfactory operation.

The triangular shape of area **28** is preferred for various reasons, though the invention is not limited thereto. One advantage is that side **28***b* is parallel to the tear-off line **30—31** and so presents an attractive appearance. Another advantage is that the ultimate container has a maximum cavity space for the contents for a given area of stock used to make the container. Also all the pouring channel is at the top of the container where the cavity is not filled by the contents.

A further advantage is that the triangular shape of area **28** produces a maximum length of pouring channel as compared with variations described below. The longer channel affords a better closure and better protection of

the contents during the storage period. Probably the chief advantage is that the bend at **28***b* and its extension **37** has a maximum value for angle *a*, thus making the bend most effective in closing the channel. This condition makes it preferable to dispose side **28***b* at about a right angle relative to the side **23**, or the intersected edge of side **22** as seen in Fig. 1. Later discussion of variational forms points up the reasons for this.

There are possible variations of this invention departing from the preferred form illustrated. For instance the angle that bend line **28***b* makes with the end seal can be progressively decreased as shown in Figs. 8, 9 and 10 with progressively less cavity area for product and progressively less inherent stress at innner limit of the channel to produce extension of bend line **28***b* across the channel.

Figs. 8, 9 and 10 illustrate variational forms of my invention in which the container is constructed as already described except for changes in the secondary sealed area that will be pointed out. The principal change illustrated is the change in the position of the inside straight edge of the sealed area which forms the bend in the container wall that closes the pouring channel. Thus in Fig. 8 this inside edge **38***d* of area **38***a* makes a flatter angle with the end seal than is the case with the edge **28***b* of the form illustrated in Fig. 1. In Fig. 8 this edge projected would intersect the end sealed area **15** near its midpoint. If this angle is further decreased the result becomes a construction as shown in Fig. 9 in which the edge **38***e* of the sealed area **38***b* extends all the way across the container meeting the end sealed area **15** at the lower corner of the container.

In Fig. 10 the secondary sealed area **38***c* extends across the container with its inner edge **38***f* parallel to the normal inner edge of the end sealed area **15**. Area **38***c* does not extend entirely across the container but obviously could be extended to the edge of the package.

A comparison of these three figures illustrates the result of this progressive change in the location of the edges **38***d*, **38***e* and **38***f*. In the first place the pouring channel **26** is progressively shortened. This is brought about because the bend at **37** intersects the edge of the container closer to the outer end of the channel. Also the bend in the container wall at **37** becomes less sharp. In other words the external angle *a* is greater at the bend **37** in Fig. 10 than in Fig. 8. This all reduces the sharpness of the bend at **37** and correspondingly reduces the capability of extended bend line **37** to hold the inner end of pouring channel together. It is for these reasons that the shape and location of the secondary sealed area illustrated in Fig. 1 are preferred.

Another change in these forms of the invention is illustrated in Figs. 9 and 10 in which the space between the end sealed area and the secondary end sealed area has been omitted. This space can likewise be omitted in the forms illustrated in Figs. 1 and 8.

It will be realized that persons skilled in the art may conceive of various changes in the construction or arrangement of a container without departing from the spirit and scope of my invention. Accordingly it is to be understood that the foregoing description is considered to be illustrative of, rather than limitative upon the appended claims.

I claim:

1. A tetrahedral shaped dispensing container for liquid, granular, or other fluent substances comprising a tube of thin, flexible material having a moderate degree of stiffness that enables the container walls to retain a set position, the container having at each end marginal portions of the tube sealed together inside face to inside face, the seal at one end of the container being in a plane substantially at 90° to the plane of the seal at the other end, and the sealed area at one end of the container including a secondary sealed area defining a pouring channel communicating at its inner end with the interior of the container and closed at the outer end by said one sealed area, said secondary sealed area defining at the inner end of the channel a bend in each of two side walls of the container, said bends extending across the inner end of the pouring channel inwardly from said one sealed area and producing stresses in said two side walls forming the pouring channel inwardly of said one sealed area that hold the walls of the pouring channel in contact after being brought into contact.

2. A dispensing container as in claim 1 in which the pouring channel is at an apex of the container and adjoins a fold common to two sides of the container.

3. A dispensing container as in claim 1 in which the secondary sealed area is adjacent but spaced from the remainder of the sealed area closing the end of the container.

4. A dispensing container as in claim 1 in which the secondary sealed area is continuous with the remainder of the sealed area closing the end of the container.

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