



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 405 800 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.04.2004 Bulletin 2004/15

(51) Int Cl.7: **B65D 65/46, C11D 17/04**

(21) Application number: **03255527.8**

(22) Date of filing: **04.09.2003**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**
Designated Extension States:
AL LT LV MK

(72) Inventors:
• **Groot, Andreas Theodorus Johannes**
3133 AT Vlaardingen (NL)
• **Ranade, Vidyadhar Sudhir**
3133 AT Vlaardingen (NL)

(30) Priority: **03.10.2002 GB 0222963**
27.11.2002 GB 0227689

(74) Representative: **Elliott, Peter William et al**
Unilever PLC
Patent Department,
Colworth House
Sharnbrook
Bedford MK44 1LQ (GB)

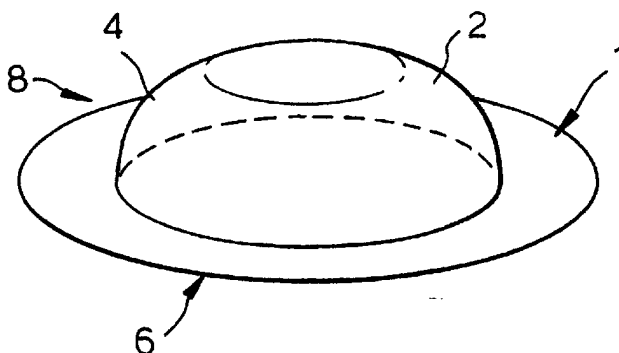
(71) Applicants:
• **UNILEVER PLC**
London EC4P 4BQ (GB)
Designated Contracting States:
CY GB IE
• **UNILEVER N.V.**
3013 AL Rotterdam (NL)
Designated Contracting States:
**AT BE BG CH CZ DE DK EE ES FI FR GR HU IT
LI LU MC NL PT SE SI SK TR RO**

(54) **Water soluble capsule**

(57) A water-soluble capsule comprising a visually clear water-soluble film containing a visually clear fluid the capsule comprising a base wall portion inclined relative to one or more further wall portions, and the film

comprising a coloured portion and a non-coloured portion, the coloured portion having a sufficiently large area in relation to the area of the non-coloured portion such that the non-coloured portion and the fluid appears coloured.

Fig.1.



Description

[0001] This invention relates to a water-soluble capsule containing a liquid composition, such as a detergent composition e.g. for the cleaning of fabrics in a washing machine or crockery etc. in a dishwashing machine.

[0002] Detergent compositions for machine washing of laundry are provided in many forms such as free-flowing powders, liquids, etc.. Detergents in the form of compressed powder tablets are also commonly available. These are advantageous in that they do not require measuring they are thus easier to handle and dispense into the wash load and allow for accurate dosing in detergent.

[0003] More recently water-soluble capsules of detergent composition in liquid and other forms have been introduced. Water-soluble capsules generally comprise a detergent composition encapsulated with water-soluble film, such as polyvinyl alcohol. Encapsulation allows for handling of the product without direct contact with the detergent composition. This is especially advantageous when the detergent composition includes aggressive cleaning components which would irritate the skin on direct contact.

[0004] Liquid detergents also offer potential aesthetic benefits in so far as they can be coloured e.g. to denote a particular function or fragrance.

[0005] However, a problem encountered with coloured liquids, is that fairly high levels of colourant are needed which can be costly, and can lead to staining of the fabrics to be washed.

[0006] Also, colouring of the fluid can be problematic in so far as the colouring agent, e.g. dye or pigment used can be unstable in the liquid.

[0007] A further problem is that the capsule film can be visually unappealing to some consumers.

[0008] It is an object of the present invention to provide a water-soluble capsule containing a fluid composition, which overcomes at least some of the above mentioned problems. In particular, it is an object of the invention to provide a water-soluble capsule with improved visual properties and a reduction in colourant-related staining problems.

[0009] Accordingly, in one aspect, the invention provides a water-soluble capsule comprising a visually clear water-soluble film containing a visually clear fluid, the capsule comprising a base wall portion inclined relative to one or more further wall portions, and the film comprising a coloured portion and a non-coloured portion and the coloured portion having a sufficiently large area in relation to the area of the non-coloured portion such that the non-coloured portion and the fluid appear coloured.

[0010] The effect of this arrangement is that only part of the capsule need be coloured in order to achieve a greater/full coloured effect i.e. so that more than the coloured part of the capsule appears coloured to the naked eye. Thus, the fluid can be made to appear coloured by colouring only part of the film thus using a reduced level of colourant (as compared with the levels required if colourants were to be added to the fluid thereby reducing the cost - financial and environmental - and the likelihood of colourant-related staining of the coloured capsule. At the same time, the film itself also appears coloured thereby enhancing its visual characteristics.

[0011] A further advantage is that new colour variants/interesting visual effects can be easily introduced by the manufacturer, simply by selecting the appropriately coloured film, rather than reformulating with new fluid colours, which can be expensive.

[0012] As used herein, the term "non-coloured" is intended to mean the formulation (of the film or contained liquid as the case may be) is substantially free of colourants (e.g. dyes, pigments); and the term "clear" is intended to mean any substance which is capable of letting light pass therethrough.

[0013] The fluid may be a detergent liquid or gel such as is used in a laundry process (i.e. including detergents, conditioners, fresheners, and the like) or machine dishwashing process. In a preferred embodiment the capsule containing a unit dose of a transparent liquid detergent composition.

[0014] The fluid may have a refractive index from 1 to 2.0 and preferably from 1.3 to 1.5.

[0015] Although it is advantageous in terms of cost to restrict colouration to the film, the invention is not limited to this. Indeed, the fluid may also be coloured. The colour of the film will effect this colour and a new 'hybrid' colouration effect produced, wherein both the film and fluid appear to have the same 'hybrid' colour, resulting from the combination of the two colours.

[0016] The capsule may take any suitable shape in order to produce the inclined wall formation which contributes to the colouration effect.

[0017] The further one or more wall portions may include a body wall which is curved (when viewed from the side) and which may provide a recess for containing said liquid. The body wall may be dome shaped.

[0018] The relative inclination of the body and further walls (measured at the general area of their intersection) may be from 0° to 90°, preferably from 0° to 80°, further preferably from 30° to 70°, e.g. 50° and (where internal acute angle is referred to here).

[0019] In one embodiment the dome shaped body wall is thermoformed and the base wall sealed thereto.

[0020] One or more of the capsule walls (and/or portion(s) of such wall(s)) may have a curved outer perimeter e.g. circular or oval.

[0021] The capsule may also be "pillow shaped" i.e. formed with rectangular or square side walls, one or both of which bulge when filled with fluid to form a pillow-like body.

[0022] The base radius/capsule height ratio is preferable from 1 to 5, and even more preferably from 1.2 to 2.0 and more preferably from 1.4 to 1.6 and even more preferably from 1.45 to 1.55.

[0023] In a one embodiment this ratio is 1.47.

[0024] In the case of square/rectangular capsules, the term 'radius' should be interpreted to mean an equivalent dimension i.e. the average distance from centre to the side(s) of the base e.g. half the base width of a square shaped capsule.

[0025] Any suitable part or parts of the capsule film may be coloured.

[0026] Coloured film may be used to form one or more walls of the capsule, the non-coloured film forming the remainder of the capsule walls etc. In a preferred embodiment the capsule may have one or more walls coloured, e.g. the base wall or the body wall of the above mentioned dome-shaped capsule. The capsule walls may comprise a combination of coloured and non-coloured film, e.g. a colour film may be attached to existing non-coloured walls on the inside or outside.

[0027] The coloured portion may comprise 20% to 80%, preferably 30% to 70% e.g. 50% of the total surface area of the capsule.

[0028] The film of one or more walls may have a laminar structure, wherein one or more coloured layers are included. In the case of a laminar structure, preferably the inner layer or layers, and more preferably the innermost layer or layers are coloured. This provides a good colouration effect.

[0029] Preferably, the colourant is a pigment, but it can also be in the form of a dye.

[0030] In another aspect the invention provides a process for making a water-soluble capsule comprising a visually clear water-soluble film containing a visually clear fluid for release on dissolution of the capsule, the process comprising the steps of

- forming coloured and non-coloured films to produce an open package having a recess adapted to receive the composition;
- placing in the capsule the visually clear fluid
- sealing the capsule.

[0031] The above process may be a vertical form fill and seal (VFFS) process or horizontal form fill and seal (HFFS) process or rotary form fill and seal process (RFFS).

[0032] Advantageously, the capsules are made with a coloured wall(s) and non-coloured wall(s).

[0033] The invention will be more clearly understood from the following description of an embodiments thereof, given by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a capsule according to one form of the invention; and

Figure 2 is a side schematic view of the capsule of figure 1.

[0034] Referring to the drawings, a dome-shaped capsule 1 is shown, the capsule comprising a body portion 8 containing a measured unit dose of a transparent liquid detergent composition 2. Surrounding the body portion is an annular seal 10. The body portion 8 is defined by a body wall 4 formed from a transparent non-coloured film and a base wall 6 formed from a transparent coloured film. The capsule has a rounded appearance.

[0035] The colourant used here is a blue dye.

[0036] The capsule has only one wall coloured and yet the whole capsule appears blue (must tally with colourant) due to the reflection by the coloured film and refraction of light by the contained liquid. The result is a pleasing appearance, using very low level of colourant.

[0037] The capsule 1 is formed using a horizontal form fill and seal (HFFS) process in which a first non-coloured transparent sheet of a water-soluble material is thermoformed to form the domed body wall 4 of the body portion and the liquid 2 is placed therein. A second sheet of a coloured transparent water-soluble material is then superimposed over the first sheet and the first and second sheets are then heat sealed along a continuous region of the superposed sheets surrounding the liquid 2 to form a base wall 6.

[0038] Figure 2 shows a side view the capsule of figure 1 so as to demonstrate how the ratio of the dome height \underline{b} relative to the radius of the dome base \underline{a} can be selected for enhanced colouration effect. In this embodiment the ratio is 1.47 (i.e. $\underline{a} = 25$ and $\underline{b} = 17$) which produces a good overall colouration effect where both the film and the liquid appear blue.

[0039] It will be appreciated that the same considerations can be applied to other shaped capsules (e.g. the widely used pillow-shaped capsule) to produce the colouration effect of the invention.

[0040] Capsules may not have exactly the shape as given in the drawings. The top film (in the drawing at the bottom) may not be flat, but curved as well due to film shrinkage. In the latter case, the length \underline{b} is determined starting from the level of the seal as this determines the colouring the effect. The length \underline{b} may deviate from the overall capsule height when measured from the floor.

[0041] In another embodiment, a capsule is formed as described for the first embodiment, except that in this case the base wall 6 is formed from an inner and an outer sheet of transparent water-soluble film, wherein innermost is non-coloured and the outermost coloured. This gives the impression of being coloured when viewed in plan view, but not when viewed from the side. This is due to the reflection of light on the colourless surface of the inner film. This interesting visual effect again uses low colourant levels.

[0042] As stated above, in both examples the capsules contain a liquid detergent composition. When a liquid detergent composition is used, it is preferred that the composition is essentially non-aqueous. However, compositions may be used which contain substantial amounts of water, provided that this water is in a form where its chemical activity is reduced (e.g. as water of crystallisation or in combination with a solvent such that its vapour pressure is reduced) such that the soluble film does not dissolve prematurely.

[0043] A suitable substantially non-aqueous visually clear liquid formulation is:-

Ingredient	wt%
Alcohol Ethoxylate Nonionic (5EO)	25
LAS (alkylbenzene sulphonic acid, as acid)	20
Coco fatty acid	17
Glycerol	10
Monoethanolamine	8
Enzymes	1
Monopropylene Glycol	15
Minors	1
Water	Balance
	100%

[0044] Another suitable formulation is:

liquid properties		
formulation	see next table	
colour	clear, transparent, colourless	
viscosity	270 mPas	
refractive index	1,333 @ 20°C	

formulation		
ingredient	level [%]	
Nonionic 7EO	20.0	
Monopropylene glycol	23.0	

(continued)

formulation		
ingredient	level [%]	
Monoethanol amine	9.6	
LAS acid	20.5	
Fatty acid	17	
Minors	5.0	
Water	up to 100	

[0045] As mentioned above, suitable colourants for the film include, but are not limited to, dyes and/or pigments. A suitable dye would be Vitasyn Patent blue V dye. A suitable pigment would be Iragon Blue pigment supplied by Ciba Speciality Chemicals.

[0046] In use capsules according to the invention can conveniently be placed directly into the wash liquor where the film dissolves, releasing the liquid detergent composition.

[0047] It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiments which are described by way of example only.

Claims

1. A water-soluble capsule comprising a visually clear water-soluble film containing a visually clear fluid the capsule comprising a base wall portion inclined relative to one or more further wall portions, and the film comprising a coloured portion and a non-coloured portion, the coloured portion having a sufficiently large area in relation to the area of the non-coloured portion such that the non-coloured portion and fluid appears coloured.
2. A water-soluble capsule according to claim 1 wherein the further one or more wall portions include a curved body wall for providing a recess for containing the fluid.
3. A water-soluble capsule according to claim 2 or claim 1 wherein the body wall is dome-shaped.
4. A water-soluble capsule according to any preceding claim wherein the body wall and or base wall are generally circular or oval.
5. A water-soluble capsule according to any preceding claim wherein the relative inclination of the body wall and the further one or more walls is from 0° to 90°.
6. A water-soluble capsule according to claim 5 wherein the relative inclination of the body wall and the further one or more walls is from 0° to 80°.
7. A water-soluble capsule according to claim 6 wherein the relative inclination of the body wall and the further one or more walls is from 20° to 60°.
8. A water-soluble capsule according to claim 7 wherein the relative inclination of the body wall and the further one or more walls is from 35° to 55°.
9. A water-soluble capsule according to any preceding claim wherein the capsule walls, and/or portion(s) of such walls may have a curved outer perimeter.
10. A water-soluble capsule according to any preceding claim wherein the capsule base radius/capsule height ratio is from 1 to 5.
11. A water-soluble capsule according to claim 10 wherein the capsule base radius/capsule height ratio is from 1.2 to 2.0

EP 1 405 800 A1

12. A water-soluble capsule according to claim 11 wherein the capsule base radius/capsule height ratio is from 1.4 to 1.6.

13. A water-soluble capsule according to claim 12 wherein the capsule base radius/capsule height ratio is 1.45 to 1.55.

14. A water-soluble capsule according to any preceding claim wherein all/part of the base wall is coloured.

15. A water-soluble capsule according to any preceding claim wherein the film of one or more walls has a laminate structure, with one or more coloured layers.

16. A water-soluble capsule according to any preceding claim wherein the fluid has a refractive index from 1 to 2.0.

17. A water-soluble capsule according to any preceding claim wherein the fluid has a refractive index from 1.3 to 1.5.

18. A process for making a water-soluble capsule comprising a visually clear water-soluble film containing a visually clear fluid for release on dissolution of the capsule, the process comprising the steps of

- forming coloured and non-coloured films to produce an open package having a recess adapted to receive the composition;
- placing in the capsule the visually clear fluid
- sealing the capsule.

19. A process for making a water-soluble capsule according to any of the above claims, the process comprising the steps of:

- forming coloured and non-coloured films to produce an open package having a recess adapted to receive the composition;
- placing in the capsule the visually clear fluid
- sealing the capsule.

Fig.1.

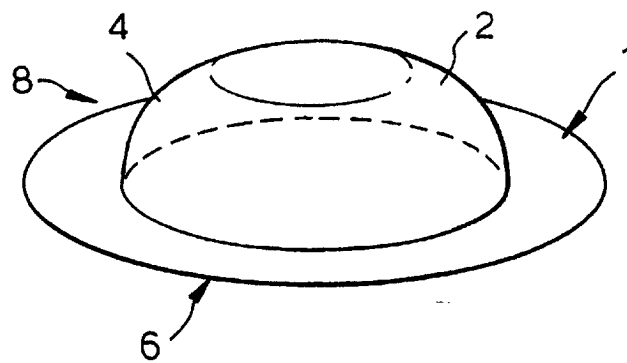
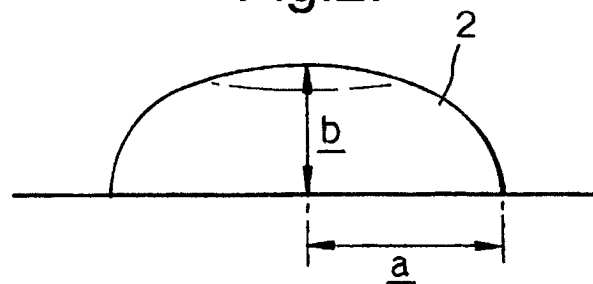


Fig.2.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 25 5527

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 2002/033004 A1 (EDWARDS DAVID BRIAN ET AL) 21 March 2002 (2002-03-21) * claims; figures *	1-19	B65D65/46 C11D17/04
A	US 3 394 983 A (CHU YEN ERNEST ET AL) 30 July 1968 (1968-07-30) * claims *	1-19	
A	WO 01 36290 A (RECKITT & BENCKISER) 25 May 2001 (2001-05-25) * page 19, line 16-18; claims * * page 20, line 19 - line 29 * * page 27, line 12 - line 27 *	1-19	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65D C11D A01N A61J
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 15 December 2003	Examiner Hillebrecht, D
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 25 5527

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-12-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 2002033004 A1		21-03-2002	AT	248758 T	15-09-2003
			AU	3425600 A	04-10-2000
			BR	0009049 A	15-01-2002
			CA	2360804 A1	21-09-2000
			CN	1344214 T	10-04-2002
			DE	1161382 T1	14-08-2003
			DE	60004976 D1	09-10-2003
			WO	0055068 A1	21-09-2000
			EP	1161382 A1	12-12-2001
			EP	1314654 A2	28-05-2003
			EP	1361172 A1	12-11-2003
			ES	2186595 T1	16-05-2003
			TR	200102519 T2	21-12-2001
			ZA	200105052 A	20-09-2002

US 3394983	A	30-07-1968	NONE		

WO 0136290 A		25-05-2001	GB	2357488 A	27-06-2001
			GB	2361010 A	10-10-2001
			AU	1647001 A	30-05-2001
			BR	0015617 A	10-09-2002
			CA	2391613 A1	25-05-2001
			CA	2414395 A1	25-05-2001
			CN	1409682 T	09-04-2003
			DE	20022487 U1	13-12-2001
			EP	1232100 A1	21-08-2002
			GB	2356842 A	06-06-2001
			WO	0136290 A1	25-05-2001
			GB	2358382 A ,B	25-07-2001
			GB	2370552 A ,B	03-07-2002
			GB	2370553 A	03-07-2002
			GB	2370554 A ,B	03-07-2002
			GB	2376676 A ,B	24-12-2002
			US	2003108705 A1	12-06-2003
