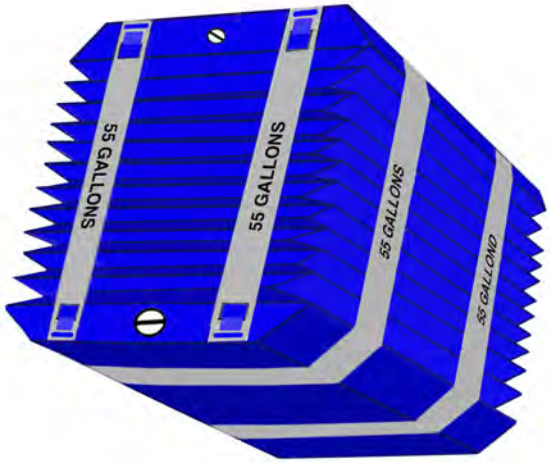
Our Revolutionary Contractible Containers Will Change The World's Shipping Industry By Saving Up To 70% On Return Transportation Costs!

The Old Way

This Type Of Drum Takes Up More Space And Costs More To Ship, Full Or Empty

The Only Way



This 55 Galllon Hard Plastic Drum Contracts Down To 15 Gallons

K-Tech's Patented Contractible Technology Will Do For The Container Industry What The Chip Did For Computers!

Introducing The 1st & Only Hard, Contractible Plastic Drums & Totes!

Guarantees A Seismic Shift In How Many Products Are Shipped Worldwide!

Standard 5 Gal. Container

Contractible 5 Gal. Container Goes To A 1 Gal. Size

Tote Feasibility Study Proves Massive Transportation & Warehouse Cost Savings

Contractible Technology Is The Future For Increasing Profitability Without Increasing Manufacturing Cost & Warehouse Space!

K-Tech's Patented Contractible Technology Will Do For The Container Industry What The Chip Did For Computers!

Engineer's Drawings Available

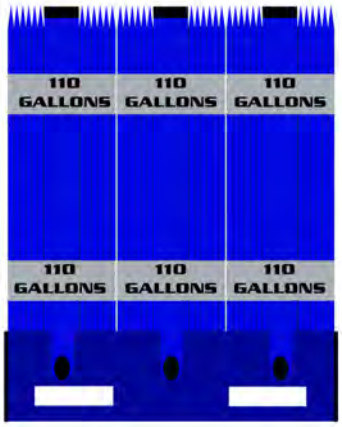
New Breakthrough Totes Are Ground Breaking!

330 Gallon Tote

You Can Ship One Tote!

The Above Tote Is Limited To Shipping One Kind Of Liquid.

Shown, 3 -110 Gallon Totes



Or, You Can Ship 3 Contractible Totes

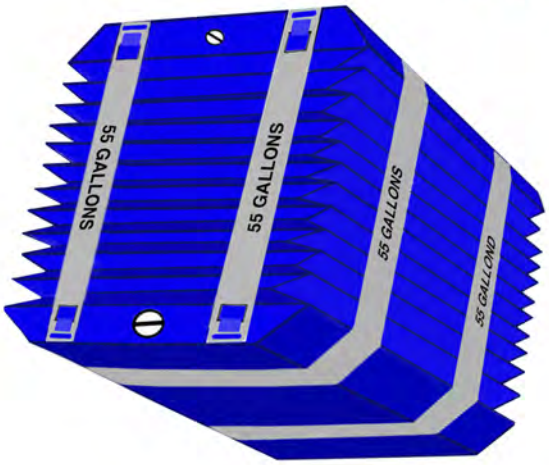
Each Of The Above Compressed Totes Can Ship 3 Different Kinds Liquids.

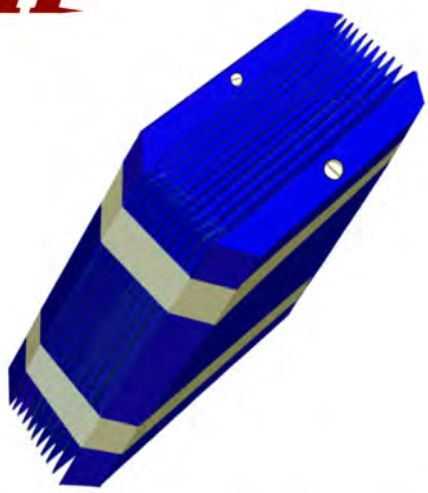
All Three Totes On The Right Can Fit Within The Space Of The One On The Left When Totally Collapsed.

K-Tech R & D CORPORATION

Our Patented Accordion Fold And Restrictor Band System!
There Is No Other Competing System!

K-Tech
R & D
Corporation





Collapsible Drum From 55 Gallons

To As Little As 15 Gallons Or Possibly Less!

From 5 Gallons

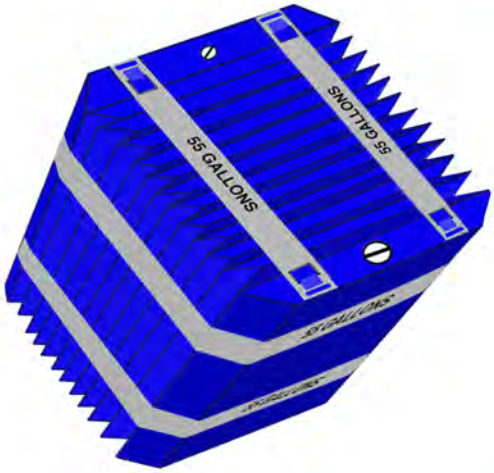
New Collapsible Technology

Can Also Be Made With Thinner Walls And Placed In Carton

Contractible To 1 Gallon

K-Tech
R & D
Corporation

Now, There Is No Reason To Pay For Shipping Air!



It has been estimated that a 40-foot container holds approximately 320 full-sized 55-gallon drums. Since DiTech drums can be constrained to 30% of their filled size (and can also be squared-off vs. made into round units), the same 40-foot container can now hold approximately 1500 constrained drums.

For Every 1 Compressed Container That Is Shipped From The Manufacturer To The Filler, The Filler Receives 2 Additional Contractible Containers, Which Are Shipped Free! This Savings Cannot Be Realized When Using Current Round Containers.

Drums From The Manufacturer Can Be Compressed For Shipment.

Spent Drums Can Then Be Compressed And Shipped Back To The Filler For More Savings.

US007600653B2

(12) **United States Patent**
Kasboske

(10) **Patent No.: US 7,600,653 B2**
(45) **Date of Patent: Oct. 13, 2009**

(54) **CONTAINER FOR FLOWABLE MATERIAL**

(76) Inventor: **George Kasboske**, 9040 S. 85th Ave., Hickory Hills, IL (US) 60457

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 247 days.

(21) Appl. No.: **11/546,603**

(22) Filed: **Oct. 12, 2006**

(65) **Prior Publication Data**

US 2008/0087676 A1 Apr. 17, 2008

(51) **Int. Cl.**
B65D 6/36 (2006.01)
B65D 8/10 (2006.01)
B65D 6/16 (2006.01)
B65D 8/14 (2006.01)

(52) **U.S. Cl.** **220/648**; 220/666

(58) **Field of Classification Search** 220/666, 220/670, 723, 720, 495.01, 721, 649, 648, 220/646, 660; 383/2, 118, 105; *B65D 21/08*
See application file for complete search history.

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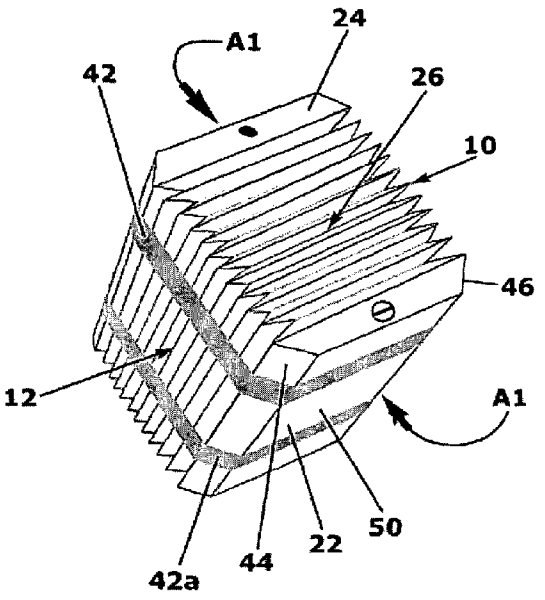
Primary Examiner—Anthony D Stashick
Assistant Examiner—Robert J Hicks
(74) *Attorney, Agent, or Firm*—Wood, Phillips, Katz, Clark & Mortimer

(57) **ABSTRACT**

The combination of a container for flowable material and at least one restrictor assembly. The container has a peripheral wall bounding a storage space into which flowable material can be introduced and in which flowable material can be confined. The storage space has a volume and is reconfigurable to thereby vary the volume. The at least one restrictor assembly cooperates with the container to control reconfiguring of the peripheral wall.

20 Claims, 8 Drawing Sheets



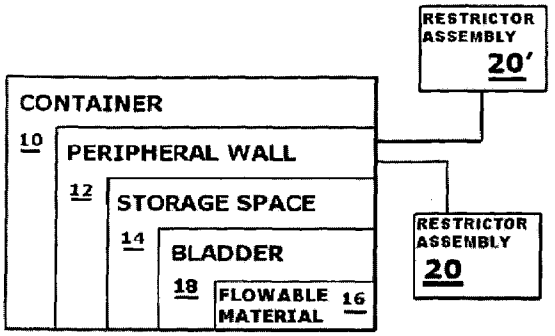


FIG.1

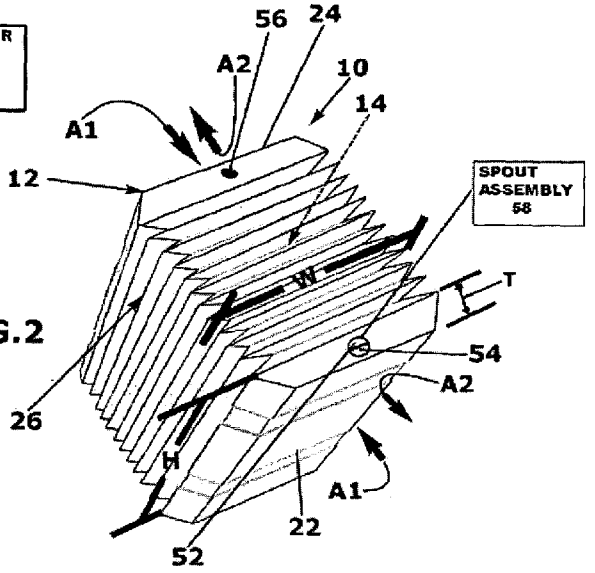


FIG.2

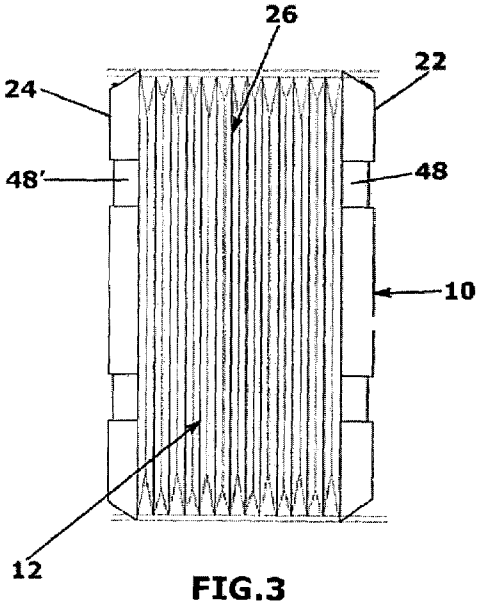


FIG.3

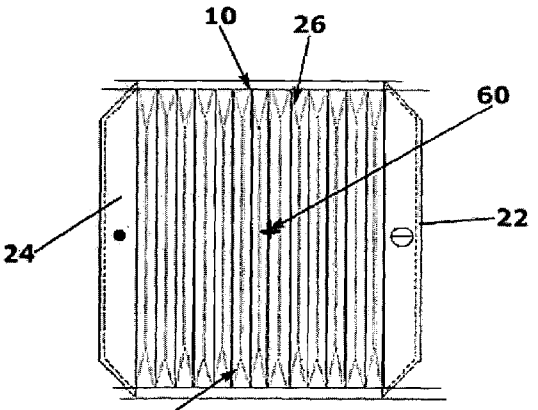


FIG.4

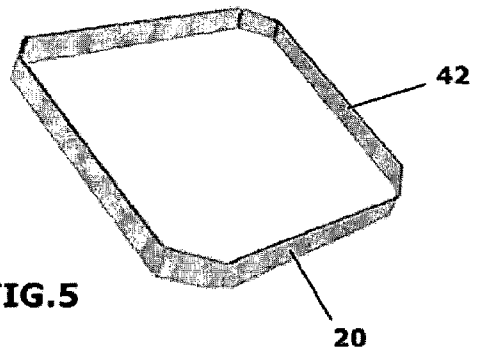


FIG.5

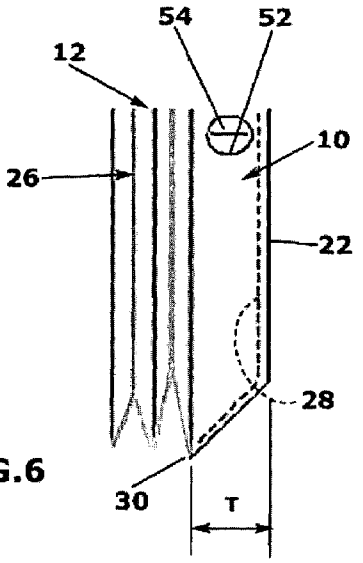


FIG.6

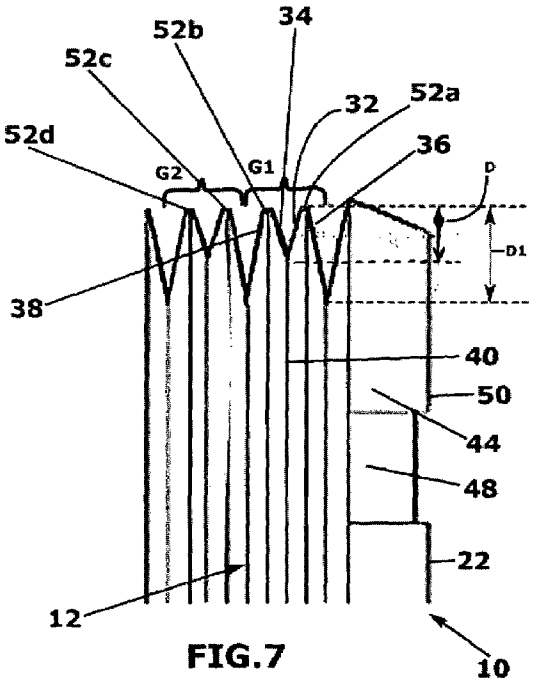


FIG.7

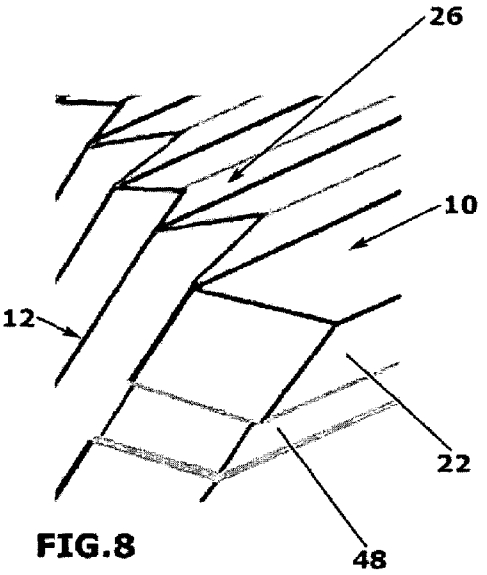
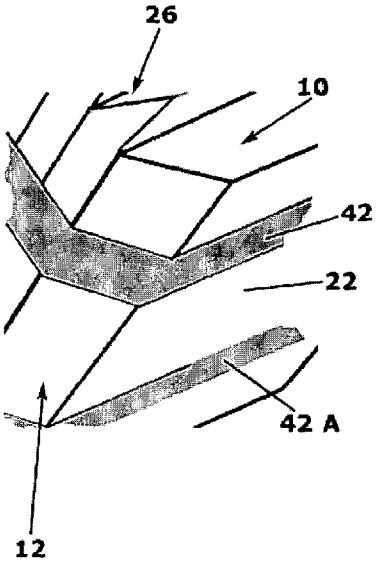


FIG.8



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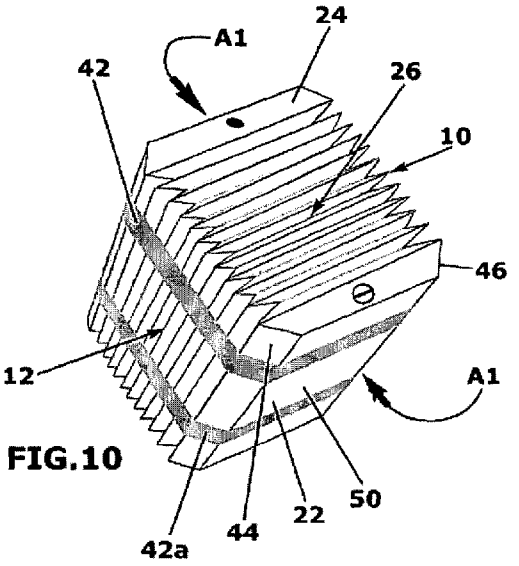

FIG.10

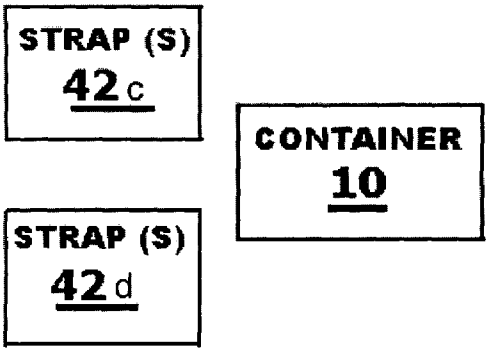

FIG.11

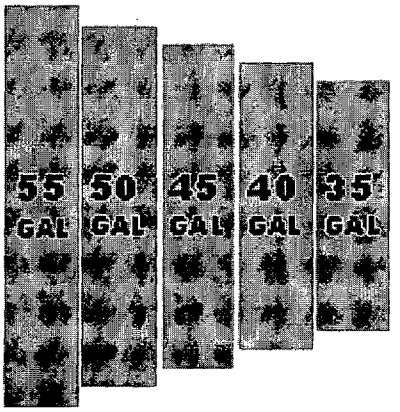

FIG.12

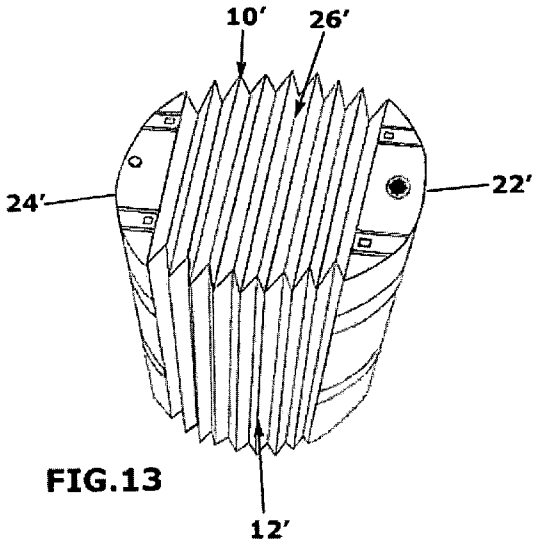

FIG.13

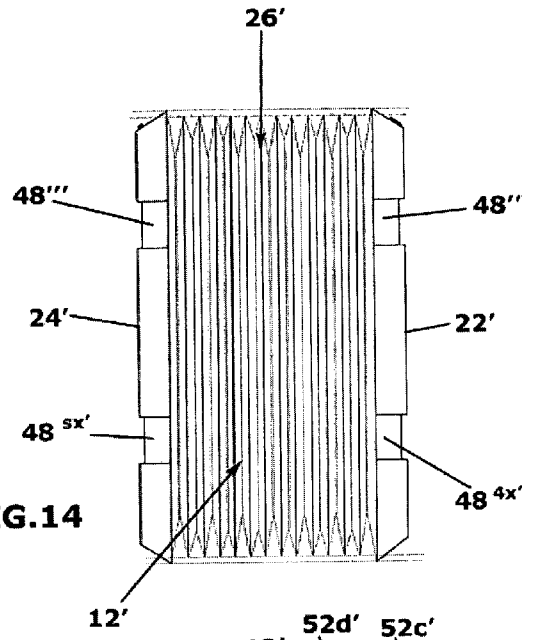

FIG.14

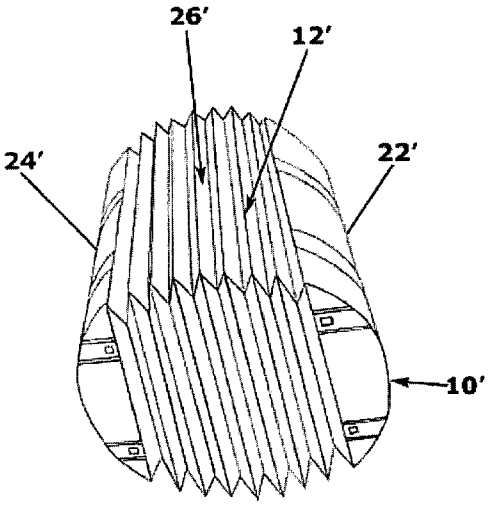

FIG. 15

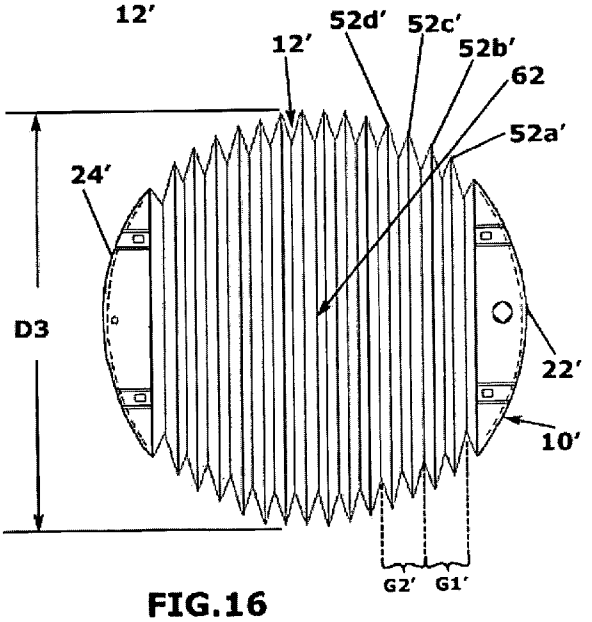

FIG.16

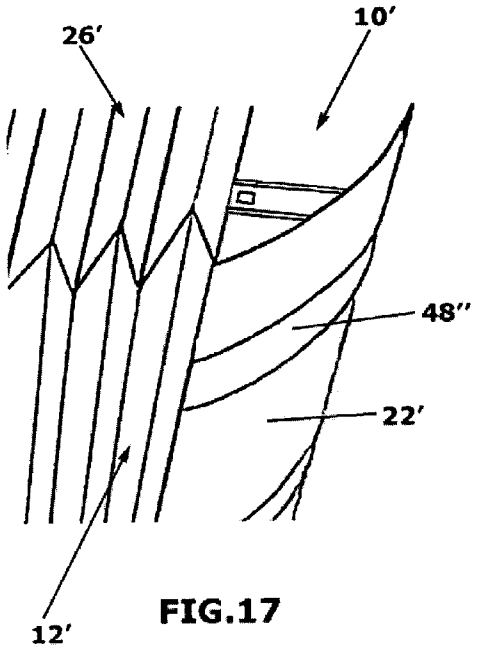

FIG.17

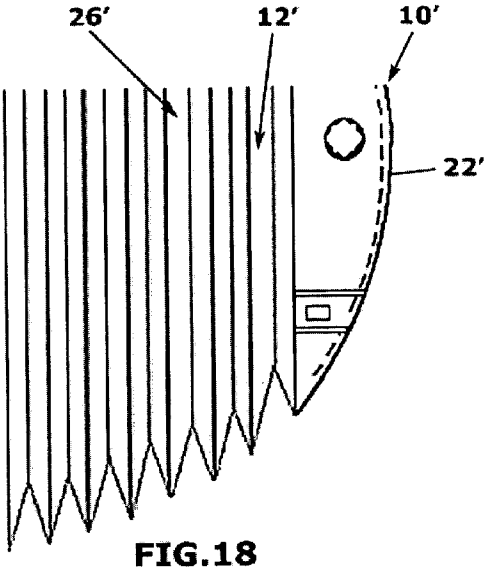

FIG.18

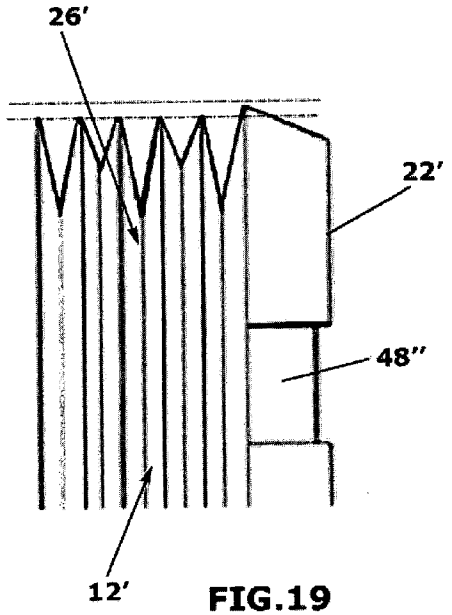

FIG.19

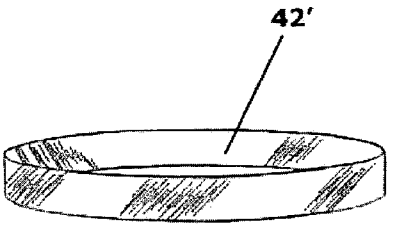

FIG.20

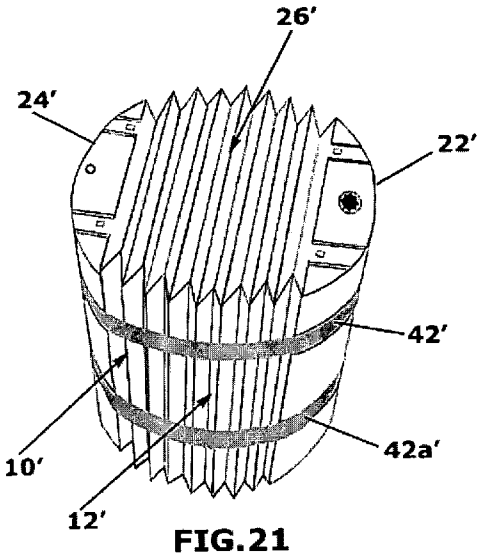

FIG.21

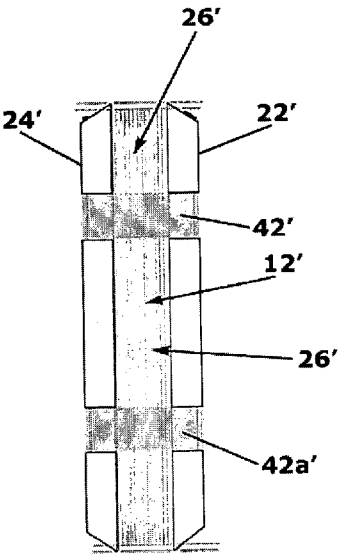

FIG.22

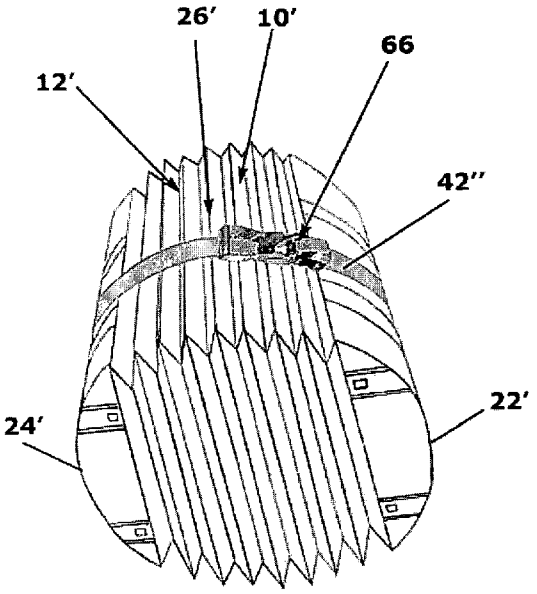

FIG.23

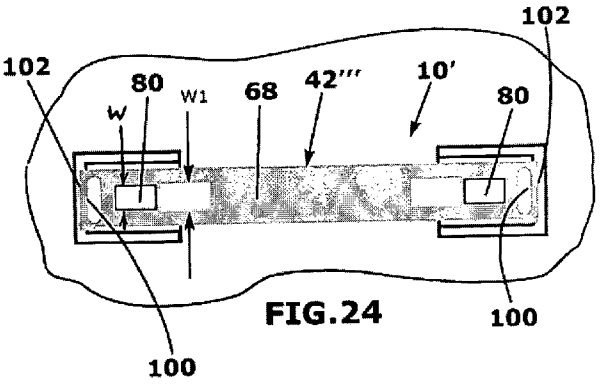

FIG.24

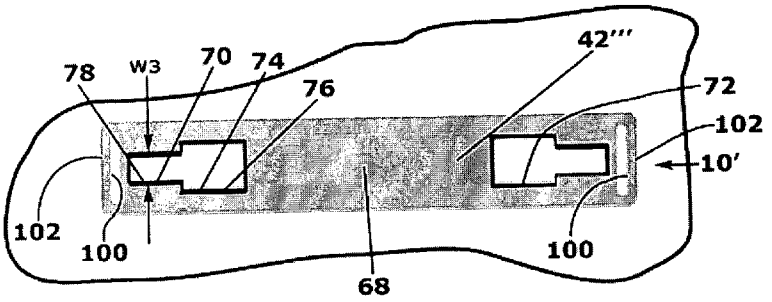

FIG.25

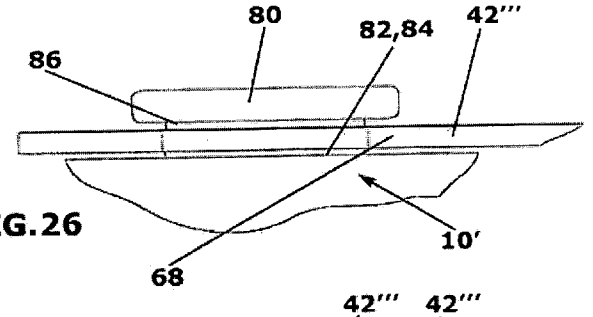

FIG.26

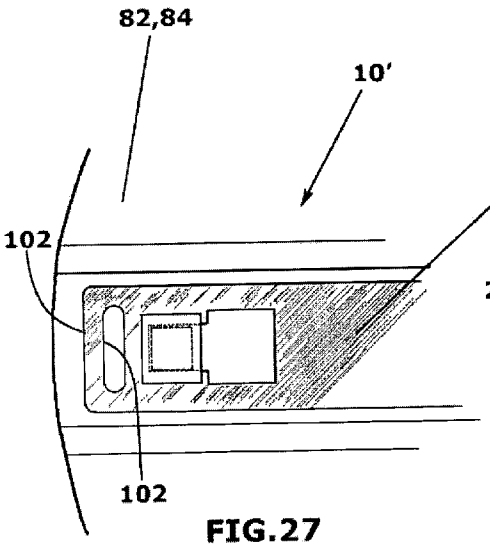

FIG.27

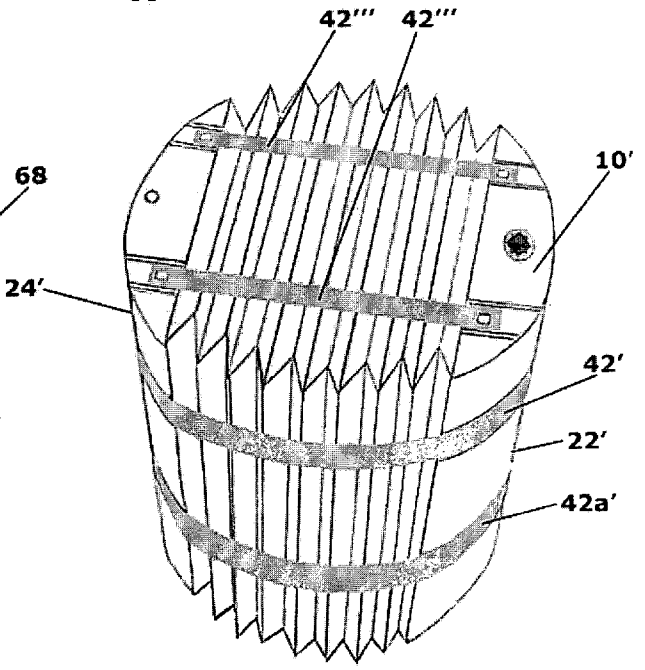

FIG.28

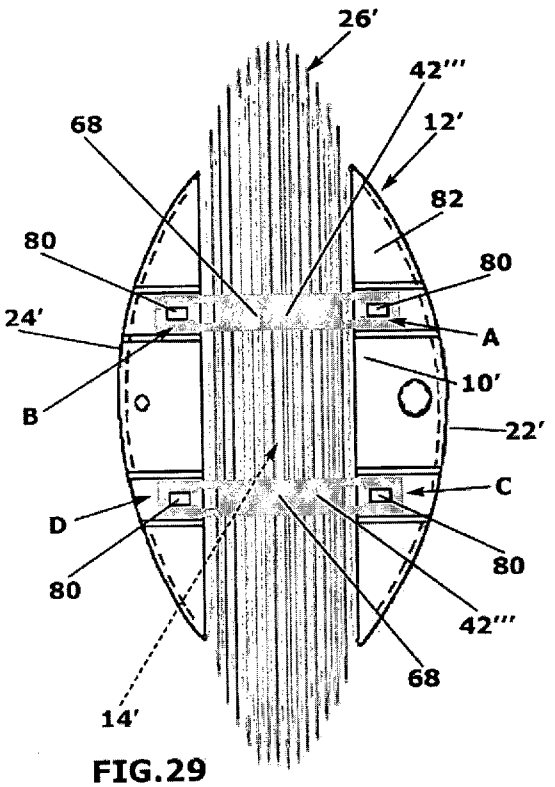

FIG.29

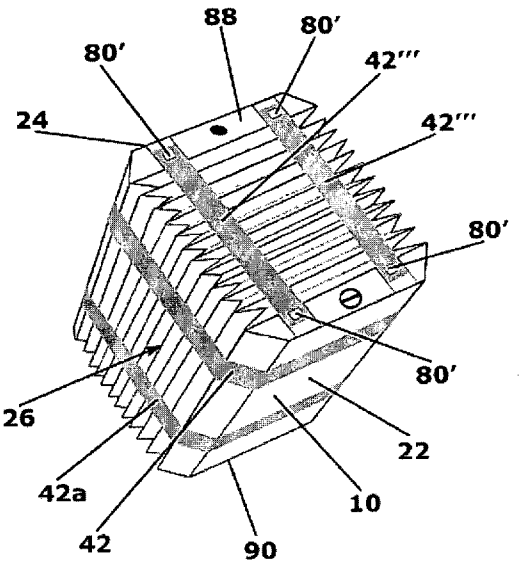

FIG.30

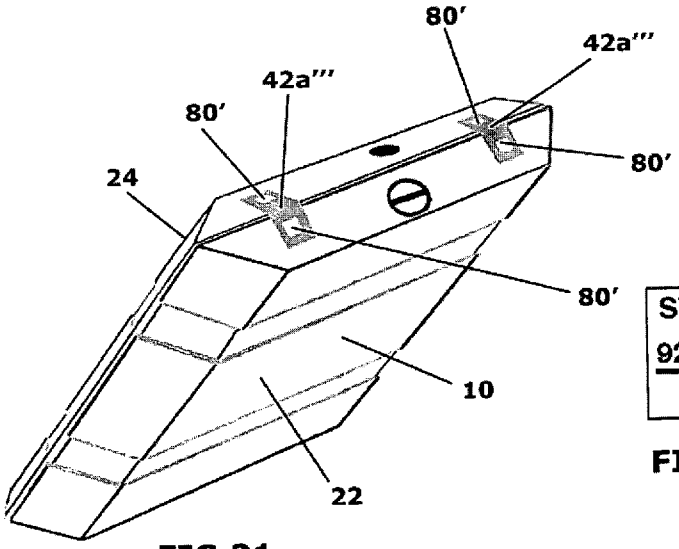

FIG.31

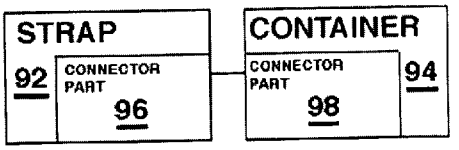

FIG.32

CONTAINER FOR FLOWABLE MATERIAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to containers for flowable materials that may be in solid or liquid form.

2. Background Art

Containers are used worldwide to store and transport a wide range of flowable materials. The nature of the materials ranges from edible products, to chemical products, to waste. The capacity of these containers likewise covers a wide range from potentially just a few ounces, or less, to as much as thousands of gallons, or more.

For any given product, containers with a range of different capacities may have to be kept on hand and available to meet individual demands. For example, a facility distributing a liquid fuel may have call for quantities ranging from a gallon or less to multiples of gallons. In a high volume operation, an operator may have to keep on hand potentially dozens of different containers, each with a fixed volume capacity.

Fixed configuration containers for bulk materials take up significant space and are cumbersome and expensive to handle and transport. Often for a single fill, a container of this type will be handled at least three times: a) first by a manufacturer of the container in delivering the same to a distributor; b) second by a customer using the contents; and c) third by the customer in returning the container, once the contents thereof is exhausted, to either the distributor or another location. The last handling step can be avoided by destroying the container after one or more uses, which has a detrimental environmental impact. Shipping and handling, associated with the first and third handling steps, is potentially expensive for large containers.

Storage of these containers, as at a distribution location, also presents a problem. Operators of distribution centers may be required to keep on hand a range of container sizes in quantities that are determined based upon historical data and rough estimates. The containers of different capacity must be separately stored to be retrieved as needed. Excess quantities of containers of one capacity may take up valuable space for long periods of time. Failure to have on hand a required quantity of another capacity container may necessitate improvisation, whereby either multiple smaller containers are used to cumulatively provide the desired volume, or a larger container than required is used but not filled to capacity. Either of these scenarios potentially represents waste and economic loss.

Ideally, there would be greater flexibility in container systems and their handling that would avoid the above problems.

SUMMARY OF THE INVENTION

In one form, the invention is directed to the combination of a container for a flowable material and at least one restrictor assembly. The container has a peripheral wall bounding a storage space into which flowable material can be introduced and in which flowable material can be confined. The storage space has a volume and is reconfigurable to thereby vary the volume. The at least one restrictor assembly cooperates with the container to control reconfiguring of the peripheral wall.

In one form, the peripheral wall is reconfigurable to a first state wherein the storage space has a maximum volume. The at least one restrictor assembly is configured to cooperate with the container to prevent reconfiguration of the peripheral wall to the first state.

In one form, the peripheral wall has accordion-type folds that permit reconfiguring of the peripheral wall so as to thereby vary the volume of the storage space.

The at least one restrictor assembly may include a first strap that extends continuously around a part of the container.

In one form, the first strap has a length that is variable between at least first and second different lengths. The first strap with the first length extends continuously around a part of the container so that the storage space has a first volume. The first strap with the second length extends continuously around the part of the container so that the storage space has a second volume that is different than the first volume.

The restrictor assembly may be connectable to the container selectively in a first manner whereby the storage space has a first volume and in a second manner whereby the storage space has a second volume that is different than the first volume.

In one form, the restrictor assembly consists of a first strap with a length that is fixedly connectable to the container at least first and second discrete locations so that the first and second locations remain spaced from each other by no more than a first distance as determined by the length of the first strap.

The above structure may be provided in combination with a second strap, with a length different than that of the first strap, that is fixedly connectable to the container at least the first and second discrete locations so that the first and second discrete locations remain spaced from each other by no more than a second distance that is different than the first distance and as determined by the length of the second strap.

At least one of the first and second straps may be releasably fixedly connectable to the container.

The peripheral wall may be made from a molded material.

In one form, the first strap has a first length, whereby with the first strap extending continuously around the container, the storage space has a first volume.

In one form, the second strap has a second length different than the first length and is extendable continuously around the container to cause the storage space to have a second volume that is different than the first volume.

In one form, the first and second straps are interchangeably usable, one in place of the other.

In one form, the restrictor assembly consists of an elongate strap and a part of the elongate strap and container cooperate to maintain the elongate strap in a predetermined position on the container.

In one form, the container is undercut to receive at least a part of a strap that is used on the restrictor assembly.

In one form, the container has spaced end walls and a plurality of accordion-type folds are formed between the end walls to allow the spaced end walls to be moved selectively towards and away from each other to thereby vary the volume of the storage space.

In one form, the peripheral wall has a vertical, central axis and is reconfigurable between circular and elliptical shapes as viewed along the central axis.

Alternatively, the peripheral wall may be reconfigurable between different square/rectangular shapes as viewed along the central axis.

In one form, a single piece on the container fully bounds the storage space.

In one form, the container has a fill opening and a vent opening each in communication with the storage space.

The storage space may have a volume in excess of one (1) gallon and potentially in excess of ten (10) gallons.

A spout assembly may be provided through which flowable material in the storage space can be discharged.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic representation of one form of the invention, including a container with a peripheral wall defining a storage space for flowable material and at least one, and preferably multiple, restrictor assemblies, useable selectively in conjunction with the container to control the volume of the storage space;

FIG. **2** is a top perspective view of one specific form of container, according to the present invention, as shown in FIG. **1**;

FIG. **3** is a side elevation view of the container in FIG. **2**;

FIG. **4** is a plan view of the container in FIG. **2**;

FIG. **5** is a perspective view of one form of restrictor assembly, as shown in FIG. **1**, in the form of an endless strap;

FIG. **6** is an enlarged, fragmentary, plan view of a corner of the container in FIG. **2**;

FIG. **7** is an enlarged, fragmentary, front elevation view of the corner of the container in FIG. **6**;

FIG. **8** is an enlarged, fragmentary, perspective view of the corner of the container shown in FIG. **6**;

FIG. **9** is a view as in FIG. **8** with the strap of FIG. **5** operatively positioned by being wrapped around the container of FIG. **2**;

FIG. **10** is a top perspective view of the container shown in FIG. **2** with two straps as in FIG. **5** operatively positioned therearound;

FIG. **11** is a schematic representation of a kit, according to the invention, including a container and multiple, selectively useable restrictor assemblies each in the form of a strap;

FIG. **12** is a schematic representation of a container with different volume capacities for the storage space achievable through selective use of one or more restrictor assemblies;

FIG. **13** is a top perspective view of a modified form of container, according to the present invention;

FIG. **14** is a front elevation view of the container in FIG. **13**;

FIG. **15** is a bottom perspective view of the container in FIG. **13**;

FIG. **16** is a plan view of the container in FIG. **13**;

FIG. **17** is an enlarged, fragmentary, perspective view of one portion of the container in FIG. **13** at the top region thereof;

FIG. **18** is an enlarged, fragmentary, plan view of the upper region of the container shown in FIG. **17**;

FIG. **19** is an enlarged, fragmentary, elevation view of the top region of the container shown in FIG. **17**;

FIG. **20** is a perspective view of one form of restrictor assembly for the container in FIG. **13** in the form of an endless strap;

FIG. **21** is a view as in FIG. **13** with a pair of endless straps as in FIG. **20** placed operatively upon the container;

FIG. **22** is a front elevation view of the container in FIG. **13** with restrictor assembly straps thereon and in a fully collapsed state to produce a minimum volume for the storage space;

FIG. **23** is a bottom perspective view of the container in FIG. **13** with a modified form of restrictor assembly, in the form of a strap having an adjustable length;

FIG. **24** is an enlarged, fragmentary plan view of a container, as in FIG. **13**, with another form of restrictor assembly, according to the invention, in the form of a strap with spaced connectors;

FIG. **25** is an enlarged plan view of the strap in FIG. **24**;

FIG. **26** is an enlarged, fragmentary, elevation view of a projection on the container of FIG. **24**, which cooperates with one of the connectors on the strap of FIG. **24**;

FIG. **27** is an enlarged, fragmentary, plan view of the container in FIG. **24** showing the connection in FIG. **26** between the strap and container;

FIG. **28** is a top perspective view of the container in FIG. **13** with the straps in FIGS. **20** and **24** operatively connected thereto;

FIG. **29** is a plan view of the container in FIG. **13** in a fully collapsed state and with straps as in FIG. **24** operatively connected thereto;

FIG. **30** is a perspective view of the container in FIG. **2** with straps as in FIGS. **5** and **24** operatively connected thereto and with the container in an expanded state;

FIG. **31** is a view as in FIG. **30** with the container in a fully collapsed state and with a different length of straps than in FIG. **24** operatively connected thereto; and

FIG. **32** is a schematic representation of a restrictor assembly/strap and container with cooperating connectors parts thereon for maintaining the restrictor assembly/strap connected to the container.

DETAILED DESCRIPTION OF THE DRAWINGS

In FIG. **1**, a schematic representation of a container for a flowable material is shown at **10**. The container **10** has a peripheral wall **12** bounding a storage space **14** into which a flowable material **16** can be introduced and in which the flowable material **16** is confined. The nature of the flowable material **16** is not in any way limiting of the invention and can be virtually any type of liquid or solid material, such as particulate, that is capable of being poured into the storage space **14**. The flowable material **16** may also be such that it is in a rigid form that must be treated to allow it to flow into and/or from the container **10**. For example, certain gels and liquids, such as waxes, fall into this category.

The container **10** is shown schematically since it likewise can take a virtually limitless number of different forms. The peripheral wall **12** may be made from any material(s) and in any manner that allows it to be reconfigured to thereby vary the volume of the storage space **14** that it bounds. The peripheral wall **12** may be defined by an exposed layer that directly contacts the flowable material **16** in the storage space **14**. Alternatively, the peripheral wall **12** may be made from more than one layer. As a still further alternative, a bladder **18** may directly engage the flowable material **16** and may underlie one or more outer wall layers.

At least one restrictor assembly **20** is provided and cooperates with the container **10** to control reconfiguring of the peripheral wall **12**. The restrictor assembly **20** may be designed to cooperate with the container **10** in only one manner so that the storage space **14** cannot be increased in volume beyond an amount dictated by the configuration of the restrictor assembly **20**.

Alternatively, the restriction assembly **20** may be changeable in configuration, or changeable in the manner in which it cooperates with the container **10**, so that the peripheral wall **12** cannot be reconfigured to increase the volume of the storage space **14** beyond selected multiple volumes as dictated by the configuration of the restrictor assembly **20**.

As a further alternative, multiple, interchangeably usable restrictor assemblies **20**, **20'** may be provided in combination with the container **10** as a kit. The restrictor assemblies **20**, **20'** are different in configuration and/or cooperate with the container **10** in different manners so that the separate restrictor assemblies **20**, **20'** control reconfiguration of the peripheral

wall **12** to confine the volume of the storage space **14** to two or more different, predetermined volumes.

Specific forms of containers **10** and restrictor assemblies **20**, **20'** will now be described, with it being understood that these are exemplary in nature only. Other designs and variations, within the scope of the schematic showing in FIG. **1**, are contemplated.

In FIGS. **2-11**, one specific form for each of the container **10** and restrictor assembly **20** is shown. The container **10** has spaced end walls **22**, **24** between which accordion-type folds **26** reside. The end walls **22**, **24** and accordion folds **26** may be formed as one piece defining the peripheral wall **12** that fully bounds the storage space **14**, directly or indirectly, as through the bladder **18**. The use and nature of the bladder **18** depends upon the nature of the flowable material **16**, the desired integrity for the container **10**, and the potential interaction of the flowable material **16** with the material(s) making up the peripheral wall **12**.

The accordion folds **26** are connected to the end walls **22**, **24** so that the end walls **22**, **24** can be moved selectively towards and away from each other, as indicated respectively by the paired arrows A**1**, A**2**. By moving the end walls **22**, **24** away from each other, the accordion folds **26** expand and the volume of the storage space **14** bounded by the peripheral wall **12** increases. By moving the end walls **22**, **24** towards each other, the accordion folds **26** collapse so that the volume of the storage space **14** decreases.

With the container **10** used alone, without any restrictor assembly, introduced flowable material **16** expands the peripheral wall **12** to a first state wherein the storage space **14** is at a maximum volume. With extended use of the container **10** at maximum volume, the material defining the peripheral wall **12**, and particularly the accordion folds **26** and points of connection therebetween and the end walls **22**, **24**, may become stressed to a point of rupture. Repeated filling to maximum volume and emptying may cause material fatigue over time.

Accordingly, the restrictor assembly **20** preferably cooperates with the container **10** to control reconfiguration of the peripheral wall **12** and prevent reconfiguration of the peripheral wall **12** fully to the first state. While not preferred, the restrictor assembly **20** could allow the peripheral wall **12** to achieve the first state and affords reinforcement thereto so as to minimize the likelihood of rupture or the effects of material fatigue.

In this embodiment, the end walls **22**, **24** have the same general shape and are mirror images of each other, with the exemplary end wall **22** having a height H, a width W, and a thickness T. The end wall **22** has a cup-shaped inner surface **28**, opening toward the other end wall **24** and bounding the storage space **14**. The accordion folds **26** are joined to a peripheral rim **30** on the wall **22** at an open end of the surface **28**.

The accordion folds **26** consist of "M"-shaped groups of walls, with two such groups G**1**, G**2**, identified in FIG. **7**. Each group of walls G**1**, G**2**, etc extends continuously around the storage space **14**. The groups have the same length at each of four sides of the container **10** to produce an overall squared configuration therefor. The groups of walls G**1**, G**2**, etc. are contiguous, each with the next, fully between the end walls **22**, **24**, with a live hinge being defined between adjacent, joined walls.

The exemplary group of walls G**1** consist of inner walls **32**, **34** joined to produce an outwardly opening "V" shape, as seen in FIG. **7**. The walls **32**, **34** have a first vertical depth D. The wall **32** is joined to a wall **36** to define an inverted, inwardly opening V shape. The wall **36** has a vertical depth D**1**. A wall **38** is connected to the wall **34** to provide an inverted, inwardly opening V shape with the same depth D**1**. The group of walls G**1** is symmetrical about a center line **40**. The "M" shape pattern is repeated fully between the end walls **22**, **24**.

By reason of having the pairs of walls **32**, **34** and **36**, **38** of different vertical depth, a more compacted arrangement can be achieved between the end walls **22**, **24**. If all of the walls had the same vertical depth, they would all stack at the same location to limit compaction. The disclosed arrangement allows, for example, the walls **36**, **38** to compact closer to the center line **40** in the region beneath the collapsed walls **32**, **34**.

The volume of the container **10** can be increased by physically drawing the end walls **22**, **24** away from each other to expand the accordion folds **26**. Additionally, the force of the introduced flowable material **16** effects expansion of the accordion folds **26** to increase the volume of the storage space **14**. In the absence of any additional structure, the peripheral wall **12** is allowed to expand to the aforementioned first state wherein the storage space **14** has its maximum volume. As noted previously, as maximum volume is achieved, the various hinge locations between adjacent walls on the accordion folds may become stressed, as does the connection of the accordion folds **26** at the rim **30**, and the corresponding location on the opposite end wall **24**. The restrictor assemblies **20**, **20'** serve to reinforce the peripheral wall **12** on the container **10** and potentially prevent reconfiguration of the peripheral wall **12** to the first state. This is accomplished by reason of the restrictor assemblies **20**, **20'** closely surrounding the container **10** over substantially the entire length of the restrictor assemblies **20**, **20'**.

In one exemplary form, the representative restrictor assembly **20** consists of an endless strap **42** that has a first continuous length. In its operative position, the endless strap **42** extends continuously, horizontally around a part of the peripheral wall **12**, as seen in FIGS. **9** and **10**. The strap **42** may be dimensioned so that, as shown in FIG. **10**, the end walls **22**, **24** must be moved towards each other, as indicated by the arrows A**1**, to allow placement of the strap **42** around the container **10**. The restoring force in the accordion folds **26** exerts a pressure on the surrounding strap **42** whereby the strap is maintained in an operative position upon the container **10**. To facilitate placement of the strap **42**, the exemplary end wall **22** has angled surfaces **44**, **46**, thereby eliminating sharp corners and giving the vertical profile of the container **10** a more rounded shape at the corners thereof, to which the strap **42** can more readily conform.

To further accommodate the strap **42**, the end wall **22** has an undercut at **48** at an end surface **50** and in both angled surfaces **44**, **46**. A like undercut **48'** is formed in the end wall **24** for the same purpose. The undercuts **48**, **48'** cooperatively maintain the strap **42** consistently in a desired horizontal, operative position.

The nature of the strap **42** can vary considerably. The strap **42** can have a rigid shape pre-formed to conform to the surface on the container **10** about which it continuously extends. Alternatively, the strap **42** can be made from a flexible material with good resistance to elongation, whereupon under the expansion pressure of the peripheral wall **12**, the strap **42** will conform to the surrounded container shape. The strap **42** is made from any of a virtually limitless number of different materials, such as metal, plastic, fiber reinforced plastic, etc.

Preferably, the end walls **22**, **24**, undercuts **48**, **48'**, and accordion folds **26** are configured so that with the strap **42** residing in the undercuts **48**, **48'** and extending continuously around the container **10**, the strap **42** bears against the apices for the walls in the various wall groups G**1**, G**2**, with four such

apices shown at **52***a*, **52***b*, **52***c*, **52***d* in FIG. **7**. This potentially relieves stress at the live hinge locations and maintains, with this embodiment, a consistent, squared overall shape.

In this embodiment, a separate strap **42***a*, either the same as or different than the strap **42**, is shown and cooperates with the container **10** in the same manner that the strap **42** cooperates therewith. The strap **42***a* is vertically spaced from the strap **42** so that the straps **42**, **42***a* cooperatively reinforce the peripheral wall **12** and limit expansion thereof to a state wherein the storage space **14** has a volume as dictated by the length of the straps **42**, **42***a*.

The end walls **22**, **24** and accordion folds **26** may be made from a single piece, such as from molded plastic, or any other material that can be molded to the requisite shape, that fully bounds the storage space **14**. However, the invention contemplates that the container **10** may be made in multiple pieces. As noted above, the aforementioned bladder **18** is also an optional feature. The peripheral wall **12** may be configured so that the storage space **14** is either continuously open or compartmentalized.

A fill opening **52** is provided in the end wall **22**. A releasable plug **54** is used to selectively block the fill opening **52**. A vent opening **56** is provided in the other end wall **24**. A spout assembly **58** may be placed in the fill opening **52**, as through the use of a threaded connection, to facilitate controlled direction of the discharging flowable material **16** from within the storage space **14**.

The container **10** can be sold as a kit with separate restrictor assemblies, shown in FIG. **11** schematically as different straps **42***c*, **42***d*. It should be understood that the straps are only representative of one type of restrictor assembly, with the kit being useable with other types of restrictor assemblies, as hereinafter described, or as otherwise would be devisable by one skilled in the art with the inventive concepts in hand.

The strap **42***c* may have a first length, with the strap **42***d* having a second length that is different than the first length. The user has the option of using either the strap **42***c* or the strap **42***d*, each which accounts for a different volume capacity for the storage space **14**. For example, a shorter strap length will cause the end walls **22**, **24** to be maintained closer together with the container filled than will a longer strap length.

As just one example of the afforded flexibility, as shown in FIG. **12**, five different strap lengths may be offered in a kit. The shortest strap length may allow reconfiguration of the peripheral wall **12** through the accordion folds **26** only to the point that the storage space **14** will accommodate 35 gallons. The largest strap will allow expansion to a storage volume of 55 gallons. Three additional straps provide volume capacities in between (40, 45 and 50 gallons).

Accordingly, the user of the inventive structure can have one universal container **10** that can be offered in conjunction with multiple straps that can be selectively operatively situated to control the container capacity to different selected volumes. Thus, the container **10** can be reconfigured so that it will occupy an overall space that is matched to the desired volume of the flowable material **16** therewithin. The user can accommodate a significant range of volume demand with a single container construction. The five different volumes noted in FIG. **12** are exemplary in nature only, as less or more different volumes, with a single container **10** are possible.

With the above construction, the container **10** is changeable between different squared/rectangular shapes of different dimension as viewed vertically through the vertical center line **60**, which can be conveniently and compactly stacked and stored.

In FIGS. **15-23**, a modified form of container is shown at **10'** and has a shape that varies between round and elliptical (FIG. **29**), as viewed along a vertical **62**, as the peripheral wall **12'** thereon is reconfigured between collapsed and expanded states.

The container **10'** can be made substantially in the same manner as the container **10**, with end walls **22'**, **24'** between which accordion-type folds **26'** are formed.

One primary difference between the container **10'** and the container **10** is that end walls **22'**, **24'** are curved continuously generally to match the diameter D**3** of the container **12'** which has a rounded shape, as shown for example in FIG. **16**.

Additionally, the groups of walls G**1'**, G**2'**, etc. are dimensioned in a horizontal direction on the top and bottom of the container **10'**, so that the apices **52***a'*, **52***b'*, **52***c'*, **52***d'*, at which adjacent walls hinge, follow the generally circular contour with the container **10'** in the expanded, rounded configuration shown in FIG. **16**.

Undercuts **48"**, **48'"** are respectively provided in the end walls **22'**, **24'** to accommodate a strap **42'** that is part of a restrictor assembly. The wall **22'** has an additional undercut $48^{4x'}$, with the wall **24'** having an undercut $48^{5x'}$ to accommodate an additional strap **42***a'*, as in the prior embodiment. The undercuts **48"**, **48'"**, $48^{4x'}$, $48^{5x'}$ are configured together with the accordion folds **26'** so that the straps **42'** can engage the walls **22'**, **24'** and apices **52***a'*, **52***b'*, **52***c'*, **52***d'*, etc. fully around the circumference of the container **10'**, which is substantially circular and of uniform diameter around the axis **62**.

The strap **42'** can be sold in conjunction with straps (not shown) of different length, whereby the selection of straps **42'** allows selection of the desired configuration for the peripheral wall **12'** between the expanded state of FIG. **16** and a collapsed state as shown in FIG. **22**, wherein the walls of the accordion folds **26'** are substantially fully collapsed against each other.

As an alternative to using a strap **42'** with a fixed configuration, a strap **42"** can be used as shown in FIG. **23**. The strap **42"** has a length adjusting mechanism at **66**, of conventional construction, which allows the effective length of the strap **42"** to be varied. The strap **42"** can be pre-set to a desired length to produce the desired volume capacity or may be put in place and adjusted to progressively reduce the effective diameter of the peripheral wall **12'**, as viewed in a vertical direction.

The strap **42"** can be used alone or in conjunction with the strap **42'**. The strap **42"** may be provided in the undercut locations or elsewhere. As shown in FIG. **23**, the strap **42"** can be used to draw the end walls **22'**, **22"** towards each other to compact the accordion folds **26'**, thereby facilitating placement of the straps **42'** of fixed length. The strap **42"** can then be either removed or kept in place to be used in conjunction with the straps **42'**.

The restrictor assemblies may include another type of strap **42'"**, as shown in FIGS. **24-31**, useable alone or in conjunction with the aforementioned straps **42**, **42'**, **42"**. The strap **42"** consists of a body **68** with spaced connectors **70**, **72**. The nature of the connectors **70**, **72** is not critical to the present invention. In this embodiment, the exemplary connector **70** consists of a generally square opening **74** with a larger portion **76** and a contiguous smaller portion **78**.

The opening **74** accommodates a projection **80** on the top **82** or bottom **84** of the exemplary container **10'**. The projection **80** is spaced from the top/bottom **82**, **84** by a neck **86**. The projection **80** has a width W that is slightly less than width W**1** of the larger portion **76** of the opening **74**. The neck **86** has a width substantially matched to that W**3** for the smaller portion **78** of the opening **74**. With this arrangement, the projection **80**

can be directed through the larger portion **76** of the opening **74**. The neck **86** can then be shifted into the smaller portion **78** of the opening **74**, whereupon the projection **80** is blocked from being withdrawn from the opening **74**.

As seen in FIG. **29**, one of the projections **80** is provided at a location at A on the end wall **22'**, with another projection at a location B on the end wall **24'**. These discrete locations A, B are spaced from each other by a distance slightly greater than the combined widths of the accordion folds **26'**. Projections **80** are provided in a similar arrangement at locations C and D, respectively on the end walls **22'**, **24'**.

By joining the projections at the locations A and B to the connectors **70**, **72**, the strap **42'"** limits movement of the end walls **22'**, **24'** away from each other to beyond a distance dictated by the length of the strap **42'"**. By selecting the length of the body **68** and the spacing between the connectors **70**, **72**, a desired volume capacity for the storage space **14'** can be selected. A single strap **42'"** can be used or, as shown, two such straps **42'"** can be used on each of the top **82** and bottom **84** of the container **10'**.

As noted above, the straps **42'"** can be used alone or in conjunction with the straps **42**, **42'**, **42"**, to control the volume of the particular container **10'**.

Accordingly, a selection of straps **42'"** of different length can be kept on hand to produce the desired storage capacity for the container **10'**. In FIG. **29**, the straps **42'"** are shown of a length to substantially fully collapse the accordion folds **26'**. With this strap length, a minimum volume capacity for the container **10'** can be selected. At the same time, this strap construction facilitates compaction of the container **10'** for storage and transportation thereof in an empty state.

As shown in FIG. **30**, the strap **42'"** can be used similarly on the container **10** to cooperate with projections **80'** on the top **88** and/or bottom **90** thereof. Straps **42***a'"*, as shown in FIG. **31**, of relatively short length, can be used to collapse the container **10** to its minimum storage volume. As noted above, this collapsed state may be selected for the lowest volume capacity or for compaction of the empty container **10** for handling and transportation thereof.

While the straps **42**, **42'**, **42***a'*, **42"**, **42'"**, **42***a'"* are shown to be releasably connected, it is contemplated that the same might be permanently held in place in a manner that allows them to be changed into and out of an operative state. As just one example, one end of a strap might be permanently affixed to its associated container.

As a further alternative, the connections between the straps and the containers might be such that a strap, initially fully separate from the container, may be permanently secured thereto by an appropriate connection, known to those skilled in the art.

As shown in FIG. **32**, a generic form of strap **92** may be consistently connected to a generic form of container **94** by cooperating connector parts **96**, **98** thereon. For example, the connector parts **96**, **98** may maintain the straps permanently or releasably, loosely upon the container or in a preliminary assembly position, as in an undercut.

Another optional feature is the inclusion of elongate slots **100** through the body **68** of the straps **42'"**, as seen in FIGS. **24**, **25** and **27**, adjacent the ends of the body **68**. The slots **100** accommodate one or more user fingers that can be directed therethrough to graspingly surround elongate strips **102** formed by the slots **100**. By grasping and exerting a force on the strips **102**, the exemplary container **10'** can be repositioned by a user, as by lifting or sliding.

The foregoing disclosure of specific embodiments is intended to be illustrative of the broad concepts comprehended by the invention.

The invention claimed is:

1. In combination:

a) a container for a flowable material,

the container having a peripheral wall bounding a storage space into which flowable material can be introduced and in which introduced flowable material can be confined,

the storage space having a volume,

the peripheral wall having a plurality of accordion folds that permit reconfiguring of the wall so as to thereby vary the volume of the storage space; and

b) at least one restrictor assembly that in an operative position cooperates with the container to control reconfiguring of the peripheral wall by limiting expansion of the accordion folds,

the restrictor assembly having a positively fixed length configuration, extending continuously around the outside of the container and in the operative position closely surrounding the container over substantially the entire fixed length of the restrictor assembly and exerting a force upon the container to control expansion of the accordion folds to a first state and thereby reconfiguring of the peripheral wall into one predetermined state wherein the storage space will accept a first predetermined maximum volume of flowable material,

the restrictor assembly changeable from the operative position to another position wherein the restrictor assembly does not surround the container so as to limit expansion of the accordion folds,

the accordion folds expandable from the first state into a second state with the at least one restrictor assembly in the another position wherein the peripheral wall is reconfigured to another predetermined state wherein the storage space will accept a second predetermined maximum volume of flowable material that is greater than the first predetermined volume of flowable material.

2. The combination according to claim **1** wherein the peripheral wall is reconfigurable to a first state wherein the storage space has a maximum volume and the at least one restrictor assembly is configured to cooperate with the container to prevent reconfiguration of the peripheral wall to its first state.

3. The combination according to claim **1** wherein the at least one restrictor assembly comprises a first strap that extends continuously around the container thereby to: a) positively and controllably limit reconfiguring of the peripheral wall as dictated by the length of the first strap; and b) reinforce the peripheral wall.

4. The combination according to claim **3** wherein the first strap has a flat shape with a width and the full width of the first strap is engagable with the container.

5. The combination according to claim **3** further comprising a second strap with a length that is fixedly connectable to the container at at least first and second discrete locations so that the first and second locations remain spaced from each other by no more than a first distance as determined by the length of the second strap.

6. The combination according to claim **5** in combination with a third strap with a length different than the length of the second strap that is fixedly connectable to the container at at least the first and second discrete locations so that the first and second discrete locations remain spaced from each other by no more than a second distance that is different than the first distance and as determined by the length of the third strap.

7. The combination according to claim **6** wherein at least one of the first and third straps is releasably fixedly connectable to the container.

8. The combination according to claim 1 wherein the peripheral wall of the container comprises molded plastic.

9. The combination according to claim 3 wherein the first strap has a first length that is fixed and not dependent upon the state of the container, whereby with the first strap extending continuously around the container the storage space has the first predetermined maximum volume, the at least one restrictor assembly comprises a second strap having a second length different than the first length that is fixed and not dependent upon the state of the container and extendable continuously around the outside of the container, with the first strap in the another position, and closely surrounding the container over substantially the entire second length of the second strap to thereby cause the storage space to have a second volume different than the first volume.

10. The combination according to claim 9 wherein the first and second straps are interchangeably usable, one in place of the other, and each fully separable from the container.

11. The combination according to claim 1 wherein the at least one restrictor assembly comprises an elongate strap and the container and a part of the elongate strap cooperate to maintain the elongate strap in a predetermined position with respect to the container.

12. The combination according to claim 1 wherein the at least one restrictor assembly comprises a strap and the container is undercut to receive at least a part of the strap.

13. The combination according to claim 1 wherein the container comprises spaced end walls and a plurality of accordion folds between the end walls which allow the spaced end walls to be moved selectively towards and away from each other to thereby vary the volume of the storage space.

14. The combination according to claim 1 wherein the peripheral wall has a vertical central axis and is reconfigurable between circular and non-circular elliptical shapes as viewed along the central axis.

15. The combination according to claim 1 wherein the peripheral wall has a vertical central axis and the peripheral wall is reconfigurable between different square/rectangular shapes as viewed along the central axis.

16. The combination according to claim 1 wherein there is a single piece on the container that fully bounds the storage space.

17. The combination according to claim 1 wherein the container has a fill opening and a vent opening each in communication with the storage space.

18. The combination according to claim 1 wherein the storage space has a volume in excess of one (1) gallon.

19. The combination according to claim 1 wherein the storage space has a volume in excess of ten (10) gallons.

20. The combination according to claim 1 in combination with a spout assembly through which flowable material in the storage space can be discharged.

* * * * *