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(73) Jogosult(ak):

Creanova Universal Closures Limited,
Tewkesbury, Gloucestershire GL20 8PF (GB)

(72) Feltaláló(k):

SMITH, Mark, Cheltenham Gloucestershire GL51 9HA
(GB)**DRUITT, Rodney, Cheltenham Gloucestershire GL50**
2AX (GB)

(74) Képviselő:

DANUBIA Szabadalmi és Jogi Iroda Kft.,
Budapest

(54)

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(73) Proprietor: **Creanova Universal Closures Limited
Tewkesbury, Gloucestershire GL20 8PF (GB)**

(72) Inventors:
• **SMITH, Mark**
Cheltenham Gloucestershire GL51 9HA (GB)
• **DRUITT, Rodney**
Cheltenham Gloucestershire GL50 2AX (GB)

(74) Representative: **Rentsch Partner AG**
Rechtsanwälte und Patentanwälte
Fraumünsterstrasse 9
Postfach 2441
8022 Zürich (CH)

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a closure, especially a closure for packages for liquids such as beverages. In particular the invention relates to a closure for containers for carbonated liquids such as soft drinks, but is well adapted to seal other containers such as glass or PET containers with contents at above or below atmospheric pressure or having gaseous components or requiring a hermetic seal.

BACKGROUND OF THE INVENTION

[0002] Screw cap closures (closures) are well known from the prior art and are a subject of continuous optimization. One attempt is to reduce the weight of the closure because the major share of the price is caused by the material used to make the closure. Therefore, in other words, reduction of the material used to make the closure means a reduction of the price of the closure. Furthermore, less material consumption results in an improved environmental compatibility.

[0003] From the same inventor several patent applications are known in the field of the invention, which are primarily directed to sealing technology and/or closures. Examples are WO06024550, WO06024656, WO06097151, WO03022701, WO0056615, WO0056616, WO9903746, WO9402371, WO8912584, US6874648 and USD613162.

[0004] EP0076778 of Albert Obrist AG was filed in 1982 and is directed to a closure cap made of plastics material, which has a circular outer sealing lip having a thickness which continuously decreases versus its free end. The outer sealing lip is arranged in the region of the joint between an outer vertical skirt and a disc like top portion and points obliquely inwards. At its smallest diameter, the sealing lip has a rounded sealing portion. Below the sealing portion, the sealing lip is widened outwards in the manner of a funnel to receive a container opening. However, due to the obliged arrangement of the sealing lip, the sealing lip often tends to be distorted during application, especially crooked application onto a neck of a container. A further disadvantage consists in that, due to the inclined arrangement, this seal is relatively rigid and therefore not very good in adjusting in lateral direction.

[0005] US4489845 was filed in 1984 and assigned to Albert Obrist AG. US4489845 is directed to a screw-cap for closing a container opening. The cap has a sealing lip which is affixed to the cap top. The inner side-wall of the outer sealing lip has a diameter which is greater than the outer diameter of the container outer wall. A clamping device, which can be designed as an inner seal, creates a contraction of the cap top when the screw-cap is screwed onto the container due to deformation of the outer shell of the closure, by which means the sealing lip

shall be pressed against the container mouth. In this manner the sealing lip is only pressed radially against the container mouth during the course of the screwing-on process. Thereby, over-stretching and damage to the material of the sealing lip shall be prevented. In an engaged position the sealing lip engages around the upper outer rim of the neck of a container opening. One disadvantage is that the described deformation of the closure is related to extensive operating forces. A further disadvantage consists in that the outer shell tends to break due to extensive stress and deformation (stress cracking), which results in complete failure of the closure and loss of the product.

[0006] WO03011699 filed in 2002 by Bericap is directed to a closure cap comprising an internal sealing skirt, which is substantially truncated and converges from the sealing skirt base towards the free end of the sealing skirt. The inside of the sealing skirt is designed to cooperate with the outside of the neck. The internal diameter of the sealing skirt towards its free end portion is designed smaller than the external diameter of the neck. As described, the closure can comprise an annular v-notch designed to improve attachment of a liner to the rim of the neck or contact between the liner and the rim.

[0007] Further patent publications showing several sealing technologies and/or closures are e.g. JP57133851, JP58073551, US4489845, US6874648, JP9150846, JP3872546, JP4392873, JP2000109105, JP4456681, US7014055, WO0187725, US6695161, JP4533597, which accords with the preamble of claim 1, WO005039996, JP4413071, US7575121, JP2007145341 or US7607547.

SUMMARY OF THE INVENTION

[0008] It is an object of the invention to provide a closure with a reduced weight, which can withstand internal pressure e.g. from carbonated soft drinks. It is a further object of the invention to provide a closure with improved performance, such as venting, removal torque and so forth.

[0009] The closure is foreseen to be used with standardized neck finishes as known from prior art. The standardized neck finishes comprise an outer peripheral surface with an external thread. The outer peripheral surface blends by an edge surface into an annular top surface, which forms the upper end of the container when it is standing upright. Between the annular top surface and the external thread an outer free surface extends over a length of approximately 1 mm to 3 mm of the neck, which is not covered by the thread and suitable for sealing purposes. Furthermore, the neck of the container comprises an in general cylindrical, inner peripheral surface adjacent to the annular top surface.

[0010] The object of the invention is solved by a closure as defined in appended claim 1, which comprises a shell with reduced weight and which is foreseen to withstand internal pressure, e.g. resulting from a carbon-ated liquid.

In general, saving of weight, i.e. reducing of material, is contradictory to capability to withstand internal pressure. The capability to withstand internal pressure is linked to a certain stiffness or rigidity of the closure, namely the outer shell of the closure to avoid unwanted deformation. Critical areas are namely the seal or the top deck of the closure. If the outer shell of the closure is not sufficiently stiff (rigid) or designed in a wrong way, the closure tends to deform and is therefore not capable to fulfill the required specifications. Namely at elevated temperatures and under internal pressure, insufficient closures tend to fail and are therefore not acceptable.

[0011] A closure according to the present invention is designed to have on the one hand a very low weight compared to closures known from prior art and on the other hand a high performance to withstand-internal pressure. The design of the closure is based on a certain deformation tolerance, which allows the closure to deform under certain extreme conditions. The outer shell and the seal are thereby interacting with each other in a balanced manner. The seal is designed that it can adjust to the deformation of the outer shell such that within the specification no unwanted leaking or loss of pressure occurs.

[0012] A closure comprises a base with a disc like top portion and a therewith adjacent outer skirt with an internal thread or similar retaining means suitable to be engaged with the external thread of a neck finish as described above.

[0013] The closure may further comprise a tamper band attached to a lower free end of the outer skirt and integrally attached thereto by frangible bridges or similar means such as a thin web of material.

[0014] A closure according to the invention comprises a top deck and a therewith adjacent outer skirt. The outer skirt comprising on the inside a segmented thread, with thread segments whereby between two in circumferential direction adjacent thread segments first channel-like recesses are arranged extending in an axial direction of the skirt. The channel-like recesses are arranged alternating with the rows of thread segments. On the outside of the skirt second channel-like recesses are arranged, which extend in the axial direction of the skirt. Said second recesses are arranged radial outside to and aligned with at least two thread segments adjacent to each other in an axial direction of the closure. The number of the first recesses on the inside and the rows of second recesses on the outside are equivalent with respect to each other. In a preferred embodiment, the at least one second recess on the outside of the skirt is arranged adjusted (symmetric) with respect to the adjacent thread segments on the inside of the skirt. If appropriate, third recesses are arranged between the second recesses. Thereby, the weight of the closure can be additionally reduced. Good results can be achieved when the number of rows of thread segments and first recesses is equivalent to 10-15 rows. Preferably, on the outside of each row of thread segments a second recess is arranged adjusted

with respect to the thread segments at least in circumferential direction. The second recesses are preferably arranged coaxial to the rows of thread segments.

[0015] To compensate and balance the deformation of the outer shell, a sealing means is arranged on the inside of the closure, which has with respect to its cross-section an outer leg extending in general perpendicular from the top deck of the closure and being arranged such that the outer leg in an applied position of the closure on a neck finish interacts with an outer surface of the neck finish forming a first sealing area. The outer leg may be arranged pointing slightly radially inwardly, whereby the inner side wall of the outer leg is arranged at an angle α between 86° to 90° with respect to the top deck (horizontal direction; direction perpendicular to the closure axis). Depending on the field of application, the outer leg may comprise on the inside a bump arranged at the inner root of the outer leg next to the top deck. The bump is designed and arranged to interact with a rim surface and/or an annular end surface of the neck finish forming a second sealing area, whereby the bump seal is functionally separated from the outer leg by a notch. When the closure is applied onto a neck finish, the bump tends to deform significantly.

[0016] Very good results are achieved by a seal comprising blend, which interconnects the outer leg and the top deck. The blend thereby acts in applied position of the closure as a second sealing area. The blend is designed to provide a functional interaction between the outer leg and the second sealing area. A further advantage is that the blend does not deform as much as the bump and in general the deformation is reversible. When the closure is applied onto a neck finish, a rim surface of the neck finish presses onto the blend after a first sealing area between the outer leg and the outer surface of the neck finish has been established. The thereby resulting foreshortening of the blend causes that the outer leg is pulled inwardly in an increased manner, thereby improving the sealing performance of the outer leg.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The herein described invention will be more fully understood from the detailed description given herein below and the accompanying drawings, which should not be considered limiting to the invention described in the appended claims. The drawings are showing:

- Fig. 1 A first embodiment of a closure according to the invention in a perspective view;
- Fig. 2 The closure according to Figure 1 in a top view;
- Fig. 3 The closure according to Figure 1 in a bottom view;
- Fig. 4 The closure according to Figure 1 in a side view;
- Fig. 5 The closure according to Figure 1 in a section view along section line D-D;
- Fig. 6 Detail A of Figure 5;

- Fig. 7 The closure according to Figure 1 in a side view;
 Fig. 8 The closure according to Figure 7 in a section view along section line E-E;
 Fig. 9 The closure according to Figure 7 in a section view along section line F-F;
 Fig. 10 The closure according to Figure 7 in a section view along section line G-G;
 Fig. 11 A second embodiment of a closure according to the invention in a side view;
 Fig. 12 The closure according to Figure 11 in a section view along section line H-H;
 Fig. 13 The closure according to Figure 11 in a section view along section line I-I;
 Fig. 14 Detail B according to Figure 12.

DESCRIPTION OF THE EMBODIMENTS

[0018] Figure 1 shows a first embodiment of a closure 1 according to the invention in a perspective view. Figure 2 shows the same closure 1 in a top view, Figure 3 in a bottom view and Figures 4 and 7 in a side view. Figure 5 shows a section view of the closure along section line D-D and Figure 6 shows detail A according to Figure 5 in a magnified manner. Figure 8 shows a section view of the closure along section line E-E, Figure 9 a section view along section line F-F and Figure 10 a section view along section line G-G.

[0019] As it can be seen in Figure 1, the closure 1 comprises a circular top deck 2 and a therewith adjacent in outer skirt 3. A tamper band 4 is interconnected to the lower free end of the outer skirt 3. A closure shell 5 consists out of the top deck 2 and the outer skirt 3.

[0020] As it can be seen in Figures 5 and 6, the outer skirt 3 comprises on the inside a thread 6, which consists out of thread segments 6.1. The thread 6 extends in the shown embodiment over a total angle of 765° ($2\frac{1}{4}$ coils). Between two in circumferential (helical) direction adjacent thread segments 6.1, channel-like recesses 7 are arranged on the inside of the skirt 3 in a vertical direction (parallel to a closure axis z; vertical means in general vertical). The shown embodiment comprises in total twelve channel-like recesses 7, which are circumferentially evenly distributed between the thread segments 6.1. As it can be seen, the recesses 7 extend in axial direction at least across two in axial direction adjacent thread segments 6.1. By the evenly distributed and balanced arrangement of the thread segments 6.1 and the channel-like recesses 7, a balanced distribution of the load is achieved, which e.g. may occur due to internal pressure or the like.

[0021] The majority of the channel-like recesses 7 are extending over approximately 70-90% of the outer free length of the outer skirt 3. Only the recess 7 above the extended thread start segment 6.2 has a shorter length (see Figure 5). The recesses 7 of the shown embodiments have an in general constant cross-section. If appropriate, the cross-section may vary over the length of

the recess 7. If appropriate, the recesses 7 may have - instead of a straight design as shown - a curved, e.g. helical shape.

[0022] As best visible in Figures 1 and 2 the outer skirt 3 of the closure 1 comprises on the outside knurls 8, which are foreseen to increase the grip of the closure 1. In radial outside direction behind and aligned to the thread segments 6.1 channel-like second recesses 9 are arranged, which extend in axial direction of the closure having a first depth d1. The second recesses 9 on the outside and the first recesses 8 on the inside of the skirt 3 alternate with respect to each other in a circumferential direction. Intermediate to the second recesses 9 channel-like third recesses 10 are arranged having a second depth d2 compared to the second recesses 9. The third recesses extend in axial direction (z-direction) of the closure 1. The dept and the orientation of the recesses 8, 9, 10 may vary over their length, e.g. due to draft angle and/or design reasons. It has been found that the herein shown arrangement of smaller knurls, recesses 7, 9, 10 and thread segments 6.1 in a balanced and equalized manner results in a closure shell 5 (top deck and outer skirt) with a very low weight still having a high stiffness to withstand the occurring loading conditions. If appropriate the second and the third recesses 9, 10 may have the same dimensions/cross-sections. If appropriate the second and/or the third recesses can be left away although the overall weight of the closure thereby increases. The recesses 9, 10 preferably have an in general cylindrical or slightly conical shape to increase the axial stiffness and rigidity of the closure shell 5.

[0023] The closure 1 comprises on the inside a sealing means 11 which interacts at least with an outer surface 13 and a rim surface 14 of the neck finish 12, when the closure 1 is applied to a neck finish 12 (cross-section in Figure 6 schematically indicated by dash line). The rim surface 14 interconnects the outer surface 13 with an annular end surface 15.

[0024] Figure 6 shows the seal 11 in a cross-sectional view. The seal is shown in a non-deformed manner. As it can be seen the seal 11 comprises in the shown embodiment an outer leg 16 with an in general constant thickness. The outer leg 16 is separated by a gap 33 from the outer skirt 3. The gap 33 allows that the outer leg 16 to be deformed freely in a radial direction. Under normal circumstances no interaction with the outer skirt is foreseen. An inner side wall 17 of the outer leg 16 is arranged perpendicular or at an angle α pointing slightly radial inwardly. Good results are achieved when the angle α is in a range between 85° - 90° . Larger angles may reduce the effectiveness of the seal, because they are difficult to produce and therefore tend to be distorted while ejection of the closure out of the mold. In the shown embodiment the inner side wall 17 merges at the lower end of the outer leg 16 into a herein toroidal lead-in surface 18 having a first radius R1. Alternatively or in addition, the lead-in surface 18 may be funnel shaped. The lead-in surface 18 helps to apply the outer leg 16 onto the neck

finish 12. When applied onto the neck finish 12, the outer leg 16 forms a first sealing area with the outer surface 13 of the neck finish 12.

[0025] On the outside, the outer leg 16 comprises an outer side wall 19, which is arranged in general parallel to the inner side wall 17. Versus the lower end of the outer leg 16, the outer side wall merges into an outer transition surface 20, which has in the shown embodiment a circular cross-section with a second radius R2, which is depending on the field of application in the range of 0.25 mm to 1.5 mm.

[0026] At the inner rear end of the outer leg 16, a bump 21 is visible which is designed and arranged such that when the closure is applied onto the neck finish 12 the bump 21 interacts with the rim surface 14 forming a second sealing area. The bump 21 is functionally separated from the outer leg 16 by a notch 22. The functional interaction between the outer seal 16 and the bump 21 can be adjusted by the shape of the notch 22. In a preferred embodiment the notch 22 has a depth in the range of 0.1 to 0.3 mm. In the shown embodiment the bump 21 has a toroidal shape with a radius preferably in the range of 0.1 to 0.5 mm. The notch 22 avoids unwanted interaction between the outer leg 16 and the bump 21 when deformation of the shell of the closure 1 occurs.

[0027] As it can be seen in **Figure 6**, the sealing means 11 further comprises a bore seal 36 having a cross-section consisting of an inner leg 23, which reaches into the neck finish 12 when the closure is applied on the neck finish 12 and acts as a bore seal. The inner leg 23 has a protrusion 24 extending radial outwardly and forming in applied position a third sealing area between the sealing means 11 and the neck finish 12. The bore seal 36 may have different shapes depending on the field of application. The bore seal 36 comprises a series of grooves 37 (see **Figure 3**) arranged at the lower free end of the bore seal 36. The grooves are 37 which are foreseen to improve venting of the closure during opening in that the gas stored inside the container can be released more quickly.

[0028] If appropriate, the herein shown sealing means 11 can be used with a different closure shell although this will result in a less efficient solution with a higher material consumption.

[0029] As it can be best seen in **Figures 5, 7 and 9** the tamper band 4 is interconnected to the closure shell 5 by frangible bridges 25 which are integrally formed when making of the closure 1. The frangible bridges are pyramidal shaped with a tip arranged in the direction of the skirt 3. Depending on the field of application and the performance of the closure alternatively the frangible bridges can be made by a scoring process. The tamper band 4 comprises on the inside radial inwardly directed protrusions 26 which are foreseen to latch with a corresponding bead (not shown in detail) on the neck finish. As it can be seen in **Figures 9** and the sectional view according to **Figure 10**, the protrusions 26 are having in the shown embodiment in a top view an in general circular cross-

section.

[0030] As it can be seen best in **Figure 5** the frangible bridges 25 are arranged in-between the protrusions 26 of the tamper band 4 and between the rows of thread segments 6. The frangible bridges are in aligned to the first recesses 7 on the inside of the skirt 3. By this balanced and symmetrical setup in combination with the sealing means compensating the deformation of the outer shell 5 when internal pressure and/or elevated temperatures occur a very light-weight closure can be achieved which still has a superior performance with respect to the closures known from prior art.

[0031] As it can be seen in the tamper band 4 according to the embodiment shown in **Figure 5** further weight saving is achieved by skeletonizing of the band, i.e. by fourth and fifth recesses 27, 28 evenly distributed on the circumference of the tamper band 4.

[0032] **Figure 11** shows a second embodiment of the closure 1 in a side view. **Figure 12** shows a section view of the closure 1 according to **Figure 11** along section line H-H and **Figure 13** a section view along section line I-I. **Figure 14** shows Detail B according to **Figure 12**.

[0033] The outer shell 5 of the closure 1 is in general similar to the shell 5 of the closure 1 according to **Figures 1** through **10**. Therefore, regarding the general explanations of these elements it is referred to said drawings. The differences between the closure 1 according to **Figures 1** through **10** and the closure 1 according to **Figure 11** through **14** are the slightly tamper band 4 and the different sealing means 11.

[0034] The sealing means 10 comprises an outer leg 16 which extends in a perpendicular direction (general z-direction) from the top deck 2. The sealing means 10 is shown in an undeformed manner. The outer leg 16 is separated by a gap 33 from the outer skirt 3 and in general free-standing, i.e. no contact with the outer skirt 3 occurs under normal conditions. The outer leg 16 comprises at its lower end a sealing surface 29 foreseen to interact with the outer surface 13 of the neck finish 11 (dash line) forming a first sealing area 30 when the closure is applied onto neck finish 11. The outer leg 16 comprises at its inner root a blend 31 forming a transition area between the outer leg 16 and the top deck 2. The blend 30 is foreseen to establish a second sealing area 32 with a rim surface 14 of neck finish 11. As it can be seen in **Figure 14** in applied position the rim surface 14 of neck finish 11 may significantly dive into and deform the blend 31. Thereby sealing surface 29 is pulled radial inwardly resulting in an increased sealing force in the first sealing area 30. Due to that effect the negative influence which may occur due to a deformation of the outer shell 5 of the closure 1 can be significantly reduced. In the shown embodiment the blend 31 has a circular shape with a radius R3. The radius is preferably in the range between 0.5 mm to 1.2 mm. In the shown embodiment the radius is 1 mm. In the shown embodiment the sealing surface 29 protrudes above the inner surface of the blend 31 forming the most inner point. On the outside the outer

leg 16 is defined by an outer side wall 34 which is arranged in general perpendicular to the top deck 2. At the free end the outer side wall 34 turns into an outer transition surface 35 having a radius R4. The radius R4 is preferably in the range of 0.25 mm to 1.5 mm. The sealing means 11 further comprises a bore seal 36 having a cross-section consisting out of an inner leg 23 and a protrusion directed in radial outward direction.

LIST OF DESIGNATIONS

[0035]

R1	First Radius (outer leg 16)
R2	Second Radius (outer leg 16)
R3	Third Radius (outer leg 16)
R4	Fourth Radius (outer leg 16)
d1	First Depth (second recess 9)
d2	Second Depth (third recess 10)
1	Closure
2	Top Deck
3	Outer skirt; skirt
4	Tamper Band
5	Closure shell (Top Deck 2 + Outer Skirt 3)
6	Thread (6.1: Thread Segments; 6.2: Thread Start Segment)
7	Channel-like first recess; first recess
8	Knurls
9	Channel-like second recesses
10	Channel-like third recesses
11	Sealing means (Seal)
12	Neck finish
13	Outer surface of neck finish
14	Rim surface of neck finish
15	Annular end surface
16	Outer Leg
17	Inner side wall
18	Lead-in surface
19	Outer side wall
20	Outer transition surface
21	Bump
22	Notch
23	Inner leg (bore seal)
24	Protrusion (inner leg)
25	Frangible bridge
26	Protrusion (tamper band)
27	Fourth recess (inside tamper band)
28	Fifth recess (outside tamper band)
29	Sealing surface (outer leg)
30	First sealing area
31	Blend (outer leg)
32	Second sealing area
33	Gap
34	Outer side wall (outer leg 16)
35	Outer transition surface
36	Bore seal
37	Groove (bore seal)

Claims

1. A closure (1) having
 - a. a top deck (2) and
 - b. a therewith adjacent outer skirt (3),
 - c. said outer skirt (3) comprising on the inside a segmented thread (6) with thread segments (6.1) whereby
 - d. between two in circumferential direction adjacent thread segments (6.1) a first channel-like recess (7) is arranged on the inside of the outer skirt (3) extending in an axial direction of the skirt (3) and whereby
 - e. on the outside of the skirt second channel-like recesses (9) are arranged which extend in the axial direction of the skirt, whereby said second recesses are arranged radial outside to and aligned with at least two thread segments adjacent to each other in an axial direction of the closure, **characterized in that**
 - f. the number of the first recesses (7) on the inside and the rows of second recesses (9) on the outside are equivalent with respect to each other.
2. The closure according to claim 1, **wherein** the second recesses are arranged symmetric with respect to the adjacent thread segments.
3. The closure (1) according to one of the previous claims, **wherein** the second channel-like recesses (9) and the adjacent thread segments (6.1) are arranged in a symmetric manner with respect to each other.
4. The closure (1) according to one of the previous claims **wherein** between two second channel-like recesses (9) a third recess (10) is arranged.
5. The closure (1) according to one of the previous claims, **wherein** on the inside of the outer skirt (3) in circumferential direction 10-15 rows of thread segments (6.1) and first channel-like recesses (7) are arranged.
6. The closure (1) according to claim 5, **wherein** on the outside of each row of thread segments (6.1) a second channel-like recess (9) is arranged.
7. The closure (1) according to claim 6, **wherein** the second channel-like recesses (9) are arranged coaxial to the rows of thread segments (6.1).
8. The closure (1) according to one of the previous claims, **wherein** at least one frangible bridge (25) is in the circumferential direction aligned with a first channel-like recess (7).

9. The closure according to claim 1, wherein a tamper band is interconnected to the closure shell by frangible bridges (25).
10. The closure according to claim 9, wherein the frangible bridges (25) are made by a scoring process. 5
11. The closure (1) according to one of the previous claims, **wherein** at least one protrusion of a tamper band (4) is in the circumferential direction aligned with a thread segment (6.1). 10
12. The closure (1) according to one of the previous claims, **wherein** a sealing means (11) is arranged on the inside of the closure (1) and wherein the sealing means (11) with respect to its cross-section comprises an outer leg (16) extending in general perpendicular from the top deck (2) of the closure (1) and being arranged such that the outer leg (16) in an applied position of the closure (1) on a neck finish (12) interacts with an outer surface (13) of the neck finish (12) forming a first sealing area. 15
13. The closure (1) according to claim 12, **wherein** the sealing means (11) comprises a bump (21) arranged at an inner root of the outer leg (16), foreseen to interact with a rim surface (14) and/or an annular end surface (15) of the neck finish (12) forming a second sealing area, whereby the bump seal (21) is functionally separated from the outer (16) leg by a notch (22). 20
14. The closure (1) according to claim 12, **wherein** between the outer leg (16) and the top deck (2) of a blend (31) is arranged, which acts as a second sealing area (32), wherein the blend (31) is designed such that it provides a functional interaction between the outer leg (16) and the second sealing area (32). 25
15. The closure (1) according to claim 14, **wherein** the blend (31) has a concave shape with respect to its cross-section. 30

Patentansprüche

1. Verschluss (1) mit

- a. einer Oberplatte (2) und
 b. einem damit verbundenen Außenmantel (3),
 c. wobei der Außenmantel (3) auf der Innenseite ein segmentiertes Gewinde (6) mit Gewindesegmenten (6.1) umfasst, wobei
 d. zwischen zwei in Umfangsrichtung angrenzenden Gewindesegmenten (6.1) eine erste kanalartige Vertiefung (7) auf der Innenseite des Außenmantels (3) angeordnet ist, die sich in Achsrichtung des Mantels (3) erstreckt und wo-

bei

e. auf der Außenseite des Mantels zweite kanalartige Vertiefungen (9) angeordnet sind, die sich in Achsrichtung des Mantels erstrecken, wobei die zweiten Vertiefungen radial an der Außenseite und ausgerichtet an mindestens zwei aneinander angrenzenden Gewindesegmenten in Achsrichtung des Verschlusses angeordnet sind, **dadurch gekennzeichnet, dass**
 f. sich die Anzahl der ersten Vertiefungen (7) an der Innenseite und die Reihen der zweiten Vertiefungen (9) an der Außenseite einander entsprechen.

2. Der Verschluss nach Anspruch 1, **wobei** die zweiten Vertiefungen symmetrisch zu den angrenzenden Gewindesegmenten angeordnet sind. 35
3. Der Verschluss (1) nach einem der vorhergehenden Ansprüche, **wobei** die zweiten kanalartigen Vertiefungen (9) und die angrenzenden Gewindesegmente (6.1) symmetrisch zueinander angeordnet sind. 40
4. Der Verschluss (1) nach einem der vorhergehenden Ansprüche, **wobei** zwischen den zweiten kanalartigen Vertiefungen (9) eine dritte Vertiefung (10) angeordnet ist. 45
5. Der Verschluss (1) nach einem der vorhergehenden Ansprüche, **wobei** an der Innenseite des Außenmantels (3) in Umfangsrichtung 10-15 Reihen von Gewindesegmenten (6.1) und erste kanalartige Vertiefungen (7) angeordnet sind. 50
6. Der Verschluss (1) nach Anspruch 5, **wobei** an der Außenseite jeder Reihe von Gewindesegmenten (6.1) eine zweite kanalartige Vertiefung (9) angeordnet ist. 55
7. Der Verschluss (1) nach Anspruch 6, **wobei** die zweiten kanalartigen Vertiefungen (9) koaxial zu den Reihen der Gewindesegmente (6.1) angeordnet sind.
8. Der Verschluss (1) nach einem der vorhergehenden Ansprüche, **wobei** mindestens eine zerbrechliche Brücke (25) in der Umfangsrichtung an einer ersten kanalartigen Vertiefung (7) ausgerichtet ist.
9. Der Verschluss (1) nach Anspruch 1, **wobei** ein Originalitätsband durch zerbrechliche Brücken (25) mit der Verschlusschülle verbunden ist.
10. Der Verschluss (1) nach Anspruch 9, **wobei** die zerbrechlichen Brücken (25) durch ein Rillverfahren gefertigt wurden.
11. Der Verschluss (1) nach einem der vorhergehenden

Ansprüche, **wobei** mindestens ein Überstand eines Originalitätsbands (4) in der Umfangsrichtung an einem Gewindegsegment (6.1) ausgerichtet ist.

12. Der Verschluss (1) nach einem der vorhergehenden Ansprüche, **wobei** ein Dichtungselement (11) an der Innenseite des Verschlusses (1) angeordnet ist und wobei das Dichtungselement (11) im Hinblick auf seinen Querschnitt einen Außenschenkel (16) umfasst, der sich allgemein senkrecht von der Oberplatte (2) des Verschlusses (1) erstreckt und so angeordnet ist, dass der Außenschenkel (16) in einer angewandten Position des Verschlusses (1) auf einem Halsendstück (12) mit einer äußeren Oberfläche (13) des Halsendstücks (12) interagiert und einen ersten Dichtungsbereich bildet. 5 10
13. Der Verschluss (1) nach Anspruch 12, **wobei** das Dichtungselement (11) eine Ausbuchtung (21) umfasst, die an einem innenliegenden Schaft des Außenschenkels (16) angeordnet ist, die dafür vorgesehen ist, mit einer Randoberfläche (14) und/oder einer ringförmigen Stirnfläche (15) des Halsendstücks (12) zu interagieren, um einen zweiten Dichtungsbereich zu bilden, wobei die Dichtungsausbuchtung (21) funktional durch eine Einkerbung (22) vom Außenschenkel (16) getrennt ist. 15 20 25
14. Der Verschluss (1) nach Anspruch 12, **wobei** zwischen dem Außenschenkel (16) und der Oberplatte (2) ein Übergangsbereich (31) angeordnet ist, der als zweiter Dichtungsbereich (32) fungiert, wobei der Übergangsbereich (31) so konstruiert ist, dass es eine funktionale Interaktion zwischen dem Außenschenkel (16) und dem zweiten Dichtungsbereich (32) bietet. 30 35
15. Der Verschluss (1) nach Anspruch 14, **wobei** der Übergangsbereich (31) eine konkave Form im Hinblick auf seinen Querschnitt aufweist. 40

Revendications

1. Fermeture (1) pourvue de 45
 - a. un plateau supérieur (2) et
 - b. en outre, un bord adjacent extérieur (3),
 - c. ledit bord extérieur (3) comprenant à l'intérieur un filetage segmenté (6) par des segments de filetage (6.1) où
 - d. entre deux segments de filetage (6.1) adjacents en direction circonferentielle, un premier creux (7) de type canal est aménagé à l'intérieur du bord (3) extérieur s'étendant le long d'une direction axiale du bord (3), et où
 - e. à l'extérieur du bord, des deuxièmes creux (9) de type canal sont aménagés et s'étendent

le long de la direction axiale du bord, par lequel lesdits deuxièmes creux sont aménagés radialement à l'extérieur de et alignés avec au moins deux segments de filetage adjacents l'un à l'autre le long d'une direction axiale de la fermeture, **caractérisé en ce que** f. le nombre des premiers creux (7) à l'intérieur et des rangées de deuxièmes creux (9) à l'extérieur sont équivalents les uns par rapport aux autres.

2. Fermeture selon la revendication 1, dans laquelle les deuxièmes creux sont arrangés symétriquement par rapport aux segments de filetage adjacents.
3. Fermeture (1) selon l'une quelconque de revendications précédentes, **dans laquelle** les deuxièmes creux (9) de type canal et les segments de filetage (6.1) adjacents sont disposés symétriquement les uns par rapport aux autres.
4. Fermeture (1) selon l'une quelconque des revendications précédentes, **dans laquelle** un troisième creux (10) est aménagé entre deux deuxièmes creux (9) de type canal.
5. Fermeture (1) selon l'une quelconque des revendications précédentes, **dans laquelle** 10-15 rangées de segments de filetage (6.1) et des premiers creux de type canal (7) sont disposés en direction circonferentielle à l'intérieur du bord extérieur (3).
6. Fermeture (1) selon la revendication 5, **dans laquelle** un deuxième creux de type canal (9) est aménagé à l'extérieur de chaque rangée de segments de filetage (6.1).
7. Fermeture (1) selon la revendication 5, **dans laquelle** les deuxièmes creux de type canal (9) sont disposés co-axialement par rapport aux rangées de segments de filetage (6.1).
8. Fermeture (1) selon l'une quelconque des revendications précédentes, **dans laquelle** au moins un pont (25) cassable se trouve en direction circonferentielle aligné avec un premier creux de type canal (7).
9. Fermeture selon la revendication 1, **dans laquelle** une bande d'invulnérabilité est interconnectée à l'enveloppe de fermeture par des ponts cassables (25)
10. Fermeture selon la revendication 9, **dans laquelle** les ponts cassables (25) sont fabriqués par un processus de rainurage.
11. Fermeture (1) selon l'une quelconque des revendi-

cations précédentes, **dans laquelle** au moins une saillie de la bande d'inviolabilité (4) se trouve en direction circonférentielle alignée avec un premier creux de type canal (6.1).

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12. Fermeture (1) selon l'une quelconque des revendications précédentes, **dans laquelle** un moyen d'étanchement (11) est disposé à l'intérieur de la fermeture (1), le moyen d'étanchement (11) comprenant, par rapport à sa section, une branche extérieure (16) s'étendant généralement perpendiculairement depuis le plateau supérieur (2) de la fermeture (1) et étant disposé de façon à ce que la branche extérieure (16), en position de la fermeture (1) appliquée à un finissage de col (12), interagisse avec une surface extérieure (13) du finissage de col (12) pour former une première zone d'étanchement.
13. Fermeture (1) selon la revendication 12, **dans laquelle** le moyen d'étanchement (11) comprend une bosse (21) disposée à une racine intérieure de la branche extérieure (16), prévue pour interagir avec une surface de bord (14) et/ou une surface d'extrémité annulaire (15) du finissage de col (12) formant une deuxième zone d'étanchement, par lequel la bosse d'étanchement (21) est fonctionnellement séparée de la branche extérieure (16) par une entaille (22).
14. Fermeture (1) selon la revendication 12, **dans laquelle** une partie de transition (31) est disposé entre la branche extérieure (16) et le plateau supérieur (2), qui agit comme deuxième zone d'étanchement (32), la partie de transition (31) étant conçu de façon à assurer une interaction fonctionnelle entre la branche extérieure (16) et la deuxième zone d'étanchement (32).
15. Fermeture (1) selon la revendication 14, **dans laquelle** la partie de transition (31) a une forme concave par rapport à sa section.

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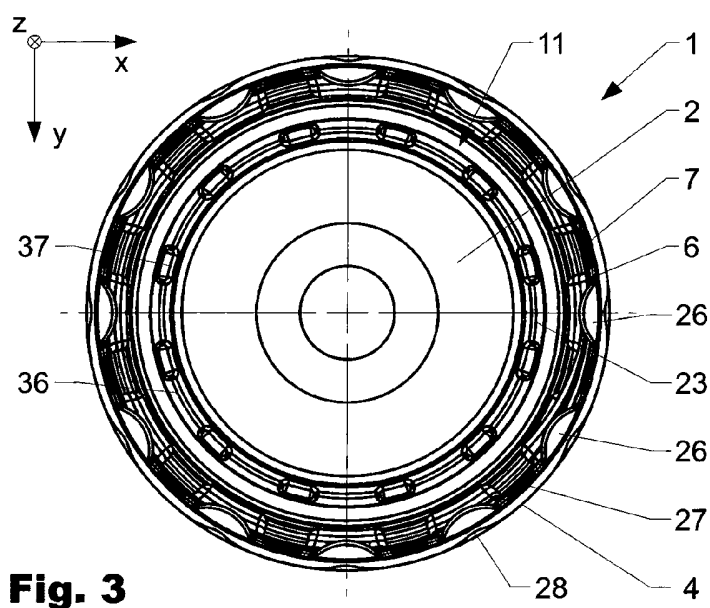
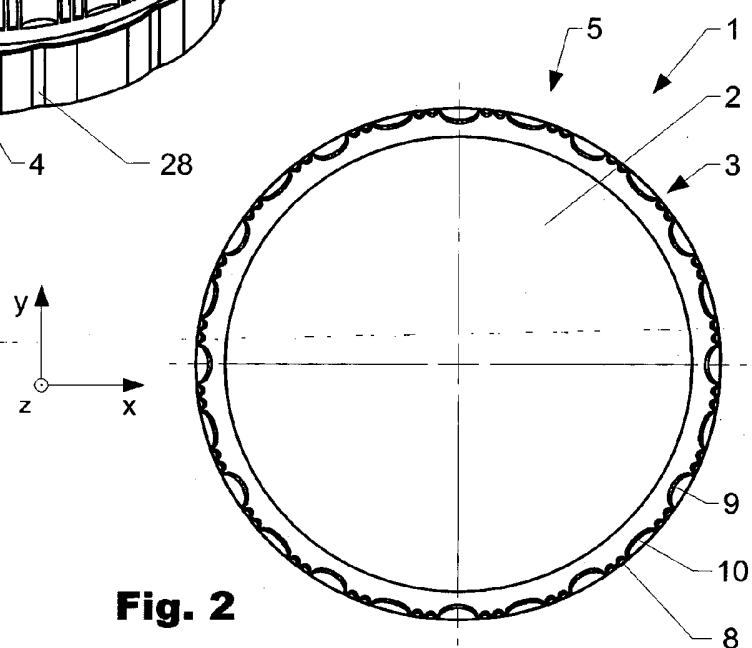
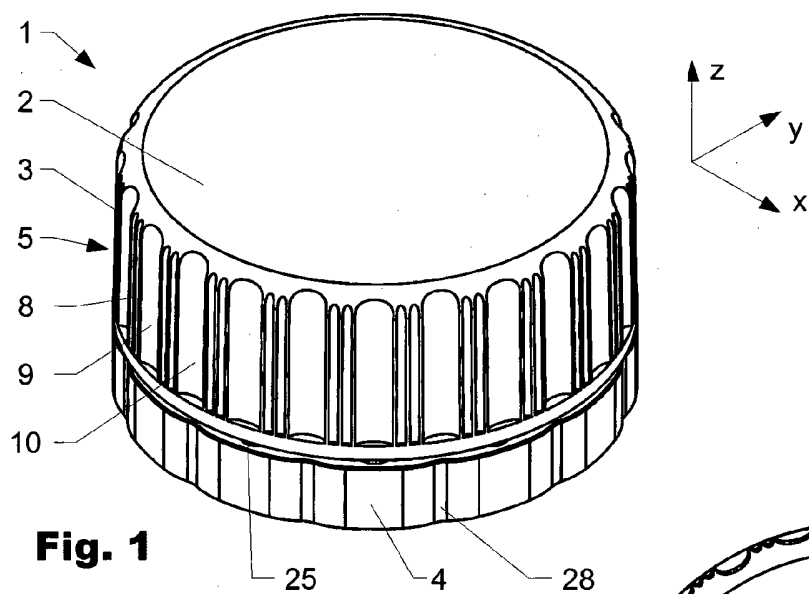
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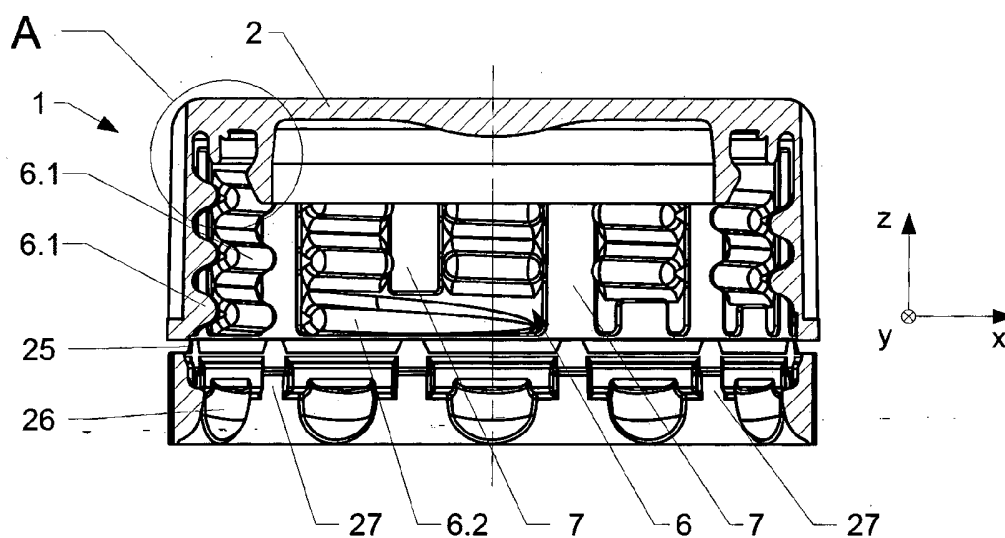
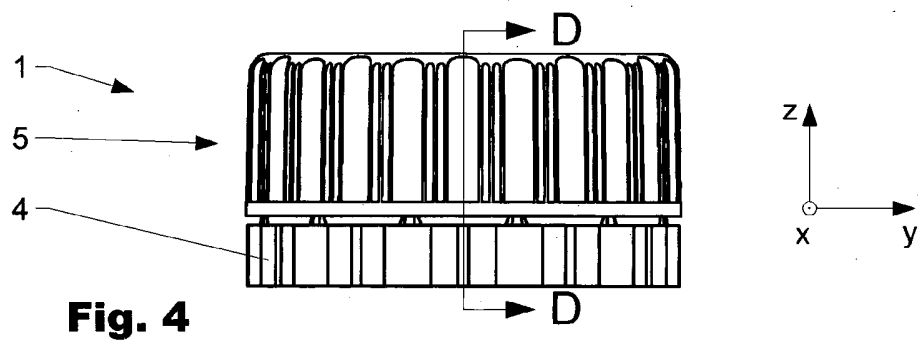


Fig. 5

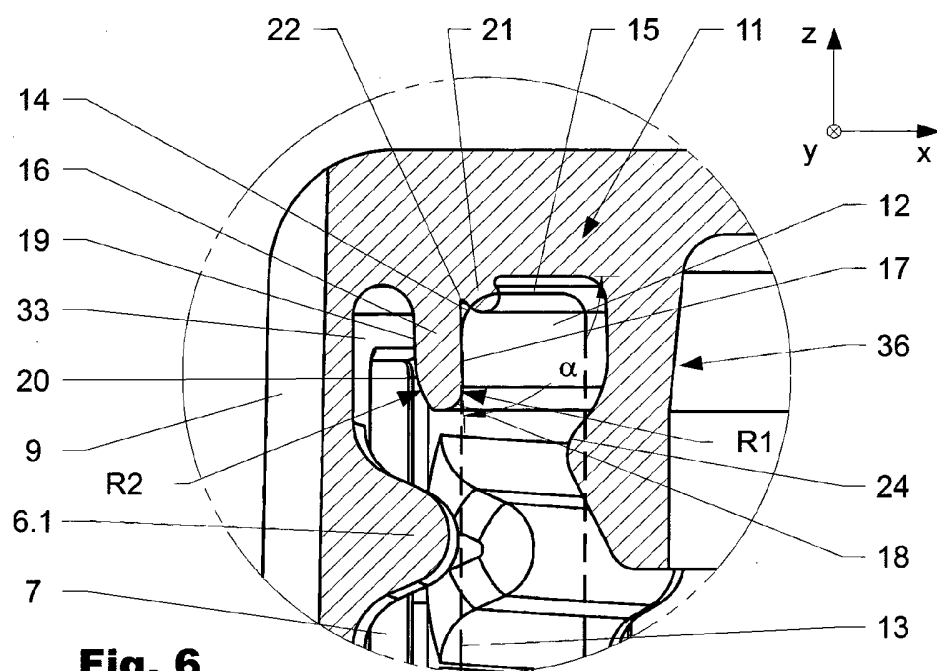
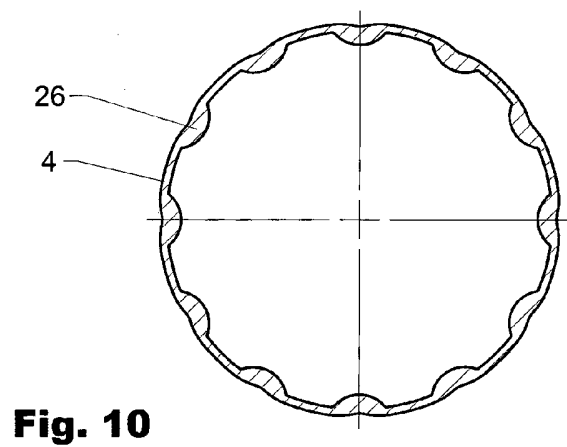
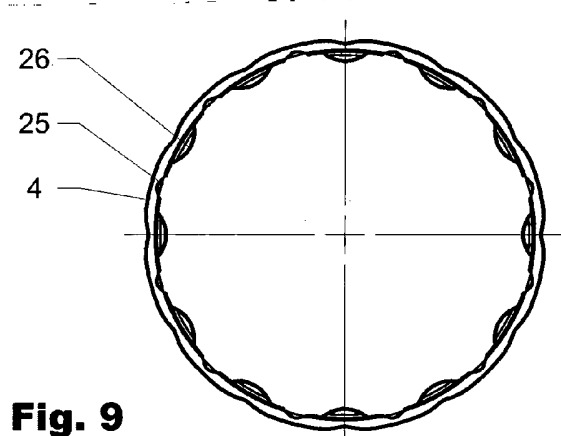
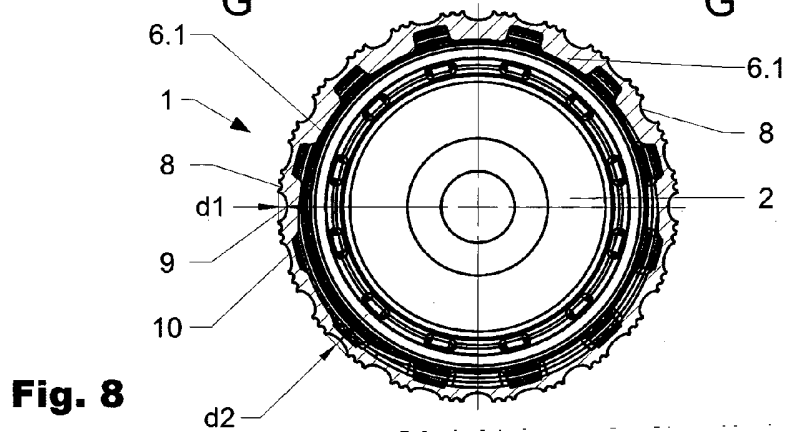
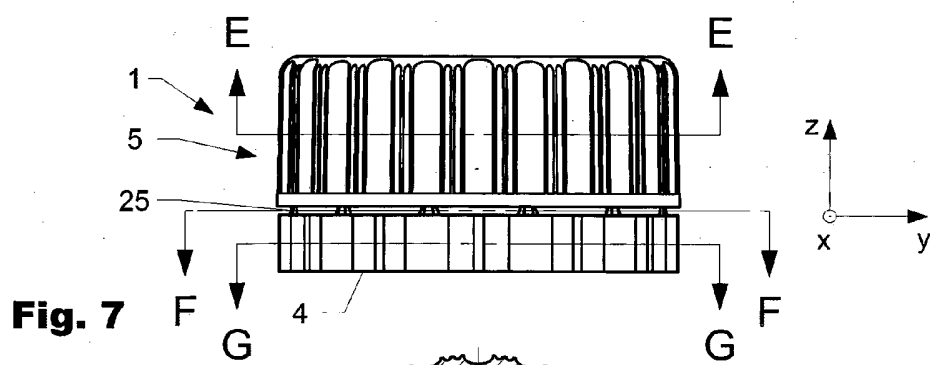


Fig. 6



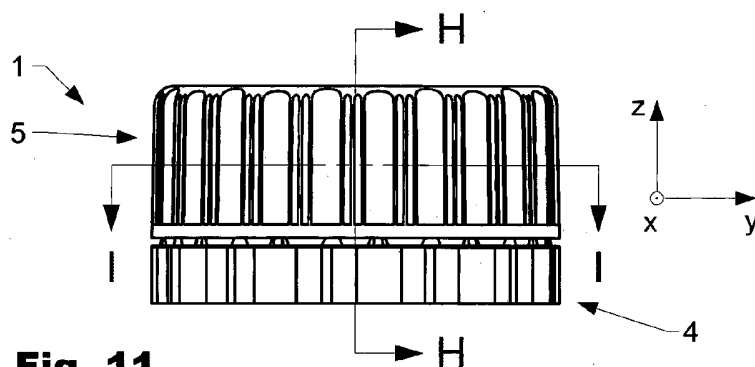


Fig. 11

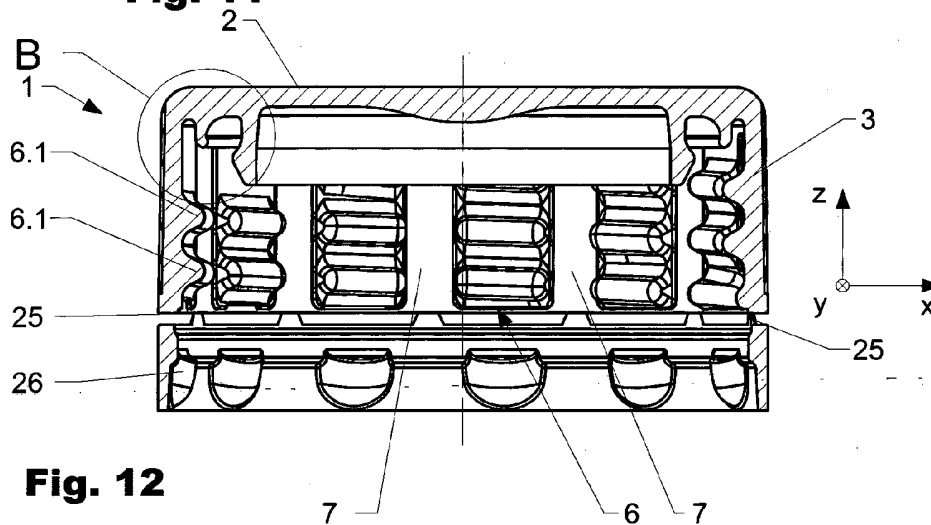


Fig. 12

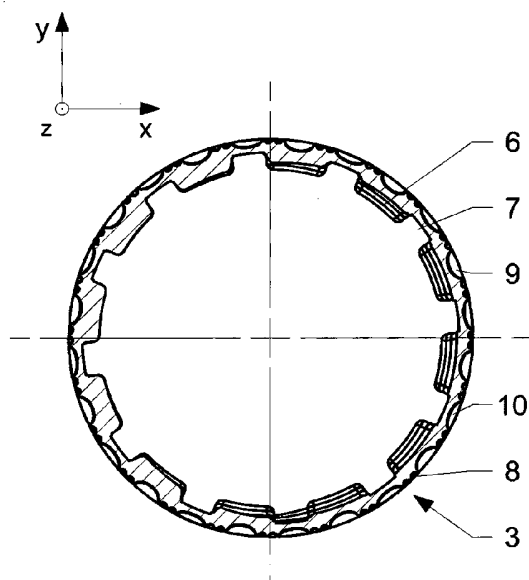


Fig. 13

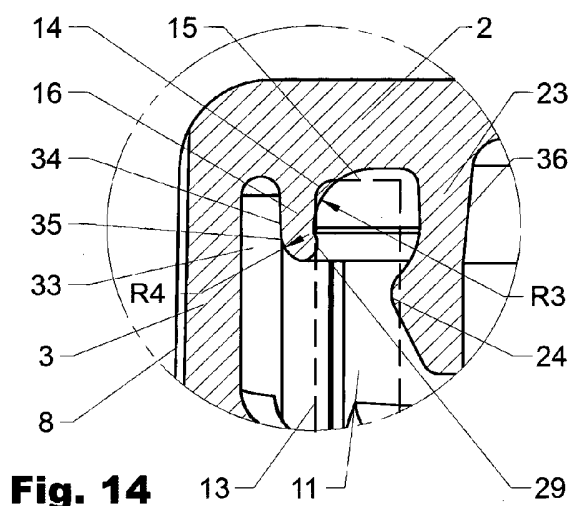


Fig. 14

REFERENCES CITED IN THE DESCRIPTION

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ZÁRÓELEM

SZABADALMI IGÉNYPONTOK

1. Záróelem (1), amely tartalmaz
 - a. egy felső tányért (2) és
 - b. egy azzal szomszédos külső szoknyát (3),
 - c. az említett külső szoknya (3) tartalmaz a belső oldalán egy szegmentált menetet (6), amely menetszakaszokat (6.1) tartalmaz,
 - d. ahol két kerületi irányban szomszédos menetszakasz (6.1) között egy első csatornaszerű mélyedés (7) van kialakítva a külső szoknya (3) belső oldalán, amely mélyedés a szoknya (3) tengelyirányában halad, és
 - e. ahol a szoknya külső oldalán második csatornaszerű mélyedések (9) vannak kialakítva, melyek a szoknya tengelyirányában haladnak, ahol a második mélyedések a záróelem tengelyirányában egymás mellett lévő legalább két menetszakasz külsejéhez képest sugárirányba és az említett menetszakaszokhoz illeszkedő módon vannak elrendezve, **azzal jellemezve, hogy**
 - f. a belül lévő első mélyedések (7) száma és a kívül lévő második mélyedések (9) sorainak száma egymással megegyező.
2. Az 1. igénypont szerinti záróelem, ahol a második mélyedések a szomszédos menetszakaszokhoz képest szimmetrikusan vannak elrendezve.
3. Az előző igénypontok bármelyike szerinti záróelem (1), ahol a második csatornaszerű mélyedések (9) és a szomszédos menetszakaszok (6.1) egymáshoz képest szimmetrikusan vannak elrendezve.
4. Az előző igénypontok bármelyike szerinti záróelem (1), ahol a két második csatornaszerű mélyedés (9) között egy harmadik mélyedés (10) van elrendezve.
5. Az előző igénypontok bármelyike szerinti záróelem (1), ahol a külső szoknya (3) belső oldalán kerületi irányban a menetszakaszok (6.1) és az első csatornaszerű mélyedések (7) 10-15 sorban vannak elrendezve.
6. Az 5. igénypont szerinti záróelem (1), ahol a menetszakaszok (6.1) mindegyik sorának külső oldalán egy második csatornaszerű mélyedés (9) van elrendezve.
7. A 6. igénypont szerinti záróelem (1), ahol a második csatornaszerű mélyedések (9) a menetszakaszok

(6.1) soraival egytengelyűen vannak elrendezve.

8. Az előző igénypontok bármelyike szerinti záróelem (1), ahol legalább egy törékeny híd (25) van kerületi irányban az első csatornaszerű mélyedéshez (7) illesztve.
9. Az 1. igénypont szerinti záróelem, ahol egy sértetlenséget jelző szalag van a záróelem palástjához csatlakoztatva törékeny hidakkal (25).
10. A 9. igénypont szerinti záróelem, ahol a törékeny hidak (25) rovátkolással vannak kialakítva.
11. Az előző igénypontok bármelyike szerinti záróelem (1), ahol egy sértetlenséget jelző szalag (4) legalább egy kiemelkedése a kerület menti irányban illeszkedik egy menetszakaszhoz (6.1).
12. Az előző igénypontok bármelyike szerinti záróelem (1), ahol a záróelem (1) belső oldalán egy tömítőeszköz (11) van elrendezve, és ahol a tömítőeszköz (11) a keresztmetszeti nézetében egy olyan külső lábbal (16) rendelkezik, amely általában merőlegesen áll ki a záróelem (1) felső tányérjából (2), és amely úgy van elrendezve, hogy a külső láb (16) egy nyak végére helyezett záróelem (1) használati helyzetében kölcsönhatásba lép a nyak végrészének (12) külső felületével (13), és ezáltal egy első tömítési területet képeznek.
13. A 12. igénypont szerinti záróelem (1), ahol a tömítőeszköz (11) tartalmaz egy, a külső láb (16) belső tövénél elrendezett ütközőt (21), amely várhatóan kölcsönhatásba lép a nyak végrészének (12) peremfelületével (14) és/vagy gyűrű alakú végfelületével (15) és ezáltal egy második tömítési területet képeznek, ahol az ütköző tömítés (25) funkcionálisan el van választva a külső lábtól (16) egy bemetszés (22) révén.
14. A 12. igénypont szerinti záróelem (1), ahol a külső láb (16) és a felső tányér (2) között egy betét (2) van elrendezve, amely egy második tömítő területként (32) szolgál, ahol a betét (31) úgy van kialakítva, hogy funkcionális kölcsönhatást létesít a külső láb (16) és a második tömítési terület (32) között.
15. A 14. igénypont szerinti záróelem (1), ahol a betét keresztmetszete konkáv alakú.