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(54) CONTAINER WITH BOWL AND LID HAVING A LEAKAGE-PREVENTING CONTACT PROFILE

(57) A container (100/200) with a bowl (100) and a detachable lid (200) having a bowl-to-lid contact profile (300) with a groove (121) in a lid-facing rim (110) and a tongue (221) in a bowl-facing rim (210). The tongue (221) and the groove (121) are both dome-shaped with different radii (RT, RG), with a tongue radius (RT) and a groove radius (RG) configured to define at least one contact point (311, 321) between the groove (121) and the tongue (221).

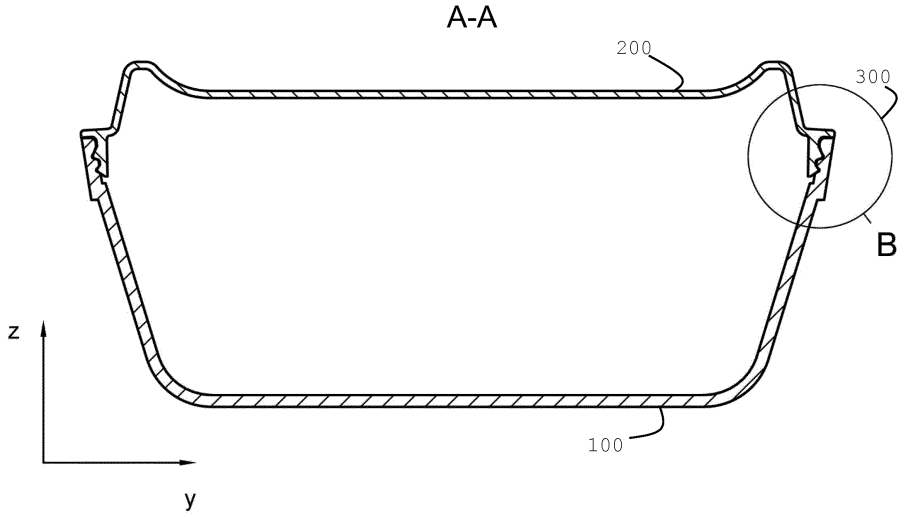

FIG. 4

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Description

Technical Field

[0001] In general, the disclosure relates to two-part containers having a bowl and a lid, and in particular, the disclosure relates to an alternative contact profile between the bowl and the lid to prevent leakages.

Background

[0002] Food and beverages, in particular, are often transported or stored in containers that comprising a bowl and a lid for covering/closing the bowl. The lid can often be separated from the bowl. After content - that means food and/or beverages - has been inserted into the bowl, the container is closed by attaching or applying the lid.

[0003] Bowl and lid are compatible with the content (i.e., the food or beverage). For example, the materials must comply with food safety standards and hygiene design principles. Further, depending on the content, there are additional requirements, such as heat resistance, microwave stability, mechanical resistance against leakage, etc.

[0004] Also, bowl and lid may need to be sealed air tight to prevent oxidizing of the contents, or escape of odors from inside. Sealing may be of particular importance for content that are hot and should remain so as much as possible.

[0005] At the same time, for a consumer, containers should be easy to open (and in many applications easy to close). It is also highly desired to store containers in stacks or the like, before or after use.

[0006] Containers, in particular, food containers can be single-use, however, there is a trend towards multi-use containers (i.e., re-usable containers).

[0007] Making containers re-usable, however, adds numerous additional constraints: For example, cleaning between uses as well as numerous use cycles and the corresponding opening/closing cycles lead to mechanical stress and to abrasion or, to a certain extent, deformation of the material. Further, it is required to have all detergents removed before the next use cycle.

Summary

[0008] According to the invention, a container with a bowl and a detachable lid has a bowl-to-lid contact profile with, in a cross-section, at least one groove in a lid-facing rim and at least one tongue in a bowl-facing rim. The tongue and the groove are both dome-shaped with different radii, with a tongue radius and a groove radius configured to define at least one contact point between the groove and the tongue. Due to the punctual contact, a relatively high pressure exists along the contact profile in the contact point thus providing leakage prevention.

[0009] Consequently, the profile can be applied to containers that have a rectangular design. As leakage prevention is supported by a relatively high contact pressure, it is possible to manufacture the bowl and the lid from the same material and thereby to avoiding traditional sealings, e.g. made from a silicone or other soft plastic component.

[0010] The container is therefore suitable for multi-use scenarios as encountered more often in the food industry.

Brief Description of the Drawings

[0011]

FIG. 1 illustrates in a schematic overview of a container according to the invention, a bowl and a lid, in a side-view and in a plan view from above, as well as cross-sections of a contact profile between a bowl-facing rim of the lid and a lid-facing rim of the container;

FIG. 2 schematically illustrates a container according to the invention in the closed configuration, as well as in transitioning states while closing the container or while opening the container;

FIG. 3 illustrates a container according to the invention in a side-view, with an indication of a section line AA;

FIG. 4 illustrates the container of the invention in a cross-sectional view along line AA of FIG. 3, with an indication of a section detail of the contact profile;

FIG. 5 illustrates aspects of the contact profile of the section detail of FIG. 4 that has first and second sections, first and second tongue-to-groove pairs, as well as first and second contact point pairs;

FIG. 6 illustrates aspects of a further inventive contact profile having a further section with a further tongue-and-groove pair in an inversed arrangement;

FIG. 7 illustrates additional aspects of the inventive contact profile;

FIG. 8 illustrates the effect of wear on the contact profile.

Detailed Description

[0012] FIG. 1 illustrates an overview of container 100/200 comprising a bowl 100 and lid 200 in a side cross-sectional view (Z- and Y-coordinates, in views (A) and (B)) and in a plan view from above (X- and Y-coordinates, views (C) and (D)), as well as cross-sections (view (B), details in (B1), (B2), (B3), (B4)) of contact profile 300 between rims 110 and 210.

[0013] The figure uses straight lines and 1xx references for elements that structurally belong to the bowl,

and uses dashed lines and 2xx references for elements that structurally belong to the lid. Lid 200 is detachable from bowl 100.

[0014] Bowl 100 has base 101 and has at least one side-wall 102. In view (C), bowl 100 has a base 101 that is shaped generally rectangular and having four side-walls 102, whereas in view (D), bowl 100 is round shaped with a single side wall.

[0015] Lid 200 (or "cover", or "closure") has a shape corresponding to the base, and having a side-wall element protruding therefrom, so that lid 200 can be attached to bowl 100 (container being closed, cf. FIG. 2) by substantially positive engagement, or can be detached from bowl 200 (container being opened).

[0016] Bowl 100 and lid 200 are three-dimensional (3D) objects, but FIG. 1 uses 2D illustrations, with plan views (C) and (D) and with cross-sectional views (A), (B). Consequently, the figures illustrate walls and other structural elements by lines. It is well-known in the art to apply the term "profile" to describe cross-sections. Elements that are described by profiles have substantially equal cross-section in their direction of extension. For example, the location where bowl 100 and lid 200 are in contact with each other is explained by a "profile" in views (B) etc., but that profile applies along the perimeter (cf. views (C) and (D)) likewise.

[0017] Due to this convention, a "point" in the profile represents a line along the perimeter, a groove extends along the perimeter, a tongue is a "rail" along the perimeter, and so on.

[0018] The side-walls of both bowl 100 and lid 200 have areas that contact each other when container 100/200 is closed (ie. in the closed configuration).

[0019] As used herein, these portions of the side-walls are called "rims", cf. (B) ... (B4). As illustrated in FIG. 1 (and in the other figures as well), lid 200 can be dimensioned for insertion into ore engagement with bowl 100. In this implementation, the outer side-wall element (or simply: side-wall) of lid 200, i.e., rim 210, contacts an inner-side portion of side-wall 102 of bowl 100 (i.e., rim 110).

[0020] To identify the contact areas of the side-walls, the present disclosure indicates a direction by using the attribute "facing": Lid-facing rim 110 belongs to bowl 100 and refers to the upper portion (or brim) that is in contact with lid 200 (i.e., with the side-walls of lid 200 facing bowl 100) when in the closed configuration. Bowl-facing rim 210 belongs to lid 200 and refers to the side-wall (or side-wall element) that is contact with bowl 100.

[0021] When container 100/200 is closed, the periphery 250 (of lid rim 210) exerts an outwardly pointing force F against the periphery 150 of bowl 100.

[0022] As illustrated and used in this disclosure, periphery 250 is an outer periphery of lid 200, and periphery 150 is an inner periphery of bowl 100. Indeed, however, the skilled person could apply an opposite arrangement in which the basic concepts of the present invention are similarly embodied, wherein the inner periphery of the side-wall (or side-wall element) of lid 200 is in contact with an outer periphery of the side-wall of bowl 100. In such arrangement, the force F exerted by the inner periphery of the side-wall of lid 200 against the outer periphery of the side-wall of the bowl 100 would be pointing inwardly, i.e. towards the center axis of bowl 100.

[0023] Arranging side-walls and/or rim portions with angles relative to the bowl base 101 or the top surface of the lid 200, such as shown in view (B3) depends on the particular use case and just an exemplary in (B3). However, the particular choice of angle may have an effect on the dimension of force F along the length of the contact profile due to the elastic nature of the side-walls and in particular a greater flexibility of the side-walls at their respective brim portions (as opposed to base-side portions).

[0024] View (B) of FIG. 1 illustrates the profile between bowl-facing rim 210 and lid-facing rim 110, with outer and inner peripheries 250 and 150, respectively, being in contact, as shown in greater detail in view (B1). Views (B2) and (B3) of FIG. 1 show minor variations, such as rim 210 having an additional shoulder 105 over the rim of bowl 100 and the contact profile being arranged at an inwardly pointing angle relative to the center axis of the bowl.

[0025] As shoulder 105 is located opposite to base 101, the portion of side-wall 102 of bowl 100 near shoulder 105 can be regarded as a distal portion of side-wall 102.

[0026] View (B4) illustrates contact profile 300 in greater detail, in a sectional and magnified view. In the closed configuration, the cross-section of lid-facing rim 110 (shown as dashed line) and bowl-facing rim 210 (shown as solid line) touch in a contact profile 300. Tongue 221 of bowl-facing rim 210 and groove 121 of lid-facing rim 110 touch one another, not completely-that is, not in a planar way-but partially, such as, in contact points. Tongue 221 touches groove 121, and groove 121 touches tongue 221, but despite this reciprocity, touching is designed to be partially, i.e. in certain contact points or areas 311, 321, so that tongue the contact profile 300 represents an engagement of bowl-facing rim 210 and lid-facing rim 110.

[0027] This partial contact deserves further attention because leakage prevention is often obtained by a full positive engagement/contact, whereas the partial contact represents an advantageous element of the present invention.

[0028] Groove 121 and tongue 221 have specific shapes, i.e. a concave and a convex shape, respectively, that causes groove 121 and tongue 221 to be in contact in at least one contact point 311 and/or contact point 321, i.e., in point 311 alone, in point 321 alone, or as illustrated in both points 311, 321, which also depends on the vertical position of the tongue 221 relative to the groove 121.

[0029] The specific shapes of groove 121 and tongue 221 have two aspects: the underlaying geometry (that is generally common for both, however, inverted) and the

dimension of both elements. i.e. groove 121 and tongue 221, which are different.

[0030] In the cross-sectional view (B4), the shape of tongue 221 and of groove 121 can be described by the attribute "dome-shaped". A synonym would be "oval-shaped", or "egg-shaped" or, in broad generality, "convexly curved" and "concavely curved".

[0031] In an embodiment, the shapes in profile 300, both groove and tongue, can be approximated by a circle or by an elliptic having a radius, specifically an inner-portion radius and an outer-portion radius, respectively. The outer-portion radius RT of the tongue 221 and the inner-portion radius RG of groove are different; specifically, the tongue radius RT may be larger than the groove radius RG (i.e., RT > RG).

[0032] In the closed configuration, tongue 221 engages with groove 121, however, due to the difference in the radii, the engagement is only partial and not a positive fit; rather, the position is such that both tongue 221 and groove 121 share contact points 311 and/or 321. It is noted that oftentimes, similar engagements would be implemented with the inner (convex) part having a smaller radius.

[0033] Describing the shapes of tongue and groove by circles, elliptics, hyperbolics, parabolics, or similar geometries is convenient but such geometries do not have to be applied in a strict sense, meaning that deviations from the geometric forms are considered part of the present disclosure; it is merely noted that the shapes have similarities with such geometries in general but may deviate, for example, by protrusions or recesses as needed in order to improve the sealing effect, cf. FIG. 1 view (B4).

[0034] Particularly, an "inner-circle" or an "inner-elliptic" is a geometrical figure that can be contained in a polygon and touching the side of the polygon in tangential contact points. Profile 300 of view (B4) does not show a "round" geometry inside a polygon but rather a "rounded" inner geometry, i.e. the profile of the tongue 221, inside (or engaging) a "rounded" outer geometry, i.e. the profile of groove 121.

[0035] Having at least one, or in some embodiments even a maximum of only two, contact points instead of many more or even a contact surface helps providing a good sealing effect even in cases of wear of the contact surfaces, i.e. the tongue and the groove surfaces, caused by multiple open-close-open transitions as well as repeated cleaning by industrial grade cleaning processes and use-cycles. Because the elastic force F exerted by the bowl-facing rim 210 of the lid on the lid-facing rim 110 of the bowl 100 being focused on a few contact points rather than contact surfaces the respective contact is relatively strong.

[0036] In particular, the exact location of the contact point(s) can vary in the course of multiple uses and subject to wear over time (cf. FIG. 8 for a use-case scenario that considers abrasion by multiple re-use) but also caused by inaccuracies from the production of the plastic parts. Accordingly, leakage prevention is improved by a configuration of the invention in which the engagement of the tongue 221 and the groove 121 is such that a contact is only present in contact point(s) rather than contact surfaces ore even in the case of a positive fit.

[0037] It is noted that contact points 311, 321, such as, illustrated in profile 300, are merely cross-sectional representations and are actually representations of contact lines extending along the perimeter of the lid-facing rim 110 and the bowl-facing rim 210.

[0038] Forces, such as force F, act by way of these contact lines but, given lines have represent very small contact areas, the resulting pressure (i.e., force over area) exerted between the components sharing a contact line-instead of a contact surface, such as, a positive fit-is relatively high. Such relatively high pressure in at least one line, or two lines per tongue-and-groove pair provides an improved protection against leakage through the component interfaces being in contact. In simplified words, and, again, in a cross-sectional representation of the profile 300, there is/are pressure concentration point(s) in the profile, which extend along the length of the contact profile to form a pressure concentration line or pressure concentration lines.

[0039] It is further noted that two such lines can provide redundancy, one line may fail because some external force, such as, for example a sharing force, many be applied to the container but the other line may still provide a sufficiently good sealing (and thus leakage prevention).

[0040] FIG. 1 also illustrates a side-view for an embodiment of a container with a circular base and a single wall extending substantially cylindrically.

[0041] Because of the configuration of the invention, it is of lesser importance whether the container shape is other than circular-in which shape a force F points in a radial direction and is of substantially similar strength in every direction-because configuration of the invention having one or more contact lines (through points 311 and/or 312) leads to the relatively high contact pressure along the contact lines as explained above and thus avoids the requirement of an evenly distributed contact pressure along the perimeter of the interface between the bowl-facing rim 210 of the lid and the lid-facing rim 110 of the bowl.

[0042] In addition to the improved sealing, such a profile according to the invention addresses a further design challenge: Independently from the selection of the profile (such as profile 300, or any other profile), forces (such as force F) act on the rims of the bowl and the lid. In a rectangular bowl design, the forces are distributed non-equally as it can be assumed that the forces at the corners are higher than forces along the side, i.e. between the corners. This effect can translate into an unwanted lack of rim-to-rim contact pressure which, in embodiments not implementing the contact profile of the invention, may lead to inferior sealing. The profile 300 of the invention, however, helps to improve sealing also in containers of such shapes where

the shape itself leads to unevenly distributed contact pressure along the perimeter of the container and thus enabling use of a large variety of container shapes, depending on the specific application.

[0043] Arranging sealing rings or the like between bowl and lid is well known in the art, wherein the material for the sealing ring would usually be softer than the material the bowl or the lid are made from. An example for such material is silicone or other similarly permanent elastic materials. However, employing different materials creates problems at the time of the ultimate disposal of the containers given common waste regulatory requirements (or financial incentives) for mono-fraction material in the waste collection cycle.

[0044] A further constraint of multi-use containers in the food and beverage industry is in relation to hygienic requirements during the cleaning cycle of such containers. In this context, it is important that cleansing liquid or even rinsing liquid does not get trapped in the profiles of such containers but runs of quickly and as completely as possible, even when, for example, clean water is used, which exhibits a relatively high surface tension and thus gets easily trapped in tight recesses. The design of sealing rings made from elastic material is often such that it includes such types of tight recesses, e.g. between sealing lips.

[0045] The invention solves these problems by providing the contact profile 300 which is sufficient to provide a good sealing function without the use of extra materials for the seal; accordingly, there is no need for such extra material.

[0046] Preferably, the material the bowl and lid are made from a plastic material having a relatively high strength, heat resistance, preferably microwave stability, acidic stability, etc. In food or beverage related applications of the container, the plastic material is also food compatible. For example, such material can be selected from a group containing poly-propylene, Poly-ethylene-terephthalate (PET), high density poly-ethylene, poly-vinylic-chloride, or other food-compatible plastic materials.

[0047] Preferably, both bowl and lid are made from the same or like materials, in particular, from like materials having similar material characteristics. Also, both bowl and lid are preferably made from only such one material and not combined with other materials such as elastic silicones, or the likes, or other materials that would be used as an interposing layer between the bowl-facing rim portion of the lid and the lid-facing rim portion of the bowl in the area of the contact profile 300.

[0048] FIG. 2 views (a) to (c) illustrate container 100/200 in the closed configuration of view (b), and well as in state transitions from open-to-closed configuration in view (a) or closed-to-open configuration in view (c) of the container.

[0049] In the closed configuration of view (b), force F acts against the inner periphery of the lid-facing rim (cf. periphery 150 and rim 110 in FIG. 1). For the state transition open-to-closed configuration, force F_CLOSE acts to bring the lid into the closed configuration of the bowl in which the bowl and the lid engage at the profile 300 along the circumference of the container. Similarly, for the state transition closed-to-open configuration, force F_OPEN acts to disengage bowl and lid so as to remove (or detach) the lid from the bowl.

[0050] Indeed, in the open-to-closed configuration, the lip 221 at the point of first engagement of the lip with the groove 121, starts running of the ramp shaped section 115 of the groove 121 which movement is caused by the force F acting on the inner periphery of the bowl. Indeed, force F not acting normal relative to the ramp shaped section 115 will be transposed into force F_RAMP, the force that is pulling the lid further towards its fully engaged position with force F_HOLD. In the fully engaged position, the lid is held by force F_HOLD acting against F_OPEN (in Z-direction) and thus effectively keeping the lid shut and in the closed configuration. The tongue-and-groove profile of the invention therefore provides a synergetic effect, namely, against leakage as previously discussed, when in the closed configuration (and thus the fully engaged position of the lid), and resistance against accidental opening of the lid. Accordingly, in order to transition the container into the open configuration with the lid removed, it will be necessary that F_OPEN overcomes F_HOLD.

[0051] FIG. 3 illustrates container 100/200 in a side-view, with an indication of a cross-section along line AA. Coordinate Z indicates the container height, and coordinate X indicates its length. While bowl 100 is higher as compared to lid 200, both components' lengths substantially correspond to one another.

[0052] It is noted that the external shape of bowl 100 and of lid 200 can be designed to allow multiple bowls to be easily stapled. In Fig. 3 bowl 100 has a lower shoulder 170 with noses 171 which help to enable stapling of numerous bowls in such a way that small air gaps are maintained also in the stapled arrangement (by way of the noses 171) allowing air to circulate and potential remaining moist or liquid to evaporate. In the stapled arrangement, the rim of one bowl would be contacting the noses 171 of the shoulder 170 of the next bowl in the stack. Usually such stapling would occur upside-down, however, this is not mandatory.

[0053] FIG. 4 illustrates container 100/200 in a cross-sectional view along line AA of FIG. 3. Additionally, the bowl and lid's rim portions are indicated having contact profile 300 (section detail indicator B). The figure shows container 100/200 in cross-sectional side-view with height coordinate Z (same as in FIG. 4) and its width along coordinate Y.

[0054] As can be seen in this view, lid 200 has a top recess which is shaped (also along the X coordinate) to match the shape of the base of bowl 100. This enables stapling of multiple containers 100/200 in the closed configuration and avoids any instability in the stack dur to inaccurate placement or a sideways slip of one bowl vs.

another.

[0055] FIG. 5 illustrates various aspects of the contact profile 300 of the invention in the closed configuration in views (a) to (c). As shown in view (a), the illustrated embodiment of the contact profile 300 has a first section 301 and second section 302, having a first tongue-and-groove pair 221/121 and a second tongue-and-groove pair 222/122, respectively (cf. view (b)). The figure also illustrates the arrangement of the first contact point pair 311/321 and second contact point pair 312/322 in the closed configuration in view (c).

[0056] First section 301 is located near the edge 105 of lid-facing rim 110 of the side wall 102 of bowl 100, and in particular the distal portion of side-wall 102. Second section 302 is located proximally relative to the first section 301 of lid-facing rim 110 of the side wall 102 of bowl 100.

[0057] Peripheral distances D1, D2 of the apex of the tongues 221, 222 of the bowl-facing rim 210 indicate the distances between the corresponding structures of oppositely arranged side-walls 102 of the container 100/200. As indicated, in the embodiment shown in FIG. 5, the distance D1 is larger in section 301 than distance D2 in section 302, meaning that the contact profile 300 is slightly tilted inwards when viewed from edge 105.

[0058] Implementing two tongue-and-groove pairs 221, 212; 222, 122 in the contact profile 300 helps to improve the tight engagement between bowl 100 and lid 200 so that which leads to additional protection against leakage and improved securing of the lid in the closed configuration. Indeed, the tongue-and-groove pairs 221, 212; 222, 122 can also be considered having an interlocking function.

[0059] Indeed, while not shown in the figures of the present disclosure, it is possible to even increase the number of tongue-and-groove pairs arranged in the contact profile 300 in order to further increase the sealing effect of the contact profile of the invention. However, it needs to be borne in mind that an increased number of tongue-and-groove pairs also leads to an increased holding force F_HOLD in the closed configuration, which might be desired or not, depending on the application.

[0060] While the radii RT and RG of the tongue 221 and groove 121 are already illustrated in view (B4) of FIG. 1, FIG. 6 (b) shows, in a separate schematic view thereof underneath the cross-sectional view, radii RT' of tongue 222 and RG' of groove 122. The RT' and RG' radii can be same as radii RT and RG, respectively, or different, however chosen in such way as to produce the beneficial sealing effects of the invention.

[0061] FIG. 6 illustrates further aspects of a contact profile 300 of the invention that has a further section 303 with a further tongue-and-groove pair 123, 223 interspersed between the first and the second section 301, 302. The tongue-and-groove pair 123, 223 has an inverse arrangement, meaning that in this embodiment the tongue 123 is located at the lid-facing rim 110 of the bowl 100 and the corresponding groove 223, with which the tongue 123 engages in the closed configuration, is arranged at the bowl-facing rim 210 of the lid 200.

[0062] This arrangement of a third, inversely oriented tongue-and-groove profile effectively represents a type of labyrinth sealing that is combined with the tongue-and-groove profile seal of the invention and thus further enhancing the sealing effect. This is even so in cases where, for example, due to numerous uses in the life of a reusable container of the invention, the force F is reduced due to wear and tear of the plastic material of the lid and a certain material fatigue. In cases where defects in a section of the profile happen due to wear over time and repeated use, having multiple tongue-and-groove pairs provides further leakage prevention. This is supported by adding an inversely arranged tongue-and-grove pair to the overall contact profile 300.

[0063] For the sake of completeness, it is noted that the radii of groove 223 and further tongue 123 can be implemented same or differently than the radii of tongue-and-groove pairs 221/121, 222/122.

[0064] FIG. 7 illustrates, once more, aspects of contact profile 300 in an embodiment in which one or more ramps 115, 116 are present. The figure schematically illustrates the profile in which groove 121 of the first section 301 has an upper ramp-like shape.

[0065] The force F that the bowl-facing rim exerts against the periphery of the lid-facing rim has already being discussed above in relation to FIG. 2 (d). By way of the mechanism discussed in context with FIG. 2 (d), force F translates to force F_HOLD by way of the ramp 115, wherein F_HOLD is the resulting force oriented towards the base of the bowl, i.e. in the direction of the closing movement of the lid 200 vs. the bowl 100. Accordingly, once the tongue 221 starts "sliding down" the ramp 115 of the groove 121 during the open-to-close transition, cf. view (a) of FIG. 2.

[0066] In an embodiment, the lid 200 and the bowl 100 of the invention are designed in such way that even in the closed configuration, the outer periphery of the bowl-facing rim 210 of the lid 200 does not abut flushly against the inner periphery of the lid-facing rim 110 of the bowl 100 but a gap 361, and, where applicable, further gaps (e.g. gap 362) must be maintained between the outer periphery of the bowl-facing rim 210 and the inner periphery of the lid-facing rim 110 of the bowl 100 so that, except for the contact points 311, 321, and, where applicable, further contact points (e.g. contact points 312, 322), no surface contact exists between the lid 200 and the bowl 100.

[0067] In order to transition the container 100/200 from the closed configuration to the open configuration, the lid 200 needs to be lifted away from the bowl against holding force F_HOLD to overcome the holding force. As such, the container of the invention supports the user in the process of securely closing and sealing the container of the invention by way of the specific embodiment thereof in which groove 121 is shaped with a ramp.

[0068] A similar mechanism can be employed for second or more tongue-and-groove mechanisms arranged at the lid and the bowl, respectively, however, this may not be necessary to achieve the desired effect.

[0069] FIG. 8 illustrates the effect of wear and, in particular, illustrates that two contact points remain to exist even in the case when the tongue (and possibly the groove) of the tongue-and-groove mechanism of the invention are subject to abrasion.

[0070] Multiple uses, especially multiple open-to-closed and closed-to-open transitions (cf. FIG. 2) as well as cleaning activities may wear off the original shape of the the tongue profile (and possibly also the groove profile). This is illustrated here for the example of a change of the outer tongue radius RT in such way as may be expected during repeated use over time, and, in particular, between a point in time t1 representing the status of a new container (left side of FIG. 8) and a point in time t2 representing the status of a container after multiple re-use cycles (right side of FIG. 8).

[0071] The tongue (of the lid) and the groove (of the bowl) are illustrated - with their respective convex and concave shapes, respectively - with their respective radii RT and RG at both points in time; time is represented by the time arrow on which points in time t1 and t2 are indicated, t2 being later than t1. In general, it can be said that RT_t1 > RG_t1, i.e. the tongue's convex curvature is of a generally larger radius than the groove's concave curvature (as viewed from the same side, e.g. the left side). Because of this specific implementation of the invention, tongue and groove touch in two contact points 311 and 321.

[0072] Over time and with wear, abrasion causes the tongue, and in a lesser relevant way possibly also the groove, to change the radius, mostly by wearing off stronger curved bits of the apex of the tongue and resulting in a curvature of a generally larger radius as compared to the original curvature's radius. Accordingly, RT_t2 > RT_t1. However, because of the design of the contact profile 300 according to the invention, the contact remains to be in two distinct points 311 and 321.

[0073] Over time (from point in time t1 to point in time t2), the distance between contact points 311 and 321 grows, however, the sealing effect achieved by the contact profile 300 of the invention remains even after numerous cycles of cleaning and reusing.

[0074] To summarize the discussion, container 100/200 can be applied in the food industry (just as to offer take-away food). There are two parts - the bowl and the lid - that need be separated when loading the food and during consumption. But these parts have to be leakage-proof in contact most of the other time. The contact profile actually avoids low-pressure contact over relatively large areas (such as traditional sealings) but favors high-pressure over relatively small areas (i.e., along the contact lines that the profile shows as points).

[0075] The alternative approach to prevent leakage appears like a paradox because leakage prevention is usually associated with low pressure. As already discussed, other advantages in using container 100/200 as a food container result from that approach as well.

Claims

1. Container (100/200) comprising a bowl (100) and a detachable lid (200), wherein the bowl (100) has a base (101) having at least one side-wall (102) with a lid-facing rim (110), wherein the lid (200) has a bowl-facing rim (210), and wherein in a closed configuration of the container (100/200), the periphery (250) of the bowl-facing rim (210) exerts a force (F) against the periphery (150) of the lid-facing rim (110),
the container (100/200) **characterized in that** - in the closed configuration - a cross-section of the lid-facing rim (110) and the bowl-facing rim (210) is a contact profile (300) having at least one groove (121) in the lid-facing rim (110) and at least one tongue (221) in the bowl-facing rim (210), wherein the tongue (221) and the groove (121) have a convex and concave shape, respectively, with different radii (RT, RG) with an tongue radius (RT) and an groove radius (RG) configured to define at least one contact point (311, 321) between the groove (121) and the tongue (221), thereby providing leakage prevention.

2. Container (100/200) according to claim 1, wherein the tongue radius (RT) is an outer-portion radius of the tongue (221) and the groove radius (RG) is an inner-portion radius of the groove (121), and wherein the tongue radius (RT) is larger than the groove radius (RG).

3. Container (100/200) according to any of claims 1 to 2, wherein, in the cross-section of the lid-facing rim (110) and the bowl-facing rim (210), the tongue (221) and the groove (121) have two contact points (311, 321).

4. Container (100/200) according to claim 3, wherein in the cross-section of the lid-facing rim (110), the tongue (221) and the groove (121) have no more than two contact points (311, 321).

5. Container (100/200) according to any of claims 1 to 4, wherein the contact profile (300) has a first section (301) that is located at a distal portion (105) of the side-wall (102), and a second section (302) that is located below the first section (301) in the direction towards the base (101) of the bowl (100), and wherein the peripheral distance of the bowl-facing rim (210) is larger in the first section (301, D1) than in the second section (302, D2).

6. Container (100/200) according to any of claims 1 to 5, wherein the contact profile (300) comprises a

further groove (122) in the lid-facing rim (110) and comprises a further tongue (222) in the bowl-facing rim (210), wherein the further groove (122) and the further tongue (222) are also concave and convex shape, respectively, with different radii (RT', RG').

7. Container (100/200) according to claim 6, wherein the groove (121) and the tongue (221) as well as the further groove (122) and the further tongue (222) are located in the first and second sections (301, 302), respectively.

8. Container (100/200) according to claim 7, wherein the contact profile (300) has a further section (303) having a bowl-side tongue (123) and a lid-side groove (223).

9. Container (100/200) according to any of claims 7 or 8, wherein the groove (121) in the first section (301) extends towards the distal portion (105) in a ramp (115), so that the force (F) the bowl-facing rim (210) exerts against the periphery (150) of the lid-facing rim (110) acts against a further force (F_OPEN) in an opening direction of the lid (200) away from the bowl (100) allowing prevention of an accidental removal of the lid from its position in the closed configuration.

10. Container (100/200) according to claims 1 to 9, wherein the shape of the contact profile (300) with the groove (121) and the tongue (221) are elements in the cross-section of the lid-facing rim (110) and the bow-facing rim (210) with substantially equal cross-section along the perimeter of the bowl (100) and of the lid (200), respectively, so that contact points (311, 321, 312, 322) between the groove (121, 122) and the tongue (221, 222) provide leakage prevention by forming contact lines.

11. Container (100/200) according to any of claims 1 to 10, wherein the bowl (100) and the lid (200) are substantially rectangular.

12. Container (100/200) according to any of claims 1 to 11, wherein the bowl (100) and the lid (200) are made from the same material.

13. Container (100/200) according to claim 12, wherein the material is a plastic material.

14. Container (100/200) according to claim 13, wherein the material is plastic material that is food compatible.

15. Container (100/200) according to claim 13, wherein the material is selected from a group containing polypropylene, Poly-ethylene-terephthalate (PET), high density poly-ethylene, poly-vinylic-chloride, and other food-compatible plastic materials.

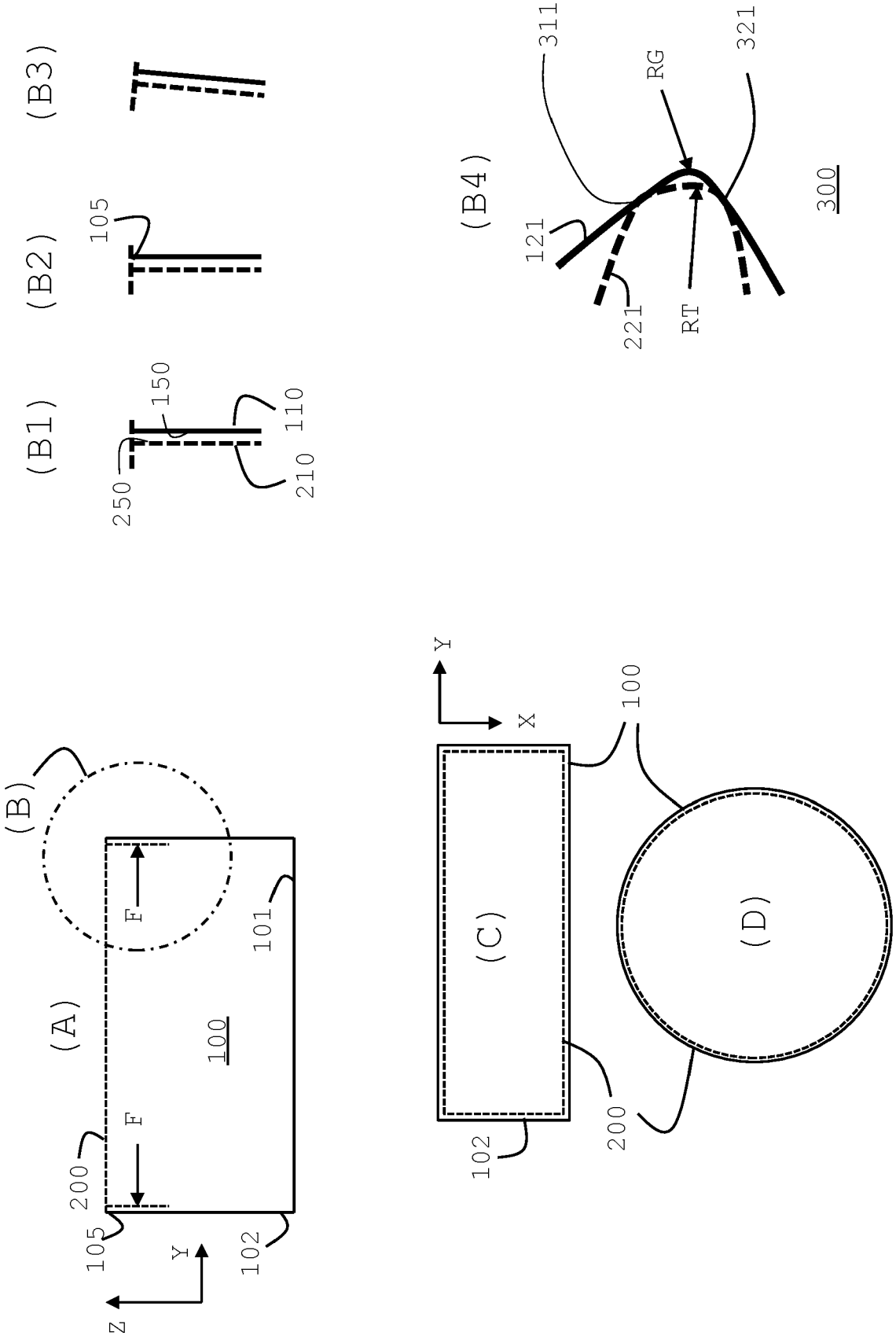
(A)
(B)
(B1)
(B2)
(B3)
(B4)
(C)
(D)
100
101
102
105
200
250
150
110
210
105
311
321
RG
121
221
RT
300
F
F
Y
Z
Y
X

FIG. 1

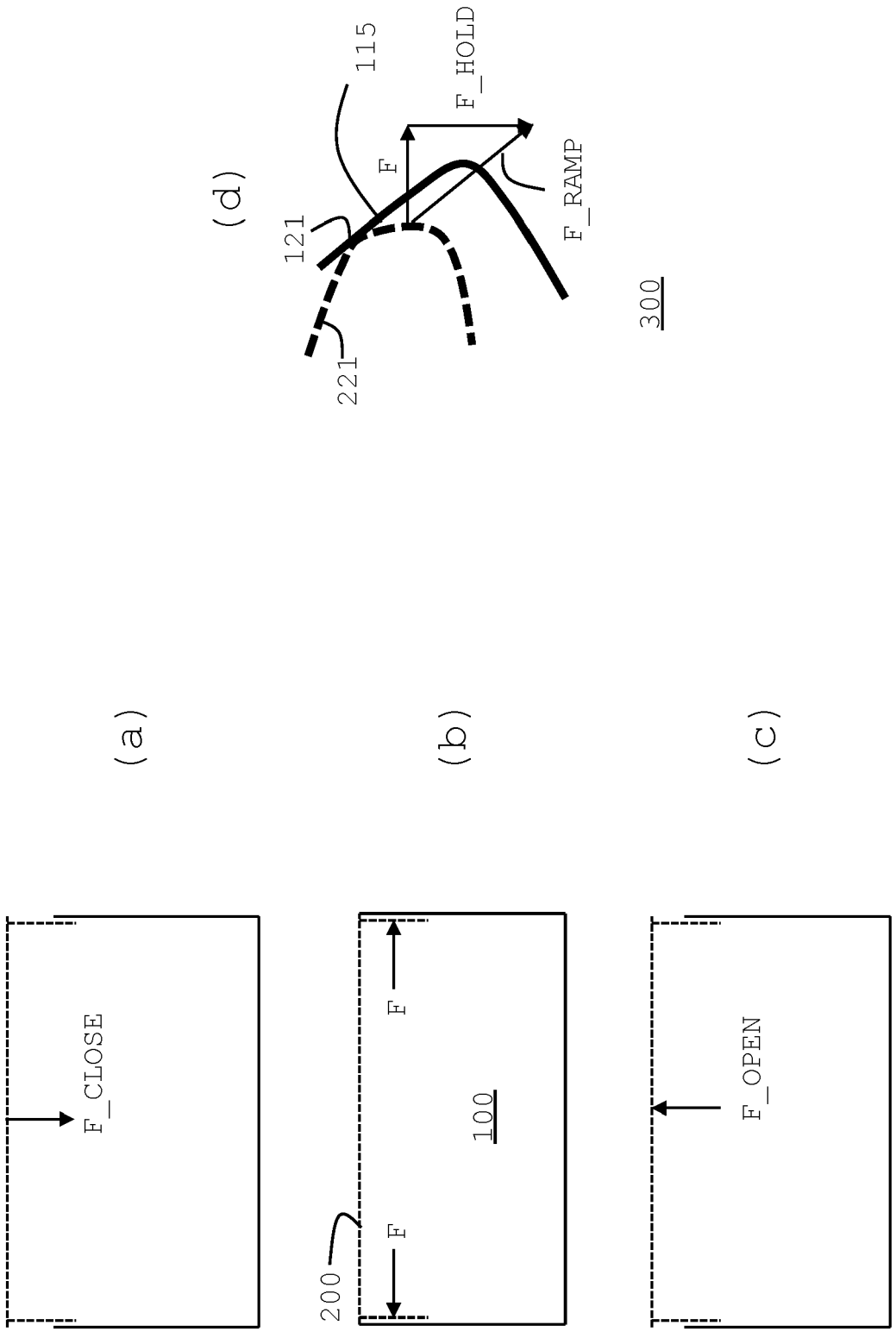

FIG. 2

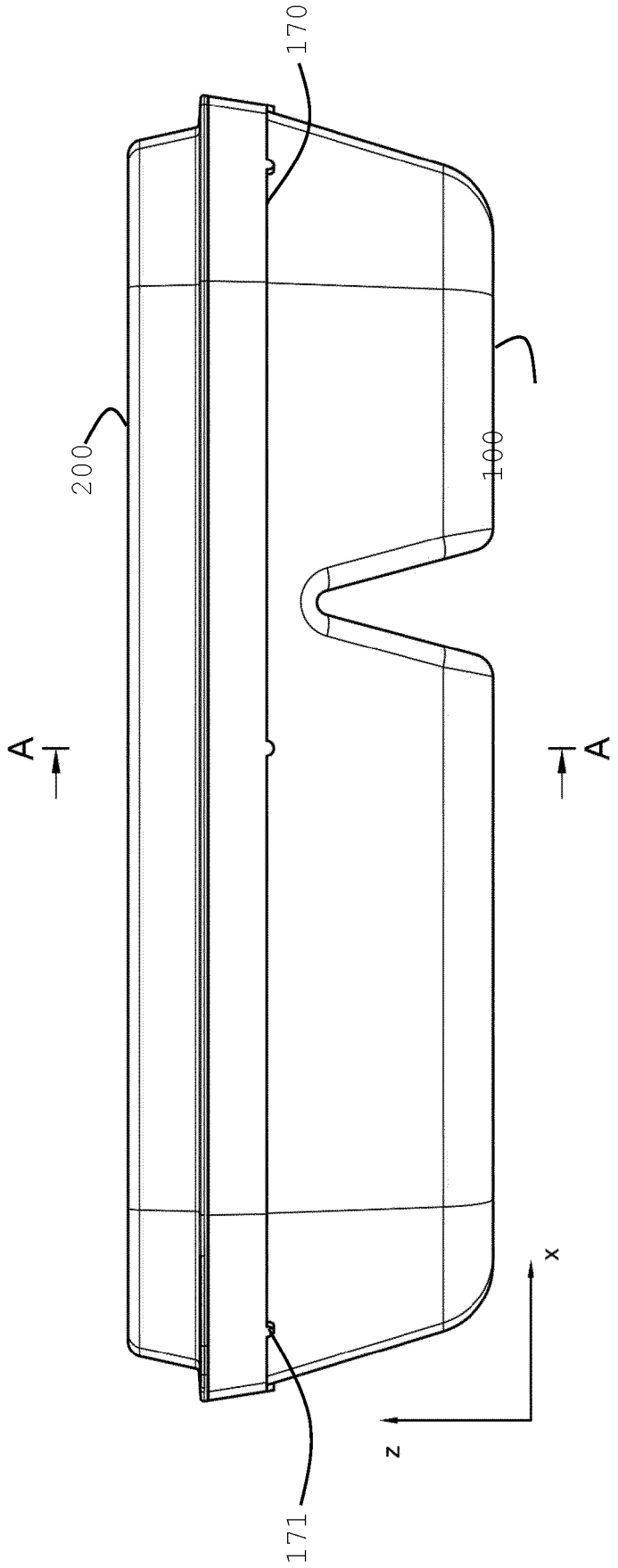

FIG. 3

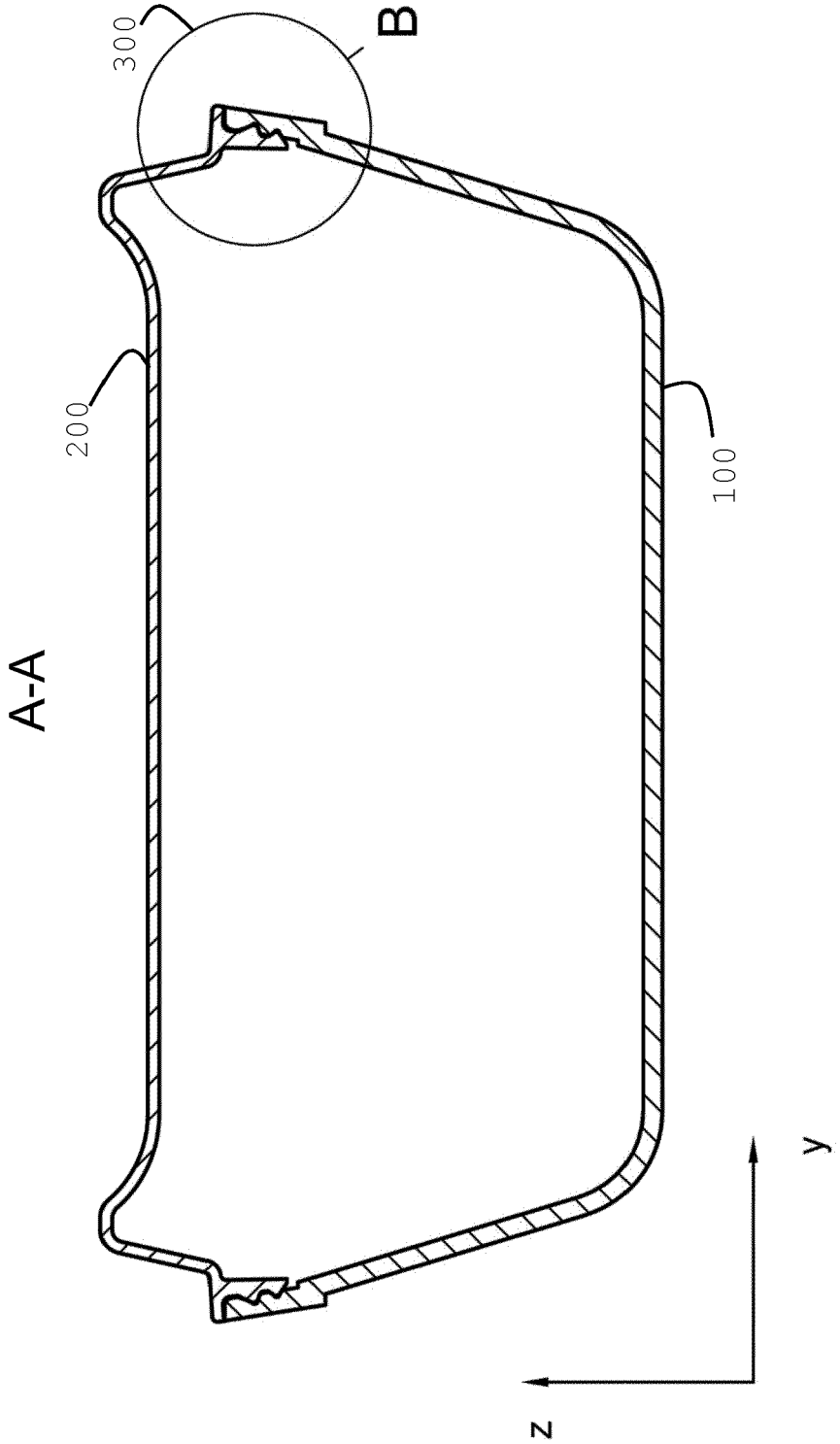

FIG. 4

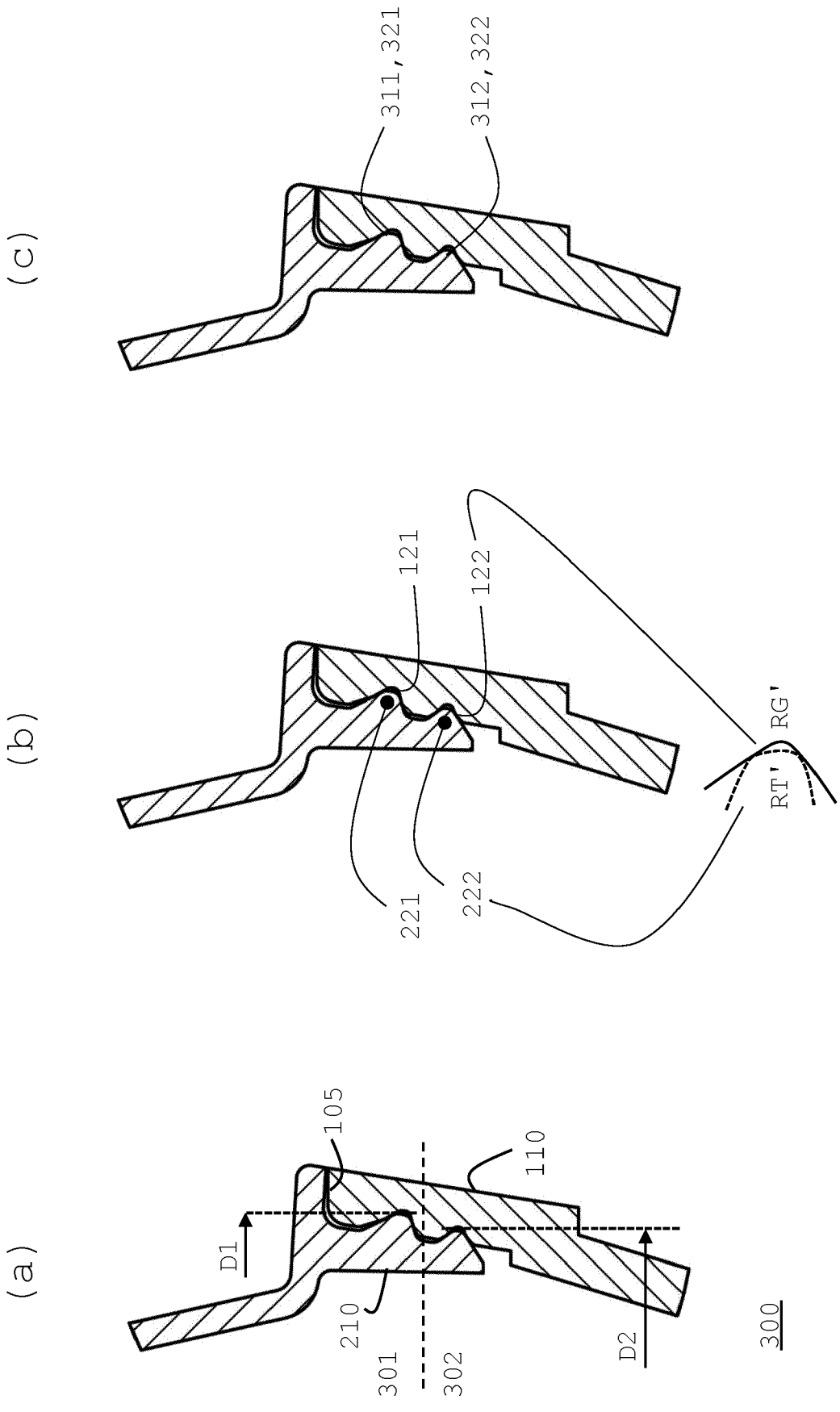
(a)
105
110
D1
210
301
302
D2
300
(b)
121
122
RT'
RG'
221
222
(c)
311,321
312,322

FIG. 5

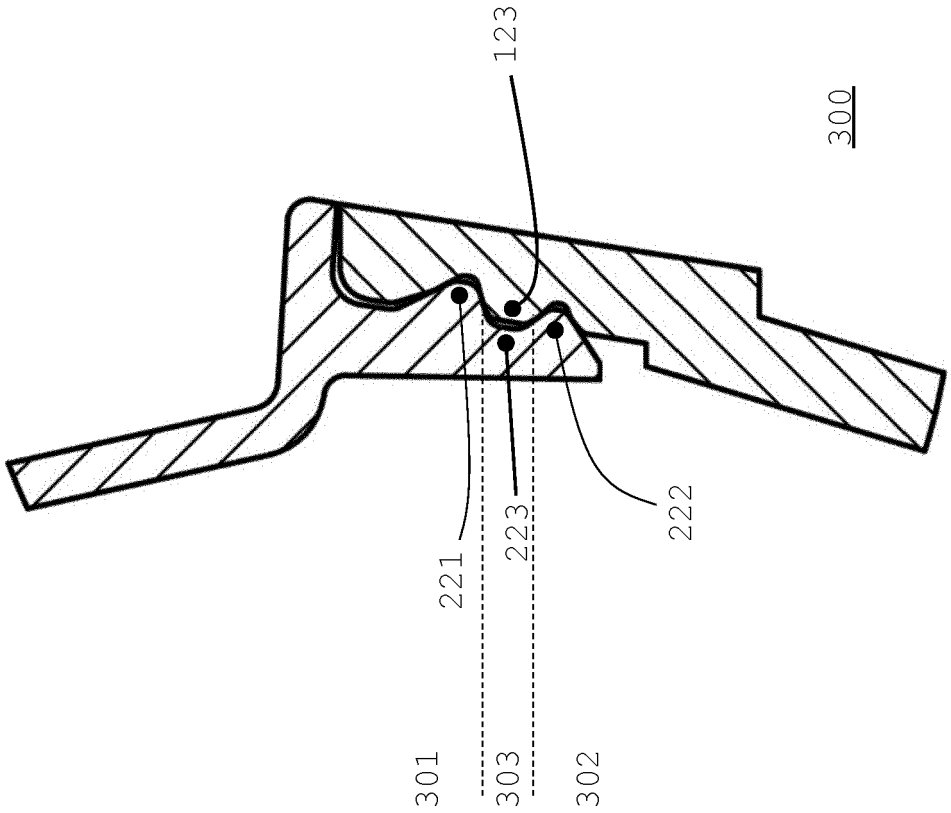

FIG. 6

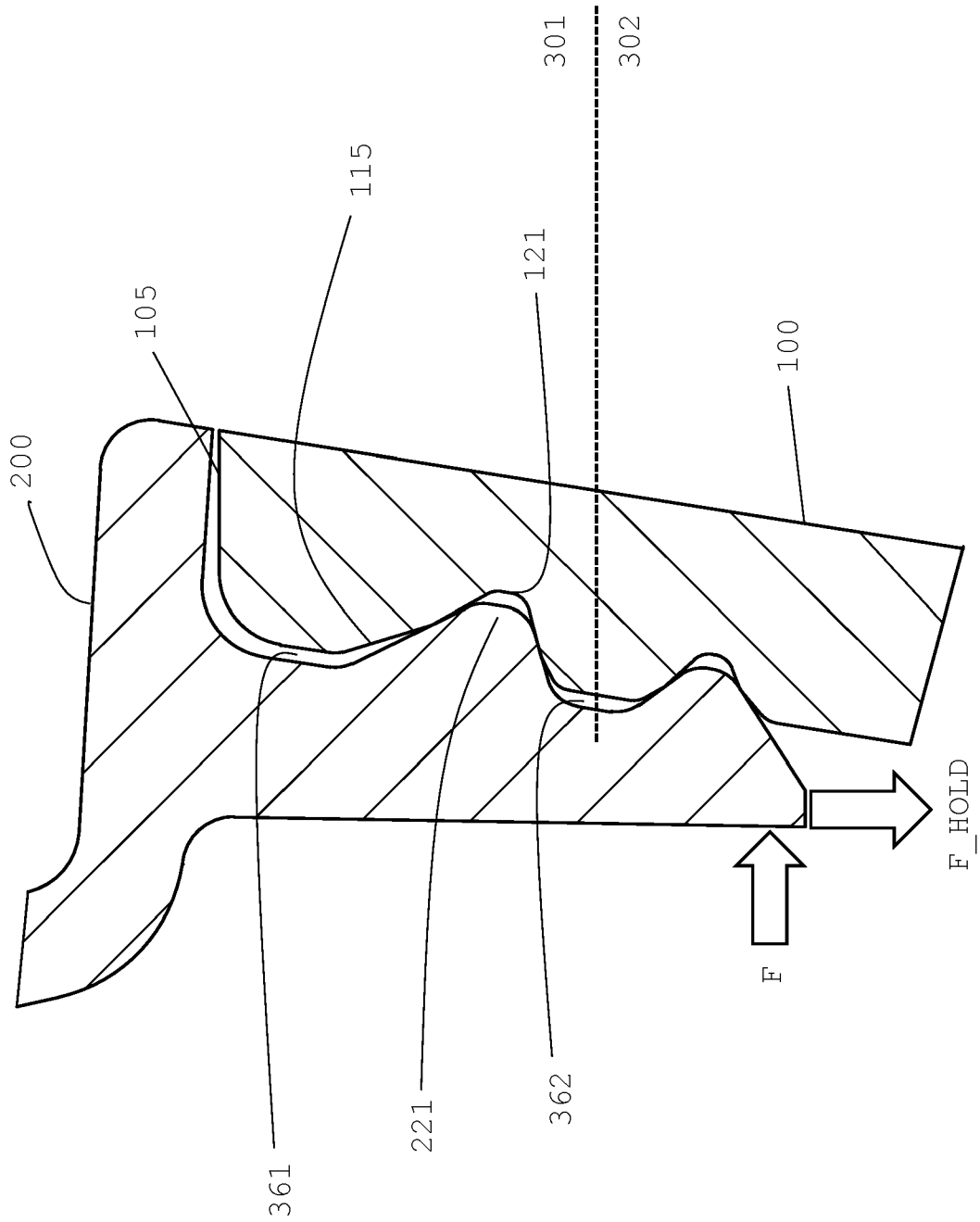

FIG. 7

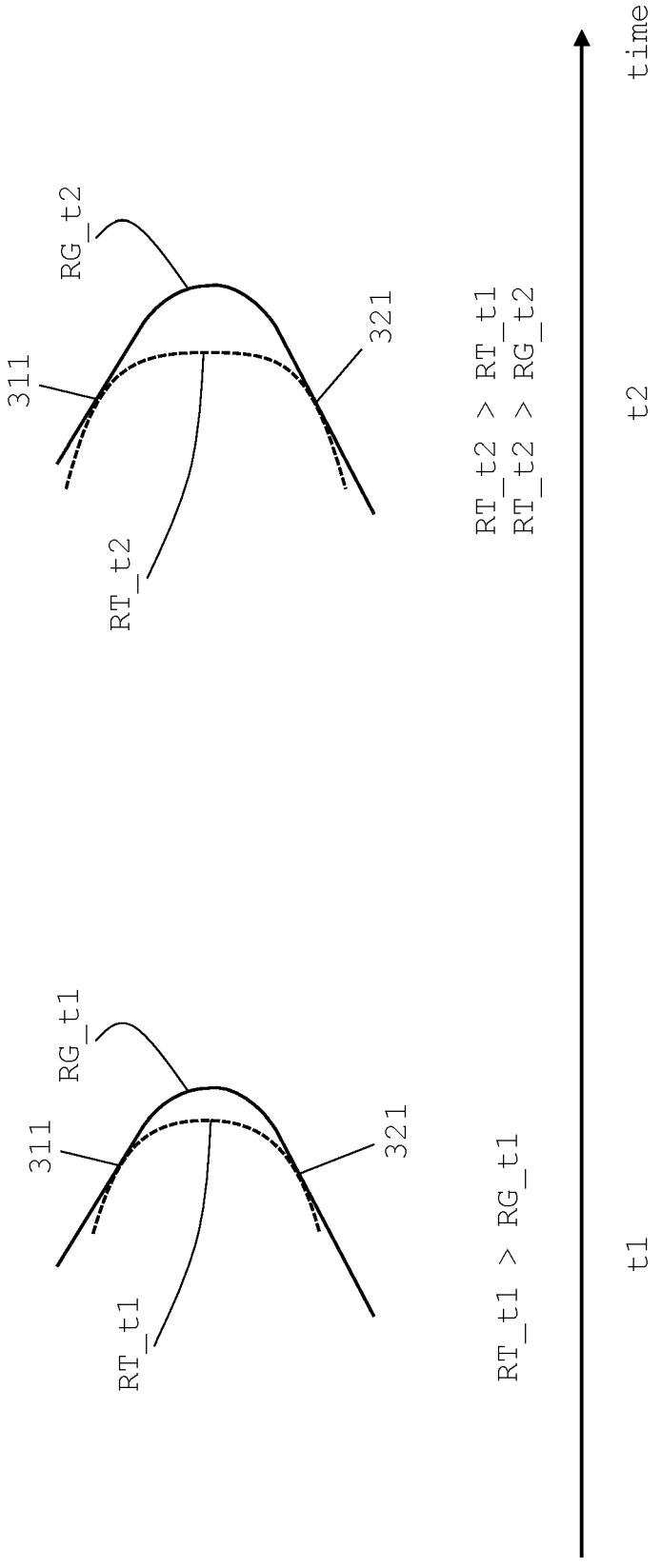
RG_t2
311
321
RT_t2
RT_t2 > RT_t1
RT_t2 > RG_t2
time
t2
RG_t1
311
321
RT_t1
RT_t1 > RG_t1
t1

FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 23 21 3850

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y A	US 2 718 980 A (STROM WILLIAM T) 27 September 1955 (1955-09-27) * figures 2,4 *	1-4,10, 12-15 11 5-9	INV. B65D43/02
X A	US 2 947 463 A (CONKLIN CHARLES S) 2 August 1960 (1960-08-02) * column 2, line 10 - line 20; figures 1-3 * -----	1-5,10 6-9, 11-15	
X A	WO 98/55365 A1 (GILMOUR S COMFORT SHOES PTY LT [AU] ET AL.) 10 December 1998 (1998-12-10) * abstract; figures 1,2a * -----	1-4,10, 12-15 5-9,11	
Y	FR 1 176 429 A (VULLIEZ HENRI-FRANCOIS) 10 April 1959 (1959-04-10) * figures 1,2 * -----	11	
A	US 5 507 406 A (URCIUOLI HENRY R [US] ET AL) 16 April 1996 (1996-04-16) * abstract; figures 1,2 * -----	1-15	TECHNICAL FIELDS SEARCHED (IPC) B65D

The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
The Hague	15 April 2024	Tempels, Marco

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15-04-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2718980 A	27-09-1955	NONE	
US 2947463 A	02-08-1960	NONE	
WO 9855365 A1	10-12-1998	NONE	
FR 1176429 A	10-04-1959	NONE	
US 5507406 A	16-04-1996	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82