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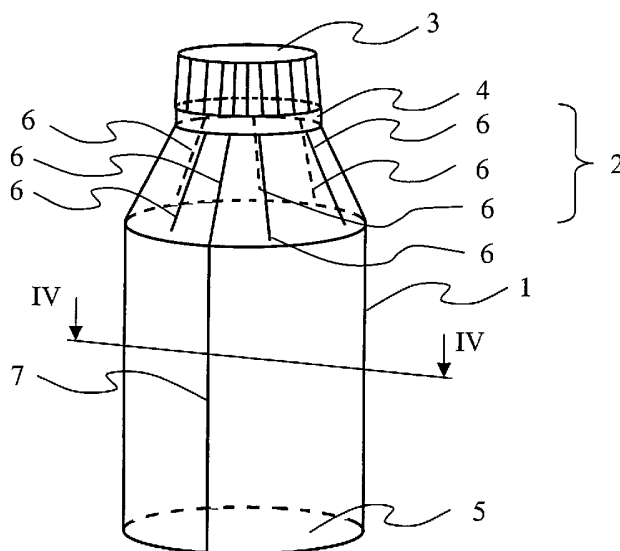
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(54) Title: A PACKAGE AND A METHOD OF PRODUCING A PACKAGE



(57) Abstract: The present invention relates to a package of packaging material comprising an at least partly cylindrical body section (1), a tapering shoulder section (2), a bottom section (5), as well as an opening arrangement (3). The sections of the shoulder section (2) which abut to those parts of the body section (1) which are of cylindrical form have been given a tapering form in that the packaging material is folded in a plurality of overlap folds (6) so that three circumferentially sequential sections of the packaging material are folded so that the first section forms the outside, the second section is folded inwards and backwards so that it abuts against the inside of the first section, and the third section is folded so that it abuts against the outside of the packaging material of the second section facing towards the inside of the package. The present invention further relates to a method of producing a package.

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A PACKAGE AND A METHOD OF PRODUCING A PACKAGE

TECHNICAL FIELD

The present invention relates to a package in accordance with the preamble to
5 appended Claim 1, as well as a method of producing a package in accordance with
the preamble to appended Claim 5.

BACKGROUND ART

Brick-shaped packages of semi-rigid, folded, paper-based packaging laminate
10 are in common use for beverages such as milk and juice. The traditional method of
opening such packages has long been to tear or cut away a corner of a corner flap and
thereby obtain a pouring spout. This type of package has, in recent years, also been
provided with various types of opening arrangements which make for reclosure.
These opening arrangements may, for example, be retrofitted glued-on lids which
15 cover previously formed weakened lines in the packaging laminate. There may also
be opening arrangements of plastic which are injection moulded direct in situ over a
hole in the packaging laminate. One variation of these opening arrangements relates
to an injection moulded, threaded neck which is provided so as to carry a screw cap.

Another trend which has recently come to notice is the wish to be able to
20 drink juice or other beverages straight from bottle-shaped packages carrying a screw
cap. These bottles may, for example, be of glass, metal or plastic. Above all, the
market for plastic bottles is growing which probably can largely be referred to the
low weight of such bottles in relation to the other materials.

There have also been a number of attempts to make packages of paper which
25 satisfy the requirements on bottle-like configuration and a reclosable screw cap.

One attempt to realise a bottle-like package of paper-based packaging
laminar is described in US-A-5,088,642. This publication discloses a brick-shaped
package with a rectangular, tapering neck with a screw cap or the like. However, this
does not satisfy the customers' wishes, since the tapering, rectangular neck does not
30 form a smooth circumferential surface. The projecting flaps extending towards the
corners make the package difficult to handle and also aesthetically unappealing for a

consumer comparing this package with a plastic bottle which has a totally round and smooth surface.

Another bottle-like package of paper-based packaging laminate is described in US-A-5,046,660. Nor does this package satisfy the requirements which are placed
5 by consumers in respect of form and convenience of handling. The projecting flaps are, in this case, moreover intended to function as gripping surfaces in order, by pulling two opposing flaps in a direction away from one another, to separate the second pair of fused flaps which are transversely positioned in relation to those which are to be grasped.

10 There is, hence, a need in the art to realise a bottle-like package of packaging material such as, for example, paper-based packaging laminate.

BRIEF SUMMARY OF THE INVENTION

The object of the present invention is to realise a bottle-like package of
15 packaging material such as, for example, paper-based packaging laminate.

This object has been attained by means of a package of the type disclosed by way of introduction which has been given the characterising features which are apparent from the characterising clause of appended Claim 1.

In that those portions of the shoulder section which connect those portions of
20 the body section which are of cylindrical shape have been given a tapering configuration in that the packaging material is folded in a plurality of overlap folds so that three circumferentially sequential portions of the packaging material are folded so that the first portion forms an outside, the second portion is folded inwards and backwards so that it abuts against the inside of the first portion, and the third
25 portion is folded so that it abuts against the outside of the material of the second portion turned to face towards the inside of the package, it is possible to obtain a rounded, tapering shape which nevertheless has a smooth outer side without any projecting flaps. In that said body section and shoulder section comprise a sleeve of a web- or sheet-shaped packaging material which has been folded so that two opposing
30 edges have been brought together and fused together along a longitudinal direction extending along the package and the sleeve, it is possible simply to produce a sleeve of optional packaging material, such as a paper-based packaging laminate. In that the

bottom section is integrally formed with the body section, it is possible to obtain from a single sleeve a complete packaging body. Moreover, an integrated body will be extremely strong in relation to most constructions involving loose bottom plates or the like.

5 Preferred embodiments of the present invention are apparent from the appended subclaims.

According to one preferred embodiment, the overlap folds in the circumferential direction are folded in the same direction. This facilitates production since it is then possible to simply carry out the folding in that a conical sleeve is
10 urged against the upper end of the sleeve during simultaneous rotation.

According to another preferred embodiment, the overlap folds are folded so that they are alternately folded in opposing directions circumferentially. By such means, it is possible simply to obtain a clear symmetry if, for example, a package is produced with two straight sides between two semicylinders.

15 In that the sleeve has a given circumference and that the extent in the circumferential direction of those portions which form the overlap folds is greater at the end of the shoulder section facing towards the opening arrangement compared with the end of the shoulder section turned to face towards the body section, there will be obtained a smaller circumference at the end of the shoulder section facing
20 towards the opening arrangement.

The above-mentioned objects have also been attained by means of a method of the type disclosed by way of introduction which has been the characterising features as are apparent from the characterising clause of appended Claim 5. The above-described package according to the present invention can be produced in a
25 number of different conventional ways where the steps included are carried out in different sequences. Moreover, Claim 5 discloses a specific method according to the present invention.

Given that the method includes the steps of forming, from a web- or sheet-shaped packaging material, a sleeve by two opposing edges being brought together
30 and fused together, by forming the sleeve so that it is at least a partly cylindrical form, by forming, at one end of the sleeve, a tapering shoulder section in that those parts of the sleeve which are of cylindrical shape at one end of the sleeve are formed

into a tapering shoulder section by the packaging material being folded in a plurality of overlap folds so that three circumferentially sequential portions of the packaging material are folded such that the first portion forms an outside, the second portion is folded inwards and backwards so that it abuts against the inside of the first portion, and the third portion is folded so that it abuts against the second portion of the outside of the material facing towards the inside of the package, and by securing an opening arrangement on that end of the sleeve which has been formed into a tapering shoulder section, it is possible to obtain a package with a rounded, cylindrical or partially cylindrical shape which moreover has a tapering shoulder section which is similar to that of a plastic or glass bottle. The tapering portion will further have a conical circumferential surface without any projecting flaps. In that the method further comprises the step of closing the package by flattening the end of the sleeve and welding or fusing together the end edges, it is possible with great reliability to realise a seal in one end of a sleeve by flattening the end of the sleeve and fusing together the insides to one another in a so-called praying joint. This transverse seal may then be folded together in that the corners of the joint are folded inwards towards the centre so that there is formed some form of flap on the underside of the package.

According to one preferred embodiment, the method further comprises the step of filling the package with a product through the end of the sleeve opposed to the opening arrangement. By such means, it is possible to design the opening arrangement exclusively for its final function, i.e. opening and closing of the package as it is used by a consumer. The previously mentioned method of sealing the bottom is moreover suitable to combine with an already filled package, since the product filled in the package may be used as a counter abutment on the final forming of the bottom.

According to another preferred embodiment, the method comprises the step of filling the package, before the opening arrangement is secured in place, through that end of the sleeve which has been shaped into a tapering portion. By such means, it is possible to form the bottom only from the viewpoint of mechanical strength and it view of production engineering aspects. On filling in this manner, it is advantageous according to one preferred embodiment if a sleeve or neck is first

secured in place which covers the free edge of the packaging material (above all if it is a question of paper-based packaging laminate), whereafter the package is filled through the sleeve and a screw cap or the like is thereupon finally positioned in place on the, for example, threaded sleeve. It is thus preferred that the method further
5 includes the steps of filling the package through the opening arrangement, as well as closing the package by sealing the opening arrangement.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will now be described in greater detail hereinbelow,
10 with reference to the accompanying schematic Drawings which show, for purposes of exemplification, currently preferred embodiments of the present invention. In the accompanying Drawings:

Fig. 1 shows a package according to a first preferred embodiment of the present invention;

15 Fig. 2 shows a package according to a second preferred embodiment of the present invention;

Fig. 3 shows a section from above of the tapering section in a partly inwardly folded state;

Fig. 4 shows the section of the sleeve marked in Fig. 1;

20 Fig. 5 shows in section the securing of a prefabricated opening arrangement;

Fig. 6 shows in section a directly injection-moulded opening arrangement;

and

Fig. 7a-d show one method of folding in an octagonal bottom in accordance with one preferred embodiment.

25

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

As will be apparent from Fig. 1, the package comprises a body portion 1, an upper tapering shoulder portion 2, an opening arrangement 3 and a bottom 5. The opening arrangement 3 is connected to the shoulder portion 2 via a neck 4. This neck
30 4 preferably connects on both sides of the free material edge which is formed uppermost on the shoulder portion 2 so that it protects the otherwise exposed edge from moisture and dirt both from the inside and from the outside of the package. In

addition, the neck 4 is preferably provided with threads on which a screw cap is screwed. In the construction illustrated in Fig. 1, the opening arrangement 3 consists of the threaded continuation of the neck 4 and the screw cap placed thereon.

Other types of opening arrangements may naturally also be employed. For example, it is conceivable to employ various types of snap locks where it is simply a matter of pulling up the cork or where the cap or cork is twisted through a slight angle of rotation. Further, the opening arrangement may be prefabricated and placed up on the shoulder section 2 or it may be formed directly on the opening section by direct injection moulding.

A prefabricated opening arrangement may, for example, be secured in place in that the plastic layer on the inside and/or outside of the packaging laminate has been melted and that the opening arrangement is pressed against the molten area until it has hardened and set sufficiently. Another method could be to employ some form of subsequently added adhesive which fuses together the opening arrangement with the inside and/or the outside of the packaging laminate. Fig. 5 shows a prefabricated opening arrangement 3 which has been placed in the hole formed by the upper portion of the tapering section 2 of the package. The downwardly extending, annular flange 3a is intended to be folded upwards towards the inside. The outwardly extending, annular flange 3b is intended to be folded downwards towards the outside. The inner flange 3a is intended to seal against the inside of the package. The outer flange 3b is intended to protect the paper edge which is otherwise open to the ambient surroundings and imparts to the package an aesthetically attractive appearance. Moreover, the outer flange 3b may be employed as a fixing point for some form of tamper evidence. As is apparent from Fig. 5, the opening arrangement is provided with threads 3c on which a screw cap is intended to be secured so that the upper opening is sealed.

An above-mentioned construction formed directly on the opening section may be realised in that a threaded neck is directly injection moulded on the open edge so that the plastic connects to both the inside and outside of the packaging wall, whereupon a prefabricated screw cap is pressed or twisted in place. Fig. 6 shows one example of such an opening arrangement. From the inside, a tool 20 is urged into abutment against the inside of the tapering section 2. From the outside, another tool

21 is urged into abutment against the outside of the tapering section 2. In the space that is formed between the tool halves, molten plastic is injected which sets and forms an opening arrangement 3. Such an opening arrangement may be provided with a membrane 3d which covers the opening and thereby automatically constitutes a tamper evidence. In an opening arrangement with a membrane, it is moreover possible to employ a simple screw cap which only needs to seal satisfactorily once the package has been opened by a consumer. Where applicable, it not necessary to provide an outer screw cap at all. In order to facilitate the tearing off of the membrane, it is provided with a weakening 3e which extends around the contemplated tearing-off line. Moreover, the membrane is provided with a pulltab or lug 3f. In order to be able to release the tool from the opening arrangement, the outer tool 21 is divided into two halves with a line of division in the plane of the paper of Fig. 6.

As will be apparent from Fig. 1 and Fig. 2, it is possible to design the package so that the core or body section 1 and the shoulder section 2 are completely round (see Fig. 1) or partially cylindrical (see Fig. 2). In Fig. 2 is shown a package having a cross section which, seen from above, has a slightly elongate appearance. In the illustrated configuration, the package has two straight sides and two semicylindrical short sides which bond together the two straight sides. In other embodiments, it is also conceivable that there be three, four or more straight sections which are bonded together by partially cylindrical sections. In order to impart to the package composed of a plurality of different configurations and as shown in Fig. 2 a distinct shape, the sleeve is provided with crease lines 18 which extend along the longitudinal direction of the package at those points where the cross section changes shape. Fig. 2 shows two crease lines 18 which mark the transition between the straight section and the partially cylindrical sections.

The tapering shoulder section 2 has been given tapering form in that three circumferentially sequential sections 6a-c of the packaging material are folded so that the first section 6a forms the outside, the second section 6b is folded inwards and backwards so that it abuts against the inside of the first section 6a, and the third section 6c is folded so that it abuts against the outside of the packaging material of the second section 6b facing towards the inside of the package.

Fig. 3 shows how a round package may look before it has been finally formed. Fig. 3 shows seven overlap folds. According to one preferred embodiment, the package comprises six or eight overlap folds distributed over the partially cylindrical sections. The package shown in Fig. 2 is then provided with three or four
5 overlap folds on each side of the straight sections. Fig. 3 shows the final contour of the package by a ghosted line. The lower down towards the body portion 1, the less overlap will the overlap folds 6 display and the higher up towards the opening arrangement 3, the greater will be the overlap. At the uppermost region (most proximal the opening arrangement 3), the overlap may, for example, be so great that
10 an overlap fold is immediately terminated before the next one commences.

According to another embodiment (not shown), the overlap folds are folded in different directions so that, for example, every second is folded in a first direction around the circumference and every other in the opposite direction to the first direction. In this embodiment, the overlap folds are preferably placed pairwise in the
15 proximity of one another so that the pairs of overlap folds form flattened Ω symbols.

Suitable packaging material is, for example, a paper-based packaging laminate with barrier layer of aluminium and outer layers of a sealable plastic, such as, for example, polyethylene. Naturally, an optional barrier layer such as, for example, SiOx, and optional outer layer such as, for example, polypropylene, may be
20 employed instead. In certain cases, no barrier layer is needed at all. Examples of such cases are, for instance, in use for products which are stored in cold storage throughout their storage life, so-called refrigerated distribution.

If it is ensured that the shoulder section 2 of the package in the extension at the cylindrical section or the partially cylindrical sections is given a tapering
25 configuration as a result of the above-described overlap folds, the package will have a bottle-like shape.

According to one preferred embodiment, the package is produced in that, in a first step, it is formed into a sleeve from a web- or sheet-shaped packaging material by two opposing edges being brought together and fused together. This longitudinal
30 joint 7 is a so-called overlap joint or seam, i.e. the one longitudinal edge extends in beneath the meeting longitudinal joint. According to this configuration, the outside of the inner edge 7a will be fused against the inside of the outer edge 7b. In a traditional

manner, it is also possible to provide the joint 7 with a so-called longitudinal joint strip 7c of a liquid-resistant material such as some form of plastic. The longitudinal joint strip protects the inner edge against the product packed in the package. Alternatively, use may be made of a technology where the inner edge is folded
5 double in between the outside of the inner edge portion and the inside of the outer edge portion. Such a longitudinal joint is described in greater detail in US-A-6,265, 009

Thereafter, the sleeve is formed so that it has at least partly cylindrical shape, i.e. so that it will be wholly round, oval or composed of straight and round or oval
10 sections. This is put into effect in that the sleeve is raised and passed on a mandrel or the like.

Thereafter, the tapering shoulder section 2 is formed in that those parts of the sleeve which are of cylindrical shape at one end of the sleeve are folded in a plurality of overlap folds 6 so that three circumferentially sequential sections 6a-c of the
15 packaging material are folded so that the first section 6a forms the outside, the second section 6b is folded inwards and backwards so that it abuts against the inside of the first section 6a, and the third section 6c is folded so that it abuts against the outside of the material of the second section 6b turned to face towards the inside of the package.

Thereafter, the package is to be provided with an opening arrangement, the
20 bottom is to be sealed and the package be filled with the intended product. These last steps may in principle be put into effect in different sequence depending upon in what type of machine the intention is to produce and fill the package.

According to one embodiment, the sleeve 1 is provided with a closed opening
25 arrangement 3 (which is not intended to be opened until the consumer is to gain access to the product), whereafter the package is filled with a product through the opposing end of the package in relation to the opening arrangement, the opposing end thereafter being sealed in that the end of the sleeve 1 is flattened out and fused together.

30 According to another embodiment, the package filled through that end of the sleeve 1 which has been formed into a tapering section 2. This filling may be put into

effect through the open end or, most preferably, through a neck 4 which has been provided on the open end and which is intended to carry a screw cap 3 or the like.

The opening arrangement 3 may naturally be provided with some form of so-called tamper evidence which gives the consumer information as to whether the package has been opened previously or not. There are innumerable variations of such
5 tamper evidence which may be employed. Use may be made of bridges which extend between the screw cap and a ring which is rotationally fixed in relation to the package and passed over the neck 4 or the like.

The bottom seal is a praying joint where the insides of the ends of the sleeve
10 are turned to face towards one another and fused together. Further, the bottom seal is transversely directed in relation to the longitudinal seal.

Fig. 7a and 7b show a package which comprises a sleeve with a bottom sealing fin 5a which is formed from the bottom seal 5b and a part of the sleeve 1 and which has been realised in that the end of the sleeve 1 has been clamped together and
15 fused together by two clamping jaws. Fig. 7c shows the package with the bottom in a partly ready-folded state. The bottom section 5 displays primary flaps 5c and secondary flaps 5d. Fig. 7d shows the ready-folded bottom.

In a first preparatory step, the fin 5a is prefolded slightly in a direction away from the longitudinal joint 7. In connection herewith and the other folding steps, it is
20 advantageous to heat the material with the aid of hot air or the like so that the material becomes softer and more pliable, which reduces the risk of cracks occurring in the material. It is advantageous to prefold the fin 5a in a direction away from the longitudinal joint 7 since it is more difficult to fold over the longitudinal joint 7 where a number of layers of the packaging material lie superposed on one another.

25 Thereafter, the fin 5a is folded and the corners are buckled, i.e. begin to be folded along the crease lines as a preparatory step for the final folding.

A central portion of the prefolded fin 5a is pressed down to that part of the sleeve that constitutes the bottom section 5. This step positively creates a primary flap 5c on each transverse end of the fin 5a. In order to render the final bottom
30 folding aesthetically attractive, and in order to ensure that the package stands stably, it is important that the flaps do not project downwards from the package. Consequently, an inward depression is provided on each side of each primary flap 5c

in the portion between the upper end and the transition between that part of the sleeve which constitutes the bottom section and the remainder of the sleeve.

By such means, there will be formed in each portion a secondary flap 5d which extends somewhat inwards in under the primary flap 5c. Fig. 7c shows the package with the primary 5c and secondary 5d flaps. The secondary flaps 5d formed by the depression entail that the finally folded packaging bottom will have an octagonal shape as shown in Fig. 7d.

Finally, the primary flaps 5c are pressed in completely to the bottom section 5 so that the primary flaps 5c, the secondary flaps 5d and the sealing fin 5a lie planar against the bottom section 5. Just before they are compressed together, the material is heated up so that it partly melts and thereby fuses together with adjacent portions when the plastic once again sets. This may naturally also be realised in that minor quantities of some form of adhesive are injected in beneath the flaps at selected spots. The thus folded package thereby achieves the ready-folded state as shown in Fig. 7d.

If the intention is to form the package with a rectangular bottom cross section, this may be put into effect in approximately the same manner as the above-described octagonal cross section. In principle, the only difference is that no secondary flaps are created, but only the fin folding and folding of the primary flaps are carried out.

A person skilled in the art will readily perceive that a number of modifications of the embodiments of the present invention described herein are possible without departing from the scope of the invention as this is defined in the appended Claims.

For example, it is possible to form the longitudinal joint as a so-called praying joint where both of the insides of the converging longitudinal edges are sealed to one another. Further, the transverse seal may naturally be given another orientation than the transverse orientation described above.

WHAT IS CLAIMED IS:

1. A package of packaging material comprising an at least partly cylindrical body section (1; 11), a tapering shoulder section (2; 12) which is formed in one piece with and connects to the one end of the body section (1; 11), a bottom section (5; 15) which connects to the opposing end of the body section (1; 11) in relation to the shoulder section (2; 12), as well as an opening arrangement (3; 13) which connects to the opposing end of the shoulder section (2; 12) in relation to the body section (1; 11), those portions of the shoulder section (2; 12) which connect to those portions of the body section (1; 11) which have a cylindrical configuration having been given a tapering form in that the packaging material is folded in a plurality of overlap folds (6; 16) so that three circumferentially sequential sections (6a-c) of the packaging material are folded so that the first section (6a) forms the outside, the second section (6b) is folded inwards and backwards so that it abuts against the inside of the first section (6a), and the third section (6c) is folded so that it abuts against the outside of the packaging material of the second section (6b) facing towards the inside of the package, characterised in that said body section (1; 11) and shoulder section (2; 12) comprise a sleeve of a web- or sheet-shaped packaging material which has been folded so that two opposing edges have been brought together and sealed together along a longitudinal joint (7) extending along the package and the sleeve; that the bottom section (5; 15) is integrally formed with the body section (1; 11); and that the bottom section (5; 15) has been sealed in that the end of the sleeve (1) has been flattened out and fused together.

2. The package as claimed in Claim 1, wherein the overlap folds (6; 16) in a circumferential direction are folded in the same direction.

3. The package as claimed in Claim 1, wherein the overlap folds (6; 16) are folded so that they are alternatingly folded in opposing directions circumferentially.

30

4. The package as claimed in anyone or more of Claims 1 to 3, wherein the extent in the circumferential direction of those sections (6a-c) which form the

overlap folds (6; 16) is greater at the end of the shoulder section (2; 12) facing towards the opening arrangement (3; 13) compared with the end of the shoulder section (2; 12) facing towards the body section (1; 11).

5 5. A method of producing a package, **characterised in that** it comprises the steps of:

 forming, from a web- or sheet-shaped packaging material, a sleeve in that two opposing edges are brought together and sealed together (7),

 forming the sleeve so that it has at least partly cylindrical form,

10 forming, at one end of the sleeve, a tapering shoulder section (2; 12) in that those sections of the sleeve which have cylindrical form at one end of the sleeve are formed into a tapering shoulder section (2; 12) in that the packaging material is folded in a plurality of overlap folds (6; 16) so that three circumferentially sequential sections (6a-c) of the packaging material are folded so that the first section (6a)
15 forms the outside, the second section (6b) is folded inwards and backwards so that it abuts against the inside of the first section (6a), and the third section (6c) is folded so that it abuts against the outside of the material of the second section (6b) facing towards the inside of the package,

 securing an opening arrangement (3; 13) on that end of the sleeve which has
20 been formed into a tapering shoulder section (2; 12); and

 sealing the package by flattening out the end section (5; 15) of the sleeve and fusing together the end edges.

 6. The method as claimed in Claim 5, which further comprises the step of
25 filling the package with a product through the opposing end of the sleeve in relation to the opening arrangement (3; 13).

 7. The method as claimed in Claim 5, which further comprises the step of
filling the package, before the opening arrangement (3; 13) is secured in place,
30 through that end of the sleeve which has been formed into a tapering section (2; 12).

8. The method as claimed in Claim 5, which further comprises the step of filling the package through the opening arrangement (3; 13), as well as closing the package by sealing the opening arrangement (3; 13).

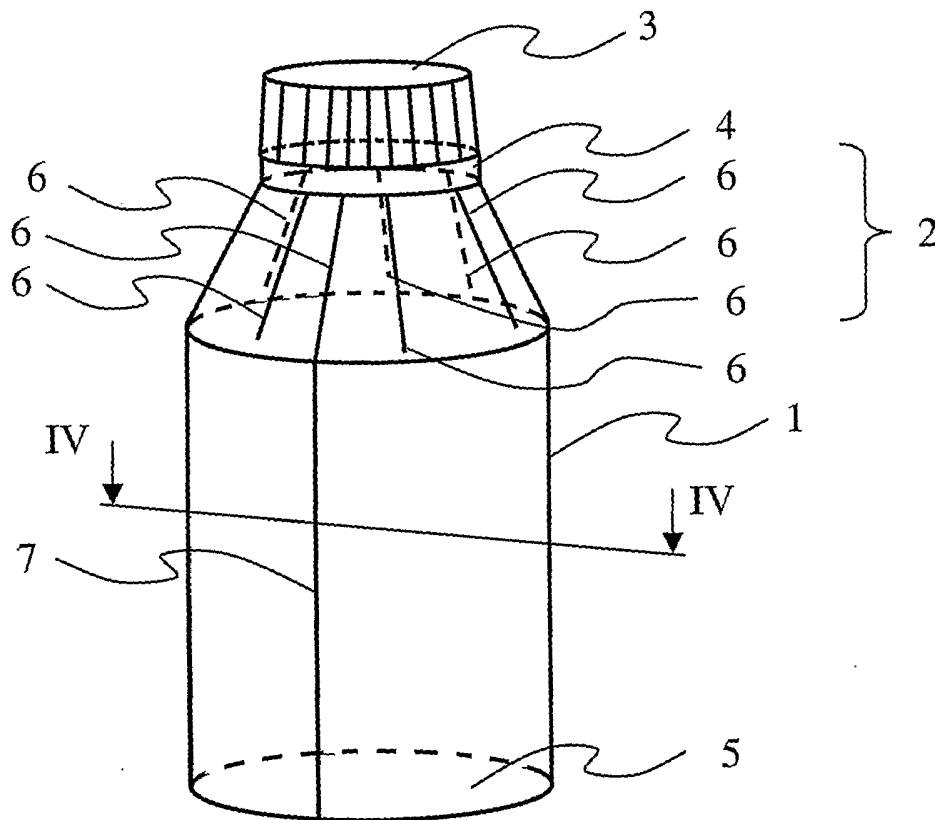


Fig 1

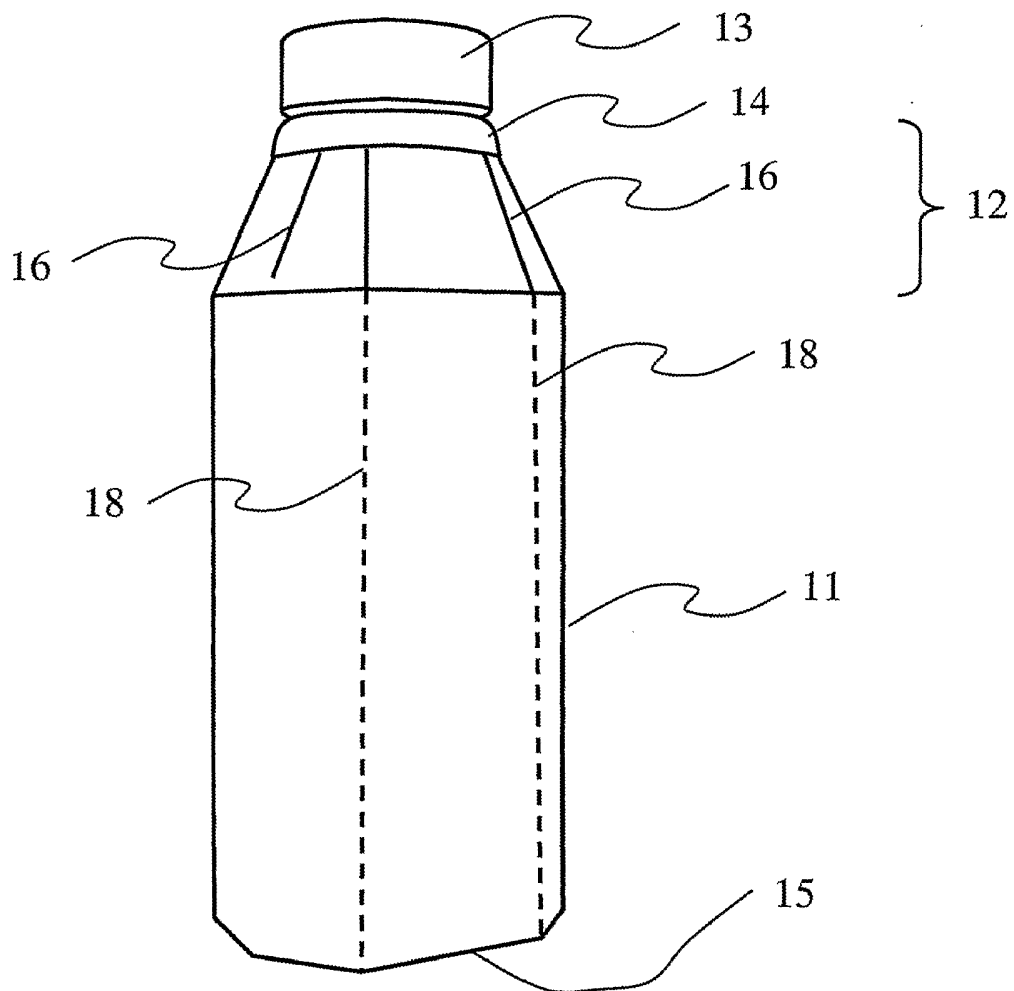


Fig 2

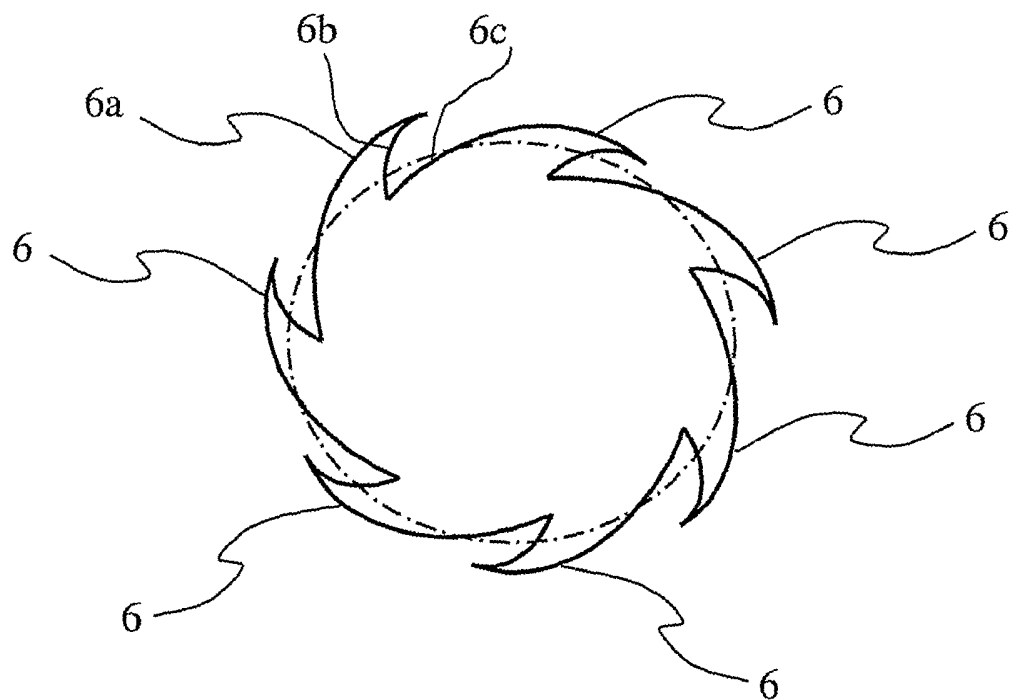


Fig 3

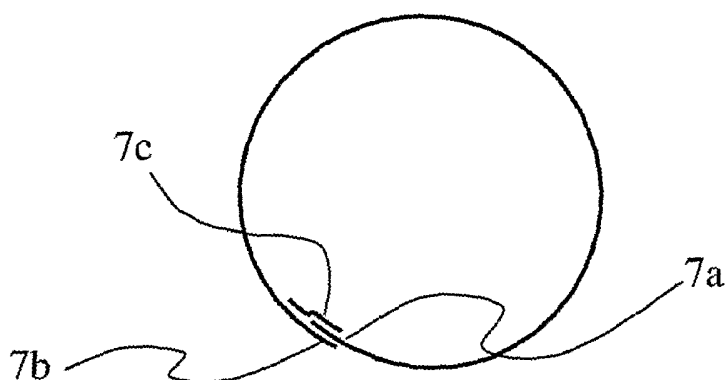


Fig 4

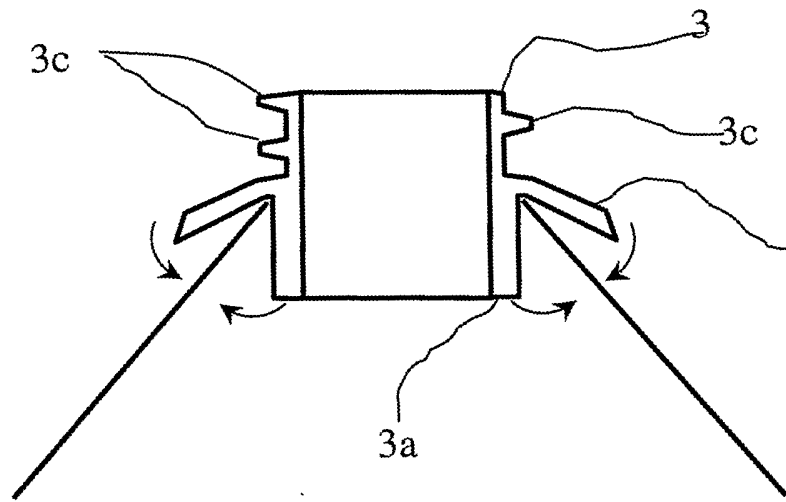


Fig 5

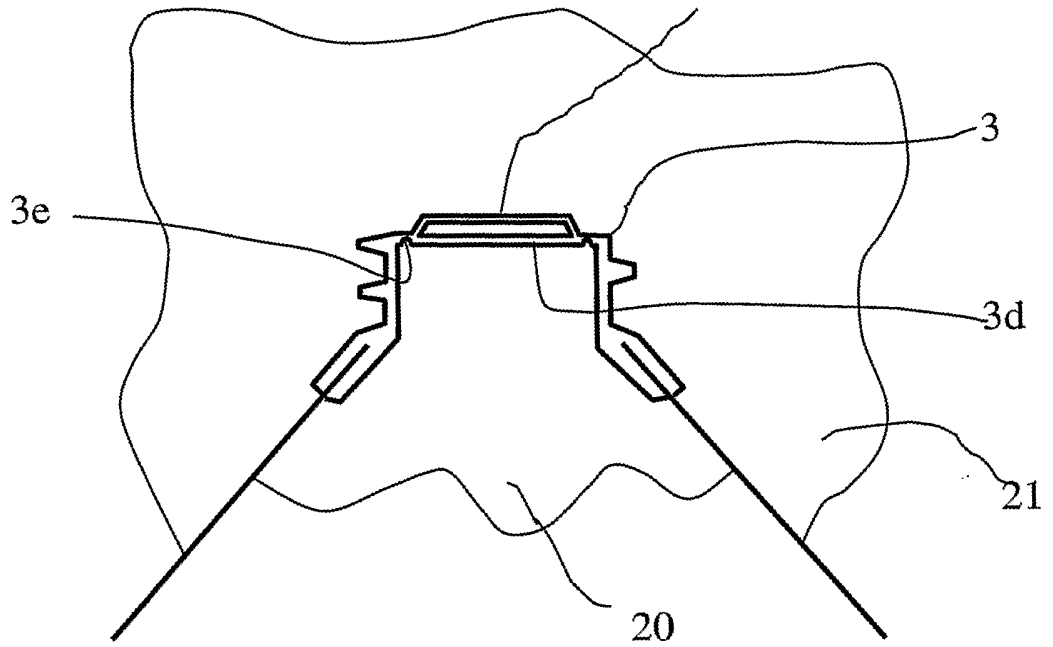


Fig 6

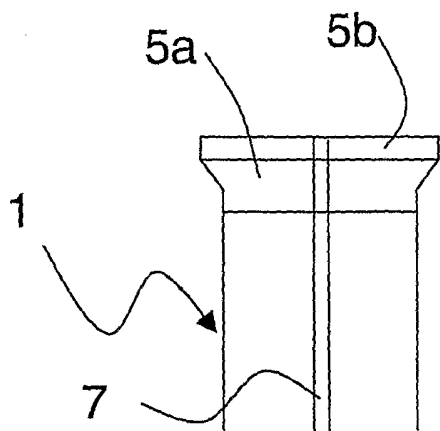


Fig 7a

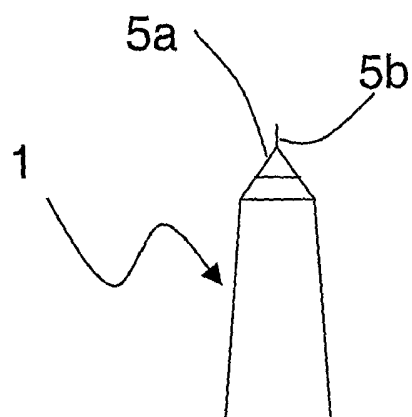


Fig 7b

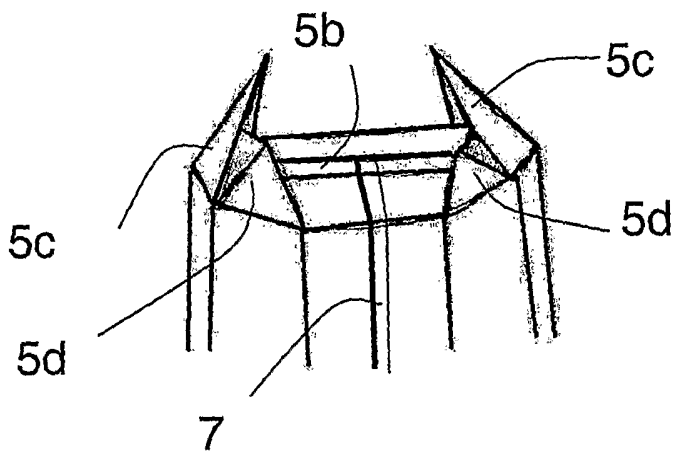


Fig 7c

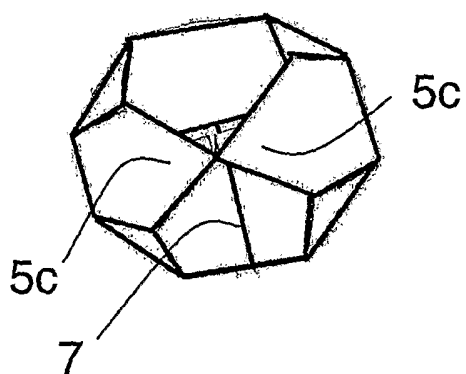


Fig 7d

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 2003/004610

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65D 3/08, B65D 3/20
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)

IPC7: B65D, B31B

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

SE,DK,FI,NO classes as above

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 343140 A (CARL RISTOW), 13 February 1931 (13.02.1931), figure 14, claim 1 --	1-8
Y	US 5088642 A (FÄRBER), 18 February 1992 (18.02.1992), column 5, line 25 - line 41; column 7, line 29 - line 36 --	1-8
A	GB 362968 A (CARL RISTOW), 9 December 1931 (09.12.1931), figures 9,10, claim 1 --	1-8
A	BE 421411 B1 (JAGENBERG-WERKE AKTIENGESELLSCHAFT), 31 July 1937 (31.07.1937), figures 8-12 --	1-8

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 22 January 2004	Date of mailing of the international search report 03 -02- 2004
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Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer William Helin/EK Telephone No. +46 8 782 25 00
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 2003/004610

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 686099 C (SÄCHSISCHE CARTONNAGEN-MASCHINEN-AG), 3 January 1940 (03.01.1940), page 3, line 71 - line 93 --	1-8
A	US 5046660 A (MAGNONI), 10 Sept 1991 (10.09.1991) -- -----	1-8

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Information on patent family members

24/12/2003

International application No.

PCT/IB 2003/004610

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