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(54) **STOPPER DEVICE FOR A CONTAINER, A CONTAINER FITTED WITH SUCH A DEVICE, AND A METHOD OF FABRICATING SUCH A DEVICE**

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(52) **U.S. Cl.** **215/216; 215/344; 215/350**(57) **ABSTRACT**

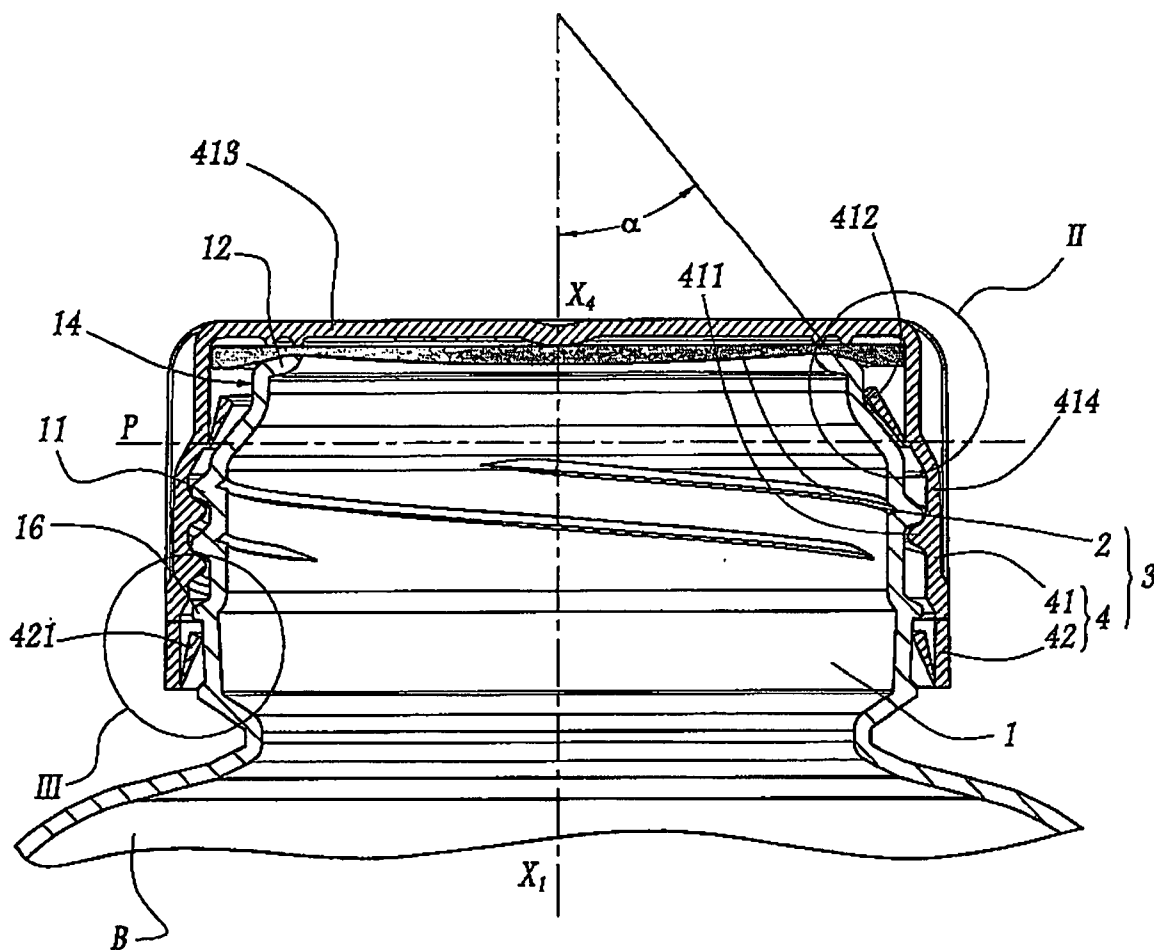
This stopper device (3) for a container (B) comprises a sealing disk (2) suitable for being sealed, adhesively bonded, or blocked against the end edge (12) of the neck (1) of the container (B), while projecting radially outwards from the neck. The device also comprises a stopper (4) suitable for being mounted on the neck (1) and provided with an internal portion in relief enabling a thrust force to be exerted on the sealing disk (2) urging the disk (2) away from the neck (1). The internal portion in relief is formed by a tongue (412) formed integrally with the stopper (4) and folded towards the end wall (413) of the stopper, in a configuration that is generally frustoconical and that converges (α) towards said end wall (413).

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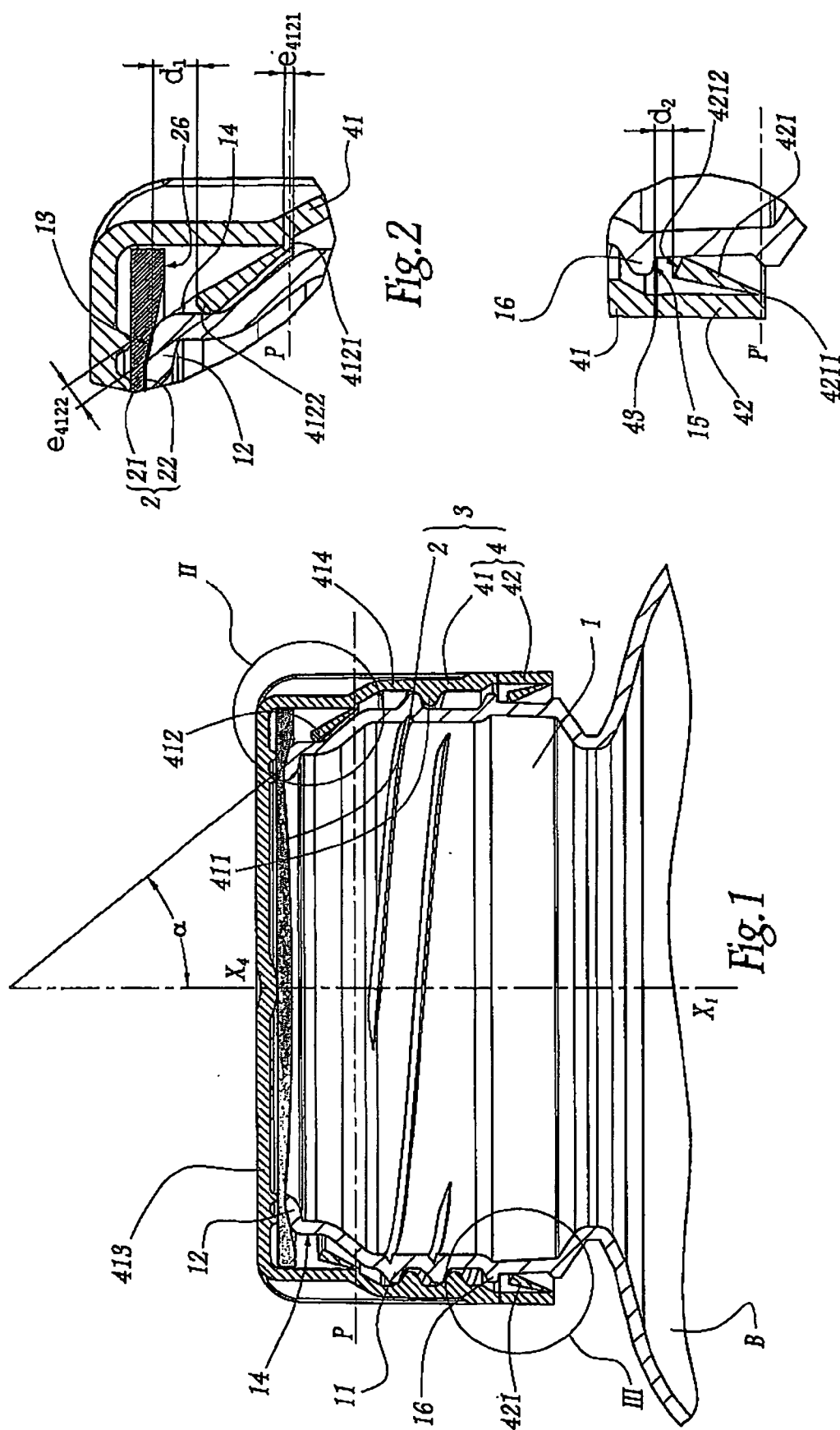


Fig. 2

Fig. 3

Fig. 1

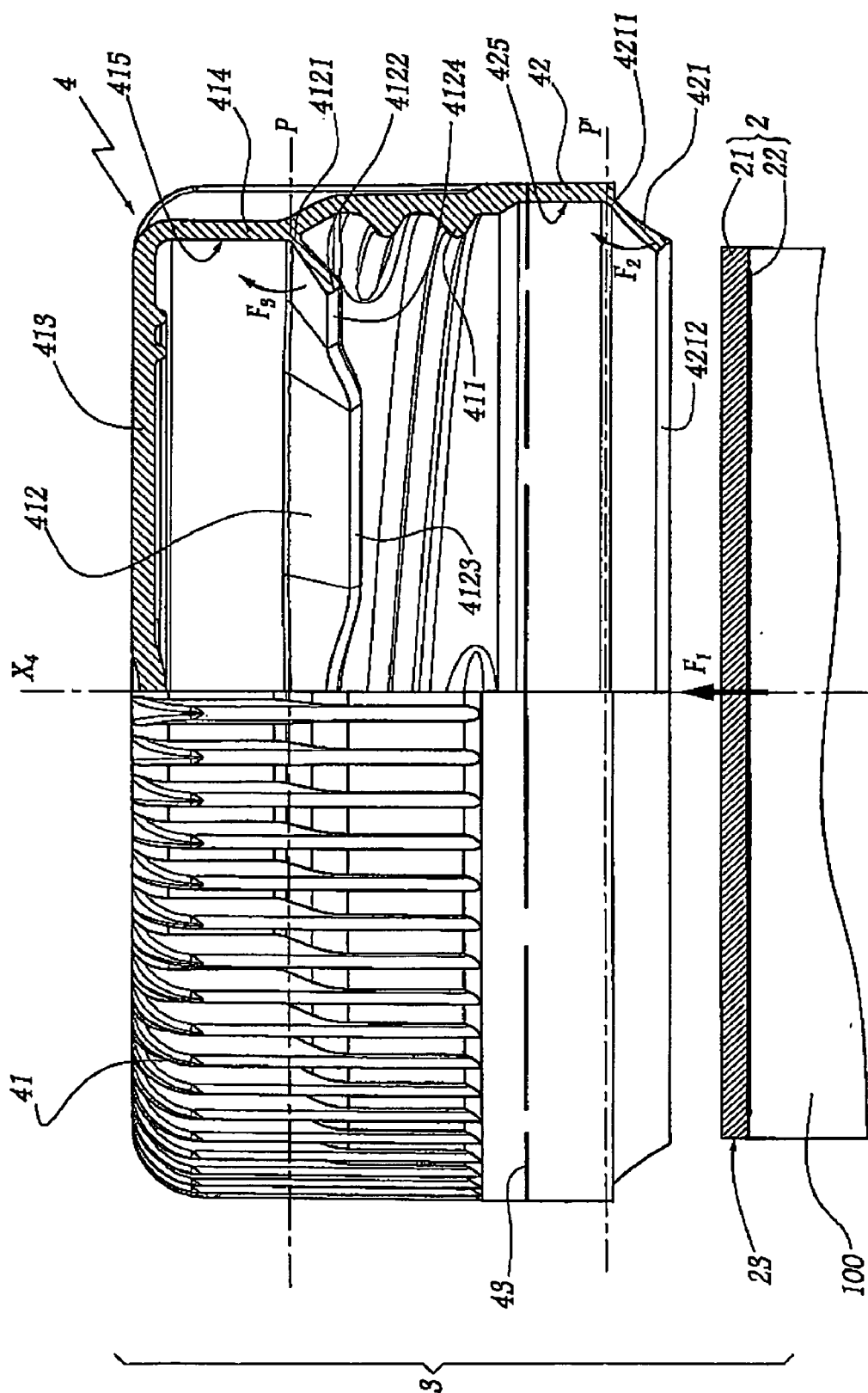
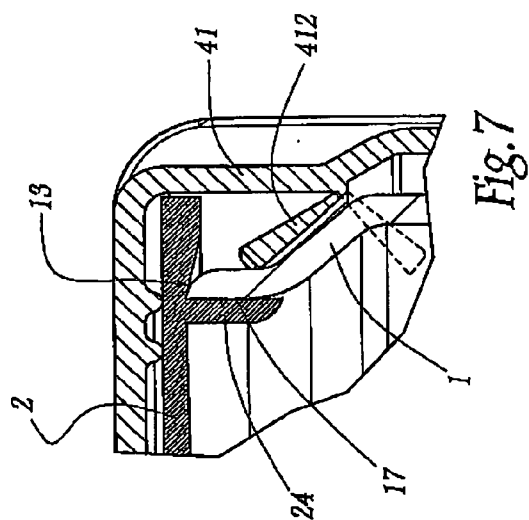
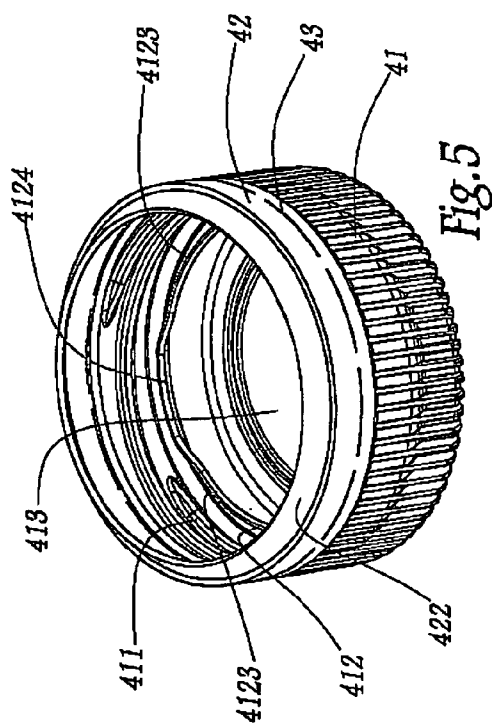
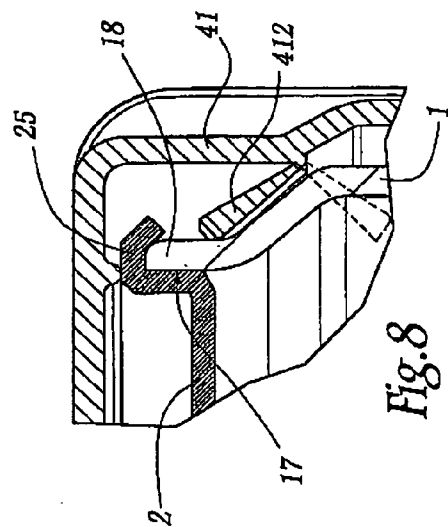
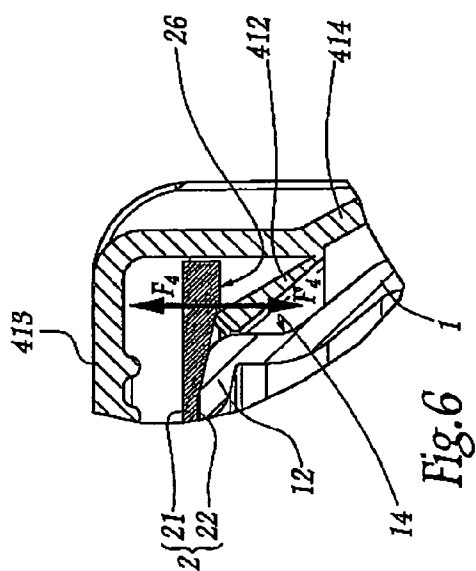


Fig. 4



**STOPPER DEVICE FOR A CONTAINER, A
CONTAINER FITTED WITH SUCH A
DEVICE, AND A METHOD OF FABRICATING
SUCH A DEVICE**

[0001] The invention relates to a stopper device and to a container fitted with such a device. The invention also relates to a method of fabricating such a stopper device.

[0002] In the field of packaging food or pharmaceutical products, it is known to fit a bottle made of plastics material with a sealing disk provided with a peel-off sealing membrane that is heat sealed by induction onto the end edge of the neck of the bottle. Such a disk needs to be removed prior to first use of the product contained in the bottle, which constitutes an operation that is difficult, and runs the risk of being performed poorly, in particular by a child or an old person. In addition, it is then necessary to dispose of the sealing disk and its membrane, which makes it necessary to go to a garbage can.

[0003] CH-A-556 274 discloses a stopper with an internal rib for holding in place a disk that is provided with an aluminum sheet. In order to install the disk in the stopper, it is necessary to deform it temporarily. The disk deforming in the opposite direction runs the risk of causing it to be extracted involuntarily from the stopper, in particular on first opening of the bottle insofar as the disk is held fast against the neck. In addition, there is a risk of damaging the peripheral edge of the disk while it is being put into place in the stopper, thereby having a negative effect on the resulting sealing.

[0004] In order to mitigate those problems, WO-A-03/08930 discloses providing a two-part stopper fitted with an inside ring having an edge that is provided with a projection that extends in an axial direction relative to a central axis of the neck. That device gives satisfaction in terms of reliability. Nevertheless, its cost price is relatively high because of the two-part structure of the stopper and the assembly steps that are necessary for fabricating it.

[0005] The invention seeks more particularly to remedy those drawbacks by proposing a stopper device for a container that is compatible with using a sealing disk and that ensures that the device will be removed on first use of the container, while also presenting a cost price that is particularly attractive.

[0006] To this end, the invention provides a stopper device for a container provided with a neck, the device comprising:

[0007] a sealing disk suitable for being sealed, adhesively bonded, or blocked against the end edge of the neck, so as to project radially outwards from the neck; and

[0008] a stopper suitable for being mounted on the neck and provided with an internal portion in relief suitable for exerting a thrust force on the sealing disk urging the disk away from the neck;

[0009] wherein the internal portion in relief of the stopper is formed by a tongue formed integrally with the stopper and folded towards the end wall of the stopper, in a generally frustoconical configuration that converges towards the end wall of the stopper.

[0010] By means of the invention, the folded tongue with a frustoconical configuration enables a thrust force to be transmitted effectively from the stopper towards the sealing disk, with the opposing force from the sealing disk having the effect of increasing the angle at the apex of the tongue which

then bears against the outside surface of the neck and remains in its folded configuration. The tongue may be continuous or discontinuous around the neck.

[0011] According to aspects that are advantageous but not essential, such a stopper device may incorporate one or more of the following characteristics:

[0012] The tongue is connected to the stopper via a deformable portion. This deformable portion advantageously has a thickness less than the thickness of the tongue in the vicinity of its free edge via which it can exert the thrust force on the disk.

[0013] The free edge of the tongue, remote from its portions connecting it to an inside face of the stopper, is provided with privileged zones for thrusting against the disk. The free edge of the skirt may present an undulating shape.

[0014] The stopper is provided with a tamperproofing band connected to a main portion of the stopper via at least one breakable zone, said band being suitable, on first removal of the stopper, for coming to bear against a portion forming an abutment against a blocking portion in relief formed on the outside of the neck, and, prior to first removal of the stopper, the distance between the abutment-forming portion and the blocking portion in relief is less than the minimum axial distance between the folded tongue and the sealing disk, such that on first removal of the stopper, the tamperproofing band comes into contact against the blocking portion in relief before the tongue exerts the thrust force. Thus, the thrust force may be exerted on the disk only after the breakable zone has broken, thereby informing a subsequent user of the container that it has already been opened.

[0015] The invention also provides a container, in particular a bottle made of plastics material, that is fitted with a stopper device as described above.

[0016] Finally, the invention provides a method of fabricating a stopper device as mentioned above, the method comprising some steps consisting in:

[0017] a)—molding the stopper with a generally frustoconical inside tongue that converges away from the end wall of the stopper;

[0018] b)—installing the sealing disk in the vicinity of the end wall of the stopper; and

[0019] c)—folding the tongue towards the end wall of the stopper so that it takes up a generally frustoconical configuration towards the end wall.

[0020] In a first approach, step c) precedes step b), the tongue being deformed elastically and radially towards an inside face of the stopper in order to enable the sealing disk to be installed during step b).

[0021] In a variant, steps b) and c) are simultaneous, the tongue being folded by the sealing disk while it is being installed or by a member for moving the sealing disk towards the end wall of the stopper.

[0022] The invention can be better understood and other advantages thereof appear more clearly in the light of the following description of three embodiments of a stopper device in accordance with the principle of the invention and of methods of fabricating such devices, given purely by way of example and made with reference to the accompanying drawings, in which:

[0023] FIG. 1 is a section view of the neck of a bottle fitted with a stopper device in accordance with the invention;

[0024] FIG. 2 is a view on a larger scale showing a detail II of FIG. 1;

[0025] FIG. 3 is a view on a larger showing a detail III of FIG. 1;

[0026] FIG. 4 is a side view in half-section showing the stopper device during a first step in the fabrication thereof;

[0027] FIG. 5 is a perspective view of the stopper in the configuration of FIG. 4;

[0028] FIG. 6 is a view analogous to FIG. 2 during first opening of the bottle;

[0029] FIG. 7 is a view analogous to FIG. 2 for a stopper device constituting a second embodiment of the invention; and

[0030] FIG. 8 is a view analogous to FIG. 2 showing a stopper device constituting a third embodiment of the invention.

[0031] The bottle B shown in part in FIG. 1 has a neck 1 provided with an outside thread 11 and a portion 12 having an outside surface 13 that is to receive a sealing disk 2 bearing thereagainst, which disk forms part of a stopper device. The sealing disk has a core of synthetic material that projects radially from the surface 13, and a membrane 22 made of an aluminum-based laminate, which membrane is adhesively bonded over substantially its entire surface area to the core 21. The membrane 22 has a diameter substantially equal to the diameter of the outer radial surface 14 of the neck 1 in the vicinity of the portion 12.

[0032] In addition to the disk 2, the stopper device 3 comprises a one-piece stopper 4 that comprises a capcap 41 and a tamperproofing band 42, the elements 41 and 42 being molded in a single operation and being connected together via a breakable zone 43.

[0033] The cap 41 is provided with an inside thread 411 for co-operating with the thread 11 to enable the stopper 4 to be screwed on and off the neck 1.

[0034] Reference X_1 designates the central axis of the neck 1. Reference X_4 designates the central axis of the stopper 4. The axes X_1 and X_4 coincide when the device 3 is in its mounted configuration on the neck 1.

[0035] On the inside face of its peripheral skirt 414, the cap 41 is provided with a deformable tongue 412 formed integrally with the skirt.

[0036] Reference P designates the plane perpendicular to the axis X_4 and passing through the center of a zone 4211 where the tongue 412 attaches to the skirt 414. On leaving the mold, the tongue 412 extends, relative to the plane P, away from the end wall 413, as shown in FIG. 4.

[0037] The tamperproofing band 42 is provided with an internal tongue 421 that is formed integrally with the band 42 and that is connected thereto via an attachment zone 4211. Reference P' designates a plane perpendicular to the axis X_4 and passing through the center of the zone 4211. On leaving the mold, the skirt 421, extends, relative to the plane P', away from the end wall 413, as shown in FIG. 4.

[0038] The orientation of the tongues 412 and 421 on leaving the mold is such that the skirts can easily be molded at high rates of production.

[0039] When the disk 2 is to be put into place inside the cap 1, in the vicinity of the end wall 413, the disk is placed on a piston 100 that is moved towards the end wall 413 in the direction of arrow F_1 in FIG. 4. The piston 100 supports the disk 2 out as far as its outer peripheral edge 23. By moving in the direction of arrow F_1 , the disk comes to bear against the

skirt 421 which it folds towards the inside surface 425 of the band 42, in the direction of arrow F_2 in FIG. 4.

[0040] By continuing its penetration movement into the cap 41, the disk 2 supported by the piston 100 also folds the tongue 412 towards the inside surface 415 of the skirt 414, in the direction of arrow F_3 in FIG. 4.

[0041] Thus, when the disk 2 is in place in the cap 41, prior to the device 3 being mounted on the neck 1, the tongue 412 is folded so that it presents a generally frustoconical configuration converging towards the end wall 413, with a half-angle at the apex, α , of about 40°. In practice, the angle α has a value lying in the range 10° to 60°.

[0042] The invention takes advantage of the fact that the attachment zone 4121 is deformable, thereby enabling the tongue 412 to pass easily from the configuration of FIG. 4 to the configuration of FIG. 1.

[0043] In a variant of the method of fabricating the device 3, the tongue 412 may be folded by a tool such as the piston 100 in the direction of arrow F_3 in FIG. 4 before the sealing disk 2 is put into place in the vicinity of the end wall 413. The disk is then put into place by radially deforming the tongue 412 temporarily away from its position shown in FIGS. 1 and 2 in a radially outwards direction towards the surface 415.

[0044] In any event, once the disk 2 is in place in the vicinity of the end wall 413, it is held in position by the tongue 412, until the device 3 is mounted on the neck 1. Once mounted, the membrane 22 can be heat-sealed to the surface 13, thereby guaranteeing that the resulting closure is sealed.

[0045] This produces the position shown in FIG. 1. In this position, the axial distance, i.e. the distance parallel to the axis X_1 , between the free edge 4122 of the tongue 412 and the disk 2 is written d_1 . In like manner, the distance between the free edge 4212 of the skirt 421 and a shoulder 15 formed by an outer radial collar 16 of the neck 1 is written d_2 , the shoulder 15 being designed to receive the free edge 4212 bearing thereagainst.

[0046] The distance d_2 is selected to be less than the minimum value for the distance d_1 such that during unscrewing of the cap 41, the skirt 421 comes into abutment against the collar 16, thereby causing the zone 43 to break, prior to any contact being made between the tongue 412 and the disk 2.

[0047] After this breakage, continued unscrewing movement has the effect of bringing the free edge 4122 of the tongue 412 to bear against the portion 26 of the surface of the disk 2 that faces away from the end wall 413 and that projects radially outside the portion 12. By continuing the movement of unscrewing the cap 41, it is possible to apply a force F_4 to the disk 2 sufficient for tearing the disk 2 away from the surface 13, this force being distributed around the axis X_1 .

[0048] This produces the configuration of FIG. 6.

[0049] The reaction force F'_4 due to the disk 2 acts on the tongue 412 in a direction tending to fold it downwards, but this is not possible given that the tongue 412 then bears against the surface 14. As a result, the tongue 412 is effective in transmitting the force F_4 , thereby enabling the connection that results from sealing the membrane 42 on the surface 13 to be broken.

[0050] As can be seen more particularly in FIGS. 4 and 5, the free edge 4122 of the tongue 412 is provided with some portions 4123 that extend further from the attachment zone 4121 than to other portions 4124 of the free edge 4122 of the tongue 412. The portions 4123 of the free edge 4122 thus

form privileged zones for applying the force F_4 , whereas no force tending to lift or tear off the disk 2 passes via the zones 4124.

[0051] The thickness e_{4122} of the free edge 4122 is greater than the thickness e_{4121} of the attachment zone, thereby giving the tongue 412 sufficient stiffness in its zone that transmits the force F_4 to the disk 2, while the hinge-forming zone 4121 is sufficiently flexible to make it easy to pass from the configuration of FIG. 4 to the configuration of FIGS. 1 and 2.

[0052] In a variant of the invention that is not shown, the tongue 412 may be interrupted over certain angular sectors, in particular those corresponding to the portions 4124. Under such circumstances, the tongue 412 is made up of a plurality of tongue portions that are separated by gaps distributed around the neck of the container.

[0053] In the second embodiment of the invention shown in FIG. 7, elements analogous to those of the first embodiment are given identical references. This embodiment differs from the preceding embodiment by the shape of the disk 2 that does not include a sealing membrane but that does include a skirt 24 that comes to bear against the radially inner surface 17 of the neck 1 and has an outer peripheral edge 25 that caps the free edge 18 of the neck 1. The disk 2 is adhesively bonded to the end edge 13 of the neck 1.

[0054] In the third embodiment of the invention shown in FIG. 8, elements analogous to the third embodiment are given identical references. This embodiment differs from the preceding embodiment in that the disk 2 is engaged in part inside the neck 1 and has an outer peripheral edge 25 that caps the free edge 18 of the neck 1. The disk 2 is jammed inside the inside surface 17 of the neck 1.

[0055] In these two embodiments, the cap 41 of the stopper 4 is provided with an internal tongue 412 that is folded from its position on leaving the mold, shown in dashed lines, to its position shown in continuous lines. The tongue 412 enables the disk 2 to be extracted from the neck 1 when the corresponding container is opened.

[0056] Whatever the embodiment in question, the stopper 4 is made of plastics material, e.g. a high density polyethylene (HDPE), a polypropylene, and more generally a polyolefin. Furthermore, the neck of the bottle may be made of plastics material, e.g. polyethylene, or it may be of glass.

What is claimed is:

1-9. (canceled)

10. A stopper device (3) for a container (B) provided with a neck (1), the device comprising:

a sealing disk (2) suitable for being sealed, adhesively bonded, or blocked against the end edge (12, 13, 17, 18) of the neck, so as to project radially outwards from the neck;

a stopper (4) suitable for being mounted on the neck and provided with an internal portion in relief suitable for exerting a thrust force (F_4) on the sealing disk urging the disk away from the neck

wherein the internal portion in relief of the stopper is formed by a tongue (412) formed integrally with the stopper and folded (F_3) towards the end wall (413) of the stopper, in a generally frustoconical configuration that converges (α) towards the end wall of the stopper.

11. A device according to claim 10, wherein the tongue is connected to the stopper via a deformable portion (4121).

12. A device according to claim 11, wherein the deformable portion (4121) has a thickness (e_{4121}) less than the thickness (e_{4122}) of the tongue in the vicinity of its free edge (4122) via which it can exert the thrust force (F_4) on the disk (2).

13. A device according to claim 10, wherein the free edge (4122) of the tongue, remote from its portions (4121) connecting it to an inside face (415) of the stopper (4), is provided with privileged zones (4123) for thrusting against the disk (2).

14. A device according to claim 10, wherein the stopper (4) is provided with a tamperproofing band (42) connected to a main portion (41) of the stopper via at least one breakable zone (43), said band being suitable, on first removal of the stopper, for coming to bear against a portion (422) forming an abutment against a blocking portion in relief (15) formed on the outside of the neck (1), and in that, prior to first removal of the stopper, the distance (d_2) between the abutment-forming portion (422) and the blocking portion in relief (15) is less than the minimum axial distance (d_1) between the folded tongue (412) and the sealing disk (2), such that on first removal of the stopper, the tamperproofing band (42) comes into contact against the blocking portion in relief (15) before the tongue (412) exerts the thrust force (F_4).

15. A container, in particular a bottle (B) made of plastics material, fitted with a stopper device (3) according to claim 10.

16. A method of fabricating a stopper device (3) for a container (B) provided with a neck (1), the device comprising:

a sealing disk (2) suitable for being sealed, adhesively bonded, or blocked against the end edge (12, 13, 17, 18) of the neck, so as to project radially outwards from the neck;

a stopper (4) suitable for being mounted on the neck and provided with an internal portion in relief suitable for exerting a thrust force (F_4) on the sealing disk urging the disk away from the neck,

wherein the method comprises the steps consisting in:

a)—molding the stopper with a generally frustoconical inside tongue (412) that converges away from the end wall (413) of the stopper;

b)—installing (F_1) the sealing disk in the vicinity of the end wall of the stopper;

c)—folding (F_3) the tongue towards the end wall of the stopper so that it takes up a generally frustoconical configuration converging (a) towards the end wall.

17. A method according to claim 16, wherein steps b) and c) are simultaneous, the tongue (412) being folded (F_3) by the sealing disk (2) while it is being installed or by a member (100) for moving the sealing disk towards the end wall (413) of the stopper (4).

18. A method according to claim 16, wherein step c) precedes step b), the tongue being deformed elastically and radially (F_3) towards an inside face (415) of the stopper (4) in order to enable the sealing disk to be installed during step b).

* * * * *