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(11) **EP 1 900 653 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.03.2008 Bulletin 2008/12

(51) Int Cl.:
B65D 85/804 *(2006.01)*

(21) Application number: **07116646.6**

(22) Date of filing: **18.09.2007**

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

(30) Priority: **18.09.2006 IT TO20060661**

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(54) Sealed capsule for making a beverage

(57) A sealed capsule (1) for making a beverage, the capsule (1) being defined by a cup-shaped container (3) of thermoplastic material for containing a measure of water-soluble material (2) and closed, at one end, by a sealing cover (8) connected to an outer annular flange (5) of the container (3), and, at the opposite end, by a bottom wall (6) having an annular reinforcing rib (9).

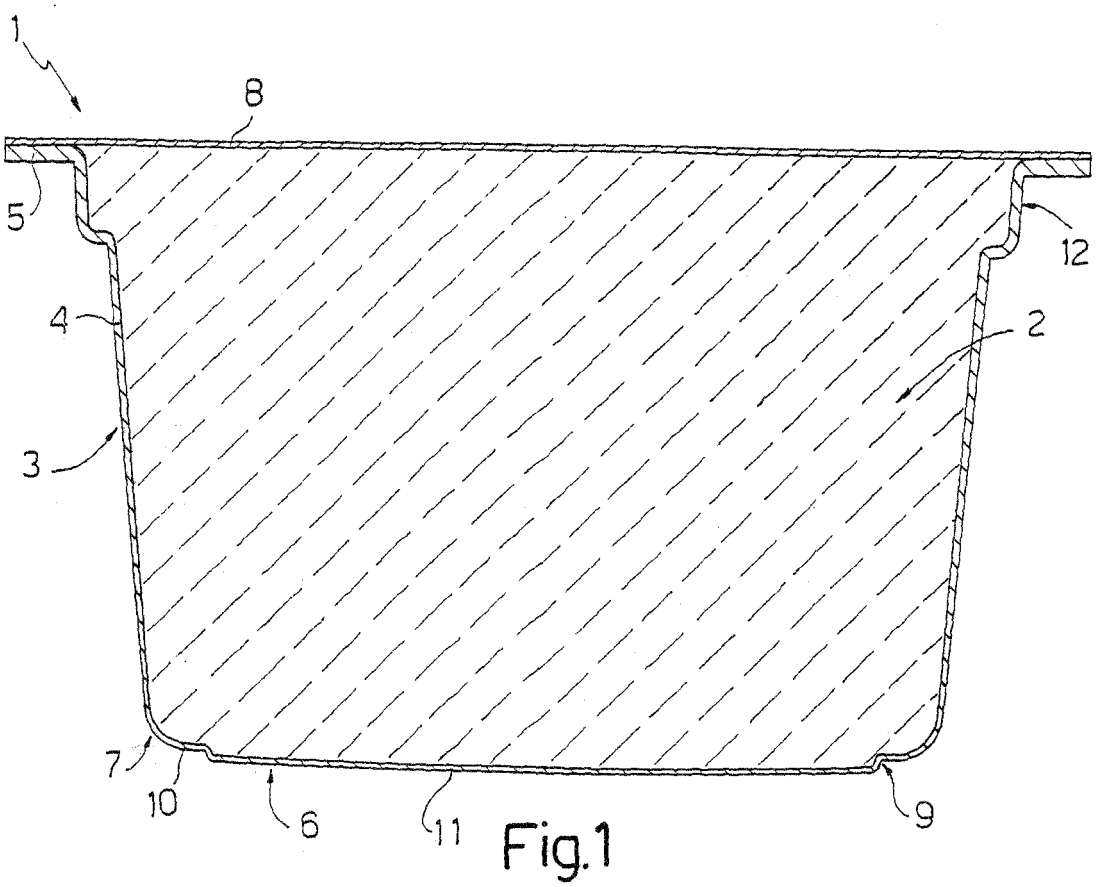

Fig.1

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Description

[0001] The present invention relates to a sealed capsule for making a beverage.

[0002] More specifically, the present invention relates to a sealed capsule of the type comprising a cup-shaped container for a measure of water-soluble material, and a flat cover fluidtight sealing the cup-shaped container; the container comprising a tubular lateral wall with a first and a second end, an outer annular flange integral with the first end, and a bottom wall connected to the second end; and the cover comprising a flat sealing wall connected in fluidtight manner to the flange.

[0003] Sealed capsules of the above type are commonly used, for example, in percolating machines for making beverages such as coffee, tea, chocolate, etc., to which the following description specifically refers.

[0004] In percolating machines employing sealed capsules, percolation is normally performed by gripping the capsule between two half-chambers of a percolating chamber, and feeding pressurized hot water through the percolating chamber.

[0005] As the capsule is gripped, the sealing wall and bottom wall, which are normally flat, are pierced substantially simultaneously by two needle piercing devices, each fitted to a respective half-chamber, to allow pressurized hot water into the capsule on one side, and outflow of the percolated beverage on the other.

[0006] Though theoretically straightforward, in actual fact, piercing the capsule has been found to pose serious problems.

[0007] That is, whereas the sealing wall - which is normally made of metal material, such as aluminium, and therefore fairly rigid - is pierced easily by the dynamic thrust of the needles, the bottom wall - which is normally made of thermoplastic material, and necessarily thin for it to be pierced by the needles - tends to be flexed inwards of the capsule by the needles, without being pierced, and to remain resting on the needles.

[0008] To solve this drawback, it has been proposed to make the bottom wall inwardly convex, as opposed to flat, so that it defines a mechanical bistable member, and is pierced after, as opposed to together with, the sealing wall when gripping the capsule. The bottom wall, in fact, is not pierced until it is pushed outwards by the pressurized water flowing into the capsule through the holes formed earlier through the sealing wall when gripping the capsule.

[0009] Though effective, this solution has several drawbacks, mainly due to the convex shape of the bottom wall making the capsule more difficult, and therefore more expensive, to produce, and also reducing the space available inside the capsule for the powdered material.

[0010] It is an object of the present invention to provide a sealed capsule of the type described above, designed to eliminate the aforementioned drawbacks, and which at the same time is cheap and easy to produce.

[0011] According to the present invention, there is provided a sealed capsule for making a beverage, as claimed in the independent Claim and, preferably, in any one of the following Claims depending directly or indirectly on the independent Claim.

[0012] A non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows an axial section of a preferred embodiment of the sealed capsule according to the present invention;

Figure 2 shows an axial section of a percolating assembly of a percolating machine employing the Figure 1 capsule;

Figures 3 and 4 show the Figure 2 assembly in respective different operating configurations.

[0013] Number 1 in Figure 1 indicates as a whole a sealed capsule for making a beverage from a measure of powdered water-soluble material 2 housed inside capsule 1.

[0014] Capsule 1 comprises a cup-shaped container 3 made of thermoplastic material and in turn comprising a truncated-cone-shaped lateral wall 4, which has an outer annular flange 5 at its wide end, and is closed at its narrow end by a bottom wall 6 connected to lateral wall 4 by a rounded edge 7.

[0015] Capsule 1 also comprises a cover 8, which fluidtight seals cup-shaped container 3 and is defined by a flat sheet of metal foil, normally aluminium, the periphery of which is connected integrally to the outer surface of flange 5.

[0016] As shown in Figure 1, bottom wall 6 has an annular reinforcing rib 9, which is formed by drawing bottom wall 6, is coaxial with lateral wall 4, and defines, on bottom wall 6, an outer annular portion 10, and a uniformly thick, flat inner circular portion 11 parallel to cover 8.

[0017] More specifically rib 9 is in the form of a cylindrical connecting wall, which is coaxial with the lateral wall, extends between an inner periphery of annular portion 10 and an outer periphery of circular portion 11, and in height is roughly twice the thickness of bottom wall 6.

[0018] Close to flange 5, lateral wall 4 has a wider portion 12 connecting lateral wall 4 to the inner periphery of flange 5.

[0019] Flange 5 is thick enough to make it rigid, and, in the example shown, is roughly 0.6 mm thick.

[0020] Lateral wall 4 is thinner than flange 5, and decreases evenly in thickness from a maximum thickness close to flange 5, to a minimum thickness close to edge 7. In the example shown, the thickness of lateral wall 4 varies from a maximum of 0.5 mm to a minimum of 0.3 mm.

[0021] The thickness of bottom wall 6 is roughly the same as or slightly less than the minimum thickness of lateral wall 4. More specifically, circular portion 11 is of a constant thickness of about 0.3 mm.

[0022] In a variation not shown, lateral wall 4 is cylin-

drical, as opposed to truncated-cone-shaped.

[0023] In another variation not shown, edge 7 connecting bottom wall 6 and lateral wall 4 - be it truncated-cone-shaped or cylindrical - is a sharp edge as opposed to rounded.

[0024] As shown in Figure 2, capsule 1 is inserted, in use, into a percolating assembly 13 of a known percolating machine.

[0025] In one known type, percolating assembly 13 comprises a pressurized-hot-water sprinkler 14 aligned along an axis 15 with a piston 16 movable to and from sprinkler 14 and having a percolated beverage outflow conduit 17.

[0026] More specifically, sprinkler 14 comprises a substantially cylindrical body, the end of which facing piston 16 has a truncated-cone-shaped, outwardly-flared axial cavity 18 coaxial with axis 15 and for housing, in use, flange 5.

[0027] Sprinkler 14 comprises a piercing device 19, in turn comprising a plate fitted at the bottom of cavity 18, and a number of hollow needles 20 projecting from the plate towards piston 16, and which, in use, pierce cover 8 of capsule 1 to feed pressurized hot water into capsule 1 from an inflow conduit 21.

[0028] Piston 16 comprises a cylindrical end body coaxial with axis 15 and fitted on the end with a cup 22 for housing cup-shaped container 3 in use. Cup 22 comprises a lateral wall defined by a number of columns extending axially towards sprinkler 14 and connected to one another by a ring 23, which is coaxial with axis 15 and, when piston 16 is gripped against sprinkler 14, presses flange 5 in fluidtight manner against the bottom surface of cavity 18.

[0029] Piston 16 comprises a piercing device 24 located at the bottom of cup 22 and in turn comprising a plate coaxial with axis 15, and a number of hollow needles 25 projecting from the plate towards sprinkler 14, and which, in use, piece bottom wall 6 to allow the percolated beverage to flow out of capsule 1 into outflow conduit 17.

[0030] Performance of capsule 1 when making the beverage will now be described as of the Figure 2 operating configuration, in which a fresh capsule 1 has been loaded by the user into percolating assembly 13, and is positioned, coaxially with axis 15, between sprinkler 14 and piston 16, with cover 8 facing sprinkler 14.

[0031] When the percolating machine is operated, piston 16 advances towards sprinkler 14, thus gradually inserting capsule 1 through ring 23 into cup 22.

[0032] As piston 16 advances, the leading end of ring 23 eventually contacts the bottom surface of flange 5 and, continuing towards sprinkler 14, pushes capsule 1 towards sprinkler 14 to press flange 5 in fluidtight manner against the bottom surface of cavity 18 (Figure 3) .

[0033] During this last stage, the axial ends of capsule 1 are pierced substantially simultaneously by piercing device 19, whose needles 20 penetrate capsule 1 through cover 8, and by piercing device 24, whose needles 25 penetrate capsule 1 through circular portion 11 of bottom wall 6.

[0034] As shown in Figure 3 - which shows the operating configuration just after capsule 1 is pierced and before pressurized hot water is fed into capsule 1 - cover 8, being made of relatively rigid foil that does not flex under the dynamic thrust of needles 20, remains flat and substantially undeformed when pierced.

[0035] On the other hand, by virtue of reinforcing rib 9, bottom wall 6, despite being made of thin, relatively flexible thermoplastic material, also performs rigidly, allows needles 25 to pierce it over the final stage in the travel of piston 16 towards sprinkler 14, and remains substantially flat when pierced, except for a slight inflection inwards of capsule 1.

[0036] Rib 9, in fact, provides, simply and cheaply, for reducing free inflection of bottom wall 6, so that circular portion 11 is rigid enough not to flex under the dynamic axial thrust of needles 25 when pierced, while at the same time being thin enough to be pierced easily by needles 25.

[0037] As shown in Figure 4, when pressurized hot water is fed along conduit 21 and through needles 20 into capsule 1, the pressure of the water presses circular portion 11 in fluidtight manner against the plate of piercing device 24, so that needles 25 penetrate further into capsule 1 through the holes already formed by needles 25.

[0038] Flow of the pressurized hot water through capsule 1 percolates material 2 to produce the beverage, which flows out of capsule 1 through needles 25 and out along conduit 17.

Claims

1. A sealed capsule (1) for making a beverage, the capsule (1) comprising a cup-shaped container (3) for a measure of water-soluble material (2), and a flat cover (8) fluidtight sealing the cup-shaped container (3); the container (3) comprising a tubular lateral wall (4) with a first and a second end; an outer annular flange (5) integral with the first end; and a bottom wall (6) connected to the second end; the cover (8) comprising a flat sealing wall connected in fluidtight manner to the flange (5); and the capsule (1) being **characterized in that** the bottom wall (6) comprises an annular reinforcing rib (9).

2. A capsule (1) as claimed in Claim 1, wherein the annular reinforcing rib (9) is coaxial with the lateral wall (4), and defines, on the bottom wall (6), an outer annular portion (10) and an inner circular portion (11).

3. A capsule (1) as claimed in Claim 2, wherein the inner circular portion (11) is parallel to the flat sealing wall.

4. A capsule (1) as claimed in Claim 2 or 3, wherein the outer annular portion (10) is connected to the

second end of the lateral wall (4) by a rounded annular edge (7).

5. A capsule (1) as claimed in one of the foregoing Claims, wherein the annular reinforcing rib (9) is formed by drawing the bottom wall (6).

6. A capsule (1) as claimed in one of Claims 2 to 5, wherein the inner circular portion (11) of the bottom wall (6) is of constant thickness.

7. A capsule (1) as claimed in one of Claims 2 to 6, wherein the annular reinforcing rib (9) is in the form of a substantially cylindrical connecting wall coaxial with the lateral wall (4) and extending between an inner periphery of the outer annular portion (10) and an outer periphery of the inner circular portion (11).

8. A capsule (1) as claimed in Claim 7, wherein the connecting wall, in height, is roughly twice the thickness of the bottom wall (6).

9. A capsule (1) as claimed in one of Claims 2 to 8, wherein the inner circular portion (11) of the bottom wall (6) is thinner than the flange (5).

10. A capsule (1) as claimed in one of the foregoing Claims, wherein the lateral wall (4) is thinner than the flange (5).

11. A capsule (1) as claimed in one of the foregoing Claims, wherein the lateral wall (4) is a truncated-cone-shaped tubular wall having a major end at the first end.

12. A capsule (1) as claimed in one of Claims 2 to 11, wherein the container (3) decreases in thickness from the flange (5) towards the inner circular portion (11) of the bottom wall (6).

13. A capsule (1) as claimed in any one of Claims 2 to 12, wherein the inner circular portion (11) of the bottom wall (6) is approximately 0.3 mm thick.

14. A capsule (1) as claimed in any one of the foregoing Claims, wherein the container (3) is made of thermoplastic material.

15. A capsule (1) as claimed in any one of the foregoing Claims, wherein the flat sealing wall comprises a sheet of metal material.

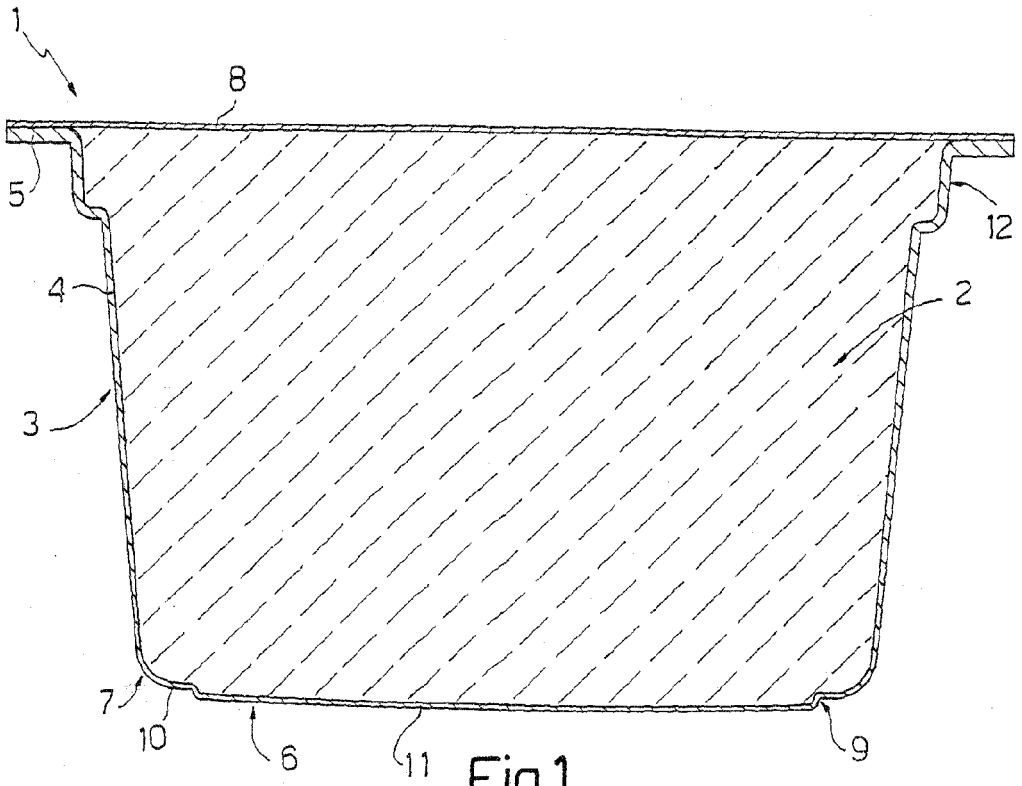
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Fig.1

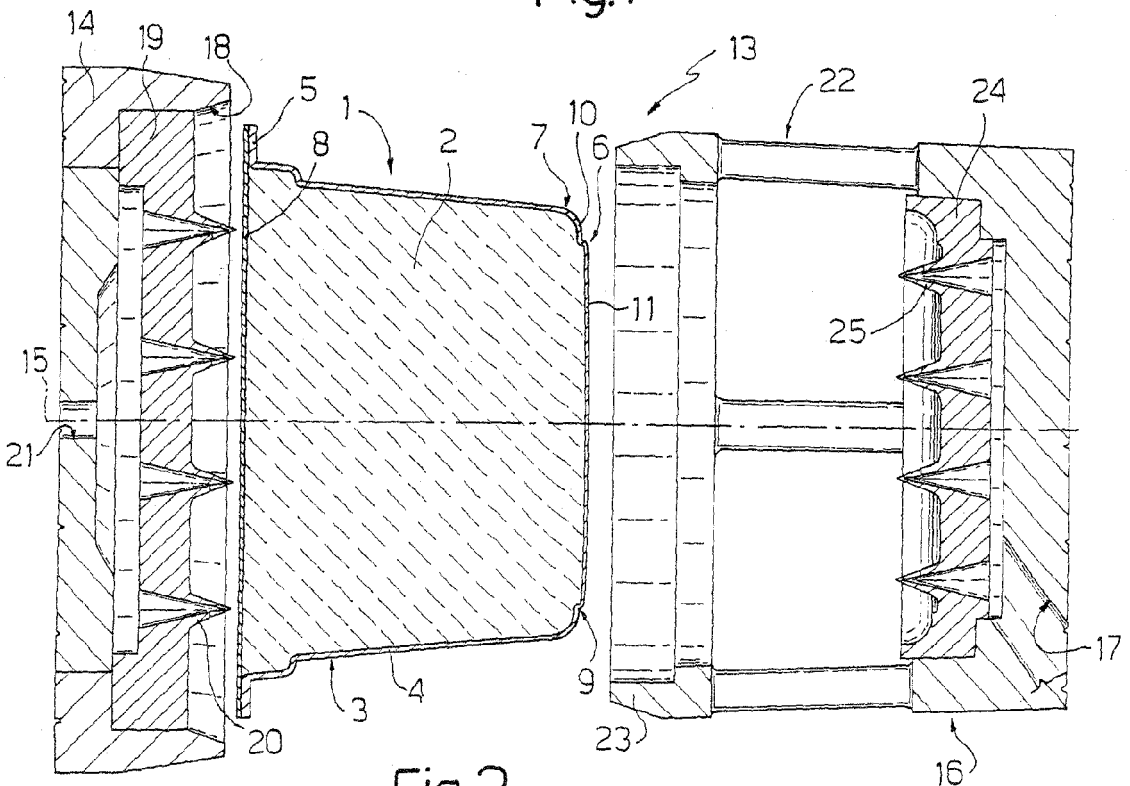
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Fig.2

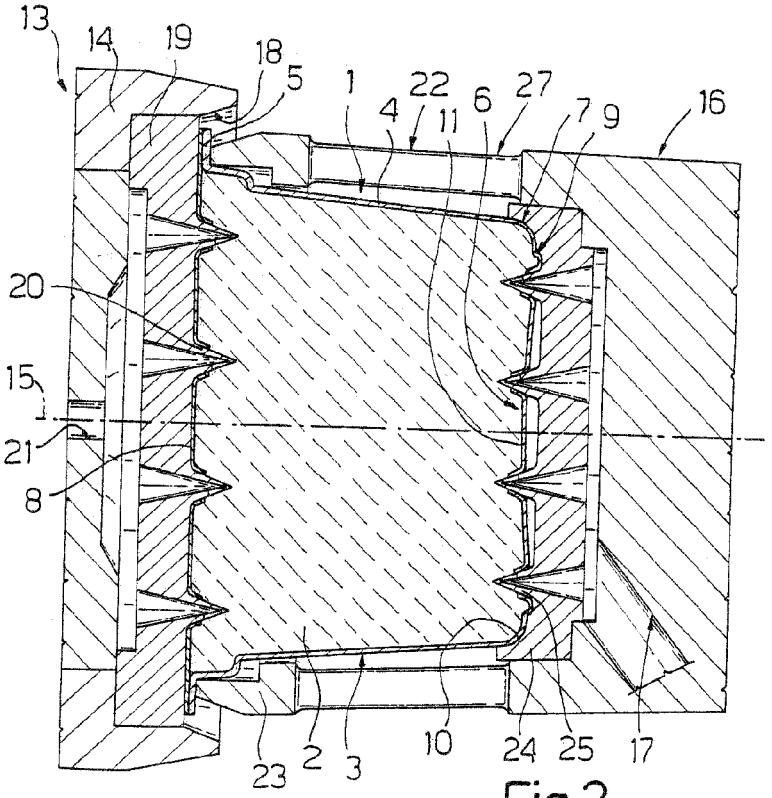
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Fig.3

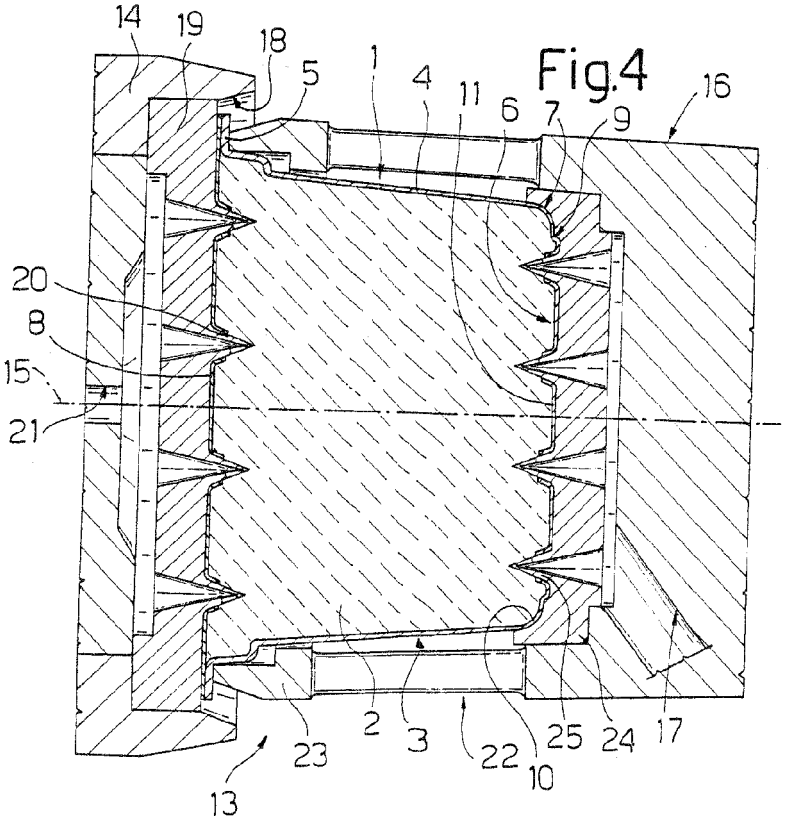
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Fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 07 11 6646

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 February 2008	Fitterer, Johann

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