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(54) **Title:** DISPOSABLE BAG FOR MIXING OF POWDER AND LIQUID, CAP AND NOZZLES

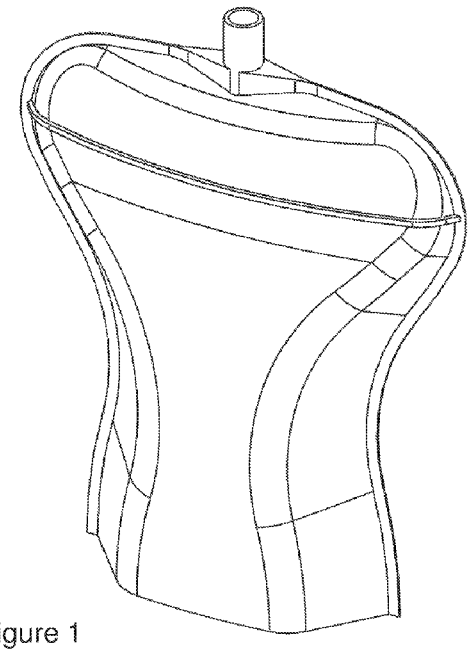

Figure 1

(57) **Abstract:** The invention relates to a disposable or reusable stand-up bag for mixing and serving of mixtures of powder and liquid. In a preferred embodiment the bag is intended for mixing and drinking of protein powder and liquid but the invention is also intended for other uses - such as nursing bottle for infant formula and mixing of glue, grout, filler or preparation of samples. In a preferred embodiment, the bag is narrow at the base for comfortable handling and wider at the top, giving it a "Torso shape". An opening with plastic zipper is placed on the surface of the bag near the top where the bag is wide, allowing easy filling of powder and liquid. The area above the opening can act as a sliding chute, easing the filling of powder into the bag.

DISPOSABLE BAG FOR MIXING OF POWDER AND LIQUID, CAP AND NOZZLES

Field of the Invention

The invention relates to a disposable or reusable stand-up bag for mixing and serving of mixtures of powder and liquid. A preferred embodiment is intended for mixing and drinking of protein powder and liquid (typically drinking water) but the invention has a much larger field of use, such as:

- Nursing bottle for infant formula
- Blending and mixing of food in connection with preparation, cocking, baking, presentation or serving of food, cookies, desserts and ingredients for food
- Mixing and dispensing/injection of powder-based glue, grout, cement, filler or the likes
- Mixing of chemicals and liquid in connection with dosing of chemicals
- Sampling and sample preparation, related to chemical and clinical analysis .

The invention is characterized by a large, sealable opening, a nozzle with closing mechanism and a foldable bottom, enabling the bag to stand firmly when filled. The sealable opening is placed on the surface of the bag and not along one of the edges. This allows all edges to be designed in a way which optimizes the volume, the handling, the stand-up bottom and the visual impression of the bag. In a preferred embodiment the bag is narrow near the base for comfortable handling and wider at the top – a "Torso shape" allowing the bag to rest comfortably in the hand without squeezing it. The sealable opening – for instance a plastic zipper – is placed near the top where the bag is wide which allows easy filling of powder and liquid without spilling. The fact that the sealable opening is placed close to the top maximizes the active volume of the mixing bag. A further advantage of placing the sealable opening close to the top but on the surface and not the top edge is that the area above the opening can act as a sliding chute when powder is filled into the bag. All users will find this helpful but especially elderly and physically challenged people as well as children will find the advantage to be considerable. The closable nozzle is placed at the top of the bag which is the ideal position for drinking regardless of how the bag is oriented when lifted by hand and ideal for all of the other uses listed above.

Prior Art

The use of bags for storing, transporting and serving of food and drinks, filled in by the producer is well known. The product is either filled via the nozzle or via an opening in the almost-sealed bag before the last section is fused.

Testing has demonstrated that a bag in a suitably durable quality is extremely well suited for mixing powder and liquid. Not only can the mixture be shaken as in a shaker made in hard plastic or metal, but the mixture can be "massaged" by hand which ensures a much quicker and more effective blending without lumps.

The use of bags or pouches for blending of powder and liquid is – although not very common – described in patents US2013084028, EP2226262, US6176394, US5709467, WO08400737 and WO03086887.

The bags described above and in particular US2013084028 has been analyzed and compared to the invention in table 1 below.

Disclosure of the Invention

Despite the fact that disposable bags hold a number of advantages over the traditional shaker in hard plastic, it seems that previous inventions of bags have failed to gain wide spread use. As basis for a discussion of the reasons for this lack of success, the desired features of a mixing device are listed in the below table. Each of the listed features is then discussed. The closest prior art is considered to be US2013084028

Table 1 – Comparison of features for mixing powder and liquid

Feature	**Note**	**Traditional shaker in hard plastic**	**Closest Prior Art**	**Invention**
Ability to mix	1	acceptable	good	good
Comfortable to hold	2	good	poor	good
Hygienic	3	acceptable	good	good
Compact	4	poor	good	good
Ability to stand	5	good	good	good
Strength against rupture if dropped	6	good	good	good
Pleasant to drink from	7	acceptable	acceptable	good
Large volume	8	good	good	good
Easy to use	9	acceptable	acceptable	good
Economical	10	good	good	good
Tightness	11	good	good	good
Esthetically pleasing	12	good	poor	good
Prepare many servings	13	poor	good	good
Easy to fill powder	14	good	acceptable	good
Use for infant formula	15	Not applicable	poor	good
Use for blending and dispensing glue, cement, grout, silicone and the likes	16	Not applicable	poor	good
Use for dispensing dough, whipped cream, icing and the likes	17	Not applicable	poor	good

Notes:

(1) Ability to mix:

It is a known problem that all powder is often not dissolved in traditional shakers. A number of attempts have been made to compensate (mainly internal grating & balls) but no op-

timal solution has been identified. It is much easier and much more efficient to mix powder and liquid in a suitable bag, using hand or hands to "massage" the content.

(2) Comfortable to hold:

A bag intended for manual handling & holding should be comfortable to grab and hold – also by one hand and also by a not-so-large hand. At the same time, the volume of the mixing bag should be as large as possible to accommodate as many different uses as possible. It is easy to achieve a good design compromise between size and handling comfort in a shaker made in hard plastic. It is however a considerable problem for the mixing bags listed as prior art since they will be quite wide. Bags listed in prior art typically have four or five edges – one facing down, two facing the sides and one facing up. The last mentioned edge can be divided into two at an angle, whereby the bag will have five angles out of which two will face upwards. One can be used for nozzle and the other for opening. When the bag shall be suitable for holding in one hand, the bag cannot be very wide and length of the upper edges become very limited when designed in accordance with prior art. In US2013084028, the problem has been addressed by placing the nozzle on the side, as high as possible. Even if this embodiment will maximize the width of the top opening, it is still not nearly as wide as on the opening in the invention. And unless the bag is very small, it is still not as comfortable to hold in one hand as the invention; in the preferred embodiment of the invention, the bag can be made in a "Torso-shape", where it is narrow around the base for comfortable holding, and wide towards the top, allowing a wide opening for comfortable filling of powder and liquid. The torso shape ensures that the bag rests nicely in the hand since the shoulders prevents it effectively from slipping.

(3) Hygienic:

Classic shakers in hard plastic are known for their need of cleaning shortly after use. If they are left with wet remains of protein mixture, they will begin to smell in a matter of hours and the smell can be impossible to remove. A disposable bag will not have this problem.

(4) Compact:

Classic shakers in hard plastic takes up the same volume whether they are empty, only contain powder, are filled with mixture or have been used and are waiting for cleaning. A disposable bag is much more compact and much lighter.

(5) Ability to stand:

It is important that a bag can stand firmly on a surface without risk of tilting. The invention, the classic shaker and the closest prior art all fulfill this requirement.

(6) Resistance against rupture if dropped:

A large number of tests have been made with several different types of plastic zippers, known in the art. The bag can sustain very rough treatment without bursting or leaking.

(7) Pleasant to drink from:

On the classic shaker in hard plastic, the drinking opening must be large enough to allow air into the container as the liquid is consumed. This is not the case when drinking from a bag, which makes it more pleasant to drink from as long as the nozzle is not to large. This feature is very relevant when using the invention for infant formula since the child is not disturbed by air passing backwards into the bottle.

While the advantage of drinking from a nozzle also applies for closest prior art US2013084028, this design has the considerable disadvantage of the nozzle being placed on the side. The nozzle on the side is much less pleasant to drink from, since the user must grab and hold the bag so that the nozzle faces the users face – or compensate by twisting the bag 180 degrees when drinking. When the nozzle is placed on the side, the bag is also more difficult to empty since this requires a very steep angle of the bag and/or the user's neck - or that the bag is rotated upside down while drinking.

In the preferred embodiment of the invention, the nozzle is placed symmetrically on the top of the bag which is ideal for drinking comfort, regardless of the rotational angle in which the bag is oriented in the hand.

(8) Large volume:

Please also refer to note (2). The invention enables designing for the largest possible volume for handling of and holding a bag with one hand. In a bag with a sealable opening, the active volume is made up by the volume below the opening. Maximizing the volume is especially relevant when using the bag for mixing, since the ingredients take up more space before they are mixed than after.

(9) Easy to use:

The traditional shaker in hard plastic is easy to use when it is dry on the inside and when working at a table when scooping powder. The container with powder is often quite large,

so if the user intends to scoop powder for the mixture at the training centre or in the field, then powder is often brought in a smaller container or small plastic bag. When the process of scooping from a small container or bag takes places in a changing room or in the field, then things can become messy. With a disposable mixing bag, the user can prepare the correct quantity of powder in new, clean, dry bags in advance and just add liquid and mix when ready to use the product.

(10) Economical :

It is assumed that there is very little difference in the economic and environmental impact between the use of disposable bags and traditional shakers. The tradition shaker can be reused many times but requires cleaning each time. Furthermore, the lifetime of the classic shaker is often limited by the fact that they tend to build up an unpleasant odour.

(11) Tightness:

Numerous tests with mixing of powder and liquid and with dropping of sealed bags on a hard surface from considerable height have shown that a fully satisfactory tightness of the bag can be achieved by means, normally used in the art, such as laminated plastic, plastic zipper, plastic nozzle and cap, but not limited thereto.

(12) Esthetically pleasing:

It is assumed that most users will find the torso-shape of the preferred embodiment esthetically more pleasing than the more asymmetric and square designs in prior art. Many will probably even find it more interesting than the traditional cylindrical shakers in hard plastic.

(13) Prepare many servings:

As mentioned in note (9), the user can prepare a number of clean, dry disposable bags with powder in advance. As long as the powder is dry, the powder can be stored for a long time before use. The bag takes up a minimum of space, even if powder has been filled in. With traditional shakers, there will be a risk of the shaker not being completely dry from cleaning which will increase the risk of the powder decomposing or forming hard lumps.

(14) Easy to fill powder:

As described in notes (2) and (8), the preferred embodiment of the invention is characterized by a very wide opening which is crucial for the ease of filling the bag with powder. A

further advantage of the sealable opening being placed close to the top but on the surface and not the top edge is that the area above the opening can act as a sliding chute when powder is filled into the bag, thereby considerably easing the filling process and reducing the risk of spill.

(15) Use for infant formula:

The bags in prior art are not well suited for infant formula since side-mounted nozzle makes them uncomfortable to hold and requires them to be rotated in order for the child to drink from them. The invention is much better suited since the nozzle is in the top.

(16) Use for blending and dispensing glue, cement, grout, filler, silicone and the likes:

The bags in prior art are not well suited for the listed purposes since the side-mounted nozzle makes them uncomfortable to hold and requires them to be rotated in order for the content to be injected downward or sideways. The invention is much better suited since the nozzle is in the top.

(17) Use for dispensing dough, whipped cream, icing and the likes

The bags in prior art are not well suited for cooking and baking purposes since the side-mounted nozzle makes them uncomfortable to hold and requires them to be rotated in order for the content to be injected downward or sideways. The invention is much better suited since the nozzle is in the top.

Drawings:

Figure 1	Sketch of filled mixing bag.
Figure 2	The elements of the mixing bag. 21: backside, 22: upper part of the front side, 23: lower part of the front side, 24: Folded sheet, forming the bottom, 25 and 26: zipper parts. 27: nozzle, 28: screw cap.
Figure 3	Fusing of bottom section, parts 21, 23 and 24
Figure 4	Alternative No. 2 for fusing of zipper part 25 on sheet 22
Figure 5	Alternative No. 3 for bending zipper part 25 on sheet 22 and zipper part 26 on sheet 23
Figure 6	Alternative No 4 Modified version of zipper 25.
Figure 7	Alternative preferred embodiment of mixing bag, using a folded sheet also in the top. 71: folded top sheet, 72: Front side
Figure 8	Alternative preferred embodiment of mixing bag with the zipper placed partially along the top edge with only a small section of sheets 21 and 22 extending above the zipper
Figure 9	Alternative preferred embodiment of mixing bag 91: Alternative nozzle
Figure 10	Sectional view of screw cap 28, designed to avoid cavity inside nozzle.

Detailed Description

Figure 1 show a preferred embodiment of the mixing bag when it is filled. As shown on Figure 2 the bag is made up by sheets of flexible plastic and/or durable material. It consists of four sheets - 21, 22, 23 and 24 - fused together along the edges, forming a tight seal. The four sides form a bag or pouch in which powder and liquid can be mixed, stored and used. 21 is the backside, 22 is the upper part of the front side, 23 is the lower part of the front side and 24 is a folded sheet, forming the bottom. When the bag is filled, the folded sheet 24 will unfold and help to form a wide bag bottom which can stand upright on a surface. The two parts of a sealing mechanism - such as a zipper – are fused onto the bottom of 22 and close to the top of 23, leaving a small flap used for pulling the zipper open. Apart from the four sheets the bag contains the two zipper parts 25 and 26 and a nozzle 27 with a screw cap 28 and/or another closing mechanism as known in the art. The nozzle with cap is placed on top of the bag for optimal accessibility for all uses.

The bag can be manufactured by processes and using materials, typically used in the art.

The terms "backside" and "front side" are only used to differentiate two different sides. In the present description, the sealable opening or zipper is placed on the front side for the sake of understanding. But printing or similar can be used to define either of the sheets 21 or (22+23) as the front side.

The plastic film, normally used in the art is laminated in such a way that the inner layer has a lower melting point than the outer layer. This is an advantage when controlling the fusing (welding) process. On known stand-up bags, it poses a small challenge when fusing the foldable bottom of the bag since the two outward sides the bottom sheet 24 needs to be fused together along the sides of the bag. In the art, this is typically done by a point-shaped fusing process using higher and more concentrated energy – see Figure 3.

In the invention, a similar challenge is present regarding sheet 22, since this sheet shall be fused to the nozzle (27) and sheet 21 on one side and to one part of the zipper 26 on the other side. Four ways of addressing this challenge has been identified:

1. By using a film, equally suitable for welding on both sides as material for sheet 22
2. By using a normal film with the zipper already fused, then folding the zipper 180 degrees and fixate the fold by use of ultrasonic fusing or other bonding methods used in the art – see Figure 4.

3. By using a normal film with the zipper already fused, then folding the zipper 90 degrees out and at the same time folding the zipper on sheet 23 90 degrees out – see Figure 5. By using this embodiment, the manual sealing of the bag is slightly easier but the sheet 22 cannot be used as sliding chute for the powder
4. By using a modified zipper on sheet 22, the modified zipper being suitable for fusing on the same side as the zipper front – see figure 6.

Since the preferred embodiment on the invention is not rectangular but has a torso-shape, a cutting process will be required, but this is commonly used in the art. In another preferred embodiment, the mixing bag has a foldable sheet in both top and bottom, see figure 7. This will enable an even larger volume. In this embodiment, the zipper is placed on one of the top edges and the nozzle on the other. In another preferred embodiment, the zipper (25 & 26) is placed partially along the top edge with only a small section of sheets 21 and 22 extending above the zipper – see Figure 8.
In another preferred embodiment, the zipper parts 25 and 26 are curved and placed along the top edge of a curved bag design, see figure 9. In this embodiment, the nozzle is made with a flat side to accommodate the zipper and not situated symmetrically between sheets 21 and 22 but above sheet 21. In a preferred embodiment of the screw cap 28 it is designed to fill the cavity inside the nozzle so that lumps of powder in the cavity is avoided – see Figure 10
In order to accommodate use of the invention for many different applications, a number of alternative nozzles can be offered as accessories to be fitted instead of the screw cap:

- Pacifier mouthpiece for infant feeding (sterilized)
- Various dispensing and injection nozzles for grout, cement, glue, silicone and similar products used in the building industry and in connection with home, hobby, cars, boats, garden, marine and other applications. Different nozzles can be long, short, thick, thin, circular, flat, conical etc and the selection of dispensing nozzles can be increased as the need arise.
- Various dispensing and injection nozzles for the food and baking industry and for professional cooks and restaurants as well as home use. Also a set containing hose and mouthpiece for hands-free drinking Different nozzles can be long, short, thick, thin, circular, flat, conical, star-shaped or similar and the selection of dispensing nozzles can be expanded as the need arise.
- A kit for hands-free drinking as known in the art. The kit contains suction hose with mouth piece intended for hands-free drinking while on the move (for example running) and for people lying down. The mouth piece can contain a system preventing the liquid from flowing when not intended.

Claims:

1. A disposable bag for mixing of powder and liquid, characterized by a combination of stand-up bottom, a nozzle on top and a wide sealable opening placed on the upper part of the surface of the bag, wherein the area above the opening can form a sliding chute, facilitating the filling of powder.
2. A disposable bag for mixture of powder and liquid, characterized by a combination of stand-up bottom, a nozzle and a large sealable opening placed partially along the top edge and partially on the surface of the bag.
3. A disposable bag for mixture of powder and liquid, characterized by a combination of stand-up bottom, a large curved sealable opening placed along the top edge and a nozzle placed alongside the sealable opening on the top.
4. A disposable bag according to any of the claims 1and/or 2 and/or 3, characterized by the shape of a torso – narrow at the base for easy handling with one hand and wider near the top, enabling a wide sealable opening and easy resting in the hand.
5. A disposable bag for mixture of powder and liquid, characterized by a combination of stand-up bottom and a similar foldable top forming two parallel top edges with a nozzle placed on one and a sealable opening on the other - or in the bottom of the V-shaped foldable top, whereby the foldable top will form a funnel
6. A disposable bag according to claims 1 and/or 4 where the sealable opening is placed flat between the two surfaces to be sealed whereby the area above the sealable opening can act as a sliding chute.
7. A disposable bag according to claims 1 and/or 4 where the sealable opening is placed at an angle, standing out from the two surfaces to be sealed, whereby closing of the sealable opening is made easier and fusing on both sides of the sheet between opening and nozzle is avoided.
8. A cap for the nozzle according to claim 1-7, characterized by a design which avoids a cavity inside the nozzle whereby un-dissolved lumps of powder are avoided.
9. A series of alternative accessory-nozzles to be fitted instead of the screw cap, facilitating the use of the bag for a number of alternative uses related to drinking, extrusion, dispensing, dosing and injection of products which can be mixed inside the bag or filled into the bag.

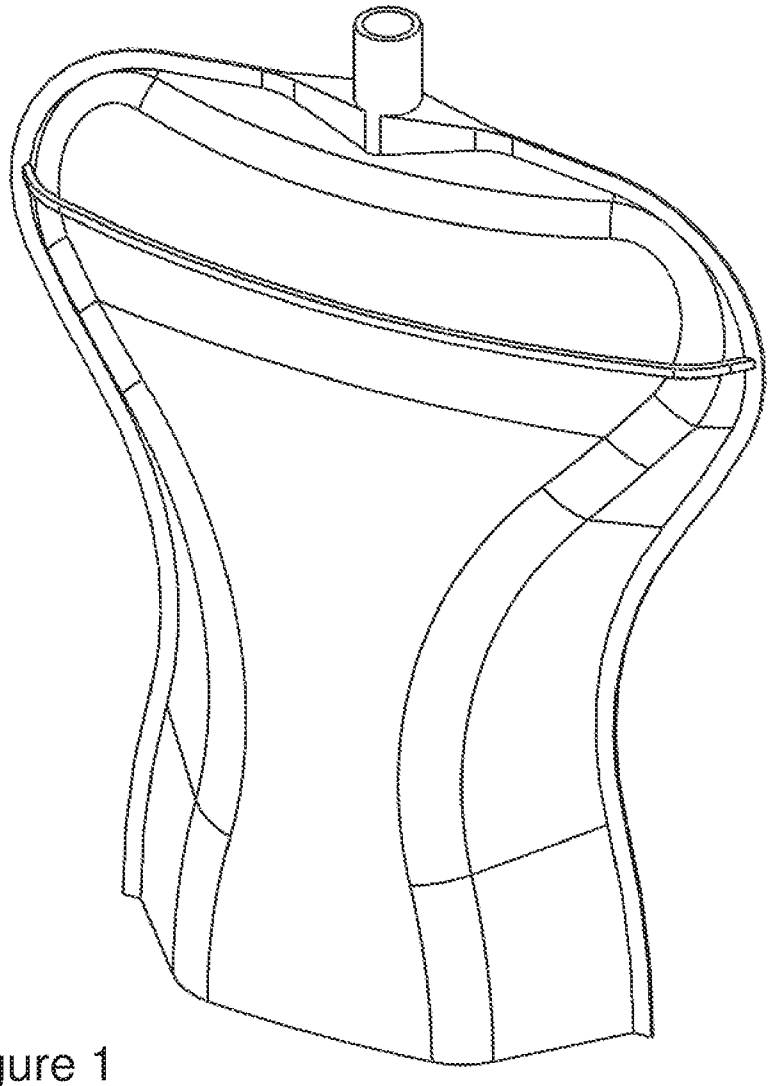

Figure 1

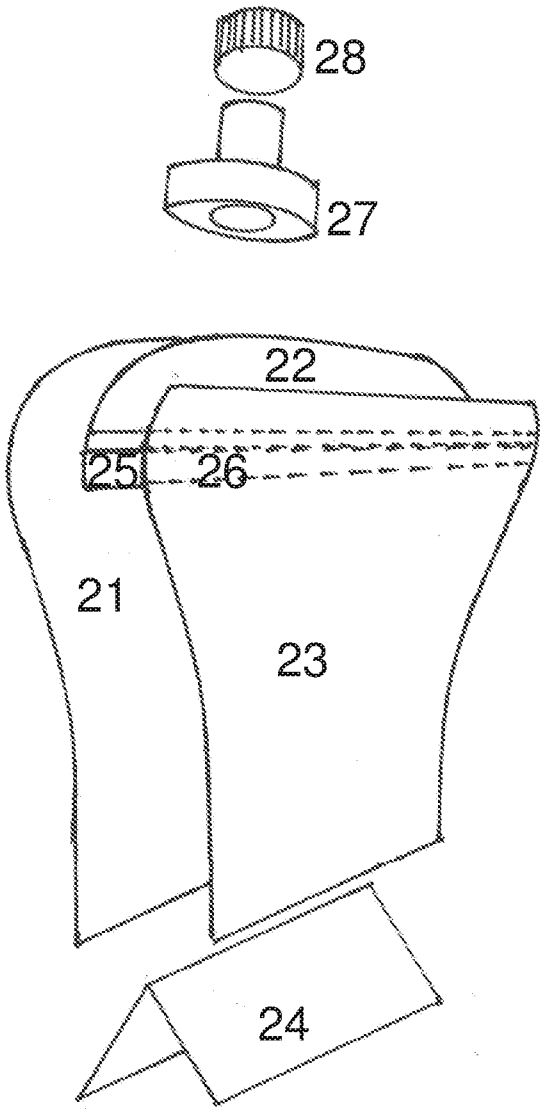

Figure 2

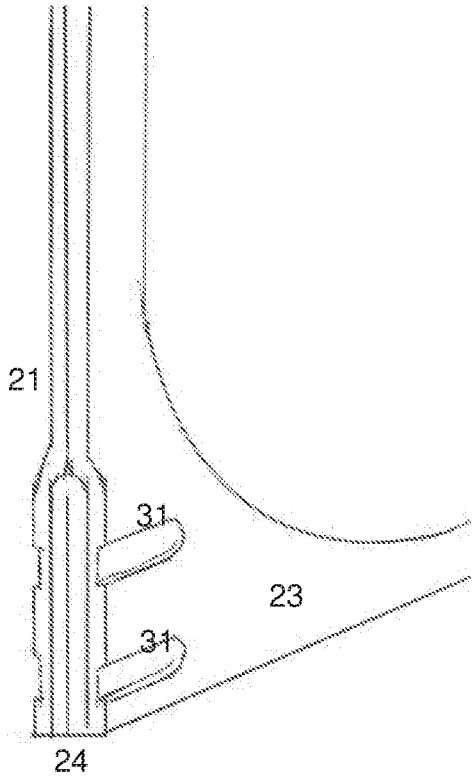

Figure 3

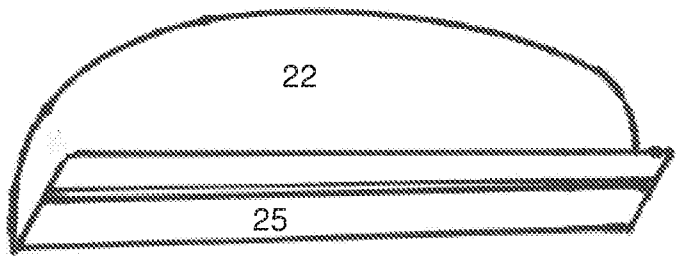

Figure 4

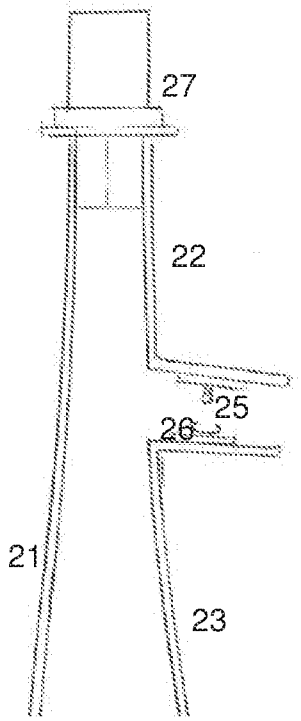

Figure 5

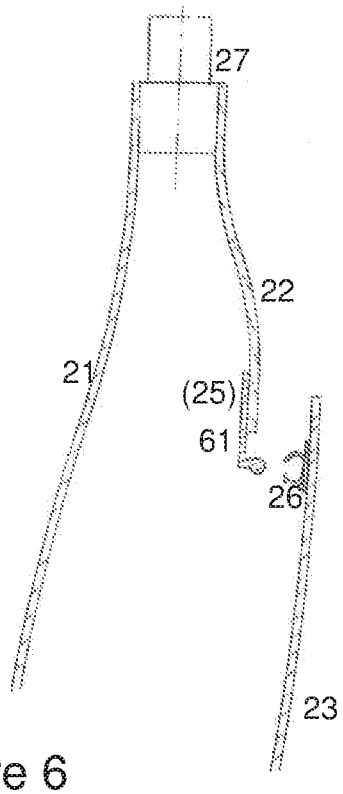

Figure 6

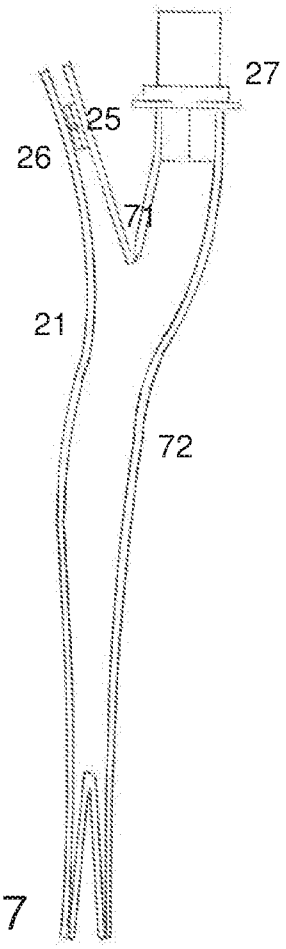

Figure 7

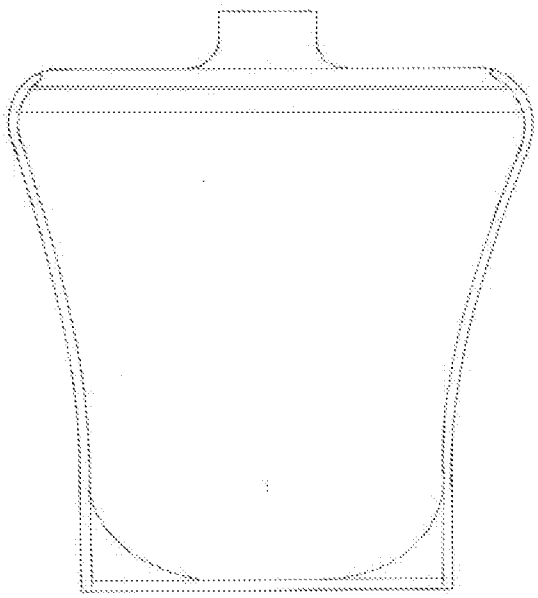

Figure 8

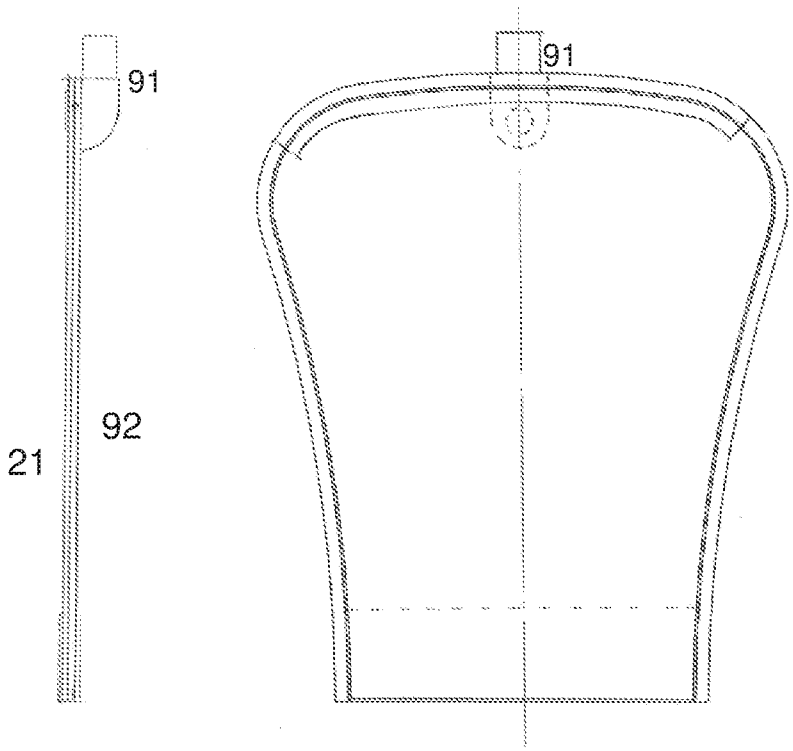

Figure 9

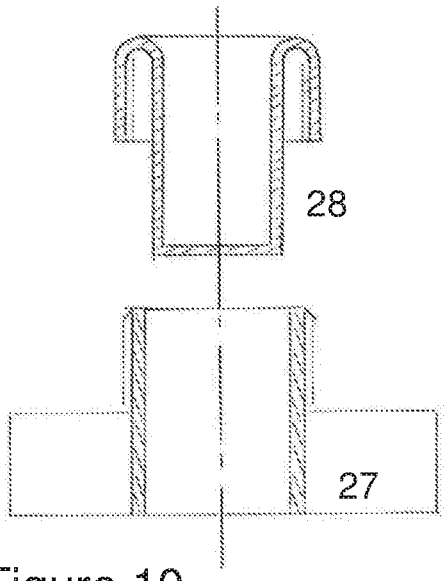

Figure 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2017/000009

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D75/00 B65D75/58 B65D33/25
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2013 103978 U1 (RENKEN MARTIN [DE]) 18 September 2013 (2013-09-18) page 2, paragraph 11 page 2, paragraph 13 - page 3, paragraph 13 page 4, paragraph 30 claims 1, 10 figures 1-5	1,2,4,5, 7
X	EP 2 226 262 A1 (TOYO SEIKAN KAISHA LTD [JP]) 8 September 2010 (2010-09-08) cited in the application column 10, paragraph 35 column 13, paragraphs 49, 50 figures 7, 16, 18, 19	1,2,4,6

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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Date of the actual completion of the international search	Date of mailing of the international search report
28 August 2017	30/10/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Piolat, Olivier

2

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK2017/000009

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-7

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 481 627 A (HYDROGARDEN WHOLESALE SUPPLIES LTD [GB]) 4 January 2012 (2012-01-04) page 3, line 31 - page 4, line 28 figures 1, 2	1,4,6
X	JP H08 72904 A (FUKUI YUKICHI) 19 March 1996 (1996-03-19) abstract; figures 2, 4	1,4,6
X	JP 2006 232367 A (TAKANASHI AKIYOSHI) 7 September 2006 (2006-09-07) abstract; figures 1-5	3,4
X	JP H11 11493 A (TOPPAN PRINTING CO LTD) 19 January 1999 (1999-01-19) abstract; figures 1, 2	3,4

2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/DK2017/000009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202013103978 U1	18-09-2013	NONE	
EP 2226262 A1	08-09-2010	CN 101084153 A	05-12-2007
		EP 1832522 A1	12-09-2007
		EP 2226262 A1	08-09-2010
		EP 2226263 A1	08-09-2010
		JP 4748064 B2	17-08-2011
		JP WO2006067880 A1	12-06-2008
		KR 20070098828 A	05-10-2007
		US 2008124006 A1	29-05-2008
		WO 2006067880 A1	29-06-2006
GB 2481627 A	04-01-2012	NONE	
JP H0872904 A	19-03-1996	NONE	
JP 2006232367 A	07-09-2006	NONE	
JP H1111493 A	19-01-1999	JP 3826496 B2	27-09-2006
		JP H1111493 A	19-01-1999

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7

   Disposable bag

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2. claim: 8

   Cap

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3. claim: 9

   Accessory-nozzles
