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(54) **Stackable bottle made of plastic material**

(57) Bottle (F) of plastic material made by means of blowing, with a neck (101) and mouth axially aligned with the body of the said bottle and closed by a cap (2) characterized in that, on the bottom of the bottle a coaxial frustum conical seat (3)is formed having a taper ratio and dimensions which are complementary to that of the cap (2) and with a depth comprised between 1/6 and 1/2 of the height (C)which is the sum of the height of the neck (101) and the cap (2), all of which so that it is possible to stack several bottles on top of one another in a stable and safe manner, with the cap (2) of one bottle (F) which is inserted with slight interference inside the bottom seat (3) of the bottle (F') situated above making close contact with the latter both on the side surface and on the bottom surface.

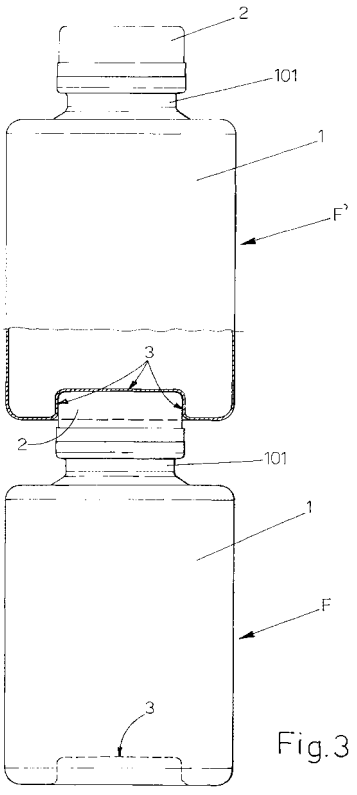

Fig.3

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Description

[0001] The present invention has for its object a plastic bottle made using the blowing technique and with characteristics such that it may be stacked together with other bottles of the same type. The bottle in question preferably has a limited nominal capacity, for example of between 300 and 500 ml, and has for example the capacity typical of cans currently filled with gaseous and non-gaseous beverages, fruit juices or the like. The proposed object of the invention is therefore to provide a plastic bottle suitable for filling with beverages, which may be an alternative to cans and, unlike the latter, has good stacking properties so that several bottles of the same type may be stacked on top of one another in a stable and safe manner, both during display on shop shelves and during packaging inside cardboard boxes or when wrapped in heat-shrunk film.

[0002] The characteristic features of the bottle according to the invention will be evident from the following description made with reference to the figures of the two accompanying sheets of drawings in which:

- Fig. 1 shows a side elevation view of a bottle on a possible real-life scale;
- Fig. 2 shows a bottom plan view of the bottle on the same scale as Figure 1;
- Fig. 3 shows a side elevation view, with parts cross-sectioned, of two bottles of the type in question stacked on top of each other.

[0003] In the example shown in Figure 1, the bottle F has a body 1 with a cylindrical shape and round cross-section, provided with a neck 101 closed by a cap 2. Only by way of example, the body 1 of the bottle has a height A of about 105 mm, a diameter D of about 80 mm and when it is closed with the cap 2, an overall height B of about 138 mm. The assembly consisting of the neck 101 with the cap 2 therefore has a height C of about 33 mm. The bottles according to the invention are made using the known technique of thermoforming by means of blowing, starting with an extruded or co-extruded hot tube of thermoplastic material - the so-called parison.

[0004] In order to provide a bottle of the type shown in Figure 1 with the desired properties of suitability for stacking with other identical bottles, it was initially thought to form on the bottom of each bottle a coaxial recessed seat, with a height equal to or slightly greater than the height C of the assembly neck 101-cap2 and with a width equal to or slightly greater than the diameter E of the cap 2 so that a bottle with closed neck could be able to enter easily inside this central seat in the bottom of a bottle situated above and so that the bottom 201 of the latter is able to rest on the top 301 of the body of the bottle underneath. This solution proved however itself to be not satisfactory for the following main reasons:

a) the bottom of the bottle with the said deep recessed seat would have had an irregular and non-uniform shape and thickness which was too small or could even break during the forming step, even if measures were taken to vary suitably the thickness of the parison, suitably increasing it in the bottom portion;
b) the said deep recessed seat could have been torn by the bottom vertically movable parts of the mould which define it internally, when, after forming of the bottles, the two mould parts are slightly opened, as mentioned in the preliminary comments regarding the prior art.

[0005] In order to achieve the desired objects of suitability of the bottles for stacking, it was therefore required to choose an alternative solution to that described above and the following procedure was adopted. An axial seat 3, for example with a round cross-section, as shown in Figures 1 and 2, is formed in the bottom of each bottle, during thermoforming thereof, said seat having a draft or tapering correlated to and for example the same as that of the cap 2, for example about 0.3°, having an average inner diameter G of a few tenths of a millimetre less than the average outer diameter E of the cap 2, for example with a difference of between 2-8 tenths of a millimetre, preferably about 5 tenths of a millimetre, and having a depth P which, depending on the said diameter of the seat 3 and the outer diameter D of the bottle, is between 1/6 and 1/2 of the height C, which represent the sum of the height of the neck 101 and the cap 2. Such a depth of the seat does not create problems during removal of the bottle from the forming moulds, as mentioned in the preamble of the invention, and allows the formation of seats 3 with precise and constant dimensions. By proceeding in this manner, it is possible to stack several bottles on top of one another in a stable and safe manner, as shown in Figure 3, with the cap 2 of a bottle F which is inserted with slight friction inside the bottom seat 3 of the bottle F' situated above and which makes close contact with the latter both on the side surface and on the bottom surface. In order to ensure the stability of the stack, the upper wall of the cap 2 touches in fact at least perimetrally, or in a more extensive manner, the bottom of the seat 3 which receives the said cap.

[0006] Owing to the flexibility of the plastic which forms the bottles, owing also to the limited depth of the seat 3 and the slight conicity of the said seat 3 and the cap 2 which engages with it and owing to the said aforementioned slight interference between cap and seat, it will be possible to unstack easily the bottles by means of a simple relative pivoting and separating movement. The slight interference fit between the cap 2 of a bottle and the seat 3 of a bottle situated above and the nature of the surfaces of the two parts in contact with each other will be such that, if a relative rotation

were to be imparted to the two stacked bottles, even in a direction able to cause unscrewing of the cap of the bottom bottle, the said cap would slide inside the bottom seat 3 of the upper bottle and would not receive from the latter the torque necessary for unscrewing, so as to prevent accidental opening of the bottles during unstacking.

[0007] It is understood that the improvements described must be regarded as protected also for bottles having shapes and dimensions different from that of the bottle illustrated. The plan-view shape of the seat 3 may also be different from that illustrated, and therefore not round, provided that it is still suitable for ensuring a fit having the characteristics of axial self-alignment and slight interference between seat and cap.

Claims

1. Bottle (F) of plastic material made by means of blowing, with a neck (101) and mouth axially aligned with the body of the said bottle and closed by a cap (2) **characterized in that**, on the bottom of the bottle a coaxial frustum conical seat (3)is formed having a taper ratio and dimensions which are complementary to that of the cap (2) and with a depth comprised between 1/6 and 1/2 of the height (C)which is the sum of the height of the neck (101) and the cap (2), all of which so that it is possible to stack several bottles on top of one another in a stable and safe manner, with the cap (2) of one bottle (F) which is inserted with slight interference inside the bottom seat (3) of the bottle (F') situated above making close contact with the latter both on the side surface and on the bottom surface.

2. Bottle according to Claim 1), **characterized in that** the said cap (2) is slightly frustum conical and that the said bottom seat (3) of the said bottle has a draft corresponding to that of the cap (2), for example of about a few tenths of a degree.

3. Bottle according to Claim 1), **characterized in that** the said bottom seat (3) of the said bottle has an average inner diameter a few tenths of a millimetre less than the average outer diameter of the cap (2), for example with a difference of between 2-8 tenths of a millimetre, preferably about 4-5 tenths of a millimetre.

4. Bottle according to Claim 1), **characterized in that**, when the said bottom seat (3) has a diameter of about 40 mm and the body (1) of the said bottle has an outer diameter of about 80 mm, the depth (P) of the said seat (3) is between 5 and 15 mm, for example about 10 mm.

5. Bottle according to Claim 1), **characterized in that** the flexibility of the plastic which forms the said bottle, the limited depth of its bottom seat (3) the slight conicity of this seat (3) and the cap (2) which engages with it and the slight interference between cap and seat are chosen and/or provided so that it is possible to unstack the stacked bottles easily, by means of a simple relative pivoting and separating movement thereof.

6. Bottle according to Claim 1), **characterized in that** the flexibility of the plastic which forms the said bottle, the limited depth of its bottom seat (3) and the slight conicity of this seat (3) and the cap (2) which engages with it, as well as the slight interference between cap and seat and the nature of the surfaces of the two parts (2, 3) in contact with each other are chosen and/or provided so that, if a relative rotation were to be imparted to two stacked bottles, even in a direction able to cause unscrewing of the cap of the bottom bottle, the said cap slides inside the bottom seat (3) of the upper bottle and does not receive from it the torque able to cause unscrewing, so as to avoid accidental opening of the bottles during unstacking.

7. Bottle according to Claim 1), **characterized in that** the plan-view shape of the bottom seat (3) may be round or any other shape suitable for ensuring a fit with the characteristics of axial self-alignment and slight interference between the said seat and the cap (2) of the bottles to be stacked on one another.

8. Bottle according to Claim 1), **characterized in that** it has a limited nominal capacity, for example of between 300 and 500 ml, and has for example the capacity typical of cans currently filled with gaseous and non-gaseous beverages, fruit juices or the like.

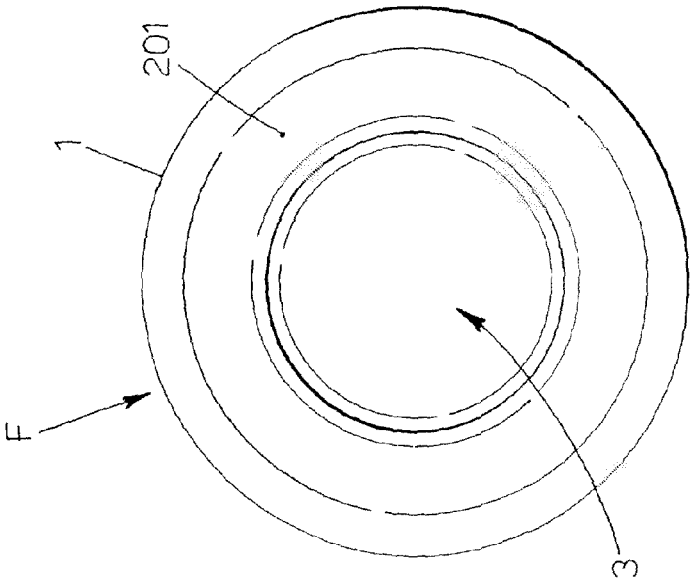

Fig.2

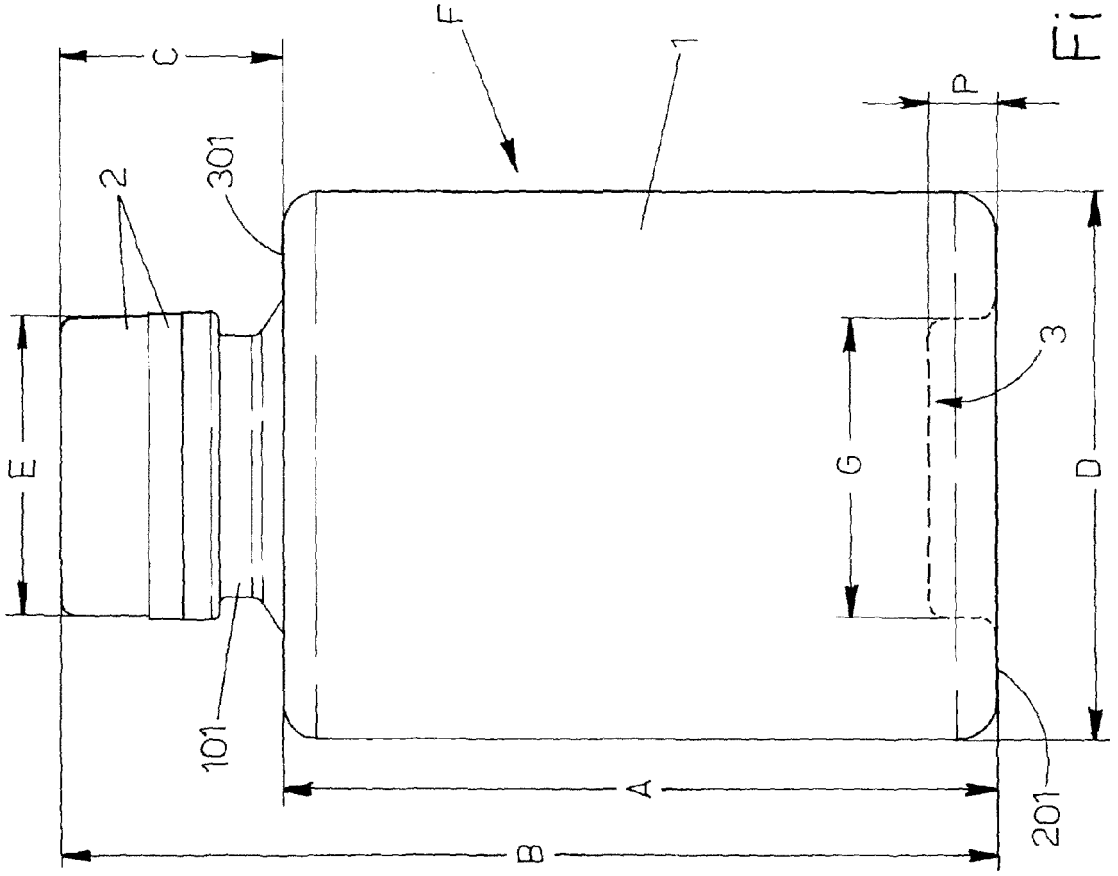

Fig.1

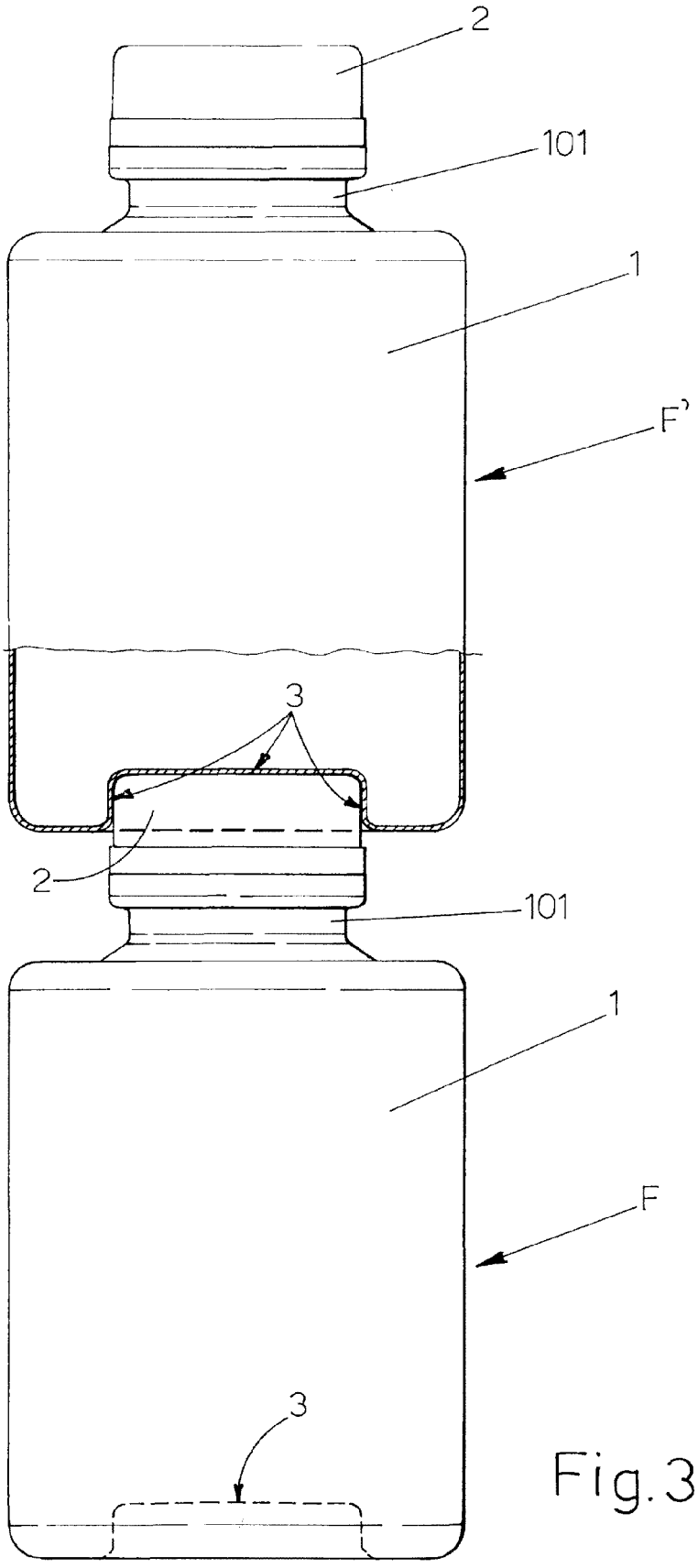

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 0385

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 02/072434 A (GOMEZ CAO, JOSE LUIS) 19 September 2002 (2002-09-19) * page 3, line 2 - page 6, line 22 * * figure 1 *	1-8	INV. B65D21/032
Y	FR 2 134 729 A (BACKOUCHE RAYMOND) 8 December 1972 (1972-12-08) * page 1, line 1 - page 3, line 4 * * figures 1,2 *	1-8	
A	DE 19 17 707 U (KRAEMER & CO [DE]) 10 June 1965 (1965-06-10) * page 1, line 1 - page 2, line 12 * * figure 1 *	1-8	
A	DE 17 88 374 U (REINER FISCHER G.M.B.H) 6 May 1959 (1959-05-06) * page 3, line 18 - page 5, line 28 * * figures 1,3,4 *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 July 2006	Rodriguez Gombau, F

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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12-07-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 02072434 A	19-09-2002	ES 1048548 U1	01-09-2001
FR 2134729 A	08-12-1972	NONE	
DE 1917707 U	10-06-1965	NONE	
DE 1788374 U	06-05-1959	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82