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(54) **Stackable plastic bottle**

(57) The stackable plastic bottle (B) defines a major longitudinal axis (A) and comprises a base (1) terminated by a closed bottom end (10), a main body (2), a shoulder part (3) and a neck (4) terminated by an opened mouth (40). The outer face of the bottle comprises a longitudinal recess (6) extending longitudinally from the closed bottom end (10) into at least the main body (2); the shape in transverse cross section of said longitudinal recess (6) and the shape in transverse cross section of the opposite

portion (5) of the bottle outer face diametrically opposite to the longitudinal recess (6) are complementary, in such a way that the bottle (B) can be stacked in a stable horizontal position onto another lower identical horizontal stackable plastic bottle (B') with the said opposite portion (5) of the lower bottle (B') fitted into the longitudinal recess (6) of the upper bottle (B), and the lower bottle (B') prevents the upper stacked bottle (B) from rotating around its longitudinal axis (A).

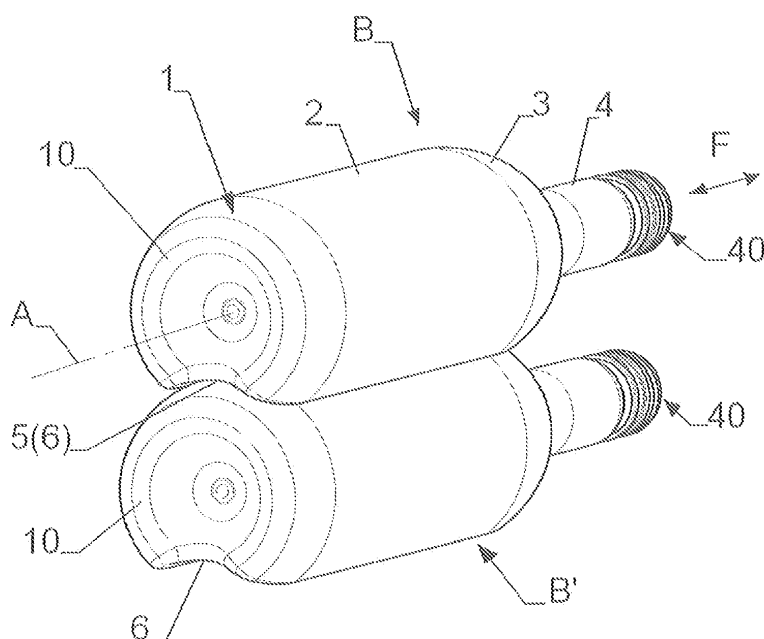


FIG.5

Description

Technical field

[0001] The invention relates to plastic bottles that can be stacked one onto the other in a horizontal position. Said stackable plastic bottles can be used for storing any kind of products, and more especially for storing food products, beverages.

Prior art

[0002] Rigid plastic bottles are widely used for storing different kinds of product, and more especially, but not only, liquid products, and in particularly beverages, such as wine, beer, carbonated soft drinks, milk...

[0003] Plastic bottles that are stackable one onto the other are disclosed in US patent 4,308, 955 and in US patent 5,002,199. These bottles have a general rectangular shape in cross section that enables to stably stack the bottles one onto the other, each bottle being positioned horizontally, i.e. its main longitudinal axis being substantially horizontal.

[0004] In these publications, in order to better interlock the bottles and avoid that one bottle slip onto the underlying bottle, the plastic bottles comprises interfitting means in the form of a quadrangular recess made in one face of the bottle and adapted to fit into a corresponding quadrangular protruding portion made on the opposite face of the bottle.

[0005] Such a technical solution is suitable for stacking bottles having a quadrangular shape in cross section with two opposite flat faces, but cannot be used with bottles having for example a cylindrical body with a circular transverse cross section or the like. Furthermore, when several bottles are stacked one onto the others, it is difficult to take out one bottle in the middle of the stack, and one is obliged in practice to take out first the bottles on top of the stack by lifting upwardly the bottle in order to disengage the interfitting means.

Objective of the invention

[0006] The objective of the invention is to propose novel plastic bottles that can be easily stacked one onto the other in a horizontal position.

Summary of the invention

[0007] This objective is achieved by the stackable plastic bottle of claim 1. The bottle of the invention defines a major longitudinal axis and comprises a base terminated by a closed bottom end, a main body, a shoulder part and a neck terminated by an opened mouth. The outer face of the bottle comprises a longitudinal recess extending longitudinally from the closed bottom end into at least the main body. The shape in transverse cross section of said longitudinal recess and the shape in transverse

cross section of the opposite portion of the bottle outer face diametrically opposite to the longitudinal recess are complementary, in such a way that the bottle can be stacked in a stable horizontal position onto another lower identical horizontal stackable plastic bottle with the said opposite portion of the lower bottle fitted into the longitudinal recess of the upper bottle, and the lower bottle prevents the upper stacked bottle from rotating around its longitudinal axis.

[0008] The wording "horizontal" or "horizontally" means therein that the bottle is positioned in such a way that the longitudinal axis A of the bottle is substantially horizontal.

[0009] The wording "transverse cross section" means therein the cross section of the bottle in a plane perpendicular to the major longitudinal axis of the bottle.

Brief description of the drawings

[0010] The technical characteristics and advantages of the invention will appear more clearly on reading the following detailed description which is made by way of non-exhaustive and non-limiting examples, and with reference to the appended drawings, as follows:

- Figure 1 is a side view of a plastic bottle according to a first particular embodiment of the invention.
- Figure 2 is a left view of the bottle of figure 1.
- Figure 3 is a right view of the bottle of figure 1.
- Figure 4 is a bottom view of the bottle of figure 1.
- Figure 5 is a view in perspective of two bottles, like the bottles of figures 1 to 4, stacked horizontally one onto the other.
- Figure 6 is a bottom view of the stacked bottles of figure 5.
- Figure 7 is a bottom view of a two stacked plastic bottles according to a second particular embodiment of the invention.
- Figure 8 is a bottom view of two stacked plastic bottles according to a third particular embodiment of the invention.
- Figure 9 is a bottom view of two stacked plastic bottles according to a fourth particular embodiment of the invention.

Detailed description

[0011] In reference to the particular embodiment of figures 1 to 6, the stackable plastic bottle B defines a major longitudinal axis A and comprises along the said axis A :

- a base 1 terminated by a closed bottom end 10,
- a main body 2 of length L that extends from the base 1,
- a shoulder part 3 that extends from the main body 2,
- a long neck 4 that extends from the shoulder part 3 and that is terminated by an opened mouth 40 for filling the bottle, for example with a beverage.

[0012] The base 1 is knowingly designed in order to support the bottle B onto a flat surface in a stable vertical position.

[0013] In this particular example, the neck 4 is a cylinder of small diameter, centered on the longitudinal axis A, and having substantially a circular transverse cross section. Said neck 4 comprises a thread 41 for closing the bottle with a threaded closure (not represented). This thread 41 is however not mandatory for the invention.

[0014] The main body 2 is the part of the bottle of highest transverse cross section i.e. the part of the bottle of largest dimensions in a plane perpendicular to the longitudinal axis A. More especially, in the particular embodiment of figures 1 to 6, the outer face of the main body 2 is substantially cylindrical.

[0015] The outer face of base 1 is also cylindrical and is centered on the longitudinal axis A. This cylindrical outer face of the base 1 has a diameter in transverse cross section that increases progressively towards the main body 2.

[0016] The outer face of the shoulder part 3 is also substantially cylindrical and is centered on the longitudinal axis A. This cylindrical outer face of the shoulder part 3 has a diameter in transverse cross section that decreases progressively towards the cylindrical neck 4 of smaller diameter.

[0017] In reference to the side view of figure 2, the different parts 1 to 4 of the bottle B have been designed in order to make the bottle B look like a "Bordeaux" wine glass bottle. This particular bottle B is thus adapted to be used as a plastic wine bottle for storing wine. The invention is however not limited to this particular bottle shape, and is not limited to the use of such a bottle for storing wine. A bottle of the invention can be used for storing any kind of product, including notably any kind of food product, any kind of beverage, etc...

[0018] Within the scope of the invention, the plastic bottle B can be made in any known thermoplastic material. The preferred candidates for the plastic material of the bottle are polyester or polyolefin polymers, in particular homo or copolymer of PET, or homo or copolymer of polypropylene or polycarbonate. But the invention is however not limited to these particular thermoplastic polymers.

[0019] Within the scope of the invention, the plastic bottle B can be a monolayer or multilayer bottle.

[0020] Within the scope of the invention, the rigid plastic bottle B can be manufactured by any known moulding technique, including injection moulding, injection stretch-blow moulding, extrusion blowmoulding.

[0021] In reference to figures 3, 5 and 6, the outer face of the bottle has been designed in order to make the bottle B stackable in a stable horizontal position onto another lower identical horizontal stackable bottle B'.

[0022] To this end, the outer face of the bottle B comprises a longitudinal recess 6 extending longitudinally (i.e. in a direction parallel to the longitudinal axis A) from the closed bottom end 10 into at least the main body 2.

[0023] In this particular embodiment, the longitudinal recess 6 is extending longitudinally on the whole length of the main body 2 and is also extending into the shoulder part 3. In another variant, the longitudinal recess 6 could extend only, from the bottom end 10, in the base 1 and partly in the main body 2 without necessarily reaching the shoulder part 3

[0024] The shape in transverse cross section (i.e. in a plane perpendicular to the longitudinal axis A) of said longitudinal recess 6 and the shape in transverse cross section of the opposite portion 5 of the bottle outer face diametrically opposite to the longitudinal recess 6 are complementary substantially on the whole length of the recess 6, in such a way that the bottle B can be stacked (figures 5 and 6) in a stable horizontal position onto a lower identical horizontal stackable plastic bottle B' with the said opposite portion 5 of the lower bottle B' fitted into the longitudinal recess 6 of the upper bottle B, and the lower bottle B' prevents the upper stacked bottle B from rotating around its longitudinal axis A.

[0025] Once the bottles B and B' are stacked one onto the other, the upper bottle B cannot rotated around its longitudinal axis A and is thus stable, but can slide in an horizontal plane parallel to its longitudinal axis A in a direction F (figure 5) parallel to its longitudinal axis A. During this sliding movement, the upper bottle B is continuously guided in translation in this horizontal plane by the lower bottle B'. It is thus very easy either to stack the bottle B on bottle B' or to take out bottle a B from a stack of bottles. In particular, for taking out one bottle B from a stack of bottles, one does not need to lift the bottle B upwardly but needs only to seize the neck 4 of the bottle B and to draw the bottle B in the direction F parallel to its longitudinal axis A.

[0026] In the particular example of figures 4 to 6, the shape in transverse cross section of the longitudinal recess 6 and the shape in transverse cross section of the opposite portion 5 of the bottle outer face diametrically opposite to the longitudinal recess 6 are not only complementary, but are also more particularly congruent. As a result the longitudinal recess 6 is in contact with the portion 5 on the whole cross section of the longitudinal recess 6, which advantageously increases the contact surface between two stacked bottles B and B', and improve the stability of the upper bottles B.

[0027] The invention is however not limited to congruent transverse cross section shapes for the longitudinal recess 6 and the diametrically opposite portion 5, but theses transverse cross section shapes need at least to be complementary in such a way that the bottle B can be stacked in a stable horizontal position onto a lower identical horizontal stackable plastic bottle B' with the said opposite portion 5 of the lower bottle B' fitted into the longitudinal recess 6 of the upper bottle B, and in such a way that the lower bottle B' prevents the upper stacked bottle B from rotating around its longitudinal axis A.

[0028] The particular embodiments of figures 7, 8 and 9 are other examples of transverse cross section shapes

for the longitudinal recess 6 and for the diametrically opposite portion 5 that are complementary within the meaning of the invention, but that are not congruent.

[0029] In the particular embodiment of figures 1 to 6, the outer face of the base 1, the outer face of the main body 2, and the outer face of the shoulder part 3 are cylindrical, and more particularly have a circular transverse cross section with the exception of the longitudinal recess 6. The shape in transverse cross section of the portion 5 that is diametrically opposite to the longitudinal recess 6 thus forms a convex arc, and more particularly an arc of circle (CD) (figure 4). On substantially the whole length of the longitudinal recess 6, the shape in transverse cross section of the longitudinal recess 6 forms a concave arc of circle (EF) having a radius substantially equal or smaller than the radius of the diametrically opposite portion 5.

[0030] In another variant, the portion 5 and the longitudinal recess 6 can form in transverse cross section a convex arc (CD) and a concave arc (EF) respectively that are not necessarily arcs of circle.

[0031] Furthermore, the transverse cross section of the longitudinal recess 6 and/or the transverse cross section of diametrically opposite portion 5 do not necessarily form an arc. The particular embodiment of figure 8 is an example of a transverse cross section shape for the diametrically opposite portion 5 that is convex but does not form an arc.

[0032] More particularly in the examples of the appended figures, the longitudinal boundaries 6a of the longitudinal recess 6 define a base plane P that is parallel to the longitudinal axis A and suitable for putting the bottle B (figure 4) in a stable horizontal position on a flat horizontal surface S. Identical bottles B, B' can thus be stacked horizontally one onto the other onto a flat surface S in a stable way and without using any casing or the like.

[0033] The invention is not limited to the particular bottle shape of figures 1 to 8, but encompasses any stackable plastic bottle having at least the technical features defined in the main appended claim. In particular, in another variant, the length of the neck 4 could be shorter, the length of the base 1 could longer and the shape of the shoulder part 3 could be different.

Claims

1. A stackable plastic bottle (B) defining a major longitudinal axis (A) and comprising a base (1) terminated by a closed bottom end (10), a main body (2), a shoulder part (3) and a neck (4) terminated by an opened mouth (40), wherein the outer face of the bottle comprises a longitudinal recess (6) extending longitudinally from the closed bottom end (10) into at least the main body (2), wherein the shape in transverse cross section of said longitudinal recess (6) and the shape in transverse cross section of the opposite portion (5) of the bottle outer face diametrically op-

posite to the longitudinal recess (6) are complementary, in such a way that the bottle (B) can be stacked in a stable horizontal position onto another lower identical horizontal stackable plastic bottle (B') with the said opposite portion (5) of the lower bottle (B') fitted into the longitudinal recess (6) of the upper bottle (B), and the lower bottle (B') prevents the upper stacked bottle (B) from rotating around its longitudinal axis (A).

2. The stackable plastic bottle of claim 1, wherein the longitudinal recess (6) extends at least on the whole length (L) of the main body (2).

3. The stackable plastic bottle of claim 2, wherein the longitudinal recess (6) extends into the shoulder part (3).

4. The stackable plastic bottle of any one of claims 1 to 3, wherein the main body (2) has a substantially cylindrical outer face.

5. The stackable plastic bottle of claim 4, wherein the cylindrical outer face of the main body (2) has a circular transverse cross section with the exception of the longitudinal recess (6).

6. The stackable plastic bottle of any one of claims 1 to 5, wherein the shape in transverse cross section of the longitudinal recess (6) is congruent with the shape in transverse cross section of the opposite portion (5) of the outer face of the bottle that is diametrically opposite to the longitudinal recess (6).

7. The stackable plastic bottle of any one of claims 1 to 6, wherein the longitudinal recess (6) has a concave shape in transverse cross section.

8. The stackable plastic bottle of claim 7, wherein the shape in transverse cross section of the longitudinal recess (6) forms a concave arc (EF).

9. The stackable plastic bottle of claim 8, wherein the shape in transverse cross section of the longitudinal recess (6) forms an arc of circle (EF).

10. The stackable plastic bottle of any one of claims 1 to 9, wherein the opposite portion (5) of the outer face of the bottle that is diametrically opposite to the longitudinal recess (6) has a convex shape in transverse cross section.

11. The stackable plastic bottle of claim 10, wherein the shape in transverse cross section of said opposite portion (5) forms a convex arc (CD).

12. The stackable plastic bottle of claim 11, wherein the shape in transverse cross section of said opposite

portion (5) forms a convex arc of circle (CD).

13. The stackable plastic bottle of any one of claims 1 to 5, wherein the shape in transverse cross section of the longitudinal recess (6) forms a concave arc of circle (EF), and the shape in transverse cross section of the opposite portion (5) of the outer face of the bottle that is diametrically opposite to the longitudinal recess (6) forms a convex arc of circle (CD), and wherein the radius of the concave arc of circle (EF) of the longitudinal recess (6) is substantially equal or smaller than the radius of the convex arc of circle (CD) of the diametrically opposite portion (5)..
14. The stackable plastic bottle of any one of claims 1 to 13, wherein the longitudinal recess (6) defines a base plane (P) that is parallel to the major longitudinal axis (A).
15. A set comprising at least two identical stackable plastic bottles (B, B'), each bottle having the characteristics of any one of claims 1 to 14, and being stackable one onto the other in a stable horizontal position, in such a way that the portion (5) of the lower bottle (B') that is diametrically opposite to the longitudinal recess (6) of this lower bottle is fitted into the longitudinal recess (6) of the upper bottle (B), and in such way the lower bottle (B') prevents the upper stacked bottle (B) from rotating around its longitudinal axis (A) and the upper bottle (B) can slide onto the lower bottle (B') in a direction parallel to its longitudinal axis (A).
16. The use of the stackable plastic bottle (B) of any one of claims 1 to 14, for storing a product.
17. The use of claim 16, for storing a food product, more particularly a beverage, and even more particularly for storing wine.

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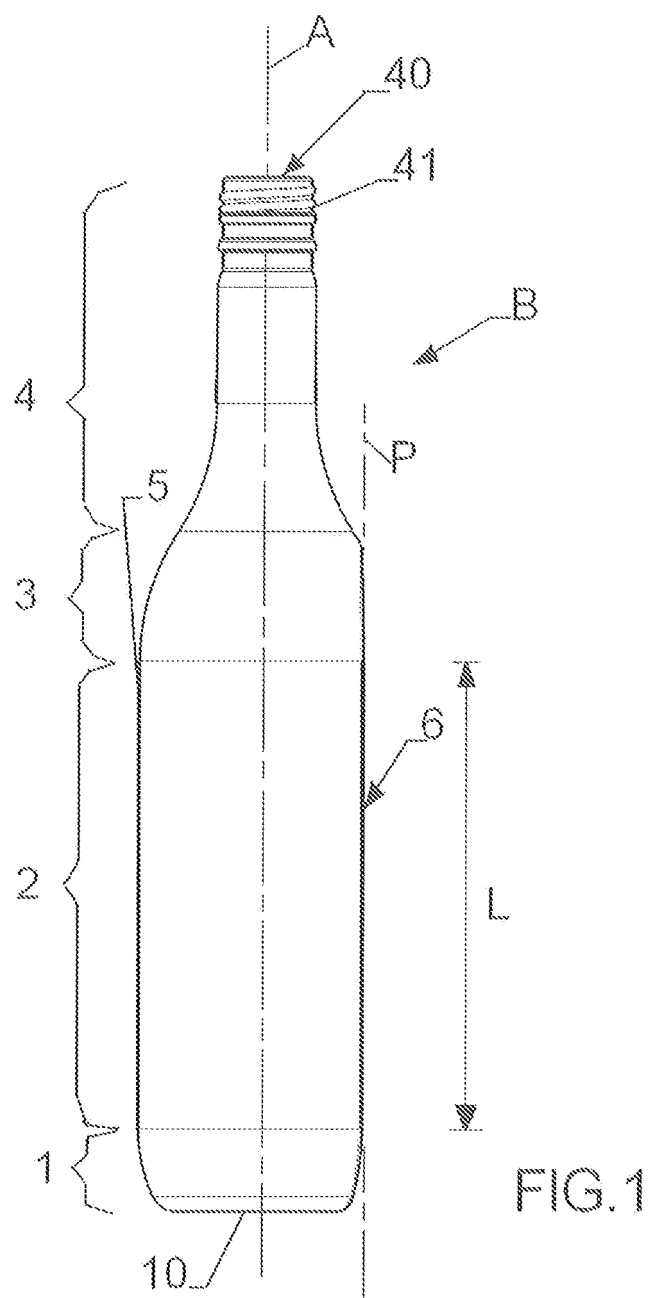
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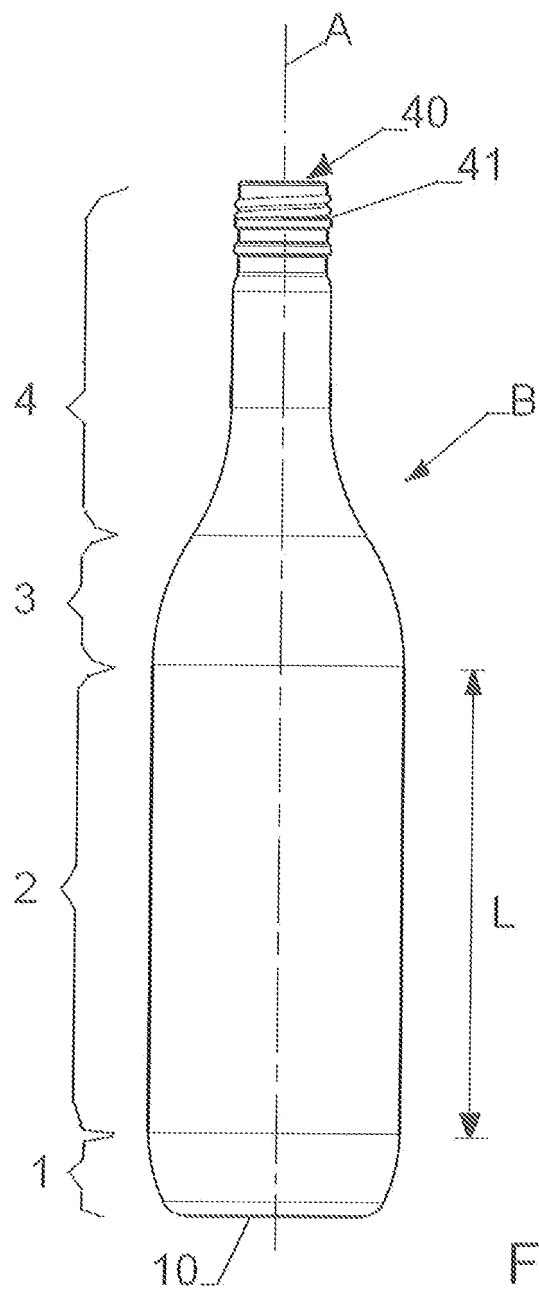
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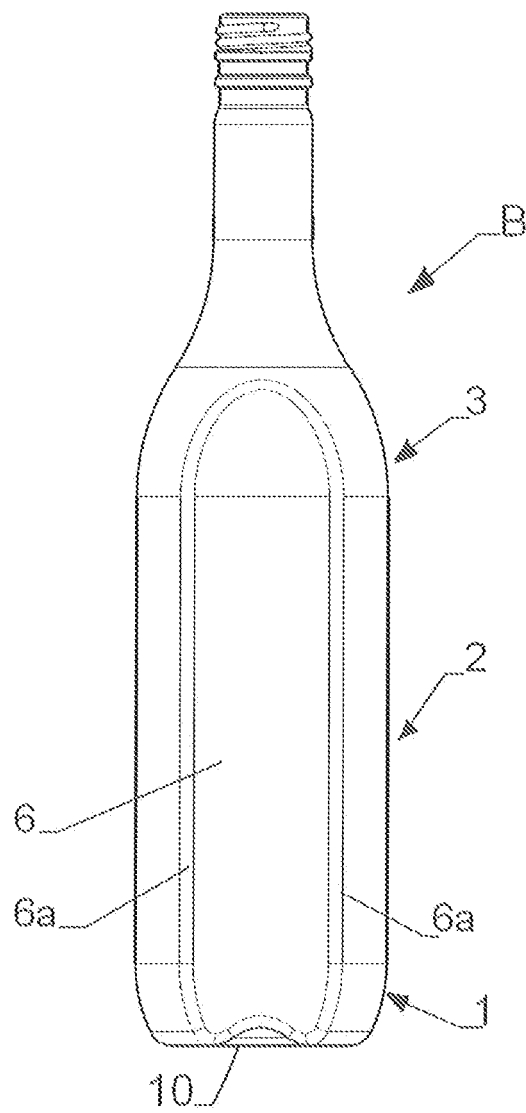
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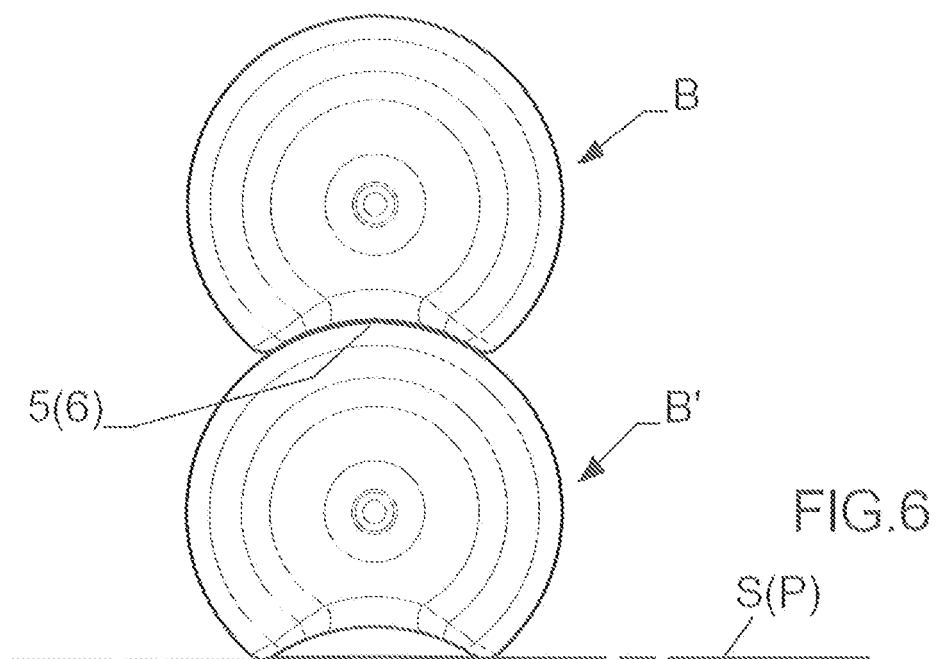
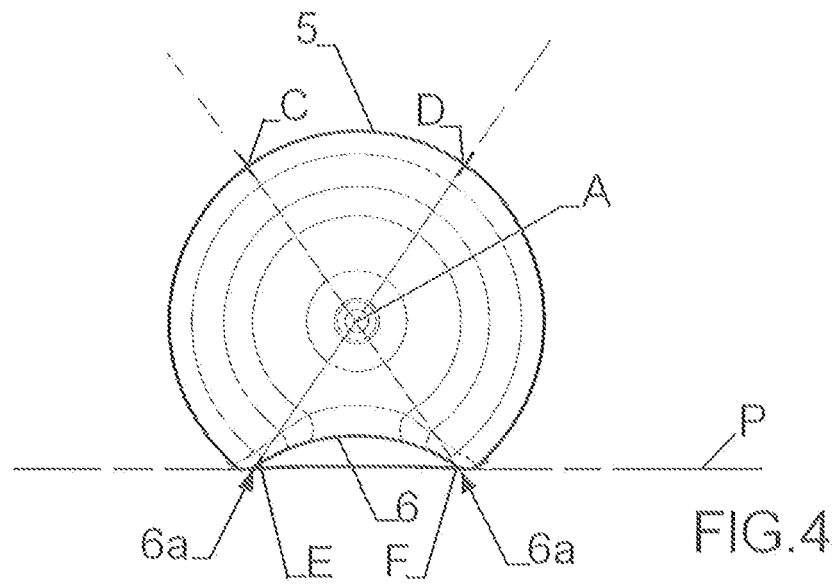
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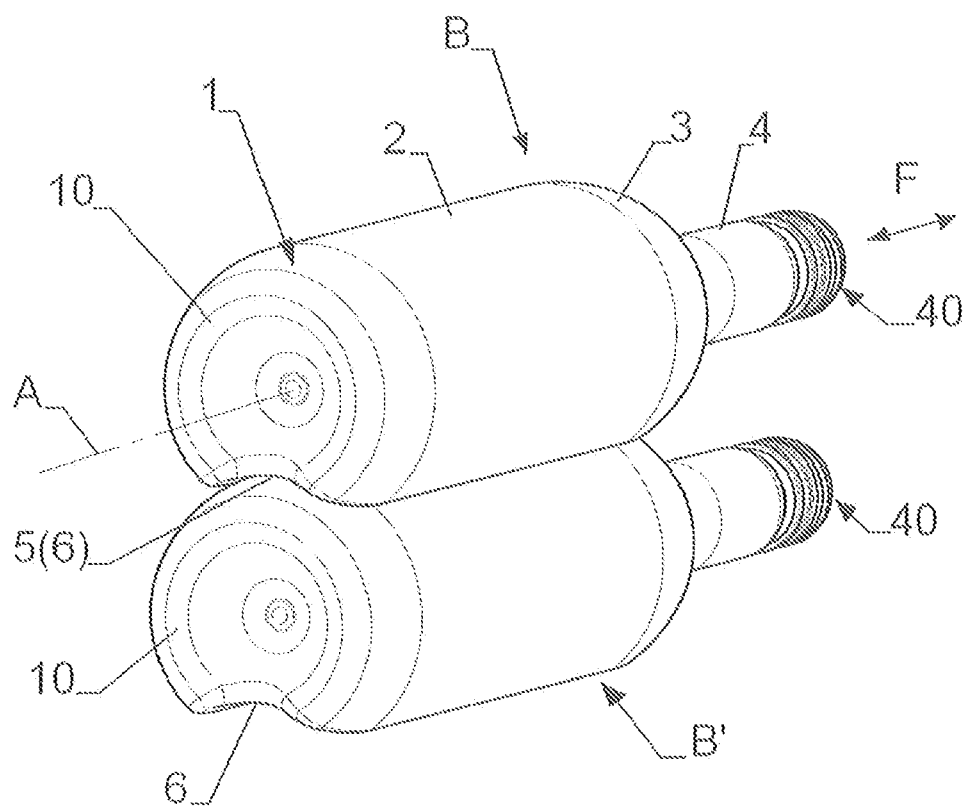
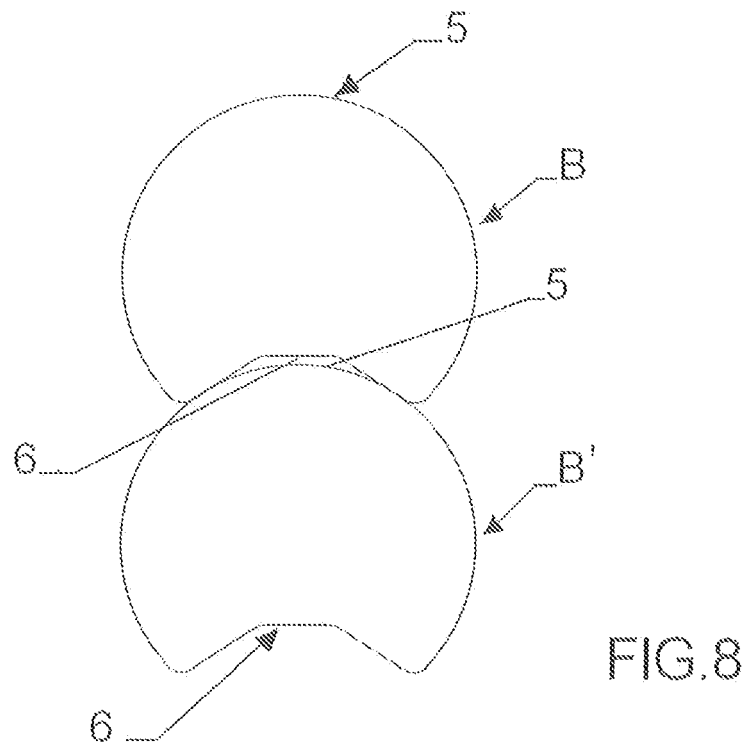
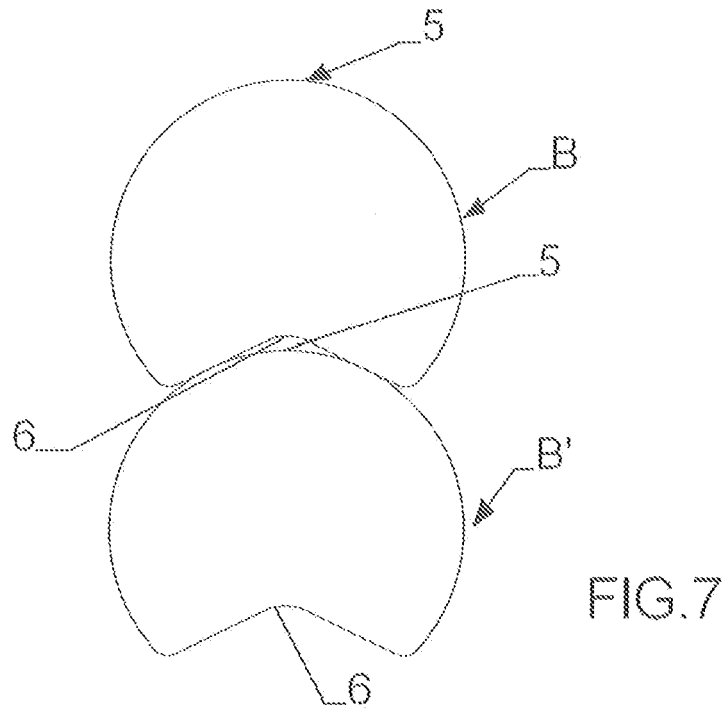
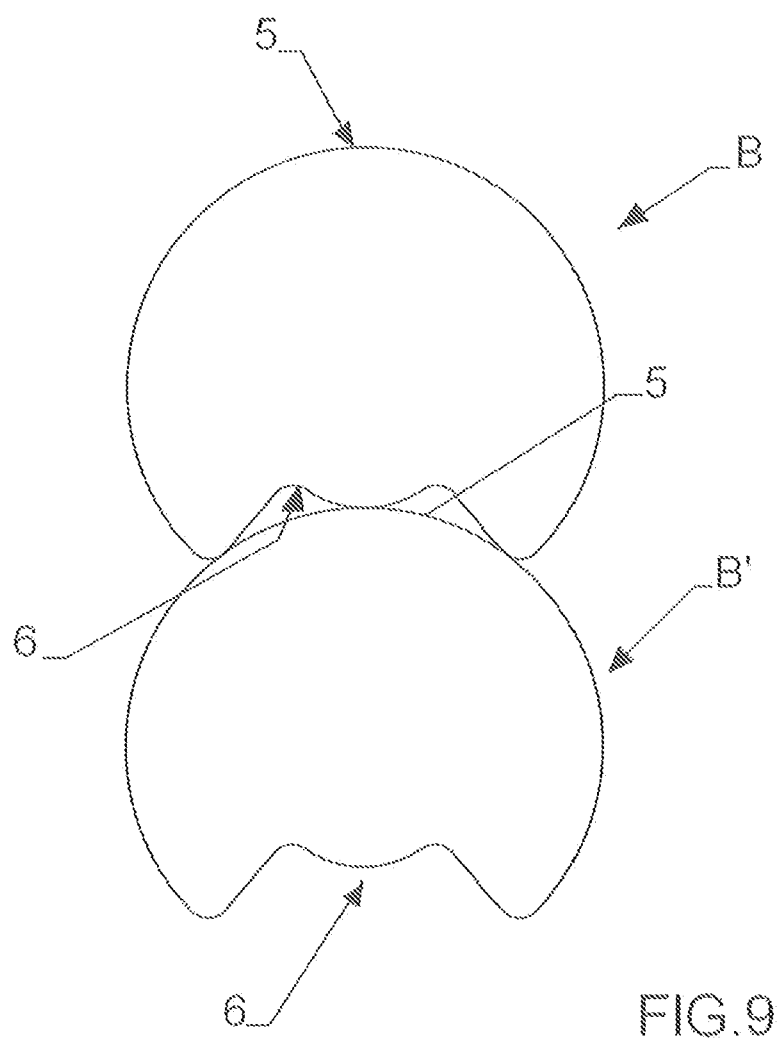


FIG.5







EUROPEAN SEARCH REPORT

Application Number
EP 11 16 5899

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 322 259 A1 (HENKEL KGAA [DE]) 28 June 1989 (1989-06-28) * column 2, lines 8,24-25,34,61; figures 1-3 *	1-4,6, 10-12, 14-17	INV. B65D1/02 B65D21/02
X	DE 299 07 258 U1 (PLM GLASHUETTE BAD MUENDER GMB [DE]) 29 July 1999 (1999-07-29) * page 1, lines 17,28; figures 1,4,5 * * page 2, line 1 - line 6 *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 August 2011	Examiner Sundell, Olli
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 16 5899

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09-08-2011

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REFERENCES CITED IN THE DESCRIPTION

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