



- (51) International Patent Classification:
B65D 43/02 (2006.01)
- (21) International Application Number:
PCT/NL2016/050847
- (22) International Filing Date:
6 December 2016 (06.12.2016)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2015979 17 December 2015 (17.12.2015) NL
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

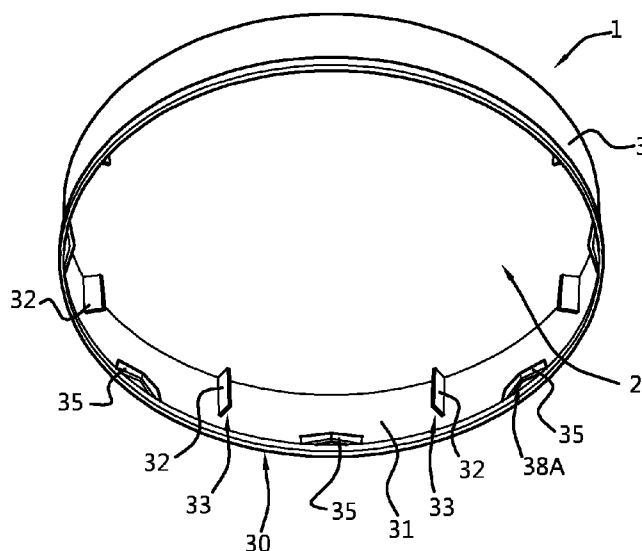
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: PACKAGING LID

Fig. 1



(57) Abstract: A packaging lid (1) for mounting over an opening of a packaging container. The lid (1) comprises a top side (2) that in a mounted state extends over an opening of the container and a skirt (3) extending from the top side (2). The skirt (3) has on an inner side (31) thereof resilient members (35) adapted to cooperate with an outwardly projecting ridge on an outer side of the circumferential wall of the container so as to secure the lid (1) to the container. The resilient members are formed as resilient elongate strips (35) having two ends (36) attached to the inner side (31) of the skirt (3) and formed as an arch which, in an unloaded state, has a rise with respect to the inner side (31) of the skirt (3).



Title: Packaging lid

5 The present invention relates to a packaging lid for mounting over an (access) opening of a packaging container, said container being adapted in particular for packaging a powdered or granular food product and comprising a bottom and a circumferential wall which has an upper rim remote from the bottom, said upper rim defining the opening of the container. The lid comprises a top side that in a mounted state extends over the opening of the container
10 and a skirt extending from the top side towards a lower end, wherein the skirt has on an inner side thereof resilient members adapted to cooperate with an outwardly projecting ridge on an outer side of the circumferential wall of the container so as to secure the lid to the container.

15 Containers combined with lids for packaging powdered or granular food products are well known in the art. Typical powdered food product for which these kind of packagings are used are infant formula or dietary supplements. Often these kinds of packagings are provided with a scoop by which a metered dose of powdered product can be taken from the container. The containers may have a cylindrical shape or may have a box-like shape with a
20 substantially rectangular cross-section.

US 2015/0129597 discloses an example of such a packaging. This known packaging includes a lid comprising an annular base which is attached to an upper end of the packaging container. A covering lid is hingedly attached to the base and is movable
25 between a closed position in which the packaging is sealed and an open position in which the user has access to the content of the container. A latching assembly is present between the base and the covering lid to maintain the covering lid in a closed position when no powdered food product has to be taken from the container. The annular base has a series of flexible lips distributed over its inner circumference. The flexible lips each have a hook
30 member at a lower end thereof to hook behind an edge of a series of indentations formed on circumference of the container. During mounting of the lid on the container, the hook members slide over the surface of the upper portion of the container. Thereby the flexible lips are flexed outwards. When the hook members reach the indentations, the hook members snap into the indentations due to the resilience of the lips. This known packaging
35 requires an accurate match between the dimensions of the lid and of the container. In general, the lid can be mounted only on a container with accurately matching peripheral

dimensions. In practise, different tolerances in manufacturing the lid and the container may lead to problems in the compatibility between the lid and the container.

5 The present invention has for an object to provide a lid in which the lid may be mounted on containers having different peripheral dimensions within a predefined range (thereby mitigating the problem induced by manufacturing tolerances).

10 This object is achieved by a packaging lid according to the preamble of claim 1, wherein the resilient members are formed as resilient elongate strips having two ends attached to the inner side of the skirt and formed as an arch which, in an unloaded state, has a rise with respect to the inner side of the skirt.

15 The packaging lid according to the invention is mounted on the packaging container by placing the skirt with the lower end around the upper end of the container and then pushing it downwards. The arch formed strips are flattened when they contact the outwardly projecting ridge of the container and move beyond it. When the arch formed strips are beyond the outwardly projecting ridge they snap under said ridge so as to block removal of the lid from the container. The arch formed strips extend radially inward as far as the outer side of the circumferential wall of the container allows. Thus depending on the outer
20 dimension of the container, the arch will return to its original shape or to a partially flattened shape. This provides a flexibility in the construction which allows compensation for dimensional variations in container and lid due to manufacturing tolerances.

25 The packaging lid according to the invention is preferably made of plastics material by injection molding. Suitable plastics material could be a PP or PE resin. It is also possible to make the lid of a combination of materials, like for example a combination of PP and TPE.

30 The arch formed strips are preferably arranged in a circumferentially distributed fashion over the inner surface of the skirt.

In a preferred embodiment of the packaging lid the strips extend in a substantial tangential direction of the inner wall of the skirt.

35 In a further embodiment the strips have a lead-in edge to facilitate compression of the arch of the strip while moving the strip past said outwardly projecting ridge during mounting of the lid on the container. The lead-in edge guides the strip onto the projecting ridge and induces

compression of the arch of the strip. Thereby the movement of the strip on and beyond the ridge is made easier. Thus the capping of the container is made easier.

In a possible embodiment said lead-in edge has a slanting surface. This facilitates the guiding effect of the edge onto the ridge.

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In a further embodiment the lead-in edge may have a curved or pointed shape, wherein, seen in a radial direction of the lid, the lead-in edge at the ends of the strip is located closer to the lower end of the skirt than at the centre of the strip. This shape has the effect that the strip is gradually compressed towards the centre of the strip by the outwardly projecting
10 ridge of the container. This gradual compression reduces resistance caused by the strips during the mounting of the lid on the container.

In a further embodiment the strips have a retaining edge opposite the lead in edge to engage an underside of said outwardly projecting ridge to retain the lid on the container.

15 When the lid is mounted on the container, the strips formed as arches are first compressed when they move along the projecting ridge of the container. When the strips have moved beyond said projecting ridge they expand again and the retaining edge of the strip hooks behind the projecting ridge. The retaining edge forms an abutment for said ridge which prevents that the lid can be withdrawn from the container.

20

Preferably the retaining edge is straight between the ends of the strip, which provides a tight fix of the lid on the container.

The retaining edge is preferably perpendicular to a front side of the strip. Also an acute
25 angle between the retaining edge and a front side of the strip may be possible. In this way it is nearly impossible to remove the lid from the container without the use of undue force.

In a possible advantageous embodiment the strips are adapted to rupture if the lid is removed from the container. In this way the strips constitute a tamper-evident feature that
30 indicates that the lid has been removed from the container.

In a preferred embodiment of the packaging lid according to the invention, the arch is formed as a pointed segmental arch which comprises two segments which extend from the respective strip ends towards a join where the two segments join under an obtuse angle with
35 respect to each other. In one possible specific embodiment the segments are substantially linear. In another possible specific embodiment the segments are substantially curved. In an alternative embodiment the arch has a continuous curve shape.

In another possible alternative embodiment the arch has substantially a "W" shape.

In a practical embodiment of the lid according to the invention the lid is of the type having a hingable cover. The lid comprises an annular base including said skirt attachable to the container and defining an access opening, and the lid furthermore comprises a cover that is
5 hingedly connected to the annular base and which is moveable between an open position in which the access opening is free and a closed position in which the access opening is covered. This embodiment is in practise a convenient lid to use with containers containing infant formula or other powdered food product. The lid can be readily opened everytime the product has to be taken from the container, for example with a scoop, and then be readily
10 reclosed. The lid according to this practical embodiment can be formed in one piece, such that the annular base and the cover are formed with an integral living hinge which connects them. Another option is that the lid is an assembled piece in which the base and the cover are formed separately and are assembled and connected by a hinge structure.

15 In another conceivable embodiment of a lid according to the invention the skirt comprises a lower skirt portion and an upper skirt portion. The upper skirt portion is integrally connected to the top side of the lid. The lower skirt portion contains the arch formed strips. The lower skirt portion and upper skirt portion are connected by one or more frangible connections. The frangible connection may for example be constituted by frangible connection members
20 or for example by a continuous weakening line (tearing line) provided in the skirt. The lid of this type can be mounted as is described in the above. To open the lid for the first time, the lower skirt portion and the upper skirt portion must be separated by rupturing the frangible connection. The lid with the upper skirt portion can be replaced after first time opening and will be retained by some snap or clamp connection between the upper skirt portion and the
25 container or the lower skirt portion.

The invention also relates to a method to manufacture a lid as described in the above.

In particular the invention also relates to a method for manufacturing a packaging lid,
30 wherein the lid comprises a top side and a skirt extending from the the top side, and wherein the skirt has on an inner side thereof resilient elongate strips having two ends attached to the inner side of the skirt and formed as an arch which, in an unloaded state, has a rise with respect to the inner side of the skirt. In the method an injection mold is provided defining a cavity to mold the packaging lid, said injection mold comprising two mold halves, movable
35 core parts to define at least a part of the inner surface of the skirt and the upper edge of the strips, core parts to define the back side of the strips, and a movable ejector. A melt of plastic resin is injected in the mold cavity defined by the mold halves and the core parts.

After the melt has been injected and sufficiently cured the movable core parts are moved inwards so as to release the strips, and the ejector pushes the formed lid away from the mold half and beyond the movable core parts so as to release the formed packaging lid from the mold.

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The invention will be elucidated in the following description with reference to the drawing, in which:

Fig. 1 shows a view in perspective of a packaging lid according to the invention;

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Fig. 2 shows a detail of the lid of Fig. 1 seen from below, with a resilient member in an expanded state;

Fig. 3 shows the same detail as Fig. 2, but with the resilient member in a compressed state;

15

Fig. 4 shows a part of a cross section perpendicular to the central axis of the container of the lid of Fig. 1 mounted on a container with a certain diameter;

Fig. 5 shows the same detail as Fig. 4, but with the lid mounted on a container with a smaller diameter;

20

Fig. 6 shows a cross section according to the line II-II indicated in Fig. 5 of a detail of the lid of Fig. 1 mounted on a packaging container;

Fig. 7 shows in perspective another embodiment of a packaging lid according to the invention;

Fig. 8 shows in a cross section a part of a mold in which the lid of Fig. 1 is formed;

Fig. 9 shows in a cross section the opened mold of Fig. 8 during a first ejection step;

30

Fig. 10 shows in a cross section the opened mold of Fig. 8 during a second ejection step;

Fig. 11 shows a part of a lid from below with a resilient member having another shape as is shown in Figs 1 - 6; and

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Fig. 12 shows a part of a lid from below with a resilient member having yet another shape.

In Fig. 1 is shown a packaging lid 1 for mounting on a container for for example baby formula, or another powdered or granular food product. The lid comprises a top side 2 and a skirt 3 that extends from the top side 2 toward a lower end 30 of the skirt. In the shown embodiment the top side is a closed plate.

5

In another embodiment of a lid according to the invention, which by way of example is shown in Fig. 7, the lid comprises an annular base 4 including a skirt 3 attachable to the container and defining an access opening. In this embodiment the lid furthermore comprises a cover 5 that is hingedly connected to the annular base 4 by a hinge 6 and which is
10 moveable between an open position in which the access opening is free and a closed position (shown in Fig. 7) in which the access opening is covered.

Either of the lid types is an injection molded product made of a plastic resin, such as a PP or a PE resin. The entire lid, including the resilient strips, is then formed of the same material.

15

It is also possible that the lid is made by a 2K injection molding process. An example could be a lid formed of the components polypropylene (PP) and a thermoplastic elastomere (TPE).

A 2K injection molding process could also allow to make the strips from a different material
20 as the skirt.

For a further explanation of the invention reference is made to Fig. 1, but it is to be understood that the features are also applied in a lid of the type as is shown in Fig. 7.

25 The skirt 3 has an inner side 31. Distributed over the circumference there are formed ribs 32 on the inner side 31 of the skirt 3. The ribs 32 extend in an axial direction. The ribs 32 have a lower end 33 that abuts an upper rim of the container when the lid 1 is mounted on the container. The ribs 32 have an upper end that may adjoin the top side 2 as is shown in Fig. 1, but in another embodiment the upper end of the rib 32 may also be spaced apart from
30 the top side 2. The ribs 32 have a reinforcing effect, and make the lid 1 stiffer.

It is noted here that the ribs 32 are practical but not essential. Also a narrowing in the skirt or a circumferential rim on the inner side of the skirt can provide an abutment for the upper rim of the container and provide a reinforcing effect.

35

On the inner side 31 of the skirt 3, near a lower end thereof, are formed resilient strips 35 which are formed as an arch. The resilient strips 35 are distributed over the circumference of the skirt 3.

- 5 Each strip 35 has two ends 36 attached to the inner side 31 of the skirt 3. The strips 35 extend substantially in the tangential direction of the skirt 3 as can be seen in Fig. 1. In an unloaded state, which is shown in Fig. 1 and in more detail in Fig. 2, the arch has a rise h with respect to the inner side 31 of the skirt 3.
- 10 The arch is in the specific embodiment shown in the figures 1 - 6 a pointed segmental arch which comprises two substantially linear segments 37 which extend from the respective strip ends 36 towards a join 38 in the centre, where the two segments 37 join under an obtuse angle with respect to each other as is best seen in Fig. 2.
- 15 It is noted that the arch shape can also be differently shaped as is shown in Figs. 1 - 6. In Fig. 11 is shown an example wherein a resilient strip 35' is formed that has a continuously curved arch shape. In Fig. 12 is shown another example wherein a resilient strip 35'' is formed that generally has a "W" shape. The given examples should not be interpreted as limiting for the invention; also other arch shapes are conceivable within the scope of the
- 20 invention.

Fig. 6 shows a detail of the lid 1 mounted on a container 40. The container 40 has at its upper end an outwardly projecting ridge 42. Each of the strips 35 has a lower edge 35A which is slanting. This is best seen in the cross sectional view of Fig. 6. The slanting edge

25 35A works as lead in edge that facilitates compression of the arch of the strip 35 while moving the strip 35 past the outwardly projecting ridge 42 during mounting of the lid 1 on the container. A compressed strip 35 is shown from above in Fig. 3.

Opposite the lead-in edge each of the strips 35 has a straight upper edge 35B. This straight

30 upper edge 35B functions as a retaining edge which engages an underside of said outwardly projecting ridge 42 to retain the lid 1 on the container 40. This is best seen in the cross sectional view of Fig. 6.

The arched strips 35 provide a flexibility in the construction which allows compensation for

35 variations in the outer diameter of the container wall 41 and/or variations in the inner diameter of the lid due to manufacturing tolerances. The packaging lid 1 is mounted on the packaging container by placing the skirt 3 around the upper end of the container 40 and

then pushing it downwards. The arch formed strips 35 are flattened when they contact the outwardly projecting ridge 42 of the container 40 and move beyond it. When the arch formed strips 35 are beyond the outwardly projecting ridge 42 they snap under said ridge 42 so as to block removal of the lid 1 from the container 40. The arch formed strips 35 extend radially inward as far as the outer side of the circumferential wall 41 of the container 40 allows. Depending on the outer dimension of the container 40, the arch will return to its original shape as is shown in Fig. 5 or to a partially flattened shape as is shown in Fig. 4. Hence, the problem of varying dimensions, for example due to manufacturing tolerances of the different parts, is resolved.

10

In the examples given in the figures the container and the lid have a circular cross section. It is noted however that also other cross sectional shapes of the container and the corresponding lid are conceivable. One can think of for example an essentially rectangular cross section with rounded corners, which is a quite common shape for packagings for infant formula.

15

In Figs 8 – 10 a possible working of a mold for the production of a lid of Fig. 1 is shown. Only a part of the cross section of the mold and the lid 1 is shown.

20 In Fig. 8 the mold 50 is shown in a closed state just after the lid 1 is formed out of a suitable plastic resin, such as a polypropylene (PP) resin. The mold 50 has mold halves 51 and 52. Furthermore the mold has core parts 53 and 56, movable core parts 54 each operable by a pin 55. The mold also includes an ejector comprising a movable ejector ring 58 operable by one or more pins 57.

25

In the embodiment shown the core 53 and the movable core 54 have a slanting interface 59. When the core 54 is moved it slides along the slanting interface 59. When the movable core 54 is moved away from the mold half 52, it simultaneously moves radially inwards and vice versa.

30

The mold half 52 defines the front side and the slanting edge 35A of the strips 35. The core part 56 forms the back side of the strips 35 as can be clearly seen in Fig. 8. Furthermore the straight retaining edge 35B of the strips 35 is defined by the movable core 54.

35 Fig. 9 shows a first ejection step in which the mold half 51 is moved apart from the mold half 52. The movable core part 54 and the ejector ring 58 are moved away from the mold half 52 whereby the lid 1 is ejected from the mold half 52. The movable core part 54 also moves

radially inward whereby the strips 35 formed on the inner side of the skirt 3 can pass beyond the core part.

Fig. 10 shows that the movable core part 54 has stopped and that the ejector ring 58 is
5 moved on in a second ejection step so as to raise the upper side 2 of the lid 1 of the movable core part 54 and to move the resilient strips 35 beyond the movable core 54. In this way the skirt 3 of the lid 1 is ejected entirely from the mold half 52 and the core parts 56.

CLAIMS

1. Packaging lid (1) for mounting over an (access) opening of a packaging container (40), said container being adapted in particular for packaging a powdered or granular food product and comprising a bottom and a circumferential wall which has an upper rim remote from the bottom, said upper rim defining the opening of the container,

wherein the lid (1) comprises a top side (2) that in a mounted state extends over the opening of the container (40) and a skirt (3) extending from the top side (2) towards a lower end (30), wherein the skirt (3) has on an inner side (31) thereof resilient members (35) adapted to cooperate with an outwardly projecting ridge (42) on an outer side of the circumferential wall of the container (40) so as to secure the lid (1) to the container (40),

characterized in that the resilient members are formed as resilient elongate strips (35) having two ends (36) attached to the inner side (31) of the skirt (3) and formed as an arch which, in an unloaded state, has a rise with respect to the inner side (31) of the skirt (3).

2. Packaging lid according to claim 1, wherein the strips (35) extend in a substantial tangential direction of the inner side (31) of the skirt (3).

3. Packaging lid according to claim 1 or 2, wherein the strips (35) have a lead-in edge (35A) to facilitate compression of the arch of the strip (35) while moving the strip (35) past said outwardly projecting ridge (42) during mounting of the lid (1) on the container (40).

4. Packaging lid according to claim 3, wherein the lead-in edge (35A) has a slanting surface.

5. Packaging lid according to claim 3 or 4, wherein the lead-in edge (35A) has a curved or pointed shape, wherein, seen in a radial direction of the lid (1), the lead-in edge (35A) at the ends (36) of the strip (35) is located closer to the lower end (30) of the skirt (3) than at a centre (38A) of the strip (35).

6. Packaging lid according to any of the preceding claims, wherein the strips (35) have a retaining edge (35B) opposite the lead-in edge (35A) to engage an underside of said outwardly projecting ridge (42) to retain the lid (1) on the container (40).

7. Packaging lid according to claim 6, wherein the retaining edge (35B) is straight between the ends (36) of the strip (35).

8. Packaging lid according to any of the preceding claims, wherein the arch is formed as a pointed segmental arch which comprises two segments (37) which extend from the respective strip ends (36) towards a join (38) where the two segments (37) join under an obtuse angle with respect to each other.

5

9. Packaging lid according to claim 8, wherein said segments (37) are substantially linear.

10. Packaging lid according to claim 8, wherein said segments are substantially curved.

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11. Packaging lid according to any of the claims 1 - 7, wherein the arch has a continuous curve shape.

12. Packaging lid according to any of the preceding claims, wherein the lid (1) comprises an annular base (4) including said skirt (3) attachable to the container and defining an access opening, and wherein the lid furthermore comprises a cover (5) that is hingedly connected to the annular base (4) and which is moveable between an open position in which the access opening is free and a closed position in which the access opening is covered.

15

13. Packaging lid according to any of the claims 1 - 11, wherein the skirt comprises an upper skirt portion and a lower skirt portion, the upper skirt portion being integrally connected to the top side of the lid and the lower skirt portion containing the arch formed strips, wherein the lower skirt portion and upper skirt portion are connected by one or more frangible connections.

25

14. Packaging lid according to any of the preceding claims, wherein the lid (1) is made of plastics material.

15. Packaging lid according to any of the preceding claims, wherein the lid (1) is

30 injection molded.

16. Packaging lid according to claim 15, wherein the lid (1) is formed by 2K injection molding, wherein the strips (35) are formed of a different material than the skirt (3).

17. Method for manufacturing a packaging lid, wherein the lid (1) comprises a top side (2) and a skirt (3) extending from the the top side (2), and wherein the skirt (3) has on an inner side (31) thereof resilient elongate strips (35) having two ends (36) attached to the inner

35

side (31) of the skirt (3) and formed as an arch which, in an unloaded state, has a rise with respect to the inner side (31) of the skirt (3),

in which method an injection mold (50) is provided defining a cavity to mold the packaging lid (1), said injection mold comprising two mold halves (51, 52), movable core parts (54) to define at least a part of the inner surface of the skirt (3) and the upper edge of the strips, core parts (56) to define the back side of the strips (35), and a movable ejector (57, 58),

in which a melt of plastic resin is injected in the mold cavity defined by the mold halves and the core parts, and wherein

10 after the melt has been injected and sufficiently cured the movable core parts (54) are moved inwards so as to release the strips (35), and

the ejector (57, 58) pushes the formed lid (1) away from the mold half (52) and beyond the movable core parts (54) so as to release the formed packaging lid (1) from the mold (50).

15

Fig. 1

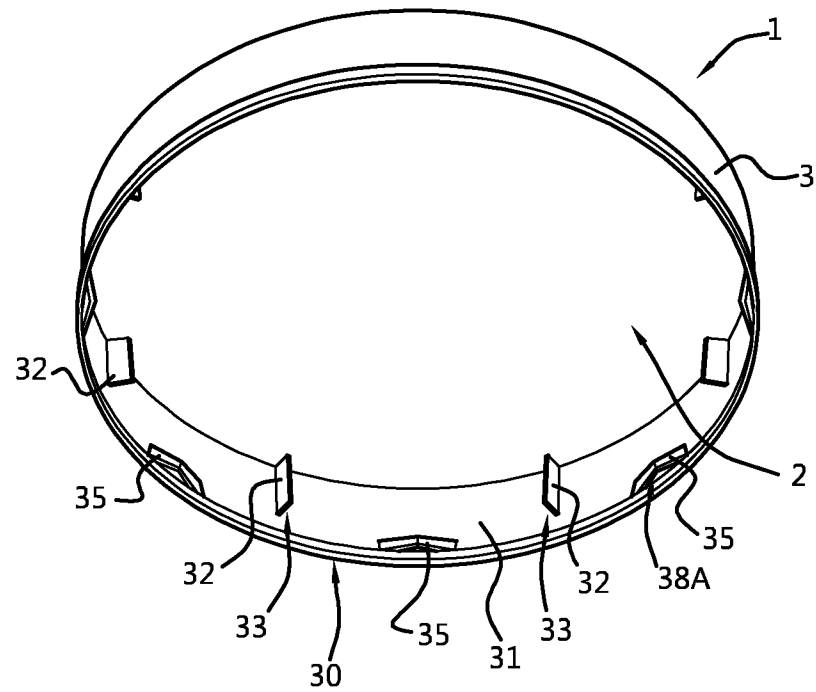


Fig. 2

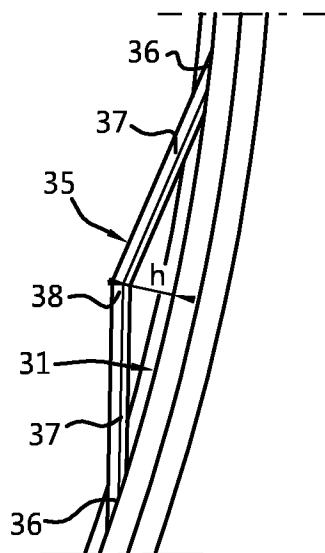


Fig. 3

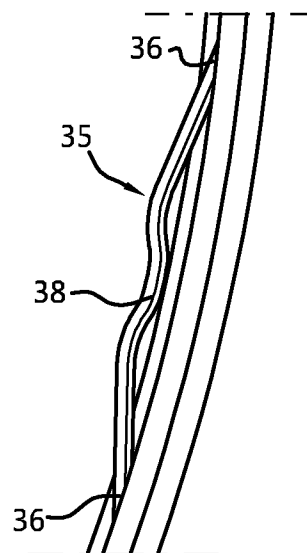


Fig. 4

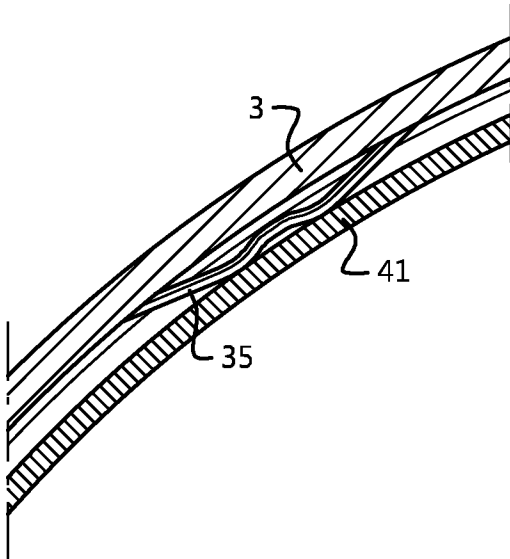


Fig. 5

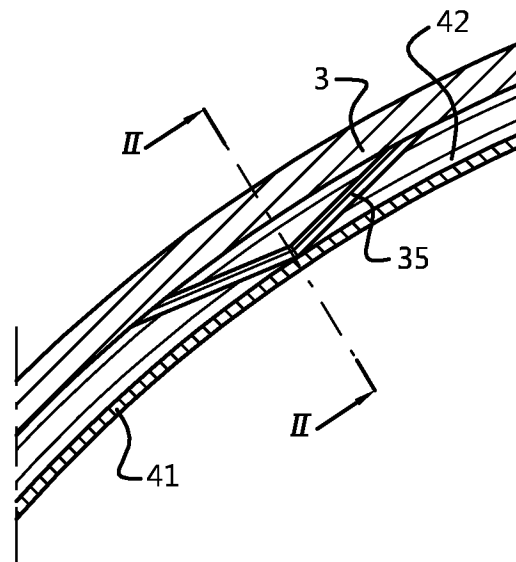


Fig. 6

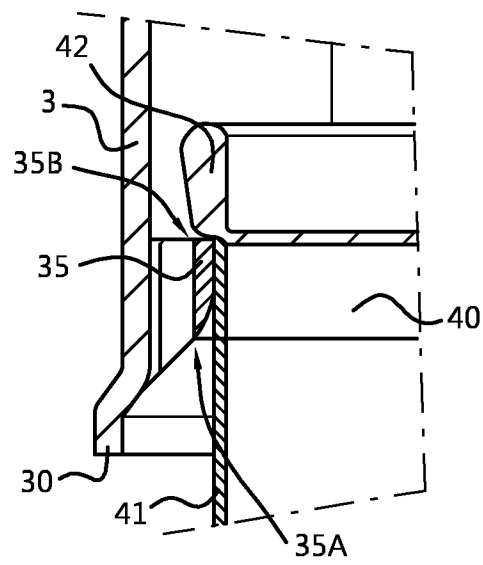


Fig. 7

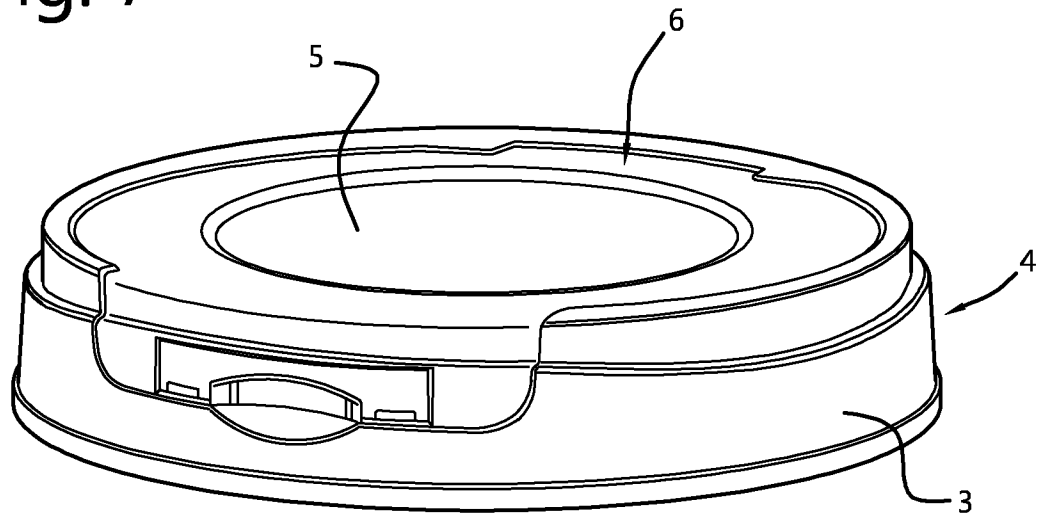
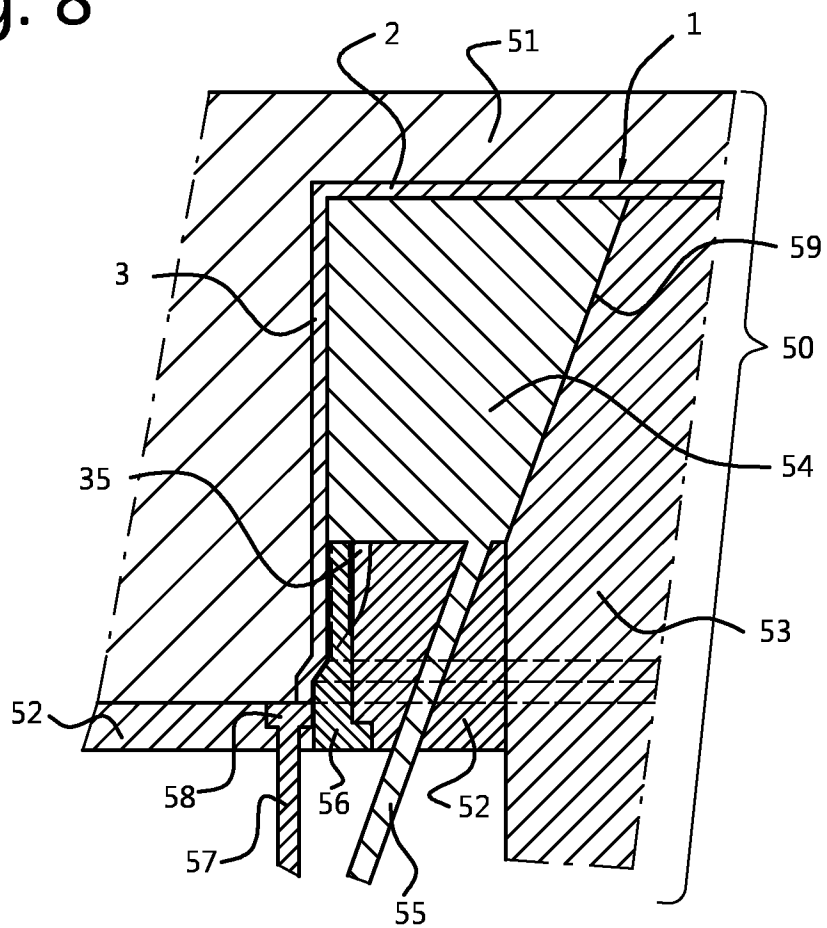


Fig. 8



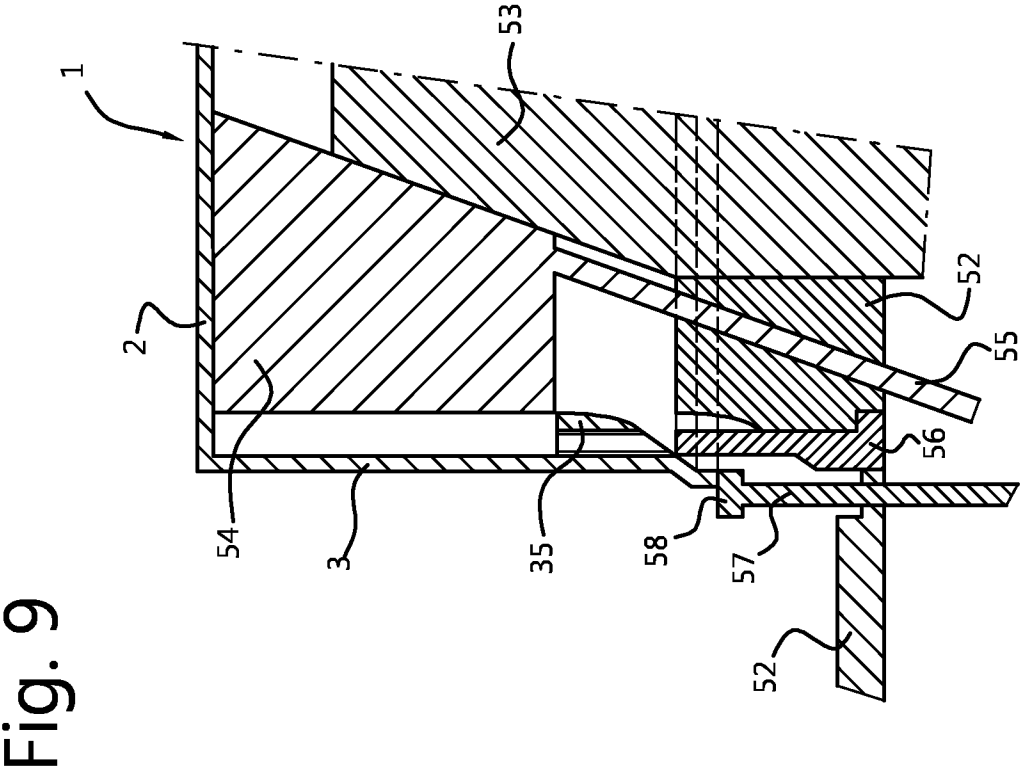
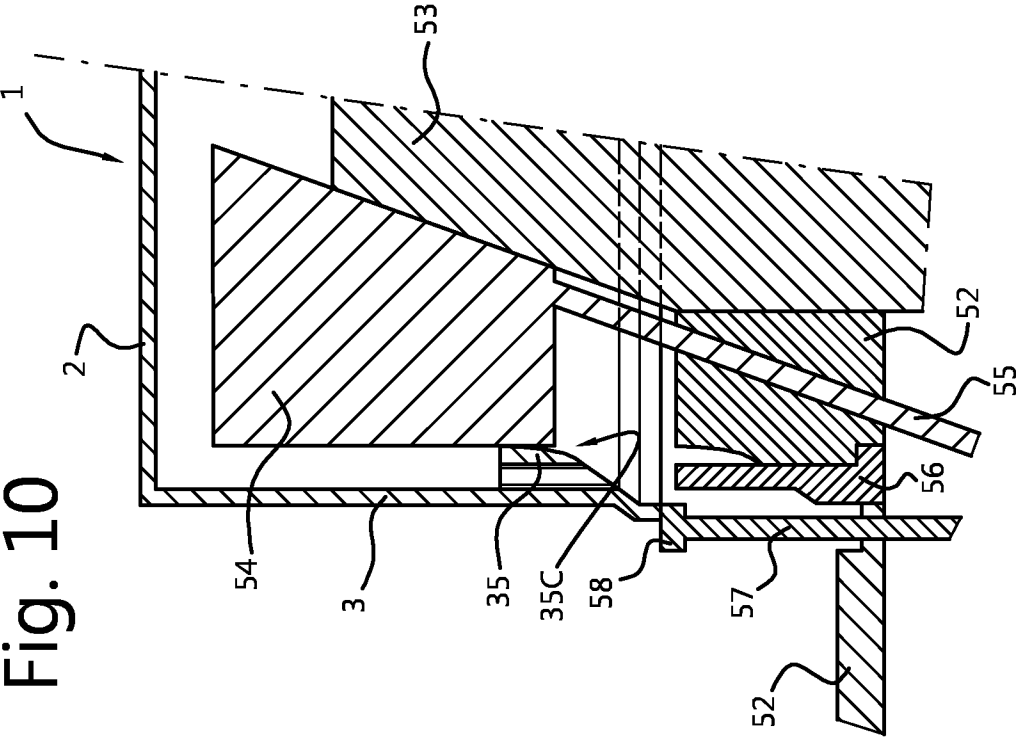


Fig. 11

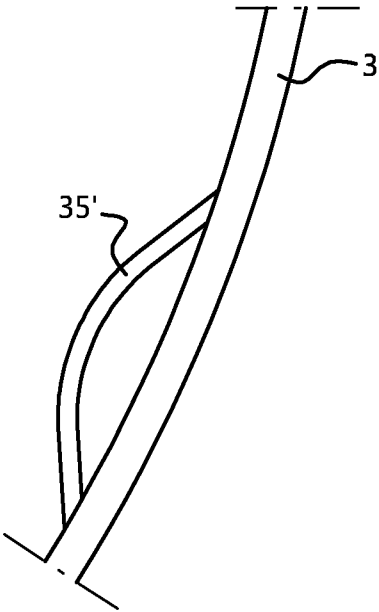
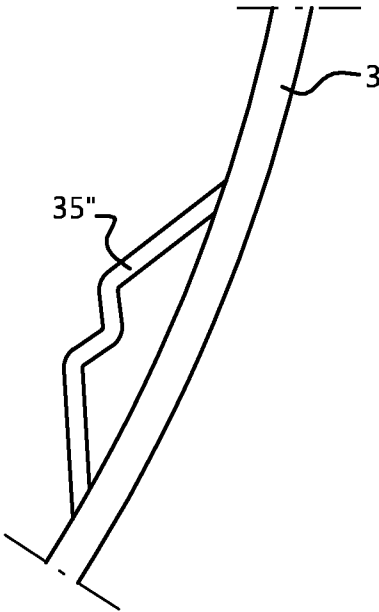


Fig. 12



INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2016/050847

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D43/02
ADD.

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)
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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 651 344 C (ROBERT DETTE) 12 October 1937 (1937-10-12) figures	1,17
A	----- GB 417 906 A (ROBERT DETTE) 15 October 1934 (1934-10-15) figures	1,17
A	----- US 3 814 278 A (BEIERLE F) 4 June 1974 (1974-06-04) figures	1,17



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

10 February 2017

Date of mailing of the international search report

17/02/2017

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/NL2016/050847

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 651344	C	12-10-1937	NONE	
GB 417906	A	15-10-1934	NONE	
US 3814278	A	04-06-1974	NONE	