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(54) **Infusion bag.**

(57) A minimized drip infusion bag is provided with means to keep the bag buoyant upon contact with the infusion liquid, the infusible material being kept near the bottom drain edge of the infusion bag and the top of the bag enclosing a gas, a foaming agent or a material imparting buoyant properties. It is essential that the bottom drain edge of the bag in wet state be straight and horizontal.

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This invention relates to an infusion bag comprising at least two layers of a liquid, permeable filter material which are joined at the edges so as to form at least one pouch containing an infusible material.

Infusion bags of this type are well known and are usually intended for preparing a single cup of beverage, such as coffee or tea, by infusion in hot water, but also infusion bags with herbs and spices or soup are well known. The bags may incorporate a handle to facilitate suspension of the bag in the infusion liquid and removal of the bag from the liquid. In some forms, the handle constitutes a short length of string stapled or sealed to the bag. The free end of the string may have a tag attached for easy handling.

In its simplest and commonest form, such a bag is just a simple envelope or pouch sealed on all edges and made of a liquid, permeable filter material which, at one side, can be heat-sealed. The liquid, permeable filter material may be filter paper, which may comprise synthetic fibres, or it may be a perforated plastic material.

While an infusion bag has many advantages and is rather easy to produce and convenient to use, it has also some drawbacks. The first disadvantage arises after the bag has been immersed in the infusion liquid for the required period of time to prepare an acceptable brew and it is desired to remove the bag from the liquid. The infusible material in the bag and the material of the bag itself have absorbed an appreciable quantity of the infusion liquid and this residual liquid drops from the bag as it is withdrawn from the infusion liquid and usually such a dripping bag is an inconvenience for the user.

The second disadvantage is that the rate and the amount of extraction from such an infusion bag is not always optimal. Attempts have been made to remedy this by providing a so-called two-chamber bag, in which two pouches or envelopes with infusible material are attached to each other at the top and usually also at the bottom, so that the infusion liquid may pass between the two pouches and at all sides enter into the bag. The disadvantage of these bags resides in their requiring complicated machinery for their production.

There is therefore a need for an infusion bag which can be produced rather easily but which does not exhibit the disadvantage of dripping for a long period of time after it has been taken out of the infusion liquid and which at the same time exhibits an acceptable rate and amount of extraction of the bag.

It has now been found in extensive experiments that such an infusion bag with the required short drip time (and the associated reduced mess) may be obtained by providing an infusion bag

which, compared to the standard rectangular, square or round tea bag, has an appreciable shorter drip time and which can easily be removed from the infusion liquid.

It has been found during the experiments, particularly with tea bags, that if the bag is brought into the hot infusion liquid (or the boiling infusion liquid is poured upon the tea bag), the small air pockets present in the tea leaf material are forced out of it and this discharged air is transferred from the tea leaf material to the top area of the tea bag. If at the same time the bulk of the expanded tea leaf material remained confined in the tea bag near the bottom drain edge, the degassing action created a flotation, which caused the tea bag to float in the infusion liquid like a buoy with the top area containing the air sticking out of the infusion liquid, thus offering a convenient lift point.

During the experiments it has been found that the infusible material, in this case the tea leaf material, should be kept tight together, which can be effected by retaining the bulk of the tea leaf material near the bottom drain edge of the infusion bag and keeping it there in a relatively confined area.

Furthermore, it has been found that it is essential, when lifting the infusion bag out of the cup, that the bottom drain edge of the infusion bag in wet state be substantially straight and in an essentially horizontal position. It was found that this could, for example, be advantageously effected by providing the bottom seal of the infusion bag in dry state in the form of an arc of a circle.

The substantially straight and essentially horizontal position of the bottom drain edge of the infusion bag could not be reached when using a standard rectangular or square tea bag and therefore the minimized drip infusion bag according to the present invention differs appreciably from the form and shape of a standard infusion bag.

Therefore, the present invention relates to a minimized drip infusion bag, which is characterized in that it is provided with means to keep the infusion bag buoyant upon contact with the infusion liquid, the bottom drain edge of the infusion bag in wet state being substantially straight and in an essentially horizontal position.

A floating infusion bag has been described in United States Patent Specification US-A-3,809,215 (Tetley Inc.). In this patent it has been proposed to provide an infusion package, such as a tea bag, with means for holding the bag in a horizontal floating position during steeping, so that the bag is almost parallel with and at about or near the surface of the water. Suitable means are attached to the bag in the form of closed cell foam strips or air filled chambers attached over the entire length of the bag.

Preferably, the present invention relates to a minimized drip infusion bag, which is characterized in that it is provided with (a) means to restrain the bulk of the infusible material near the bottom drain edge and/or (b) means to restrain the gas evolved upon contacting the infusible material in the bag with hot infusion liquid, after its transfer to the top area of the bag in that area, said bottom drain edge of the infusion bag in wet state being substantially straight and in an essentially horizontal position.

The means to restrain the bulk of the infusible material near the bottom drain edge of the infusion bag can first of all be based on the friction between the infusible material and the interior of the infusion bag. Thus, the infusible material and/or its particle size may be selected such that together with the relative roughness of the inside of the selected infusion bag material a maximum friction occurs, which is sufficient to keep the infusible material near the bottom drain edge of the infusion bag.

Another means to restrain the bulk of the infusible material near the bottom drain edge of the infusion bag is to fold over or crease the upper part of the infusion bag along a horizontal folding line extending over the full width of the infusion bag, and which is located in the vicinity of the top surface of the infusible material contained in the lower part of the infusion bag.

Still another means to restrain the bulk of the infusible material near the bottom drain edge of the infusion bag is to provide physical restrictions which are located over the surface of the infusible material contained in the lower part of the infusion bag. These physical restrictions may consist of adhered or sealed areas, preferably heat-sealed areas, extending from the lateral seams of the infusion bag into the free area of the bag in the form of bars, fins, diamonds, half-circles and the like shapes, said adhered or sealed means being located over the top surface of the infusible material contained in the lower part of the bag. The sealed areas restrict the upward movement of the infusible material but still provide sufficient passageway for the air during the degassing action of the infusible material when the infusion bag is wetted by immersion in the infusion liquid.

The physical restriction may also consist of restricted adhered areas like spot seals located in the free surface area of the infusion bag above the top surface of the infusible material contained in the lower part of the infusion bag. The spot seals are preferably heat seals and may have any size and shape, as long as a free passage of the air during the degassing is guaranteed. Instead of spot seals, at least one staple or a stitch may also be used.

The means to restrain the gas evolved upon contacting the infusible material in the bag with

infusion liquid after its transfer to the top area of the bag in that area may vary widely, the main purpose being to keep the infusion bag buoyant, preferably with the top of the infusion bag protruding above the level of the infusion liquid in the container into which the infusion bag is brought. This may, for example, be effected by the provision of a certain shape of the infusion bag in which the horizontal distance between the lateral seals diminishes towards the top of the bag and the lateral seals are isosceles so as to form a triangular or trapezoidal bag.

Furthermore, the means may be the provision of a coating, preferably a adhesive coating, on the interior surface area of the infusion bag in the top area of the bag, extending from the top of the bag towards the bottom over at most half the perpendicular distance between the top and the bottom drain edge of the infusion bag.

Another means to restrain the evolved gas in the top area of the bag is to treat the top half area of the material from which the infusion bag is prepared in such a way, e.g. by heating it, that its porosity is reduced to such an extent that the gas occluded in the top space of the infusion bag cannot leave this space by diffusing through the bag material.

If the amount of occluded gas in the infusible material contained in the minimized drip infusion bag according to the present invention is too small to keep the infusion bag in a buoyant condition, an innocuous foaming agent evolving a gas when contacted with the infusion liquid can be provided in the interior top space of the infusion bag according to the present invention.

In another embodiment, a certain amount of encapsulated gas, e.g. encapsulated in a plastic container like a sphere or an ellipsoid container, may be provided in the interior top space of the infusion bag according to the present invention.

In still another embodiment, a piece of material imparting buoyant properties to the infusion bag may be provided in the top area of the infusion bag according to the present invention.

Preferably, the means to restrain the bulk of the infusible material near the bottom drain edge of the infusion bag according to the present invention are used in conjunction with the means to restrain the gas evolved upon contacting the infusible material in the bag with infusion liquid after its transfer to the top area of the bag in that area, or with the other means of keeping the infusion bag according to the present invention in buoyant condition, used if insufficient gas is evolved from the infusible material contained in the infusion bag upon wetting with the infusion liquid.

In its simplest embodiment, the infusion bag according to the present invention may have the

form of a segment of a circle with a truncated apex. Usually, however, the infusion bag according to the present invention will have the form of an isosceles trapezium. The liquid, permeable filter material may be standard filter paper as normally used in the manufacture of infusion bags, such as tea bags. Preferably, this filter paper is heat-sealable, at least at one side of the paper. The filter paper may also comprise synthetic fibres or may consist of perforated plastic material, and may at least be partially provided with a coating material. It may also have been impregnated with ingestible colouring agents, flavouring agents, sweetening agents, pH-adjusting agents, and the like substances.

The infusion bag may also be provided with a string to which, at the end, a tag may be attached.

The infusible material may be a tea-comprising material, a coffee-comprising material, a herbs-comprising material, or a mixture of tea and herbs, a spices-comprising material, such as spice mixtures or soup mixtures and bouillon powders, a material comprising a flavouring agent, and mixtures of these materials. Although, preferably, the infusible material is ingestible, also non-ingestible materials may be used, such as dyes.

The invention will now further be described with reference to the accompanying drawings, in which :

Fig. 1-11 show front views of various infusion bags according to the present invention; and Fig. 12 shows a relation between water-retention weight in grams and drip time in seconds for two infusion bags according to the present invention (A,B), a standard round tea bag (C) and a standard rectangular tea bag (D);

Fig. 1 shows a front view of an infusion bag 1 according to the present invention, which includes two layers 2,3 of a liquid, permeable filter material, which are joined together along the lateral seals 4,5, the bottom seal 6 and the top seal 7, preferably through heat-sealing. Heat-sealed areas are depicted in hatched lines in all drawings.

In Fig. 1, the infusion bag has the form of a segment of a circle with truncated apex and the angles between the lateral seals 4,5 and the top seal 7 and the bottom seal 6, both in the open area 8 (which is the area available for infusion) and along the outer edge of the bag 9, are rounded off. In this type, both the upper edge 10 and the lower edge 11 of the bottom seal 6 constitute an arc of a circle.

In Fig. 2, another embodiment of the infusion bag according to the present invention has been shown in an isosceles trapezoidal form. Here, both the upper edge 10 and the lower edge 11 of the bottom seal 6 also constitute an arc of a circle but, as has been

shown in Fig. 4, it is also possible that only the upper edge 10 of the bottom seal 6 constitutes an arc of a circle, whereas the lower edge 11 of the bottom seal 6 is horizontal. The reverse may also occur, in which the upper edge 10 of the bottom seal 6 is horizontal and the lower edge 11 of the bottom seal 6 constitutes an arc of a circle. This modification has not been shown in the Figures.

The horizontal distance of the top seal 7 between the lateral seals 4,5 may be different in length, as may be seen when comparing Fig. 2 and Fig. 4.

Fig. 3 shows another embodiment of the infusion bag according to the present invention, also in an isosceles trapezoidal form. Here, the top seal 7 and the bottom seal 6 are both horizontal and all angles between the lateral seals 4,5 and top seal 7 and bottom seal 6, both along the open area 8 and along the outer edge 9 of the infusion bag, are rounded off. It is possible, however, that only the angles in the open area 8 or along the outer edge 9 of the infusion bag are rounded off.

Fig. 5 shows a further embodiment of the infusion bag according to the present invention in an isosceles trapezoidal form, in which, at a distance from the top seal 7, the two layers 2,3 of the liquid, permeable filter material are joined by heat-sealing over at least part 12,12' of the horizontal distance between the lateral seal 4,5. Although in Fig. 5, the bottom seal 6 is horizontal, the lower edge 11 or the upper edge 10, or both, of the bottom seal 6 can constitute an arc of a circle.

In Fig. 6, an embodiment of the minimized drip infusion bag according to the present invention has been shown, in which the means to restrain the bulk of the infusible material near the bottom drain edge 10 is formed by folding over the top part of the infusion bag along folding line 13. Although in this Fig. 6 the bottom seal 6 is horizontal, the lower edge 11 or the upper edge 10 (not indicated), or both, of the bottom seal 6 can constitute an arc of a circle.

In Fig. 7, another embodiment of the minimized drip infusion bag according to the present invention has been shown, in which the means to restrain the bulk of the infusible material near the bottom drain edge of the infusion bag is a physical restriction which consists of a seal area in the form of two half diamonds 14 protruding inwardly from the lateral seals 4,5.

In Fig. 8, a further embodiment of the minimized drip infusion bag according to the present invention has been shown, in which the means to restrain the bulk of the infusible material contained in the bag near the bottom drain edge of the infusion bag is a physical restriction which consists of two round point seals 15 connecting the two layers of a liquid-permeable filter material of which

the infusion bag has been made. The point seals may be heat-sealed but can also be effected by using an innocuous adhesive material.

In Fig. 9, yet another embodiment of the minimized drip infusion bag according to the present invention has been shown, in which the means to restrain the bulk of the infusible material contained in the bag near the bottom drain edge of the infusion bag is the specific shape of the bag, of which the interior surface of the permeable filter material has a high friction coefficient. In this embodiment, the lower edge 11 of the bottom seal 6 may also be horizontal.

In Fig. 10, a further embodiment of the minimized drip infusion bag according to the present invention has been shown, in which the means to restrain the bulk of the infusible material contained in the bag near the bottom drain edge of the infusion bag are formed by the specific shape of the bag in conjunction with the two ellipsoidal heat-seal spots or adhesive spots. In this embodiment, the lower edge 11 of the bottom seal 6 may also be horizontal.

Finally, in Fig. 11, still another embodiment of the minimized drip infusion bag according to the present invention has been shown, in which the means to restrain the bulk of the infusible material in the bag near the bottom drain edge of the infusion bag is formed by the constriction in the centre part of the hour glass-shaped infusion bag. In this embodiment, the lower edge 11 and/or the upper edge 10 of the bottom seal 6 may also be horizontal. In all embodiments as shown in Fig. 1-11, the liquid permeable material can be filter paper, but also perforated plastic material. Advertisement can also be printed on the outside of the infusion bag on the two layers 2,3 of the liquid, permeable material.

In Fig. 12, the results of some experiments have been graphically depicted. The water weight, which is the weight of the water in grams retained by the brewed infusible material (in this case black tea leaf), is plotted along the vertical axis of the vertical axis and the drip time, which is the time in seconds measured from the moment at which the infusion bag is raised above the hot water (90 °C) level till the moment when the period of time between two successive drops is more than 10 seconds, is plotted along the horizontal axis. Line D relates to the results obtained with a standard rectangular tea bag (75 mm x 65 mm); line C depicts the results obtained with a standard round tea bag (diameter 65 mm); line B relates to the results obtained with a tea bag according to the present invention as shown in Fig. 3, and line A relates to the results obtained with a tea bag according to the present invention as shown in Fig. 2. It is clear from these results that the tea bags according to

the present invention provide the optimum drip time, whereas the brew obtained with both tea bag types was considered to be excellent.

Claims

1. A minimized drip infusion bag, characterized in that it is provided with means to keep the infusion bag buoyant upon contact with the infusion liquid, the bottom drain edge of the infusion bag in wet state being substantially straight and in an essentially horizontal position.
2. A minimized drip infusion bag according to Claim 1, characterized in that it is provided with (a) means to restrain the bulk of the infusible material contained in the bag near the bottom drain edge of the bag, and (b) means to restrain the gas evolved upon contacting the infusible material in the bag with infusion liquid, after its transfer to the top area of the bag in that area, said bottom drain edge of the infusion bag in wet state being substantially straight and in an essentially horizontal position.
3. A minimized drip infusion bag according to Claim 2, in which the means (a) is to fold over the upper part of the infusion bag along a folding line extending over the full width of the infusion bag, said folding line being located in the vicinity of the top surface of the infusible material contained in the lower part of the infusion bag.
4. A minimized drip infusion bag according to Claim 2, in which the means (a) consist of physical restrictions, located over the top surface of the infusible material contained in the lower part of the infusion bag.
5. A minimized drip infusion bag according to Claim 2, in which the means (a) consist of adhered or sealed areas extending from the lateral seams of the infusion bag into the free area of the bag, located over the top surface of the infusible material contained in the lower part of the infusion bag.
6. A minimized drip infusion bag according to Claim 2, in which the means (a) consist of restricted adhered areas in the free area of the bag over the top surface of the infusible material contained in the lower part of the infusion bag.
7. A minimized drip infusion bag according to

Claim 2, in which the means (a) consist of spot heat seals, staples or stitches located in the free area of the bag above the top surface of the infusible material contained in the lower part of the infusion bag.

8. A minimized drip infusion bag according to Claim 2, in which the means (b) is the provision of a shape of the infusion bag in which the horizontal distance between the lateral seals diminishes towards the top of the bag and the lateral seals are isosceles so as to form a triangular or trapezoidal bag.
9. A minimized drip infusion bag according to Claim 2, characterized in that it has the form of a segment of a circle with truncated apex.
10. A minimized drip infusion bag according to Claim 2, characterized in that the lower edge of the bottom seal of the bag constitutes an arc of a circle.
11. A minimized drip infusion bag according to Claim 2, characterized in that the upper edge of the bottom seal of the bag constitutes an arc of a circle.
12. A minimized drip infusion bag according to Claim 2, characterized in that at least one of the angles between the lateral seals and the top seal and the bottom seal in the open area of the bag is rounded off.
13. A minimized drip infusion bag according to Claim 2, characterized in that at least one of the angles between the lateral seals and the top seal and the bottom seal measured along the outer edge of the bag is rounded off.
14. A minimized drip infusion bag according to Claim 2, characterized in that it comprises two chambers in the form of pouches.
15. A minimized drip infusion bag according to Claim 2, characterized in that, at a distance from the top, the two layers of liquid, permeable filter material are joined over at least part of the horizontal distance between the lateral seals.
16. A minimized drip infusion bag according to Claim 2, in which means (b) is the provision of a coating on the interior surface area of the infusion bag in the top area of the bag extending from the top of the bag towards the bottom over at most half the perpendicular distance between the top and the bottom drain edge of

the infusion bag.

17. A minimized drip infusion bag according to Claim 2, in which means (b) is the provision of an area of non-porosity of the infusion bag material in the top area of the bag, extending from the top of the bag towards the bottom over at most half the perpendicular distance between the top and the bottom drain edge of the infusion bag.
18. A minimized drip infusion bag according to Claim 2, in which an innocuous foaming agent evolving a gas when contacted with the infusion liquid is provided in the interior top space of the infusion bag.
19. A minimized drip infusion bag according to Claim 2, in which an encapsulated gas is provided in the interior top space of the infusion bag.
20. A minimized drip infusion bag according to Claim 2, in which a piece of material having buoyant properties is provided in the interior top space of the infusion bag.
21. A minimized drip infusion bag according to any one of Claims 1-20, characterized in that the infusible material is selected from the group consisting of a tea-comprising material, a coffee-comprising material, a herbs-comprising material, a spices-comprising material, a material comprising a flavouring agent, and mixtures thereof.

Fig. 1.

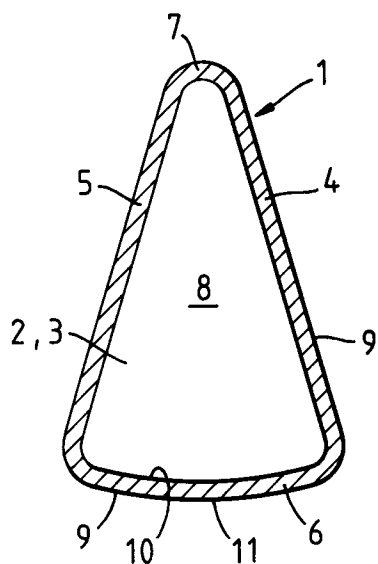


Fig. 2.

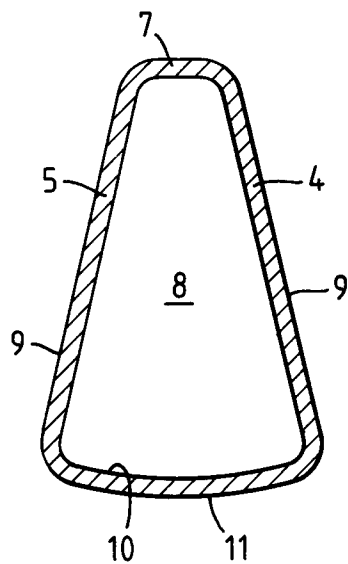


Fig. 3.

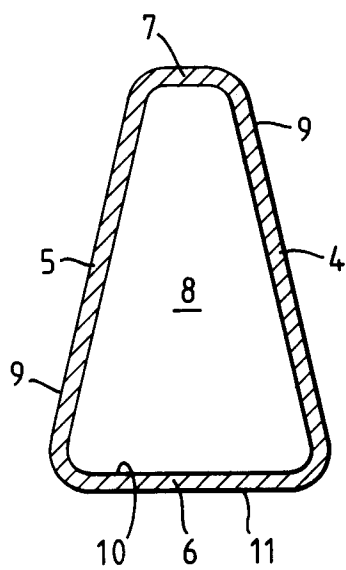


Fig. 4.

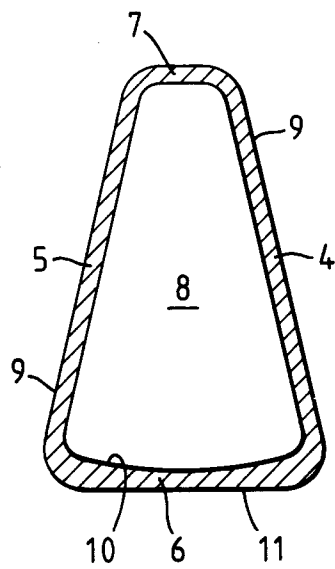


Fig. 5.

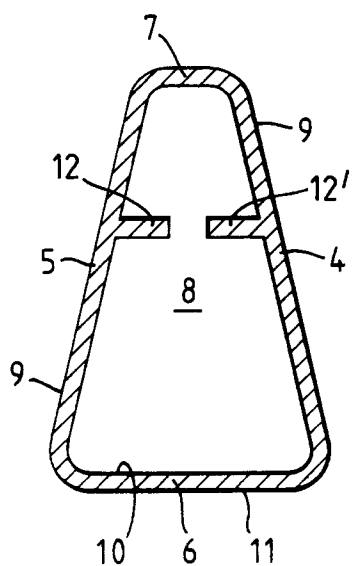


Fig. 6.

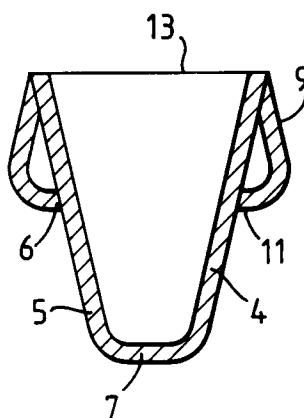


Fig. 7.

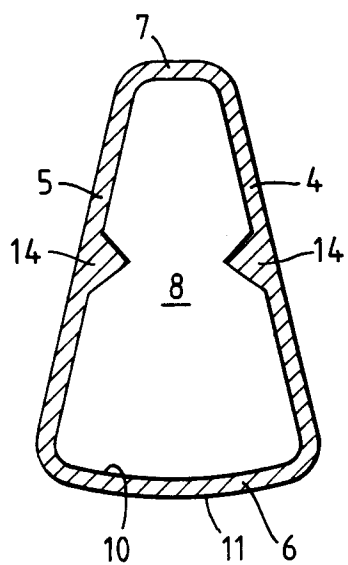


Fig. 8.

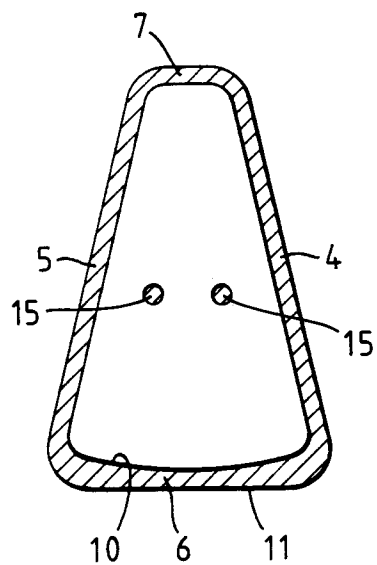


Fig.9.

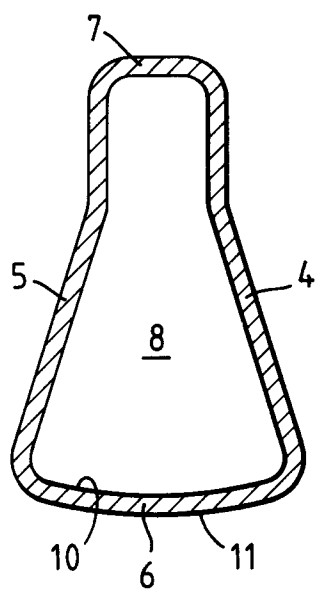


Fig.10.

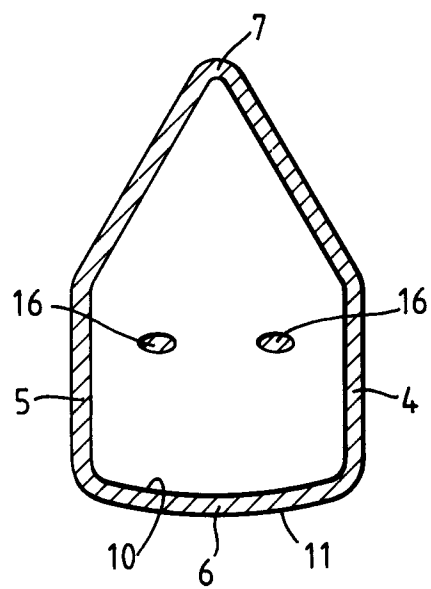


Fig.11.

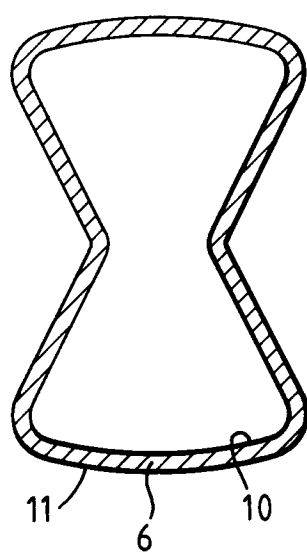
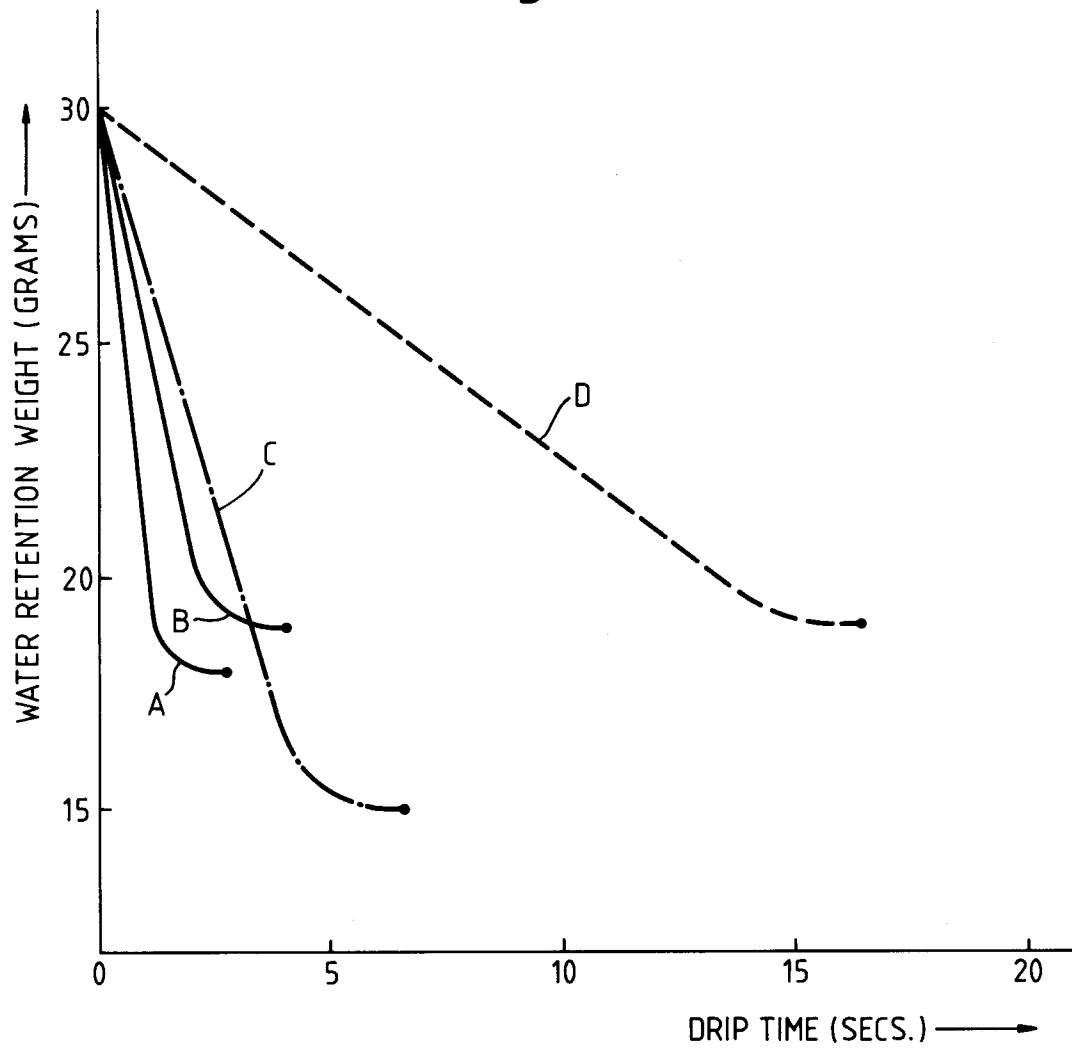


Fig. 12.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 20 1958

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.5)
X	FR-A-850 471 (MELITTA) * page 1, line 51 - page 2, line 51; figures 3-5 *	1-2,21	B65D81/34
A	---	5-6, 14-15	
X	US-A-2 359 292 (BARNETT) * figure 7 *	1-2, 8-10,21	
A	---	2,7	
A	DE-A-3 420 128 (LISCHKA) * page 6, paragraph 2; figures *	16	
A	---	17,19-20	
A	US-A-3 095 315 (MAGILL) * column 1, line 13 - line 23 *	18	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	---		B65D
A	US-A-4 626 435 (ZIMMERMAN) * column 1, line 54 - column 2, line 36 *		
A	-----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 OCTOBER 1992	Examiner BRIDAULT A.A.Y.
CATEGORY OF CITED DOCUMENTS 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 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			