

Dec. 3, 1957

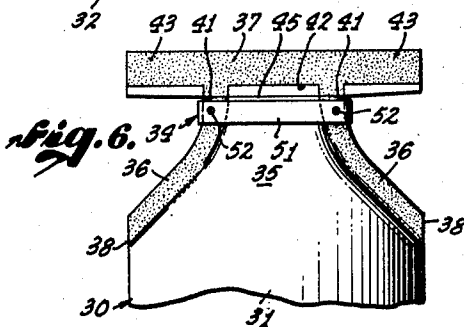
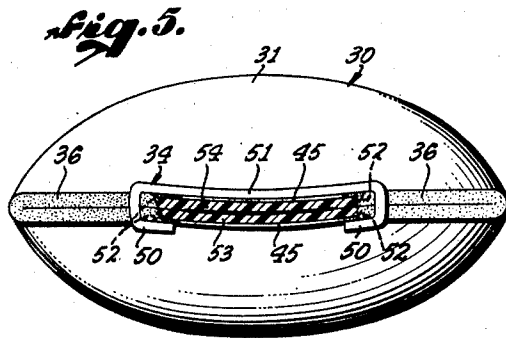
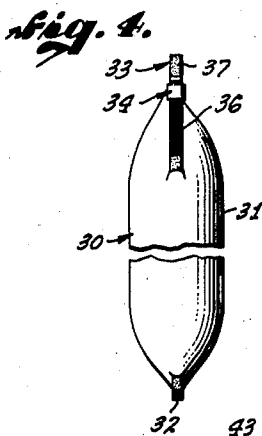
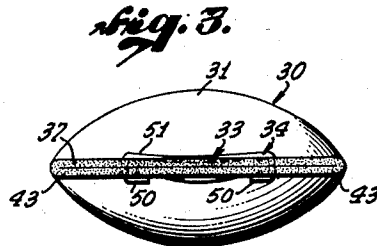
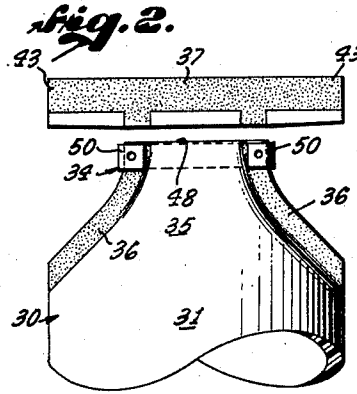
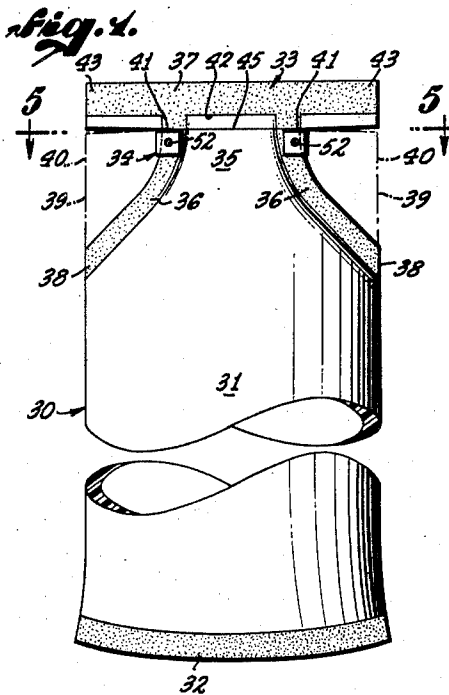
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2,815,150

SQUEEZE CONTAINER WITH TEAR OPENING AND AUTOMATIC CLOSURE

Filed April 30, 1956

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

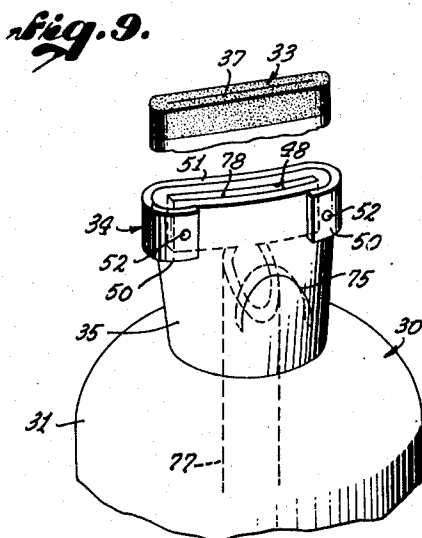
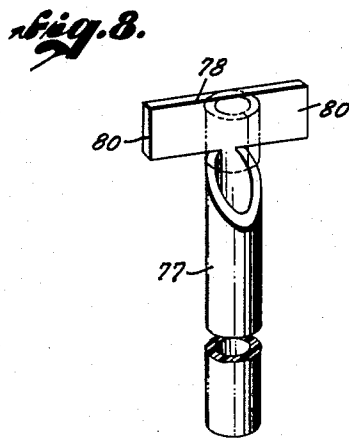
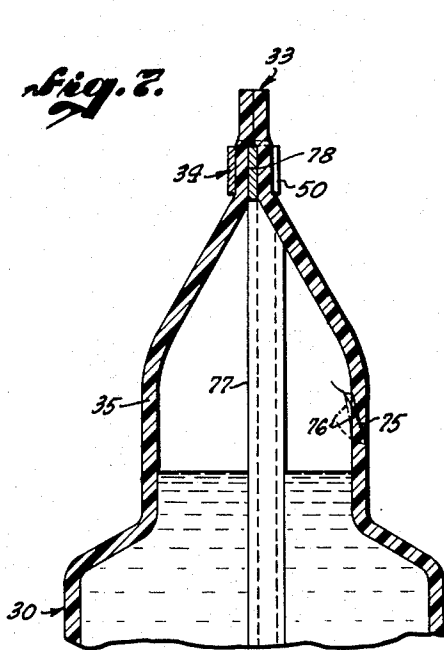
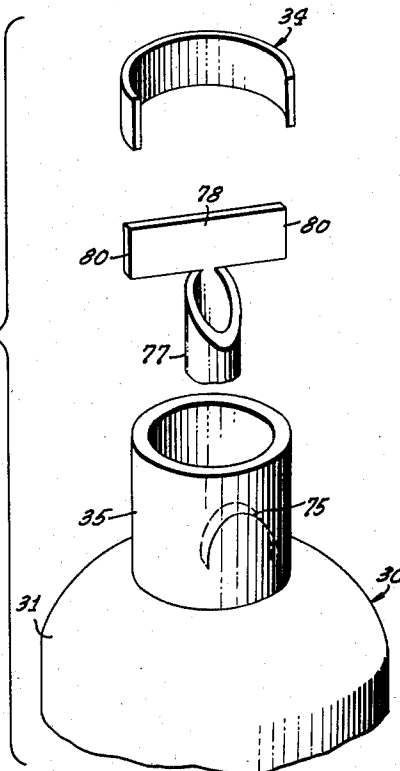


fig. 10.



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4 Sheets-Sheet 3

fig. 11.

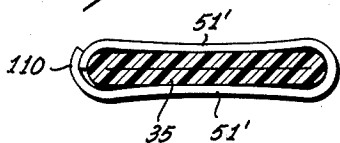


fig. 12.

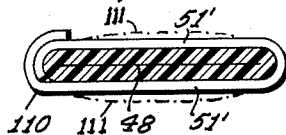


fig. 13.

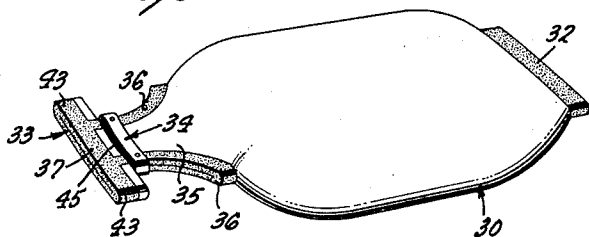


fig. 14.

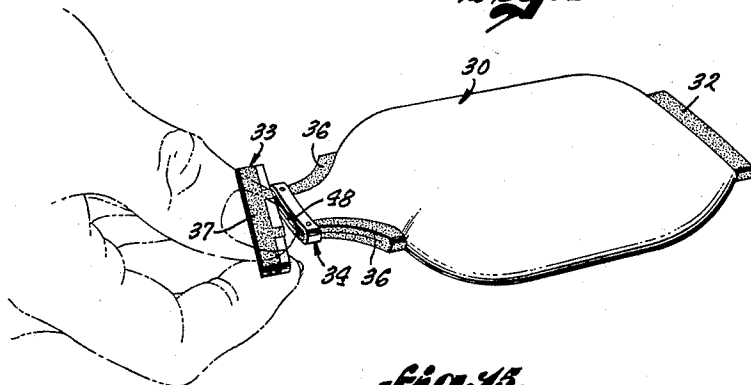


fig. 16.

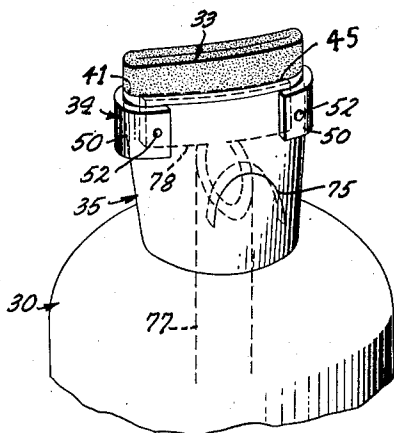
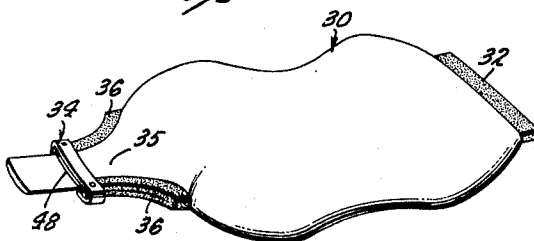


fig. 15.



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4 Sheets-Sheet 4

fig. 17.

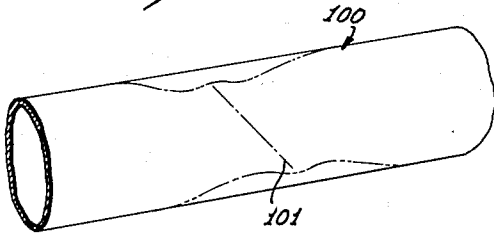


fig. 18.

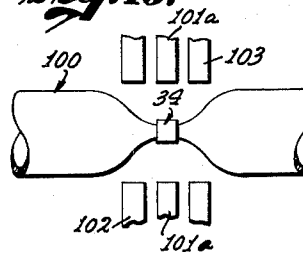


fig. 19.

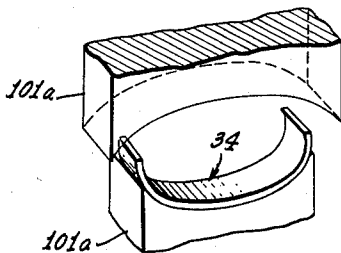


fig. 20.

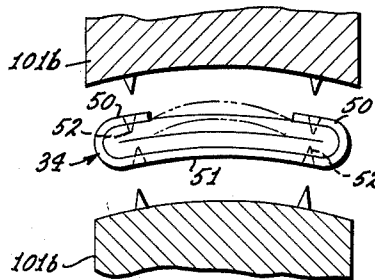


fig. 21.

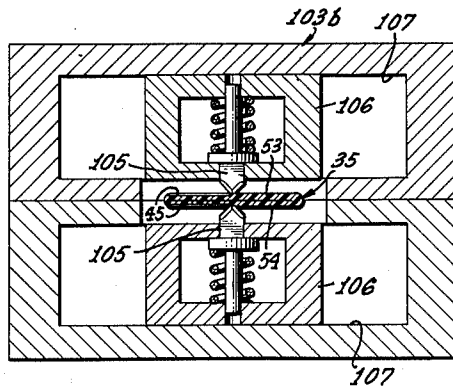


fig. 22.

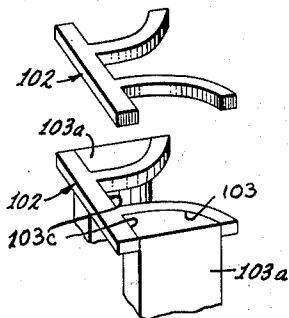
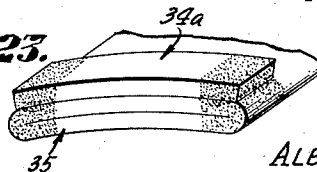


fig. 23.



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1

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SQUEEZE CONTAINER WITH TEAR OPENING AND AUTOMATIC CLOSURE

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Application April 30, 1956, Serial No. 581,397

7 Claims. (Cl. 222—211)

This invention relates to collapsible tubes and squeeze bottles, collectively referred to as squeezable containers incorporating preferably integral but optionally separate and replaceable automatic closure means including new and improved removable container sealing construction. This invention also relates to new and improved removable sealing means for squeezable containers, and tear-strip means and methods of making them.

The present application is directed to an improvement on the device disclosed in my copending application Serial No. 330,379, filed January 9, 1953, and now patent numbered 2,753,091, dated July 3, 1956.

This invention has among its objects a provision of a new and improved automatic closure device for squeezable containers.

The invention also has among its objects the provision of new and improved removable sealing construction for squeezable containers, specifically of the polyethylene type including polyvinyl and the like flexible or elastomeric types.

It is another object of this invention to provide in a squeezable container of the desired character described a new and improved combined automatic closure device and a new and improved removable seal construction, or tear strip.

Another object of this invention is the provision of a new and improved simplified squeezable container adapted for economical mass production.

Yet another object of this invention is the provision of a new and improved self-sealing closure for bag-type squeezable containers heretofore unavailable with a closure device of the character herein disclosed.

It is particularly an object of this invention to provide a new and improved structure permitting the tearing of polyethylene-type squeezable containers.

Likewise among the objects of this invention is the provision of improvements over prior art devices heretofore intended to accomplish generally similar purposes.

It is also among the objects of this invention to provide new and improved methods and means for achieving the above desired objects and the hereinafter described structure.

Other objects and purposes will appear from the following description when considered in the light of the accompanying drawings and in the appended claims.

In the drawings:

Figure 1 is a front view of a squeezable container embodying this invention.

Figure 2 is a similar view to Fig. 1, but showing the parts in a different cooperative relationship, parts being cut away.

Figure 3 is a top view of a container as shown in Figure 1.

Figure 4 is a side edge view of the container of Figure 1.

Figure 5 is a sectional view as on a line 5—5 of Figure 1.

2

Figure 6 is a back view of the container of Figure 1.

Figure 7 is a vertical sectional view from front to back of a squeezable bottle type container modified as a spray container.

Figure 8 is a perspective view of an insert means of the character shown in Figure 7, adapted for the converting of the container of Figure 7 from a simple extrusion or fluid-flow-type dispenser to a spray-type dispenser.

Figure 9 is a perspective view of the container of Figure 7 showing the parts in a dis-assembled relationship.

Figure 10 is an exploded view of the container of Figure 7.

Figure 11 is a sectional view taken as on a line 5—5 of Figure 1, but showing a modified form of automatic closure embodying this invention.

Figure 12 is a similar view to Figure 11, but showing the parts in a further condition of assembly relative to one another.

Figure 13 is a perspective view of a container of the general type illustrated in Figure 1, but also applicable to the preceding figures insofar as the closure elements are concerned.

Figure 14 is a view similar to Figure 13, but showing the method of removal of the removable sealing means.

Figure 15 is a view similar to Figure 14, but showing the mode of use of the container of Figure 14.

Figure 16 is a perspective view of a squeezable bottle of the general character illustrated in Figures 7 through 10.

Figure 17 is a perspective view of a tube of polyethylene-type tubing illustrating a step in a preferred method of making a squeezable container of a type illustrated in the preceding drawings.

Figure 18 is a schematic view of a further step or steps in the making of such container.

Figure 19 is a perspective view of a means and method of securing an automatic closure means on the neck of a squeezable container embodying this invention.

Figure 20 is a similar view to Figure 19 showing the parts in a further advanced stage in the making of said automatic closure means.

Figure 21 is a sectional view illustrating another step in the making of a removable sealing means preferably comprising a portion of the closure means embodying this invention.

Figure 22 is a perspective view of a cut-off die in combination with a sealing die usable in the practice of this invention.

Figure 23 is a perspective view of a modified automatic closure means on the neck of the squeezable container, parts including the container body and removable closure means or tear-strip being omitted.

Referring more particularly to the drawings, there is illustrated by way of example, but not of limitation, a squeezable container generally designated at 30, comprising a hollow body portion 31 having a normally closed and permanently sealed end 32 and an upper end generally designated at 33 incorporating a closure embodying this invention.

The entire container 30 with an exception consisting of a resilient or rigid material such as metal or rigid or semi-rigid plastic rib 34, preferably comprises a unitary and continuous material of the nature of an elastomer such as polyethylene, polyvinyl or rubbery material. Rubber, in some forms, depending upon the substance to be contained within the container will be more suitable than others. Thus, oily substance will be better resisted by neoprene than by pure or natural rubber.

The container 30 is preferably formed with a con-

stricted neck portion 35 as by means of zones of fusion 36 on either side and an end zone of fusion 37 preferably continuous with said side zones 36. The zone 37 preferably extends from edge 38 to edge 38 of the container. The zones 36 and 37 preferably leave wings 39 of container material which in the practise of the instant invention may be cut away by any suitable means so that the side edges 40 of the container illustrated in dotted outline, as in Figure 1, may be removed to give the container the shape and contour substantially as shown in solid lines in said figure. Although the container is preferably formed as illustrated and described in Figure 1, a configuration substantially conforming thereto may be obtained as by molding of the container in rounded or cylindrical form in the manner of a continuous tube or as a molded form, such as illustrated in Figure 1. It will be understood that the container may be of any shape. The proportions shown for the wings 39, the neck 35, and the zones of fusion 36, 37 being merely illustrative.

The neck portion 35 of the container in the area 41 is slit preferably by means of a sharp instrument, either from the side edges 40 of the container inwardly, where the side edges 40 are retained, or, and preferably, whether said side edges 40 are retained or not, said slit preferably extends as illustrated in said Figure 1 into and at least partially through the zone of fusion 36. Said slit may occur in any portion of the zone of fusion 36, but is most desirably placed at or adjacent the inner edge 42 of the zone of fusion 37 so that the ends 43 of the upper seal or zone of fusion 37 provides ears adapted as finger pieces or tabs which may be grasped for tearing off the upper seal 37 by means of said slits 41. Said slits 41 are provided on either side, preferably both sides of the container neck 35 so that the tear-off may be accomplished by pulling on either tab 43 with one hand while the other hand of the user grasps and holds the container body 31. As above noted, the wings 39 can be omitted and the zones 36 merely extend down along each side edge 40 from the zone 37, so that the neck 35 is as wide as possible, i. e., from one thus fused edge 40 to the other edge 40, as for "one shot" containers.

It has been found that notwithstanding slits 41 on either side of the neck 35, material such as polyethylene and polyvinyl plastics will not tear easily, if at all, nor if such tear occurs, usually in a manner to permanently distort the material at the tear by carrying the same beyond its elastic limit, will such tear occur in a straight line or in any predetermined direction. More elastic materials such as natural rubber will scarcely tear at all, even though started at a slit along one edge of a sheet of the material. Sheets or other bodies of plastic elastomers will, however, readily tear along score lines sharply cut as with a razor both along and over one edge and continuously therefrom over the side of the sheet. Thus:

It has been found that polyethylene in particular, and to an advantageous extent also polyvinyl, and to a still lesser extent neoprene, possess a remarkable and unexpected property of tearing along a shallow cut extending continuously or substantially so from a slit at one edge of a sheet of such material across one or both surfaces of such sheet. Without such slit and cut, tearing along a pre-determined line is as stated difficult if not impossible, whereas a slit at one edge of a sheet of polyethylene of approximately .332 thickness can be carried across said sheet in a straight or sinuous line when said cut is hardly more than discernible by the naked eye and not appreciably more than about .003 of an inch deep. With such slit and cut, tearing of polyethylene and polyvinyl plastic materials in particular is remarkably easy. The edges of the cut and resultant adjacent tear appear clean and straight and is achieved well within the visible elastic limits of the material.

Cuts extending from slits at the edge of a sheet of

polyethylene plastic of approximately .012 to .015 inch in thickness have been satisfactorily achieved with a cut on one surface of the plastic sheet of approximately .002 to .003 of an inch deep. Of course, the deeper the cut along the surface of the plastic, the more readily will proportionately thinner uncut material under the cut tear. A cut along the surface of the plastic sheet without a slit at the edge from which the desired tear can originate will not accomplish the desired result and the tear cannot be started without permanent distortion of the material by stretching the same beyond its elastic limits. The longer the slit in the edge of the sheet or closure and the more readily the slit edges can be grasped, the easier the tear can be started, but the edge slit need not necessarily be deeper than the side or surface score line.

In accordance with the above discovery, a cut line 45 extends across the neck from the inner edge of the slots 41 or either of them along the line, optionally at the edge 42 but preferably spaced downwardly from said edge, as illustrated in Figure 1. A cut such as 41 is made upon the front side (Figure 1) as well as the back side (Figure 2) of the container neck 35. Thus, each separate layer of the container in the neck between the slits 41 is thus scored between the slits 41. It has been found that by this means the upper seal 37 constitutes a tear strip which may be removed from the container body 31 with utmost facility and with great accuracy. The tear strip 37 (Fig. 14) while flat and stiff appearing as illustrated, is in fact quite flexible, like the rest of the container body. The resultant tear is, however, sharp and clean to the naked eye and faithfully follows a properly made score line, even to and across a fused area.

In tubes of the so-called "one shot" type, the above-described construction provides a new and improved means for sealing the container outlet formed at the neck 35 or for removing said seal at will. The contents of the container may thereby readily be discharged through the resultant opening 48, or across a corner of the container, or other pre-selected place thereon.

Where it is desired to continue to use the container 30 repeatedly, means are provided to hold the opening 48 in normally closed condition. Preferably, such closure means portion comprises a rigid or flexible optionally resilient rib or clip of metal or other rigid material as compared to the rigidity of the material of which the container 30 is made. In those instances where the neck portion of the container is removable as by means of screw-threads not shown, or the like, then these remarks apply to the material of which the neck portion 35 is made, in which case the body 31 of the container may be of any desired material of squeezable nature, ordinarily stiffer than the material of the neck 35.

As can be seen most clearly in Figure 5, the stiffener means 34 may take the form of a staple having ends 50 extending through the wings 39, or at least around the edges of the neck 35, preferably solely in the area of fusion 36 so that the ends 50 of the stiffening means 34 will be less likely to rupture the material defining the discharge opening or orifice 48 in the neck 35. In order to prevent material of the neck between the ends 50 and the main body 51 of the stiffening means from becoming disengaged relative to said stiffening means, ears 52 are advantageously formed in said stiffening means so as to enter the material in the neck 35 which is pinched between said ends 50 and body 51.

The body 51 is preferably curved inwardly toward the discharge opening 48 so as to place the front lip 53 and the rear lip 54 of said opening in tension with respect to one another.

In squeeze bottles, as opposed to collapsible containers, the side walls of the container body 31 normally tend to return to their unsqueezed position following use. Therefore, for such bottles I provide a check valve slot preferably of arcuate configuration as shown at 75 (see Figures

7 and 16). In such construction, air is permitted to enter when the resultant flap 76 moves inwardly under the influence of incoming air as shown in dotted outline in Figure 7, but moves outwardly as shown in solid outline in said figure under the influence of internal pressure occasioned by squeezing of the container, to close thereat.

Normally, the container is inverted in the above described uses. However, when it is desired to use the squeeze bottle as a spray-type dispenser, a tube 77 extends down into the liquid 78 within the bottle, wings 78 then laterally outwardly from the slant formed opening 79 at the top of the tube and the ends 80 of said wing are together with the edges 81 of the discharge opening 48 pinched and held, together with the edges 81 of the discharge opening 48, by means of the member 34. Other parts of the bottle are preferably constructed and arranged as heretofore described and are accordingly given corresponding reference numerals.

As shown in Figure 17, a tube 100 preferably of polyethylene or polyvinyl plastic is flattened laterally at 101, then simultaneously or alternately sealed 36, 37 as by a suitable heat or electronic sealer 102, clipped with a member 34 as by a stapler or stitcher 101a, 101b, slit at 41, and cut or scored as along the lines 45 as by means of a suitable die 103, 103a.

The sealing dies are preferably shaped as shown at 102 in Figure 22, the cutting dies at 103a in said figure and the scoring dies as at 103b in said figure. Slitting and scoring are achieved as by a raised sharp knife edge at or about 103c of suitable depth depending upon the particular use and desired result. Such knife edges are advantageously vibrated to insure their cutting action by a vibrating means not shown.

Optionally, as in Fig. 21, the scoring 45 can be done by transversely guided knives 105 extending and guided through the edges 39, 36 and respective lips 53 and 54 of the neck 35. The knives 105 are mounted on spring urged carriers 106 moving on guides 107 by suitable power means not shown.

Before or after sealing and scoring of the closure the tubes are filled and the lower ends 32 sealed in a customary manner.

Another preferred form of automatic closure means is shown in Figure 11 where the essential bowed shape of one or both body portions 51' are secured around the neck 35 and fastened together as at an end portion 110 under tension to close the discharge opening 48 against emission of the contents of the container 30 except when pressure is applied sufficiently to cause them to yield resiliently as shown in dotted outline in Figure 12 at 111 to permit the extrusion of the contents of the container. On release of pressure on the container the resilient members or ribs 51' restore themselves and automatically reseal the tube. Their bowed shape—although one of them may be straight or bowed on a different radius of curvature from the other—assures proper closing pressure at the acting center of the discharge opening 48. These ribs 51' are preferably more readily yieldable than the ribs 51 or 34a because of the greater relative pressure required to open them in use.

Figure 13 shows a tube incorporating the instant teaching. Figure 14 shows the manner of its use in removing the sealing means 37. Figure 15 shows the manner in which the automatic closure means permits extrusion of the contents of the container when pressure is applied to the container.

While I have herein described my invention it is understood that variations may be made therein within the ability of those skilled in this art, in that I desire to be limited in my invention only by the scope of the appended claims when construed in the light of the foregoing description and drawings as limited by the prior art, and added comment.

The bottom of the tear strip 37 of Fig. 9 is shown as jagged merely to emphasize its being a torn line.

Where in this description polyethylene plastic is referred to, polyvinyl plastic is also intended.

The depth of scoring will advantageously be determined with respect to the nature of the plastic or other material used, its thickness, hardness, particular composition, the degree of ease of tearing desired, and like considerations within the skill of the art in the light of these disclosures. A slight cut or score merely cutting the surface is sufficient in most instances. Such a cut can be, for example, approximately .001 to .005 inch or more deep for tubing of approximately .010 to .030 of an inch. It can also extend to or beyond one half the thickness of the tubing, sheeting, film or other stock. The slit at the edge is preferably at least as deep as the thickness of the material.

Another preferred form of stiffener means is a rib 34a (Fig. 23) of relatively stiff arcuately set plastic or the like sealed as by heat along zones of fusion as illustrated in Fig. 23, initially held loosely, straight or even reversely curved as shown when applied, then taking an opposite but approximately equal flexure to place the neck 35 in tension as heretofore and in said copending patent application noted.

I claim:

1. A squeezable container comprising a generally tubular body having a discharge portion, at least said discharge portion being formed of an elastomeric plastic material and comprising flattened opposed walls in surface abutment and sealingly joined together at their opposed edges to define a discharge passage, a transverse seal across said passage, shallow cuts in the outer surfaces of said walls, extending across said passage inwardly of said transverse seal, said cuts terminating in a side cut extending through and inwardly from the sealed edges of said walls on at least one side of said passage.

2. A container as defined in claim 1, including automatic closure means extending across said discharge portion, said shallow cuts and side cut being disposed between said automatic closure means and said transverse seal.

3. A container as defined in claim 2, and a check valve means in a wall of said container, the walls of said container being resiliently self-sustaining.

4. A container as defined in claim 3, and further having a spray tube at an open end and extending from a position immediately below including the automatic closure means downwardly into the container.

5. A container as defined in claim 1, wherein said opposed walls, outwardly of said shallow cuts, extend laterally beyond at least one of said sealingly joined edges at said side cut to define a tearing tab.

6. A container as defined in claim 1 wherein said side cut through said sealed edges is of a depth at least equal to the thickness of one of said opposed walls.

7. The method of opening a sealed flattened tubular container of elastomeric plastic material, comprising the steps of; making shallow cuts in the outer surfaces of the opposed walls of said flattened container, cutting inwardly from an edge thereof to join said shallow cuts, and tearing said flattened container open along the line of said shallow cuts, starting at said cut edge.

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