(12) UK Patent Application (19) GB (11) 2 152 469 A

(43) Application published 7 Aug 1985

(21) Application No 8432670

(22) Date of filing 27 Dec 1984

(30) Priority data

(31) 8400025 (32) 3 Jan 1984 (33) GB

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(51) INT CL[4]
B65D 21/02 17/50 // A47G 19/23 B67C 3/26

(52) Domestic classification
B8D 11 15 1C 1F1 7M 7PY SX3
A4A 1B2 1B4A 1C1 2B 6D
B8T EFM
U1S 1080 1110 1306 1308 1310 1343 A4A B8D B8T

(56) Documents cited
None

(58) Field of search
B8D
A4A

(54) Stackable container with dilutable product

(57) Filled containers 18 which are nestable in stacks each have a ledge 26 to which a diaphragm 12 is peelably secured to confine a product 27 beneath it, and an upper nested container is supported by a denesting ledge of the container beneath so that it does not compress the lower container's diaphragm in its region of securement. The denesting ledge 28 may be provided above the ledge 26 to support the upper container so that it is spaced from the lower diaphragm. Alternatively the upper container may rest on the lower diaphragm but not in its region of securement, and be supported through the diaphragm by ledges beneath it (formations 82: Fig. 8).

A stack of containers may be packed in a carton (Fig. 7), with at each end corrugated board and foam sheeting between the stack and the carton.

Containers may be filled by means of a head (Fig. 4) insertable into a container to rest on the diaphragm ledge. The ledge 26 may be sloped (Figures 3a, 3b, 3c) so that any liquid spilled thereon will tend to run off the part of the ledge to which the diaphragm is sealed, and the filling head may have suction ports for removing liquid from the ledge.

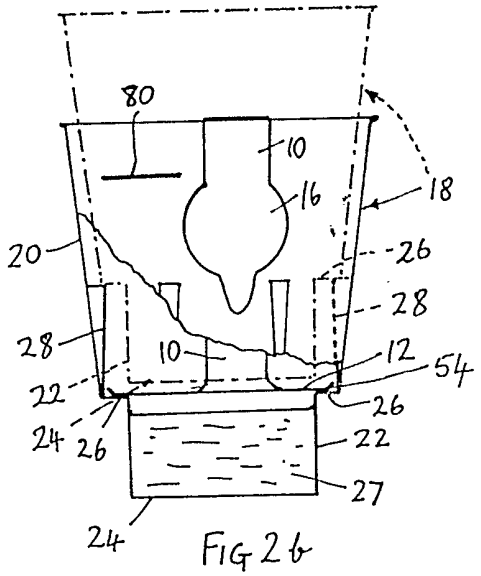

FIG 2b

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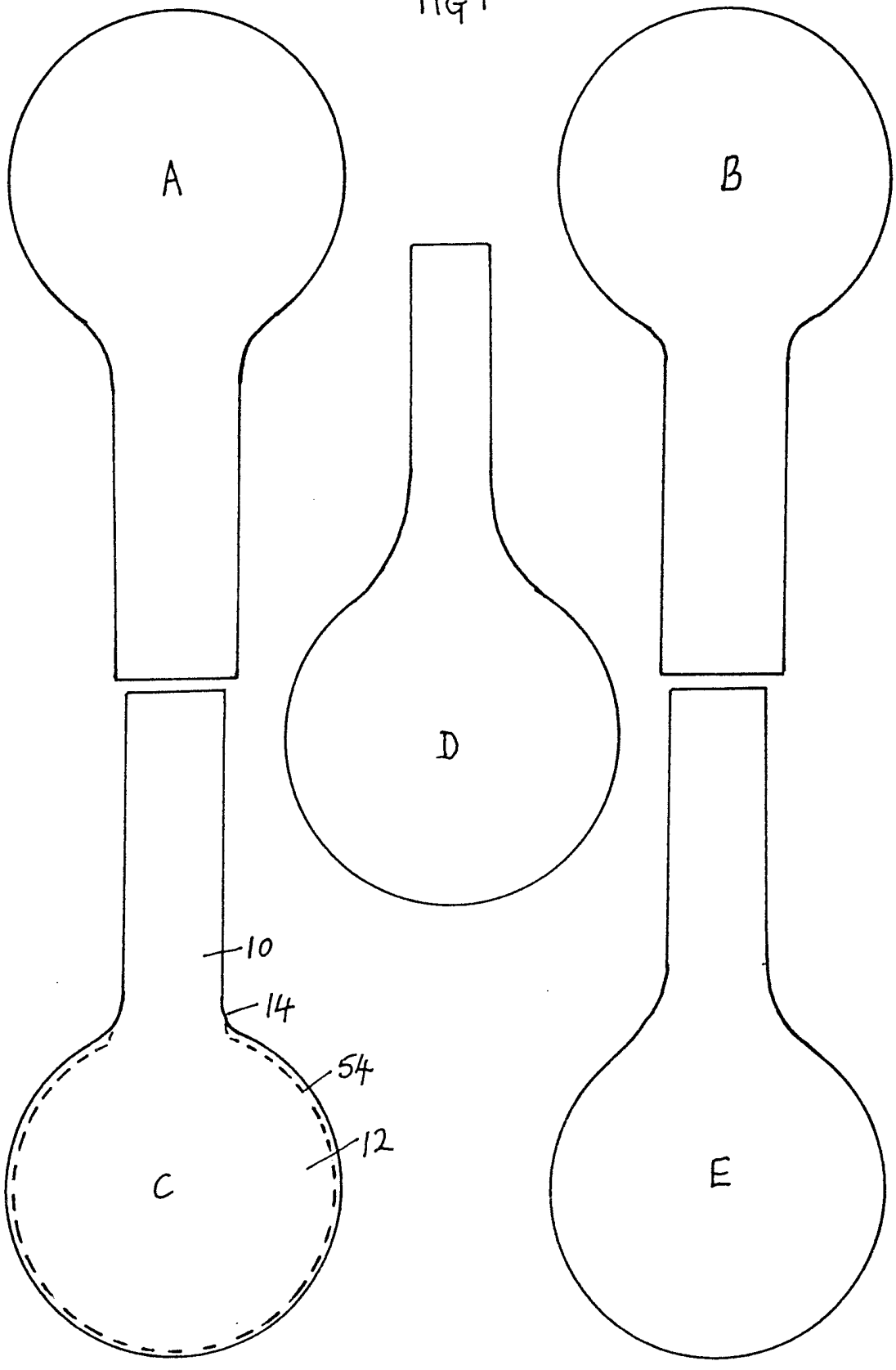
FIG 1



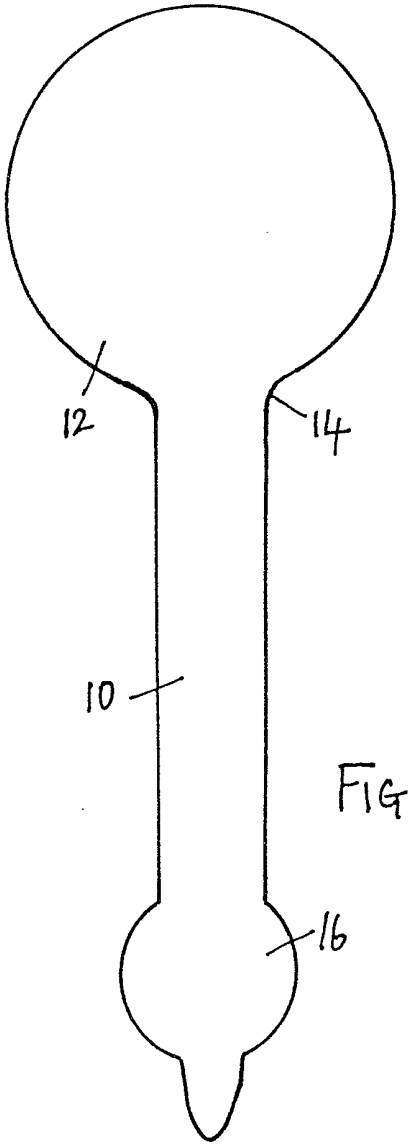


FIG 2a

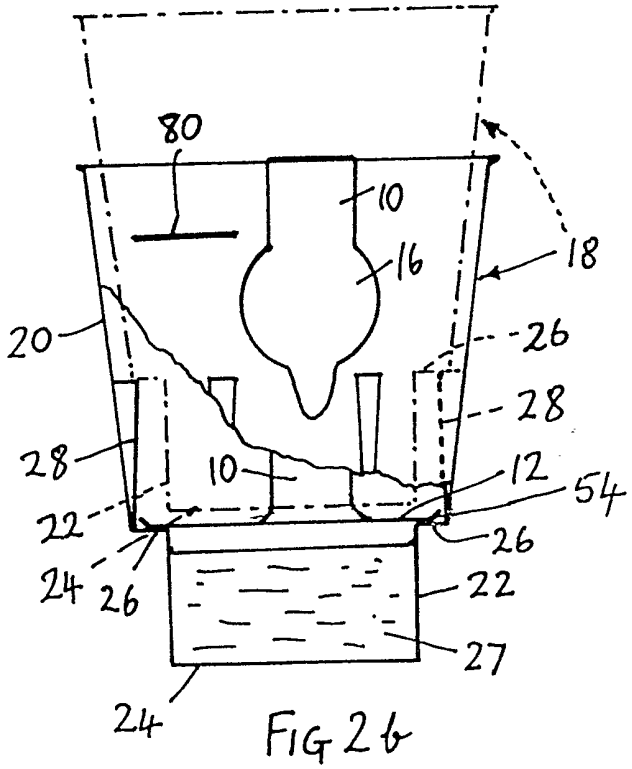


FIG 2b

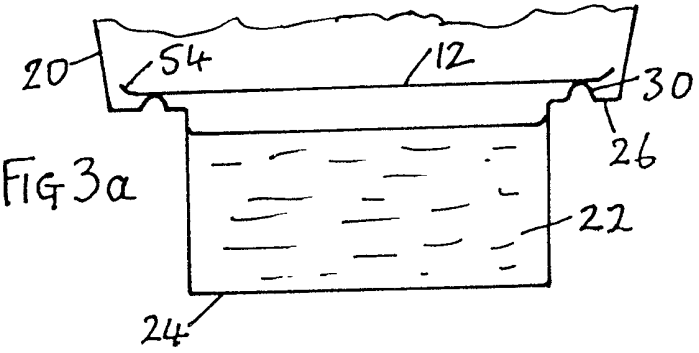


FIG 3a

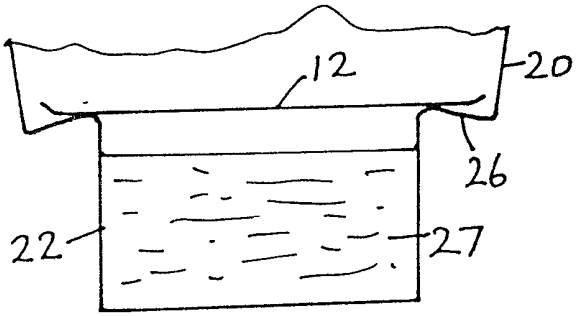


FIG 3b

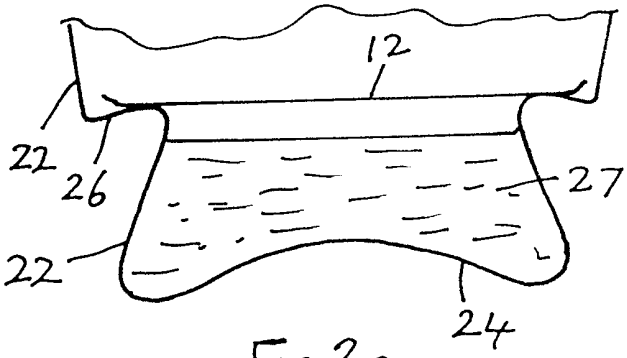


FIG 3c

FIG4

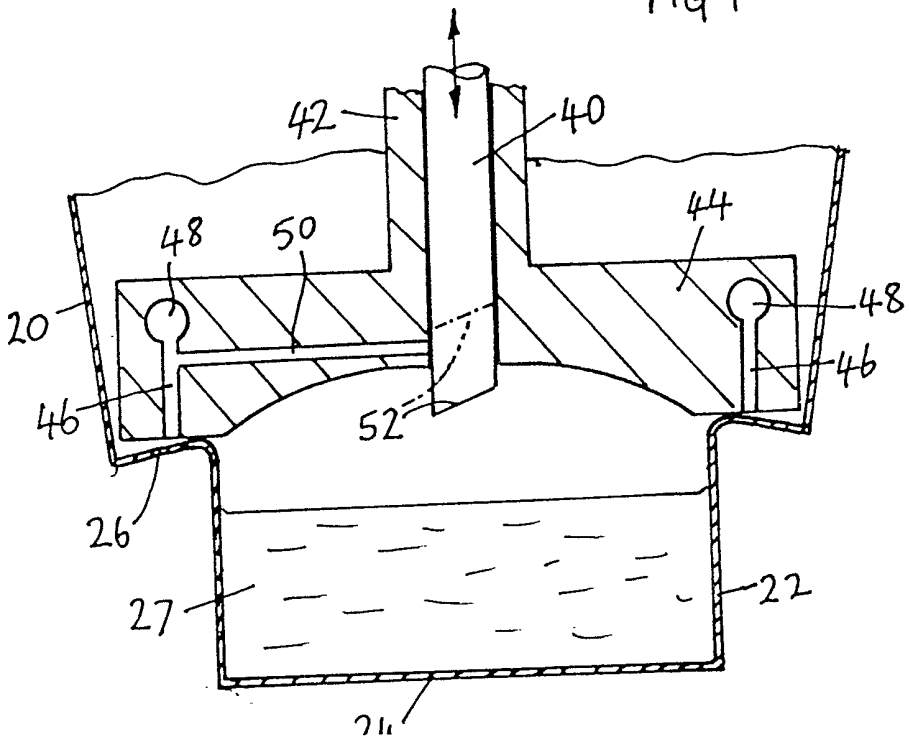
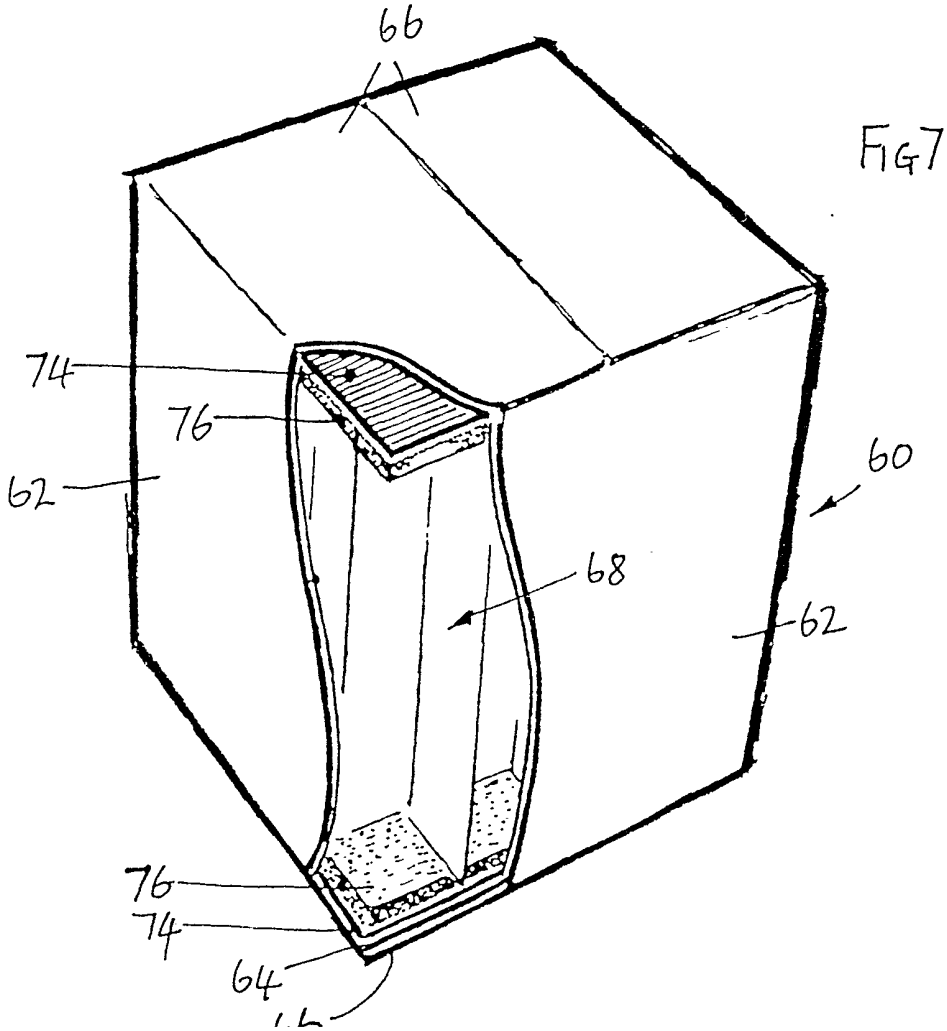


FIG7



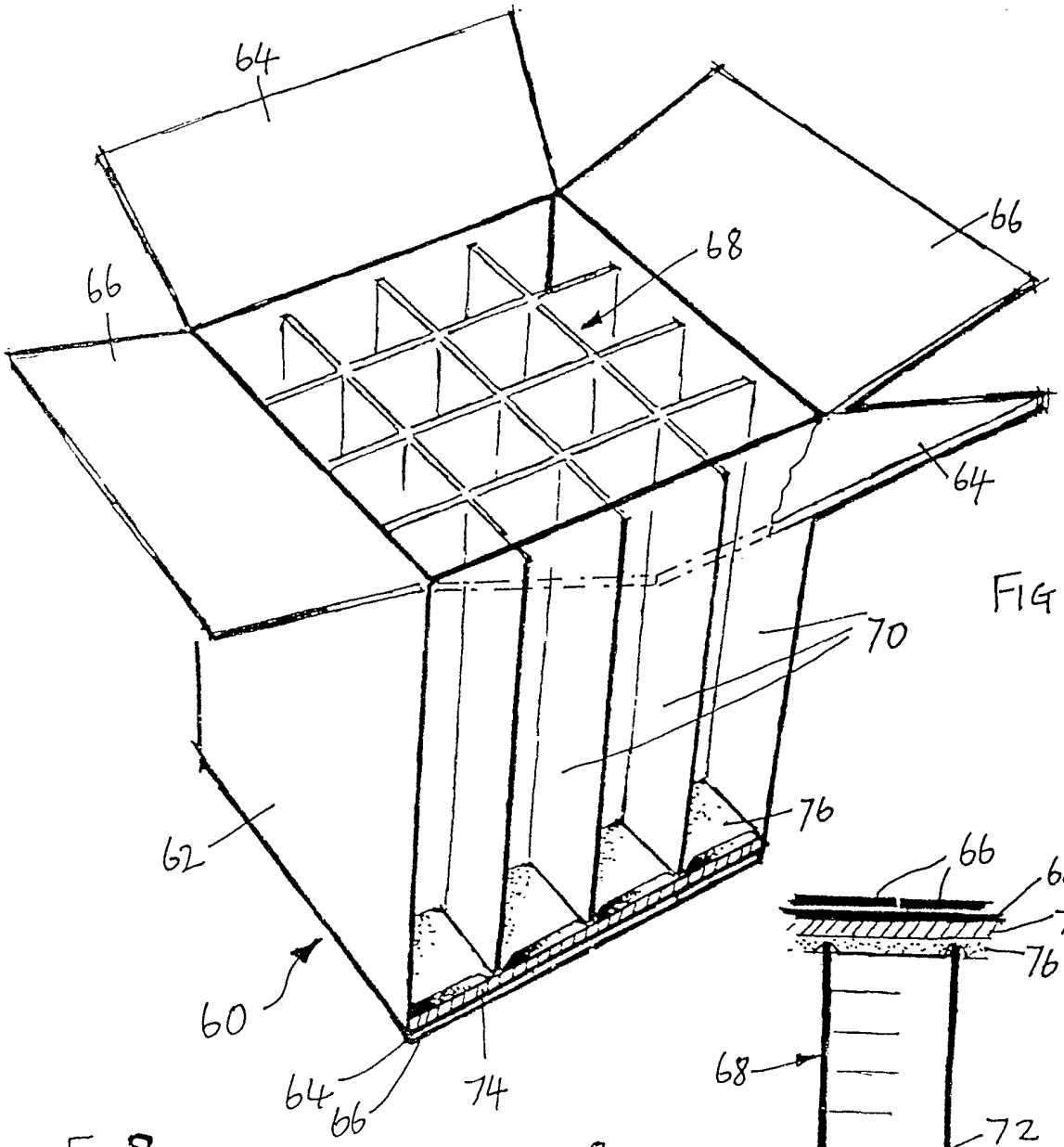


FIG 5

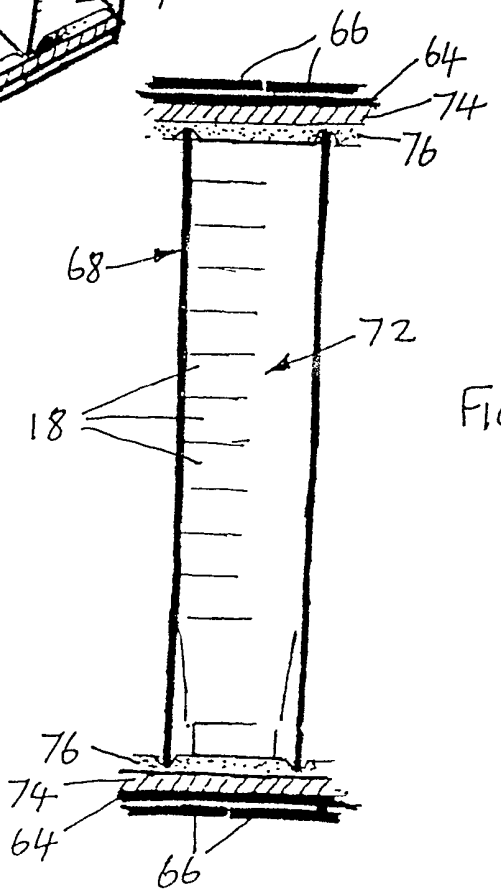
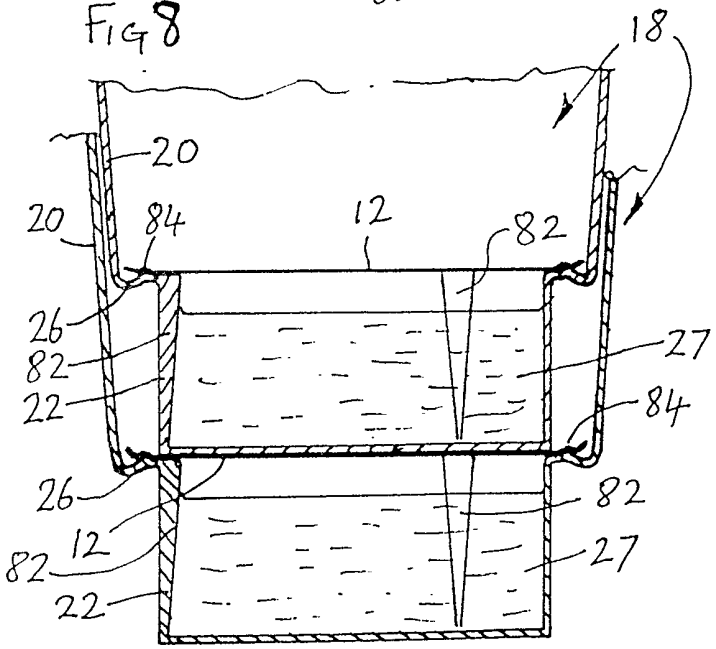


FIG 6

FIG 8



SPECIFICATION

Container with dilutable product

This invention relates to the packaging of a product within a container, which container is capable of accepting a liquid diluent, solvent or dispersant (hereinafter generally referred to as a diluent) after exposing the packaged product.

Disposable tumblers for holding liquids to which a further liquid may be added are known, and are shown in GB 1,603,421. Further examples are shown in GB 1,604,614 and DE OLS 1,941,965. While these specifications indicate a general idea, when it comes to putting that idea into practice many problems are encountered, and the prior art disclosures are generally silent on these problems and their solutions.

Many products are sold in concentrated or dried form, for subsequent reconstitution, solution, dispersion or dilution. Examples are spirituous liquors or other dilutable alcoholic drinks, pharmaceutical or cosmetic dosage units, herbicidal or insecticidal units, permanent wave lotions for use in hairdressing, dried foods such as soup powders and drink powders, and so forth. In such cases, usually a relatively small portion of the product is required at a time, and prior to use it has to be mixed with water or some other liquid by the user, often with some degree of accuracy. The addition of such a liquid will be generally referred to herein as dilution, even though it may involve other but related processes such as dispersion, solution and reconstitution.

The package of the present invention takes the form of a container, often a cup, having an inwardly projecting ledge to which a diaphragm is peelably secured. The portion of the container below the diaphragm and consequently closed thereby contains the product which is subsequently to be diluted on removal of the diaphragm.

Precharged containers of this kind are conveniently transported and stored as a nested stack, with the bottom of one container resting on the diaphragm-covered ledge of the container next below. While this is quite convenient, and may work satisfactorily where the packaged product and the container are very light, there has been found to be a risk, particularly where a liquid is being packaged, of the weight of the stack of containers causing undue compression of the marginal portions of the diaphragms of the containers towards the bottom of the stack, so that the diaphragms cannot then be cleanly peeled from the ledge of one of those lower containers. Accordingly, one aspect of the present invention provides a denesting ledge, arranged to support a similar container nested within so that the upper nested container does not bear upon the diaphragm of the lower container.

In many cases it is necessary or desirable that the amount of diluent added should be accurately controlled, and accordingly a second aspect of the present invention provides a mark, e.g. moulded or printed, on the wall of the container, inside or outside, to indicate a suitable level for the added diluent.

The container may be made of one of a number of materials, dependent upon its final use. A container for whisky or other spirituous liquor, for example, is preferably made of a transparent or semi-transparent material (often referred to as "glass-clear" or "contact clear"). Glass-clear plastics containers may be made by thermoforming or injection moulding from crystal styrene, or may be blow-moulded from polyester. Contact-clear containers may be formed by injection moulding from polypropylene. Other materials, such as polyvinyl chloride, will readily spring to the mind of the person skilled in the art, but the choice may depend to a great extent on the nature of the product being packaged; whether it is attacked by the product or whether it might contaminate the product. Translucent, tinted or opaque containers may be similarly formed.

If desired, or if the content of the package requires, a barrier layer may be provided by the use of a coated plastics material, which may be a simple two-layer construction of, e.g. polyvinylidene chloride/ polyvinyl chloride or it may be a more complex structure, such as a five-layer co-extrusion, e.g. polypropylene/adhesive/ethylene-vinyl alcohol copolymer/adhesive/polypropylene. Other forms of container having a barrier layer may be formed by an in-mould labelling technique in the injection moulding process, whereby the barrier material is incorporated into the base or wall or both of the container as a label at the time of moulding.

The diaphragm material is suitably selected to provide the necessary barrier. It should be strong enough to enable the user to peel cleanly the diaphragm from the ledge, and in many cases the diaphragm should be peeled completely from the ledge for aesthetic or hygienic purposes. Furthermore, the material of which the diaphragm is made must not affect the characteristics, e.g. taste, of the packaged product, particularly when an alcoholic beverage is packaged.

A suitable diaphragm for the packaging of whisky comprises a polyester layer (for strength), an adhesive layer, an aluminium layer (for barrier properties), and a heat-sealable, cleanly peelable lacquer layer. When packaging other substances, a lesser degree of barrier and peelability may be adequate, and in such cases an adhesive layer may be used, which may be pressure-sensitive or may be an encapsulated adhesive layer in which capsules are rupturable when subjected to pressure. Other peelable layers may include hot melt adhesives.

Closure after filling the container may be carried out by heat-sealing, high-frequency induction heating, or ultra-sonic sealing. The sealing jaws for so doing may be profiled to enable the diaphragm's peelable seal to start the peel more easily. The or each jaw may for example be chamfered around its outer periphery to provide an area of the seal which is of lesser strength than the remaining area. When the sealing step itself is profiled (as described later) the sealing faces of the jaws may

present different profiles. For example, the anvil jaw may conform to the profiled step while the other jaw may have a flat surface, the profiled step providing an easy lead-in to start the peel.

The transverse cross-section of the container below the ledge may be different from that above the ledge, e.g. square and round respectively. A square bottom might allow the diaphragm to have a pull tab of greater width at the point where it joins the diaphragm. A circular diaphragm generally restricts the width of pull tab which can be used. For example, with a diaphragm of about 70 mm diameter it has been found difficult to have a pull tab of greater width than about 17 mm at the point at which it joins the diaphragm. With a greater width of pull tab at this point the diaphragm tends to pucker or crease in the seal area, with consequent risk of leakage.

Figure 1 shows, to relative scale, a variety of blanks for use as diaphragms with integral pull tabs. These are labelled A to E. It will be seen that they vary as regards the width of tab 10 in relation to diameter of diaphragm 12, and also the radius of curvature of the shoulder region 14 where the tab joins the diaphragm, and hence which determines the effective width of the tab at this point and the risk of tearing the tab away from the diaphragm or the difficulty of sealing the diaphragm to the ledge without puckering or creasing the diaphragm in the sealing area. Of those shown, the blank C has been found to have the most suitable proportions for a container of circular cross-section with a circular product-containing lower region, and hence a sealing ledge of uniform width.

Figure 2a shows a C-type diaphragm 12 with tab 10; the end portion of the tab having an enlarged area 16 which constitutes a seal which, as shown in Fig. 2b is secured to the outside surface of the container 18. This is intended to indicate whether or not there has been any prior attempt to remove the diaphragm; i.e. it is a tamper-indicator.

Figure 2b, which is a partly cut-away side view of the container, also shows the internal construction. The container takes the form of a cup having an open-topped upper main body portion 20 of upwardly divergent frusto-conical form, and a straight sided shallower lower portion 22, closed at the bottom 24 and united with the upper portion 20 through an annular inwardly directed ledge 26 to which the margin of the diaphragm 12 is peelably sealed after the introduction of the packaged product 27 into the lower portion 22 of the container. There is also shown a number of denesting ledges 28 in the wall of the main body portion 20. A similar container nested within is shown in dot-dash lines, and it will be seen that the ledge 26 of the upper container rests upon the denesting ledges 28 of the lower container, and the height of the denesting ledges are such that the bottom 24 of the upper container is maintained clear of the diaphragm of the lower container.

When filling the container, especially with liquid, care must be taken to avoid drips or splashes from the filling spout falling onto the sealing ledge. Any such drip or splash could interfere with the subsequent sealing of the diaphragm to the ledge.

Figures 3a to *3c* show vertical cross-sectional views through the lower regions of modified designs of cups, in which this problem can be alleviated. In Fig. 3a, the sealing ledge 26 is provided with a continuous annular upstanding bead 30 to which the diaphragm 12 is sealed. When the liquid 27 is introduced into the lower portion 22, any drips or splashes falling on the sealing ledge will tend to run off the bead 30 onto the surrounding areas of the ledge, leaving the bead substantially clean for sealing to the diaphragm. Fig. 3b shows an alternative arrangement in which the sealing ledge 26 is simply arranged so as to slope downwardly in the radially outward direction, so that the annular radially inner region is raised relative to the outer region in the same manner as the bead 30. Any splashes falling on the raised inner region of the sealing ledge will tend to run to the lower outer region, leaving the raised inner region substantially clean for sealing to the diaphragm. Fig. 3c shows a modification which can be applied to Fig. 3a or 3b, in which the bottom 24 of the container is upwardly convex, and the sides of the bottom region 22 are somewhat convergent upwardly, and the lower corner region between the side and the bottom is rounded in profile. This can be used in conjunction with a filling spout which is directed off-centre and at an angle so as to introduce the liquid in a swirling motion, aided by the shape of this bottom portion of the container. This tends to maintain a smooth flow of the liquid and reduce the risk of splashing during filling.

Figure 4 shows a similar vertical cross-sectional view through a lower region of a container, in conjunction with a filling device for a liquid product. The liquid is introduced through a spout 40 which is vertically reciprocatable within a shaft 42, at the lower end of which is an annular head 44, which is introduced into the cup and rests on the sealing ledge 26. This head thus tends to protect the ledge from splashing during filling. Should any liquid nevertheless find its way onto the ledge during filling, it is removed by suction resulting from vacuum applied to a series of downwardly opening ports 46 in the periphery of the head 44, and connected to a suction header 48. Branches 50 from at least some of the ports 46 extend radially through the head to the region adjacent the filling spout 40. When the required amount of liquid has been discharged from the spout, the spout is withdrawn upwardly into the head, and in doing so its lower edge 52 passes the inner ends of the branch passages 50, at which suction removes into those branch passages any drips of liquid remaining on the end of the filling spout. Thus, there should be no drips of liquid falling from the filling device as it is removed from the container.

The present invention has been successfully applied to the packaging and transporting of whisky in containers which are subsequently used as mixing and drinking vessels. The vessel is of circular shape in plan, and its configuration is otherwise similar to that illustrated in Fig. 2b, with a diaphragm and tab of the form C shown in Figs. 1 and

2a. The sealing ledge is situated about 1/3 of the way up the container from the base. The container is transparent, and was made by thermoforming crystal styrene resin. The as yet empty containers were nested together to form a stack, and the bottom container of the stack was withdrawn by a suction cup, and a vacuum head was introduced to remove dust and other particles. It was then carefully charged with the required amount of whisky. A diaphragm was withdrawn from a magazine containing a stack of the diaphragms, and positioned on the sealing ledge. The diaphragm was approximately 72 mm in diameter, and the width of the tab 10 at the point where it joins the diaphragm 12 was about 17 mm. When punching out the blanks for the diaphragm and pull tab, a narrow peripheral region 54 (see Figs. 1 and 2b) was embossed or deformed somewhat out of the plane of the diaphragm to prevent the diaphragm from curling prior to its introduction into the container and its sealing to the flange. The diaphragm was made of a lamination of polyester/adhesive/aluminium foil/heat sealable, cleanly peelable lacquer. A heat sealing ring heat sealed the diaphragm in a peelable manner to the sealing flange 26. The pull tab 10, which extended up the inside surface of the wall of the container and emerged from the top of the container, was bent over the rim of the container and adhered into the position shown in Fig. 2b using the adhesive seal 16. Skilled whisky tasters could not detect any taint in the whisky thus packaged, resulting from the use of crystal styrene or heat sealable peelable lacquer.

Figures 5 to *7* show a manner of packaging a number of containers for transport and storage. Fig. 5 shows a carton 60 of generally conventional design, of which one side wall and part of a top closure flap are omitted to show the interior of the carton. The carton has side walls 62, and is closed at top and bottom in similar manner by means of two opposite pairs of flaps 64,66 respectively. One pair of opposite flaps 64 are first folded in, followed by the second pair of opposite flaps 66, and they are sealed down in conventional manner. Within the carton is an insert of rectangularly intersecting partitions 68, again of generally conventional construction. This divides the interior of the carton into a series of columns 70 into which are introduced stacks 72 of the containers 18 (see Fig. 6). However, the carton also contains, top and bottom corrugated boards 74, and inwardly of the boards sheets 76 of foamed plastics material, such as foamed polyurethane. The corrugated boards 74 lie against the end closure flaps 64,66, and the top and bottom edges of the inserts 68 press into the surface of the foamed plastics sheets 76. The thickness of the foamed plastics material is such that it lightly contacts the top and bottom of the stacks 72, but provides a degree of vertical resilience, which is useful in protecting the cups during transport and storage, especially when the stack is relatively heavy as a result of containing packaged liquid. Fig. 7 shows, partly cut away and with the stacks of containers omitted, the structure of the closed carton.

In Fig. 2b there is shown a mark 80 on the wall of the body 20 at a level suitable for the addition of diluent. This is less appropriate for a whisky package, but may be more suitable, for e.g. a gin package to indicate the appropriate level of tonic. Also in containers for other products, the precise amount of diluent added may be of some importance.

Figure 8 shows a vertical cross-section through the lower region of a pair of nested containers, which employ an alternative denesting arrangement from that shown in Fig. 2b. Instead of providing upwardly slightly convergent flutings 28 in the wall of the main body 20, the tops of the flutings providing the denesting ledges, as shown in Fig. 2b, similar flutings 82 are provided in the walls of the lower part 22. The tops of these flutings are flush with the sealing ledge 26, and thus provide a series of small inward extensions around the ledge 26. These extensions provide denesting ledges which support, through the diaphragm 12, the bottom of the container next above. To avoid the above-mentioned problem of the pressure of the filled stack affecting the peelability of the diaphragm seal with the ledge 26, that seal 84 is established radially outwardly of the region of contact between the bottom of the cup above with the diaphragm of the cup below. This can work satisfactorily if there is no substantial sideways movement of the bottom of one cup within the cup below, i.e. it is reasonably accurately centred. This can be achieved by providing centering projections on the walls of the main body 20 of the cup or around the outside of the sealing ledge 26 to contact the nested cup and hold it centred; or more simply (as shown in Fig. 8) by arranging for the divergence of the wall of the main body part 20 to be such that the walls of the nested containers lie in close proximity, without of course frictionally jamming together, so that they maintain each other concentrically on the axis of the stack of containers.

Although the present invention has been particularly described in relation to plastics containers, it will be understood that it is not limited to containers made of such material, but could be applied to glass or other containers of suitable material.

CLAIMS

1. A filled container having at an intermediate region an inwardly projecting ledge to which a diaphragm is peelably secured, the portion of the container below the diaphragm and consequently closed thereby containing a product which is subsequently to be diluted on removal of the diaphragm; the container having means defining a denesting ledge arranged to provide support for a similar container nested therein, the arrangement being such that the nested container does not bear upon the diaphragm of the lower container in the region in which it is secured to its ledge.

2. A filled container according to claim 1 in which the denesting ledge is provided above the

diaphragm so as to support a nested container so that it does not bear upon the diaphragm of the lower container.

3. A filled container according to claim 1 wherein the denesting ledge is defined flush with the diaphragm ledge so as to act to support a nested upper container through the diaphragm of the lower container; the diaphragm being secured radially outwardly of the region of contact between the bottom of the nested cup and the diaphragm of the lower cup.

4. A filled container according to any preceding claim wherein the container bears a mark to indicate a suitable level for the diluent which is to be added.

5. A filled container according to any preceding claim wherein the material of at least a portion of the container incorporates a barrier layer.

6. A filled container according to claim 5 wherein the container is injection moulded and the barrier material is incorporated into the base and/or the wall of the container as a label at the time of moulding.

7. A filled container according to any preceding claim wherein the diaphragm comprises a polyester layer, an adhesive layer, an aluminium layer and a heat-sealable, cleanly peelable lacquer layer.

8. A filled container according to any preceding claim wherein the container has a square cross-section below the diaphragm ledge and a round one above it, the ledge providing a surface outlining a square to which the diaphragm is secured.

9. A filled container according to any preceding claim wherein the diaphragm has a pull tab which extends over onto the outside surface of the container to which it is secured to provide a tamper indicator.

10. A filled container according to any preceding claim wherein the diaphragm ledge is shaped to slope downwardly away from the region to which the diaphragm is secured, so that any liquid that may splash on to that region prior to the attachment of the diaphragm tends to run off.

11. A filled container substantially as any herein described with reference to and as illustrated in Figs. 1 to 3 and 8 of the accompanying drawings.

12. Apparatus for use in filling a container having an inwardly projecting ledge to which a diaphragm is to be secured, the apparatus comprising an annular head which can be introduced into the container to rest on the ledge, and a filling spout which in use projects into the container beneath the head.

13. Apparatus according to claim 12 wherein the periphery of the head has suction ports connected to a suction header for removing liquid from the container ledge.

14. Apparatus according to claim 13 wherein the spout is reciprocable in a tubular shaft in the head between a downwardly projecting filling position and a position for moving between containers in which it is withdrawn into the shaft; the shaft having means communicating with the suction header for removing drips of liquid from the spout as it is withdrawn.

15. Apparatus for use in filling a container substantially as herein described with reference to and as illustrated in Fig. 6 of the accompanying drawings.

16. A carton containing at least one stack of filled containers according to any of claims 1 to 11, the stack extending substantially between opposed end walls of the carton, there being interposed between the stack and the end wall at each end material providing resilience.

17. A carton according to claim 16 wherein the material at each end comprises an outer layer of corrugated board and an inner layer of foamed plastics sheet.

18. A carton containing at least one stack of filled containers and being substantially as herein described with reference to and as illustrated in Figs. 5 to 7 of the accompanying drawings.

19. A diaphragm for sealing around a ledge of a container to confine a product, the diaphragm being suitable for use as part of a filled container according to any of claims 1 to 11.

20. A diaphragm substantially as any herein described with reference to and as illustrated in Figs. 1 and 2a of the accompanying drawings.

Printed in the UK for HMSO, D8818935, 6/85, 7102.
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