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(54) Method of producing a sealed package of a pourable food product, and package so formed

(57) There is described a method of producing a sealed package (1) of a pourable food product from a multilayer sheet packaging material (2) including layers of thermoplastic material (6, 8), of barrier material (7), and of base material (5); the method including the steps of forming in the sheet packaging material (2) a removable portion (10, 10') including at least layers of thermoplastic material (6, 8) and of barrier material (7); applying about the removable portion (10, 10') a frame (11) defining a pour opening (12); fitting to the frame (11) a removable cap (13) closing the pour opening (12), by causing the cap (13) to adhere directly to the removable portion (10, 10'); and providing the removable portion (10, 10') with a layer of stiffening material (15, 36).

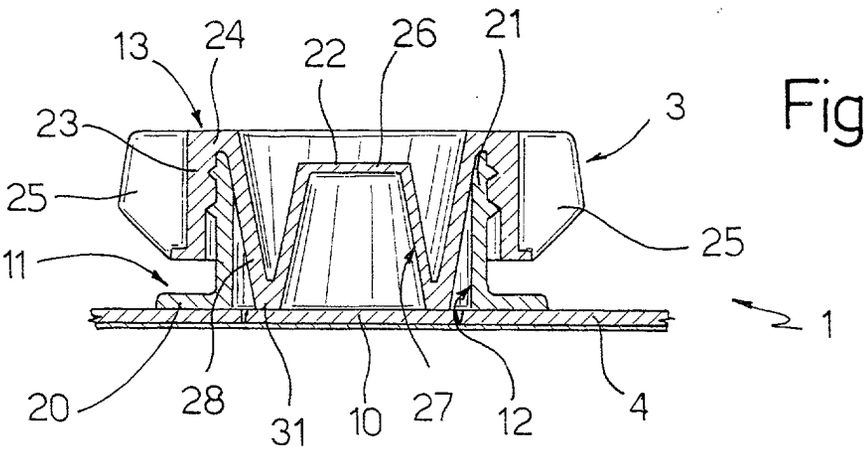

Fig.2

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Description

[0001] The present invention relates to a method of producing a sealed package of a pourable food product, and to the package so formed.

[0002] As is known, many pourable food products, such as fruit juice, UHT (ultra-high-temperature processed) milk, wine, tomato sauce, etc., are sold in packages made of sterilized packaging material.

[0003] A typical example of such a package is the parallelepiped-shaped package for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is formed by folding and sealing laminated strip packaging material. The packaging material has a multilayer structure comprising a base layer which imparts stiffness and strength and which may composed of a layer of fibrous material, e.g. paper, or a material such as mineral-filled polypropylene. The base layer is covered on both sides with layers of thermoplastic material, e.g. polyethylene film, and, in the case of aseptic packages for long-storage products, such as UHT milk, the packaging material also comprises a layer of oxygen-barrier material defined, for example, by an aluminium film, which is superimposed on a layer of thermoplastic material and is in turn covered with another layer of thermoplastic material eventually defining the inner face of the package contacting the food product.

[0004] As is known, such packages are made on fully automatic packaging machines, on which a continuous tube is formed from the web-fed packaging material; the web of packaging material is sterilized on the packaging machine itself, e.g. by applying a chemical sterilizing agent, such as a hydrogen peroxide solution, which, after sterilization, is removed, e.g. vaporized by heating, from the surfaces of the packaging material; and the web of packaging material so sterilized is maintained in a closed sterile environment, and is folded and sealed longitudinally to form a vertical tube.

[0005] The tube is filled with the sterilized or sterile-processed food product, and is sealed and cut at equally spaced cross sections to form pillow packs, which are then folded mechanically to form the finished, e.g. substantially parallelepiped-shaped, packages.

[0006] Alternatively, the packaging material may be cut into blanks, which are formed into packages on forming spindles, and the resulting packages are filled with the food product and sealed. One example of such a package is the so-called "gable-top" package commonly known by the trade name Tetra Rex (registered trademark).

[0007] Packages of the above type are normally provided with closable opening devices to permit consumption of and safeguard the food product from contact with external agents.

[0008] The most commonly used opening devices comprise a frame defining an opening and fitted about a pierceable or removable portion of the top wall of the package; and a cap hinged or screwed to the frame and which can be removed to open the package. Other, e. g. slidable, opening devices are also known to be used.

[0009] The removable portion of the package may be defined, for example, by a so-called "prelaminated" hole, i.e. a hole formed in the base layer of the packaging material before the base layer is joined to the thermoplastic layers and to the barrier layer, which closes the hole to ensure hermetic, aseptic sealing, while at the same time being easily pierced.

[0010] In a particularly advantageous solution described in Patent Application EP-A-1081054 by the present Applicant, the opening device cap is preferably heat sealed directly to the thermoplastic material covering the hole in the layer of the packaging material, so that, when removing the cap from the frame, the removable portion remains attached to the cap and is detached from the rest of the top wall of the package. In other words, to open the package, the user simply acts on the cap to detach the cap from the frame and remove the removable portion in one single operation.

[0011] Though relatively practical and cheap, the above solution nevertheless leaves room for improvement. In particular, owing to the thinness and elastic properties of the removable portion defined by thin films of thermoplastic material and aluminium covering the hole in the base layer, the thermoplastic material has a tendency to tear and fray when removing the cap from the frame, thus resulting in a ragged opening and irregular outflow of the food product, due to the frayed plastic of the removable portion projecting through the exposed hole in the packaging material when the cap is detached from the frame.

[0012] It is an object of the present invention to provide a method of producing a sealed package of a pourable food product, designed to eliminate the aforementioned drawback.

[0013] According to the present invention, there is provided a method of producing a sealed package of a pourable food product from a multilayer sheet packaging material comprising a base layer and layers of thermoplastic material and of barrier material; said method comprising the steps of:

- forming in said multilayer sheet packaging material a removable portion comprising at least layers of thermoplastic material and of barrier material;
- applying about said removable portion a frame defining a pour opening; and
- fitting to said frame a removable cap closing said pour opening, by causing said cap to adhere directly to said removable portion;

characterized by comprising the step of providing said removable portion with a layer of stiffening material.

[0014] The present invention also relates to a sealed package for pourable food products, formed from a multilayer sheet packaging material comprising a base layer and layers of thermoplastic material and of barrier ma-

terial; said package comprising a removable portion including at least layers of thermoplastic material and of barrier material, and being provided with a closable opening device in turn comprising a frame fixed to the package about said removable portion and defining a pour opening, and a removable cap fitted to said frame to close said pour opening and fixed directly to said removable portion; characterized in that said removable portion also comprises a layer of stiffening material.

[0015] A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a view in perspective of a sealed package for pourable food products in accordance with the present invention;

Figure 2 shows a larger-scale cross section of a top wall of the Figure 1 package fitted with a respective closable opening device;

Figure 3 shows a larger-scale section, indicating the component layers, of a portion of the top wall of the Figure 1 package;

Figure 4 shows a top plan view of a packaging material web portion to which a respective opening device is to be applied to form the Figure 1 package;

Figure 5 shows a partly sectioned side view of the top part of the Figure 1 package following removal of the opening device cap;

Figure 6 shows a top plan view of a variation of the packaging material web portion to which a respective opening device is to be applied to form a sealed package in accordance with the present invention.

[0016] Number 1 in Figure 1 indicates as a whole an aseptic sealed package for pourable food products, e. g. a parallelepiped-shaped package known as Tetra Brik Aseptic (registered trademark), which is produced from a web 2 of packaging material (shown only partly in Figure 4) as described in more detail previously, and is provided with a closable opening device 3 made of plastic material and applied to a top wall 4 of package 1.

[0017] The packaging material defining web 2 and package 1 (Figure 3) has a multilayer structure, and comprises a base layer 5 of fibrous material, e.g. paper, or mineral-filled polypropylene, covered on the side defining the outer face of package 1 with a film 6 of thermoplastic material - in the example shown, polyethylene. On the opposite side to layer 5, i.e. the side defining the inner face of package 1, there is a layer 7 of oxygen-barrier material, e.g. an aluminium film, which is covered on both sides with respective films 8 of thermoplastic material, e.g. polyethylene.

[0018] Opening device 3 is fitted to top wall 4 of package 1, at a removable, in this case circular, portion 10 of wall 4, i.e. a portion detachable from the rest of package 1 to pour out the food product.

[0019] More specifically, opening device 3 comprises an externally threaded, annular frame 11 fixed to wall 4 of package 1 about removable portion 10 and defining a circular opening 12 through which to pour the food product; and a cap 13, which is formed separately from frame 11, is screwed to frame 11 in a closed position closing opening 12, and adheres, e.g. is heat sealed, directly to removable portion 10.

[0020] Once opened, cap 13 is movable between said closed position and an open position detached from frame 11.

[0021] As cap 13 is unscrewed from frame 11, removable portion 10 remains attached to cap 13 and is detached from the rest of wall 4 of package 1.

[0022] In a preferred embodiment of the present invention, removable portion 10 is formed by cutting, e.g. laser cutting, layer 5 of web 2 along a discontinuous line L extending along a closed circular path C and interrupted at two diametrically opposite portions defining respective connecting points 14 between the portion of material defined by path C and the rest of layer 5. Once the above cutting operation is performed, layer 5 is laminated with films 6, 8 of thermoplastic material and layer 7 of barrier material, so that removable portion 10 is defined by layers of thermoplastic material (6, 8) and barrier material (7), in exactly the same way as the prelaminated holes formed using known methods and described in the introduction to the present description, as well as by a layer 15 of stiffening material, in this case defined by a circular disk of fibrous material. The presence of layer 15 of stiffening material enables removable portion 10 to be detached neatly from wall 4 of package 1, without leaving any plastic residue through the hole defined by the parting line L of removable portion 10.

[0023] With reference to Figures 1, 2 and 5, frame 11 comprises an annular flange 20 heat sealed to wall 4 of package 1 and internally defining opening 12; and a cylindrical, externally threaded, annular portion 21 projecting from a lateral edge of opening 12.

[0024] Cap 13 comprises, integrally, a portion 22 closing opening 12; and a cylindrical, internally threaded, annular portion 23 projecting from a circular outer peripheral edge 24 of portion 22 and which screws onto annular portion 21 of frame 11. Cap 13 also comprises, integrally, two radial tabs 25, each substantially in the form of a right-angle trapezium, and which project radially outwards from annular portion 23 and provide for screwing and unscrewing cap 13 easily on and off frame 11.

[0025] More specifically, portion 22 is substantially defined by a truncated-cone cup-shaped body 26 increasing in section towards removable portion 10 of wall 4 and defining an inner cavity 27 open towards wall 4; and by a truncated-cone-shaped lateral wall 28 tapering oppositely with respect to cup-shaped body 26, extending from a bottom lateral edge of cup-shaped body 26, and defining peripheral edge 24 at the top.

[0026] More specifically, annular portion 23 extends from peripheral edge 24, and is located radially out-

wards of and coaxial with lateral wall 28 so as to define, with lateral wall 28, a seat for receiving annular portion 21 of frame 11.

[0027] The connecting portion between lateral wall 28 and cup-shaped body 26 of portion 22 defines an annular anchoring section 31 projecting through opening 12 in the closed position of cap 13, and heat sealed directly to removable portion 10 of wall 4.

[0028] As such, the stiffening material layer 15 of removable portion 10 is interposed between barrier material layer 7 and anchoring section 31 of cap 13.

[0029] Number 10' in Figure 6 indicates as a whole an alternative removable portion for package 1 produced according to the present invention. Removable portion 10' is similar to removable portion 10, and its component parts are indicated wherever possible using the same reference numbers as for the corresponding parts of removable portion 10.

[0030] Removable portion 10' is obtained by forming a hole 35 through layer 5 of web 2, laminating layer 5 with films 6, 8 of thermoplastic material and layer 7 of barrier material to cover hole 35, and then applying onto the portions of material covering hole 35 a portion 36 of stiffening material, preferably a disk of fibrous material covered outwards with thermoplastic material.

[0031] In actual use, package 1 is opened using tabs 25 to rotate cap 13 with respect to frame 11. As it rotates, cap 13 retains, and so detaches from the rest of wall 4, removable portion 10, or likewise removable portion 10', of top wall 4 sealed to anchoring section 31.

[0032] More specifically, by providing stiffening material (15, 36) on removable portion 10, 10', which is no longer simply defined by thin superimposed films of thermoplastic and barrier material (as in the case of prelaminated holes formed using known methods), removable portion 10, 10' is detached neatly from the rest of wall 4 of package 1 with very little residual plastic projecting through the hole formed in wall 4 by detaching removable portion 10, 10'.

[0033] Tests have shown, in fact, that stiffening removable portion 10, 10' with a layer of fibrous material (15, 36) provides, when opening package 1, for better cutting films 6, 8 of thermoplastic material and layer 7 of barrier material. As compared with known packages, films 6, 8 of thermoplastic material are therefore stretched and frayed less when opening package 1, thus reducing the residual plastic projecting through the hole formed in wall 4 of package 1 by detaching removable portion 10, 10'.

[0034] Clearly, changes may be made to package 1 and to the relative production method as described and illustrated herein without, however, departing from the scope of the accompanying Claims.

Claims

1. A method of producing a sealed package (1) of a pourable food product from a multilayer sheet packaging material (2) comprising a base layer (5) and layers of thermoplastic material (6, 8) and of barrier material (7); said method comprising the steps of:

- forming in said multilayer sheet packaging material (2) a removable portion (10, 10') comprising at least layers of thermoplastic material (6, 8) and of barrier material (7);
- applying about said removable portion (10, 10') a frame (11) defining a pour opening (12); and
- fitting to said frame (11) a removable cap (13) closing said pour opening (12), by causing said cap (13) to adhere directly to said removable portion (10, 10');

characterized by comprising the step of providing said removable portion (10, 10') with a layer of stiffening material (15, 36).

2. A method as claimed in Claim 1, **characterized in that** said base layer (5) and said layer of stiffening material (15, 36) comprise fibrous material.

3. A method as claimed in Claim 1 or 2, **characterized in that** said layer of stiffening material (15, 36) is interposed between said layer of barrier material (7) of said removable portion (10, 10') and said cap (13).

4. A method as claimed in any one of the foregoing Claims, **characterized in that** said sheet packaging material (2) is formed by means of a laminating operation to laminate said base layer (5) and said layers of thermoplastic material (6, 8) and of barrier material (7); and **in that** said layer of stiffening material (15) of said removable portion (10) is obtained by means of a cutting operation to cut said base layer (5), prior to said laminating operation, along a discontinuous line (L) extending along a closed path (C) and interrupted at least one portion of said path (C) defining a connecting point (14) between the portion of material defined by said path (C) and the rest of said base layer (5).

5. A method as claimed in Claim 4, **characterized in that** said cutting operation to cut said base layer (5) is performed by means of a laser.

6. A method as claimed in any one of Claims 1 to 4, **characterized in that** said removable portion (10') is obtained by forming a hole (35) through said base layer (5); laminating said base layer (5) with said layers of thermoplastic material (6, 8) and of barrier material (7) to cover said hole (35); and then applying said layer of stiffening material (36) onto the portions of material covering the hole (35).

7. A sealed package (1) for pourable food products, formed from a multilayer sheet packaging material (2) comprising a base layer (5) and layers of thermoplastic material (6, 8) and of barrier material (7); said package (1) comprising a removable portion (10, 10') including at least layers of thermoplastic material (6, 8) and of barrier material (7), and being provided with a closable opening device (3) in turn comprising a frame (11) fixed to the package (1) about said removable portion (10, 10') and defining a pour opening (12), and a removable cap (13) fitted to said frame (11) to close said pour opening (12) and fixed directly to said removable portion (10, 10'); **characterized in that** said removable portion (10, 10') also comprises a layer of stiffening material (15, 36).

8. A package claimed in Claim 7, **characterized in that** said base layer (5) and said layer of stiffening material (15, 36) comprise fibrous material.

9. A package as claimed in Claim 7 or 8, **characterized in that** said layer of stiffening material (15, 36) is interposed between said layer of barrier material (7) of said removable portion (10, 10') and said cap (13).

10. A package as claimed in Claim 8 or 9, **characterized in that** said layer of stiffening material (15) is defined by a disk of fibrous material detached along most of its outer perimeter from said base layer (5) and covered, together with the base layer (5), with said layers of thermoplastic material (6, 8) and of barrier material (7).

11. A package as claimed in Claim 8 or 9, **characterized in that** said removable portion (10') is defined by a through hole (35) formed through said base layer (5) and covered with said layers of thermoplastic material (6, 8) and of barrier material (7); and **in that** said layer of stiffening material (36) is defined by a disk comprising fibrous material applied to the portions of material covering said hole (35).

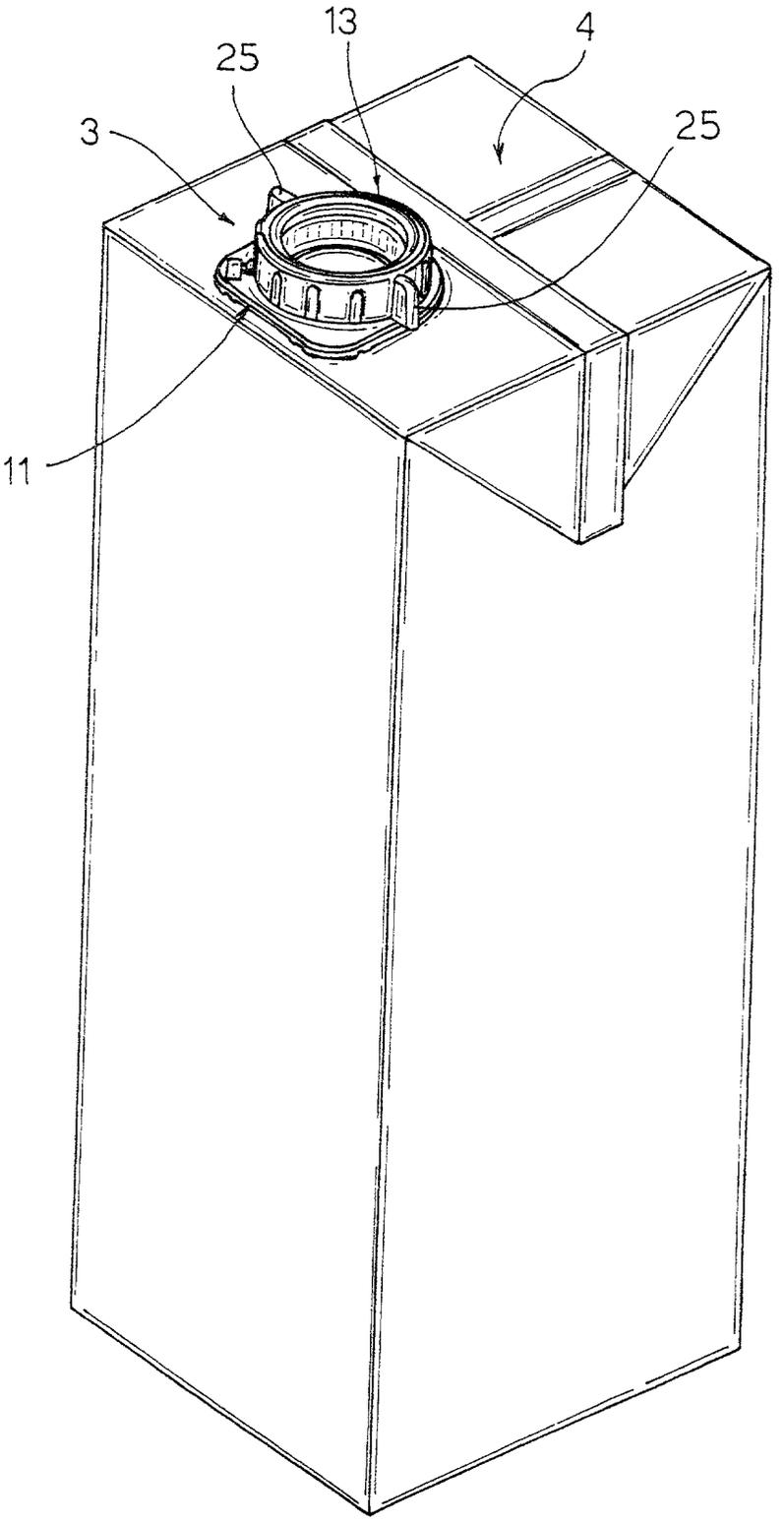


Fig.1

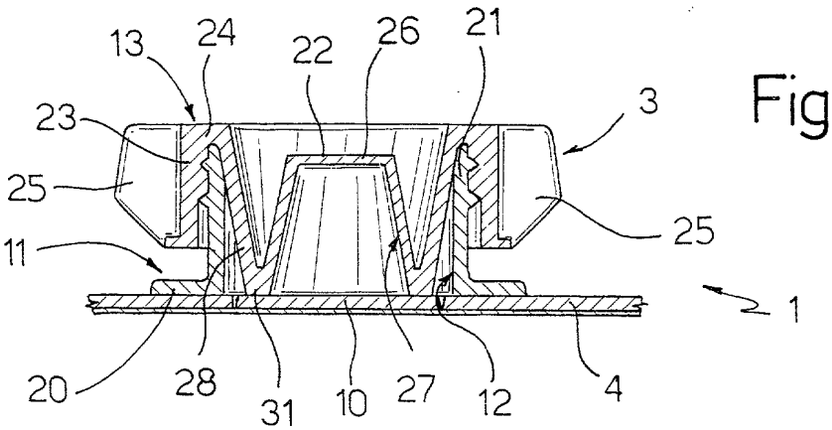
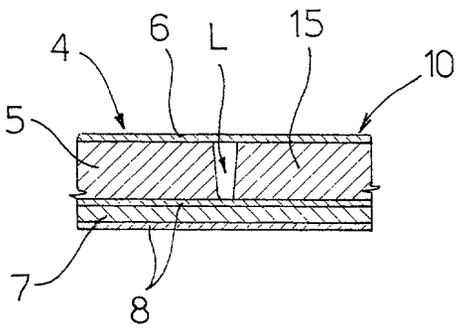


Fig.2

Fig.3



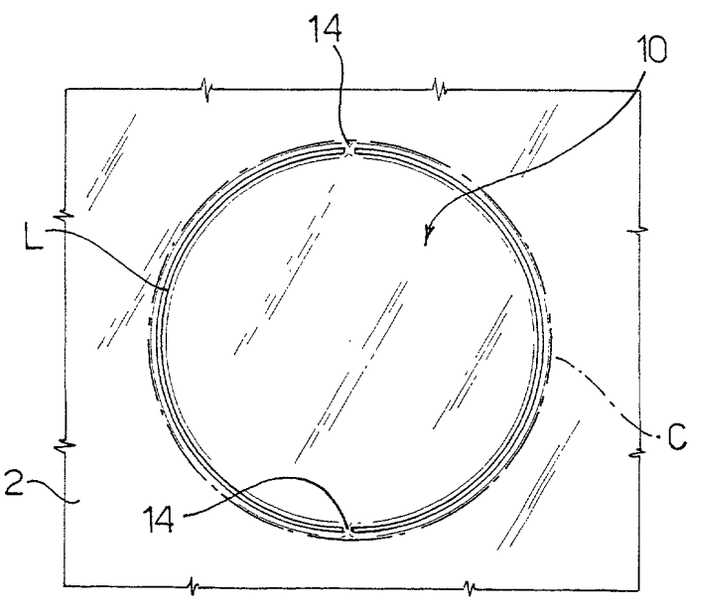


Fig.4

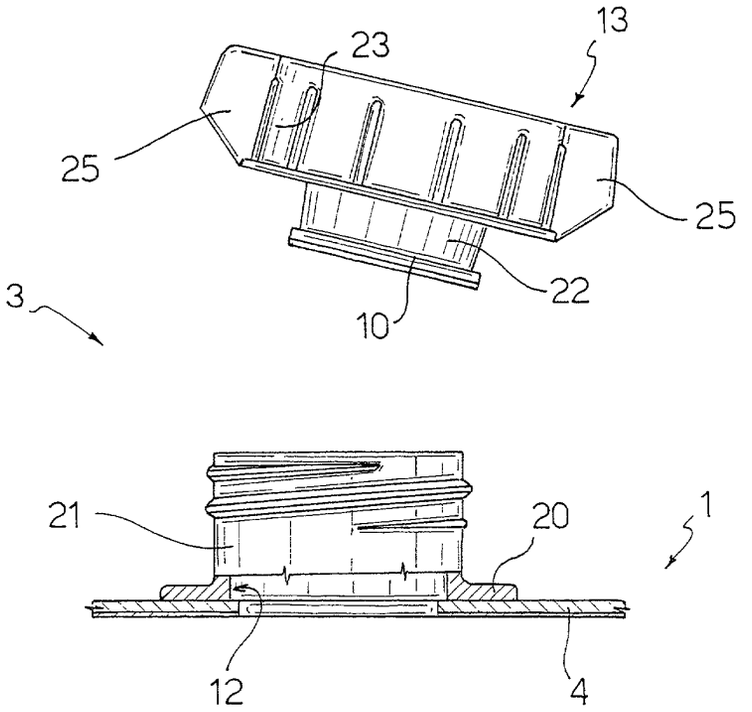


Fig.5

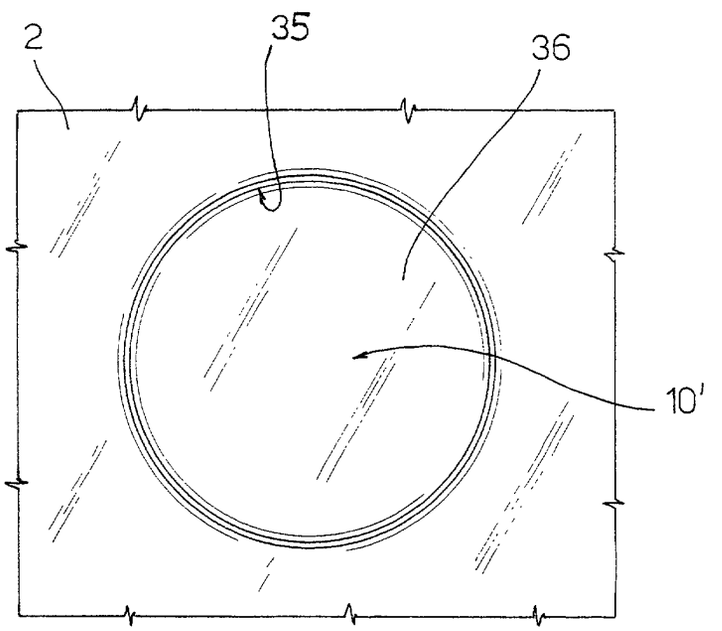


Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 6561

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)
B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	20 December 2001	Spettel, J

CATEGORY OF CITED DOCUMENTS

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