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(71) Applicant: **Omega S.R.L.**
30030 Gardigiano Di Scorze' (VE) (IT)

(72) Inventor: **De Polo, Antonio**
31015 Conegliano (Treviso) (IT)

(74) Representative: **Pajola, Stefano**
Maroscia & Associati Srl
Contrà Porti, 21
36100 Vicenza (IT)

(54) Snap-fit container-cap assembly for fluids

(57) A snap-fit fluid container-cap assembly, which comprises a fluid container (2) having a neck (3) with an open top that defines a mouth (4), a cap (5) with an upper wall (6) for snap-on sealing of said mouth (4) and a substantially cylindrical side wall (7) for encircling said neck (3), releasable anchor means (8) for removably securing said cap (5) to said neck (3). The releasable anchor means (8) include at least one radial inward tooth-like formation (9) on said cap (5), and at least one radial outward projection (10) of said neck, which is designed to interact with said at least one tooth-like formation (9) and to removably lock said cap (5) to said neck (3).

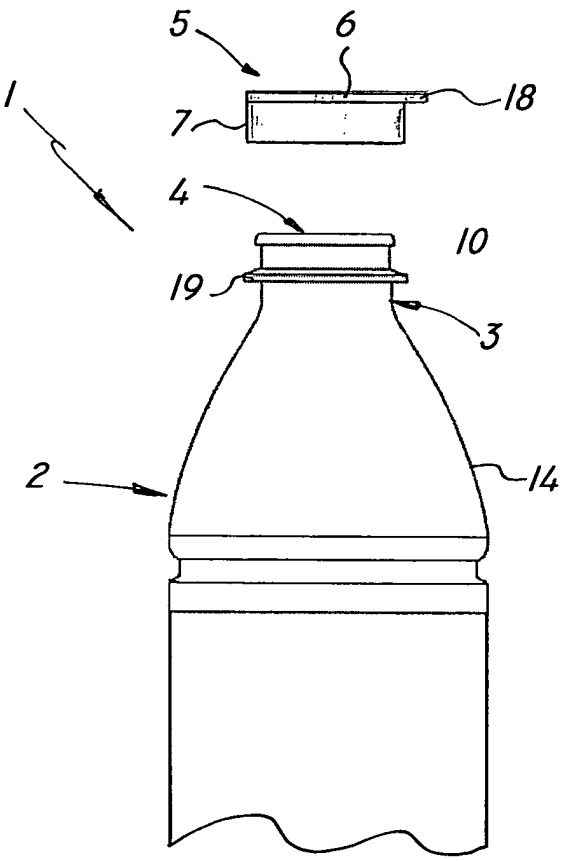

FIG. 1

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Description

Field of invention

[0001] The present invention generally finds application in the field of fluid containers and particularly relates to a snap-fit fluid container-cap assembly, particularly liquid-containing bottles, flasks, jars or the like.

Background art

[0002] Liquid or fluid containers, such as bottles, jars, flask and the like, for beverages, detergents and chemicals in general, are known to have an externally threaded outlet mouth, for a mating internally threaded cap to be tightened thereon.

[0003] One of the commonly recognized drawbacks of this solution is a relatively high final cost of such containers, considering the sale price for the final user.

[0004] The accuracy required for container and cap thread mating requires the design of rather complex molds having a small number of cavities, due to small-size requirements.

[0005] This will involve both increased manufacturing costs associated with mold construction and final product design and poor throughput, due to a necessarily low number of manufactured parts per unit time.

[0006] Furthermore, during the manufacturing process, the cap is applied to the container mouth by exerting an appropriately calibrated pressure to force the cap threads onto the container threads.

[0007] Therefore, the walls of the container and cap should be thick enough to ensure adequate resistance to the stresses generated during this step.

[0008] This will require the use of larger amount of material, thereby involving a further cost increase, as well as a higher product weight, resulting in an environmental impact.

[0009] Finally, another drawback of these solutions is that the actions of tightening and releasing the cap for opening and closing the container require the use of both hands by the final user, which is rather inconvenient, especially in particular conditions of use, such as during sports activities.

[0010] In an attempt to obviate the above drawbacks, snap-fit cap containers have been devised, allowing the container to be opened and closed in one simple and quick action.

[0011] Nevertheless, these prior art solutions include a quick opening cap which fits onto an internally threaded interface element to be tightened onto the external threads of the container neck.

[0012] Therefore, these solutions involve further construction complications, and consequent higher costs.

[0013] US 2006/186080 discloses a quick-closing cap consisting of a cylindrical part having a number of radial inward resilient protrusions at its lower edge, arranged along the entire circumference of such edge.

[0014] Such protrusions are designed to interact with a ring-like projection on the container neck, for stable fixation of the cap.

[0015] The cap has a closing portion hinged to the cylindrical wall at the upper edge thereof for opening and closing the container mouth.

[0016] While this solution avoids the need of forming container and cap threads, it is still apparently complex and does not satisfactorily solve the cost problems associated with prior art solutions.

Disclosure of the invention

[0017] The object of the present invention is to overcome the above drawbacks, by providing a snap-fit container assembly that is highly efficient and relatively cost-effective.

[0018] A particular object is to provide a snap-fit container assembly that can be manufactured by simple molds with a relatively high throughput.

[0019] A further object is to provide a snap-fit container assembly having a simple design, while ensuring high resistance and adequate sealing properties.

[0020] Yet another object is to provide a snap-fit container assembly that requires a relatively small amount of material and is thus particularly light and easily and cost-effectively transportable.

[0021] Another important object is to provide a snap-fit container assembly that can be simply opened and closed, even by one hand.

[0022] These and other objects, as more clearly shown hereinafter, are fulfilled by a snap-fit fluid container-cap assembly as defined in claim 1, which comprises a fluid container having a neck with an open top that defines a mouth, a cap with an upper wall for snap-on sealing of said mouth and a substantially cylindrical side wall for encircling said neck, releasable anchor means for removably securing said cap to said neck.

[0023] According to a peculiar feature of the invention, the releasable anchor means include at least one radial inward tooth-like formation formed on said tubular wall of said cap and at least one radial outward projection of said neck, which is designed to interact with said at least one tooth-like formation and to removably lock said cap to said neck.

[0024] Due to this particular configuration, the container may be closed without forming threads on the container or the cap, and by directly securing the cap to the container body.

[0025] Thus, the assembly of the invention will be of simple design and construction and ensure a considerable reduction of manufacturing costs.

Brief description of the drawings

[0026] Further features and advantages of the invention will be more apparent from the detailed description of a few preferred, non-exclusive embodiments of a con-

tainer-cap assembly of the invention, which is described as a non-limiting example with the help of the annexed drawings, in which:

FIG. 1 is an exploded front view of an assembly of the invention;
FIG. 2 is a bottom view of a cap that is part an assembly of the invention;
FIG. 3 is a top view of a container that is part of the assembly of Fig. 1, without the cap;
FIG. 4 is a top view of the assembly of Fig. 1, with the cap thereon;
FIG. 5 is broken away view of a detail of the assembly of the invention;
FIG. 6 is a view of the detail of FIG. 5 during removal of the cap from the container;
FIGS. 7 and 8 are enlarged broken away views of a detail of the assembly of a first preferred configuration with the cap removed from and fitted on the container;
FIG. 9 is an enlarged broken away view of a detail of the assembly of a second preferred configuration with the cap fitted on the container.

Detailed description of a preferred embodiment

[0027] Referring to the above figures, the assembly of the invention, generally designated by numeral 1, may be used to contain fluids, such as liquids or liquid mixtures of any type, such as water or other beverages, possibly sodas, or liquid chemicals, such as detergents or the like.

[0028] Furthermore, a pressurized gas, such as nitrogen, carbon dioxide or the like, may be enclosed in the assembly, to create a controlled atmosphere within the assembly.

[0029] As shown in Fig. 1, a snap-fit fluid container-cap assembly of the invention comprises a container 2 for a fluid or a fluid mixture, having a substantially cylindrical neck 3 with an open top defining a mouth 4 for the passage of the fluid, and a removable cap 5 for snap-on sealing of the container 2 and closing of the mouth 4.

[0030] The cap 5 has an upper wall 6 for closing the mouth 4 and a substantially cylindrical tubular side wall 7 coaxial with and encircling the neck 3 of the container 2. Releasable anchor means 8 are further provided for removably securing the cap 5 to the container 2.

[0031] According to a peculiar feature of the invention, the anchor means 8 include at least one radial inward tooth-like formation 9 on the cylindrical wall 7 of the cap 5, and at least one radial outward projection 10 on the neck 3 of the container 2, which is designed to interact with the tooth-like formation 9 and to removably lock the cap 7 to the container 2 with the mouth 4 closed.

[0032] Both the container 2 and the cap 5 may be formed of any plastic material having the required resistance properties, possibly of food grade if the assembly 1 is designed to contain a beverage.

[0033] In the accompanying figures, the container 2 has a bottle shape, but it may have any other typical fluid container shape, and be conformed, for instance, as a flask, a jar, a can or the like, possibly having a cylindrical body with a substantially constant diameter, without departure from the scope of the present invention.

[0034] According to a preferred, non exclusive embodiment of the present invention, the projection 10 may have a flat bottom surface 11 for retaining the tooth-like formation 9.

[0035] The latter may in turn have a top abutment surface 12, which may be flat or have a mating edge, and is adapted to contact the retaining surface 11 of the container 2 when the cap 5 is fitted thereon.

[0036] The retaining surface 11 will be located at a first axial distance d_1 from the peripheral edge 13 of the mouth 4 and the abutment surface 12 will be located at a second axial distance d_2 from the upper wall 6 of the cap 5, whose average value is substantially similar to that of the first distance d_1.

[0037] The interaction between the two surfaces 11, 12 will cause the upper wall 6 of the cap 5 to remain on the mouth 4 of the container 2 and close it.

[0038] As shown in Fig. 2, the tooth-like formation 9 may have a smaller circumferential extension than the tubular wall 7, and the tubular wall 7 may have a lower flexural stiffness at the tooth-like formation 9 than over its remaining portion, to allow radial expansion of the tooth-like formation 9 as the cap 5 is fitted onto the mouth 4 of the container 2.

[0039] Thus, a lower force will be required to snap the container 2 closed, which will afford apparent advantages, particularly while bottling and assembling the assembly 1.

[0040] In a first embodiment, not shown, the radial projection 10 of the container 2 may have a circumferential extension substantially similar to that of the tooth-like formation 9.

[0041] However, the radial projection 10 may preferably have a substantially annular shape, with a circumferential extension coincident with that of the neck 3, to allow the cap 5 to be fitted with any angular orientation of the tooth-like formation 9.

[0042] In a further alternative embodiment, also not shown, the projection 10 may be replaced by a peripheral groove formed in the side wall 14 of the container 2 at the mouth 4 and designed to be at least partially engaged by the tooth-like formation 9 of the cap 5 in a radial direction.

[0043] In Figures 5 to 8, the cap 5 is shown as having a single radial tooth-like formation 9. However, alternative arrangements may be provided, with the tubular wall 7 of the cap 5 possibly having multiple tooth-like formations 9.

[0044] For instance, one or more pairs of tooth-like formations 9 may be provided, for interaction with one or more projections 10 of the container 2.

[0045] For each of these pairs, the tooth-like formations 9 may be formed at diametrically opposite positions

on the tubular wall 7, and be designed to mate with a single annular projections 10 or with respective projections 10 also disposed at diametrically opposite positions on the neck 3.

[0046] In a further preferred embodiment of the invention, more clearly shown in Fig. 9, two substantially similar tooth-like formations 9, 9' may be provided in axially offset positions for interaction with respective projections 10, 10' of the container 2, also disposed in axially offset positions.

[0047] The releasable anchor means 8 may include a sealing ring 15 extending downwards from the upper wall 6 of the cap 5 to a predetermined axial length 1.

[0048] Conveniently, the mouth 4 of the container 2 may have a substantially circular or elliptical shape, with a predetermined maximum internal diameter ϕ_i and the sealing ring 15 may have a maximum external diameter ϕ_e not smaller than the maximum internal diameter ϕ_i of the mouth 4.

[0049] Thus, as the cap 5 is fitted onto the container 2, the sealing ring 15 will be pressed against the inner surface 16 of the side wall 14 of the latter to ensure sealing thereof.

[0050] Particularly, the sealing ring 15 may have an outer outwardly convex lateral surface 17, to allow the sealing ring 15 to bend inwards and facilitate mutual mating of the cap 5 and the container 2.

[0051] For simpler removal of the cap 5 by a user with a simple and quick one-hand action, the cap 5 may have an a tab 18 projecting outwards from the side wall 7 and adapted to be seized by a user to cause disengagement of the tooth-like formations 9, 9' from their respective projections 10, 10'.

[0052] The tab 18 will be preferably integral with the upper wall 6 and radially project therefrom.

[0053] According to another aspect of the invention, the upper and side walls 6, 7 of the cap 5 may be relatively thin, with substantially constant and coincident thicknesses s_1, s_2.

[0054] For instance, the thicknesses s_1, s_2 of the upper and side walls 6, 7 may fall in a range from 0.5 mm to 1.2 mm, and be preferably of about 1 mm.

[0055] The container 2 may also have a substantially constant thickness s_3, comparable with that of the cap 5, excepting any projection 10, 10' or other formation, such as the ring pull 19, which is designed to facilitate grasping and transportation of the assembly 1.

[0056] This will considerably reduce the amount of material that forms the parts of the assembly 1, and will allow the latter to be less expensive and lighter, for easier and cheaper transport.

[0057] In an alternative embodiment, not shown, the upper wall 6 of the cap 5 may have a closed line of weakness that delimits a removable portion of the upper wall 6 to define a passage for the liquids contained in the container 2.

[0058] The removable portion may be designed as a common pull tab typical for beverage cans, or with any other known configuration, so that a hole will be formed on the upper wall 6 of the cap 5 after removal thereof to allow fluid to be poured therefrom without requiring full removal of the cap 5.

[0059] The above description clearly shows that the invention fulfills the intended objects and particularly meets the requirement of providing a fluid container-cap assembly of simple construction and convenient use, in which the container and the removable cap may mate together without any thread or interface element therebetween.

[0060] The assembly of this invention is susceptible of a number of changes and variants, within the inventive principle disclosed in the appended claims. All the details thereof may be replaced by other technically equivalent parts, and the materials may vary depending on different needs, without departure from the scope of the invention.

[0061] While the assembly has been described with particular reference to the accompanying figures, the numerals referred to in the disclosure and claims are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Claims

1. A snap-fit fluid container-cap assembly, which comprises:

   - a fluid container (2) having a neck (3) with an open top defining a mouth (4);
   - a cap (5) with an upper wall (6) for snap-on sealing of said mouth (4) and a substantially cylindrical side wall (7) for encircling said neck (3);
   - means (8) for releasable anchoring said cap (5) to said neck (3);

   characterized in that said releasable anchoring means (8) include at least one radially inward tooth-like formation (9) on said cap (5), and at least one radially outward projection (10) of said neck (3), which is designed to interact with said at least one tooth-like formation (9) and to removably lock said cap (5) to said neck (3).

2. Assembly as claimed in claim 1, **characterized in that** said at least one projection (10) has a flat bottom surface (11) for retaining said at least one tooth-like formation (9), the latter having a top abutment surface (12) adapted to contact said retaining surface (11) of said projection (10) with said cap (5) fitted on said container (2), to hold said upper wall (6) on said mouth (4).

3. Assembly as claimed in claim 2, **characterized in that** said retaining surface (11) is axially offset to said mouth (4), at a first distance (d_1) and said abut-

ment surface (12) is axially offset to said upper wall (6) of said removable element (5), at a second distance (d_2), whose average value is substantially similar to that of said first distance (d_1).

4. Assembly as claimed in claim 2 or 3, **characterized in that** said at least one tooth-like formation (9) is formed on said cylindrical side wall (7) of said cap (5) and has a circumferential extension smaller than the latter.

5. Assembly as claimed in claim 4, **characterized in that** said side wall (7) of said cap (5) has a lower flexural stiffness at said tooth-like formation (9) than over the rest of its circumferential extension, to allow radial expansion of said at least one tooth-like formation (9) during the positioning of said cap (5) onto said container (2).

6. Assembly as claimed in any preceding claim, **characterized in that** said at least one radial projection (10) of said container (2) has a circumferential extension substantially similar to that of said at least one tooth-like formation (9).

7. Assembly as claimed in any preceding claim, **characterized in that** said at least one radial projection (10) of said container (2) has a substantially annular shape.

8. Assembly as claimed in any preceding claim, **characterized in that** said tubular wall (7) of said cap (5) has a pair of said tooth-like formations (9, 9') designed to interact with respective projections (10, 10') of said neck (3).

9. Assembly as claimed in claim 8, **characterized in that** the tooth-like formations (9, 9') of said pair are axially offset to each other to interact with respective axially offset projections (10, 10') of said neck (3).

10. Assembly as claimed in any preceding claim, **characterized in that** said anchoring means (8) comprise a sealing ring (15) that extends downwards from said upper wall (6) of said cap (5) to a predetermined axial length (1).

11. Assembly as claimed in claim 10, **characterized in that** said mouth (4) of said container (2) has a substantially circular or elliptical shape, with a predetermined maximum internal diameter (ϕ_i), said sealing ring (15) having a maximum external diameter (ϕ_e) not smaller than said maximum internal diameter (ϕ_i) of said mouth (4), to ensure sealing of said container (2).

12. Assembly as claimed in claim 11, **characterized in that** said sealing ring (15) has an outer outwardly convex lateral surface (17), to allow said sealing ring (15) to bend inwards, as said cap (5) is fitted onto said container (2).

13. Assembly as claimed in any preceding claim, **characterized in that** said cap (5) has a tab (18) projecting outwards from said tubular wall (7) and adapted to be seized by a user to facilitate disengagement of said at least one tooth-like formation (9) from said at least one projections (10), for removal of said cap (5) from said container (2).

14. Assembly as claimed in any preceding claim, **characterized in that** said upper (6) and side (7) walls of said cap (5) are relatively thin, with substantially constant and coincident thicknesses (s_1, s_2), which fall in a range from 0.5 mm to 1.2 mm, and are preferably about 1 mm.

15. Assembly as claimed in any preceding claim, **characterized in that** said upper wall (6) of said cap (5) has a closed weakness line that delimits a removable portion of said upper wall (6) to define a passage for the liquids contained in said container (2).

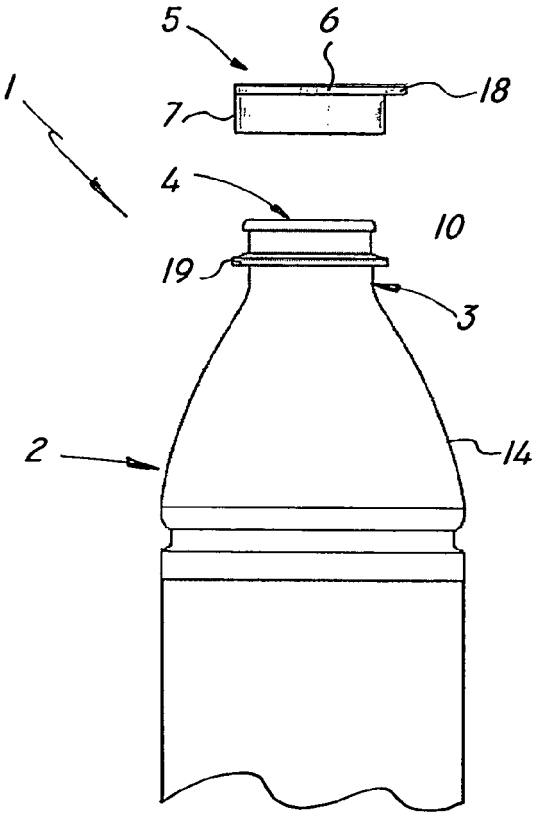

FIG. 1

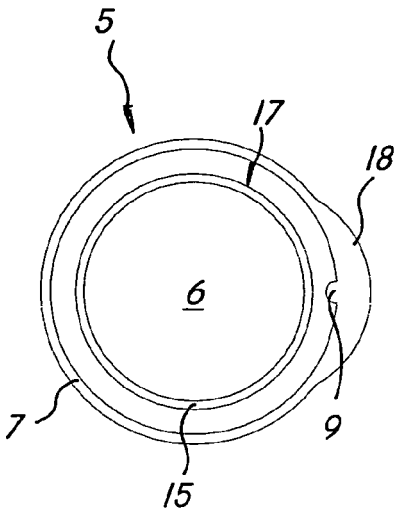

FIG. 2

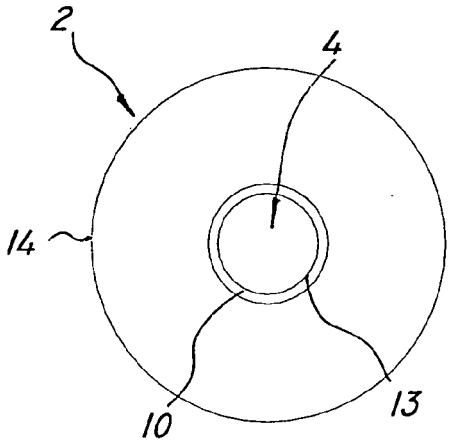

FIG. 3

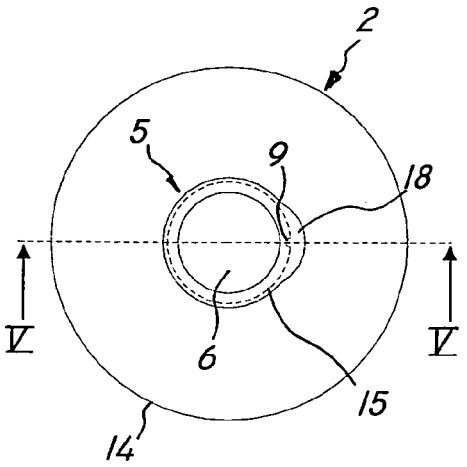

FIG. 4

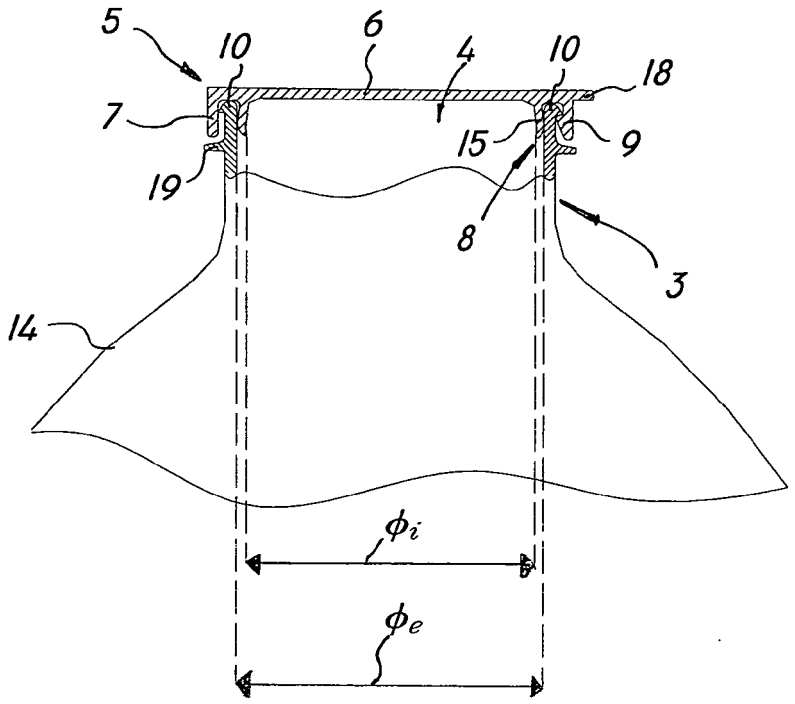

FIG. 5

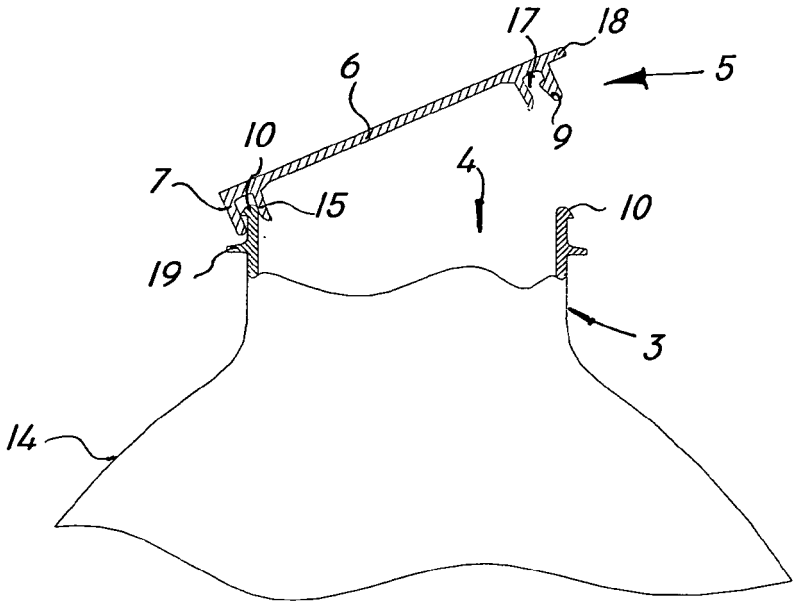

FIG. 6

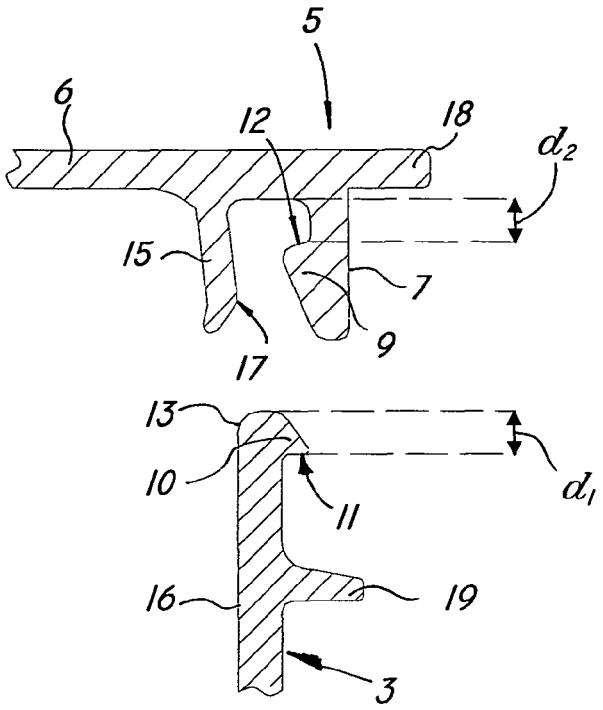

FIG. 7

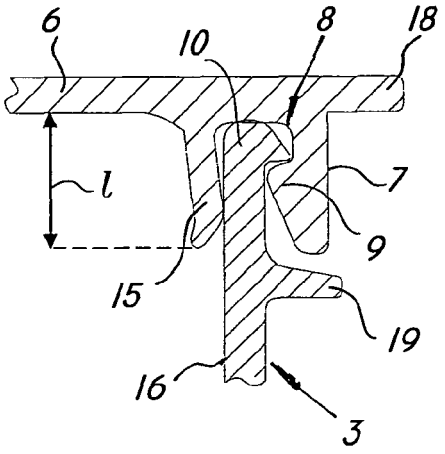

FIG. 8

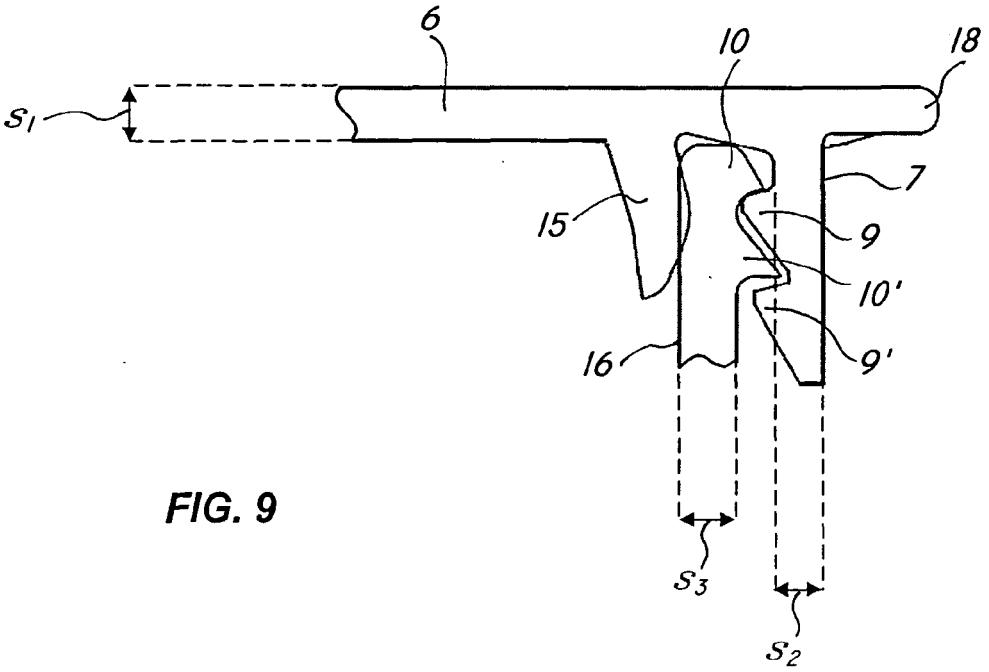

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 7663

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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
The Hague	15 September 2009	Grentzius, Wim

CATEGORY OF CITED DOCUMENTS

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