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MULTI-CHAMBERED CONTAINER

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Fig.1

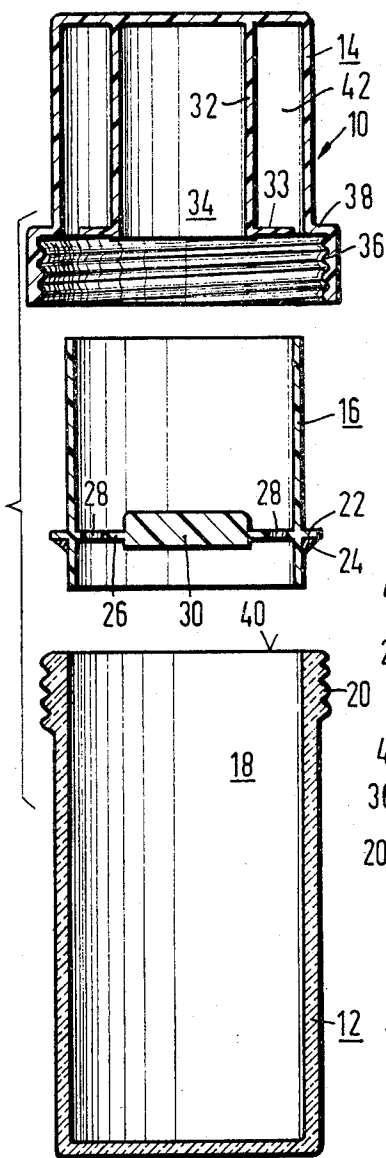
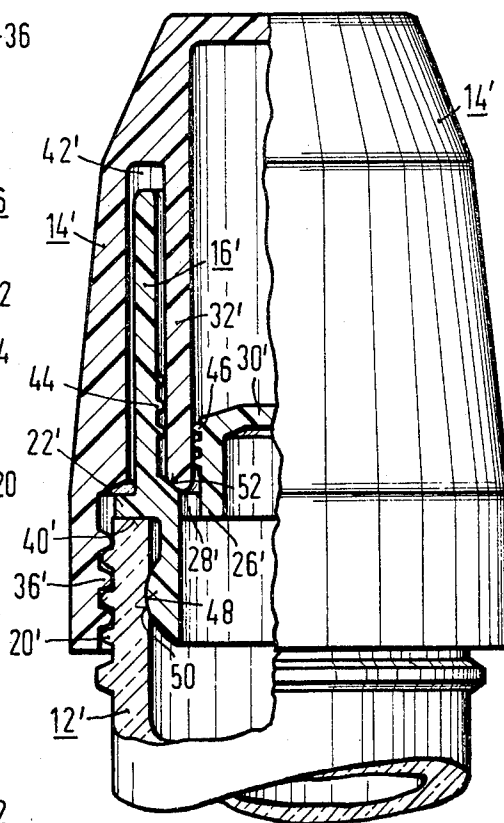


Fig.2



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MULTI-CHAMBERED CONTAINER**Max J. Bubbs, Chur, Switzerland, assignor to Designa G.m.b.H., Chur, Switzerland**

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10 Claims

ABSTRACT OF THE DISCLOSURE

Two cup-shaped vessels form a container when mating threads about their rims are engaged. An external flange on a coaxial tube is clamped between the rims when the threads are tightened. An internal transverse partition in the tube separates the vessels when passages in the partition are sealed by engagement with one of the vessels. The passages are opened when the vessels move threadably apart without opening of the container. Frictionally engaged parts of the vessels and the tube hold the tube less strongly to the one vessel than to the other vessel.

BACKGROUND OF THE INVENTION

This invention relates to multi-chambered containers which permit two or more substances to be stored separately and to be mixed in the container after a storage period.

The invention will be described hereinafter with particular reference to a container for storing a dosage unit of a vitamin concentrate together with a suitable amount of a liquid diluent which could cause loss of potency of the vitamin if combined with the concentrate much before ingestion, but other applications will readily suggest themselves.

The containers available heretofore for the same purpose are difficult to charge with the components of the ultimate mixture, and they usually cannot be refilled after one use.

The object of the invention is the provision of a readily refilled, multi-chambered container suitable for separate storage of materials which are not compatible over extended periods, and for mixing of these materials in the container.

SUMMARY OF THE INVENTION

With this object and others in view, as will hereinafter become apparent, this invention provides a container which may be open or closed, and which includes two vessels of which each defines a chamber having an opening. Cooperating releasable means on the vessels are engaged when the container is closed to form a conduit which connects the openings while permitting limited relative movement of the vessels. A separating device in the conduit separates two portions of the conduit which respectively communicate with the two chambers of the vessels and includes a partition member formed with an aperture therethrough which connects the conduit portions. A sealing device on a first one of the two vessels engages the separating member when the vessels are moved toward each other into a sealing position, seals the aperture in the partition, and seals the two conduit portions from each other. A first coupling device releasably couples the partition member to the first vessel with a coupling force sufficient to overcome the force of gravity on the partition member, and a second coupling device couples the partition member to the second vessel with a coupling force substantially greater than the force of the first coupling device so as to move the partition member away from engagement with the sealing

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device on the first vessel when the vessels move away from the afore-mentioned sealing position.

Other features, additional objects of the invention, and many of the attendant advantages thereof will be readily appreciated as the same becomes better understood by reference to the following detailed description of preferred embodiments when considered in connection with the appended drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 shows the elements of a container of the invention in elevational section in the open condition of the container; and

FIG. 2 shows another container of the invention in fragmentary elevation and partly in section while in the closed condition.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The container 10 shown in FIG. 1 consists of three elements: a cup-shaped, cylindrical glass vessel 12, a cup-shaped, cylindrical plastic vessel 14, and a plastic separator 16 having the general shape of a cylindrical tube. The two vessels will be referred to hereinafter as the cup 12 and the cover 14.

The rim portion of the cup 12 has external threads 20 about the opening of the smoothly cylindrical chamber 18 in the cup. The internal diameter of the rigid glass cup 12 is slightly smaller than the external diameter of the plastic tube 16 which is sufficiently resilient to be inserted in the cup 12 until an external, annular flange 22 on the tube 16 carrying a sealing ring 24, abuts against the radial rim face 40 of the cup, whereby the tube 16 may be quite firmly coupled to the cup 12.

A transverse partition 26 in the tube 16 in a common plane with the flange 22 has a circular row of axial passages 28 near its circumference while its central portion 30 is axially enlarged to form a plug.

The cover 14 has a cylindrical, inner wall 32 coaxial with the axial outer wall of the cup. The wall 32 divides the cavity of the cup 14 into a central chamber 34 and an annular peripheral space 42. A flat, radial flange 33 on the free rim of the wall 32 about the opening of the chamber 34 partly obstructs the orifice of the space 42. The radially enlarged rim portion of the cover 14 which axially projects beyond the wall 32 has internal threads 36 mating the threads 20 on the cup 12 so that the rim portions form a connecting conduit between the chambers 18, 34 when the threads 20, 36 are engaged. A shoulder 38 connects the rim portion with the remainder of the cover 14 in the plane of the flange 33.

The afore-described container is used as follows:

The cup 12 and the cover 14 are placed on a suitable support so that their open ends face upward, and the materials which are to be stored are poured or dropped into the chambers 18, 34. The common radial plane of the partition 26 and of the flange 22 divides the tube 16 into two axial sections of unequal length. The longer section is introduced in a downward direction into the annular space 42 through the gap between the wall 32 and the shoulder 38 until the plug 30 is sealingly received in the opening of the chamber 34, the flange 33 abuts against the peripheral portion of the partition 26, thereby closing the passages 28, and the flange 22 abuts against the shoulder 38.

The separator 16 is held in position on the cover 14 by the frictional coupling engagement between opposite axial faces of the plug 30 and of the wall 32 with a force sufficient to permit the cover 14 and separator 16 to be inverted without releasing the separator

from the cover under its own weight and the weight of the material in the chamber 34.

When the inverted assembly consisting of the cover 14 and the separator 16 is coaxially aligned with the upwardly open, partly filled cup 12, the threads 20, 36 may be engaged while the shorter axial section of the tube 16 enters the chamber 18 in frictional engagement with the chamber walls. The threads 20, 36 are tightened until the flange 22 and the sealing ring 24 are clamped between the shoulder 38 of the cover 14 and the rim face 40 of the cup 12. The two chambers 18, 34 are securely sealed thereby from each other, from the ambient atmosphere, and also from the annular space 42, and the container 10 may thereafter be stored in any desired position.

When the contents of the chambers 18, 34 are to be mixed, the threads 20, 36 are loosened a few turns, thereby still sealing the contents of the container 10 from the atmosphere while the vessels 12, 14 move axially apart. The frictional coupling of the tube 16 to the cup 12 is stronger than that of the plug 30 to the wall 32 in the cover 14. As the cup 12 and the cover 14 move axially apart, the separator 16 moves with the cup 12 relative to the cover 14. The flange 33 unseals the passage 28 in the partition 26, and the plug 30 is sufficiently withdrawn from the chamber 34 to permit liquid to flow along the plug 30 and the partition 26 to the passages 28 and into the chamber 18. The two materials are mixed by shaking the container which is thereafter briefly held in an upright position to drain its contents into the cup, an operation which is readily observed through the transparent glass walls of the cup. The cover 14 may then be unscrewed completely and the separator 16 withdrawn manually before the contents of the cup 12 are ingested by the user.

FIG. 2 shows a closely similar container of the invention in a fragmentary view, a portion of the glass cup 12' omitted from the showing of FIG. 2 being identical with the corresponding portion of the cup 12. A cup-shaped plastic cover 14' which tapers from its rim toward its bottom is mounted on the cup 12' by engaged threads 20', 36'. In the illustrated closed position of the container, the chambers in the cup 12' and the cover 14' are sealed from each other and from the atmosphere by a separator which includes a plastic tube 16' of generally circular cross section.

The separator has an integral external flange 22' and an internal partition 26' partly extending in the radial plane of the flange 22' and integral with the tube 16'. The central portion 30' of the partition 26' is domed to form a hollow plug received in the opening of the chamber in the cover 14'.

The peripheral portion of the partition 26' has axial passages 28' which, in the illustrated condition of the device, are sealed from the chamber in the cup 14' by integral, annular sealing ribs 46 on the outer axial face of the plug 30' in frictional engagement with an opposite face on an inner cylindrical wall 32' radially bounding the chamber in the cover 14' and dividing the chamber from an annular space 42'. The passages 28' are sealed from the space 42' by annular ribs 44 on an inner face of the tube 16' which frictionally engage an opposite axial face of the wall 32'. The free rim of the wall 32' urges the partition 26' toward the cup 12', and thereby holds the flange 22' in sealing engagement with the radial rim face 40' of the cup 12'.

The shorter section of the somewhat resilient plastic tube 16' which extends into the cup 12' has an annular, outwardly projecting integral rib 48 of rounded configuration which is partly received in a conforming groove 50 in the glass wall of the cup 12' when the container chambers are sealed from each other by the separator.

The embodiment of the invention shown in FIG. 2 is operated in a manner so closely analogous to the mode of operation of the afore-described container 10 as not

to require separate description. In the illustrated operative position of the separator, the ribs 44, 46 frictionally and sealingly engage the wall 32' with a force sufficient to permit the charged cover 14' to be inverted without leakage of its contents, but release the wall 32' when the rib 48 engages the groove 50 while the cover 14' is threadedly moved away from the illustrated position, thereby connecting the chambers in the cup 12' and the cover 14' through the released passages 28'.

The materials of construction shown in the drawing and described hereinabove have been found useful in many applications for which containers of the invention are suitable, but the invention is not limited to the described rigid glass and resilient plastic. It is not necessary that any one of the three principal elements of the container be of resilient material, and rigid materials of any kind may be employed together with suitable friction couplings and seals. Other modifications may readily be resorted to by those skilled in the art to make the illustrated containers more suitable for the mixing of a solid material with a liquid, or for the mixing of more than two materials stored in as many separate chambers.

What is claimed is:

1. A container adapted to be open or closed comprising:

- (a) a first vessel;
- (b) a second vessel, each vessel defining a chamber having an opening;

(c) cooperating releasable means on said vessels engaged when said container is closed to form a conduit connecting said openings while permitting relative movement of said vessels toward and away from a sealing position;

(d) separating means for substantially separating two portions of said conduit respectively communicating with said chambers,

- (1) said separating means including a partition member formed with an aperture therethrough for connecting said portions;

(e) sealing means on said first vessel engaging said separating means in said sealing position of said vessels for sealing said aperture and for sealing said two portions from each other;

(f) first coupling means releasably coupling said separating means to said first vessel with a coupling force sufficient to overcome the force of gravity on said partition member; and

(g) second coupling means coupling said separating means to said second vessel with a coupling force substantially greater than the coupling force of said first coupling means so as to move said partition member away from engagement with said sealing means when said vessels move away from said sealing position thereof.

2. A container as set forth in claim 1, wherein said separating means further include a tubular member having an axis, respective axial portions of said tubular member extending from said partition member inward of said vessels respectively.

3. A container as set forth in claim 2, wherein said first vessel has a bottom and an annular wall extending from said bottom toward said second vessel, an annular flange on a terminal portion of said wall adjacent said second vessel constituting said sealing means.

4. A container as set forth in claim 3, wherein the chamber in said first vessel is bounded by said bottom, said wall and said partition member in said position of said sealing means.

5. A container as set forth in claim 4, said wall being partly received in said tubular member in said sealing position of said vessels, said first coupling means including resilient friction means interposed between said tubular member and said wall.

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6. A container as set forth in claim 4, said wall having an annular rim defining the opening of the chamber in said first vessel, a portion of said partition member being conformingly received in said rim in said position of the vessels.

7. A container as set forth in claim 6, wherein said vessels move in a direction toward and away from each other during said relative movement, said rim and said partition member having respective opposite faces extending in said direction, and an annular sealing ring of resilient material on one of said faces engaging the other face.

8. A container as set forth in claim 1, wherein each of said coupling means includes cooperating frictionally engaged elements on said vessels respectively and on said separating means.

9. A container as set forth in claim 1, wherein said second vessel and said separating means have respective opposite faces extending in the direction of said relative movement, said second coupling means including a projection on one of said faces, the other face being formed with a recess receiving said projection in the closed condition of said container.

10. A container as set forth in claim 1, wherein said

vessels are cup-shaped and have respective annular rim portions about the corresponding openings, said cooperating releasable means including mating threads on said rim portions, said threads being engaged when said container is closed, said separating means including a tubular separating member having an axis substantially parallel to the common axis of the engaged threads, respective axial portions of said tubular member extending into said vessels, an external annular flange on said tubular member interposed between said rim portions for simultaneous clamping engagement with said rim portions, said partition member extending in said tubular separating member transversely of said axis.

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