Sept. 24, 1957 R. LAMBERT 2,807,405

COLLAPSIBLE CONTAINERS

Filed Jan. 20, 1956 2 Sheets-Sheet 1

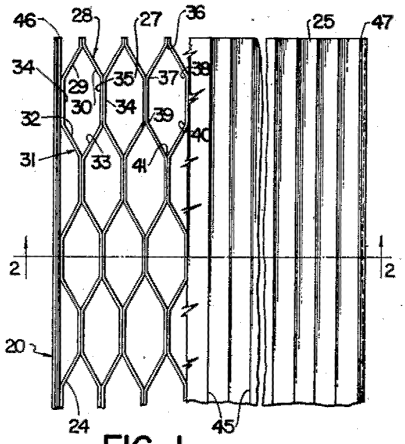

FIG. 1.

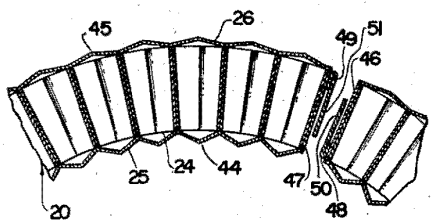

FIG. 5.

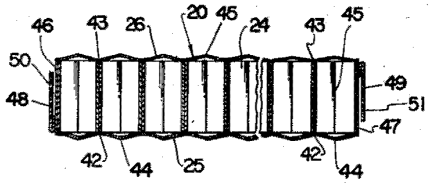

FIG. 2.

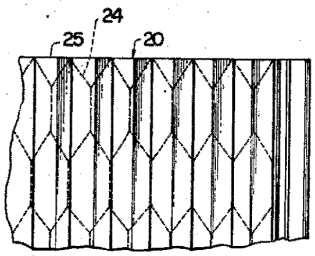

FIG. 6.

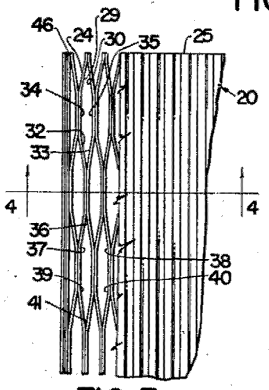

FIG. 3

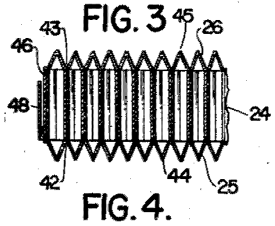

FIG. 4.

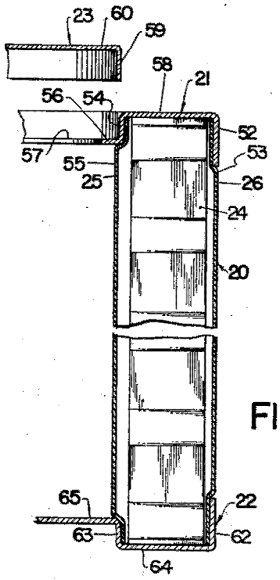

FIG. 8.

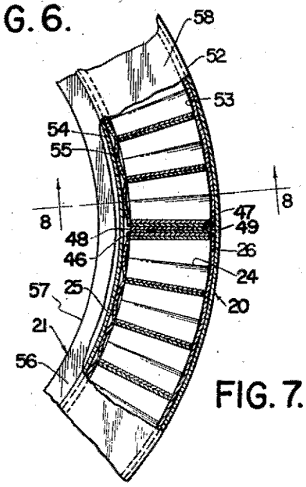

FIG. 7.

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Sept. 24, 1957 R. LAMBERT 2,807,405

COLLAPSIBLE CONTAINERS

Filed Jan. 20, 1956 2 Sheets-Sheet 2

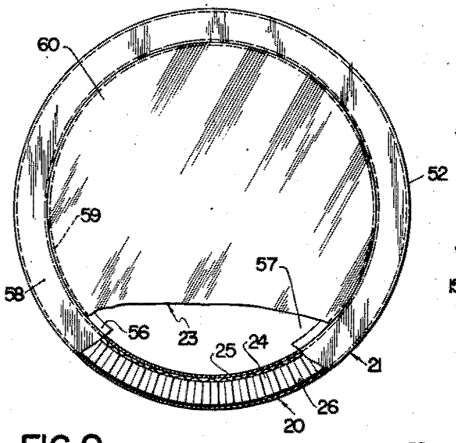

FIG. 9.

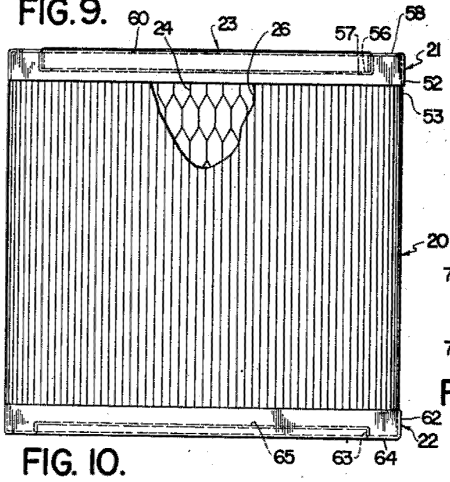

FIG. 10.

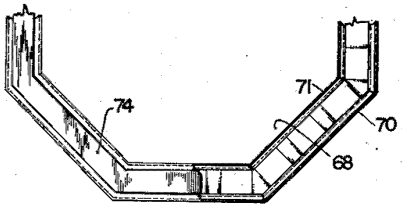

FIG. 12.

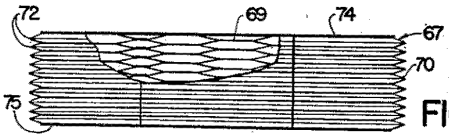

FIG. 11.

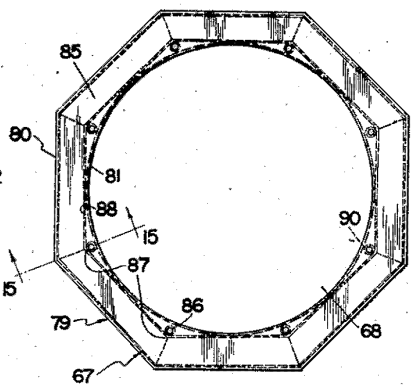

FIG. 13.

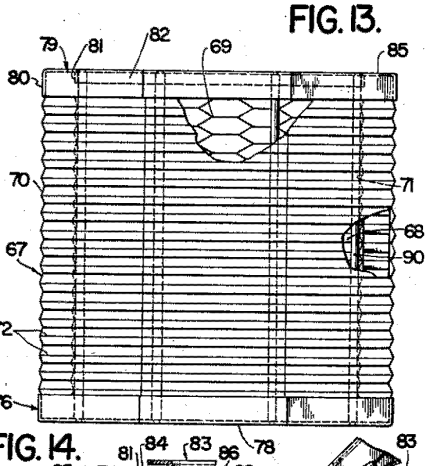

FIG. 14.

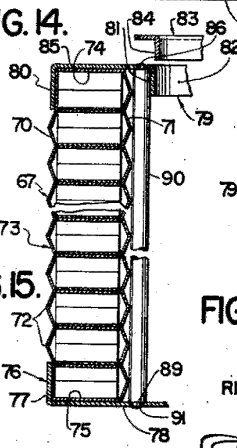

FIG. 15.

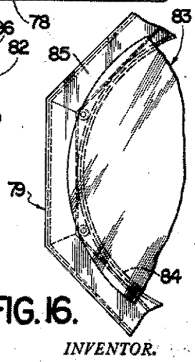

FIG. 16.

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United States Patent Office 2,807,405 Patented Sept. 24, 1957

2,807,405

COLLAPSIBLE CONTAINERS

Richard Lambert, New York, N. Y., assignor of one-half to Paula A. Lambert, New York, N. Y.

Application January 20, 1956, Serial No. 560,321

14 Claims. (Cl. 229—41)

This invention relates to collapsible containers, and particularly to low-cost disposable containers.

It has been a common practice to employ fiber-board or rigid cardboard containers and drums for the shipment of goods to points of use or distribution. Such shipping receptacles are merely intended for use in transit, thereafter to be disposed of; and it is for this reason that it has always been an objective to make such devices of low-cost materials. Of widespread use in this category of containers is the fiber-board drum having a metal base and metal cap or top. Such containers have been found to be considerably less costly than steel drums or other permanent containers; yet they have certain characteristics which render them in many cases disadvantageous for commercial use. Among such disadvantages are their rigidity and space-consuming proportions. More specifically, disposable containers of this category, such as the aforesaid fiber-board drums, are formed of rigid cylindrical walls which while empty are just as space-consuming as when filled. Hence, shipping costs of said empty containers from the source of their manufacture to the packing points, are obviously comparatively high. Moreover, such drums cannot be economically stored, in view of their space-consuming character, thereby requiring either extensive and hence costly storage warehouses, or the purchasing of empty drums in relative-small quantities. It has also been found that, at points of use or distribution of the goods shipped in such drums, the problem of disposal thereof is serious, particularly when large quantities of such drums are received.

It is within the contemplation of my invention to provide a disposable container having none of the aforesaid disadvantages of conventional containers, and yet which will adequately and effectively serve its intended receptacle and shipping purposes. More specifically, it is an object of my invention to provide a collapsible container that is extremely economical of space when in its collapsed condition. In this aspect of my invention, it is my objective to provide a container of this category comprising components which, before they are assembled into container form, occupy a minimum of space, and which when disassembled from their container configuration would also occupy comparatively little space.

It is also an object of my invention to provide a device of the above category made of relatively low cost, easily fabricated and easily assembled components. These components are adapted to be fabricated for and combined into different forms; but regardless of the form, the components thereof are readily produced for convenient assembly. The said components comprise three main members, to wit, prefabricated base and top members, and an extendable wall portion readily obtainable in the commercial market.

Other objects, features and advantages will appear from the drawings and the description herein given.

Referring to the drawings:

Fig. 1 is a fragmentary front view of a honeycomb wall portion constituting an important component of my invention, the wall being shown in an extended uncurved condition prior to the forming thereof into a cylinder, part of the lining being removed for clarity.

Fig. 2 is a section of Fig. 1 taken along line 2—2.

Fig. 3 is a fragmentary front view, substantially like Fig. 1, but showing the wall in a partially compressed or contracted condition.

Fig. 4 is a section of Fig. 3 taken along the line 4—4.

Fig. 5 is a fragmentary section, substantially like that of Fig. 2, but showing the honeycomb wall in its curved condition when formed into a cylinder, the wall being shown with the locking elements disconnected.

Fig. 6 is a fragmentary front view of Fig. 5.

Fig. 7 is a fragmentary top view of the device in its assembled condition, a fragment of the upper retainer member being removed to show the section therebelow, the section being taken substantially along line 7—7 of Fig. 8, the figure also showing the locking members in interlocked position.

Fig. 8 is a fragmentary section of Fig. 7 taken along line 8—8, a fragment of the closure member being shown in disassembled relation to the container.

Fig. 9 is a top view of the entire container with the cover in place, a fragment being removed for clarity.

Fig. 10 is a side elevation of Fig. 9, a fragment being removed for clarity.

Fig. 11 is a side elevation of the extensible wall component of a modified form of my invention, shown in collapsed condition, a fragment of the lining being removed for clarity.

Fig. 12 is a fragmentary top view of Fig. 11, a fragment of the top wall being removed for clarity.

Fig. 13 is a top view of a drum formed with the components shown in Fig. 11, the device being shown without a closure member.

Fig. 14 is a side elevation of the device of Fig. 13, fragments being removed for clarity.

Fig. 15 is a somewhat enlarged fragmentary section of Fig. 13 taken along line 15—15, the closure member being shown in detached relation to the drum.

Fig. 16 is a fragmentary top view of the container of Fig. 14, with the closure member in place.

In the embodiment of my invention illustrated in Figs. 1 to 10, the three main components are the wall member **20**, the top and upper retainer member **21**, and the base and bottom retainer member **22**. There is also a closure member **23** adapted for coactive use with member **21**, in a manner to be hereinafter set forth.

The said wall structure **20** comprises three parts, to wit, the expandable and collapsible honeycomb wall **24**, the inner lining **25** and the outer lining **26**, said linings flanking said honeycomb wall. In the embodiment illustrated, the honeycomb wall is a known commercial article of manufacture, its most frequent use being as a component for flat wall structures. In the present device, as will more clearly hereinafter appear, this structure forms an improved component of the container assembly, whereby its use is both extremely novel and of great utilitarian value. The wall **24** comprises a plurality of six-sided cells generally designated **27**, the junctures of adjacent sides serving as corner hinges for giving flexibility to this structure—for expansion and contraction. Specifically, each of said cells comprises an upper V-shaped portion **28** comprising walls **29** and **30**, a lower V-shaped portion **31** comprising walls **32** and **33**, and lateral parallel connecting walls **34** and **35**. The said lateral walls **34** and **35** are adhesively joined to adjacent walls of adjacent cells, as illustrated, thereby forming parallel rows of six-sided cells. The six corners **36**, **37**, **38**, **39**, **40** and **41** of each

of the cells serve as hinges, as aforesaid, whereby the walls can move relative to each other, and the entire device expand or contract, in well known manner. As illustrated in Fig. 1, the said wall is in an expanded condition, the lateral walls **34** and **35** being a relatively great distance apart, whereas in Fig. 3 the device is shown in a partially contracted position, the said lateral walls **34** and **35** being relatively closer together. It is obvious that the wall can be compressed further than as illustrated in Fig. 3, whereby the entire wall structure can be compressed to occupy a minimum of space. For the purpose of this specification, the wall **24** will be referred to as an extensible honeycomb wall.

Adhesively secured to the opposite faces of said honeycomb wall **24** are the said respective inner and outer linings **25** and **26**. These may be made of flexible sheet material, either limp or semi-stiff. Although both inner and outer linings are shown, it is also within the contemplation of this invention to employ either an inner or an outer lining.

In the embodiment illustrated, the said lining sheets **25** and **26** are made of semi-stiff paper, such as that known as kraft, each sheet being adhesively secured along adjacent edges of certain of said walls **34** and **35** in the regions generally designated **42** and **43**, it being preferred that the regions of adhesion be at alternate cells, so as to effectively permit an operative expansion and contraction of the cells, as will hereinafter appear. Each sheet is scored along a plurality of vertical lines generally designated **44** for the inner lining and **45** for the outer lining. The said scored portions **44** and **45** of the sheets are entirely free, along their lengths, from the honeycomb wall **24**, the regions of adhesion **42** and **43** being at laterally opposite sides of said scored lines **44** and **45**. It is preferred, although not necessary, that the said sheets of lining **25** and **26** be applied to the honeycomb structure **24** when the latter is in its fully or almost fully extended condition, the lining sheets being also almost in their fully stretched out condition. More specifically, by referring to Fig. 2, it will be seen that sheets **25** and **26** are each almost in their fully stretched out conditions, the scored portions at **44** and **45** extending outwardly from the plane of the flat sheet, to form undulating sheets each comprising a plurality of sections substantially V-shaped in cross section.

The arrangement is hence such that when the wall structure **20** is compressed into the form shown in Fig. 3, the said lining sheets **25** and **26** are folded outwardly along said scored lines **44** and **45**, to produce an accordion-like effect. In other words, when the honeycomb wall structure is forced into a collapsed condition, such as is shown in Figs. 3 and 4, the lining sheets **25** and **26** are each correspondingly shortened in length, with the formation of a plurality of vertical folds or pleated sections, hereinafter referred to as folds. It is further to be observed that when the entire structure **20** is curved into cylindrical configuration, as illustrated in Fig. 5, the inner lining **25** is contracted to a greater extent than outer lining **26**, the V formations of the folds of inner lining **25** being more acute than the corresponding sections of lining **26**.

In the form illustrated, the lateral ends of the wall structure **20** are provided with vertical terminal sides **46** and **47** to which are attached the locking elements **48** and **49**, respectively. These locking members comprise folded back sheets having respective flaps **50** and **51** spaced from the said walls **46** and **47**, respectively, flap **50** extending substantially from the plane of the inner lining **25** towards that of outer lining **26**, and flap **51** extending in the opposite direction, whereby said flaps are adapted for interlocking engagement when the wall structure **20** is formed into a complete cylinder, as illustrated in Fig. 7. If desired, said flaps **50** and **51** can be adhesively secured together. However, this is not absolutely necessary, since

the said components **21** and **22**, when operably assembled upon the cylindrical wall structure **20**, form a rigid device.

Said top and upper retainer member **21** is press-fitted over the top of the cylindrical honeycomb structure above mentioned. In the particular form illustrated, said member **21** comprises an outer peripheral flange **52** embracing the upper portion of the outer wall **53** of the honeycomb wall structure **20**; and spaced inwardly from flange **52** is the inner annular wall **54** in embracing engagement with the upper portion of the inner wall **55** of structure **20**, said annular wall **54** defining the periphery of the depressed wall **56** of member **21**, there being a central aperture **57** in wall **56** to permit the entry and withdrawal of the contents of the container. Between and bridging flange **52** and annular wall **54** is the peripheral marginal wall **58** disposed over the top of the structure **20**. The member **21** is so proportioned that the upper portion of the wall structure **20** is frictionally clamped between flange **52** and wall **54**. The closure member **23** contains an annular peripheral wall **59** proportioned for a frictional fit within annular wall **54**, the roof **60** of the closure serving to complete the seal of aperture **57** when closure **23** is operatively in place, as shown in Figs. 9 and 10.

The base and lower retainer member **22** is, in the form illustrated, substantially of the form of member **21**, except that it contains no apertured portion therein. The bottom of the structure **20** is clamped between the flange **62** and inner annular wall **63**, the annular marginal wall **64** underlying the structure **20**. The transverse wall **65**, which is depressed upwardly, serves as a bottom closure for the container.

It is thus evident that members **21** and **22** not only serve as upper and lower components of the assembly, but also serve the additional function of retainers to maintain the structure **20** in cylindrical form, as well as to give rigidity to the entire device.

When the device is assembled in the manner above described, it constitutes a firm, fully enclosed and transportable container. The cellular structure of the cylindrical wall, together with the outwardly extending folds of the outer lining **25**, serve as yieldable elements to absorb shocks and protect the contents of the container.

The honeycomb structure **24** is, as aforesaid, a commercial device, and hence can be purchased in various sizes to suit the requirements; and because of the fact, well known to those skilled in the art, that said collapsible honeycomb structures are commercially fabricated on a mass production basis, it is obtainable at a relatively low cost, compared with specially fabricated structures. The members **21**, **22** and **23** can readily be formed by well-known and readily available pressing machinery. And the entire assembly can be effected in relatively simple manner, without the need to employ specially skilled artisans. Since the entire cost, including the paper wall structure **20** and the other components hereinabove described, can thus be comparatively low—particularly as compared to the commercial fiber-board constructions above mentioned—this device can be economically employed as a disposable item.

It is to be noted that the entire honeycomb structure **20** can be compressed to a small fraction of the volume occupied by the completely assembled container, and hence can be economically stored until ready for use. Similarly, the relatively flat disc-like members **21**, **22** and **23** can be economically stored.

In the form of my invention illustrated in Figs. 11 to 16, an expandable honeycomb structure is also employed, the cells and folds in the lining being, however, horizontally disposed. In the particular embodiment illustrated, an octagonally-shaped honeycomb structure **67** is employed, the laterally enclosed wall of the structure forming the hollow interior **68**. The six-sided cells **69** are substantially of the type of the form first above described, the six corners of each cell constituting hinges to permit the contraction and expansion of the device.

Disposed over the outer surface of said octagonal honeycomb structure **67** is the outer lining **70**; and disposed along the inner surface of said honeycomb structure **67** is the inner lining **71**. The lining sheets are horizontally scored, the scored lines being generally designated **72**. These scored lines are substantially like those described in connection with the first form above referred to; and the regions of adhesive securement of said sheets are also substantially positioned like those first above described. The arrangement is hence such that the entire wall structure **73**, comprising the honeycomb wall **67** and the linings **70** and **71**, can be contracted and expanded, in accordion-like manner.

Disposed over the upper and lower terminals of said octagonal-shaped structure **73** are the annular octagonal walls **74** and **75**. These can be secured in place by mucilaginous or other suitable means.

The base and bottom retainer member **76** comprises the outer peripheral octagonal flange **77** and the floor **78** underlying the entire structure, flange **77** being compressed over the outer bottom wall of structure **73**. The top and upper retainer member **79** also has an outer peripheral octagonal flange **80** force-fitted around the upper outer portion of the octagonal wall structure **73**. Member **79** also has spaced inwardly from flange **80**, the cylindrical annular wall **81** defining the central aperture **82** of member **79**. Closure **83** is so proportioned that the annular wall **84** thereof can be press-fitted within said annular wall **81**.

Connecting flange **80** and annular wall **81** is the marginal annular wall **85** which overlies said wall upper **74**. Disposed within marginal wall **85** are a plurality of holes **86**, these being preferably positioned between annular wall **81** and the corners **87** formed by the junctures of adjacent sides of the inner wall **88** of structure **73**. In registry with each of said holes **86** are a plurality of holes **89** in the floor **78** of base **76**. A plurality of rods **90** are positioned within the container between walls **81** and **88**, the particular construction showing said rods provided with terminals **91** proportioned to fit into said respective holes **86** and **89**. The arrangement is hence such that when these rods **90** are inserted in place, the top and bottom members **79** and **76** are held in proper spaced relation, and the entire device is maintained in its operative container position. In this condition it can safely accommodate its contents in shipment, in the manner above described with respect to the first embodiment of my invention. After the device has served its purpose, the rods **90** can be removed (since the expandable nature of the structure permits a slight further separation of the upper and lower portions of the device), whereupon the entire device can be collapsed either for further use, or for other disposal.

In the above description, the invention has been disclosed merely by way of example and in preferred manner; but obviously many variations and modifications may be made therein. It is to be understood, therefore, that the invention is not limited to any specific form or manner of practicing same, except insofar as such limitations are specified in the appended claims.

I claim:

1. In a collapsible container, a laterally enclosed wall structure, a top member and a base member, said wall structure comprising an extensible honeycomb wall and at least one sheet of lining of flexible material disposed against said wall, said lining having sections thereof attached to said wall and other unattached sections, said unattached sections constituting folds extending away from said wall when the wall is in an operatively contracted position, whereby when said wall is in an operatively extended position said lining will be in a correspondingly extended condition, said top and base members being secured to the upper and lower portions of said wall structure.

2. In a collapsible container, a laterally enclosed wall structure, a top member and a base member, said wall structure comprising an extensible honeycomb wall and at least one sheet of lining of flexible material disposed against said wall substantially along the entire extent thereof, said lining having sections thereof attached to said wall and other unattached sections, said unattached sections constituting parallel continuous folds disposed along said wall, each fold extending outwardly away from said wall when the wall is in an operatively contracted position, whereby when said wall is in an operatively extended position said lining will be in a correspondingly extended condition, said top and base members being secured to the upper and lower portions of said wall structure.

3. In a collapsible container, a laterally enclosed wall structure, a top member and a base member, said wall structure comprising an extensible honeycomb wall, an inner sheet of flexible lining material and an outer sheet of flexible lining material, said sheets being disposed in flanking relation to and against opposite sides of said wall, each of said sheets having sections thereof attached to said wall and other unattached sections, said unattached sections constituting folds extending away from said wall when the wall is in an operatively contracted position, whereby when said wall is in an operatively extended position said sheets will be in correspondingly extended conditions, said top and base members being secured to the upper and lower portions of said wall structure.

4. In a collapsible container, the combination according to claim 1, said folds extending longitudinally of the container.

5. In a collapsible container, the combination according to claim 1, said folds extending transversely of the container.

6. In a collapsible container, the combination according to claim 1, said sheet constituting semi-stiff paper scored along parallel lines and bendable outwardly along said scored lines, said unattached sections being in the regions of said outwardly bendable portions.

7. In a collapsible container, the combination according the claim 1, said sheet constituting semi-stiff paper scored along parallel lines and bendable outwardly along said scored lines, said unattached sections being in the regions of said outwardly bendable portions, said sheet being in a substantially flattened condition when said honeycomb wall is in a predetermined extended position.

8. In a collapsible container, a laterally enclosed wall structure, a top member and a base member, said wall structure comprising an extensible honeycomb wall, an inner sheet of lining material and an outer sheet of lining material, each of said sheets being of semi-stiff paper scored along parallel lines and bendable outwardly along said scored lines, said sheets being disposed in flanking relation to and against opposite sides of said walls, each of said sheets having sections thereof attached to said wall and other unattached sections, said unattached sections being in the regions of said outwardly bendable portions, said top and base members being secured to the upper and lower portions of said wall structure.

9. In a collapsible container, the combination according to claim 8, said top member having an outer peripheral flange and spaced inwardly therefrom an annular wall, the upper portion of the said wall structure being disposed between and in pressing engagement with said flange and annular wall, said top member having an apertured portion therein.

10. In a collapsible container, the combination according to claim 8, said top member having an outer peripheral flange and spaced inwardly therefrom an annular wall, the upper portion of the said wall structure being disposed between and in pressing engagement with said flange and annular wall, a marginal wall bridging said flange and annular wall, said marginal wall being disposed over the upper edge of said wall structure, and a closure member in operative engagement with said top member, said top member having an apertured portion therein below said closure member.

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