(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 December 2004 (09.12.2004)

PCT

(10) International Publication Number
WO 2004/106174 A1

(51) International Patent Classification[7]: B65D 1/02, 41/34

(21) International Application Number:
PCT/EP2004/050974

(22) International Filing Date: 1 June 2004 (01.06.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
RM2003U000098 3 June 2003 (03.06.2003) IT

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

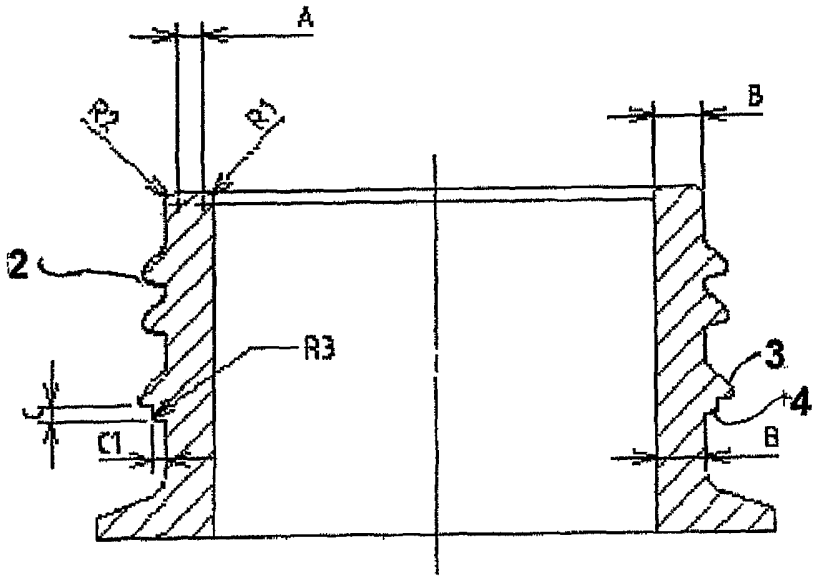
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv)) for US only*

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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(54) Title: PLASTIC BOTTLE NECK



(57) Abstract: A plastic neck for hot filled bottles comprising on the outside wall a two-start thread (2), a seal-ring (3) placed near an end of the thread, and a circular elevation (4) placed under, the seal-ring (3), having an essentially square shape with sides of dimension included between 0.5mm and 1mm and a radius (R3) included between 0.4mm and 0.15mm.

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PLASTIC BOTTLE NECK

Technical Field

This invention relates to the bottle neck. More particularly, it relates to a plastic bottle neck for hot filling.

Background Art

Making and filling bottles with non-carbonated, sugary drinks such as tea, juice, flavoured mineral water, etc. requires the use of sterile containers and the implementation of tight controls to prevent microbiological contamination during filling. One of the techniques used in the drink bottling industry, when filling PET containers, is to fill the bottles with hot liquids at temperatures that usually range from 80 to 93°C.

The bottle must be designed specifically to absorb the depression caused by the decrease in volume of the product during cooling. The neck of the bottle must withstand the heat of the hot beverage without deforming in order not to compromise the application of the cap and the airtightness of the seal.

Normally, the neck is made of injected material that is cooled quickly. This means that the neck is made of completely amorphous PET that has a glass transition temperature (Tg) lower than the filling temperature; nevertheless, this area tends to soften and deform when it comes in contact with the hot drink.

To resolve this problem, some solutions were put forward to improve the resistance to heat when the bottle is used for hot filling. The first solution involves subjecting the necks of the bottles to post crystallization through a heat treatment. The second solution of the state-of-the-art technology involves the use of thickened necks. In this case, although the neck area remains amorphous, good airtightness is guaranteed without complicating the manufacturing process. Unfortunately, thickening the wall in the neck area means that the bottle weighs more; thus, the bottle is normally lightened by shortening the height of the neck.

When using the hot-filling technique, the use of a bottle with a short, light neck of the type marketed today for cold-filled, non-carbonated drinks has some drawbacks. This neck, which has been simply thickened to reduce the risk of deformation, is less safe: it is harder to ensure airtightness if the cap is turned slightly unintentionally without breaking the seal, which is always present on

bottles that contain drinks or foodstuff that can be contaminated. This is because traditional necks designed for cold filling normally have threads placed at a very slanted angle relative to the horizontal surface; in this case, it is harder to break the seal than to make the cap no longer airtight. This increases the likelihood that the cap loses its airtightness, allowing exchanges between the sterile environment of the bottle and the outside, without this being indicated by the simultaneous breakage of the seal. Obviously, this is unacceptable from a health and safety viewpoint. To date, no satisfactory solutions have been put forward to resolve this problem.

Objects of the Invention

It is an object of this invention to provide a neck of a plastic bottle for hot filling that resolves the aforementioned problems.

It is a main object of this invention to provide a short neck, different from the one used on bottles for cold filling, that is able to comply with the strict airtightness criteria and ensure breakage of the seal whenever the cap is turned slightly.

These objects are achieved by means of a neck in accordance with claim 1.

Thanks to the particular shape of the neck and its complementary shaped cap, the weight of the bottle is acceptable and, at the same time, perfect airtightness is guaranteed when the cap screwed on and the seal is broken immediately at the slightest turn of the cap in the opening direction.

Brief Description of the Drawings

These and other advantages and properties of the invention shall be readily apparent from the more detailed description of the preferred version of a neck of a plastic bottle, given as a nonlimiting example and in conjunction with the following accompanying drawings:

Fig. 1 shows a side view of a neck of a bottle in accordance with the invention;

Fig. 2 shows a sectional view of the neck of bottle displayed in Fig. 1.

Description of the Invention

The Figures show a neck of a plastic bottle, hereinafter also referred to as reference 1, having a thread (2) with a particular profile. The thread (2) is double threaded: it increases the angle of rotation necessary to unscrew the cap and its

development varies from 270° to 330° with the starting point of a thread distanced from the other by 150° to 210°.

In order to increase resistance to heat, the thickness (B) of the wall of the neck is greater than the one of necks for cold filling. The value of B is advantageously included between 2.0mm and 2.6mm; the value is chosen depending on the filling temperature of the beverage and, thus, depending on the structural stability required of the neck.

The change in the surface of the closure (A), meaning the increase in the surface of the upper rim of the closure due to the thickening of the wall, which creates the seal by coming into contact with the closed cap, is advantageously included between 0.9mm and 1.5m.

To make sure that the area rests properly against the cap, ensuring airtightness, radii are used for the top rim of the neck. The values of the inside radius (R1) and outside radius (R2) of the neck are comprised between 0.4mm and 0.7mm.

To improve cap seal breakage (not shown in the figures), the shape of which is complementary to the one of the neck, a tooth (4), having essentially a square section and a height (C) and width (C1) included between 0.5mm and 1mm, is positioned at the base of the neck under the seal-ring (3). The radius (R3) ranges from 0.4mm to 0.15 mm.

The synergistic combination of these properties ensures the correct application of the plastic closure and enables the breakage of the connections of the seal of the plastic cap during opening (thus, when unscrewing the cap relative to the thread of the bottle), before air can come into contact with the beverage that, due to its nature, is generally easily contaminated.

Using a bottle with a neck like the one described above, for bottles containing non-carbonated drinks or water or used in hot filling processes, has the added important advantage of lightening the weight of the bottle compared with known necks, while preserving performance.

CLAIMS

1. A plastic bottle neck (1), for bottles suitable to be hot filled, comprising on the outside wall a two-start thread (2), a seal-ring (3) placed near an end of the thread, and a circular elevation (4) placed adjacent to the side of the seal-ring (3) and opposite to the one near the thread, wherein the circular elevation (4) has an essentially square shape with sides of dimensions comprised between 0.5mm and 1mm and a radius (R3) comprised between 0,4mm and 0,15 mm, on a plane passing through the axis of the neck.

2. A neck as claimed in claim 1 wherein the thread (2) is a two-start thread with a circular development varying between 270° and 330° and start points of the two threads are at a distance comprised between 150° and 210°.

3. A neck as claimed in claim 2 wherein the thickness (B) of the wall of the neck is included between 2,0mm and 2,6mm.

4. A neck as claimed in claim 3 wherein the change in the surface of the closure (A) is included between 0,9mm and 1,5m.

5. A neck as claimed in claim 4 wherein the top rim of the neck has an inside (R1) and outside (R2) radius with values ranging from 0,4mm to 0,7mm.

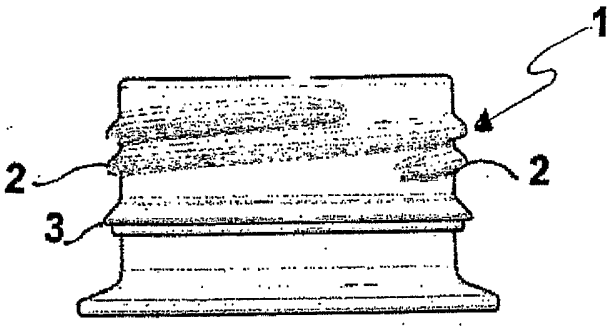


Fig. 1

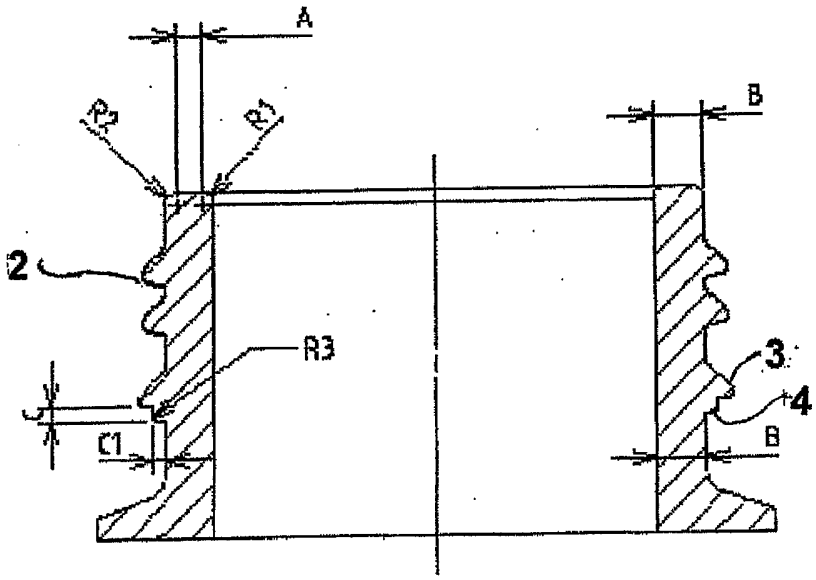


Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/050974

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D1/02 B65D41/34

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)
IPC 7 B65D

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
6 October 2004	15/10/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Bridault, A

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP2004/050974

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