United States Patent [19]

Spencer

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[45] **Oct. 28, 1975**

[54] **CONTAINER FOR MIXING LIQUID WITH A MATERIAL**

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[21] Appl. No.: **436,169**

[52] **U.S. Cl.** ..... **206/217;** 220/90.2; 229/7 R

[51] **Int. Cl.²** **B65D 81/32**

[58] **Field of Search** ..... 206/219, 217, .5; 229/7 R, 229/43; 220/23, 90.6, 90.4, 90.2; 426/86; 222/541

[56] **References Cited**

UNITED STATES PATENTS

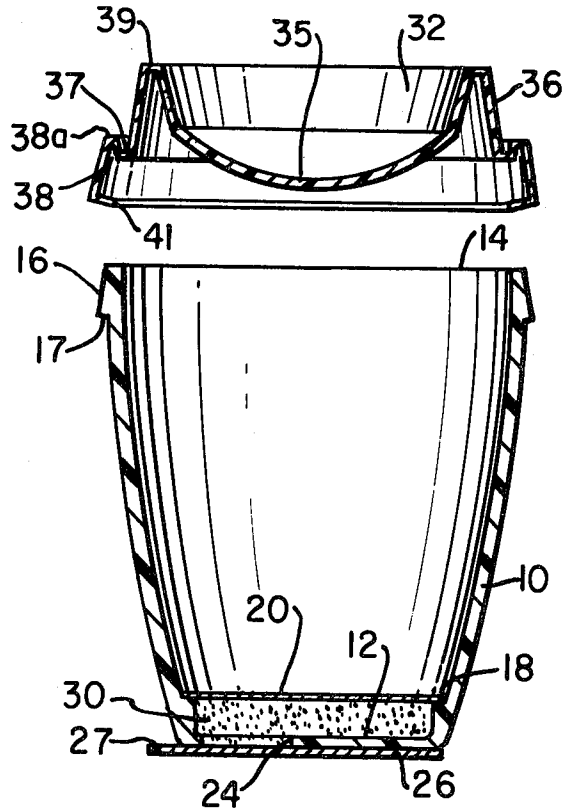
712,095	10/1902	Reed	220/1 E
1,885,757	11/1932	Orlopp	206/217
2,062,897	12/1936	Michel et al.	426/86
2,165,860	7/1939	Killmeyer	222/541
2,201,332	5/1940	Bensel	229/43
2,967,776	1/1961	Utler	206/.5
3,100,592	8/1963	Orr	222/541
3,157,312	11/1964	Kitterman	222/541
3,186,850	1/1965	Anthony	206/217
3,326,363	6/1967	Bennett et al.	220/23
3,655,111	4/1972	Surerus	229/7 R

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Attorney, Agent, or Firm—Darby & Darby

[57] **ABSTRACT**

A container having material in solid form into which a liquid is to be added to dissolve the material and produce a liquid preparation such as a beverage. The container has an opening in its bottom which is sealed and the solid material is located in the bottom of the container sealed off to the atmosphere by a member of dissolvable material. A liquid is poured into the open top of the container to dissolve both the member and the material. The top is then covered and the container is inverted. The seal is removed from the opening in the bottom wall and the mixed contents of the container withdrawn through this opening.

21 Claims, 11 Drawing Figures



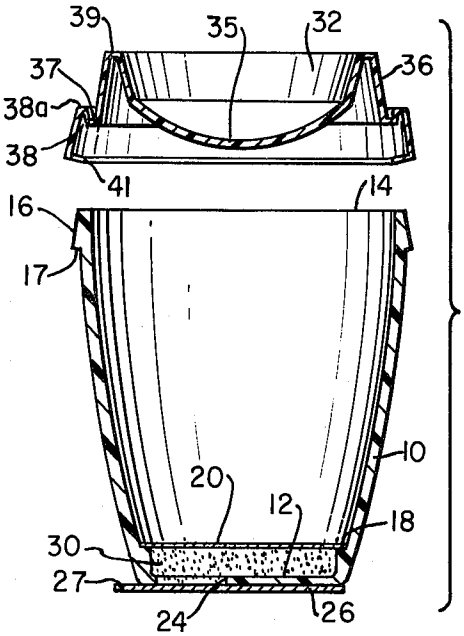


FIG. 1

FIG. 2

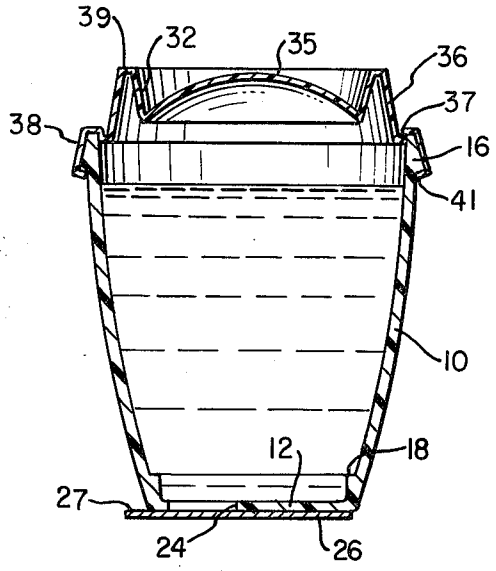


FIG. 3

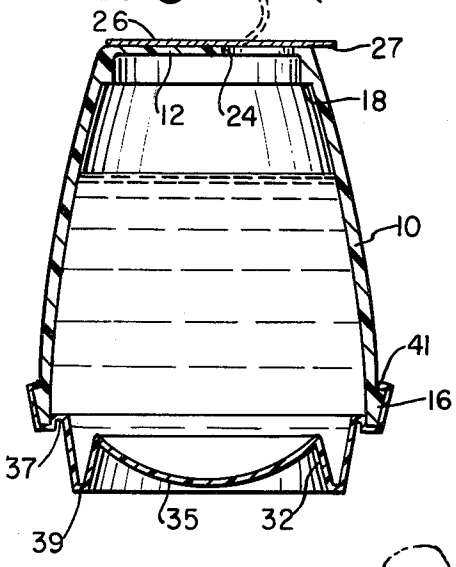


FIG. 4

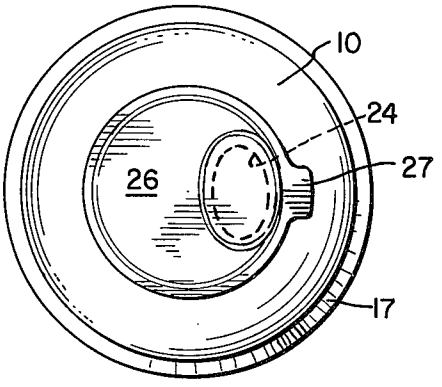


FIG. 5

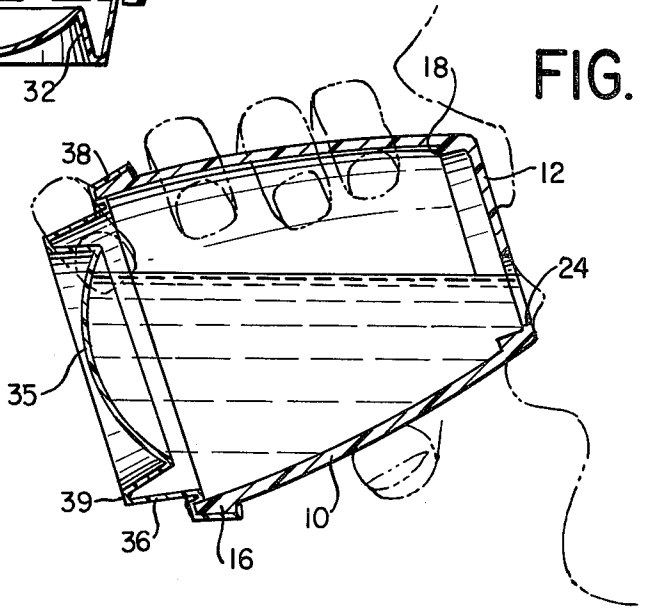


FIG. 6

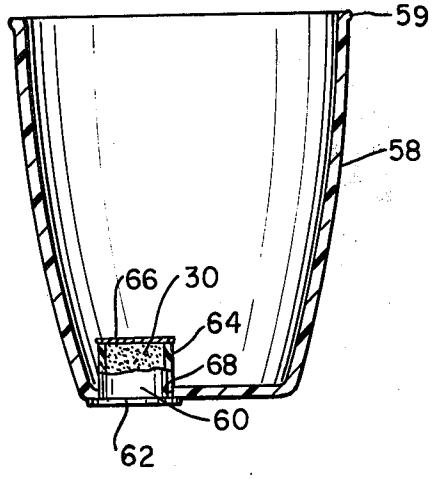


FIG. 7

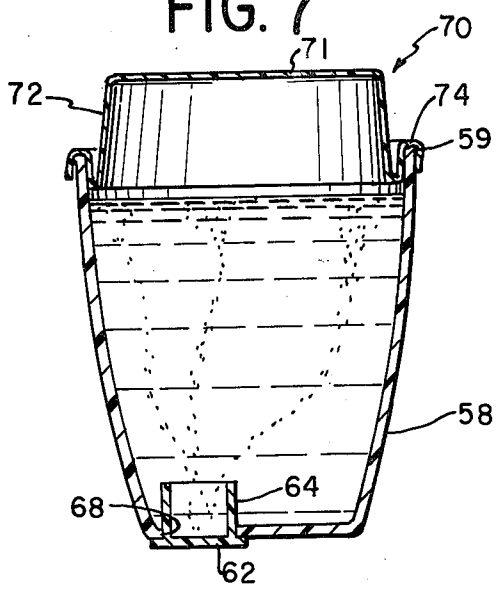


FIG. 8

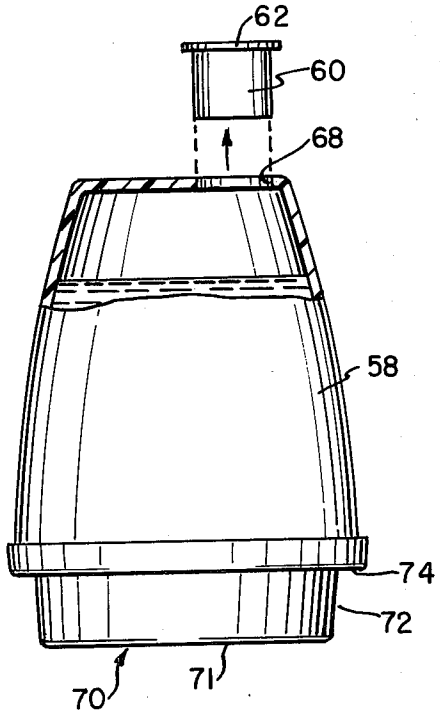


FIG. 9

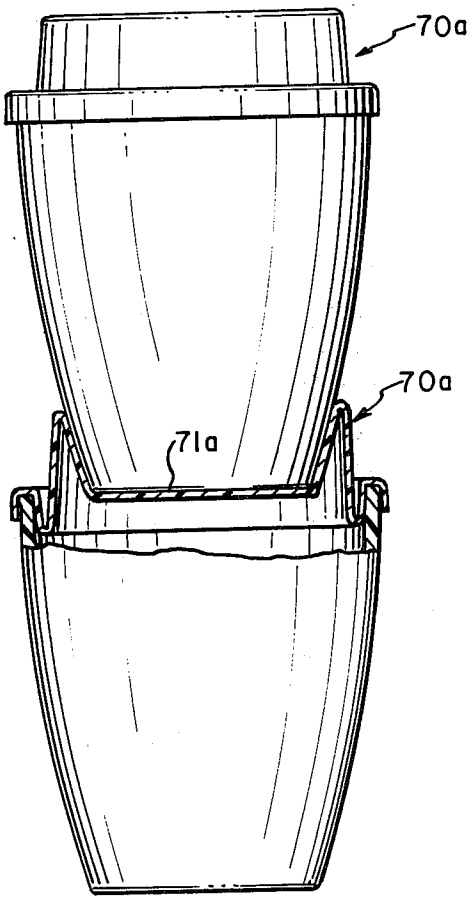


FIG. 10

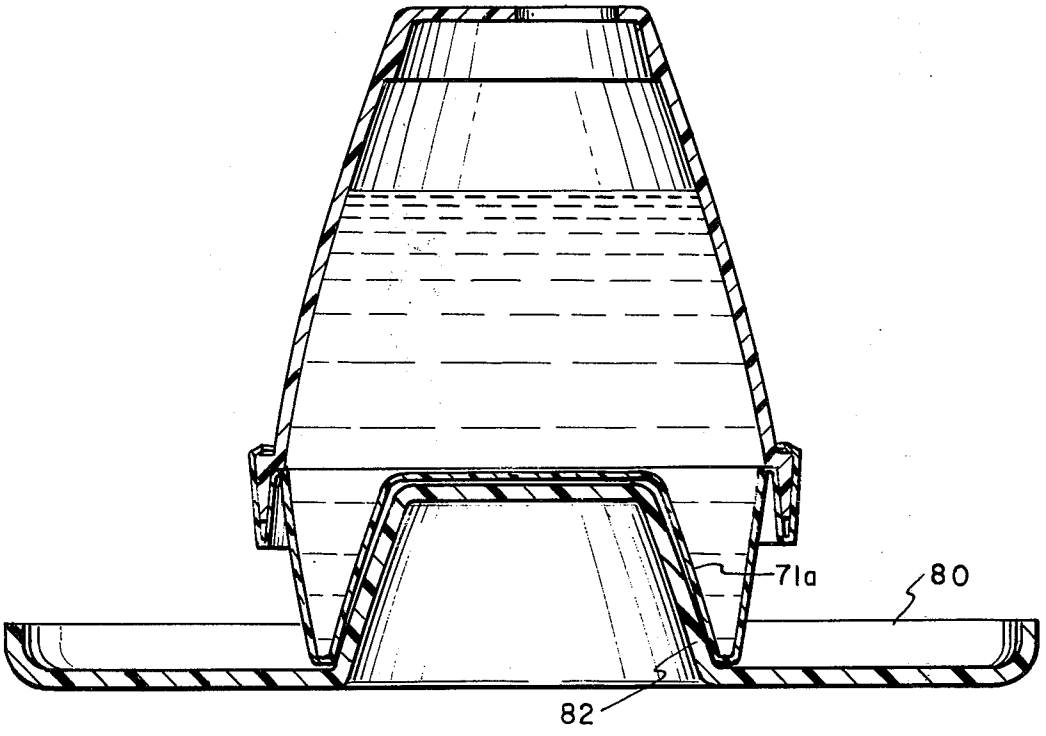
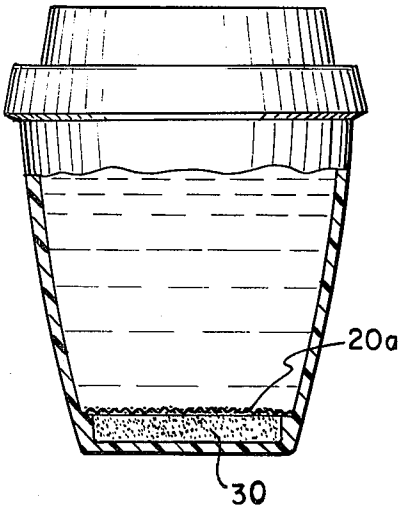


FIG. 1A



CONTAINER FOR MIXING LIQUID WITH A MATERIAL

This invention relates to containers and more particularly to containers of the type holding material in solid form into which fluid is added to form a liquid preparation. Such containers are useful for making beverages, such as coffee, tea and soup, and also for mixing pharmaceutical products.

Containers of this general type are known in the art in which a material in a solid form to be mixed with a liquid is located in the bottom of the container and then sealed with a cover. For example, U.S. Pat. Nos. **3,407,922** to Palmer and **1,709,168** to Eppenson, describe containers in which the cover is of cardboard or paper and it is removed by pulling on a tab which is accessible from the open top of the container. In the containers of these patents, and other similar prior art, after the cover for the material is removed and the liquid is added, it is usually necessary to stir the contents of the container to dissolve the solid material. The mixed preparation is then extracted through the container's open top. Usually, the open top is of relatively wide diameter making it comparitively easy for the mixed preparation to spill out where the container is used in moving vehicles, such as aircraft, cars, trains and buses. Further, the prior art containers generally have a bottom of smaller diameter than the top. This also makes the container susceptible to tipping over when used in moving vehicles.

The present invention relates to a novel and improved container of the type holding solid material which is to be dissolved upon the addition of a liquid and which does not require the removal of a paper or cardboard type seal to expose the material to be dissolved. Further, an arrangement is provided wherein the mixed contents are taken out of the bottom of the container instead of the top.

In accordance with the invention, the material is located in the bottom portion of the container and held by a member. An opening is formed in the bottom of the container and this opening is closed off by a seal which can be taken off. A lid is also provided and, in use, liquid is poured into the container through its open top which is then sealed by the lid. The liquid in the container dissolves the material and the container is inverted. After the container is inverted, the seal on the bottom wall is removed to expose the opening and the mixed contents are extracted through the opening. The container can now be rested on the lid which can be constructed to provide a firm base. Since the opening at the bottom of the container is preferably made small, the container contents are prevented from spilling out if the container is moved.

It is therefore an object of the present invention to provide a novel container holding material which is to be mixed with a liquid with the contents of the container being extracted through an opening in the bottom of the container after the top has been covered with a lid.

Another object is to provide a container holding material to be mixed with a liquid in which the mixing can take place without the use of a mixing implement.

A further object is to provide a container in which the material to be mixed is held adjacent the container bottom wall by a soluble sealing membrane.

Yet another object is to provide a container having an opening in its bottom wall which is sealed, the container being provided with a lid which permits it to be inverted and the contents extracted through the opening in the bottom wall after the seal has been removed.

A further object is to provide a container which can be rested in an inverted position on its lid and the contents extracted through an opening in the bottom wall.

Other objects and advantages of the present invention will become more apparent upon reference to the following specification and annexed drawings, in which:

FIG. **1** is an exploded view, in cross-section, of the container and lid according to a preferred embodiment of the invention;

FIG. **1A** is a view of another type of member for holding the dissolvable material;

FIG. **2** is an elevational view in cross-section showing the lid assembled to the container;

FIG. **3** is an elevational view in cross-section showing the container inverted;

FIG. **4** is a bottom view of the container showing the seal;

FIG. **5** shows the container in drinking position;

FIG. **6** is a cross-sectional view showing a further embodiment of a container according to the invention;

FIG. **7** is an elevational view in cross-section showing the container of FIG. **6** with its lid assembled;

FIG. **8** shows the container of FIG. **6** in the inverted position and the bottom wall seal member removed;

FIG. **9** is a view showing the stacking of several containers; and

FIG. **10** is an elevational view, partly in cross-section showing the container stacked on a serving plate.

Referring to FIGS. **1** through **5**, the container **10** of the preferred embodiment of the invention is generally barrel-shaped having an upper end **14** which tapers down to a narrow bottom portion terminating in a bottom wall **12**. The container's upper end **14** is preferably of greater diameter than the bottom wall **12**.

A locking rib **16** is formed around the upper end **14**. The locking rib tapers from a minimum to a maximum thickness going toward the bottom of the container. If desired, the bottom wall **17** of locking rib **16** can be undercut to provide a more secure lock for a lid.

A step **18** is formed around the interior of the container wall at a point above bottom wall **12**. Step **18** serves two functions. First, it provides a stacking lug, or platform, so that a number of containers **10** can be stacked, or nested, one above the other. The stacking arrangement is conventional. Second, the step **18** provides an area for peripheral sealing of a disc **20**. This is described in detail below.

The container **10** can be made of any suitable material, for example, plastic which is either injection-molded, blow-molded, or thermoformed. Any conventional type of solid, foamed or cellular plastic material can be used.

An opening **24** is formed in the container bottom wall **12**. This can be done during or after the molding of the container. As seen in FIG. **4**, the opening **24** is generally oval, or elliptical, in shape and is spaced inwardly from the peripheral edge of the bottom wall. The opening **24** is covered by a seal **26** which can be made of any suitable material, such as, for example paper, metal foil, plastic, etc. The seal **26** is attached to the bottom wall by any suitable adhesive, preferably one which is approved for use with foods. A tab **27** extends from the

seal. The tab **27** preferably clears the outer edge of bottom wall **12** as shown in FIGS. **1** and **2.**

The material **30** which is to be dissolved is located in the bottom of the container and sealed therein by the disc **20.** The dissolvable material **30** can be of any suitable type, for example, instant tea, instant coffee, boullion, soup, sugar, cream, etc., or any combination thereof. Also, pharmaceutical products can be used. The various material can be in their normal forms or they can be micro-encapsulated as is known in the art. The material **30** can be in loose or cake form.

The sealing disc **20** is preferably made of a food material which will dissolve when a liquid is placed in the container. A suitable material is, for example, a starch base material sold under the name EDIFLEX which is manufactured by the American Maize-Products Company, of New York, New York **10017.** This material is a soluble, edible and digestible film made from high amylose corn starch. Other suitable materials can be used. This material is shaped, such as by cutting it into a disc, and is sealed to the step **18** by a combination of liquid, pressure and heat. That is, the periphery of the disc, or the step **18,** is moistened. The disc is placed on the step and heat and pressure is applied. The peripheral portion of the disc to which the heat is applied fuses to the step **18.** This can be done by automatic packaging machinery. As an alternative to the type of sealing discussed above, where the soluble material forming the disc **20** has sufficient strength to give adequate rigidity, the disc can be friction fitted within the container.

A lid **34** for the container is of a complementary shape to the container top **14.** The lid has a central bellows portion **35** in its top wall which extends downwardly in a generally concave shape from a peripheral ring **39.** A skirt wall **36** extends downwardly from the outer edge of ring **39** and has a reverse bent leg **37** from which extends a locking rim **38.** As seen in FIG. **5,** the height of the skirt wall **36** is made large enough to accommodate one finger of the holder when the cup is in use. The locking rim **38** terminates in an inwardly extending lip **41.** The lid is preferably made of plastic by any suitable process such as molding or thermoforming.

When the lid **34** is placed over the open top end **14** of the container, the sealing rim **38** snaps over the rib **16** on the container and the lip **41** locks under the rib bottom wall **17** to form a first sealing area on the outside of the container. The sealing rim **38** also has an upper channel member **38***a* which includes a part of the reverse bent leg **37.** As seen in FIG. **2,** the upper wall of the channel **38***a* engages the top edge of the container while the channel side walls engage the inner and outer walls of the container at its top and holds the container material under compression in a pinching manner. When fully fastened to the container, the lid sealing rim **38** conforms to the shape of the container rib **16** and there are no projections extending outwardly from the lid. This forms a fluid tight seal for liquid in the container.

The bottom of the concave bellows **35** terminates below the channel **38***a* of the lid locking rim **38** so that the bellow's bottom would normally extend below the top edge of the container into its interior.

In use, as shown in FIG. **2,** the lid bellows **35** expands outwardly to a convex shape when the lid is fastened to the container due to the air captured in the container between the top surface of the liquid and the lower surface of the bellows. In its expanded state the bellows **35** terminates below the ring **39** on the top of the lid so that the inverted container can be rested on the ring **39.** The bellows **35** also gives a visible signal that the lid has been properly placed on the container. That is, if the bellows does not change its shape from concave to convex, the user will know that the lid is not fully fastened down.

FIGS. **2, 3** and **5** depict the use of the container. Liquid is poured in through the open top **14** and it dissolves the sealing disc **20** and also infuses with the material **30.** The lid **34** is then applied, as shown in FIG. **2,** and the bellows changes to a convex shape. The container is now sealed both on the top and bottom. Therefore, mixing of the container contents can take place by shaking the container or, by inverting it one or more times. When it is desired to remove the liquid into which the material **30** is now infused, the container is eather held in the inverted position or set down on the ring **39** of the lid. The user pulls on the tab **27** of the seal **26** to either take it off entirely or to peel it back sufficiently to expose all or a portion of the opening **24.** The seal **26** provides a sanitary advantage in that the opening **24** is always covered until the seal is removed.

The user extracts the contents of the container, as shown in FIG. **5,** by drinking through the opening **24.** The spacing of the opening **24** with respect to the container side wall is made such that the mouth and nose of the user can be accommodated when the container is held in a drinking position.

The contents of the container also can be extracted by a straw. If desired, a part of the seal **26** can be weakened so that a straw can be inserted through it without taking off the entire seal. This further aids in keeping contaminants out of the liquid and, also, retards spilling. As Shown in FIG. **5,** the tapered container side wall permits the nose of the user to clear the bottom wall.

When the container is in use and the seal **26** has been peeled off, the container, with the contents therein, can be rested on the rim **39** of the lid to provide a stable surface for the container and its contents. Only the relatively small opening **24** is now present so that even if the container is jostled in a manner such that the liquid will slosh around, it will be very difficult for any of the contents to come out through the opening **24.** In addition to its self-mixing feature for the material **30,** the mechanical arrangement described above makes the container particularly useful in applications where there is movement, for example, trains, aircraft, cars and buses.

The material **30** can be packed and contained in the same manner as previously described but using a perforated shield, which stays rigidly fixed in place of the soluble disc **20.** The shield **20***a*, as shown in FIG. **1A** is of foraminous material and is flat, at least semi-rigid in form. It is made of metal, plastic or woven wire, all with non-toxic properties wherein the holes in the member are of lesser size than the granular or crystaline materials **30** that are restrained by it.

The liquid to be mixed with the dissolvable material **30** passes freely through the perforated disc thereby causing the crystaline or granular dissolvable material to change its substance and flow freely back into the main body of the container. The shield can be pressed flat or otherwise adhered to the container.

The perforations or weave of the shield **20***a* are such as to permit the mixed fluid to pass freely through it at a rate greater than the speed of consumption by the drinker.

FIGS. **6–8** show a further embodiment of the invention. Here, instead of packing the material to be mixed directly in contact with the bottom wall of a container **58**, a thimble type device **60** is used. The thimble **60** is made of a non-toxic material acceptable for food use. The thimble has a flanged wall **62** at the bottom of a generally cylindrical wall **64** within which the material **30** is located. The top of the cylinder **64** is sealed off by a disc **66** which can be of the same material as the disc **20** previously described. It is also possible for the entire thimble to be made of the same material. The cylinder **64** extends in through the opening **68** in the container bottom wall **12.** The opening **68** conforms to the shape of wall **64.** Adhesive is preferably located on the flanged portion of bottom wall **62** to secure the thimble to the bottom wall.

In the embodiment of FIGS. **6–8** a step, such as **18** of FIG. **1,** is not provided on the inner wall of container **58.** Stacking of the containers is accomplished merely by nesting the containers one within the other. A bead **59** is formed around the upper end of the container's side wall to hold a lid.

A lid **70** is provided which has a flat top wall **71** from which depends a skirt wall **72.** A reverse bent sealing lip **74** terminates the skirt wall. Lip **74** is designed to snap over the sealing bead **59.**

The use of the container **58** is depicted in FIGS. **7** and **8.** Liquid is poured into the open top of the container dissolving the seal **66** so that the material **30** is mixed with the liquid. A shield of the type **20***a* discussed previously, also can be used. The lid **70** is fastened over the open top of the container which then can be shaken or inverted several times to completely mix the fluid and the material. After the mixing has taken place, the thimble **60** is pulled out of the opening **68** so that the contents may be extracted therethrough. As before, the top wall **71** of lid **72** provides a stable surface for standing the container while it is inverted.

FIG. **9** shows another form of lid **70***a* for the container having a depressed center section **71***a*. The depressed section **71***a* corresponds to the shape of the bottom of the container so that containers can be stacked one on top of the other. As the angle of the bottom of the container is increassed, that is, the container is made shorter, it will fit further into the lid. The lid is shaped accordingly. This permits more containers to be stacked in a smaller space. The containers can be stacked after filling but before drinking.

The container of FIGS. **6–8** has the same advantages as that of FIGS. **1–5.** Both containers are relatively strong, are easy to hold due to their shape and provide rapid preparation of any beverage or other preparation using pre-measured quantities of material. Supplements can be added to any of the beverages produced, i.e., additional sugar, cream, etc. The containers are compatible for use with vending machines and reduce the cost of mechanisms for these machines since the beverage materials are already in the container. The containers are advantageously used in applications where there is movement or in other situations such as in hospitals where the relatively small opening at the bottom of the container reduces the possibility of spillage. The opening at the bottom of the container also effectively strains ice and slush and prevents it from entering the mouth where a cold beverage is mixed.

FIG. **10** shows the container of the subject invention used in combination with a serving member, such as a plate or tray, **80,** which can be of any size or shape. The serving member **80** is preferably made of plastic material by any suitable process, for example, molding or thermoforming, and includes a projection **82** of complementary shape to the depression in the lid. The projection **82** is illustratively shown of a shape complementary to the lid depression **71***a* of the container of FIG. **9.** It should be understood, of course, that the projection can be made complementary to the shape of the lid of FIGS. **1–4.** The projection **82** need not extend all of the way up into the lid depression. Also, it can be segmented or itself have a depressed central portion.

After the contents of the container have been mixed, the container is placed on the projection **82** as shown in FIG. **10** and it interlocks with the projection. The serving member **80** can hold any suitable articles such as food. The interlocking of the lid to the projection provides a very high degree of stability to the container since its base is now effectively the entire serving member. The container can be readily removed from and replaced onto the projection on the serving member.

What is claimed is:

1. In combination a container having a generally circular bottom wall and a side wall tapering upwardly from said bottom wall, the upper edge of said side wall defining a normally open generally circular top for the container and having a larger diameter than the bottom wall, a lid for engaging said side wall and sealing said open top of the container, an opening formed in said bottom wall through which the contents of the inverted container can be extracted, and separate seal means attached to said bottom wall for covering said opening in said bottom wall and removable from said wall to uncover said opening.

2. The combination of claim **1** wherein said lid has a central bellows portion which is generally concave, the lower end of said concave bellows extending below the upper edge of the container side wall when the lid is sealed to the container to trap air between the interior of the container and the bellows causing the bellows to assume a convex shape.

3. The combination of claim **2** further comprising a locking rib formed on the outer wall of the container upper edge and tapering from a minimum to a maximum thickness from the top edge toward the container bottom wall and terminating on a wall at the lower end of said rib which is generally transverse to said container side wall, and a locking rim formed on the periphery of said lid of a shape complementary to said container locking rib and having an inwardly extending lip which extends under the wall of said locking rib.

4. The combination of claim **3** wherein said locking rim of said lid further comprises a channel having inner and outer walls defining a space therebetween, said inner and outer walls of said channel respectively engaging the inner and outer faces of the upper edge of the container side wall.

5. The combination of claim **1** wherein the opening in the bottom wall is of generally oval shape.

6. The combination of claim **1** where said lid includes means on the top wall thereof to rest the container on a surface in an inverted position.

7. The combination of claim 1 wherein the lid is formed with a depressed central top section adapted to accommodate and hold the bottom of another container for stacking.

8. The combination of claim 1 wherein the lid is formed with a depressed area in its top and further comprising a member separate from said lid and said container and having a projection extending therefrom over which the lid fits.

9. The combination of claim 1 further comprising a foraminous member for holding a quantity of liquid dissolvable material within the container.

10. The combination of claim 9 wherein the openings of the foraminous member are generally smaller than the size of the particles of the dissolvable material.

11. The combination of claim 1 further comprising a quantity of material within said container which is to be dissolved upon the addition of liquid into the container through said open top, and means which are dissolvable by said liquid for sealing the cross-sectional area within which said dissolvable material is located.

12. The combination of claim 11 wherein said sealing means extends across the cross-section of the interior of the container.

13. The combination of claim 12 further comprising a step on the interior of the side wall of the container, the sealing means being sealed to said step.

14. The combination of claim 11 further comprising a housing separate from said container within which the material is located, said housing having an open top and said sealing means sealing said open top, said housing fitting within the opening of the container bottom wall.

15. In combination a container having a bottom wall and a side wall extending upwardly from said bottom wall having an upper edge forming a normally open top for the container through which liquid can be placed into the container, a quantity of a liquid dissolvable material within said container, a lid for covering the open top of the container to permit the material to be dissolved by the liquid and mixed when the container is inverted, an opening formed in the container bottom wall through which the liquid and dissolved material can be extracted, and removable means for sealing said bottom wall opening.

16. The combination of claim 15 further comprising liquid dissolvable means in said container for holding the dissolvable material.

17. The combination of claim 16 wherein said dissolvable means for holding the material covers a complete cross-section of the interior of the container.

18. The combination of claim 17 further comprising a step on the interior of the container side wall, said dissolvable means being sealed to said step.

19. The combination of claim 15 further comprising means on said sealing means for holding said dissolvable material.

20. The combination of claim 19 wherein said means for holding the material comprises a housing which extends through the opening in the bottom wall of the container and can be withdrawing therefrom, said housing having an open top section when within said container, and a dissolvable member sealing said open top section.

21. The combination of claim 20 wherein said housing includes means for sealing the opening in the bottom wall.

* * * * *